

ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1988-

BRISTOL BAY AREA

Regional Information Report¹ No. 4D89-09

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September, 1989

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MEMORANDUM

STATE OF ALASKA

To: Report Recipients

Date: September 8, 1989

From: Wesley A. Bucher 
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Subject: 1988 Bristol Bay
Annual Management
Report

The attached report represents our most recent efforts to update and upgrade fishery statistics useful in describing the Bristol Bay salmon and herring fisheries. We believe this report is the most current and comprehensive document available describing and explaining management rationale, as well as providing a single source for catch, escapement and production information on all species of salmon as well as herring harvested in Bristol Bay during the last 20 years.

The report is not written for the general public as its intended audience. It is distributed only within Department circles with certain exceptions. Please route needed corrections or comments to me here in Dillingham.

PREFACE

The 1988 Bristol Bay Management Report is the twenty-ninth consecutive annual volume reporting on management activities of the Division of Commercial Fisheries staff in Bristol Bay. The report emphasizes a descriptive account of the information, decisions, and rationale used to manage the Bristol Bay commercial salmon and herring fisheries, and outlines basic management objectives and procedures. We have included all information deemed necessary to fully explain the rationale behind management decisions formulated in 1988. All narrative and data tabulations in this volume are combined under separate SALMON and HERRING sections to aid in the use of this document as a reference source. The extensive set of tables has been updated to record previously unlisted data for easy reference. Fisheries data in this report supersedes information in previous reports. Corrections or comments should be directed to the Dillingham area office, Attention: Editor.

Wesley A. Bucher
Togiak Area Management Biologist
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ACKNOWLEDGEMENTS

The Commercial Fisheries Division in Bristol Bay employed 11 permanent employees and 68 seasonal employees during the 1988 season who participated in various area management programs. Thanks is extended to all personnel for a successful 1988 season.

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-continued-

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Kvi. Test Fish/Stock I. D.
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Egegik Test Fish
Ugashik Smolt/Ugashik Test Fish
Ugashik Test Fish
Kvichak Smolt/Kvichak Tower
Kvichak Smolt/Naknek Tower
Kvichak Smolt/Kvichak Tower
Egegik Smolt
Egegik Smolt/Kvichak Tower
Egegik Smolt/Ugashik Tower
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-continued-

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ANNUAL MANAGEMENT REPORT
BRISTOL BAY SALMON FISHERY
1988

INTRODUCTION

The Bristol Bay area includes all coastal waters and inland drainages east of a line from Cape Newenham to Cape Menshikof and is the largest sockeye salmon producing region in the world (Figure 1). Bristol Bay also produces substantial returns of other salmon species and the Togiak herring fishery has developed into the State's largest sac roe fishery.

The area-wide salmon catch during the 1988 season was 16.667 million fish of all species (Table 24), slightly less than the harvest of 17.704 million landed in 1987. The estimated catch of 103 million pounds was valued at over \$177 million to participating fishermen, the highest exvessel value ever recorded for the Bristol Bay salmon fishery, and the sixth consecutive year that the exvessel value has exceeded \$100 million (Appendix Table 47).

Sockeye salmon dominated the commercial harvest, and totaled 14.0 million fish (Table 4). The management objective for all districts in Bristol Bay is the achievement of escapement goals for major salmon species while at the same time allowing for an orderly harvest of those fish surplus to spawning requirements, at the highest possible quality. Sockeye salmon escapement objectives were met in 1988 in all

FISHERY RUN STRENGTH INDICATORS

Inshore Preseason Forecast

A total of 26.5 million sockeye were forecast to return to Bristol Bay fishing districts in 1988 (Table 1). All of the districts expected a good inshore return, and every river system had an indicated harvestable surplus. The total projected Bristol Bay sockeye salmon harvest for 1988 was 16.8 million (Table 1). The 1988 total run forecast was based on a modified ADF&G method which omitted data prior to the 1978 return year from calculations using spawner-recruit, sibling, and smolt data.

Based on the results of the modified ADF&G method, total production for Bristol Bay in 1988 was expected to be 28.3 million sockeye salmon which also included the high seas Japanese Mothership harvest, and the South Unimak/Shumagin Islands fisheries (False Pass). This return would have been about 5 percent (1.4 million sockeye salmon) greater than the 20-year, (1968-1987) mean (26.9 million; range 3.5 to 66.3 million), but about 24 percent (6.5 million) less than the most recent 10 year, 1978-1987, mean (37.2 million; range 20.8 to 66.3 million).

The total projected sockeye salmon harvest was expected to be about 18.6 million including the Japanese high seas catch, False Pass, and Bristol Bay (80 percent confidence interval, 5.5 to 32.4 million). That inshore harvest would have been 32 percent (4.2 million) less than the 20 year, 1967-1986, mean

(13.0 million, range 0.7 to 37.3 million), and 56 percent (11.4 million) less than the most recent 10 year, 1977-1986, mean (20.2 million, range 4.9 to 37.3 million).

Since a minimum of three years of smolt estimates and subsequent adult returns are needed to fit linear regression models, forecasts using smolt data could only be calculated for all age classes for the Kvichak, Wood, Naknek, and Egegik River systems.

Japanese High Seas Fishery

For many years, Japan has operated two directed salmon fisheries on the high seas which impact the Bristol Bay return. These include the mothership fishery and the landbased gill net fishery. At the peak of the mothership harvest in the late 1950's, 50 - 60 million salmon were caught per year. Catch levels have been greatly reduced in recent years, as a result of treaty negotiations between the United States and Japan. The harvest in 1988 was even further reduced due to a lawsuit by Western Alaska fishermen that blocked the issuance of a required marine mammal permit. Without the permit, the mothership fleet could not operate within the 200 mile zone. There was a harvest of salmon outside of the zone, and preliminary catch figures, although unofficial, were estimated as follows:

| Species | <u>Mothership</u> | <u>Land-based</u> |
|---------|-------------------|-------------------|
| | Number | Number |
| Chinook | 26,000 | 47,000 |
| Sockeye | 225,000 | 116,000 |
| Coho | 0 | 293,000 |
| Chum | 892,000 | 751,000 |
| Pink | 56,000 | 5,083,000 |
| Total | 1,199,000 | 6,290,000 |

The land-based fishery vessels deliver their catch to various ports in northern Japan, and during the peak years of harvest, catches were frequently over 40 million salmon. Like the mothership fishery, the harvest by this fleet has been significantly reduced as a result of treaty negotiations. This fishery traditionally operates outside the U.S. 200 mile limit, so it remained unaffected by the lack of a marine mammal permit.

The most recently negotiated treaty between the United States and Japan in the spring of 1986 resulted in reductions in both fisheries, which were immediately visible in the 1986 and 1987 harvests. When this treaty is fully implemented after the 1993 fishing season, total catches will probably be further reduced by a modest amount. Alaska has benefitted by reduced interception of salmon stocks passing through these fisheries, plus the additional number of drop outs that would have been

killed but not caught, if the removal had continued at its former level.

Specific changes to these fisheries negotiated in the treaty included a phaseout of effort in the mothership fleet in the Central Bering Sea portion of the fishery between the 1986 and 1993 seasons, and a 45 mile (1 degree longitude) shift of the land-based fishery boundary away from Alaska toward Asia. Additionally, enforcement measures and research efforts were strengthened. It is uncertain how the controversy over the recent denial of the marine mammals permit may affect the treaty and the flow of harvest information between the two governments.

South Unimak/Shumagin Fishery

Preliminary data indicates that the South Unimak/Shumagin Island intercept fisheries landed 756,000 sockeye salmon of North Peninsula/ Bristol Bay origin in 1988 (Appendix Table 54). The inseason development of the Unimak/Shumagin June intercept sockeye fishery is closely monitored by Bristol Bay fishery managers as an indication of migration timing, relative abundance, age composition and fish size of the incoming Bristol Bay run. These intercept fisheries were again managed under a guideline harvest quota policy originally adopted in 1974 by the Alaska Board of Fisheries to prevent over-harvest of sockeye runs to individual river systems in Bristol Bay.

FISHERY HARVEST POTENTIAL

Formal total run forecasts for salmon species returning to Bristol Bay other than sockeye and Nushagak and Togiak chinook salmon are not generally available, because long-term escapement data are limited for those species. However, catch projections were calculated based on relative estimates of parental run size, average age composition data, and recent relative productivity patterns. Catch potential and actual harvests for all species in 1988 are listed below:

| Species | Harvest | |
|--------------|----------------------|------------|
| | Potential | Actual |
| Sockeye----- | 16,758,000 | 14,005,984 |
| Chinook----- | 93,000 ^a | 45,135 |
| Chum----- | 1,959,000 | 1,477,016 |
| Pink----- | 328,000 ^b | 935,870 |
| Coho----- | 170,000 | 202,577 |
| Total | 19,308,000 | 16,666,582 |

a Includes actual forecasts for Nushagak District, and 20-year average chinook catches for Naknek/Kvichak, Egegik, Ugashik, and Togiak.

b Based on 20 year average catches for all districts except Nushagak, which would not have a district fishery and would only include an incidental harvest with large mesh gear.

Due to the relatively low expected volume of sockeye, the continued large demand for frozen product, the availability of freezing facilities, and the expected high price, many of Bristol Bay's canneries did not operate in 1988, or did so at a reduced capacity. Only 7 plants canned salmon and a total of

seven 1-lb., eleven 1/2-lb., one 1/4-lb., and one 5-oz. glass jar lines were in production (Table 39). In addition to the land-based canning operations, 10 companies operated in Bristol Bay in 1988 in the fresh export, brine or refrigerated sea water (RSW) export, frozen and cured salmon marketing areas (Table 39). A total of 42 processors/buyers reported catches in Bristol Bay in 1988 compared with 57, 48, 59, 62, and 72 in the years 1987-1982.

FISHERY ECONOMICS AND MARKET PRODUCTION

Since the large increase in the number of floating fish processors and the considerable number of individual market agreements with small groups of fishermen, price disputes have not been a significant factor in Bristol Bay. The 1986, 1987, and 1988 seasons were unaffected by price negotiations and because of the major change in markets for salmon, the two major fishermen's groups in Bristol Bay, Alaska Independent Fishermen's Marketing Association (AIFMA) and Western Alaska Fishermen's Marketing Association (WACMA) both elected to stop negotiating for prices, concentrating instead on other issues such as boat storage and support services.

Salmon prices were the highest ever reported in Bristol Bay, in 1988. With a low inventory of all species of salmon on the world market, and a very favorable dollar/yen exchange rate, there was good demand for frozen product throughout the season. On June 8, one of the major processors in Bristol Bay

reportedly offered \$1.90 per pound for sockeye. At the same time, False Pass fishermen were asking \$2.50 per pound, and Copper River sockeye were already selling for \$3.15 per pound.

Overall, sockeye prices averaged \$1.93 per pound in season, but several of the major processors paid a post-season bonus as well. This was due, in part, to a better than anticipated market price for frozen salmon brought about by a lower than expected volume of coho and pink salmon in Southeast Alaska, and Prince William Sound.

With the low return of chinook salmon in the Nushagak District in 1988, there was not a directed fishery on that species, and virtually all of the chinook were incidentally taken. Therefore, many of the fish landed were blushed and did not demand top prices. The average price paid for chinook was \$1.05 this season. Several of the processors reported after the season that due to the high price paid for sockeye, many fishermen mixed the chinooks with the sockeye, which may have resulted in an under-reported chinook harvest.

Chum salmon ranged from a low of \$.39 to a high of \$.48 per pound, but averaged \$.43. With the relatively good price this year, chum salmon played an important role in the economic value of the Bay fishery, especially in Togiak District where the participants enjoyed a record harvest.

The low return of pink salmon in other areas of the State, and the high demand for frozen product, improved the price for that species in 1988. Though the catch was relatively small,

at an average value of \$.34 per pound, pink salmon were important to Bristol Bay fishermen, especially those in the Nushagak District where the sockeye run came in well below the preseason forecast.

The 1988 Bristol Bay coho price averaged \$1.14 per pound. The exvessel value of coho also benefitted from the good demand for frozen product.

After weighting the catch by company, it was estimated that the 1988 exvessel value of the Bristol Bay salmon harvest was worth over \$177 million to participating fishermen. This ranked as the highest value in the history of the fishery, and the sixth consecutive year that the total has exceeded \$100 million (Appendix Table 47).

1988 COMMERCIAL SALMON FISHERY

All five species of Pacific salmon are found in Bristol Bay and are the focus of commercial, subsistence and sport fisheries. The sockeye salmon run is the most significant, but there are also important runs of chinook, chum, coho, and in even-years, pink salmon. Numerically, based on 20 years of data (1969-88), the average annual commercial catches are as follows: 16.4 million sockeye salmon; 125,000 chinook; 1,062,000 chums; 170,000 coho; and 1,646,000 million even-year pink salmon. Subsistence catches average approximately 160,000 salmon per year; mostly sockeye, while sport fisheries operate to varying degrees of intensity on all species of

salmon, with most effort directed toward chinook and coho stocks.

In recent years, spotter aircraft have been employed in the Bristol Bay commercial salmon fishery, but a new regulation in 1988 prohibited their use. The reasons for this ban were several, but the main objection to the use of spotter aircraft concerned enforcement. Reportedly, many vessels were employing planes to watch for Fish & Wildlife personnel, while they fished outside of the legal district boundaries. There was also considerable sentiment against the use of spotters by top fishermen, who felt that they were being shadowed by aircraft employed by relative newcomers to the fishery.

Sockeye Salmon

As of June 14, the projected midpoint of the 1988 sockeye run, based on Fisheries Research Institute (FRI) Adak/Cold Bay air temperature analysis, was July 3 for Naknek-Kvichak and July 5 for Nushagak. These dates were very close to the historic means for these runs, and identical with the 1986 and 1987 run timing projections. The mean Adak - Cold Bay air temperature of 40.2 degrees F for May 1988 was within 0.1 degree of the 1986 mean (40.1 degrees F) and the 1960-1987 average of 40.3 degrees F. Run timing based on the mid-point of the Unimak District purse seine and gill net fishery, suggested that the mid-point of the Bristol Bay fishery would occur on July 4.

The sockeye return to Bristol Bay in 1988 was 23.4 million which was 22% less than the preseason forecast, (Table 1) and less than the recent 10-year average of 36 million (Appendix Table 25). The difference between the total run and the preseason forecast was relatively small in 1988, but that was because the errors cancelled each other (the large returns in Egegik and Togiak offset the low runs in the other districts). When the forecast was examined district by district, its performance was quite unsatisfactory. Final returns saw a 33% over forecast for the Naknek/Kvichak District, a 52% over forecast for the Ugashik District, a 91% over forecast for the Nushagak District, and a 28% under forecast for the Egegik and Togiak Districts. However, minimum spawning escapement objectives were met or exceeded in all of the major sockeye producing river systems. The 1988 sockeye catch of 16.0 million was less than the recent 10-year (1979-88) average of 24 million, but slightly over the 20-year (1969-88) average of 16 million (Appendix Table 9). Actual returns of sockeye compared to forecasted returns in 1988 are presented by river system in Table 1.

Chinook Salmon

The 1988 Bristol Bay commercial harvest of 45,000 chinook salmon was the lowest since 1975, less than the 20-year (1969-88) average, and was considerably under the recent 10-year (1979-88) average (Appendix Table 10). The Nushagak

District is the primary chinook producer in Bristol Bay, and the 1988 commercial harvest of 16,501 was the lowest in that district since 1945 (subsistence and sport fish harvests excluded).

Chinook salmon escapement in Nushagak District totaled 57,000, which was 24% less than the desired goal of 75,000 (Table 27). The Nushagak River is the only system in Bristol Bay that is specifically managed to achieve a defined escapement objective for chinook salmon.

The preseason forecasted return of chinook salmon to the Nushagak District was 139,000 in 1988. With an escapement goal of 75,000, only a small harvestable surplus was anticipated. Due to concern for the future of chinook stocks in Nushagak (and several of the other fishing districts) and to ensure additional protection for this valuable resource, a new management approach was approved by the Alaska Board of Fisheries for the 1988 season which would provide a better opportunity to achieve a viable escapement. The season opening date was changed to June 1 for all districts of Bristol Bay, the "king line" in Nushagak was abolished, Egegik and Ugashik Districts went to a four day per week fishing schedule before and after the emergency order period, the emergency order period in the Nushagak District was adjusted to begin on June 1, and the management staff was given emergency order authority to reduce mesh size in Nushagak District (if necessary) to

provide additional protection to chinook salmon during openings for other species.

The Togiak chinook catch of 15,615 was the lowest since 1980 and roughly one-half of the recent 10-year average, and the escapement of 9,000 was also just over one-half of the long-term average (Appendix Table 39). Chinook salmon catches in other districts were all below recent averages.

Chum Salmon

The 1988 Bristol Bay commercial catch of 1.5 million chum salmon was well above the previous 20-year average (1969-88), and ranked fifth largest in the long history of this fishery (Appendix Table 11). The large catch this year was particularly interesting because the 370,224 harvest in the Nushagak District, which is the primary chum producing system, was well below the recent 10-year average. Chum salmon runs were extremely strong in all of the other fishing districts in Bristol Bay, and new catch records were established at Togiak and Egegik. Escapements to the Nushagak and Togiak systems were 186,000 and 282,000, respectively. The provisional escapement goal is 350,000 for Nushagak and 200,000 for Togiak.

Pink Salmon

Bristol Bay has a dominant even year pink run, but due to the poor return in the parent year (1986), particularly in the Nushagak District which is the primary pink producer, a large

return was not expected in 1988. With a documented pink salmon escapement of only 72,000 in the Nushagak River, it was anticipated that near record production would be required to achieve the escapement goal of 1,000,000 in 1988. Therefore, the management staff requested that the Board of Fisheries give emergency order authority to specify a minimum mesh size in an attempt to harvest expected surplus coho salmon, while providing for additional pink escapement. The Board approved the request, and this approach was successfully used in the Nushagak District in 1988.

The pink run in Nushagak was better than expected, and the total return of 743,000 from an escapement of only 72,000, equated to a return per spawner of over 10 to 1. The majority of the commercial harvest was taken incidentally in mesh that was 5-3/8 inches or larger, but the catch still exceeded 248,000, and the escapement of 495,000 nearly reached the lower management range of 500,000. Historically, escapements of 500,000 to 1,500,000 have demonstrated the ability to produce very large returns, so there is hope for a strong run in 1990.

The Naknek/Kvichak District pink salmon catch of over 625,000 was nearly three times the average for that district. The harvest of 57,000 at Togiak was the third largest for that system, and was taken incidentally in larger mesh gear. Both systems are not regarded as major pink producers, but have experienced increases in recent years.

Coho Salmon

Commercial interest in the Bristol Bay coho run was more active in 1988 than it had been for several years. This was primarily due to the healthy market for all types of frozen salmon, and an economic need by many fishermen from the Nushagak and Naknek/Kvichak Districts who had experienced a poor sockeye season. The strong coho run in 1984 provided the majority of the return in 1988, as most of the fish are four year old's, but the volume was disappointing in both Nushagak and Togiak Districts, which are the primary producers.

The 1988 commercial coho harvest in Bristol Bay totaled 203,000, with a comparable amount of fish landed in the Nushagak, Egegik, and Ugashik Districts (Table 24). This catch was greater than the long-term (1969-88) average, but slightly under the recent (1979-88) 10-year average, (Appendix Table 13). The Nushagak District, which normally produces over 46% of Bristol Bay's coho harvest, only accounted for 26% of the total in 1988. The district was closed on August 11 and did not reopen due to the relatively weak run and a desire to reach the escapement goal of 150,000. This goal was largely accomplished, and by August 23 when the Portage Creek sonar project was terminated, over 131,000 had been enumerated. Until 1987, the Nushagak District was the only system where the Department had a method (sonar) to measure inseason coho escapement. However, the U.S. Fish and Wildlife Service

operated an adult sonar in the lower Togiak River this season, and attempted to enumerate all five species of salmon.

The Togiak District also experienced a relatively poor coho run in 1988, and fished a reduced schedule until the season was finally closed on September 1, to improve the escapement rate. Ultimately, an estimated 65,000 coho had passed the sonar site on the Togiak River when the project was terminated in early October.

Coho catches were stronger on the East side of Bristol Bay. The Naknek/Kvichak District set a new catch record, and both Egegik and Ugashik Districts were above average. Escapements appeared to be adequate, based on the aerial spawning ground survey results.

Limited coho returns in recent years and large efficient fishing fleets have resulted in long closures in some districts to achieve desired escapement. A regulation change to reduce fishing time after the emergency order period in the Egegik, and Ugashik Districts was approved by the Alaska Board of Fisheries at their December 1987 meeting. This was an attempt to better balance the fishing fleet with the available resource, and the new regulation was in effect in those districts for the 1988 fishing season.

1988 DISTRICT INSEASON MANAGEMENT SUMMARIES

Naknek-Kvichak District

The 1988 return to the Naknek-Kvichak District totaled 8.8 million, 30% of the preseason forecast of 11.4 million (Table 1). The Kvichak River return of 6.8 million included an escapement of just over 4.0 million, slightly above the lower management range of 4.0 million. The Naknek River return of 1.8 million included an escapement just above the point goal of 1.0 million. The total district harvest of 3.5 million was 47% of the preseason forecast. The Kvichak River return was comprised mostly (61%) of five year old fish from the 3.6 million escapement in 1983. That escapement has already produced 3.6 fish per spawner.

Preseason management strategy, unlike 1986 and 1987, would allow a harvest from the Kvichak River run. Both major river systems had total run forecasts in excess of escapement goals. The Kvichak River escapement goal was 5.0 million with a management range of 4.0-6.0. The lower end of the escapement range would be targeted in 1988 because the upper end had been reached in 1987 and 1989 should produce a large run with an escapement goal of 8.0-10.0 million. Some early fishing would be allowed to assess run strength. As in previous years, early king salmon fishing would be monitored closely. Local fishermen in the Naknek-Kvichak area also formed a fall fishing co-op in order to attract a buyer for the even-year pink salmon run and the late fall coho salmon run. This additional fishing

effort would also be monitored very closely to insure adequate escapements of both species.

The South Unimak/Shumigan Island fisheries began on June 11 with a 14-hour period (Appendix Table 54). No purse seiners fished as discussions were being carried out on prices and the chum salmon quota. Sockeye catches were relatively light in both areas with harvests of nearly 12,000 in Unimak and 8,000 in the Shumigans. Average weights for sockeye in both areas were 5.6 lbs. A second 14-hour period on June 15, again without the purse seine fleet fishing, produced better catches with 50,000 sockeye harvested in Unimak and 7,000 in the Shumigans. The average weight remained at 5.6 in Unimak while the Shumigan average rose to 6.1 lbs. The last period without the purse seine fleet fishing was held on June 16. Results were harvests of 70,000 in Unimak and 24,000 in the Shumigans (which were extended until 10:00 p.m. June 17). Average weights dropped slightly in both areas to 5.4 lbs. and 5.9 lbs. respectively. The chum salmon cumulative catches through this same time period were 124,000 in Unimak and 3,000 in the Shumigans.

Commercial catches in the Naknek-Kvichak District through June 14 stood at 1,500 with a couple of deliveries at 1,000-1,200 lbs. indicating some fish moving into the district (Table 14). Egegik District catches meanwhile were strong with a cumulative through June 14 of about 53,000 (Table 15). Fish were large in both districts with averages of 6.5 lbs. in the

Naknek-Kvichak and 6.9 in Egegik. Catches increased in both districts on June 15 with 25,000 harvested in Egegik and 2,300 in the Naknek-Kvichak. Catches in the Naknek-Kvichak District were 7,000, 8,000, and 4,000 respectively for June 16, 17, and 18.

The Port Moller test boat began fishing on June 11. Catches were fairly consistent through June 18 with indexes ranging from 7 to 21 (Table 5). The running mean length of sockeye caught through June 18 at Port Moller was 556 mm indicating a fair number of large 3-ocean fish. The first age class information on the June 11 Unimak/Shumigan fishery was made available on June 18. Age classes pretty well matched those of the Bristol Bay forecast. Age 5₃ was slightly higher than forecast which could help out the Kvichak River run if the percentage held inshore.

South Unimak fished for a 6-hour period on June 18 with both types of gear participating. The catch was 71,000 with an average weight of 5.0 lbs. per sockeye. The chum salmon catch of 52,000 brought the cumulative catch of that species to 177,000. The Shumigan catch for the same time period was 71,000 with an average weight of 4.9 lbs. per sockeye. The chum salmon catch was 17,000 bringing the cumulative chum salmon catch in that area to 21,000.

A district test boat fished the Nushagak District the evening of June 17 but sockeye catches were poor with a total of two sockeye caught in eleven drifts (Table 10). Port Moller

test boat indices were 8 on June 19 and then increased to 23 on June 20. Size of fish dropped slightly to a running mean length of 552 through June 20. The estimated passage past Port Moller through June 20 was 1.4 million and was based on a lag time from there to inshore Bristol Bay of five days. The commercial catch in the Egegik District for June 20 was phenomenal with a daily of 329,000 and a cumulative catch of 473,000. The Naknek-Kvichak catch for June 20 was 48,000 bringing the cumulative catch to 63,000. Run timing estimates from Burgner (FRI) based on the relationship between run timing and the combined mean Adak and Cold Bay air temperatures for May was made available on June 20. It predicted a midpoint date of the Nushagak run on July 5 and a date of July 3 for the Naknek-Kvichak. June 21 commercial catches were 51,000 in the Naknek-Kvichak District and 132,000 in Egegik. The Port Moller test boat indices for June 21 was 13. Only two drifts were made on June 22 and none were made on June 23. The estimated passage was 3.3 million through June 23. Fishing resumed at Unimak on June 21 with a 7-hour period. The sockeye catch was 79,000 at an average weight per fish of 5.1 lbs. The chum salmon catch of 63,000 brought the cumulative catch of that species to 239,000. The Shumigan period was for 12 hours and resulted in a sockeye catch of 39,000 at an average weight per fish of 5.2 lbs. The chum salmon catch was 9,000 for a cumulative catch of 30,000. The combined chum salmon catch in

both areas was 269,000, more than half of the chum salmon cap of 500,000.

Commercial catches of sockeye in the Naknek-Kvichak District for June 22 and June 23 were 9985,000 and 44,000 respectively. The total Naknek-Kvichak run, based on long-term average catches through June 23, was predicted at 13-15 million. Age class composition from the June 22 and 23 commercial catch was comprised mostly of 5₂ fish at nearly 65%. Both of the two-ocean age classes were below preseason forecasts. The Kvichak River test fish project started fishing on June 21 but catches were low the first three days (Table 29). Fishermen were indicating that fish were being caught mostly in the middle channels of the district, much like the 1983 run. Based on information from the Unimak fishery before the June 21 fishing period, C.P.U.E. indicated a total bay sockeye salmon run of 45 million and a chum salmon run of 13 million.

The Port Moller test fish boat fished three stations on June 24 and indices climbed to 42. An estimate, based on a lag time of six days, of 4.6 million had passed the project. A 31 hour fishing period in Unimak on June 22-23 produced a sockeye salmon catch of 122,000 with an average weight of 5.8 lbs. The chum salmon catch of 110,000 brought the cumulative to 365,000. A six hour period in the Shumigans was extended an additional 24 hours and produced a catch of 107,000 sockeye salmon at an average weight of about 5.0 lbs. The cumulative catch of chum

salmon for both areas through June 24 now stood at 419,000. The latest age class information showed an increase in the abundance of two-ocean fish. A district test fish boat fished the Naknek-Kvichak District on June 24 however, except for one fair index near Half Moon Bay, results were disappointing (Table 7). Kvichak River test fish catches were low with one fish caught on the west bank and seven fish caught on the east bank on the noon tide. There were several reports of a large number of jumpers off of Middle Bluff during the afternoon of June 24.

The Naknek River counting tower began operations on June 21 however no significant passage occurred until June 25 (Table 26). Kvichak River tower began counting on June 25 with a passage of just over 1,000 sockeye (Table 26). The inside test fish program picked up a little on the midnight tide with indices of 0 and 22 and even more on the noon tide of June 25 with indices of 704 and 84. It appears that even though winds have been pre- dominantly from the west and northwest, a significant number of fish were migrating up the west side of the district. District test fish drifts made several fair drifts from the division buoy to Half Moon Bay and one off the mouth of the Naknek River.

Another district test boat on June 26 showed increases off the mouth of the Naknek River and in the upper west side near Gravel Spit and Salmon Flats. River test fish indices again increased on the night tide to 600 and 800 and on the noon tide

of June 26 to 1,100 and 1,800. Meanwhile, a six hour fishing period in the Nushagak District on June 25-26 produced a catch of 94,000 sockeye and 57,000 chum (Table 17). A survey of the Kvichak River was flown on June 26 and showed fish coming out of muddy water 2-4 wide up to the second index area (Table 29). An estimate of 100,000 in the river was made while the formula using index area counts, tower counts, and river test fish indices estimated 64,000. A two day travel time from district to tower would put the escapement very near the average of 167,000 for June 29. A one day travel time would put the Naknek River escapement slightly under the 84,000 fish for June 28. Based on these escapement trends, the district test fish results the past three days which showed an increase of fish in the district and a movement through the district, an expected large push of escapement on the early morning tide, and a desire to get age, size, and strength of run information, an announcement for fishing time in the entire Naknek-Kvichak District was made at 9:00 p.m., June 26 for a 10-hour period to begin at 8:00 a.m., June 27 (Table 12).

A survey of the fishery was flown at 8:30-9:30 a.m., June 27 to assess catches. Most of the drift effort was concentrated in the channels off the west side above the mouth of the Naknek River. Set nets at Graveyard and Cutbank seemed to be doing good. South Naknek and North Naknek set nets were not doing near as well. Very few boats were fishing the Naknek Section of the district. My catch estimate at the time of

survey was 325,000, slightly lower than the 375,000 actually caught. As predicted, river test fish indices jumped to 3,200 and 4,200 on the morning tide. Naknek River escapement counts, however, dropped off between 2:00 p.m. and 6:00 p.m. Port Moller indices for June 26 was 63 and based on a six day lag time, was indicating a total passage past the project of 6.0 million. No drifts were made by the test boat on June 27. Age class composition of the Port Moller test catches became available on June 27 as did the Unimak catch of June 21. A comparison of age information through June 26 is as follows:

| | 4 ₂ | 5 ₃ | 5 ₂ | 6 ₃ |
|-----------------------|----------------|----------------|----------------|----------------|
| South Unimak Catch | 31% | 41% | 20% | 7% |
| Port Moller Test Fish | 17% | 17% | 55% | 5% |
| Bay Forecast | 30% | 26% | 35% | 9% |
| N-K Catch | 16% | 15% | 65% | 5% |
| Kvichak Test Fish | 33% | 13% | 53% | 3% |
| Naknek Escapement | 42% | 20% | 19% | 17% |
| Kvichak Forecast | 52% | 30% | 15% | 3% |
| Naknek Forecast | 12% | 32% | 29% | 27% |

The Naknek-Kvichak catch and Kvichak test fish ages closely resembled the catch at Port Moller test fish. The South Unimak catches somewhat resembled the Bay forecast while all other results seemed to favor the 5₂ age class as being strong and both two-ocean age classes as being weak. Based on catches and size of fish at South Unimak in earlier fishing periods, one would have suspected that smaller two-ocean fish should be showing up inshore in the very near future.

The Naknek escapement through June 27 totaled 67,000 past the tower while the Kvichak escapement totaled 76,000. An aerial survey of the Kvichak River at 7:00 p.m., June 27 gave an estimate of 300,000 while the formula gave an estimate of 218,000. Total escapement in the Kvichak River as of 6:00 p.m. was estimated to be 260-350,000. As expected, the indices at the Kvichak River test fish project dropped dramatically on June 28 with indices from the morning tide of 21 and 113 and from the afternoon tide of 31 and 169. The Naknek River escapement dropped severely to 8,000 for a daily through 6:00 p.m. on June 28. The only report of jumpers was from the Low Point area. More age class information became available on June 28. The Naknek-Kvichak catch from the period on June 27 showed 54% 5₂, much stronger than the 5₂ forecast to either the Kvichak or Naknek system. South Unimak age class from the June 17 period showed only 14% 5₂ while showing 45% 4₂ and 33% 5₃. This is just the opposite of what has shown up at Port Moller and inshore to date. Shumigan catches from the period on June 18 on the other hand more closely resembled inshore and Port Moller age classes with 51% 5₂, 22% 4₂, and 17% 5₃. Migration patterns of fish past Kvichak tower were unusual this year. Even though fish are on the west bank below and in the lower sections of Kaskanak Flats, very little passed the west bank tower.

A district test boat fished the area on June 29. Fair catches were made at Cutbank and in the middle of the Naknek

section and very good catches were made near Half Moon Bay and at Low Point. The river test fish indices dropped to zeros on the first tide of June 29 but started to climb again slightly on the second tide with indices of 59 and 101. Port Moller was again able to fish on June 28 and ended with an indices of 37 for the day. This brought the estimated passage past the project, based on a seven day lag, of 10.7 million. Catches on June 29 increased to an indices of 86 and gave an estimated passage of 15.1 million. The Kvichak River was again surveyed the evening of June 28. I estimated between 85-100,000 while the formula gave an estimate of 219,000. These estimates along with the cumulative passage past Kvichak tower gave a total escapement of 245-379,000. The Naknek escapement past the tower through the same time period was 75,000. There were numerous reports coming in of lots of fish between the Egegik and Naknek-Kvichak Districts.

A district test boat was sent out on the morning tide of June 30. Catches were very good at Graveyard/Cutbank and at Johnson Hill, fair at Low Point, and low at Gravel Spit and Half Moon Bay. Another boat was sent out on the afternoon tide. A good indices was obtained off the mouth of the Naknek River and an excellent indices of 4,300 was obtained at Cutbank. The boat was called back in after four drifts because of an impending announce- ment. The Kvichak River test fish indices on the morning tide of June 30 were 73 and 169 and on the afternoon tide jumped to 2,900 and 2,400. The Naknek River

escapement had reached 125,000 by 2:00 p.m., June 30 with an hourly passage rate approaching 4,000. With the large push of fish on the afternoon tide and the present escapement rates, it was estimated that the escapement through July 2 would be 375,000. This escapement would be one day ahead of the long-term average for that date. The Naknek River and lower half of the Kvichak River were flown in the early afternoon of June 30. Fish were observed in the Naknek River at the mouth and across from Pauls Creek, however because of the muddy water, no enumeration was possible. Not many fish were observed above King Salmon. Although not many fish were observed in the lower five index areas of the Kvichak River, evidence of a good size body of fish was observed from the test fish site downstream to the upper district boundary. Based on the present escapement rate past the river test fish project an estimated 500-600,000 additional sockeye would escape the district before the next commercial period. This would put the Kvichak River escapement nearly one day ahead of the long-term average. An announcement for fishing time was made at 3:00 p.m., June 30 for a 10-hour period to begin at 12:00 noon, July 1. This opening was based on estimated escapements compared to long-term averages, movement of fish into and through the district as evidenced by district test fishing, the large increase in indices from the river test fish project, and aerial surveys of both the Naknek and Kvichak Rivers.

Kvichak River test fish indices continued to climb on July 1 with the morning tide producing indices of 2,800 and 4,200 and the afternoon tide producing indices of 4,000 and 6,400. A complete survey of the commercial opening was not possible due to fog over the district, however radio reports monitored during the fishery indicated that catches were not that strong. The only area available for surveying was the beaches on the east side of the district. Set nets on the South Naknek beach looked fair, those at Cutbank and Graveyard looked good, and those on the north Naknek beach looked poor.

The commercial catch for the period on July 1 was 675,000. Updated age class composition from all sources indicated very little change from previous reports with everything inshore of Unimak showing higher percentages of 5₂ and lower percentages of both 4₂ and 5₃ than forecasted. Only Unimak was showing large percentages of the two-ocean age classes. A district test boat was sent out the afternoon of July 2. Catches remained strong along the Cutbank/Graveyard areas and fair at Pederson Point and off the mouth of the Naknek River. Kvichak River test fish indices dropped to 69 and 85 on the first tide of July 2 but increased dramatically to 5,400 and 3,600 on the second tide. A survey of the Kvichak River was made the afternoon of July 2 and resulted in my estimate of 650,000 and a formula estimate of 397,000. Fish were 2-4 wide to Egg Island and 4-6 wide above. The Naknek River was also flown and fish were 3-4 wide in all areas where fish could be seen. The

Naknek River escapement count through 6:00 p.m., July 2 was 316,000 while the Kvichak River escapement through 2:00 p.m. was 583,000 and coupled with the aerial survey results gave a total estimated escapement of 980,000-1,233,000. An announcement at 9:00 p.m., July 2 for a 12-hour fishing period in the Naknek Section only from 2:30 p.m., July 3 until 2:30 a.m., July 4 was based on an estimated escapement into the Naknek River through July 3 of 470,000 (one and a half days ahead of the long term average), an aerial survey of the Naknek River which showed fish above the district, fair district test fish catches off the mouth of the Naknek River, and a need to concentrate effort on the Naknek run because previous drift effort had been concentrated in the Kvichak Section. The Kvichak River escapement had fallen slightly behind the long-term average, so additional escapement was needed to achieve this average.

Kvichak River test fishing indices dropped the first tide of July 3 to 1,800 and 700. An aerial survey in the late afternoon produced an estimate of 600-650,000 while the formula estimate gave 316,000. These results coupled with a 2:00 p.m. cumulative escapement past the tower of 995,000 gave a total estimated escapement of 1.3-1.7 million. A survey of the fishery showed the only fair catches were on the lower district line and on the South Naknek beach in the lower third of the district. The catch estimate of 275,000 was quite a bit higher than the actual catch of 154,000. The indices from the Kvichak

River test fish project on the second tide of July 3 showed a good increase to 900 and 6,700. Indices again dropped to 200 and 2,100 on the first tide of July 4. The Naknek River escapement through 2:00 p.m., July 4 was 515,000 compared to a long-time average escapement of 441,000 for this date. The Kvichak River escapement through 2:00 p.m. was 1.4 million with an additional 600,000 estimated from an aerial survey of the river at 3:00 p.m. The long-term average escapement through July 4 is 918,000. Several reports were received of fish milling below the boundary at Deadman Sands. A 12-hour commercial fishing period from 3:30 a.m., July 5 until 3:30 p.m., July 5 was announced at 5:00 p.m., July 4 because of the above average escapements and aerial survey information.

A survey of the fishery was flown at 10:00 a.m., July 5. Although the tide was at full ebb at the time, a poor showing was evident. Most drift effort was concentrated in the channels west of Pederson Point and the mouth of the Naknek River. Set net catches looked poor to only fair in all areas. The catch for the period ended up at 376,000. Kvichak River test fish indices had increased to 1,000 and 5,300 on the second tide of July 4 but dropped to 42 and 288 on the first tide of July 5. An aerial survey of the Kvichak River the evening of July 5 gave an estimate of 200-250,000 while the formula estimate was 333,000. These estimates, plus the 6:00 p.m. cumulative tower count of 1,837,000, gave a total estimated escapement of 2.0-2.2 million. The Naknek River

escapement rates had been dropping since the evening of July 3. Daily counts went from 121,000 to 56,000 to 25,000 for July 3, 4, and 5 respectively.

A district test boat was sent out on the morning tide of July 6 and two others on the evening tide. The first boat showed no real strength anywhere in the district. It was also instructed to search the lower Deadman Sands area as there had been numerous reports of fish in the area. No significant catches were made. One boat on the evening tide fished the west side of the district and although no large catches were made, there was a significant showing of fish from below the marker throughout the section to Gravel Spit. The other boat fished the east side of the district. No large buildup of fish was found anywhere in the Naknek Section and as far south as Low Point. Port Moller catches did not show any great increase and, based on a lag time of eight days, gave an estimated passage past the project of 23.2 million sockeye. Indices from the Kvichak River test fish project continued to drop the evening of July 5 and both tides on July 6. Age class composition from all projects remained relatively the same as previous. A district test boat was sent out the evening of July 7. The only significant catch was made on the beach at Johnson Hill although fair catches were made at the mouth of the Naknek River, Cutbank/Graveyard, and Half Moon Bay. The test boat captain reported a body of fish from the lower line to Ships Anchorage that was two miles wide. Many other reports

from fishermen and spotters were being received of fish all over the district. A forecast of the total Bristol Bay run was received from Don Rogers of the Fisheries Research Institute based on the Port Moller project. A total Bay run of 22 million with 8 million scheduled for the Naknek-Kvichak District was predicted. Indices from the Kvichak River test fish project remained fairly low during both tides of July 7 with averages for each tide of 434 and 65. Total escapements enumerated past Kvichak and Naknek towers through July 7 were 2.2 million and 589,000 respectively.

Kvichak River test fish indices remained low on July 8. A district test boat searched areas outside the district on the afternoon tide. Very few fish were observed below Deadman Sands although a fair set was made within the district in a cut in the Deadman Sands area. One excellent set was made along the beach at Middle Bluff. The test boat broke down and was inoperable for most of the fishing time and not many sets were made. Another test boat was sent out on the night tide. Good sets were made throughout the area including upper Half Moon Bay, Johnson Hill beach, and Low Point. The Port Moller test fish project fished its last day on July 7. Estimated passage past the project as of July 8 was 23.4 million. Reports continued to come in on fish from the Egegik District north and within the Naknek-Kvichak District. Total escapements past Kvichak and Naknek towers through July 8 were 2.2 million and 660,000 respectively.

Two district test boats were sent out on the afternoon tide of July 9, one to fish the west side of the district and the other to fish the east side. Very good indices were achieved from Gravel Spit down to Half Moon Bay and fair to good indices at Pederson Point and from Half Moon Bay south to the boundary line. The east side drifts were not overly impressive except off the mouth of the Naknek River and near Low Point although there were fish scattered throughout the Naknek Section. The Kvichak River test fish project had low indices on the first tide of July 9. The Naknek River escapement through 6:00 p.m., July 9 was 739,000 with an hourly passage rate of 6,000. An aerial survey of the entire district was flown the late afternoon of July 8 with Fish and Wildlife Protection. Substantial numbers of fish seemed to be located mainly from just above Johnson Hill south to Middle Bluff. These fish were right along the beach and not much was observed offshore or on the west side of the district. A cursory look was taken of the lower Kvichak River, but very few were coming out of muddy water. Another survey was flown the morning of July 9. Fish were in evidence just off Savonoski in the Naknek River, but subsistence nets did not look exciting. The lower half of the Kvichak River was again flown, but as in last evenings survey, very little evidence of large numbers of fish were observed. The Naknek River was again surveyed on the return flight. Subsistence catches were still weak and only a few jumpers were seen in scattered groups up river to Pauls

Creek. The only strong show of fish in the river was from below Big Creek to the counting tower. Another cursory look at the Kvichak River was taken the evening of July 9. Fish could be seen 2-4 wide up to the third index area, however it was not a steady stream. An announcement was made at 9:00 p.m., July 9 for a 12-hour fishing period in the Naknek Section only from 7:30 a.m., July 10 until 7:30 p.m., July 10. Reasons for the opening were the cumulative escapement on the Naknek River of 739,000 (long-term average = 772,000), the hourly passage rate past the tower, the good catches off the mouth of the river made by the district test boat, evidence via aerial survey of some fish in the river especially the upper portion, and a need to balance catch with escapement. The Kvichak River escapement was falling behind the long-term average and additional escapement was needed in that system.

Kvichak River test fish indices picked up substantially on the second tide of July 9 with indices of 400 and 12,200 and on the morning tide of July 10 with indices of 11,300 and 14,300. An aerial survey of the river the morning of July 10. An estimate based on the formula suggested 297,000 fish in the river. This seemed like a smaller number of fish in the river than one would expect from the large indices from the river test fish project. Catches in the commercial fishery appeared weak with the estimate of 200,000 falling above the actual catch of 150,000. The age class composition of both the Naknek-Kvichak commercial catch to date and the Kvichak River

escapement and test fish still showed predominantly the 5₂ age class. This would indicate that, based on the forecast, the Kvichak run would probably be less than forecast.

Another aerial survey of the Kvichak River was made the evening of July 10 with much better results. Fish were 4-6 wide and steady from below the index areas to the third index, 2-4 wide for the next two index areas, and scattered from there upstream. The estimate was 700,000 while the formula estimate was 704,000. The Naknek River escapement had reached 886,000 by 2:00 p.m., July 10 and the 900,000 escapement that triggered the personal use fishery was assured. The personal use fishery was opened effective at 6:00 p.m., July 10. By 6:00 p.m., the Naknek River escapement had reached 892,000 with an hourly passage rate of 1,500. The 6:00 p.m. cumulative Kvichak tower escapement had reached over 2.3 million and with the aerial survey estimate of fish in the river gave a total escapement figure of 3.0 million. This escapement would be right on schedule for the long-term average while the Naknek River escapement was slightly ahead of schedule. A 10-hour commercial fishing period for the entire district to run from 9:00 a.m., July 11 until 7:00 p.m., July 11 was announced at 9:00 p.m., July 10.

A survey of the district during the fishing period showed fairly strong catches, especially near the beaches at Johnson Hill and on the west side near Half Moon Bay and Copenhagen Creek. Set nets on the upper west side were doing very good

while those near Graveyard and Cutbank were doing fair. Naknek and South Naknek beaches were poor in most areas. An aerial survey of the Kvichak River the morning of July 11 showed strength from below the index areas through Kaskanak Flats and to the counting towers. The estimate of 900,000 was very close to the formula estimate of 1.1 million. Kvichak River test fish indices remained strong on the morning tide of July 11 at 7,700 and 2,100. By 2:00 p.m., July 11 the Naknek River escapement had reached 920,000, well within the management range of .8-1.4 million and 92% of the point goal. The Kvichak River escapement through the same time had reached 2.5 million with hourly passage rates that increased from 7,000 to 13,000. The second tide on July 11 produced river test fish indices of 5,300 and 2,000 indicating fish still moving past the district. Because both river escapements were at or ahead of the long-term averages for this date, a 14- hour extension of the present fishing period was announced at 3:00 p.m., July 11.

The commercial catch for the total 24 hour fishing period was 544,000. An aerial survey of the Kvichak River the morning of July 12 gave an formula estimate of 704,000 which, when added to the cumulative escapement count at the time, gave a total estimated escapement of 3.8 million, just shy of the lower management range. Kvichak River test fish indices on the morning tide of July 12 dropped to 34 and 299 indicating the efficiency of the commercial fleet. While the total Kvichak River estimate was nearing the lower end of the management

range, concern was still felt on the reliability of the aerial survey estimates and river test fish indices. The Naknek River escapement, meanwhile, had reached 950,000 by 2:00 p.m., July 12 and at 6:00 p.m., an announcement was made for the Naknek Section only to run from 11:00 a.m., July 13 until 12:00 noon, July 14 and Kvichak Section fishermen were advised to stand by at 12:00 noon, July 13 for further updates.

Kvichak River test fish indices remained low on the evening tide of July 12 and the morning tide of July 13. An aerial survey of the Kvichak River the morning of July 13 gave a formula estimate of only 142,000 although survey conditions were poor. At noon, the Kvichak fishermen were advised that the escapement still looked to be about 200,000 short of the minimum goal and were advised to stand by at 6:00 p.m. when river test fish results would be available. The test fish results of the afternoon tide gave indices of 2,000 and 8,200, indicating a substantial movement into the river. At 6:00 p.m., July 13 an announcement for a 12-hour period for the Kvichak Section was made to run from 12:00 midnight, July 13 until 12:00 noon, July 14. This opening was based on a Kvichak River escapement past the tower of nearly 3.7 million with an hourly passage rate of 9,000 (ahead of the long-term average for an escapement of 4.5 million), very good indices on the last tide from the river test fish boat, the aerial survey of the river which showed good fish in the upper portion of the

river, and additional escapement that would enter the river on the next tide.

An aerial survey of the Kvichak River in the early morning of July 14 gave an estimate of 150-200,000 fish in the river while the formula estimate was 169,000. Visibility was poor in the lower sections of the river. The morning drifts from the Kvichak River test fish project dropped to indices of 200 and 600, however it was felt that the lower escapement range of 4.0 million should be assured in the river. A twelve-hour extension of the fishing period was announced at 8:45 a.m., July 14 and fishermen were advised to stand by at 6:00 p.m. for further announcements.

At 2:00 p.m., July 14, the Kvichak River tower escapement had just surpassed 3.8 million with fair numbers of fish in the river. The Naknek River escapement had reached its goal of 1.0 million through the same time period. The commercial catch from the Naknek Section opening on July 13 was 82,000. A survey of the district on July 14 showed most of the effort concentrated on the Johnson Hill line and near Ships Anchorage. Effort was scattered throughout the Kvichak Section indicating that some of the fish migrating through that area would probably enter the escapement. A 10-hour extension of fishing time was announced at 4:15 p.m., July 14 to last until 10:00 a.m., July 15. It was announced at the same time that a short closure would take place for the entire district in order to

distribute fish throughout the district and to obtain some late escapement.

An aerial survey of the Kvichak River was flown in the early afternoon of July 15. An estimate of 75-100,000 fish compared favorably with the formula estimate of 88,000. This estimate, together with the total passage past the tower of 3.9 million, gave a total river escapement near the 4.0 million lower range. The hourly tower count was just over 5,000. A fishing period for the Naknek Section was announced at 3:00 p.m., July 15 to last from 1:30 a.m., July 16 until 9:00 a.m., July 18 when normal 5-day-per-week fishing would commence. A period was also announced at the same time for the Kvichak Section, however it would only last from 1:30 a.m., July 16 until 12:00 midnight, July 16 in order for further assessment of the escapement to take place. Fishermen were urged to stand by at 6:00 p.m. for further information. The Kvichak River tower count through 2:00 p.m., July 16 was only 25,000 shy of the lower range. The Kvichak River test fish indices, although not large, indicated that some fish were entering the escapement on each tide. The lower end of the escapement range was assured, therefore the Kvichak Section was also extended until 9:00 a.m., July 18.

The final Kvichak River escapement was just under 4.1 million while the Naknek River escapement was just over 1.0 million. The final sockeye salmon catch was over 3.5 million and comprised 79% of the total salmon catch for the district.

The Alagnak (Branch) River escapement, assessed by aerial survey post-season, was 195,000 and was composed primarily of age 4₂ (50%) and 5₂ (37%) fish.

Normal five-day-per-week continued throughout July. Fall fishing effort was four times the normal during that time period. The pink salmon commercial catch of 93,000 through July 31 was not unusually large however an aerial survey of the Naknek and Alagnak (Branch) Rivers on August 3 showed escapements to be substantially lower than that expected or desired. The increased effort and lower than desired escapements in both rivers caused concern. It was desirable to increase escapement trends and, because the peak of the run should be approaching, an additional 29-hour closure before the normal 48-hour weekend closure was announced to begin at 4:00 a.m., August 5. A starting time of 7:00 a.m., July 8 was announced in order for set nets to be able to deploy their gear. A survey of the Alagnak River was again made on August 12. The pink salmon escapement was estimated to be 620,000 with most of the fish still schooled and migrating (Table 28). This escapement was deemed adequate for that system, and because most of the drift net effort was fishing the Kvichak Section, no additional closures were necessary. The coho salmon estimated escapement on the August 12 survey was 22,000 and was also considered adequate. The Naknek River was flown on August 24 and an estimated pink salmon escapement of 187,000 was obtained. Chinook salmon escapements were estimated to be

Egegik sockeye. This factor, plus concern for a declining trend in chinook and chum salmon escapements in the Egegik District were management considerations as the season approached.

The commercial salmon season began on June 1. The month of May was cut from the commercial season in all Bristol Bay districts by the Board of Fisheries (December 1987) to provide a greater chance for early run chinook salmon to enter the escapement. The Board of Fisheries also amended the weekly fishing schedule for the Egegik District to permit fishing four days rather than five days per week prior to 9:00 a.m. June 23 and after 9:00 a.m. July 17. This early season reduction in fishing time was an additional measure aimed at promoting chinook salmon escapement at Egegik where escapement indices have been declining in recent years. A third Board of Fisheries action changed the southern boundary of the Egegik District to the 9990-Y-32630 Loran C line from the previous 58° 09' 30" N. lat. designation in an effort to improve the identification of district lines and hence the observance of these boundaries by the fishing fleet.

Initial salmon landings in the district were recorded June 6 with both sockeye and chinook delivered from local set nets (Table 15). Small catches of sockeye, chinook, and chum salmon were registered through June 10 with only minimal effort on the grounds. However, by June 13 fishing intensity began to increase as fishermen, processors, and sockeye began arriving

in greater numbers. By the end of the second week of fishing (June 17) a total of 147,000 sockeye, 1,100 chinook, and 30,000 chum salmon had been harvested in the district, a very productive beginning to the season. An aerial survey of the district on June 20 yielded a count of 576 drift boats and 147 set nets actively fishing, with 30 tenders awaiting the catch. This drift boat effort was about four times the normal fleet size for this early part of the season.

Sockeye catches during the week of June 20-23 were much larger than usual averaging approximately 250,000 fish per day (range 216,000 - 292,000). Normally sockeye catches average roughly 25,000 fish per day at this stage of the season. The significance of these large catches was an issue of intense interest and prompted several questions: were these 1) an indicator of an unusually large or early Egegik District run, 2) the result of an unusually large and efficient Egegik fleet cleaning the district more thoroughly than usual, 3) the result of the commercial closure at False Pass during the first week of June, 4) the result of an Egegik management strategy during the past eight years promoting early escapement (10% of the escapement goal from the early part of the run), or 5) an interception of fish bound for other adjacent districts? The best answer probably was "All of the above".

Escapement counts at Egegik River counting towers did not begin until the afternoon of June 22 due to budget considerations so a larger or earlier than normal run could not be

evaluated at this point based on escapement counts. Inside test fishing near Wolverine Creek in the lower Egegik River began on June 18 but equipment problems led to only partial coverage until June 21. Initial indices were modest indicating 20-30,000 fish had entered Egegik River from June 18 through June 23, but with a record fleet working at the river mouth during this period a low-to-modest entry rate was expected. Data was insufficient to ascertain whether early June False Pass closures or emphasis on obtaining early escapement at Egegik were significant contributors to this early run strength. Without scale samples from the escapements of potential rivers of origin, it was impossible to analyze interception rates in the commercial catch at this juncture, so the fishery was allowed to continue on its 4-days per week pre-Emergency Order period schedule. Each day the daily catch total was expected to drop due to the effect of the large effort, but each day the catch totals remained larger than anticipated indicating the fill-in rate was substantial. There were reports of numerous fishermen illegally fishing outside the district's boundaries (particularly the south line) on several occasions during this June 20-23 period. Their impact cannot be separated from that of the legal fishermen with the available data, but it was conceivable that they may have substantially added to the interception rate of this early fishery. The enforcement vessels of the Alaska Department of Public Safety arrived in the district during the night of June

21-22 and promptly apprehended 10 boats fishing closed waters outside the district.

By the onset of the Emergency Order period at 9:00 a.m. June 23 approximately 1.2 million sockeye, 1,875 chinook, and 79,000 chum salmon had been landed in the district. These were all-time record cumulative harvests for sockeye and chum salmon for this early in the season, and projecting ahead based on historic mean catch percentages by day (26 years of data, 1960-85), a seasonal chinook catch of 3,700 fish was indicated. These indications suggested optimism was warranted with respect to run strength for all three species. The sockeye and chum runs were either earlier than normal or both early and stronger than expected. The chinook fishery was showing average strength (1968-87 mean harvest = 3,140 fish) although fishing effort was greater than normal. The "False Pass" fishery statistics thus far were intriguing as sockeye catches were spotty, chum abundance was high, and sockeye age class composition data indicated over 70% of the fish were of the 2-Ocean age groups (as opposed to the preseason forecast of 57%). This led to optimism regarding the eventual return to districts where large 2-Ocean sockeye components were expected this season (Kvichak and Egegik).

Fishermen had been notified that one of the ongoing management goals for the Egegik District was attainment of escapement from each major segment of the run. To ensure adequate representation from the early portion of the run at

least 10% of the escapement goal was desired in Egegik River past the fishery before the first opening would be announced after the onset of the Emergency Order period. Thus, on June 23 the management staff and fishermen were awaiting indications from tower and inside test fish crews that at least 100,000 sockeye had entered Egegik River. Because this threshold had not been met, the fishery remained closed June 24-26 while inside test fish indices gradually climbed. An outside test fishing survey was conducted in the commercial district on June 25 and two medium-sized concentrations of fish were located in near shore areas close to Bishop Creek and in the South Channel (Table 8). This helped confirm sightings of fish concentrations in and near the district reported by pilots and fishermen and indicated escapement rates into the lower river might soon increase.

Things began to change quickly on June 26. Inside test fishing data through June 25 indicated a cumulative total of 60,000 sockeye had entered the river thus far. However, an aerial survey of Egegik River at noon June 26 yielded an estimate of 25,000 sockeye in Egegik Lagoon and 150-200,000 more downstream between the lagoon and the inside test fish site. It was apparent the test fishery was under-estimating fish passage. Based on visual confirmation that well over the necessary 100,000 sockeye were in the river past the fishery, a 12-hour fishing period was announced to commence at 8:00 a.m. June 27.

where the percentage in the catch was 15% above that in the escapement. Comparisons of age group percentages in the Egegik escapement and catch versus the Naknek-Kvichak drift catch (June 22-27) were as follows:

| <u>Age Group</u> | <u>Egegik</u> | | <u>N/K Catch</u> |
|------------------|-------------------|--------------|------------------|
| | <u>Escapement</u> | <u>Catch</u> | |
| 4 ² | 7% | 6% | 22% |
| 5 ³ | 33% | 28% | 14% |
| 5 ² | 32% | 47% | 60% |
| 6 ³ | 23% | 19% | 4% |

These data indicated it was possible Egegik District fishermen were harvesting some non-Egegik age 5₂ sockeye although no stock separation results were available yet to confirm interception. Otherwise the catch compositions from the two districts did not appear similar.

The fishery remained closed on June 30 as escapement continued to increase. By 6:00 p.m. June 30 the cumulative count past the Egegik River towers totaled 312,000 sockeye, a level not normally reached until July 7 on the average. With the escapement proceeding ahead of schedule, the catch indicating a run stronger than forecast, the expectation that 2-Ocean fish were the main run components (based on False Pass catches), and with fish beginning to move into the Naknek-Kvichak District, another short fishing period at Egegik

appeared warranted. An 11-hour fishing period was authorized beginning at noon July 1.

Weather at Egegik July 1 was inclement, 20-30 kn SW winds and fog all day, making surveys of the district impossible. Outside set netters were reportedly having trouble picking fish early in the period due to the large surf. Drift boats reportedly made some good catches early in the period inside Egegik Bay and then moved to outside waters. Inside test fish indices increased substantially over previous daily levels (Table 30) indicating another pulse of fish had moved into the lower river. The period was allowed to close on schedule at 11:00 p.m. July 1 allowing another "window" for passage of any non-Egegik fish past the district.

The first results from the stock separation work comparing sockeye scales from Egegik catches (June 27-29) to those from Egegik escapements and Naknek-Kvichak escapements became available July 1 and these preliminary analyses indicated interception rates of non-Egegik age 5₂ sockeye ranged from 15-26%. The analysis included an assumption that Ugashik age 5₂ sockeye scales were similar to those from the Naknek-Kvichak as no Ugashik escapement samples were available yet for comparison. No other age groups were included in the analysis.

The catch from the July 1 period totaled just over 1.0 million sockeye, bringing the cumulative district harvest total to 3.6 million sockeye. This was the second instance on record of a daily catch exceeding 1.0 million fish in the district and

it occurred in only 11 hours (the other was accomplished June 29, 1985 with 1.146 million fish caught in 18 hours).

The fishery remained closed July 2-3 in spite of indications there were a lot of fish in the inner district moving into the lower river. This was done to obtain a large portion of the Egegik sockeye escapement from the peak of the run. It was also done to provide an extra measure of protection for any non-Egegik fish moving north or south at a time just preceding the normal run peak in the Naknek-Kvichak District (July 4).

By noon July 3 the Egegik tower cumulative escapement count totaled 425,000 sockeye. The 35-year average escapement total for July 3 was 135,000 fish and only two of the 35 years had totals larger than the current year for this date. It was apparent escapement rates were far above normal and additional fishing was necessary to harvest excess fish.

Also at noon July 3 results of the preliminary stock separation analysis of the July 1 Egegik District commercial sockeye catch became available. Only age group 5₂ fish were included in the analysis and the results indicated 29% of the 5₂'s in the catch were non-Egegik fish. Thus the stock separation results to date indicated a trend towards increasing interception of age group 5₂ sockeye at Egegik; June 27 = 15%, June 29 = 26%, July 1 = 29%. Based on this increasing interception trend the management staff discussed options for reducing interception in the district for the next commercial

opening. The fact that the peak of the Naknek-Kvichak run could still be passing through or near the Egegik District weighed heavily. The Naknek and Kvichak River escapements were both progressing toward their seasonal point goals at normal rates but commercial catches were below expectations for a normally timed run (July 4 peak). Based on the discussions it was decided the preferred option to reduce interception would be to reduce the size of the Egegik District by moving the outer boundaries inward as follows: North line = 9990-Y-32585, West line = 9990-Z-45130, South line = 9990-Y-32625. This would push fishermen south of the North Bar off Big Creek at the northern end of the district, and position the southern boundary as it was in 1987. It would also move the western line shoreward about 0.75 miles along its entire length. All told it would reduce the overall district size from approximately 50 square miles to 35 square miles (30% reduction). It was decided this would be announced to the fleet at 9:00 p.m. July 3 along with news of the next fishing opening (planned for 3:00 p.m. July 4). So that the new boundaries would be available for inspection by fishermen when they were announced to the fleet, repositioning of the outer Egegik District corner buoys via a commercial tendering vessel in the district was initiated early in the afternoon of July 3. This resulted in unofficial word of the impending change being circulated amongst the fleet and caused considerable anxiety for some fishermen who felt their fishing success would be

negatively impacted by crowding, loss of preferred fishing locations, etc. Many questions were forthcoming from the fishermen regarding the rumored move; i.e. the possibility of authorizing one free transfer out of the district (without a waiting period), the status of set nets north of the 9990-Y-32585 line, the impact on other areas as drift boats transferred into them, the need to reposition the processor fleet away from the Ships Channel to prevent obstructing remaining drift lanes, the duration of the line change, etc. Because aerial surveys in another district were necessary during that afternoon, fishermen were told to standby at 9:00 p.m. July 3 for a full explanation of what was being undertaken. Over the course of the afternoon the proposed boundary alteration was discussed extensively by personnel from the Regional and Headquarters ADF&G management staffs and it was decided this proposed action was premature. The fleet had not been properly put on notice that such an action was possible or given enough warning to permit them to react in their own best interests. Additionally, fishing had been allowed and was again being considered in the Naknek-Kvichak District so any argument based on the premise that interception was leading to a biological problem in that district was not supported. Without evidence of a biological problem in the donor districts it was decided to proceed with the upcoming fishing period utilizing the normal Egegik District boundaries. Thus at 9:00 p.m. July 3 an 11-hour commercial opening was

announced for July 4-5. Fishermen were put on notice that future boundary adjustments were possible if deemed necessary.

The July 4 fishing period began at 3:00 p.m. under overcast skies and SW winds at 10 kn later switching to SE at 20-25 kn. During an aerial survey of the district at 5:00 p.m., a total of 563 drift boats and 227 set nets were observed fishing. Set net catches appeared best in the Bishop Creek to Coffee Point and Cutbank areas. North Flats set nets were doing poorly. Drift boats were spread out in all quadrants but none of the nets were very impressive although "jumpers" were observed along South Spit and near the South line. In Egegik River an estimated 193,000 sockeye were observed in Egegik Lagoon and this estimate was considered minimal due to poor weather for fish surveying. As 609,000 sockeye had been counted past Egegik tower through 6:00 p.m. it was evident at least 800,000 fish were in the escapement well out of reach of the fishery.

The July 4-5 fishery closed on schedule at 2:00 a.m. July 5. It yielded a catch of 374,000 sockeye and 8,600 chum salmon, well below catches registered each of the three preceding periods, and it brought the cumulative catches of sockeye and chums in the district to 4.0 million and 138,000 fish respectively. With the catch below levels of the previous periods quite a few drift boat fishermen transferred out of the district at the close of fishing July 5 (Table 13).

By 6:00 p.m. July 5 the cumulative escapement count past Egegik tower totaled 779,000 sockeye. Adding these to fish observed during aerial surveys downriver, at least 880,000 sockeye (88% of the point goal) were visually confirmed in the escapement. This level of escapement is generally attained on about July 17. With the escapement far ahead of schedule additional fishing time was warranted. Preliminary stock separation analysis of the July 4-5 district sockeye catch was completed late on the afternoon of July 5 and indicated interception of non-Egegik age 5₂ fish had dropped to 17%. This was encouraging news and it reinforced the decision not to alter district boundaries. Due to the need to exert more harvest pressure on the Egegik sockeye run now that the escapement goal was being approached the rotation of fishing periods versus closed periods was altered such that every third flood tide was scheduled for fishing instead of every fourth flood. This had the effect of shortening the "windows" between fishing periods from roughly 36 hours to 24 hours. "Windows" were still deemed necessary as adjacent districts were still awaiting the bulk of their runs. The Naknek-Kvichak District at this point had accounted for 4.1 million sockeye from a forecast inshore return of 11.4 million (36%). The Ugashik District had accounted for 0.1 million fish inshore from a return forecast at 3.2 million (3%), but this was not unusual for Ugashik as the sockeye run generally peaks there around July 10-12. A 10-hour fishing period was scheduled to commence

in the district at 2:30 a.m. July 6. The length of this period (10 hours rather than 11 or 12 hours) was an attempt to curtail fishing on the ebb and reduce fishing pressure at the northern boundary line as many fishermen felt this was where a large measure of any interception was taking place.

The July 6 opening began under rainy skies with a SW wind at about 10 kn. A survey was flown at 11:00 a.m. to evaluate the fishery and observations indicated set net catches appeared poor throughout the district while drift boat catches were spotty with best success noted in the outer Ships Channel area. Only 385 drift boats and 220 set nets were observed fishing. Aerial observations of Egegik River yielded an estimate of 120,000 sockeye in clear water downstream of the counting towers. These, plus the 865,000 fish cumulatively counted past Egegik River towers through 10:00 a.m. July 6, brought the total escapement visually confirmed to 985,000 sockeye, 99% of the point goal and above the lower escapement range of 800,000.

The July 6 opening yielded a catch of 327,000 sockeye bringing the district cumulative sockeye catch to 4.3 million fish. Adding the Egegik escapement count through midnight July 6 (950,000 sockeye) to the catch yielded an inshore run of 5.3 million fish accounting for 95% of the preseason forecast. With the escapement goal nearly attained and substantial numbers of fish apparently still moving into the district an announcement was broadcast at 9:00 a.m. July 7 opening the fishery for 10 hours beginning at 7:00 p.m. July 7. Later in

the day it was determined that interception of non-Egegik age 5₂ sockeye in the catch of July 6 was 44%, indicating a pulse of north or south bound fish had been present in the district on that day. This was the largest rate of interception recorded during the season.

The July 7 opening occurred under partially foggy skies with winds from the SW at about 10 kn. The district was surveyed at 8:00 p.m. and fleet success appeared fair. Set nets were doing best on the outside beach from just above Bishop Creek all the way to Coffee Point and then in to King Salmon Island. They were doing poorly on the North Flats, Cutbank, and on the south side of Egegik River. Drift boats were spread throughout the district but fog patches prevented a complete count of their numbers. About half the 224 boats observed were fishing the inner Egegik Bay waters (upstream of Coffee Point) and doing quite well. Other boats were making good catches in the South Spit - Ships Anchorage area. Thus it was apparent two concentrations of fish were moving through the district, one of which was definitely headed into Egegik Bay while the other was at the bay entrance.

By midnight July 7 the 1.0 million sockeye escapement point goal had been met at the Egegik River counting tower so at 9:00 a.m. July 8 the 48-hour waiting period required of transfers into the district was waived. The fishery closed on schedule however, at 5:00 a.m. July 8. At this point in many previous seasons the fishery has been opened "until further

notice". However, as there was continued concern for minimizing potential interception of north-bound sockeye, the practice of alternating short openings with "window" closures seemed a preferable course of action and was continued. It was felt this practice would allow the opportunity for any non-Egegik fish to pass through the district during closures. It would also result in fish being distributed throughout inner and outer district waters at the opening of fishing periods, thus available to all user groups, and this would reduce the extent of "line fishing" early in the openings. It would also provide a greater opportunity for Egegik District chum salmon to enter the escapement during the targeted sockeye fishery.

During July 8 the subject of whether to alter the Egegik District boundaries for the next opening was discussed again at length by the staff. There was even more concern that the Kvichak sockeye run had not yet materialized as forecast, but still no concensus that a biological problem was imminent. Data on age composition of the run from test boat catches at Port Moller (37% 2-Ocean fish) contrasted sharply with age composition results from the South Unimak commercial sockeye catch (74% 2-Ocean fish) thus providing conflicting indications as to the strength of the main age groups forecast to return to the Kvichak. Despite this, escapement rates were still near historic norms in both the Naknek and Kvichak Rivers and it was felt that fishing in the Naknek-Kvichak District could soon be allowed. An aerial survey at 6:00 p.m. July 8 showed lots of

from the North Flats all the way to Coffee Point. Whole schools of fish were visible near the water surface in some areas outside Bishop Creek, a very unusual occurrence in this district where the waters are generally murky. These fish had apparently moved into the district following the closure of the fishing period six hours earlier. Based on this survey and the rotation of openings versus closures at this time, another nine-hour fishing period was announced to begin at 9:00 a.m. July 12.

The July 12 opening occurred under foggy skies with winds SW at 10-15 kn. The fog prevented a good survey of the district but initial reports from the fishery indicated inside set nets did well while drift boat catches were mediocre. This was surprising until further reports indicated a lot of fish had moved into the lower end of Egegik River. Inside test fishing in Egegik River later in the afternoon confirmed a large pulse of fish moving quickly upriver (Table 30). Because large numbers of additional fish were not necessary in the escapement at this point in the run the length of the "window" closures was immediately shortened from two flood tides to one and a 10-hour fishing period was scheduled to begin at 10:00 a.m. July 13.

As of noon July 12 preliminary stock separation studies of portions of the Egegik District sockeye catch to that point indicated approximately 75% of the catch were Egegik fish and 25% were of non-Egegik origin. The Naknek River sockeye

escapement through midnight July 11 stood at 93% of the 1.0 million fish point goal. The Kvichak River sockeye escapement stood at 2.8 million with another 800,000 fish estimated in the river below the towers. The Ugashik River sockeye escapement totaled 12,000 fish with another 47,000 estimated in the lower Ugashik River.

The July 13 opening again occurred during southwesterly winds (15 kn), with a total of 283 drift boats and 231 set nets taking part. Set nets along the outside beach did fairly well but those inside Egegik Bay did poorly and immediately expressed their desire for more large flood openings. Best drift boat success appeared to be near the South line. The district again closed on schedule at 8:00 p.m. July 13, and yielded a catch of 265,000 sockeye (Table 15).

Short closures were alternated with daily fishing periods throughout the remainder of the Emergency Order period as the catches tailed off quickly. The district then went back on a four days per week fishing schedule. Of the 576 hours possibly available for fishing during the Emergency Order period a total of 150 (26%) were actually fished, for a ratio of three hours closed for each hour open. Sockeye landings continued through September 8 (Table 14) with a preliminary total of 6,400,126 fish reportedly harvested.

Escapement counts at Egegik tower continued through July 21 yielding a season's total of 1,612,680 sockeye. An additional 65 fish were later counted aurally in the Shosky

target for the district. The Egegik River and lagoon was surveyed once each week generally on a Tuesday or Wednesday following a three day weekend closure to provide escapement indices useful for direct management decisions. Fish movement through the river the rest of the week went unmeasured, as did most of the escapement into the glacially milky mainstem King Salmon River.

Twenty-eight buyers operated in the district during the season. Most of the harvest was taken aboard floating freezer processors or tendered to other districts for processing. No new shore based canneries were operated this season. There were no instances of inadequate processing capacity in the district during 1988.

Post-season the biggest issue relating to the 1988 fishery continues to be interception of non-Egegik sockeye salmon in the Egegik District salmon fishery. Scales collected from the commercial catches and escapements of sockeye in all three eastside Bristol Bay districts received extensive analysis by stock separation specialists in the Research Section of the Commercial Fisheries Division, Department of Fish and Game. In addition to these samples, further efforts to document interception patterns in the district were initiated during the 1988 season. Two commercial fishing vessels were chartered to test fish parallel transects at the northern and western district boundaries during "window" closures in late June and July. During the ebb one vessel fished the north line (9990-Y-

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Creek drainage bringing the district total to 1,612,745. Peaks in the counts at Egegik tower occurred July 3-6 with sub-peaks June 29, July 8, and July 11 (Table 26). A good mix of fish from each portion of the run, and a sex ratio of 46% male to 54% female were attained in the escapement. The escapement was principally five year old fish from the 1983 brood year escapement of 792,000 although all of the major age groups were well represented. A larger than usual number of "jacks" were noted in the tower counts and samples, primarily from age group 4₃.

Fishermen harvested 79.9% of the 1988 sockeye run, the seventh year in the last ten that exploitation has exceeded 75%. The mean exploitation rate over the past 38 years (1951-88) has been 70.5%. Drift gillnet permit holders harvested 90% of the sockeye catch while set netters caught 10%. Historically over the period 1965-87 drift gillnetters have averaged 86% of the catch and set gillnetters 14%.

The commercial harvest of other salmon species totaled 302,000 fish, 4.5% of the total district harvest. The chinook harvest of 3,000 fish was the third lowest in the past 10 years (Appendix Table 10), but only slightly below the 1969-88 mean of 3,100. Cutting three days off the early June fishery probably contributed a little to the low catch total. The chum salmon harvest of 245,000 was the largest on record, exceeding the previous high of 183,000 set in 1984. It was well over three times the 1969-88 mean catch of 76,000 fish (Appendix Table 11). The pink salmon harvest of 4,400 fish was slightly

above the even year average (3,700) of the past 20 years (Appendix Table 12). The coho salmon catch of 49,000 fish was the third largest on record behind catches of 75,000 and 66,000 in 1982 and 1984, respectively. It was more than twice the 1969-88 mean of 21,000 (Appendix Table 13). The coho season was also subject to the four days per week fishing schedule so approximately six less fishing days were available to the fleet this season than in previous years.

Aerial surveys were conducted in the Egegik and King Salmon River drainages to provide escapement indices for chinook, chum, pink, and coho salmon. The resultant escapement indices totaled 868 chinook, 15,100 chums, 23,000 pinks, and 13,715 cohos respectively (Table 28). These chinook indices were the second lowest in the last seven years (the span of years of for which comprehensive surveys are available) and are considerably below the mean chinook index of 1,354. Additional management steps (less fishing time in mid to late June) will be necessary to build up the chinook escapements in coming seasons. The chum indices revealed an average chum escapement occurred despite the record chum harvest. The pink salmon indices are the largest on record. They were obtained during coho management surveys and should be considered minimal. It appears the Egegik River "rapids" are the prime pink salmon spawning area in the district. The coho index is the third largest over the past seven years and probably reflects an escapement in excess of 20,000 fish, the unofficial management

target for the district. The Egegik River and lagoon was surveyed once each week generally on a Tuesday or Wednesday following a three day weekend closure to provide escapement indices useful for direct management decisions. Fish movement through the river the rest of the week went unmeasured, as did most of the escapement into the glacially milky mainstem King Salmon River.

Twenty-eight buyers operated in the district during the season. Most of the harvest was taken aboard floating freezer processors or tendered to other districts for processing. No new shore based canneries were operated this season. There were no instances of inadequate processing capacity in the district during 1988.

Post-season the biggest issue relating to the 1988 fishery continues to be interception of non-Egegik sockeye salmon in the Egegik District salmon fishery. Scales collected from the commercial catches and escapements of sockeye in all three eastside Bristol Bay districts received extensive analysis by stock separation specialists in the Research Section of the Commercial Fisheries Division, Department of Fish and Game. In addition to these samples, further efforts to document interception patterns in the district were initiated during the 1988 season. Two commercial fishing vessels were chartered to test fish parallel transects at the northern and western district boundaries during "window" closures in late June and July. During the ebb one vessel fished the north line (9990-Y-

32570) while the second simultaneously fished along the 9990-Y-32585 Loran C line approximately three miles farther south. Then during the flood these vessels moved to the west line (9990-Z-45140) and the 9990-Z-45130 Loran C lines, respectively and made simultaneous test drifts. Scale samples were collected from each test set for comparison using discriminant analysis techniques to provide river of origin information. Result from these investigations hopefully will provide a clearer picture of the interception patterns in the district and yield a basis for future management and research actions relating to minimizing the harvest of fish bound for other districts.

Ugashik District

The 1988 sockeye run to the Ugashik District totaled 2.2 million fish, 1.2 million short of the preseason forecast (Table 2). Fishermen harvested 1.5 million sockeye, the tenth largest catch on record while 0.7 million entered the escapement. Compared to similar cycle years dating back to 1953, the 1988 run was the second largest on record and nearly twice the cycle year mean (1.3 million).

The preseason district outlook was fairly optimistic as a large forecast had been issued, but the fishing public was notified that early fishing time would depend on the timing of the first strong push of sockeye into the lower reaches of Ugashik River. Due to the forecast harvests in other districts

and the fact that the Ugashik sockeye run tends to peak about a week later than runs to other major districts, fewer fishermen and processors expressed intentions to start the season in the Ugashik District. Preseason management concerns were similar to those for the Egegik District with major emphasis directed at minimizing potential interception of fish bound for other districts. In that regard it was felt that delaying significant commercial fishing for sockeye in the district until approximately July 4 would adequately protect Naknek-Kvichak fish as the normal Naknek-Kvichak sockeye peak occurs July 4 and it would take at least three days for sockeye to travel the 90 miles from the Ugashik District to the Kvichak District. Thus, in a normal year, Naknek-Kvichak fish should be passing offshore of Ugashik Bay sometime around June 30-July 1. Attaining adequate escapements of chinook, chum, and coho salmon was another management concern. It was thought the new regulation shortening the fishing week from 5-days to 4-days prior to and after the Emergency Order period would contribute to this goal.

Initial landings in the Ugashik District occurred June 6 as a few chinook salmon were caught by drift boats (Table 16). The first sockeye of the season were landed June 7. Early effort and catches remained small throughout the pre-Emergency Order period. An aerial survey June 20 revealed the presence of 50 drift boats and 31 set nets fishing, only slightly above the historic mean fleet size for this early portion of the

fishery. By the start of the Emergency Order period (9:00 a.m. June 23) a total of 64,000 sockeye, 2,800 chinook, and 17,000 chum salmon had been harvested. Based on mean historic harvest percentages, these catches suggested the season's total sockeye harvest would approach 4.2 million fish while the projected chinook harvest would total approximately 3,700 fish. Thus, it appeared the sockeye run was at or above forecast strength and chinook numbers were about average.

No sockeye escapement was documented in the district prior to June 23. The inside test fishing crew was deployed June 20 and began fishing June 21 with initial sets yielding no sockeye. The salmon counting towers at the outlet of Lower Ugashik Lake were deployed July 1. With no indications of significant numbers of sockeye in Ugashik River, the fishery was allowed to close at the onset of the Emergency Order period.

The fishery remained closed until July 3 as inside test fishing (Table 31) indicated very few fish were entering the lower portions of Ugashik River, and outside test fishing June 26, 27, 28, 30, and July 2 indicated fish were building up slowly in district waters (Table 9).

A short opening (12-hours) was announced for the district beginning at 1:00 p.m. July 3 to test run strength, provide age composition data, and maintain some processing capacity in the district. Inside test fish indices suggested 8,000 fish had passed the test fish site by this point and Ugashik Village

subsistence nets farther downstream had begun to yield fairly respectable catches July 2. With a fleet of only 57 drift boats, an opening at this point offered more gain than risk. A total of 58 drift boats and 62 set nets fished the July 3-4 fishing period (Table 16). Weather was nice for the opening, partly sunny and calm. An aerial survey of the district at 7:00 p.m. indicated set net success appeared best along the outer north beach near Cape Grieg, while Pilot Point and Ugashik village set nets were doing poorly. Most drift boats were fishing the northern half of the district without any large catches evident. With no apparent large abundance of fish in the district the fishery closed on schedule to permit assessment of the catch. The July 3-4 fishery yielded a catch of 37,000 sockeye bringing the cumulative catch to 102,000 and indicating the Ugashik run was not yet exhibiting any large build-up in the waters of the district.

Sockeye began passing the Ugashik River counting towers on the morning of July 4. Over the course of the day the first 3,800 were counted past the towers and the first scale samples from the escapement were collected. Also during the evening of July 4 a substantial movement of fish into the outer Ugashik District was observed. Numerous "jumpers" were observed along the beach between Cape Grieg and Smoky Point during an over-flight at 6:00 p.m., and more fish were noted at 8:00 p.m. in areas near the South line and the main Entrance Channel. Another outside test fishing trip in the district was

dispatched July 5 to determine fish abundance in all major sectors.

The July 5 outside test fishing trip included sets at 14 locations (Table 9) and the resultant indices suggested very few fish had come inshore any farther than the entrance to Ugashik Bay. Lots of "jumpers" were seen near Smoky Point and seaward of the western district boundary. Indices confirmed the presence of a fairly large concentration of fish just north of Smoky Point. With inside test fish indices still small (Table 31) and no large movement of fish into the inner waters of Ugashik Bay, the fishery remained closed July 5-6 and additional test fishing was scheduled to monitor fish abundance in the commercial district. The fleet was getting nervous and petitioned for a short opening soon, but sockeye movement into the river was not substantial enough yet to ensure that Ugashik fish were a dominant fraction of the fish in the district.

Similar results from outside test fish boats were reported for July 6-7. Fish were present in moderate numbers in outside waters but scarce in areas inside Ugashik Bay. Several reports were received from tender vessels anchored just inside the Ugashik Bay entrance. They were sighting fish with sonar gear and observed fish schools entering the bay on flood tides and then backing out again on the ebbs. Inside test fishing in Ugashik River above Ugashik village confirmed that only small numbers of sockeye were entering and moving up the river during

this time. The counting towers had enumerated 7,400 sockeye through midnight July 7.

The situation began to change during the afternoon of July 8. The outside test boat reported large numbers of "jumpers" at several locations in the district and registered an index of 4,000 at the southern entrance to Ugashik Bay. Pilot Point residents reported seeing fish finning along the beach in front of the village. An aerial survey of the district and lower river at 7:00 p.m. yielded observations of lots of "jumpers" at the entrance to Ugashik Bay and a fair show of "finners and jumpers" between the district and Ugashik village. Based on these indications of movement into Ugashik Bay and the presence of a large mass of fish at the bay entrance, a 12-hour fishing period was announced for July 9.

Fishing commenced at 6:00 a.m. July 9 with success mostly limited to the drift fleet working outer district waters and a few set nets along the north outside beach. Set nets fared poorly from Smoky Point all the way to Ugashik village indicating no large volume of fish had entered inner district waters during the opening and possibly those seen in the river July 8 backed out. Drift boats, when surveyed at 1:00 p.m., were doing very well throughout outside waters from the North line to Cape Menshikof and large numbers of fish were observed surfacing outside the western boundary of the district. Jumpers were also numerous along the beach for about 10 miles just north of the district. With only meager inner district

catch success and escapement rates still very slow, the district was again allowed to close on schedule.

The fishery remained closed July 10 as the catch from July 9 was tabulated. A total of 215,000 sockeye were reportedly caught bringing the cumulative catch up to 318,000 (13% of the preseason harvest forecast). Beginning early in the day, reports were received indicating increased numbers of fish migrating upstream past the Pilot Point beach. Additional pilot reports indicated fish were quite abundant along the beaches both north and south of the district. An aerial survey of the district and its approaches was conducted at 5:00 p.m. July 10 and large numbers of "jumpers" were noted at several locations. The largest concentrations observed were in two tide rips just south of the entrance to Ugashik Bay where 15-20 airborne fish at a time were evident anywhere along the rips from the bay entrance all the way out to the "Bell Buoy" west of the western district line. Jumpers were also seen along the Pilot Point beach and farther upriver confirming the observations of village residents earlier in the day. Based on these visual indications a 12-hour fishing period was announced for July 11, the traditional peak day in the district.

The July 11 fishing period opened at 8:00 a.m. under overcast skies and drizzle, with light westerly winds (5-10 kn). A survey of the fishery flown at 1:00 p.m. indicated 150 drift boats and 76 set nets were participating in the opening and nearly all were doing well. Good catches were evident from

all sectors both inside and outside Ugashik Bay and upriver at Ugashik village. It was apparent a strong push of fish into the lower river had occurred and this was confirmed later in the day by the inside test fishery. Due to the lack of substantial escapement prior to this opening and uncertainty regarding the number of fish that actually were present in the lower river, the period closed on schedule at 8:00 p.m. July 11.

The July 11 catch totaled 437,000 sockeye, the largest daily catch of the season. This brought the cumulative sockeye catch to 755,000 (30% of the preseason harvest forecast). Escapement past Ugashik tower through midnight July 11 totaled 12,000 sockeye (2% of the 700,000 fish point goal). The inside test fish program had accumulated 3,334 index points up to this point. When multiplied by 41 fish per index point (the historic mean) this yielded an estimate of 137,000 sockeye past the inside test fish site approximately two miles upstream of Ugashik village to date (20% of the escapement point goal).

The fishery remained closed July 12 to allow the district to refill and provide additional escapement in the lower river. The district was fogged-in all day so no aerial surveying to monitor fish movements was impossible. Reports from Pilot Point residents and fishermen on the scene indicated fish were continuing to migrate into the lower reaches of Ugashik River all day and several requests were made for an immediate opening. Inside test fish indices were increasing as expected.

Based on previous behavior of sockeye runs at this stage of the season and the reports received from the district, approximately 200,000 sockeye were estimated present in the lower river in addition to those already past the inside test fish site. Knowing that the run often surges into the district over a 2-3 day period at the peak, another fishing period at this point seemed reasonable so a 12-hour opening was announced for July 13.

The district opened at 10:00 a.m. July 13 under overcast skies with a SW wind at 15-20 kn. A survey was flown at 2:00 p.m. and set nets throughout the district appeared to be faring quite well. Drift boat numbers had increased to 332 (Table 16) and they were doing well both inside and outside Ugashik Bay. Schools of fish were also noted just upstream of the commercial district (in the lower river). Due to an erroneous interpretation of the district boundaries provided to some fishermen and the Department of Public Safety by a staff member unfamiliar with the area, the lower reaches of Dago Creek were inadvertently opened to fishing during this period and good drift catches of fish backing out of the creek were reportedly made at the turn of the tide causing some serious "heartburn" for set netters who normally would have shared in the harvest of these fish on either side of the creek. Otherwise the period was very successful and it closed as scheduled at 10:00 p.m. July 13.

The age composition of the Ugashik District sockeye catch through July 11 was as follows; age group $4_2 = 17\%$, age group $5_3 = 25\%$, age group $5_2 = 24\%$, and age group $6_3 = 30\%$. Insufficient escapement samples had been collected at Ugashik tower at this point for comparison with catch samples to indicate whether any substantial disparities existed.

The rate of escapement past Ugashik tower began to increase July 13. Daily inside test fish indices remained moderately high contributing to a cumulative passage estimate of 186,000 sockeye to date. Based on observations of fish distribution from the district, the large set net catches made at Ugashik village, and the impression that escapement rates were improving, another 12-hour fishing period was announced for July 14.

The July 14 period began at 11:00 a.m. under sunny skies with a light westerly wind at 5-10 kn. A survey of the district at 4:00 p.m. yielded a peak seasonal count of 406 drift boats and 71 set nets. Drift catches appeared to be best along the western district line while set nets were making moderate catches throughout most of the district. The best catches in the district appeared to be in set nets at Ugashik village where estimates yielded 600-800 fish per net. Fish were seen at several locations in Ugashik River upstream of Ugashik village but murky waters precluded obtaining an estimate of numbers. Only 2,000 were noted in Ugashik Lagoon. Inside test fish indices shot up to seasonal peak levels during

the day indicating an estimated 364,000 sockeye were now past the test fish site. With good indications of fish in the river but tower counts still not impressive the fishing period again closed on schedule at 11:00 p.m. July 14.

The July 14 opening yielded a catch of 196,000 sockeye, substantially down from the two previous periods. This brought the cumulative sockeye catch to 1.4 million fish (56% of the preseason harvest projection). Escapement past Ugashik tower through midnight July 14 totaled 91,000 fish (13% of the escapement goal). Inside test fish indices dropped July 15 to levels about half those of July 14, but still high enough to indicate significant passage was in progress. Through the afternoon of July 15 a cumulative total of 11,263 index points had been generated at the inside test fish site. When multiplied by 41 fish per index point, an estimate of 462,000 sockeye had passed the test fish site. Based on these indications that over half the escapement was in the river above the test fish site and fish were still passing that site in good numbers, a 14-hour fishing period was announced commencing at 11:00 p.m. July 15.

Initial reports from the fleet July 16 were that the district was "flat" (poor) with regard to fish abundance. Foggy weather all morning prevented a survey of the district until the period closed (1:00 p.m.) making visual assessment of fleet distribution and identification of areas of best catch success impossible. Set nets had been pulled and picked prior

to the survey. Escapement past Ugashik tower through midnight July 15 totaled 188,000 fish and counts were going strong July 16. Inside test fish indices however, continued to drop more quickly than expected. By day's end, a cumulative 505,000 sockeye were projected to have passed the test fish site and approximately 300,000 of these were past Ugashik tower. The historic (46 years) mean Ugashik escapement count through July 16 totals 337,000 sockeye so escapement was about normal for this point. However, with test fish indices falling and the Emergency Order period due to expire July 17 it was becoming necessary to exercise caution with regard to fishing time until escapement numbers neared the 700,000 fish point goal. At 9:00 p.m. July 16 the fleet was informed the Emergency Order period for the Ugashik District only was being extended one additional week until 9:00 a.m. July 24.

The July 15-16 fishery yielded a catch of 128,000 sockeye bringing the cumulative catch to 1.5 million (60% of the projected harvest). The rate of escapement at Ugashik tower dropped sharply July 17 while inside test fish indices farther downriver also continued to decline. The cumulative escapement count as of 6:00 p.m. July 17 totaled 348,000 sockeye (50% of the escapement point goal) so the fishery remained closed. It became apparent at this point that the fish were not exhibiting their normal 6-12 day milling behavior in Ugashik River between the district and the counting towers. The surge of fish that passed the towers July 14-16 were from the large movement into

the lower river July 11-13, displaying only a three day lag time. Thus, previous projections of lower river fish strength were obviously too high and further caution was in order to ensure escapement goals would be met.

The fishery remained closed throughout the entire week-long Emergency Order period extension. Each day escapement improved by small increments ranging from 11,000 to 55,000 fish. Inside test fishing continued through July 25 but indices never improved. Most drift boat fishermen transferred their vessels to other districts to "scratch fish", but kept an ear to the radio ready to return to Ugashik whenever the district re-opened. By July 21 the lower range of the escapement goal (500,000) was attained at the counting towers. The tower count, by the morning of July 25, stood at 585,000 fish (84% of the point goal) and a review of daily sockeye catch data from previous years indicated a 26-year mean harvest of only 6,800 sockeye for the period July 25-31 with little to be gained by keeping the district closed any longer. The district was therefore allowed to resume four days per week fishing on July 25.

The fishery reopened at 9:00 a.m. July 25 with approximately 60 drift boats on hand. By noon reports from the district indicated most of these boats were quitting as there was no build-up of fish to keep them interested. They harvested 12,000 sockeye during the day and by week's end catches dropped to less than 1,000 fish per day. A few sockeye

were caught over succeeding weeks and the last reported landing occurred September 7 (Table 16). The season's preliminary sockeye catch totaled 1,531,615 fish.

Peak day in the fishery proved to be July 11 when the daily harvest reached 437,000 sockeye. Ultimately 70% of the run was harvested, 5% above the 40-year mean exploitation rate of 65%. Drift gillnet fishermen took 91% of the sockeye catch while set gillnet fishermen landed 9% as opposed to 1965-87 averages of 82% and 18%, respectively. A total of 73 hours (10%) were fished during the 744 hours potentially available for fishing during the Emergency Order period.

Sockeye escapement counts at Ugashik tower continued through August 2 yielding a final count of 642,972 fish (92% of the point goal). Counts had dropped to less than 1,000 fish per day when counting was terminated. Historic daily escapement data suggest a mean escapement beyond August 2 of approximately 12,000 sockeye annually. Aerial surveys of sockeye spawning grounds in the Dog Salmon and King Salmon Rivers (August 14) added another 3,080 and 8,360 fish respectively, to the drainage-wide escapement total bringing it to 654,412 fish.

Escapement was attained from each segment of the run. Fish from the early and peak portions apparently mixed to some extent and moved together as a group during the July 14-16 surge. Late run fish also moved quickly from the district to the counting towers with an estimated lag time of three days

similar to the peak run fish. This was very atypical behavior for the Ugashik sockeye migration and may have been influenced by the much warmer than usual Ugashik River temperatures. Mid-June to early August river water temperatures, taken just downstream of the outlet of Lower Ugashik Lake, have been recorded annually since 1962. Seasonal means have ranged from a low of 6.1° C in 1972 to a high of 11.3° C in 1988, with an average of 8.6° C. During the interval from July 4 through August 3, 1988 mean daily Ugashik River water temperatures exceeded historic daily averages on 28 of the 31 days making this the warmest season on record for the river. Whether this influenced migration behavior is unknown but something influenced the fish to move more quickly than normal once they entered the river this year. A sex ratio of 48% males to 52% females was documented from the 3,094 escapement samples collected.

Age composition of the Ugashik sockeye escapement versus the Ugashik District catch appeared quite similar for all age

groups, with the 5₂ age component showing the greatest disparity (8%) as shown below:

Ugashik District

| <u>Age Group</u> | <u>Escapement</u> | <u>Catch</u> |
|------------------|-------------------|--------------|
| 4 ₂ | 24% | 19% |
| 5 ₃ | 30% | 26% |
| 5 ₂ | 10% | 18% |
| 6 ₃ | 28% | 35% |

For the second year in a row the 6₃ age component, progeny of the 1982 escapement of 1.2 million, produced the largest single fraction of the run (33%). Age Groups 5₃, 4₂, 5₂, and 4₃ followed in that order (Table 3). Compared to the preseason forecast, age group 6₃ was the only run component returning at or above expectations. The return of 54,000 age 4₃ jacks was the second largest on record dating back to 1952, and an encouraging sign for 1989.

The district harvest of other salmon species totaled 148,000 fish, 9% of the total catch. The chinook harvest totaled approximately 3,300 fish, slightly below the 20-year (1969-88) mean of 3,500 (Appendix Table 10), and well below the 1979-88 average of 5,600. Peak day in the chinook fishery was June 17 (Table 16). The chum harvest totaled 92,000 fish, twice the 1969-88 mean harvest of 46,000 for this species (Appendix Table 11), and the sixth consecutive year catches have exceeded 90,000 fish. July 11 proved the peak harvest day

for chums. Pink salmon harvests have exceeded 1,000 fish in this district only once since 1914 and this year was no exception as only slightly over 200 pinks were landed. The coho harvest of 52,000 fish was the third largest on record, nearly three times the 1969-88 mean of 19,000 (Appendix Table 13). Peak day in the coho fishery was August 24.

Escapement index surveys were flown August 14 for chinook and chum salmon (Table 28). These yielded total indices of 9,680 chinook and 56,690 chums. The chinook index was the largest observed since comprehensive surveys were initiated in 1983, well above the 6-year mean of 6,600. The chum index was the second largest obtained over the period 1982-88. Pink salmon were observed on the spawning grounds during coho management surveys August 23 and September 7 and a total escapement index of 2,400 pinks was obtained. Cohos were surveyed seven times during August and September in the lower 20 miles of King Salmon River and in the Ugashik River rapids and lagoon. The surveys were conducted in conjunction with those done in the Egegik District providing data necessary to evaluate weekly fishing schedules in both districts. A total of 28,000 cohos were observed in the Ugashik District escapement during these surveys, the largest number of cohos ever documented in the district escapement. This is only a partial escapement index however, as fish passing through the mainstem rivers and into the creeks during periods other than mid-week were not counted. No tributary creeks were surveyed.

Dog Salmon River was not surveyed due to murky waters, and no late season surveys were conducted. However, it is apparent a strong run of coho salmon returned to the district in 1988 and a large escapement was obtained.

A total of 27 buyers operated in the district during the season, one less than in 1987. Nearly all the catch was either frozen on floating processors or tendered to other districts for processing as in recent years. No new canning operations were initiated nor were any instances of buyer capacity saturation documented in the district.

Overall the season was a success. The sockeye fishery came up short of expectations and the extensive closures late in the season were necessary to approach the escapement goal. The practice of waiting for substantial sockeye movement into the lower end of Ugashik River prior to authorizing fishing periods was not too popular with the small fleet that remained in the district all season. They would have preferred to fish often and maximize their catches before the large fleet returned to the district for the peak of the run. However, it probably helped minimize interception of fish bound for other districts. The 4-days per week fishing schedule before and after the Emergency Order period appears to have been received well and it helped provide strong escapements of chinook, chum, and coho salmon as it was designed to do.

Nushagak District

The preseason sockeye salmon forecast for the Nushagak District in 1988 was 6.0 million, and included 3.0 million for Wood River, 1.2 million for Igushik River, and 1.8 million for Nuyakuk River (Table 1). This would have allowed a potential harvest of 3.9 million sockeye after the removal by the Japanese on the high seas, and the False Pass fishery. That level of harvest would have slightly exceeded the recent 10-year average of 2.6 million and been well over the 20-year average of 1.4 million (Appendix Table 9).

Close examination of the forecast age composition suggested that the 3-ocean component of the Wood River run could make up a large percentage of the total return to that system. With that in mind, fishery managers were aware that a mid-season shift in the Wood River escapement goal might be necessary (per the Department's variable escapement goal policy for that system). It has been demonstrated that 3-ocean sockeye in the Wood River system tend to spawn heavily in the rivers and creeks where space appears to limit production. This is particularly evident in the two major river systems (Agulowak and Agulukpak). The Wood River drainage has a point escapement goal of 1,000,000, but the variable escapement policy allows fishery managers to adjust the goal from 800,000 to 1,200,000 inseason. A reduction of the goal to 800,000 helps to reduce crowding on the spawning grounds if it appears that the run contains over 60% three-ocean sockeye salmon,

which tend to spawn heavily in the two major rivers. It also allows the manager to adjust upward to a maximum of 1,200,000, if most of the return is 2-ocean fish which are primarily beach spawners and tend to distribute well throughout the lake system.

The 1988 Nushagak chinook salmon forecast predicted a return of 139,000, which was below the 20-year average for this district (Appendix Table 39). In order to help ensure an adequate chinook salmon escapement, in light of the low forecast, and due to concerns for declining returns in recent years, the Board of Fisheries passed several new regulations that were in effect for the 1988 season. The salmon season was changed in all districts of Bristol Bay by one month from May 1 to June 1; the chinook (king salmon) line was eliminated in the Nushagak District, thereby reducing the available fishing area to the traditional sockeye salmon boundary, and the emergency order period was adjusted to begin on June 1 in the Nushagak District.

With the low projected return and small harvestable surplus, commercial fishing was unlikely in the early part of June, but the rate of chinook escapement was monitored intensively on a daily basis, using data gathered from the subsistence catches on the local beaches, at Lewis Point, and from sonar enumeration at the Portage Creek site.

Another new regulation in 1988 concerned subsistence fishing within the commercial district. For the first time,

the staff was directed by the Board of Fisheries to provide local residents with the opportunity to obtain subsistence salmon from the commercial district, during periods of long closures. Due to the absence of any early commercial fishing in 1988, two emergency orders were issued which allowed subsistence fishing in the Nushagak District. A schedule of two 24-hour periods per week was allowed from June 1 through June 14, and one additional 24-hour period was allowed on June 17 (Table 11). However, fishing success was limited due to the calm weather and low fish passage during the openings.

The subsistence harvest, and the low sonar counts, confirmed that only a limited number of chinook had escaped into the lower Nushagak River throughout much of June (Table 10). Therefore, the possibility of a directed chinook fishery became even less likely.

By June 17, some sockeye and chum salmon were beginning to appear in the subsistence nets on the local beaches, so the first district test boat of the season was deployed in an effort to determine their distribution and abundance. This vessel failed to locate any concentrations of fish in the areas that were sampled. Trips on June 19, 20, and 22 also failed to find any large quantities of fish, but a slight increase in the catch was noted on June 22 and 23 when a small number of sockeye were landed (Table 10).

On June 24, the test boat found migrating sockeye salmon at 12 of 13 stations fished, and a good showing of jumpers were

reported at Clark's Point. Subsistence nets at Kanakanak Beach averaged 15 chinook per net, Scandinavian Beach 14 per net, and Lewis Point nets averaged 5.6 each, thus indicating an additional quantity of fish had moved out of the district and escaped the commercial fishery (Table 10).

Test boat catches on the morning of June 25 increased dramatically, and 10,880 index points were tallied in a two-minute set at Ralph Slough, just above the commercial district. Fog was present in the early morning, but an aerial survey completed before noon documented 25,000 sockeye in the lower Nushagak River. Subsistence fishermen on the local beaches did very well overnight, and several averaged over 100 sockeye per net. Based on good test fishing indices above the commercial district, the large subsistence catch of chinook, sockeye, and chum salmon, (which was an indication that "significant" escapement was occurring), and with good numbers of fish visibly moving into clear water in the lower Nushagak River, a six-hour commercial fishing period was announced at 12:00 noon on June 25, for the same evening.

The resultant harvest of 161,000 mixed fish was disappointing, but the fleet efficiency was reduced due to the short six-hour fishing period and dense fog that moved in just one hour before the opening. The chinook catch of just over 3,000, was particularly alarming, after considering that this was the first commercial opening of the season, and well after the historical peak for that species. Commercial catch samples

from sockeye taken during that fishing period compared well with the preseason age composition forecast. The chinook escapement was still low, but higher subsistence catches on local beaches indicated that additional fish had passed the commercial district yet to be enumerated at the Portage Creek sonar site. To provide some additional protection for chinook salmon, the use of large mesh gear was prohibited (by emergency order) for the opening. With the extremely low chinook catch, it was obvious that the run was very weak. It was unlikely that anyone used large mesh gear after June 26, so there was never a directed chinook fishery in the Nushagak District in 1988.

At this juncture, the chinook escapement was still a concern, but with the large showing of sockeye moving into the area above the commercial district, it was not prudent to delay an opening any longer since the staff still assumed there were nearly four million sockeye to be harvested.

To avoid any surprises, the management team felt it was prudent to continue an aggressive test fishing effort, combined with daily aerial surveys of the three major river systems. Dense fog on the morning of June 27 prevented any surveys, but a test boat was deployed, and located good numbers of fish in 19 of 20 areas sampled. The subsistence nets on the local beaches did very well on sockeye too, which was somewhat surprising so soon after the commercial harvest. The species composition of the catch was also interesting since both the

subsistence harvest and the test boat landings were predominantly sockeye, a further indication that the run was continuing to build.

The sockeye escapement past Wood River tower began to increase in the early morning of June 27, and the hourly counts continued to build throughout the day. Several reports of fish sightings along the beach at Clark's Point were received during the day, so it was likely that additional fish would escape on the evening tide. Therefore, a commercial opening was announced for June 28, in an effort to balance the harvest with the expected escapement. Again, the resulting harvest (180,503) was rather disappointing (Table 17). With a 12-hour opening during the hours of daylight, and under good conditions, a larger harvest was anticipated given the preseason forecast.

With the traditional "peak" of the run just a few days off, a test boat was deployed on the afternoon tide on June 29, only 14-1/2 hours after the fishery closed. The staff felt it was necessary to send the boat out quickly in order to keep informed on the buildup of fish in the district, and to provide more options for the next fishing period. To delay the test boat for an additional tide would have been 29-1/2 hours after the closure, which would not have allowed another fishery until the afternoon of June 30, or the morning of July 1. The large forecasted harvest, and the possibility of delayed run timing weighed heavy in the decision-making process. Since the run

was still building, the staff did not want to react too conservatively to the negative indicators.

Test boat catches on June 29 were quite low, though they did locate some sockeye at nearly all stations fished (Table 10). Aerial surveys of Wood River and the lower Nushagak confirmed that low numbers of sockeye were present, so the only option was to wait for additional escapement. On the early morning tide of June 30, another test boat found very few migrating sockeye, and caught fish at only five of 18 stations (Table 10). Test boat catches began to improve on the afternoon tide of June 30, but the fish were still clearly in the outer part of the district. A tender traveling into the Nushagak District also reported a good showing of fish approximately four miles north of the Coast Guard bell buoy.

At this same time, both the Naknek/Kvichak, and the Egegik Districts were experiencing a large inshore movement of sockeye. Due to the good reports of fish in the outer part of the district, the improvement in the test boat catches, and the strong showing in other districts, the fleet was advised to "get out of the harbor" on the morning tide on July 1, for a possible short notice opening on the afternoon tide that same day.

The test boat's effectiveness was limited by dense fog on the morning of July 1. However, it was clear that there was not a large volume of sockeye in the upper part of the

district, but there did appear to be good numbers of fish from Queen Slough to the top of Flounder Flats.

Another test boat was deployed on the afternoon tide of July 1, and that vessel documented a heavy volume of sockeye from Pile Driver Creek to Clark's Point, a considerable increase from the mornings tide. It is standard procedure for Nushagak test boats to be deployed at high slack tide and fish the ebb tide down the district. This helps managers determine if the fish are actively migrating upstream into the current, or simply milling. Therefore, it is necessary to initiate test fishing coincident with the turn of the tide. To follow the established fishing pattern, the boat could not start the drifts until almost 5:00 p.m., on the afternoon tide of July 1.

For the sake of consistency, the Department attempts to announce all fishing periods at 09:00, 12:00, 15:00, 18:00, and 21:00, and by starting the test boat at 17:00, only a limited number of sets could be made before the 21:00 announcement. It was clear that the fish were actively migrating, but uncertain whether they would continue moving into the rivers in good numbers, or lose momentum and therefore be available to the fishery. The question was whether to announce at 9:00 p.m. for a fishing period early the next morning, or delay until we were sure of a solid piece of escapement. The danger with delaying, was the real possibility of getting a large percentage of the escapement goal in a single tide, then losing the ability to manage for an orderly harvest for the rest of the season by

plugging the processors. With a six million forecasted return, that scenario was still a real possibility. From a different perspective, a large removal by the fleet could easily jeopardize escapement objectives if the run proved to be less than forecast. Since the normal Nushagak peak was still three to five days away, and having only accounted for 550,000 sockeye from the large forecasted return, we elected to announce a seven-hour fishing period, starting at 3:00 a.m. July 2.

Another option not considered at the time, would have been to simply ask the fleet to standby until more test sets could be made above the marker to confirm that fish were moving in. If it had been July 10 instead of July 1, we could not have gambled as much on fish yet to arrive.

The harvest of 490,000 sockeye on July 2 was the largest of the season, and at the time, it appeared that only a small number of fish had entered the escapement. Early reports from the grounds indicated a large catch had occurred, but could not be confirmed on the early morning aerial survey, due to fog and smoke from forest fires present in the area, which greatly reduced visibility. In this instance, there was no question that the combination of darkness, fog, and the short opening reduced the efficiency of the fleet, and thus the harvest.

Immediately after the period closure, we began to get reports of fish throughout the district. Subsistence catches on the Dillingham beaches were very heavy on the morning of

dramatically. With the Wood River escapement at approximately 300,000, Igushik nearing 100,000, and Portage Creek at less than 200,000, there was no option but to wait. Test boats were sent out on both flood tides each day, and daily aerial surveys were flown whenever weather permitted. On a very gradual basis, test fishing catches as well as escapements began to increase. Daily updates were broadcast on marine VHF channel 7, and KDLG, and the fleet was kept on short notice for many days.

On July 9, there were several reports of a large volume of fish building in the district. On the same day test boat catches also significantly improved and good numbers of fish were documented from the mouth of Wood River to the head of Ekuk Bluff. However, nearly all of the good sets were made on milling fish, with strikes on both sides of the net. Clearly, there was a volume of fish in the area, but with relatively low escapements in all three systems, there was no option but to closely monitor the run and wait until a large volume of fish began actually migrating up the rivers.

A test boat fished the upper stations (north of Nushagak Point) in the early morning hours on July 10, but the indices in this critical area above the fishing district, remained low (Table 10). However, on the afternoon tide, a second boat found heavy concentrations of fish moving in the same area. A new record test fish index was established in the Nushagak District, when 125 sockeye were caught at Grassy Island in a

1.16 minute set (64,322 index points). That was the largest reported set in the 20-year history of the program. With this confirmation of a large escapement above the commercial district, a six-hour fishing period was announced for the evening of July 10.

The harvest of just over 209,000 sockeye was again somewhat disappointing, but not as disturbing as the low number of fish (8,200) observed migrating in the Wood River, on an early morning aerial survey July 11. In the lower Nushagak, approximately 25,000 migrating sockeye were observed. With the heavy abundance of fish documented by the test boat the previous afternoon at Grassy Island, Picnic Point and Tule Point, it was difficult to believe that so few fish were visible moving into clear water the next morning.

At 9:00 a.m. on July 11, a rather pessimistic update was broadcast to the Nushagak fleet detailing the volume of the catch on the previous evening, and by the poor showing of escapement in the rivers. Based on the quantity of fish visible on the morning aerial survey, it was estimated that by the end of the day the Wood River sockeye escapement would total 650,000, about 81% of the goal, Igushik, 140,000, 70% of the goal, and Nushagak, 360,000, roughly 72% of the goal. In the update, no mention was made of future fishing plans, and therefore, most of the fleet elected to return to the boat harbor. In an early afternoon staff meeting, discussion focused on the large number of fish that seemed to be present

in the closed area before the fishery. There was also reference to the good signs of fish noted on the morning's aerial survey observed in muddy water near the outlet of Wood River. After much discussion, it was concluded that the fish probably had held overnight in muddy water near the river mouth and were just beginning to move up at the time of the aerial survey. With roughly 650,000 fish assured in Wood River, and only 150,000 needed to reach the 800,000 goal, perhaps things were not as desperate as they had first appeared.

From the tide table, it was apparent that if the fleet went dry on that tide, a considerable amount of time would elapse before another commercial opening could take effect. On the chance that the escapement might improve faster than expected, the local radio station was asked to immediately advise all Nushagak District fishermen to remain afloat. All of the processors were notified, and the word quickly spread through the fleet. Although there was no certainty of an opening, with the fleet afloat, at least the option of fishing was still available. On an afternoon aerial survey, over 42,500 sockeye were observed in the upper third of Wood River, and signs of fish were visible clear down to Dragnet dock at the mouth. The volume of fish in the lower Nushagak had also increased, and 56,800 fish were observed below the sonar site.

Based on the strength of the fish showing in the inshore areas, a 12-hour opening was announced to begin at midnight July 11. The resultant harvest totaled 192,000 mixed fish and

with the relatively low catch Bay-wide, the price increased to \$2.25 for sockeye on July 12.

The previous discussion has made little no mention of how the Igushik River was managed during the 1988 season. This was due to the low effort, the modest catches in that section, and the relatively steady escapement. Throughout the season, the escapement rate past the Igushik tower just slightly exceeded that necessary to reach the season-end goal of 200,000. The test fish project in the lower river tended to over-estimate the actual escapement during the middle of the season, but in general terms, it correlated fairly well. At no time during the 1988 season was serious consideration given for an opening of only the Igushik Section. The indicated run strength simply did not justify additional fishing effort from the entire fleet. When the main Nushagak District is open, the Igushik fishing effort mostly consists of set nets, which are not as effective as the drift fleet in stopping the inshore migration.

By July 12, the Igushik escapement rate had declined to the point where it was unlikely that the goal could be reached. However, the lower management range of 150,000 was assured, and the commercial removal was so low, that the fishery was allowed to remain open whenever the main Nushagak District was fishing. Several of the more aggressive set net fishermen left Igushik and traveled to Togiak District in the later part of the season.

The reduced Wood River escapement goal of 800,000 was achieved on July 12, and a large volume of fish were also passing the sonar counter at Portage Creek, with good numbers of fish visible below. The sockeye escapement rate in the Igushik River was dropping, but certain to reach the lower management range. Therefore, the commercial fishery was extended for 25 hours, and extended again for another 49 hours, until 2:00 p.m. July 15. In order to ensure some late season escapement, to break up the harvest, and to reduce a developing "line fishery", we elected to have two brief closures over the weekend, and then returned to five-day-per-week fishing on Monday, July 18.

After July 25, the fishing schedule was reduced to three days per week by emergency order, and a mesh-size restriction of 5-3/8 inches or larger, was imposed. The authorization to specify mesh size during the late season was delegated to the staff, by the Board of Fisheries, at the December 1987 meeting. The intent of this new regulation was to provide for the harvest of an expected surplus of coho salmon while reducing the incidental catch of pink salmon, which were expected to be weak due to the poor parent year escapement in 1986. The mesh size restriction appeared to reduce the harvest of pinks, and the season's total catch was held to under 250,000, while the escapement was close to 500,000, the lower end of the management range. With a total return of over 700,000 pinks to

the Nushagak District in 1988, the 72,000 escapement in 1986, produced over a 10 to 1 return per spawner.

The good coho run in 1984 was expected to produce a strong return in 1988, but such was not the case. The catch during the week of July 25 was below average, and the escapement rate also fell behind schedule, so the fishery was restricted to 48 hours, the week of August 1. When the coho escapement rate failed to significantly improve by August 15, it became necessary to close the fishery until further notice. The final coho escapement estimate past the Portage Creek sonar site totaled approximately 131,000 through August 23 when the project was terminated, 87% of the season goal of 150,000. However, in most years subsistence nets on local Dillingham beaches catch coho until late September, so some additional escapement undoubtedly occurred after the counters had been removed.

The 1987 season saw the first six-hour fishing period in Bristol Bay history, and post-season comments about this type of approach were all favorable. Consequently, this same management tool was employed in the Nushagak District in 1988, and again proved effective in controlling the number of fish harvested. Prior to the season, the staff made several efforts to inform fishermen not to expect long advance notices prior to commercial openings. Short notice openings were avoided when unnecessary, but having the fleet on standby during the peak of

the run allowed management more flexibility for "fine tuning", and to react quickly to changes in the escapement.

Togiak District

The 1988 sockeye salmon forecast for the Togiak River was 733,000, of which 63% were expected to be 3-ocean fish and 35% 2-ocean fish (Table 2). With the sockeye escapement goal of 150,000, a harvestable surplus of 537,000 was potentially available in the Togiak River Section. Smaller sockeye runs to other drainages in the district (primarily Kulukak Section) do occur, but these were not included in the forecast because age composition and escapement data used to generate the forecast is unavailable.

Togiak District is managed differently than other areas of Bristol Bay using a fixed weekly fishing schedule of three days per week in the Kulukak Section, four days per week in Togiak Section, and five days per week in the Osviak, Matogak, and Cape Peirce Sections, although the schedule may be adjusted by emergency order as necessary to achieve desired escapements.

Because the projected harvest was 48% more than the most recent 10-year average and two times larger than the previous year's harvest, a liberal fishing schedule was anticipated during the sockeye run. The Department did not generate a formal chinook salmon forecast this season, although a declining trend in chinook returns observed over the last several years was a management concern going into the season.

The first landing of the 1988 season (two chinook) occurred on June 6 (Table 20) and small numbers of sockeye and chinook were harvested throughout that week with a total of 14 deliveries in the Togiak Section. After the weekend closure, fishing resumed June 13 and continued through June 18 with very high catches in the Togiak Section for this date (ten times the 20-year cumulative average).

High turbid water conditions prevented aerial surveys of the Togiak River, but better conditions allowed a survey of the Kulukak and Kanik Rivers on June 29 to determine the early escapement rate of sockeye salmon. Although no fish were observed in the Tithe Creek Ponds, 8,200 sockeye and 4,300 chums were observed in Kulukak River with over 6,000 already in Kulukak Lake. Meanwhile the cumulative harvest in Kulukak Section through June 30 stood at 28,000, two times the long-term (1960-87) average while Togiak Section catches continued strong with a cumulative of 130,000 through the end of the weekly fishing period July 1. Age composition analysis from commercial catch samples taken June 14-27 from Togiak Section showed 94-96% 3-ocean fish, over 30% higher than the preseason forecast.

Drift effort began to concentrate in Togiak Section with daily deliveries reaching the season's peak on July 5 with a total of 245 landings. In contrast, only 31 landings from Kulukak were posted on that same day. The commercial sockeye harvest in the Togiak Section was running nearly 4-6 times

higher than the historical average catch for the period June 26-July 5.

The cumulative sockeye escapement past the Togiak tower stood at 36,450 through July 6. The daily escapement rate had increased for three consecutive days with tower counts of 4,248, 5,826, and 16,404 for July 4-6. This rate was well above the long-term average daily escapement for this time period. With both catch and escapement indicating a very strong sockeye run developing much as projected by the pre-season forecast, an emergency order was announced at 3:00 p.m. Thursday, July 7, extending the weekly fishing schedule in the Togiak Section from 9:00 a.m. July 8 until 9:00 p.m., July 9.

The harvest during the week of July 6-9 produced the season's peak catches in Togiak Section with 180,000 landed, while only 8,000 sockeye were landed in Kulukak Section during the three days of open fishing there. Drift effort, which amounted to 66 boats for the entire district, had dropped to five boats (and 12 setnets) in Kulukak for that week. Historical data (1960-86 average) indicated that 43% of the Togiak Section's cumulative harvest has occurred by this date while 58% of the Kulukak harvest has been accounted for. Based on these comparisons, both the Togiak and Kulukak River runs were well above average and stronger than forecast.

Another aerial survey of the Kulukak River, Togiak River, and Tithe Creek Ponds was flown on July 12 to assess escapement. Visibility was fair on the Togiak River, but

excellent on the Kulukak where nearly 11,000 sockeye were observed in Kulukak Lake alone. The main Kulukak River had another 1,300 sockeye mixed with dense schools of chums in the lower sections and 400 chinook were also noted. Spawners were also beginning to accumulate in the lower sections of the Tithe Creek Ponds and it was obvious that despite commercial fishing effort, fish were still escaping in good numbers. Fish abundance in Togiak River was strong throughout its entire length, showing 4-5,000 in each index area, although survey conditions precluded counting the bottom section below Gechiak Creek. A total of 13,300 sockeye were enumerated, which equated to an expanded estimate of at least 25,000 fish in the river.

By July 12 the Togiak tower had accounted for 126,114 sockeye, with daily escapements ranging between 7-13,000 for the period July 9-12. This rate was well above the long-term average daily escapement needed to obtain the escapement goal of 150,000 and indicated that the goal would be achieved within 24-48 hours. Given the strong indications of a run significantly greater than forecast and the current catch/escapement ratio, additional fishing time was deemed necessary to harvest available surplus sockeye and chum salmon. An adjustment of the weekly fishing schedule was announced at 12:00 noon July 13 extending fishing in both the Togiak and Kulukak Sections from 9:00 a.m. Thursday, July 14 until 9:00 a.m. Sunday, July 31 (Table 11).

The final sockeye catch totalled 817,000 for the entire district, 53% above the 1968-87 average, and about 7% above the most recent 10-year average (761,000). The Togiak Section catch amounted to 675,000 while the Kulukak Section comprised 136,000 or 17% of the total.

Escapement enumeration at Togiak Lake was discontinued on August 1 after posting a cumulative tower count of 276,612. When the tower count was combined with the estimated escapement in the tributaries and main river stem, the total cumulative sockeye escapement was estimated at 309,000. The escapement plus the Togiak Section catch yielded a total run of 983,572, which was 34% higher than the preseason forecast.

In contrast to the sockeye run, the 1988 Togiak District chinook salmon catch of 15,600 was 37% less than the 1968-87 average and 47% less than the most recent 10-year average. Comprehensive aerial escapement estimates of chinook were made on the spawning grounds. The counts totalled 6,400 for Togiak River, and 1,500 for Kulukak River. An additional 2,580 were estimated in the Osviak, Negukthlik, and Ungalikthluk Rivers. The total district chinook escapement was estimated at 10,400 which was 47% less than the most recent 10-year average and one of the lowest on record.

The Togiak District chum salmon harvest proved to be a new record high with total landings of over 471,000. The strong chum run developed early in the season with significant catches occurring in late June (31,000 on June 30). The strong return

yielded sustained daily catches over 20,000 fish with three successive weeks (June 27 - July 9) when catches exceeded 100,000 chums. The record catch combined with a 412,000 district-wide aerial escapement estimate, produced a total run of 883,000. This was also the largest total run of chum salmon on record for Togiak District topping the 1977 run of 767,000. It was 77% higher than the recent year average and over two times higher than the 1968-87 average (Appendix Table 40).

Pink salmon are not a commercially targeted species in Togiak but the catch of 57,000 was nearly six times the historical average for the even-year return to this district (Table 20). Despite the large harvest, the escapement in Togiak River was very strong. The U.S. Fish and Wildlife Service (USFWS), operating a sonar counter on the lower Togiak River, generated a preliminary pink salmon escapement estimate of 142,500. An additional 9,600 spawning pinks were documented by aerial survey in the Kulukak River.

Due to the increased interest in coho salmon and the growing commercial fishing effort in recent years, management of this species has become increasingly difficult with the limited data available. The 1988 coho salmon return to the Togiak District was expected to be strong. The parent year run in 1984 was exceptionally strong, posting the highest documented commercial catch as well as escapement on record (1980-87). However, poor coho returns to Nushagak District, which often reflect the strength of the later Togiak run, and

small catches of coho in late July, provided early indications that a cautious management approach was necessary.

Because the strength of the coho run was uncertain, the fishing schedule was reduced to three days per week beginning August 1, from 9:00 a.m. Monday to 9:00 a.m. Thursday. By August 18, the coho harvest stood at just under 9,000 fish. This was only 36% of the historical average catch through this date. On the same day, the coho escapement, which was being monitored with sonar equipment by the USFWS on the lower Togiak River, was estimated at 6,800 fish, only about 10% of the minimum escapement goal of 50,000. Given the low numbers, the entire Togiak District was closed on Monday, August 22 to boost escapements into the Togiak and Kulukak Rivers.

During the closure, aerial surveys of the rivers were impossible due to poor weather and turbid water conditions. However, the coho escapement past the sonar site had increased to 14,000 fish by August 26. A short (three-day) commercial fishing period was announced for all sections of the Togiak District beginning Monday, August 29 so that catch per unit effort data from the commercial fleet during the historical peak period of abundance could be used to help determine the coho run strength.

By September 4 the cumulative coho escapement estimate in the Togiak River stood at 34,000 fish. District catches for the three-day period totalled 7,200 or only 29 fish per delivery. Historically the average coho harvest for the last

week in August has exceeded 22,000 fish. With over 91% of the catch accounted for by this date, the remainder of the run could not sustain a commercial harvest if the escapement goals for the district were to be achieved. Therefore, fishing in all sections of the Togiak District was closed effective September 5 for the remainder of the season.

Aerial spawning ground surveys were later conducted by the USFWS in October. The aerial coho escapement estimate for Togiak River proved to be significantly less than the sonar estimate. This was the second year that there was a significant discrepancy between the final sonar estimate for the Togiak River (65,000) and the aerial count (25,770). After further analysis the sonar count was selected as most representative for the Togiak River drainage, and when combined with aerial survey results from the other drainages, the final district escapement totalled 86,330 cohos.

1988 SUBSISTENCE SALMON FISHERY

Archaeological evidence in Bristol Bay indicates that indigenous residents have utilized salmon as a food source since prehistoric times. Salmon continues to be a significant subsistence resource in all Bristol Bay communities. All five species of Bristol Bay salmon are utilized for subsistence purposes, but the most popular are sockeye, chinook, and coho. Many residents continue to preserve large quantities of fish

through traditional methods such as drying and smoking. Fish are also frozen, canned, salted, pickled, fermented, and eaten fresh. In some communities significant numbers of fish are put up for dog teams as well.

Regulations

In 1985, several court decisions threatened the viability of the state subsistence law and the Alaska legislature responded by adopting major changes in the statute the following year. Modifications made in 1986 mandated that subsistence uses of fish and game be limited to customary and traditional uses by residents of rural areas. It also confirmed subsistence as a priority over all other uses. The Board of Fisheries was authorized to establish personal use fisheries (discussed below) for those residents who did not qualify as subsistence users under the new definition. Finally, the law stated that hunting and fishing regulations must provide specifically for subsistence uses.

To implement the new law in Bristol Bay, the Board of Fisheries adopted regulations for the 1988 season which limited subsistence fishing in the Nushagak and Togiak Districts to drainage residents. Subsistence fishing in the Naknek River and Iliamna-Lake Clark drainages continued to be restricted to residents domiciled in those areas as well. All state residents were eligible to participate in subsistence fishing in the Egegik and Ugashik drainages.

For the first time since statehood, the Board of Fisheries authorized limited subsistence fishing in the Nushagak commercial district by emergency order. In recent years, declining chinook and coho stocks resulted in longer commercial closures and some residents had an increasingly difficult time obtaining subsistence fish. The Department established five 24 hour emergency openings between June 1 and June 18. Volunteers were recruited at Clarks Point, Ekuk, and Igushik to collect and report catch information to the Department within 24 hours. In general, effort and catch were low during these openings for several reasons. Openings were set by the calendar and did not coincide with the chinook run. There were no openings at all during the coho season. Twenty-four hour openings were considered too short since only one tide could actually be fished. For some residents the allowable limit of ten fathoms was a problem if they did not already have a short net. Families who had drift permits but no commercial set net sites were sometimes unable to secure access to a site. In general, residents want to continue this fishery but think extended openings, longer gear, and smaller distance between sites would more effectively meet their needs.

Permit System

In order to document the subsistence removal of salmon, a permit system was gradually introduced throughout the region in the late 1960's and early 1970's. Much of the growth in the number of permits issued during these years reflects increasing

compliance with the permitting and reporting requirements and the level of effort expended each year by the Department in making permits available, contacting individuals, and reminding them to return the harvest forms. With the exception of residents of a few communities, most fishermen are obtaining permits and reporting their catches. However, fish removed from commercial catches for immediate consumption or future personal use are probably not included.

The permit system has been refined and expanded and this year a total of 934 permits were issued (Table 43). This number is slightly below the number of permits issued in 1987 but the number of personal use permits issued for the Nushagak District (Table 44) accounts for most of the difference.

Growth of the local population is probably the main factor responsible for the increased subsistence harvest. However, some of this increase has been offset by the replacement of dog teams with snow machines. Although there has been a renewed interest in recreational dog mushing in some communities, the number of dog teams in the regions does not approach the numbers in the past when dog teams were a critical means of winter transportation.

Subsistence fishermen harvested a total of 160,733 fish in 1988, of which sockeye represent 77.4 percent, chinook 7.3 percent, coho 4.7 percent, pink 4.6 percent and chum 6.0 percent. This amount is nearly identical to the 20-year average harvest and somewhat below the recent (1979-88) average of 175,295

fish. This harvest represents .6 percent of the total 1988 salmon run and 1.7 percent of the total escapement.

1988 PERSONAL USE FISHERY

Competition for resources and limited available fishing space resulted in regulations restricting subsistence fishing in the Naknek River and Iliamna-Lake Clark drainages to only those persons domiciled in those areas. In 1982 a personal use fishery was allowed for the first time in Bristol Bay. It gave non-traditional subsistence users and non-watershed residents the opportunity to harvest salmon in times of surplus. The personal use fishery was restricted to the Naknek River drainage and was allowed only when the sockeye escapement had reached 900,000 fish.

In 1988, a personal use fishery was established in the Nushagak District as well. This fishery was open to state residents from July 1 to July 31. The season catch limit was 70 fish, no more than five of which could be chinook. A total of 44 personal use permits were issued. The total harvest was 1,759 fish, most of which were sockeye (1,569). In addition, 125 chum, 77 chinook, and 4 pinks were harvested.

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Table 1. Comparison of inshore sockeye salmon forecast versus actual run, escapement goals versus actual escapements, and projected versus actual commercial catch, by river system and district, in thousands of fish, Bristol Bay, 1988.

| District and River System | Inshore Forecast | | | Escapement ² | | | | Inshore Catch ² | | |
|--------------------------------------|-----------------------|--------|---------------|-------------------------|--------------|--------------------|-------------------|----------------------------|--------|-------------------|
| | Forecast ¹ | Actual | Percent Error | Goal | Range | Actual | Percent Deviation | Projected Harvest | Actual | Percent Deviation |
| NAKNEK-KVICHAK DISTRICT | | | | | | | | | | |
| Kvichak River | 9,306 | 6,772 | 37 | 5,000 | 4,000- 6,000 | 4,065 | 23 | 3,718 | 2,707 | 37 |
| Branch River ³ | 427 | 322 | 33 | 185 | 170- 200 | 195 | -5 | 215 | 127 | 69 |
| Naknek River | 2,450 | 1,753 | 40 | 1,000 | 800- 1,400 | 1,038 | -4 | 1,295 | 715 | 81 |
| Total ³ | 12,182 | 8,847 | 38 | 6,185 | 4,970- 7,600 | 5,298 | 17 | 5,228 | 3,549 | 47 |
| EGEGIK DISTRICT | | | | | | | | | | |
| | 5,944 | 8,013 | -26 | 1,000 | 800- 1,200 | 1,613 ^a | -38 | 4,568 | 6,400 | -29 |
| UGASHIK DISTRICT | | | | | | | | | | |
| | 3,422 | 2,175 | 57 | 700 | 500- 900 | 643 ^b | 9 | 2,506 | 1,532 | 64 |
| MUSHAGAK DISTRICT | | | | | | | | | | |
| Wood River | 3,021 | 1,846 | 39 | 1,000 | 800- 1,200 | 867 | -8 ^c | 1,830 | 979 | 87 |
| Igushik River | 1,166 | 426 | 174 | 200 | 140- 250 | 170 | 18 | 892 | 255 | 250 |
| Mush/Mul River | 1,834 | 957 | 92 | 500 | 300- 700 | 483 | 4 | 1,218 | 474 | 157 |
| Total ³ | 6,021 | 3,229 | 86 | 1,700 | 1,240- 2,150 | 1,520 | 1 | 3,941 | 1,708 | 131 |
| TOGIK DISTRICT | | | | | | | | | | |
| | 733 | 984 | -26 | 150 | 100- 200 | 309 ^d | -51 ^e | 537 | 675 | -20 |
| TOTAL BRISTOL BAY³ | | | | | | | | | | |
| | 28,302 | 23,251 | 22 | 9,735 | 7,610-12,050 | 9,383 | 4 | 16,758 | 13,864 | 21 |

1 Final Bristol Bay sockeye salmon forecast of inshore run for 1988.

2 Escapement data is final, while catch data is preliminary.

3 Due to rounding, the totals may not equal the sum of the district totals.

a Including sockeye observed in King Salmon River.

b Including sockeye run to Mother Goose and Dog Salmon River systems.

c This reflects the adjusted escapement goal (800,000) in 1988 per the Department's variable escapement goal strategy for this river system.

d Including sockeye runs to various tributaries and minor river systems of Togiak District.

e This reflects the published escapement goal for Togiak Lake and the actual 1988 escapement of 276,612.

Table 2. Inshore forecast of sockeye salmon returns by age class, river system and district, in thousands of fish, Bristol Bay, 1988.

| District and River System | Age Class (Brood Year) | | | Age Class (Brood Year) | | | Total |
|--------------------------------------|------------------------|----------------------|---------------|------------------------|----------------------|---------------|--------|
| | 4 ₂ | (1984)5 ₃ | (1983)2-Ocean | 5 ₂ | (1983)6 ₃ | (1982)3-Ocean | |
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | | | | | |
| Kvichak River | 4,817 | 2,915 | 7,732 | 1,275 | 299 | 1,574 | 9,306 |
| Branch River | 171 | 21 | 192 | 211 | 24 | 235 | 427 |
| Naknek River | 289 | 800 | 1,089 | 702 | 659 | 1,361 | 2,450 |
| Total | 5,276 | 3,736 | 9,012 | 2,188 | 982 | 3,170 | 12,182 |
| <u>EGEGIK DISTRICT</u> | | | | | | | |
| | 609 | 2,191 | 2,800 | 2,195 | 949 | 3,144 | 5,944 |
| <u>UGASHIK DISTRICT</u> | | | | | | | |
| | 760 | 1,291 | 2,051 | 943 | 428 | 1,371 | 3,422 |
| <u>NUSHAGAK DISTRICT</u> | | | | | | | |
| Wood River | 1,116 | 190 | 1,306 | 1,639 | 77 | 1,716 | 3,022 |
| Igushik River | 247 | 40 | 287 | 824 | 55 | 879 | 1,166 |
| Nuyakuk River | 273 | 11 | 284 | 1,472 | 78 | 1,550 | 1,834 |
| Total | 1,636 | 241 | 1,877 | 3,935 | 210 | 4,145 | 6,022 |
| <u>TOGIAK DISTRICT</u> | | | | | | | |
| | 239 | 28 | 267 | 448 | 18 | 466 | 733 |
| <u>TOTAL BRISTOL BAY¹</u> | | | | | | | |
| Number | 8,520 | 7,487 | 16,007 | 9,709 | 2,587 | 12,296 | 28,303 |
| Percent | 30.10 | 26.45 | 56.55 | 34.30 | 9.15 | 43.45 | 100.00 |

1 Sockeye salmon of several minor age classes are expected to contribute an additional 1-2% to the total return.

Table 3. Inshore run of sockeye salmon by age class, river system and district, in thousands of fish, Bristol Bay, 1988.^a

| District and River System | 4 ₂ | 5 ₃ | 2-ocean | 5 ₂ | 6 ₃ | 3-Ocean | Total |
|--------------------------------|----------------|----------------|---------|----------------|----------------|---------|-------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | | | | | |
| Kvichak River | | | | | | | |
| Number | 2,458 | 1,134 | 3,592 | 2,980 | 136 | 3,116 | 6,708 |
| Percent | 36.6 | 16.9 | 53.5 | 44.4 | 2.0 | 46.5 | 100.0 |
| Branch River | | | | | | | |
| Number | 155 | 31 | 186 | 130 | 3 | 133 | 319 |
| Percent | 48.6 | 9.7 | 58.3 | 40.8 | 0.9 | 41.7 | 100.0 |
| Naknek River | | | | | | | |
| Number | 455 | 319 | 774 | 479 | 450 | 929 | 1,703 |
| Percent | 26.7 | 18.7 | 45.4 | 28.1 | 26.4 | 54.6 | 100.0 |
| Total | | | | | | | |
| Number | 3,068 | 1,484 | 4,552 | 3,589 | 589 | 4,178 | 8,730 |
| Percent | 35.1 | 17.0 | 52.1 | 41.1 | 6.7 | 47.9 | 100.0 |
| <u>EGEGIK DISTRICT</u> | | | | | | | |
| Number | 582 | 3,028 | 3,610 | 2,692 | 1,587 | 4,279 | 7,889 |
| Percent | 7.4 | 38.4 | 45.8 | 34.1 | 20.1 | 54.2 | 100.0 |
| <u>UGASHIK DISTRICT</u> | | | | | | | |
| Number | 454 | 594 | 1,048 | 336 | 719 | 1,055 | 2,103 |
| Percent | 21.6 | 28.2 | 49.8 | 16.0 | 34.2 | 50.2 | 100.0 |
| <u>NUSHAGAK DISTRICT</u> | | | | | | | |
| Wood River | | | | | | | |
| Number | 525 | 20 | 545 | 1,231 | 19 | 1,250 | 1,795 |
| Percent | 29.2 | 1.1 | 30.4 | 68.6 | 1.1 | 69.6 | 100.0 |
| Igushik River | | | | | | | |
| Number | 87 | 3 | 90 | 315 | 7 | 322 | 412 |
| Percent | 21.1 | 0.7 | 21.8 | 76.5 | 1.7 | 78.2 | 100.0 |
| Nuyakuk River | | | | | | | |
| Number | 114 | 2 | 116 | 543 | 2 | 545 | 661 |
| Percent | 17.2 | 0.3 | 17.5 | 82.1 | 0.3 | 82.5 | 100.0 |
| Total | | | | | | | |
| Number | 726 | 25 | 751 | 2,089 | 28 | 2,117 | 2,868 |
| Percent | 25.3 | 0.9 | 26.2 | 72.8 | 1.0 | 73.8 | 100.0 |

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Table 3. (Page 2 of 2)

| District and River System | Number of Fish in Thousands | | | | | | Total |
|--------------------------------------|-----------------------------|----------------|---------|----------------|----------------|---------|--------|
| | 4 ₂ | 5 ₃ | 2-ocean | 5 ₂ | 6 ₃ | 3-Ocean | |
| <u>TOGIK DISTRICT</u> | | | | | | | |
| Number | 21 | 8 | 29 | 908 | 25 | 933 | 962 |
| Percent | 2.2 | 0.8 | 3.0 | 94.4 | 2.6 | 97.0 | 100.0 |
| <u>TOTAL BRISTOL BAY¹</u> | | | | | | | |
| Number | 4,851 | 5,139 | 9,990 | 9,614 | 2,948 | 12,562 | 22,552 |
| Percent | 21.5 | 22.8 | 44.3 | 42.6 | 13.1 | 55.7 | 100.0 |

- 1 Approximately 697,000 additional sockeye salmon of several minor age classes returning in 1988 are not included in this total.
- a The inshore run data does not include the 1988 Japanese high seas catch of maturing Bristol Bay sockeye or the 1987 Japanese catch of immatures.

Table 4. Inshore commercial catch and escapement of sockeye salmon, Bristol Bay, in numbers of fish, 1988.^a

| District and River System | Catch | Escapement | Total Run |
|--------------------------------|------------|------------|------------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | |
| Kvichak River | 2,706,667 | 4,065,216 | 6,771,883 |
| Branch River | 127,430 | 194,630 | 322,060 |
| Naknek River | 715,325 | 1,037,862 | 1,753,187 |
| Total | 3,549,422 | 5,297,708 | 8,847,130 |
| <u>EGEGIK DISTRICT</u> | 6,400,126 | 1,612,745 | 8,012,871 |
| <u>UGASHIK DISTRICT</u> | | | |
| Ugashik River | | 642,972 | |
| Dog Salmon River | | 3,080 | |
| Mother Goose System | | 8,360 | |
| Total | 1,531,615 | 654,412 | 2,186,027 |
| <u>NUSHAGAK DISTRICT</u> | | | |
| Wood River | 979,304 | 866,778 | 1,846,082 |
| Igushik River | 255,178 | 170,454 | 425,632 |
| Nuyakuk River | 473,557 | 319,992 | 793,549 |
| Nushagak/Mul. System | | 163,208 | |
| Snake River | | 4,320 | |
| Total | 1,708,039 | 1,524,752 | 3,232,791 |
| <u>TOGIK DISTRICT</u> | | | |
| Togiak Lake | 674,715 | 276,612 | 951,327 |
| Togiak River and Tributaries | | 32,400 | |
| Kulukak System | 136,325 | 31,700 | 168,025 |
| Other Systems ¹ | 5,742 | | |
| Total | 816,782 | 340,712 | 1,157,494 |
| <u>TOTAL BRISTOL BAY</u> | 14,005,984 | 9,430,329 | 23,436,313 |

1 Includes Ungalikthluk, Osviak, Matogak and Slug River systems when survey data is available.

a Inshore catch apportionment by river system is preliminary until results from scale pattern analysis become available; however escapements are final.

Table 5. Inshore commercial catch and escapement of pink salmon, in numbers of fish, Bristol Bay, 1988.^a

| District and River System | Catch | Escapement ¹ | Total Run |
|--------------------------------|----------------|-------------------------|------------------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | |
| Kvichak River | | 94,000 | |
| Branch River | | 620,000 | |
| Naknek River | | 187,000 | |
| Total | 625,551 | 901,000 | 1,526,551 |
| <u>EGEGIK DISTRICT</u> | 4,437 | 23,000 | 27,437 |
| <u>UGASHIK DISTRICT</u> | 210 | 2,400 | 2,610 |
| <u>NUSHAGAK DISTRICT</u> | | | |
| Nushagak River | | 494,610 ^b | |
| Total | 248,656 | 494,610 | 743,266 |
| <u>TOGLAK DISTRICT</u> | | | |
| Togiak Section | 42,757 | 142,500 ^c | |
| Kulukak Section | 9,444 | | |
| Osviak Section | 425 | | |
| Matogak Section | 4,390 | | |
| Total | 57,016 | 142,500 | 199,516 |
| TOTAL BRISTOL BAY | 935,870 | 1,563,510 | 2,499,380 |

1 Estimated by aerial survey unless otherwise noted.

a Inshore district catches are preliminary, while escapements are final.

b Sonar count at Portage Creek through 8/23.

c Includes main Togiak River only as estimated by sonar (USF&WS).

Table 6. Offshore test fishing catch indices and estimated inshore daily passage rate of sockeye salmon, Port Moller, Bristol Bay, 1988.^a

| Date | No. of Stations Fished | Sockeye Catch | Running Mean | | Index ¹ | | Passage Rate ² | | Days Lag |
|---------------------|------------------------|---------------|---------------|-------------|--------------------|------|---------------------------|--------|----------|
| | | | Weight (lbs.) | Length (mm) | Daily | Cum. | Daily | Cum. | |
| 6/11 | 4 | 18 | .00 | 505 | 7.32 | 7 | 148 | 148 | |
| 12 | 4 | 15 | .00 | 529 | 6.76 | 14 | 137 | 286 | |
| 13 | 0 | (14) | .00 | 529 | (7.00) | 21 | 143 | 428 | |
| 14 | 0 | (21) | .00 | 529 | (10.50) | 32 | 213 | 642 | |
| 15 | 4 | 30 | .00 | 546 | 14.09 | 46 | 286 | 928 | |
| 16 | 4 | 50 | .00 | 557 | 21.21 | 67 | 431 | 1,359 | 5 |
| 17 | 4 | 18 | .00 | 555 | 9.06 | 76 | 69 | 512 | 5 |
| 18 | 4 | 17 | .00 | 556 | 8.23 | 84 | 63 | 645 | 5 |
| 19 | 4 | 16 | .00 | 555 | 7.51 | 92 | 92 | 1,124 | 5 |
| 20 | 4 | 46 | .00 | 552 | 22.64 | 114 | 278 | 1,401 | 5 |
| 21 | 4 | (34) | .00 | 555 | (17.18) | 132 | 153 | 1,554 | 5 |
| 22 | 2 | (51) | .00 | 556 | (23.51) | 155 | 315 | 2,681 | 6 |
| 23 | 0 | (92) | .00 | 555 | (41.77) | 197 | 752 | 3,643 | 6 |
| 24 | 3 | (134) | .00 | 553 | (60.52) | 257 | 1,189 | 4,533 | 6 |
| 25 | 4 | 55 | .00 | 552 | 27.79 | 285 | 511 | 5,242 | 6 |
| 26 | 4 | 169 | .00 | 552 | 63.17 | 348 | 1,093 | 6,031 | 6 |
| 27 | 0 | (99) | .00 | 552 | (49.50) | 372 | 620 | 9,813 | 7 |
| 28 | 4 | 81 | .00 | 552 | 37.18 | 405 | 873 | 10,786 | 7 |
| 29 | 4 | 183 | .00 | 553 | 85.84 | 521 | 2,500 | 15,081 | 7 |
| 30 | 2 | (170) | .00 | 554 | (79.71) | 600 | 2,170 | 16,450 | 7 |
| 7/1 | 0 | (124) | .00 | 554 | (62.00) | 662 | 1,688 | 18,038 | 7 |
| 2 | 0 | (89) | .00 | 554 | (44.50) | 707 | 1,311 | 19,250 | 7 |
| 3 | 4 | 55 | .00 | 553 | 26.18 | 733 | 713 | 19,963 | 7 |
| 4 | 4 | 55 | .00 | 554 | 27.94 | 761 | 864 | 20,828 | 7 |
| 5 | 4 | 112 | .00 | 553 | 56.07 | 817 | 1,428 | 20,814 | 7 |
| 6 | 4 | 57 | .00 | 552 | 28.44 | 846 | 779 | 23,176 | 8 |
| 7 9 ^b | 4 | 91 | .00 | 551 | 43.21 | 889 | 1,136 | 23,379 | 8 |
| Total | 79 | 1,896 | .00 | 551 | | 889 | | 20,956 | |

1 Indices expressed in fish/100 fathom hours and includes interpolations for missed days and stations (in parentheses).

2 Estimated passage rate is expressed in thousands of fish and is adjusted throughout the season based on catchability and/or lag time.

a Passage rates are those actually used inseason and adjusted daily as required.

b Final cumulative estimate made on July 9 was 20,955,577 using a lag time of nine days based on 14,157,368 sockeye inshore through 7/9 and 600 cumulative Port Moller index points through June 30.

Table 7. Offshore test fishing catch indices and estimated inshore daily passage rate of chum salmon, Port Moller, Bristol Bay, 1988.

| Date | No. of Stations Fished | Chum Catch ³ | Index ¹ | | Passage Rate ² | |
|------|------------------------|-------------------------|--------------------|------------|---------------------------|------------|
| | | | Daily | Cumulative | Daily | Cumulative |
| 6/11 | 4 | 7 | 2.76 | 3 | 28 | 28 |
| 12 | 4 | 3 | 1.34 | 4 | 14 | 41 |
| 13 | 0 | (2) | 1.00 | 5 | 10 | 52 |
| 14 | 0 | (1) | .50 | 6 | 5 | 57 |
| 15 | 4 | 1 | .48 | 6 | 5 | 61 |
| 16 | 4 | 6 | 2.55 | 9 | 26 | 87 |
| 17 | 4 | 3 | 1.43 | 10 | 14 | 102 |
| 18 | 4 | 1 | .48 | 11 | 5 | 107 |
| 19 | 4 | 8 | 3.81 | 14 | 39 | 145 |
| 20 | 4 | 4 | 1.90 | 16 | 19 | 164 |
| 21 | 4 | 10 | 5.03 | 21 | 35 | 200 |
| 22 | 2 | (6) | 2.74 | 24 | 28 | 243 |
| 23 | 0 | (7) | 3.18 | 27 | 32 | 275 |
| 24 | 3 | (15) | 6.84 | 34 | 69 | 344 |
| 25 | 4 | 5 | 2.53 | 37 | 26 | 369 |
| 26 | 4 | 15 | 7.03 | 44 | 71 | 440 |
| 27 | 0 | (4) | 1.00 | 46 | 10 | 450 |
| 28 | 4 | 6 | 1.36 | 49 | 14 | 464 |
| 29 | 4 | 37 | 17.78 | 66 | 180 | 669 |
| 30 | 2 | (20) | 9.24 | 76 | 93 | 763 |
| 7/ 1 | 0 | (7) | 3.50 | 79 | 35 | 798 |
| 2 | 0 | (4) | 2.00 | 81 | 20 | 818 |
| 3 | 4 | 2 | .95 | 82 | 10 | 828 |
| 4 | 4 | 13 | 6.80 | 89 | 69 | 897 |
| 5 | 4 | 12 | 5.96 | 95 | 60 | 957 |
| 6 | 4 | 6 | 3.12 | 98 | 32 | 988 |
| 7 | 4 | 27 | 14.23 | 112 | 144 | 1,132 |

1 Indices expressed in fish/100 fathom hours.

2 Estimated passage rate is expressed in thousands of fish, and is based on the historical average of 10,100 fish per adjusted index point (1979 not used in computing average).

3 Interpolated values for missed days and stations are in parentheses.

Table 8. Summary of district sockeye salmon test fishing indices in the Naknek-Kvichak District by index area and date, Bristol Bay, 1988.^a

| Index Area | June | | | | | | July | | | | | | | | |
|---------------------|------------------|------------------|------------------|--------------------|------------------|--------------------|--------------------|------------------|-----------------|------------------|------------------|-----|-------|--------------------|------------------|
| | 24 | 25 | 26 | 29 | 30 | 30 | 2 | 6 | 7 | 7 | 8 | 8 | 8 | 9 | 9 |
| Naknek River Mouth | 24 ^b | 244 | 457 | 180 | 64 | 821 | 244 | | | 41 ^d | 116 ^b | | 133 | 240 | 1,315 |
| Pederson Pt. | 144 | 20 | 151 | 0 | 62 | | 364 | 14 | 39 | | 45 | | 95 | 431 | |
| Cutbank & Graveyard | 2 ^b | 4 ^b | 73 ^b | 325 ^b | 949 ^b | 2,173 ^b | 1,553 ^b | | 39 ^b | | 166 ^b | | | | |
| Salmon Flats | 0 | 4 | 720 | 0 | | 0 | 0 | 190 | | | 0 | | | | |
| Gravel Spit | 0 | 3 | 336 ^b | 71 ^b | 15 ^b | | 52 | 379 ^b | 20 ^b | | 0 | | 53 | 1,476 | |
| Ships Anchorage | 30 ^c | 253 ^b | 178 | | 25 | | 46 | 77 | 194 | | 40 ^b | 190 | | | 0 |
| Half Moon Bay | 548 ^b | 345 ^b | 128 | 1,065 ^b | 51 ^b | | | 465 ^d | | | 73 ^c | | 887 | 1,199 ^b | |
| Middle Naknek | 2 ^d | 189 | 0 | 518 ^b | | | | | 176 | 134 ^d | 126 ^b | | | | 169 ^c |
| Johnson Hill | 0 | | 65 | | 1,115 | | | | 334 | 26 ^b | 367 ^b | | 604 | | 290 |
| Division Buoy | 0 ^b | 255 ^c | 53 ^b | 0 | | | | | | 22 | 5 | | 28 | | 62 |
| Deadman Sands | 22 ^b | | | 0 | | | | 194 ^b | 91 ^b | | | 510 | 18 | 123 ^c | |
| Low Point | | | | 3,562 | 250 ^b | | | | | 90 ^c | | 18 | 4,579 | | 1,787 |
| Other | | | | | | | | | | | | e | | | |

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a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

b Average of two drifts in the same general index area.

c Average of three drifts in the same general index area.

d Average of four drifts in the same general index area.

e One drift was made at Middle Bluff with an indices of 3,683 and one drift was made on the beach south of Deadman Sands with an index of 0.

Table 9. Summary of district sockeye salmon test fishing indices in the Egegik District by index area and date, Bristol Bay, 1988.^a

| Index Area | Date |
|---------------------------------|---------|
| | June 25 |
| Two Miles North of North Marker | 4 |
| North Marker (Near shore) | 13 |
| Outer Entrance Channel | 12 |
| South Marker (Offshore) | 141 |
| Two Miles South of South Marker | 69 |
| South Spit Offshore Two miles | 167 |
| Ships Anchorage | 33 |
| Bishop Creek | 596 |
| Coffee Point | 164 |
| South Channel | 703 |

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

Table 10. Summary of district sockeye salmon test fishing in the Ugashik District by index area and date, Bristol Bay, 1988.^a

| Index Area | June | | | July | | | | |
|--|------|-----|-----|------|-----|-----|-----|------|
| | 26 | 28 | 30 | 2 | 5 | 6 | 7 | 8 |
| Two Miles North of Cape Grieg | | | 529 | | 8 | | | 568 |
| Cape Grieg (Beach) | 191 | 382 | 176 | 265 | 26 | | | 216 |
| North Marker (Offshore) | | 153 | | | | | | |
| Four Miles North of Smoky Point Near Shore | 189 | 135 | 231 | 147 | | | | |
| Four Miles North of North Bar Outer Line | | | | 120 | 4 | | | 196 |
| Smoky Point | 70 | 336 | 253 | 73 | 800 | 296 | | 782 |
| Bell Buoy | | | 9 | | 352 | | | 68 |
| Mid Outer Line | 0 | 0 | | 18 | 17 | 188 | | 895 |
| Two Miles North of Cape Menshikof | 5 | 0 | | 5 | 94 | 501 | | 54 |
| Three Miles South of South Spit | 4 | 13 | | 0 | 58 | 856 | 544 | 162 |
| Mid Channel South Spit | 4 | 0 | 25 | 56 | 12 | 16 | 36 | 4056 |
| Dago Creek Mouth | | | | 46 | 12 | 0 | 14 | 28 |
| Pilot Point | 0 | 4 | 21 | 40 | 0 | 38 | 4 | 32 |
| South Spit Rip Offshore | | | 26 | | | | | |

-continued-

Table 10. (Page 2 of 2)

| Index Area | June | | | July | | | | |
|------------------|------|----|----|------|-----|----|----|----|
| | 26 | 28 | 30 | 2 | 5 | 6 | 7 | 8 |
| Muddy Point | 14 | 8 | 11 | 64 | 12 | 25 | | 44 |
| Dog Salmon River | 5 | 23 | 0 | 12 | 102 | 19 | | |
| Cutbank | | | | 156 | 8 | 29 | 13 | 44 |

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

Table 11. Summary of district sockeye salmon test fishing indices in the Nushagak District by index area and date, Bristol Bay, 1988.^a

| Index Area | June 17 | June 19 | June 20 | June 22 | June 23 | June 24 | June 25 |
|-------------------------|---------|------------------|----------------|------------------|----------------|------------------|---------|
| | P.M. | A.M. | A.M. | A.M. | A.M. | A.M. | A.M. |
| Nushagak River: | | | | | | | |
| Tule Point | | | | | | | 617 |
| Picnic Point | | | | | | | 3,716 |
| Wood River ¹ | | | | | | | |
| A | 0 | | | | | | 0 |
| B | | 0 | | 0 | | | 192 |
| Peter Pan | 0 | 0 | 0 | 0 | 0 | | |
| Kanakanak Beach | 0 | | | | | | |
| Grassy Island | 0 | 0 ^b | 0 ^b | 0 ^b | 0 ^b | 495 ^b | 10,880 |
| Nushagak Point | 160 | 0 | 0 | 0 | 0 | 469 ^c | |
| Nushagak Pt. Offshore | | | | 0 | | 0 | |
| Coffee Point | | | | | | 171 | |
| Combine Flats | 0 | 0 | | | | 3,180 | |
| Queen Slough | | 0 | | | | | |
| Clarks Point | 0 | 0 | 0 | 0 | 0 | 1,248 | |
| Snake River Flats | | | 0 ^b | 0 | 0 | | |
| Ekuk | 0 | 0 ^b | | 0 ^b | | | |
| Ekuk Offshore | | | | | 0 ^b | | |
| Ekuk Bluff | | 0 | 80 | | 240 | 80 | |
| Schooner Ch. N.W. | 0 | 0 | 0 | 0 | 137 | | |
| Schooner Ch. S.E. | | | 0 | | 0 ^b | | |
| Ships Ch. N.W. | 0 | 68 ^c | | | | 434 | |
| Ships Ch. S.E. | | | 60 | 160 | 0 | | |
| Middle Ch. N.W. | 0 | 0 | | 186 ^b | 160 | 180 | |
| Middle Ch. S.E. | | 197 ^b | 0 | 240 | 0 | | |
| West Ch. N.W. | | | | 0 | | 90 | |
| West Ch. S.E. | | 32 ^b | 0 ^b | 206 | | | |
| Outer King Boundary | | | | 45 ^b | | | |

(continued)

Table 11. (Page 2 of 4)

| Index Area | June 27 | | June 29 | | June 30 | | July 1 | | July 3 |
|-------------------------|------------------|-------|------------------|-----------------|--------------------|--------------------|---------------------|------|--------------------|
| | A.M. | P.M. | A.M. | A.M. | P.M. | A.M. | P.M. | A.M. | |
| Mushagak River: | | | | | | | | | |
| Tule Point | 720 | | | 0 | 0 | | | | 11,245 |
| Picnic Point | 320 | | 0 | 0 | 0 | | 218 | | 42,500 |
| Wood River ¹ | | | | | | | | | |
| A | 480 | | | | | | | | 7,636 |
| B | 560 | | | | | | | | 1,154 |
| C | 686 | | | | 0 | | | | |
| Peter Pan | | | | 0 | 0 ^b | 0 | 0 | | 7,372 ^b |
| Kanakanak Beach | | | | | | | | | 10,080 |
| Grassy Island | 200 ^b | 3,273 | 0 | 0 | 1,912 ^b | 0 | 0 | | 6,503 ^b |
| Mushagak Point | 382 ^b | | 188 | 0 | 0 | 0 ^c | 923 ^b | | 24,857 |
| Mushagak Offshore | 0 | | | | | | | | |
| Coffee Point | | 2,308 | | | | | 0 | | 3,000 |
| Combine Flats | 1,860 | 3,456 | 2,288 | | 0 ^b | 715 ^c | 11,340 ^b | | 17,400 |
| Queen Slough | 779 | | 37 ^b | | 1,989 | 3,540 | 18,145 | | |
| Clarks Point | 721 ^b | | | 43 ^b | | 1,819 | 7,579 | | |
| Clarks Offshore | 280 ^b | | | 0 | | 78 | | | |
| Snake River Flats | 87 | | | 0 | | | | | |
| Ekuk | | | 0 | | 0 | 702 | | | |
| Ekuk Bluff | | | 686 | 87 | 4,523 ^b | 2,106 ^b | | | |
| Schooner Ch. N.W. | | | 87 | | 615 | | | | |
| Schooner Ch. S.E. | | | | | 0 ^c | | | | |
| Ships Ch. N.W. | | | 132 | | 779 | 614 | | | |
| Ships Ch. S.E. | | | 721 ^c | | | | | | |
| Middle Ch. N.W. | | | 100 ^c | | 264 | 1,995 | | | |
| Middle Ch. S.E. | | | | 0 | | | | | |
| West Ch. N.W. | | | 0 | | 0 | | | | |
| West Ch. S.E. | | | | | | | | | |
| Igushik S. Line | | | | | 115 ^c | | | | |

(continued)

Table 11. (Page 3 of 4)

| Index Area | July 4 | July 5 | | July 6 | | July 7 | |
|-------------------------|------------------|--------|-----------------|--------------------|------------------|------------------|---------------------|
| | P.M. | A.M. | P.M. | A.M. | P.M. | A.M. | P.M. |
| Nushagak River: | | | | | | | |
| Tule Point | 8,678 | 0 | 3,033 | 1,439 | 3,375 | 3,400 | 1,846 |
| Picnic Point | 1,200 | 2,323 | 750 | 4,363 | 139 ^b | 728 | 9,706 |
| Wood River ¹ | | | | | | | |
| A | 6,347 | | | | | | |
| B | | 3,777 | | 457 | | 0 ^b | |
| C | 4,696 | | 300 | | 272 | 316 ^b | 1,026 ^b |
| D | | | 1,487 | 1,358 | 272 | 406 | 500 |
| Peter Pan | 0 | | | | | 78 ^b | 744 ^b |
| Kanakanak Beach | | 167 | | | 249 | | 0 |
| Grassy Island | 300 ^b | 2,172 | 1,765 | 365 | 316 | 94 ^b | 10,100 ^e |
| Nushagak Point | 0 | 0 | 90 ^b | 1,211 ^b | 0 | 0 ^b | 10,320 |
| Coffee Point | 0 | | | | | | |
| Combine Flats | 761 | 3,840 | 576 | 6,661 | 1,309 | 19,897 | 6,306 ^c |
| Queen Slough | | 1,200 | | 415 | | 4,072 | |
| Clarks Point | 65 ^b | | | | | 9,373 | |
| Clarks Offshore | | | | | | 0 | |
| Ekuk | 375 | 1,667 | | 1,558 | | 3,629 | |
| Ekuk Bluff | 421 | 1,282 | | 2,256 | | 7,210 | |
| Schooner Ch. N.W. | | 30 | | 14 | | 283 | |
| Schooner Ch. S.E. | | | | 97 | | | |
| Ships Ch. N.W. | 0 | 0 | | 22 | | 64 ^b | |
| Ships Ch. S.E. | | 1,177 | | 247 | | | |
| Middle Ch. N.W. | 26 | 0 | | 31 | | 212 ^b | |
| Middle Ch. S.E. | | | | 2,560 | | 1,786 | |
| West Ch. N.W. | | 57 | | 0 | | 0 | |
| West Ch. S.E. | | | | | | | |
| Dead Man's | | | | | | 429 ^c | |

(continued)

Table 11. (Page 4 of 4)

| Index | July 8 | | July 9 | | July 10 | |
|-------------------------|--------------------|--------------------|---------------------|---------------------|--------------------|---------------------|
| | A.M. | P.M. | A.M. | P.M. | A.M. | P.M. |
| Mushagak River: | 4,600 | 2,366 | 6,683 ^b | | 1,029 | 9,969 ^b |
| Picnic Point | 5,142 | 1,733 | 10,167 ^b | | 3,290 ^b | 11,162 |
| Wood River ¹ | | | | | | |
| A | 732 ^b | 431 ^b | 2,823 ^b | | 2,100 ^b | 4,263 ^c |
| B | 3,752 ^b | | 3,469 ^b | | 4,304 ^b | |
| C | | 6,397 ^c | 4,320 ^e | | | 0 |
| D | 320 | | | | | 853 ^b |
| E | | | 4,861 ^d | | | |
| F | | 194 | 2,586 ^b | | | |
| Peter Pan | 257 ^b | | 6,354 ^b | 1,679 | | |
| Kanakanak Beach | | 232 | 200 ^b | | 276 | 370 |
| Grassy Island | 3,096 | 959 ^b | 10,740 ^b | 2,264 | 3,173 | 50,596 ^b |
| Mushagak Point | 1,107 | 2,500 ^c | 13,028 ^b | 3,722 | 0 | 9,188 |
| Coffee Point | | | | | | |
| Combine Flats | | 12,821 | | 3,558 ^b | | 13,159 |
| Queen Slough | | 5,443 | | 296 ^b | | |
| Clarks Point | | | | 4,686 | | 10,352 |
| Clarks Offshore | | | | 6,585 | | |
| Ekuk | | 6,887 | | 10,147 ^b | | |
| Ekuk Bluff | | 47,200 | | 10,077 | | |
| Schooner Ch. N.W. | | 9,283 ^b | | 160 | | |
| Schooner Ch. S.E. | | 1,055 | | | | |
| Ships Ch. N.W. | | | | 1,899 | | |
| Ships Ch. S.E. | | | | | | |
| Middle Ch. N.W. | | | | 115 ^b | | |
| Middle Ch. S.E. | | | | | | |
| West Ch. N.W. | | | | 38 | | |
| West Ch. S.E. | | | | | | |

1 Wood River: A- Hansen Point (west side of river); B-across from Hansen's Point (east side of river); C-Tule Point (near mouth of Black Slough); D-east side mouth; E-Red Bluff; F-Muklung River mouth.

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

b Average of two drifts in the same index area.

c Average of three drifts in the same index area.

d Average of four drifts in the same index area.

e Average of five drifts in the same index area.

Table 12. Daily chinook salmon catch per unit of effort in subsistence nets at Kanakanak, 1988.

| Date ¹ | Wind ² | | Kanakanak Beach | | Scandanavian Beach | | Lewis Point | |
|-------------------|-------------------|-------|-----------------|---------------------|--------------------|---------------------|-------------|---------------------|
| | Direction | Knots | CPUE | Effort ³ | CPUE | Effort ³ | CPUE | Effort ⁵ |
| 6/ 7 | | | | | | | 0 | 3 |
| 8 | | | | | | | 0 | 2 |
| 9 | | | | | | | 0 | 2 |
| 9 | | | | | | | 3.3 | 4 |
| 10 | | | | 34 | .5 | 9 | 7.5 | 4 |
| 10 | | 0 | .3 | 32 | | | 1.8 | 4 |
| 11 | | | | | | | 1.3 | 4 |
| 11 | | 0 | 0 | 34 | | | 0 | 3 |
| 12 | | 0 | 0 | 36 | | | .3 | 3 |
| 12 | | 0 | 0 | 36 | | | 0 | 3 |
| 13 | | 0 | 0 | 36 | | | 0 | 3 |
| 13 | | | | | | | 0 | 3 |
| 14 | | | .02 | 35 | | | .3 | 3 |
| 14 | SE | 20 | 7.8 | 33 | | | 0 | 3 |
| 15 | SE | 0-5 | 17.7 | 6 | | | 34.3 | 3 |
| 15 | SE | 0-5 | 2.0 | 19 | | | 0 | 2 |
| 16 | | | | | | | 9.3 | 4 |
| 16 | | | | | | | 0 | 1 |
| 17 | | | | | | | .7 | 6 |
| 17 | | | | | | | 0 | 2 |
| 18 | | | | | | | .4 | 7 |
| 18 | | | | | | | 0 | 2 |
| 19 | | | | | | | 0 | 7 |
| 19 | | | | | | | 0 | 1 |
| 20 | | | | | | | 2.9 | 6 |
| 20 | | | | | | | 0 | 2 |
| 21 | | | | | | | .3 | 7 |
| 22 | | | | | | | 0 | 4 |
| 22 | | | | | | | 0 | 7 |
| 23 | | | | | | | 0 | 7 |
| 23 | | | | | | | 0 | 8 |
| 24 | | | | | 14.0 | 3 | .6 | 7 |
| 24 | | | | | 2.0 | 1 | 2.1 | 8 |
| 25 | | | | | 2.0 | 1 | 6.2 | 10 |
| 25 | | | | | | | .1 | 8 |
| 26 | | | | | | | 3.8 | 6 |

(continued)

Table 12. (Page 2 of 2)

| Date ¹ | Wind ² | | Kanakanak Beach | | Scandanavian Beach | | Lewis Point | |
|--------------------------------|-------------------|-------|-----------------|---------------------|--------------------|---------------------|-------------|---------------------|
| | Direction | Knots | CPUE | Effort ³ | CPUE | Effort ³ | CPUE | Effort ⁵ |
| 26 | | | | | | | .4 | 7 |
| 27 | | | | | | | 3.4 | 7 |
| 27 | | | | | | | 0 | 5 |
| 28 | | | | | | | 2.0 | 7 |
| Season Average CPUE and Effort | | | .9 | 30 | 1.3 | 4.3 | 1.9 | 4.6 |

- 1 Catches recorded at low water when nets are picked.
- 2 As recorded on Kanakanak Beach at time of survey.
- 3 Total subsistence nets fishing on Kanakanak and Scandanavian Beaches.
- 4 Not monitored on a regular basis
- 5 Subsistence nets (index and non-index) monitored for CPUE.

Table 13. Emergency order commercial salmon fishing periods, by district, Bristol Bay, 1988.

| I. Emergency Orders ¹ | | | | | |
|--------------------------------------|---------|---------------|------------|-----------------|---------------------|
| Number | | Date and Time | | Hours/Days Open | |
| NAKNEK-KVICHAK DISTRICT | | | | | |
| AKN 01 | June 27 | 8:00 a.m. | to June 27 | 6:00 p.m. | 10 hrs. |
| AKN 05 | July 1 | NOON | to July 1 | 10:00 p.m. | 10 hrs. |
| AKN 09 | July 5 | 3:30 a.m. | to July 5 | 3:30 p.m. | 12 hrs. |
| AKN 18 | July 11 | 9:00 a.m. | to July 11 | 7:00 p.m. | 10 hrs. |
| AKN 19 | July 11 | 7:00 p.m. | to July 12 | 9:00 a.m. | 14 hrs. |
| AKN 27 | July 14 | NOON | to July 14 | MIDNIGHT | 12 hrs. |
| AKN 28 | July 14 | MIDNIGHT | to July 15 | 10:00 a.m. | 10 hrs. |
| AKN 35 | Aug. 8 | 7:00 a.m. | to Aug. 8 | 9:00 a.m. | 2 hrs. ² |
| Naknek Section Only | | | | | |
| AKN 07 | July 3 | 2:30 p.m. | to July 4 | 2:30 a.m. | 12 hrs. |
| AKN 14 | July 10 | 7:30 a.m. | to July 10 | 7:30 p.m. | 12 hrs. |
| AKN 21 | July 13 | 11:00 a.m. | to July 14 | NOON | 25 hrs. |
| AKN 29 | July 16 | 1:30 a.m. | to July 18 | 9:00 a.m. | 55.5 hrs. |
| Naknek (Personal Use Fishery) | | | | | |
| AKN 16 | July 10 | 6:00 p.m. | to July 25 | MIDNIGHT | 15 days, 6 hrs. |
| Kvichak Section | | | | | |
| AKN 24 | July 13 | MIDNIGHT | to July 14 | NOON | 12 hrs. |
| AKN 32 | July 16 | MIDNIGHT | to July 18 | 9:00 A.m. | 33 hrs. |

(continued)

Table 13. (Page 2 of 4)

I. Emergency Orders¹

| Number | Date and Time | Hours/Days Open |
|--------------------------|--------------------------------|-------------------------------|
| <u>EGEGIK DISTRICT</u> | | |
| AKN 01 | June 27 8:00 a.m. to June 27 | 8:00 p.m. 12 hrs. |
| AKN 03 | June 29 10:00 a.m. to June 29 | 10:00 p.m. 12 hrs. |
| AKN 04 | July 01 NOON to July 01 | 11:00 p.m. 11 hrs. |
| AKN 08 | July 04 3:00 p.m. to July 05 | 2:00 a.m. 11 hrs. |
| AKN 10 | July 06 4:30 a.m. to July 06 | 2:30 p.m. 10 hrs. |
| AKN 11 | July 07 7:00 p.m. to July 08 | 5:00 a.m. 10 hrs. |
| AKN 12 | July 09 7:00 a.m. to July 09 | 4:00 p.m. 9 hrs. |
| AKN 15 | July 10 10:00 p.m. to July 11 | 7:00 a.m. 9 hrs. |
| AKN 20 | July 12 9:00 a.m. to July 12 | 6:00 p.m. 9 hrs. |
| AKN 22 | July 13 10:00 a.m. to July 13 | 8:00 p.m. 10 hrs. |
| AKN 25 | July 14 11:00 a.m. to July 15 | 11:00 a.m. 24 hrs. |
| AKN 30 | July 16 1:00 a.m. to July 16 | MIDNIGHT 23 hrs. |
| AKN 33 | July 17 2:00 p.m. to July 18 | 9:00 a.m. 19 hrs. |
| <u>UGASHIK DISTRICT</u> | | |
| AKN 06 | July 03 1:00 p.m. to July 04 | 1:00 a.m. 12 hrs. |
| AKN 13 | July 09 6:00 a.m. to July 09 | 6:00 p.m. 12 hrs. |
| AKN 17 | July 11 8:00 a.m. to July 11 | 8:00 p.m. 12 hrs. |
| AKN 23 | July 13 10:00 a.m. to July 13 | 10:00 p.m. 12 hrs. |
| AKN 26 | July 14 11:00 a.m. to July 14 | 11:00 p.m. 12 hrs. |
| AKN 31 | July 15 11:00 p.m. to July 16 | 1:00 p.m. 14 hrs. |
| AKN 34 | EXTENDS EMERGENCY ORDER PERIOD | 8 days ³ |
| <u>NUSHAGAK DISTRICT</u> | | |
| DLG. 01 | SUBSISTENCE OPENING | 2 24 hrs. ⁴ |
| DLG. 02 | SUBSISTENCE OPENING | 24 hrs. ⁵ |
| DLG. 03 | June 25 11:00 p.m. to June 26 | 5:00 a.m. 6 hrs. ⁶ |
| DLG. 05 | June 28 11:00 a.m. to June 28 | 11:00 p.m. 12 hrs. |

(continued)

Table 13. (Page 3 of 4)

I. Emergency Orders¹

| Number | Date and Time | Hours/Days Open |
|---------|-------------------------------|--------------------------------|
| DLG. 06 | July 2 3:00 a.m. to July 2 | 10:00 a.m. 7 hrs. |
| DLG. 07 | July 3 4:00 p.m. to July 3 | 10:00 p.m. 6 hrs. |
| DLG. 09 | July 10 11:00 p.m. to July 11 | 5:00 a.m. 6 hrs. |
| DLG. 10 | July 11 MIDNIGHT to July 12 | NOON 12 hrs. |
| DLG. 11 | July 12 NOON to July 13 | 1:30 p.m. 25 hrs. |
| DLG. 12 | July 13 1:00 p.m. to July 15 | 2:00 p.m. 49 hrs. |
| DLG. 14 | July 16 3:00 p.m. to July 17 | 9:00 a.m. 18 hrs. ⁷ |
| DLG. 16 | Aug. 2 9:00 a.m. to Sept. 30 | MIDNIGHT 9 |
| DLG. 17 | Aug. 15 9:00 a.m. to Sept. 30 | MIDNIGHT 10 |

TOGLIAK DISTRICT

| | | |
|---------|------------------------------|------------|
| DLG. 15 | Aug. 1 9:00 a.m. to Sept. 30 | MIDNIGHT 8 |
| DLG. 18 | Aug. 1 9:00 a.m. to Sept. 30 | MIDNIGHT 8 |

Togiak River Section Only

| | | |
|---------|------------------------------|-------------------|
| DLG. 08 | July 8 9:00 a.m. to July 9 | 9:00 a.m. 24 hrs. |
| DLG. 13 | July 14 9:00 a.m. to July 31 | 9:00 a.m. 17 days |

Kulukak Section Only

| | | |
|---------|------------------------------|-------------------|
| DLG. 13 | July 14 9:00 a.m. to July 31 | 9:00 a.m. 17 days |
|---------|------------------------------|-------------------|

(continued)

Table 13. (Page 4 of 4)

I. Emergency Orders¹

| Number | Date and Time | Hours/Days Open |
|--------|---|-----------------|
| 1 | Prefix code on emergency orders indicate where announcements originated ("AKN" for King Salmon field office and "DLG." for Dillingham field office). | |
| 2 | Closes the Naknek-Kvichak District to commercial salmon fishing from 4:00 a.m. August 5 to 7:00 a.m. August 8; opens 7:00 a.m. to 9:00 a.m. August 8 then back to weekly fishing period. | |
| 3 | Extends Emergency Order period in Ugashik District 8 days from 9:00 a.m. July 17 until 9:00 a.m. July 24. | |
| 4 | Allows subsistence fishing 9:00 a.m. Monday to 9:00 a.m. Tuesday and 9:00 a.m. Friday to 9:00 a.m. Saturday - two 24-hour periods per week in the Nushagak commercial fishing district June 1 to June 15, 1988. | |
| 5 | Allows subsistence fishing from 9:00 a.m. Friday, June 17 to 9:00 a.m. Saturday, June 18, 1988. | |
| 6 | Requires the use of 6-3/4 inch mesh or smaller from June 25 11:00 p.m. until June 26, 5:00 a.m. | |
| 7 | Reduces weekly fishing schedule in Nushagak District to 3 days per week from 9:00 a.m. July 25 and requires 5-3/8 inch mesh or larger. | |
| 8 | Reduces weekly fishing schedules in all sections of the Togiak District to 3 days per week from 9:00 a.m. Monday to 9:00 a.m. Thursday. | |
| 9 | Reduces weekly fishing schedule in Nushagak District to 48 hours per week from Tuesday 9:00 a.m. to Thursday 9:00 a.m. | |
| 10 | Closed to commercial fishing. | |

Table 14. Daily district registration of drift gill net fishermen by district, Bristol Bay, 1988.^a

| Date | Naknek-Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|------|----------------|--------|---------|----------|--------|-------|
| 6/03 | 152 | 148 | 26 | 171 | 51 | 548 |
| 07 | 174 | 172 | 34 | 176 | 54 | 610 |
| 09 | 185 | 186 | 35 | 176 | 58 | 640 |
| 14 | 261 | 321 | 35 | 170 | 63 | 850 |
| 15 | 240 | 381 | 35 | 165 | 63 | 884 |
| 6/16 | 290 | 424 | 37 | 167 | 63 | 981 |
| 17 | 340 | 460 | 36 | 168 | 69 | 1,073 |
| 18 | 329 | 507 | 34 | 143 | 69 | 1,082 |
| 20 | 457 | 678 | 61 | 140 | 68 | 1,404 |
| 21 | 506 | 712 | 65 | 145 | 68 | 1,496 |
| 6/22 | 522 | 714 | 68 | 168 | 69 | 1,541 |
| 23 | 504 | 694 | 58 | 176 | 71 | 1,503 |
| 24 | 489 | 679 | 54 | 191 | 74 | 1,487 |
| 25 | 490 | 688 | 53 | 221 | 72 | 1,524 |
| 26 | 517 | 719 | 50 | 307 | 68 | 1,661 |
| 6/27 | 558 | 736 | 48 | 312 | 68 | 1,722 |
| 28 | 577 | 647 | 32 | 335 | 67 | 1,658 |
| 29 | 581 | 646 | 33 | 333 | 67 | 1,660 |
| 7/01 | 654 | 638 | 42 | 366 | 67 | 1,767 |
| 02 | 658 | 629 | 44 | 377 | 67 | 1,775 |
| 7/03 | 658 | 627 | 50 | 382 | 66 | 1,783 |
| 04 | 647 | 623 | 56 | 383 | 66 | 1,775 |
| 05 | 649 | 523 | 57 | 385 | 66 | 1,680 |
| 06 | 653 | 489 | 61 | 402 | 66 | 1,671 |
| 07 | 725 | 435 | 71 | 417 | 66 | 1,714 |
| 7/09 | 771 | 226 | 90 | 416 | 66 | 1,569 |
| 10 | 772 | 213 | 103 | 417 | 66 | 1,571 |
| 11 | 738 | 195 | 119 | 405 | 66 | 1,523 |
| 12 | 690 | 189 | 295 | 347 | 67 | 1,588 |
| 13 | 609 | 288 | 379 | 296 | 69 | 1,641 |
| 7/14 | 568 | 325 | 478 | 291 | 79 | 1,741 |
| 15 | 538 | 425 | 450 | 278 | 96 | 1,787 |
| 16 | 572 | 325 | 534 | 292 | 99 | 1,822 |
| 17 | 540 | 426 | 471 | 279 | 106 | 1,822 |
| Mean | 518 | 473 | 120 | 276 | 69 | 1,457 |

a Total indicates number of drift gillnet permit holders legal to fish each day in the districts (transferees not included). There were 1,822 permit holders registered for the season.

Table 15. Commercial salmon catch by period and species, in numbers of fish, Maknek-Kvichak District, Bristol Bay, 1988.

| Period | Time | Effort ¹ | | Sockeye | Chinook | Chum | Pink | Coho | Total |
|---------|---------|---------------------|-----|---------|---------|--------|-------|------|---------|
| | | Drift | Set | | | | | | |
| 6/ 1- 4 | 81 hrs. | | | | 4 | | | | 4 |
| 6-11 | 5 days | 3 | 4 | 43 | 87 | | | | 130 |
| 13 | 15 hrs. | 6 | 11 | 249 | 11 | 15 | | | 275 |
| 14 | 24 hrs. | 22 | 29 | 1,788 | 149 | 543 | | | 2,480 |
| 15 | 24 hrs. | 39 | 36 | 2,054 | 212 | 1,517 | | | 3,783 |
| 16 | 24 hrs. | 100 | 51 | 6,801 | 219 | 1,167 | | | 8,187 |
| 17 | 24 hrs. | 143 | 57 | 7,889 | 139 | 1,255 | | | 9,283 |
| 18 | 9 hrs. | 86 | 22 | 3,970 | 46 | 624 | | | 4,640 |
| 20 | 15 hrs. | 352 | 77 | 34,689 | 252 | 2,844 | | | 37,785 |
| 21 | 24 hrs. | 423 | 126 | 64,340 | 245 | 3,480 | | | 68,065 |
| 22 | 24 hrs. | 430 | 150 | 99,478 | 384 | 4,771 | | | 104,632 |
| 23 | 9 hrs. | 295 | 132 | 43,707 | 127 | 1,697 | | | 45,531 |
| 27 | 10 hrs. | 567 | 243 | 361,061 | 140 | 15,097 | | | 376,298 |
| 7/ 1 | 10 hrs. | 653 | 246 | 675,222 | 369 | 21,078 | | | 696,669 |
| 3- 4 | 12 hrs. | 679 | 167 | 153,892 | 54 | 6,714 | | | 160,660 |
| 5 | 12 hrs. | 648 | 273 | 376,000 | 267 | 15,268 | | | 391,535 |
| 10 | 12 hrs. | 750 | 177 | 149,658 | 56 | 5,762 | | | 155,476 |
| 11-12 | 24 hrs. | 671 | 291 | 544,163 | 413 | 42,473 | | | 587,049 |
| 13 | 13 hrs. | 500 | 181 | 82,250 | 60 | 7,035 | | | 89,345 |
| 14 | 24 hrs. | 539 | 293 | 374,888 | 184 | 47,886 | 2 | | 422,960 |
| 15 | 10 hrs. | 481 | 267 | 190,920 | 146 | 13,176 | | | 204,242 |
| 16 | 23 hrs. | 439 | 281 | 158,472 | 230 | 16,643 | | | 175,345 |
| 17 | 24 hrs. | 431 | 272 | 69,548 | 161 | 8,987 | 3 | 2 | 78,701 |
| 18 | 24 hrs. | 390 | 247 | 42,321 | 69 | 6,204 | 37 | 1 | 48,632 |
| 19 | 24 hrs. | 309 | 224 | 31,196 | 161 | 5,643 | 27 | | 37,027 |
| 20 | 24 hrs. | 221 | 199 | 15,184 | 209 | 4,600 | 177 | | 20,170 |
| 21 | 24 hrs. | 156 | 177 | 16,015 | 450 | 8,741 | 283 | 2 | 25,491 |
| 22 | 24 hrs. | 144 | 175 | 13,439 | 583 | 5,828 | 1,120 | 10 | 20,980 |

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Table 15. (Page 2 of 2)

| Period | Time | Effort ¹ | | Numbers of Fish | | | | | Total |
|---------------------------|----------|---------------------|-----|-----------------|---------|---------|---------|--------|-----------|
| | | Drift | Set | Sockeye | Chinook | Chum | Pink | Coho | |
| 23 | 9 hrs. | 54 | 76 | 7,545 | 132 | 3,140 | 516 | 5 | 11,338 |
| 25-30 | 5 days | 116 | 129 | 18,709 | 739 | 37,886 | 91,238 | 2,092 | 150,664 |
| 8/ 1- 6 | 91 hrs. | 73 | 83 | 2,544 | 243 | 7,351 | 218,771 | 8,542 | 237,451 |
| 8-13 | 122 hrs. | 74 | 74 | 1,002 | 78 | 1,249 | 272,146 | 8,046 | 283,521 |
| 15-20 | 5 days | 48 | 57 | 283 | 35 | 246 | 36,026 | 5,601 | 42,191 |
| 22-27 | 5 days | 18 | 38 | 96 | 23 | 35 | 4,917 | 2,578 | 7,649 |
| 28-9/3 | 5 days | 3 | 6 | 6 | | 12 | 288 | 473 | 779 |
| Total | | | | 3,549,422 | 6,677 | 298,966 | 625,551 | 28,352 | 4,508,968 |
| Percent of District Catch | | | | 78.7 | 0.2 | 6.6 | 13.9 | 0.6 | 100.0 |

1 Estimated fishing effort based on aerial surveys and fish ticket computer run summaries.

Table 16. Commercial salmon catch by period and species, in numbers of fish, Egegik District, Bristol Bay, 1988.

| Period | Time Hrs. | Effort ¹ | | Number of Fish | | | | | |
|----------------|--------------|---------------------|-----|----------------|---------|--------|------|------|-----------|
| | | Drift | Set | Sockeye | Chinook | Chum | Pink | Coho | Total |
| 6/ 6 | 15 | | | 189 | 34 | 47 | | | 270 |
| 7 | 24 | 3 | 30 | 363 | 47 | 149 | | | 559 |
| 8 | 24 | | | 345 | 40 | 138 | | | 523 |
| 9 | 24 | | | 496 | 106 | 328 | | | 930 |
| 10 | 9 | | | 233 | 55 | 206 | | | 494 |
| 13 | 15 | 102 | 81 | 12,631 | 319 | 4,654 | | | 17,604 |
| 14 | 24 | | | 26,684 | 152 | 5,784 | | | 32,620 |
| 15 | 24 | | | 30,758 | 204 | 6,583 | | | 37,545 |
| 16 | 24 | | | 42,649 | 140 | 7,151 | | | 49,940 |
| 17 | 9 | | | 33,055 | 49 | 4,888 | | | 37,992 |
| 20 | 15 | 576 | 147 | 292,350 | 216 | 16,708 | | | 309,274 |
| 21 | 24 | | | 215,591 | 267 | 10,806 | 1 | | 226,665 |
| 22 | 24 | | | 259,472 | 168 | 10,987 | | | 270,627 |
| 23 | 9 | | | 244,216 | 78 | 10,223 | | | 254,517 |
| 27 | 12 | 715 | 241 | 519,225 | 259 | 18,728 | | | 538,212 |
| 29 | 12 | 575 | 236 | 938,322 | 247 | 15,279 | | | 953,848 |
| 7/ 1 | 11 | | | 1,007,728 | 87 | 16,960 | | | 1,024,775 |
| 3 ^a | 0 | | | 2,017 | | 27 | | | 2,044 |
| 4 | 9 | 563 | 227 | 143,750 | 49 | 3,050 | | | 146,849 |
| 5 | 2 | | | 229,893 | 25 | 5,576 | | | 235,494 |
| 6 | 10 | 385 | 220 | 327,356 | 52 | 7,062 | | | 334,470 |
| 7 | 5 | | 225 | 104,687 | 9 | 2,023 | | | 106,719 |
| 8 | 5 | | | 354,901 | 25 | 7,444 | | | 362,370 |
| 9 | 9 | 384 | 231 | 306,276 | 34 | 6,611 | | | 312,921 |
| 10 | 2 | | | 462 | | 11 | | | 473 |
| 11 | 7 | | | 182,536 | 10 | 6,069 | | | 188,615 |
| 12 | 9 | | | 246,657 | 38 | 9,163 | | | 255,858 |
| 13 | 10 | 283 | 231 | 264,725 | 26 | 12,235 | | | 276,986 |
| 14 | 13 | 337 | 234 | 92,229 | 27 | 5,438 | | | 97,694 |
| 15 | 11 | | | 164,399 | 27 | 11,161 | | | 175,587 |
| 16 | 23 | | | 119,563 | 27 | 9,769 | | | 129,359 |
| 17 | 10 | | | 52,318 | 22 | 3,885 | | | 56,225 |
| 18 | 24 | | | 69,980 | 23 | 4,749 | 1 | 1 | 74,754 |
| 19 | 24 | 300 | | 41,532 | 15 | 3,833 | 1 | 4 | 45,385 |
| 20 | 24 | | | 19,157 | 17 | 1,992 | | 4 | 21,170 |

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Table 16. (Page 2 of 3)

| Period | Time Hrs. | Effort ¹ | | Number of Fish | | | | | Total |
|--------|--------------|---------------------|-----|----------------|---------|-------|------|-------|--------|
| | | Drift | Set | Sockeye | Chinook | Chum | Pink | Coho | |
| 7/21 | 24 | | | 21,271 | 14 | 3,492 | 2 | 6 | 24,785 |
| 22 | 9 | | | 14,536 | 8 | 2,723 | 2 | 6 | 17,275 |
| 25 | 15 | | | 4,724 | 10 | 2,021 | 27 | 114 | 6,896 |
| 26 | 24 | | | 6,430 | 13 | 2,687 | 46 | 364 | 9,540 |
| 27 | 24 | | | 1,873 | 8 | 898 | 95 | 249 | 3,123 |
| 28 | 24 | | | 871 | 10 | 292 | 105 | 377 | 1,655 |
| 29 | 9 | | | 339 | 2 | 82 | 73 | 195 | 691 |
| 8/ 1 | 15 | | | 323 | 3 | 142 | 76 | 472 | 1,016 |
| 2 | 24 | | | 642 | 5 | 362 | 378 | 1,210 | 2,597 |
| 3 | 24 | | | 725 | 10 | 418 | 508 | 1,806 | 3,467 |
| 4 | 24 | | | 467 | 5 | 337 | 504 | 1,556 | 2,869 |
| 5 | 9 | | | 148 | 1 | 119 | 101 | 453 | 822 |
| 8 | 15 | | | 213 | 7 | 370 | 488 | 3,122 | 4,200 |
| 9 | 24 | 8 | 60 | 285 | 9 | 403 | 697 | 3,679 | 5,073 |
| 10 | 24 | | | 138 | 3 | 189 | 405 | 2,573 | 3,308 |
| 11 | 24 | | | 69 | 4 | 150 | 233 | 2,022 | 2,478 |
| 12 | 9 | | | 43 | 2 | 52 | 122 | 756 | 975 |
| 15 | 15 | | | 46 | 2 | 60 | 117 | 3,341 | 3,566 |
| 16 | 24 | | | 25 | 1 | 61 | 56 | 1,858 | 2,001 |
| 17 | 24 | | | 20 | | 16 | 34 | 1,909 | 1,979 |
| 18 | 24 | | | 33 | 2 | 20 | 18 | 2,838 | 2,911 |
| 19 | 9 | | | 12 | 1 | 20 | 10 | 473 | 516 |
| 22 | 15 | | | 20 | 2 | 21 | 37 | 2,639 | 2,719 |
| 23 | 24 | | | 32 | 4 | 25 | 51 | 3,063 | 3,175 |
| 24 | 24 | | | 15 | 1 | 10 | 29 | 2,468 | 2,523 |
| 25 | 24 | | | 16 | | 15 | 29 | 1,611 | 1,671 |
| 26 | 9 | | | 13 | | 10 | 14 | 1,063 | 1,100 |
| 29 | 15 | | | 8 | | | 13 | 1,299 | 1,320 |
| 30 | 24 | | | 7 | 1 | 8 | 15 | 1,073 | 1,104 |
| 31 | 24 | 3 | 32 | 5 | | 2 | 13 | 888 | 908 |
| 9/ 1 | 24 | | | 6 | | 2 | 22 | 1,015 | 1,045 |
| 2 | 9 | | | 6 | | 10 | 21 | 323 | 360 |
| 5 | 15 | | | 7 | | 2 | 23 | 1,297 | 1,329 |
| 6 | 24 | | | 3 | | 3 | 34 | 1,181 | 1,221 |
| 7 | 24 | | | 7 | | 4 | 24 | 1,002 | 1,037 |

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Table 16. (Page 3 of 3)

| Period | Time Hrs. | Effort ¹ | | Number of Fish | | | | | Total |
|---------------------------|--------------|---------------------|-----|----------------|---------|---------|-------|--------|-----------|
| | | Drift | Set | Sockeye | Chinook | Chum | Pink | Coho | |
| 9/ 8 | 24 | | | 3 | 1 | 2 | 12 | 566 | 584 |
| 9 | 9 | | | | | | | 12 | 12 |
| 12 | 15 | | | | | | | 330 | 330 |
| 13 | 24 | | | | | | | 189 | 189 |
| Total | 1,240 | | | 6,400,126 | 3,023 | 244,745 | 4,437 | 49,407 | 6,701,738 |
| Percent of District Catch | | | | 95.50 | 0.05 | 3.65 | 0.07 | 0.74 | 100.00 |

1 Estimated fishing effort based on aerial surveys.

a ADF&G test fishing catches.

Table 17. Commercial salmon catch by period and species, in numbers of fish, Ugashik District, Bristol Bay, 1988.

| Period | Time Hrs. | Effort ¹ | | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-------------------|--------------|---------------------|-----|---------|---------|--------|------|------|---------|
| | | Drift | Set | | | | | | |
| 6/ 6 | 15 | | | | 20 | | | | 20 |
| 7 | 24 | 12 | 3 | 2 | 104 | | | | 106 |
| 8 | 24 | | | 2 | 139 | | | | 141 |
| 9 | 24 | | | 3 | 114 | | | | 117 |
| 10 | 9 | | | 5 | 91 | | | | 96 |
| 13 | 15 | 10 | 7 | 69 | 146 | 5 | | | 220 |
| 14 | 24 | | | 113 | 316 | 91 | | | 520 |
| 15 | 24 | | | 461 | 459 | 24 | | | 944 |
| 16 | 24 | | | 1,074 | 409 | 123 | | | 1,606 |
| 17 | 9 | | | 3,067 | 476 | 617 | | | 4,160 |
| 20 | 15 | 50 | 31 | 6,288 | 151 | 2,013 | | | 8,452 |
| 21 | 24 | | | 17,120 | 162 | 5,455 | | | 22,737 |
| 22 | 24 | | | 22,578 | 130 | 5,921 | | | 28,629 |
| 23 | 9 | | | 13,672 | 36 | 2,806 | | | 16,514 |
| 26 ^a | 0 | | | 144 | 2 | 27 | | | 173 |
| 27 ^a | 0 | | | 3 | 1 | 1 | | | 5 |
| 29 ^a | 0 | | | 324 | | | | | 324 |
| 7/ 1 ^a | 0 | | | 285 | | 35 | | | 320 |
| 3-4 | 12 | 58 | 62 | 36,789 | 222 | 6,303 | | | 43,314 |
| 8 ^a | 0 | | | 1,045 | | 57 | | | 1,102 |
| 9 | 12 | 84 | 65 | 215,221 | 68 | 9,488 | | | 224,777 |
| 11 | 12 | 150 | 76 | 437,165 | 60 | 16,589 | | | 453,814 |
| 13 | 12 | 332 | 77 | 424,741 | 30 | 11,534 | | | 436,305 |
| 14 | 12 | 406 | 71 | 196,132 | 60 | 10,302 | | | 206,494 |
| 15 | 1 | | | 28,975 | 9 | 2,200 | | | 31,184 |
| 16 | 13 | | | 99,510 | 22 | 7,552 | | | 107,084 |
| 25 | 15 | | | 12,463 | 41 | 3,728 | | 15 | 16,247 |
| 26 | 24 | | | 6,927 | 13 | 3,166 | 1 | 34 | 10,141 |
| 27 | 24 | | | 2,964 | 12 | 1,121 | | 38 | 4,135 |
| 28 | 24 | | | 1,612 | 10 | 833 | | 54 | 2,509 |
| 29 | 9 | | | 443 | 1 | 54 | | 10 | 508 |
| 8/ 1 | 15 | | | 259 | 3 | 40 | | 98 | 400 |
| 2 | 24 | | | 52 | | 115 | | 194 | 361 |
| 3 | 24 | | | 364 | | 115 | | 293 | 772 |
| 4 | 24 | | | 852 | 3 | 235 | | 576 | 1,666 |

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Table 17. (page 2 of 2)

| Period | Time Hrs. | Effort ¹ | | Number of Fish | | | | | Total |
|---------------------------|--------------|---------------------|-----|----------------|---------|--------|------|--------|-----------|
| | | Drift | Set | Sockeye | Chinook | Chum | Pink | Coho | |
| 8/ 5 | 9 | | | 52 | | 115 | | 224 | 391 |
| 8 | 15 | | | 192 | | 398 | | 769 | 1,359 |
| 9 | 24 | | | 153 | 1 | 353 | 12 | 1,191 | 1,710 |
| 10 | 24 | | | 90 | 3 | 179 | 5 | 608 | 885 |
| 11 | 24 | | | 135 | | 335 | | 1,180 | 1,650 |
| 12 | 9 | | | 5 | | 21 | | 244 | 270 |
| 15 | 15 | | | 18 | | 44 | | 1,411 | 1,473 |
| 16 | 24 | | | 52 | 1 | 86 | 5 | 2,726 | 2,870 |
| 17 | 24 | | | 24 | | 66 | 12 | 2,126 | 2,228 |
| 18 | 24 | | | 14 | | 71 | 6 | 2,621 | 2,712 |
| 19 | 9 | | | 9 | | 16 | 2 | 966 | 993 |
| 22 | 15 | | | 20 | | 18 | 12 | 2,577 | 2,627 |
| 23 | 24 | | | 11 | 1 | 36 | 12 | 3,444 | 3,504 |
| 24 | 24 | | | 21 | 1 | 30 | 15 | 4,653 | 4,720 |
| 25 | 24 | | | 17 | | 17 | 10 | 3,572 | 3,616 |
| 26 | 9 | | | | | | | 233 | 233 |
| 29 | 15 | | | 9 | | 6 | 8 | 2,421 | 2,444 |
| 30 | 24 | | | 11 | 2 | 4 | 20 | 2,318 | 2,355 |
| 31 | 24 | 10 | 24 | 30 | | 4 | 18 | 2,853 | 2,905 |
| 9/ 1 | 24 | | | 9 | | | 27 | 3,568 | 3,604 |
| 2 | 9 | | | 3 | | | 8 | 978 | 989 |
| 5 | 15 | | | | | 1 | 2 | 2,699 | 2,702 |
| 6 | 24 | | | 8 | | 6 | 22 | 3,056 | 3,092 |
| 7 | 24 | | 17 | 8 | | 2 | 13 | 1,640 | 1,663 |
| 8 | 24 | | | | | 2 | | 748 | 750 |
| 9 | 9 | | | | | | | 523 | 523 |
| 12 | 15 | | | | | | | 466 | 466 |
| 13 | 24 | | | | | | | 638 | 638 |
| 14 | 24 | | | | | | | 443 | 443 |
| 15 | 24 | | | | | | | 49 | 49 |
| 16 | 9 | | | | | | | 15 | 15 |
| Total | 1,105 | | | 1,531,615 | 3,319 | 92,360 | 210 | 52,272 | 1,679,776 |
| Percent of District Catch | | | | 91.18 | 0.20 | 5.50 | 0.01 | 3.11 | 100.00 |

1 Estimated fishing effort based on aerial surveys.

a ADF&G test fishing catches.

Table 18. Commercial salmon catch by period and species, in numbers of fish, Nushagak District, Bristol Bay, 1988.^a

| Period | Time | Effort ¹ | | Sockeye | Chinook | Chum | Pink | Coho | Total |
|---------------------------|----------|---------------------|-----|-----------|---------|---------|---------|--------|-----------|
| | | Drift | Set | | | | | | |
| 6/26 | 6 hrs. | 300 | 164 | 100,306 | 3,037 | 57,167 | 1 | 0 | 160,511 |
| 6/28 | 12 hrs. | 335 | 262 | 180,503 | 5,197 | 76,543 | 3 | 0 | 262,246 |
| 7/02 | 7 hrs. | | | 490,426 | 449 | 80,622 | 1 | 0 | 571,498 |
| 7/03 | 6 hrs. | 382 | 259 | 219,001 | 1,754 | 29,696 | 5 | 0 | 250,456 |
| 7/11 | 6 hrs. | 420 | 258 | 209,185 | 1,139 | 31,574 | 11 | 0 | 241,909 |
| 7/12 | 24 hrs. | 347 | | 162,609 | 1,567 | 27,721 | 125 | 0 | 192,022 |
| 7/13 | 24 hrs. | 299 | | 92,887 | 929 | 18,902 | 160 | 5 | 112,883 |
| 7/14 | 24 hrs. | 291 | | 74,496 | 421 | 12,603 | 267 | 4 | 87,791 |
| 7/15 | 14 hrs. | 299 | | 60,611 | 494 | 8,836 | 362 | 33 | 70,336 |
| 7/16 | 9 hrs. | 292 | | 30,608 | 168 | 1,926 | 1,053 | 23 | 33,778 |
| 7/17 | 9 hrs. | 279 | | 32,792 | 234 | 5,158 | 1,095 | 33 | 39,312 |
| 7/18 | 15 hrs. | | | 21,971 | 183 | 3,439 | 4,824 | 194 | 30,611 |
| 7/19 | 24 hrs. | | | 13,112 | 155 | 5,203 | 5,308 | 374 | 24,152 |
| 7/20 | 24 hrs. | | | 5,325 | 153 | 1,625 | 6,316 | 270 | 13,689 |
| 7/21 | 24 hrs. | | | 5,442 | 134 | 2,499 | 9,680 | 1,117 | 18,872 |
| 7/22 | 24 hrs. | | | 2,560 | 102 | 1,316 | 12,942 | 476 | 17,396 |
| 7/23 | 9 hrs. | | | 2,291 | 82 | 516 | 12,394 | 329 | 15,612 |
| 7/25 | 15 hrs. | | | 1,637 | 126 | 2,732 | 26,844 | 8,253 | 39,592 |
| 7/26 | 24 hrs. | | | 785 | 72 | 980 | 33,734 | 3,099 | 38,670 |
| 7/27 | 24 hrs. | | | 553 | 18 | 365 | 11,422 | 968 | 13,326 |
| 7/28 | 9 hrs. | | | 374 | 28 | 284 | 23,742 | 744 | 25,172 |
| 8/02 | 9 hrs. | | | 173 | 21 | 100 | 29,110 | 7,860 | 37,264 |
| 8/03 | 24 hrs. | | | 168 | 11 | 107 | 13,292 | 1,642 | 15,220 |
| 8/04 | 9 hrs. | | | 102 | 7 | 173 | 30,671 | 789 | 31,742 |
| 8/09 | 15 hrs. | | | 62 | 10 | 78 | 15,752 | 8,728 | 24,630 |
| 8/10 | 24 hrs. | | | 60 | 10 | 48 | 8,064 | 15,905 | 24,087 |
| 8/11 | 9 hrs. | | | 0 | 0 | 10 | 1,478 | 2,279 | 3,767 |
| Total | 423 hrs. | | | 1,708,039 | 16,501 | 370,223 | 248,656 | 53,125 | 2,396,544 |
| Percent of District Catch | | | | 71.3 | 0.7 | 15.4 | 10.4 | 2.2 | 100.0 |

1 Estimated fishing effort based on aerial survey count or district registration.

a Includes fish landed in district test fish project.

Table 19. Commercial sockeye salmon catch by period from Clarks Point, Ekuk and Igushik beaches, Nushagak District, in numbers of fish, Bristol Bay, 1988.

| Period | Time | Clark's Point Beach ¹ | Ekuk Beach ² | Igushik Beach ³ |
|--------|---------|-------------------------------------|-------------------------|-------------------------------|
| 6/26 | 6 hrs. | 5,329 | 5,906 | 1,453 |
| 28 | 12 hrs. | 829 | 1,492 | 8,754 |
| 7/ 2 | 7 hrs. | 9,971 | 12,576 | 2,762 |
| 3 | 6 hrs. | 1,924 | 8,554 | 7,266 |
| 11 | 6 hrs. | 8,028 | 28,041 | 6,262 |
| 12 | 24 hrs. | 6,018 | 21,285 | 10,325 |
| 13 | 24 hrs. | 1,070 | 6,058 | 4,203 |
| 14 | 24 hrs. | 572 | 8,044 | 3,609 |
| 15 | 14 hrs. | 990 | 3,693 | 1,550 |
| 16 | 9 hrs. | 1,631 | 3,682 | 1,350 |
| 17 | 9 hrs. | 643 | 2,072 | 945 |
| 18 | 15 hrs. | 1,243 | 2,665 | 1,150 |
| 19 | 24 hrs. | 185 | 950 | 1,312 |
| 20 | 24 hrs. | 45 | 457 | 809 |
| 21 | 24 hrs. | | 329 | 792 |
| 22 | 24 hrs. | | 139 | 70 |
| 23 | 9 hrs. | | 124 | |
| 25 | 15 hrs. | | 95 | |
| 26 | 24 hrs. | | 333 | |
| 27 | 24 hrs. | | 332 | |
| 28 | 9 hrs. | | 124 | |
| 8/ 2 | 9 hrs. | | 11 | |
| 3 | 24 hrs. | | 89 | |
| 4 | 9 hrs. | | 44 | |
| 9 | 15 hrs. | | 25 | |
| 10 | 24 hrs. | | 30 | |
| 11 | 9 hrs. | | 2 | |
| Total | | 38,478 | 107,152 | 52,612 |

1 Approximate fishing effort was 24 set nets. Sockeye salmon accounted for 92% of the total beach catch. Other species landed included 35 chinook, 2,946 chums, 0 pinks, and 0 cohos.

2 Approximate fishing effort was 88 set nets. Sockeye accounted for 95% of the total beach catch. Other species landed included 273 chinook, 3,437 chums, 2,343 pinks, and 112 coho.

3 Approximate fishing effort was 73 set nets. Sockeye accounted for 98% of the total beach catch. Other species landed included 264 chinook, 614 chums, 12 pinks, and 1 coho.

Table 20. Commercial salmon catch by period and species, in numbers of fish, Togiak District, Bristol Bay, 1988.

| Period ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|---------------------|---------|---------|--------|------|------|--------|
| 6/ 6 | | 2 | | | | 2 |
| 7 | 18 | 24 | 27 | | | 69 |
| 8 | 21 | 32 | 45 | | | 98 |
| 9 | 2 | 18 | 28 | | | 48 |
| 10 | 13 | 23 | 13 | | | 49 |
| 13 | 44 | 68 | 514 | | | 626 |
| 14 | 998 | 566 | 2,005 | | | 3,569 |
| 15 | 1,262 | 281 | 3,015 | 1 | | 4,559 |
| 16 | 2,150 | 634 | 6,411 | | | 9,195 |
| 17 | 1,908 | 368 | 5,948 | | | 8,224 |
| 18 | 107 | 66 | 1,099 | | | 1,272 |
| 20 | 8,588 | 979 | 5,762 | | | 15,329 |
| 21 | 13,877 | 1,224 | 14,730 | 1 | | 29,832 |
| 22 | 9,306 | 890 | 12,587 | | | 22,783 |
| 23 | 8,874 | 579 | 17,717 | 3 | | 27,173 |
| 24 | 4,038 | 252 | 9,107 | | | 13,397 |
| 25 | 72 | 28 | 1,894 | 2 | | 1,996 |
| 27 | 20,136 | 1,138 | 20,232 | 1 | | 41,507 |
| 28 | 24,486 | 1,164 | 17,729 | 5 | | 43,384 |
| 29 | 28,230 | 978 | 21,860 | 6 | | 51,074 |
| 30 | 20,801 | 787 | 31,222 | 2 | | 52,812 |
| 7/ 1 | 9,536 | 354 | 14,734 | 1 | | 24,625 |
| 2 | 24 | 4 | 215 | | | 243 |
| 4 | 38,160 | 747 | 18,526 | 15 | | 57,448 |
| 5 | 50,874 | 675 | 28,555 | 37 | | 80,141 |
| 6 | 21,485 | 467 | 19,806 | 21 | | 41,779 |
| 7 | 20,767 | 472 | 20,518 | 17 | | 41,774 |
| 8 | 28,340 | 362 | 18,487 | 24 | | 47,213 |
| 9 | 29,101 | 162 | 8,556 | 23 | | 37,842 |
| 11 | 28,039 | 283 | 9,813 | 22 | | 38,157 |
| 12 | 37,610 | 316 | 17,151 | 50 | | 55,127 |
| 13 | 34,397 | 178 | 17,682 | 27 | | 52,284 |
| 14 | 36,583 | 173 | 17,864 | 34 | | 54,654 |
| 15 | 41,307 | 152 | 15,800 | 67 | | 57,326 |
| 16 | 38,656 | 122 | 6,170 | 53 | | 45,001 |

-continued-

Table 20. (Page 2 of 2)

| Period ¹ | Number of Fish | | | | | Total |
|---------------------------|----------------|---------|---------|--------|--------|-----------|
| | Sockeye | Chinook | Chum | Pink | Coho | |
| 7/17 | 25,478 | 64 | 4,074 | 21 | | 29,637 |
| 18 | 40,142 | 145 | 14,929 | 139 | | 55,355 |
| 19 | 35,475 | 137 | 14,848 | 356 | | 50,816 |
| 20 | 21,842 | 111 | 7,879 | 531 | | 30,363 |
| 21 | 18,875 | 76 | 6,398 | 1,138 | 4 | 26,491 |
| 22 | 14,704 | 47 | 5,023 | 1,126 | | 20,900 |
| 23 | 15,092 | 60 | 4,120 | 1,169 | 1 | 20,442 |
| 24 | 13,067 | 52 | 4,059 | 1,348 | 4 | 18,530 |
| 25 | 12,536 | 56 | 5,569 | 3,469 | 1 | 21,631 |
| 26 | 9,731 | 46 | 3,815 | 3,529 | 1 | 17,122 |
| 27 | 11,260 | 30 | 3,835 | 4,898 | 9 | 20,032 |
| 28 | 7,311 | 22 | 2,004 | 4,582 | 1 | 13,920 |
| 29 | 7,836 | 43 | 1,700 | 5,091 | 17 | 14,687 |
| 30 | 5,088 | 26 | 1,199 | 4,084 | 10 | 10,407 |
| 31 | 2,913 | 10 | 881 | 2,970 | 14 | 6,788 |
| 8/ 1 | 2,111 | 5 | 695 | 2,584 | 14 | 5,409 |
| 2 | 2,501 | 15 | 1,131 | 4,065 | 22 | 7,734 |
| 3 | 1,984 | 13 | 638 | 2,696 | 54 | 5,385 |
| 4 | 1,186 | 11 | 278 | 1,846 | 43 | 3,364 |
| 8 | 923 | 13 | 264 | 1,722 | 211 | 3,133 |
| 8/ 9 | 3,067 | 17 | 761 | 4,318 | 791 | 8,954 |
| 10 | 926 | 6 | 217 | 1,494 | 305 | 2,948 |
| 11 | 355 | 4 | 81 | 579 | 255 | 1,274 |
| 15 | 606 | 2 | 130 | 690 | 1,759 | 3,187 |
| 16 | 614 | 14 | 137 | 762 | 2,582 | 4,109 |
| 17 | 825 | 10 | 127 | 720 | 3,301 | 4,983 |
| 18 | 300 | 5 | 80 | 437 | 1,962 | 2,784 |
| 29 | 21 | | 4 | 16 | 1,338 | 1,379 |
| 30 | 36 | | 4 | 38 | 1,542 | 1,620 |
| 31 | 97 | 4 | 15 | 92 | 2,528 | 2,736 |
| 9/ 1 | 70 | 3 | 4 | 94 | 1,826 | 1,997 |
| Total | 816,782 | 15,615 | 470,721 | 57,016 | 18,595 | 1,378,729 |
| Percent of Dist. Catch | 59.3 | 1.1 | 34.2 | 4.1 | 1.3 | 100.00 |

¹ See emergency order table in 1988 Bristol Bay Annual Management Report for adjustments in the regular weekly fishing schedule.

Table 21. Commercial salmon catch by period and species, in numbers of fish, Togiak Section, Bristol Bay, 1988.

| Period ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|---------------------|---------|---------|--------|------|------|--------|
| 6/06 | | 2 | | | | 2 |
| 07 | 18 | 24 | 27 | | | 69 |
| 08 | 21 | 16 | 39 | | | 76 |
| 09 | 1 | 6 | 4 | | | 11 |
| 10 | 13 | 23 | 13 | | | 49 |
| 13 | 41 | 26 | 19 | | | 86 |
| 14 | 744 | 551 | 1,699 | | | 2,994 |
| 15 | 737 | 157 | 662 | 1 | | 1,557 |
| 16 | 1,578 | 438 | 2,560 | | | 4,576 |
| 17 | 1,713 | 289 | 2,601 | | | 4,603 |
| 20 | 6,783 | 823 | 2,286 | | | 9,892 |
| 21 | 10,544 | 938 | 5,304 | 1 | | 16,787 |
| 22 | 5,923 | 614 | 5,920 | | | 12,457 |
| 23 | 7,005 | 486 | 11,991 | 1 | | 19,483 |
| 24 | 3,805 | 151 | 4,917 | | | 8,873 |
| 27 | 17,476 | 927 | 13,835 | 1 | | 32,239 |
| 28 | 19,878 | 1,026 | 11,438 | 2 | | 32,344 |
| 29 | 25,034 | 861 | 18,157 | 2 | | 44,054 |
| 30 | 19,026 | 751 | 30,391 | 1 | | 50,169 |
| 7/01 | 9,536 | 354 | 14,734 | 1 | | 24,625 |
| 04 | 35,685 | 648 | 17,227 | 15 | | 53,575 |
| 05 | 48,391 | 619 | 24,743 | 27 | | 73,780 |
| 06 | 19,262 | 449 | 19,007 | 20 | | 38,738 |
| 07 | 19,778 | 460 | 20,010 | 17 | | 40,265 |
| 08 | 28,340 | 362 | 18,487 | 24 | | 47,213 |
| 09 | 29,101 | 162 | 8,556 | 23 | | 37,842 |
| 11 | 26,204 | 269 | 9,549 | 16 | | 36,038 |
| 12 | 32,269 | 300 | 16,588 | 48 | | 49,205 |
| 13 | 28,932 | 162 | 16,099 | 27 | | 45,220 |
| 14 | 30,029 | 165 | 16,501 | 34 | | 46,729 |
| 15 | 32,832 | 142 | 14,766 | 56 | | 47,796 |
| 16 | 27,338 | 116 | 4,572 | 46 | | 32,072 |
| 17 | 14,333 | 57 | 2,467 | 11 | | 16,868 |
| 18 | 33,487 | 143 | 13,478 | 95 | | 47,203 |
| 19 | 23,172 | 117 | 10,312 | 249 | | 33,850 |
| 20 | 15,282 | 84 | 6,215 | 224 | | 21,805 |

-continued-

Table 21. (Page 2 of 2)

| Period ¹ | Number of Fish | | | | | Total |
|-----------------------------|----------------|---------|---------|--------|-------|-----------|
| | Sockeye | Chinook | Chum | Pink | Coho | |
| 7/21 | 9,630 | 69 | 4,636 | 381 | 1 | 14,717 |
| 22 | 10,808 | 43 | 4,370 | 672 | | 15,893 |
| 23 | 12,419 | 57 | 3,564 | 871 | | 16,911 |
| 24 | 10,267 | 37 | 3,351 | 1,267 | | 14,922 |
| 25 | 10,824 | 44 | 4,996 | 2,449 | | 18,313 |
| 26 | 8,232 | 42 | 3,447 | 2,520 | 1 | 14,242 |
| 27 | 8,096 | 21 | 2,800 | 3,198 | 2 | 14,117 |
| 28 | 5,564 | 19 | 1,577 | 3,571 | 1 | 10,732 |
| 29 | 5,972 | 36 | 1,320 | 4,016 | 11 | 11,355 |
| 30 | 3,963 | 24 | 1,086 | 3,328 | 5 | 8,406 |
| 31 | 2,276 | 9 | 794 | 2,719 | 9 | 5,807 |
| 8/01 | 2,111 | 5 | 695 | 2,584 | 14 | 5,409 |
| 02 | 1,888 | 7 | 631 | 2,701 | 14 | 5,241 |
| 03 | 1,621 | 10 | 387 | 2,036 | 13 | 4,067 |
| 04 | 899 | 8 | 178 | 1,322 | 18 | 2,425 |
| 08 | 777 | 11 | 186 | 1,444 | 111 | 2,529 |
| 09 | 2,261 | 11 | 466 | 3,172 | 297 | 6,207 |
| 10 | 842 | 5 | 190 | 1,291 | 219 | 2,547 |
| 11 | 298 | 1 | 39 | 438 | 127 | 903 |
| 15 | 540 | 2 | 113 | 586 | 990 | 2,231 |
| 16 | 396 | 11 | 75 | 410 | 822 | 1,714 |
| 17 | 361 | 8 | 75 | 376 | 1,432 | 2,252 |
| 18 | 216 | 2 | 51 | 302 | 1,275 | 1,846 |
| 29 | 19 | | 3 | 14 | 723 | 759 |
| 30 | 36 | | 4 | 34 | 806 | 880 |
| 31 | 46 | 3 | 8 | 64 | 503 | 624 |
| 9/01 | 42 | 3 | 3 | 49 | 378 | 475 |
| Total | 674,715 | 13,206 | 380,219 | 42,757 | 7,772 | 1,118,669 |
| Percent of Section Total | 60.3 | 1.2 | 34.0 | 3.8 | 0.7 | 100.00 |

¹ Togiak River Section open four days per week. See emergency order table in 1988 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 25. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1988.^a

| District and River System | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--------------------------------|------------|---------|-----------|---------|---------|------------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | | | | |
| Kvichak River | 2,706,667 | | | | | |
| Branch River | 127,430 | | | | | |
| Naknek River | 715,325 | | | | | |
| Total | 3,549,422 | 6,677 | 298,966 | 625,551 | 28,352 | 4,508,968 |
| <u>EGEGIK DISTRICT</u> | 6,400,126 | 3,023 | 244,745 | 4,437 | 49,407 | 6,701,738 |
| <u>UGASHIK DISTRICT</u> | 1,531,615 | 3,319 | 92,360 | 210 | 52,272 | 1,679,776 |
| <u>NUSHAGAK DISTRICT</u> | | | | | | |
| Wood River | 979,304 | | | | | |
| Igushik River | 255,178 | | | | | |
| Nushagak-Mulchatna | 473,557 | | | | | |
| Total | 1,708,039 | 16,501 | 370,223 | 248,656 | 53,125 | 2,396,544 |
| <u>TOGIK DISTRICT</u> | | | | | | |
| Togiak Section | 674,715 | 13,206 | 380,219 | 42,757 | 7,772 | 1,118,669 |
| Kulukak Section | 136,325 | 1,454 | 60,215 | 9,444 | 4,892 | 212,330 |
| Matogak Section | 4,510 | 228 | 15,954 | 4,390 | 4,860 | 29,942 |
| Osviak Section | 1,232 | 727 | 14,333 | 425 | 1,071 | 17,788 |
| Total | 816,782 | 15,615 | 470,721 | 57,016 | 18,595 | 1,378,729 |
| TOTAL BRISTOL BAY | 14,005,984 | 45,135 | 1,477,015 | 935,870 | 201,751 | 16,665,755 |
| SPECIES PERCENT | 84.0 | 0.3 | 8.9 | 5.6 | 1.2 | 100.0 |

a Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak Districts is preliminary.

Table 26. Daily sockeye salmon escapement tower counts by river system, Bristol Bay, 1988.

| Date | Kvichak River | | Naknek River | | Egegik River | | Ugashik River | |
|------|---------------|-----------|--------------|-----------|--------------|-----------|---------------|---------|
| | Daily | Cum. | Daily | Cum. | Daily | Cum. | Daily | Cum. |
| 6/21 | | | 0 | 0 | | | | |
| 22 | | | 618 | 618 | 10,032 | 10,032 | | |
| 23 | | | 252 | 870 | 6,768 | 16,800 | | |
| 24 | | | 1,062 | 1,932 | 5,964 | 22,764 | | |
| 25 | 1,068 | 1,068 | 15,492 | 17,424 | 2,256 | 25,020 | | |
| 26 | 3,378 | 4,446 | 9,564 | 26,988 | 6,636 | 31,656 | | |
| 27 | 71,958 | 76,404 | 39,540 | 66,528 | 17,100 | 48,756 | | |
| 28 | 188,070 | 264,474 | 8,718 | 75,246 | 96,108 | 144,864 | | |
| 29 | 48,396 | 312,870 | 9,528 | 84,774 | 111,444 | 256,308 | | |
| 30 | 14,730 | 327,600 | 67,272 | 152,046 | 66,288 | 322,596 | | |
| 7/ 1 | 36,204 | 363,804 | 140,556 | 292,602 | 39,348 | 361,944 | | |
| 2 | 414,204 | 778,008 | 47,586 | 340,188 | 58,164 | 420,108 | | |
| 3 | 414,504 | 1,192,512 | 120,600 | 460,788 | 109,584 | 529,692 | 0 | 0 |
| 4 | 405,258 | 1,597,770 | 56,448 | 517,236 | 126,168 | 655,860 | 3,792 | 3,792 |
| 5 | 303,438 | 1,901,208 | 24,906 | 542,142 | 158,940 | 814,800 | 1,968 | 5,760 |
| 6 | 178,062 | 2,079,270 | 14,988 | 557,130 | 135,216 | 950,016 | 1,296 | 7,056 |
| 7 | 109,842 | 2,189,112 | 31,806 | 588,936 | 81,666 | 1,031,682 | 312 | 7,368 |
| 8 | 42,528 | 2,231,640 | 71,262 | 660,198 | 115,896 | 1,147,578 | 360 | 7,728 |
| 9 | 40,224 | 2,271,864 | 111,612 | 771,810 | 64,506 | 1,212,084 | 3,240 | 10,968 |
| 10 | 117,084 | 2,388,948 | 134,046 | 905,856 | 78,918 | 1,291,002 | 750 | 11,718 |
| 11 | 385,602 | 2,774,550 | 23,280 | 929,136 | 104,148 | 1,395,150 | 642 | 12,360 |
| 12 | 698,280 | 3,472,830 | 21,666 | 950,802 | 42,048 | 1,437,198 | 504 | 12,864 |
| 13 | 279,762 | 3,752,592 | 28,170 | 978,972 | 53,796 | 1,490,994 | 11,694 | 24,558 |
| 14 | 87,486 | 3,840,078 | 21,720 | 1,000,692 | 79,578 | 1,570,572 | 66,366 | 90,924 |
| 15 | 107,856 | 3,947,934 | 6,696 | 1,007,388 | 9,804 | 1,580,376 | 96,690 | 187,614 |
| 16 | 41,706 | 3,989,640 | 20,232 | 1,027,620 | 5,466 | 1,585,842 | 130,008 | 317,622 |
| 17 | 30,636 | 4,020,276 | 5,202 | 1,032,822 | 8,328 | 1,594,170 | 35,340 | 352,962 |
| 18 | 25,224 | 4,045,500 | 2,286 | 1,035,108 | 10,938 | 1,605,108 | 53,004 | 405,966 |
| 19 | 11,742 | 4,057,242 | 1,764 | 1,036,872 | 4,662 | 1,609,770 | 54,756 | 460,722 |
| 20 | 4,296 | 4,061,538 | 990 | 1,037,862 | 1,986 | 1,611,756 | 36,426 | 497,148 |

(continued)

Table 26. (Page 2 of 4)

| Date | Kvichak River | | Naknek River | | Egegik River | | Ugashik River | |
|-------|---------------|-----------|--------------|-----------|--------------|-----------|---------------|---------|
| | Daily | Cum. | Daily | Cum. | Daily | Cum. | Daily | Cum. |
| 21 | 3,078 | 4,064,616 | | | 924 | 1,612,680 | 29,826 | 526,974 |
| 22 | 600 | 4,065,216 | | | | | 25,806 | 552,780 |
| 23 | | | | | | | 21,198 | 573,978 |
| 24 | | | | | | | 11,016 | 584,994 |
| 25 | | | | | | | 14,778 | 599,772 |
| 26 | | | | | | | 25,980 | 625,752 |
| 27 | | | | | | | 6,126 | 631,878 |
| 28 | | | | | | | 2,334 | 634,212 |
| 29 | | | | | | | 2,220 | 636,432 |
| 30 | | | | | | | 2,718 | 639,150 |
| 31 | | | | | | | 2,070 | 641,220 |
| 8/ 1 | | | | | | | 1,056 | 642,276 |
| 2 | | | | | | | 696 | 642,972 |
| 3 | | | | | | | | |
| Total | | 4,065,216 | | 1,037,862 | | 1,612,680 | | 642,972 |

^a Daily escapements from 7/17-7/22 were interpolated using two hours of counts on 7/20, percentages of escapement for those two hours of the total daily escapements for 7/13-7/16 and percentage of drop in daily escapements from 7/12-7/16.

(continued)

Table 26. (Page 3 of 4)

| Date | Wood River | | Igushik River | | Nuyakuk River | | Togiak River | |
|------|------------|---------|---------------|---------|---------------|---------|--------------|---------|
| | Daily | Cum. | Daily | Cum. | Daily | Cum. | Daily | Cum. |
| 23 | 18 | 18 | 600 | 600 | | | | |
| 24 | 1,098 | 1,116 | 1,452 | 2,052 | | | | |
| 25 | 9,744 | 10,860 | 2,832 | 4,884 | | | | |
| 26 | 28,320 | 39,180 | 4,242 | 9,126 | | | | |
| 27 | 19,566 | 58,746 | 6,114 | 15,240 | | | | |
| 28 | 21,522 | 80,268 | 9,048 | 24,288 | | | | |
| 29 | 14,142 | 94,410 | 6,072 | 30,360 | | | | |
| 30 | 2,610 | 97,020 | 4,224 | 34,584 | | | | |
| 7/ 1 | 1,362 | 98,382 | 4,758 | 39,342 | 7,362 | 7,362 | 2,070 | 2,070 |
| 2 | 2,472 | 100,854 | 11,670 | 51,012 | 19,926 | 27,288 | 3,456 | 5,526 |
| 3 | 36,372 | 137,226 | 9,072 | 60,084 | 13,080 | 40,368 | 4,938 | 10,464 |
| 4 | 107,922 | 245,148 | 9,018 | 69,102 | 8,844 | 49,212 | 4,248 | 14,712 |
| 5 | 45,564 | 290,712 | 8,844 | 77,946 | 3,996 | 53,208 | 5,826 | 20,538 |
| 6 | 14,772 | 305,484 | 11,208 | 89,154 | 1,854 | 55,062 | 16,404 | 36,942 |
| 7 | 15,678 | 321,162 | 10,266 | 99,420 | 5,520 | 60,582 | 29,400 | 66,342 |
| 8 | 20,832 | 341,994 | 9,888 | 109,308 | 18,858 | 79,440 | 21,996 | 88,338 |
| 9 | 64,206 | 406,200 | 9,930 | 119,238 | 29,736 | 109,176 | 13,038 | 101,376 |
| 10 | 82,812 | 489,012 | 8,700 | 127,938 | 26,976 | 136,152 | 9,072 | 110,448 |
| 11 | 164,610 | 653,622 | 7,356 | 135,294 | 11,862 | 148,014 | 7,386 | 117,834 |
| 12 | 161,562 | 815,184 | 6,084 | 141,378 | 12,114 | 160,128 | 8,784 | 126,618 |
| 13 | 23,622 | 838,806 | 4,230 | 145,608 | 28,614 | 188,742 | 14,424 | 141,042 |
| 14 | 3,732 | 842,538 | 7,596 | 153,204 | 34,602 | 223,344 | 17,046 | 158,088 |
| 15 | 2,268 | 844,806 | 7,242 | 160,446 | 35,154 | 258,498 | 7,938 | 166,026 |
| 16 | 4,260 | 849,066 | 3,456 | 163,902 | 40,008 | 298,506 | 11,550 | 177,576 |
| 17 | 10,308 | 859,374 | 2,922 | 166,824 | 13,464 | 311,970 | 8,964 | 186,540 |
| 18 | 4,890 | 864,264 | 1,872 | 168,696 | 3,234 | 315,204 | 6,606 | 193,146 |
| 19 | 1,326 | 865,590 | 996 | 169,692 | 2,052 | 317,256 | 10,728 | 203,874 |
| 20 | 1,188 | 866,778 | 762 | 170,454 | 1,944 | 319,200 | 16,656 | 220,530 |

(continued)

Table 27. (Page 2 of 2)

| Date | Chinook | | Sockeye | | Chum | | Pink | | Coho | |
|------|---------|--------|---------|---------|-------|---------|--------|---------|--------|---------|
| | Daily | Cum. | Daily | Cum. | Daily | Cum. | Daily | Cum. | Daily | Cum. |
| 8 1 | 95 | 56,469 | 410 | 480,658 | 1,102 | 183,594 | 23,238 | 147,021 | 1,574 | 12,489 |
| 8 2 | 0 | 56,469 | 0 | 480,658 | 489 | 184,083 | 32,460 | 179,481 | 5,174 | 17,663 |
| 8 3 | 436 | 56,905 | 0 | 480,658 | 436 | 184,519 | 55,663 | 235,144 | 8,513 | 26,176 |
| 8 4 | 0 | 56,905 | 0 | 480,658 | 156 | 184,675 | 60,774 | 295,918 | 9,168 | 35,344 |
| 8 5 | 0 | 56,905 | 285 | 480,943 | 205 | 184,880 | 19,695 | 315,613 | 6,362 | 41,706 |
| 8 6 | 0 | 56,905 | 294 | 481,237 | 170 | 185,050 | 17,049 | 332,662 | 6,033 | 47,739 |
| 8 7 | 0 | 56,905 | 355 | 481,592 | 248 | 185,298 | 23,977 | 356,639 | 7,837 | 55,576 |
| 8 8 | 0 | 56,905 | 476 | 482,068 | 945 | 186,243 | 80,869 | 437,508 | 18,480 | 74,056 |
| 8 9 | 0 | 56,905 | 279 | 482,347 | 175 | 186,418 | 17,246 | 454,754 | 5,903 | 79,959 |
| 8 10 | 0 | 56,905 | 140 | 482,487 | 0 | 186,418 | 6,451 | 461,205 | 7,888 | 87,847 |
| 8 11 | 0 | 56,905 | 132 | 482,619 | 0 | 186,418 | 6,699 | 467,904 | 11,607 | 99,454 |
| 8 12 | 0 | 56,905 | 211 | 482,830 | 0 | 186,418 | 9,763 | 477,667 | 11,984 | 111,438 |
| 8 13 | 0 | 56,905 | 71 | 482,901 | 0 | 186,418 | 3,195 | 480,862 | 3,359 | 114,797 |
| 8 14 | 0 | 56,905 | 79 | 482,980 | 0 | 186,418 | 3,491 | 484,353 | 3,278 | 118,075 |
| 8 15 | 0 | 56,905 | 43 | 483,023 | 0 | 186,418 | 1,957 | 486,310 | 2,107 | 120,182 |
| 8 16 | 0 | 56,905 | 36 | 483,059 | 0 | 186,418 | 1,636 | 487,946 | 1,928 | 122,110 |
| 8 17 | 0 | 56,905 | 62 | 483,121 | 0 | 186,418 | 2,762 | 490,708 | 2,852 | 124,962 |
| 8 18 | 0 | 56,905 | 31 | 483,152 | 0 | 186,418 | 1,432 | 492,140 | 1,701 | 126,663 |
| 8 19 | 0 | 56,905 | 13 | 483,165 | 0 | 186,418 | 706 | 492,846 | 1,421 | 128,084 |
| 8 20 | 0 | 56,905 | 9 | 483,174 | 0 | 186,418 | 438 | 493,284 | 799 | 128,883 |
| 8 21 | 0 | 56,905 | 15 | 483,189 | 0 | 186,418 | 718 | 494,002 | 911 | 129,794 |
| 8 22 | 0 | 56,905 | 6 | 483,195 | 0 | 186,418 | 392 | 494,394 | 1,016 | 130,810 |
| 8 23 | 0 | 56,905 | 5 | 483,200 | 0 | 186,418 | 216 | 494,610 | 291 | 131,101 |

Table 28. Salmon aerial survey escapement estimates by species, district and river systems, in numbers of fish, Bristol Bay, 1988.^a

| District and River System | Sockeye | | Chinook | | Chum | | Pink | | Coho | |
|--------------------------------|---------|---------|---------|-------|---------|---------|---------|-------|--------------------|-------|
| | Index | Total | Index | Total | Index | Total | Index | Total | Index | Total |
| WAKNEK-KVICHAK DISTRICT | | | | | | | | | | |
| Kvichak River | - | - | 570 | - | - | - | 94,000 | - | - | - |
| Branch River drainage | 194,630 | - | 7,900 | - | 59,000 | - | 620,000 | - | 22,400 | - |
| Waknek River ¹ | - | - | 11,750 | - | - | - | 187,000 | - | - | - |
| Total | 194,630 | - | 20,220 | - | 59,000 | - | 901,000 | - | 22,400 | - |
| EGEGIK DISTRICT | | | | | | | | | | |
| Egegik River ² | - | - | 201 | - | 550 | - | 23,000 | - | 13,415 | - |
| King Salmon River ³ | - | - | 667 | - | 14,550 | - | - | - | 300 | - |
| Total | - | - | 868 | - | 15,100 | - | 23,000 | - | 13,715 | - |
| UGASHIK DISTRICT | | | | | | | | | | |
| Dog Salmon River | 3,080 | - | 900 | - | 2,290 | - | - | - | 80 | - |
| Mother Goose Lake ⁴ | 8,360 | - | 8,675 | - | 53,900 | - | - | - | 21,400 | - |
| Upper Ugashik R. | - | - | 105 | - | 500 | - | - | - | 6,800 | - |
| Total | 11,440 | - | 9,680 | - | 56,690 | - | - | - | 28,280 | - |
| MUSHAGAK DISTRICT | | | | | | | | | | |
| Wood River ⁵ | 5,900 | - | - | - | - | - | - | - | - | - |
| Muklung River | 2,100 | - | 430 | - | - | - | - | - | - | - |
| Muyakuk River ⁶ | - | - | - | - | - | - | - | - | - | - |
| Mushagak River ⁷ | 20,900 | - | 4,510 | - | - | - | - | - | - | - |
| Mulchatna River ⁸ | 19,000 | - | 5,330 | - | - | - | - | - | - | - |
| Snake River | 2,160 | - | - | - | - | - | - | - | - | - |
| Total | 50,060 | - | 10,270 | - | - | - | - | - | - | - |
| TOGLAK DISTRICT | | | | | | | | | | |
| Togalak River ⁹ | 32,400 | - | 2,130 | 6,390 | 34,900 | - | - | - | 8,590 | - |
| Kulukak River ¹⁰ | 31,700 | - | 490 | 1,470 | 35,000 | 70,000 | - | - | 1,840 ^b | 5,520 |
| Total | 64,100 | - | 2,620 | 7,860 | 69,900 | 70,000 | - | - | 10,430 | 5,520 |
| TOTAL BAY | 119,590 | 401,530 | 23,172 | 8,550 | 197,216 | 311,100 | - | - | 34,950 | - |

1 Includes King Salmon, Pauls, and Big Creeks.

2 Includes Shosky Creek.

3 Includes Contact, Takayoto, Gertrude Creeks and several smaller tributaries.

4 Includes Punice, Old and Painter Creeks, Needle Lake, King Salmon River, and Mother Goose system.

5 Includes Youth and Sunshine Creeks.

6 Includes Tikchik River, Allen River beach, and outlet of Lake Chaukuktuli; these surveys were all above the counting tower which was terminated early due to extremely high water.

7 Includes Iowithla, Klutispaw, and King Salmon Rivers.

8 Includes Stuyahok and Koktuli Rivers.

9 Minimal estimates from incomplete surveys.

10 Includes Kulukak Lake and Tithe Creek ponds.

^a Detailed information on aerial survey escapement estimates is published in an annual summary report. Estimates are categorized as: index - indices of escapement; generally data is incomplete which will not allow determination of total escapement; total - aerial survey data is complete and does allow estimate of total escapement.

^b Surveys were conducted by Togiak Refuge USFWS.

Table 29. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Kvichak River, Bristol Bay, 1988.

| Date | Aerial Survey | | | | | | River Test Fishing | | | |
|------|---------------|-------|-----------------------|----------------------|----------------------|------------------|------------------------------------|--------------|--------|--------------------------|
| | Tower Count | | Makeen to Index | Index to Index | Index to Tower | Total | Fish Per Index Pt. ¹ | Index Points | | Cumulative Escapement |
| | Daily | Cum. | | | | | | Daily | Cum. | |
| 6/21 | | | | | | 107 | 4 | 17 | 2 | |
| 22 | | | | | | 107 | 4 | 21 | 2 | |
| 23 | | | | | | 107 | 17 | 38 | 4 | |
| 24 | | | | | | 107 | 99 | 137 | 15 | |
| 25 | 1 | 1 | | | | 107 | 200 | 337 | 36 | |
| 26 | 3 | 4 | 30 | 30 | 4 | 64 | 107 | 1,079 | 1,416 | 152 |
| 27 | 72 | 76 | 130 | 49 | 39 | 218 | 107 | 2,831 | 4,247 | 455 |
| 28 | 188 | 264 | 115 | 38 | 65 | 218 | 62 | 84 | 4,331 | 269 |
| 29 | 48 | 313 | | | | | 71 | 40 | 4,371 | 310 |
| 30 | 15 | 328 | | | | | 73 | 1,360 | 5,731 | 418 |
| 7/ 1 | 36 | 364 | | | | | 62 | 4,340 | 10,071 | 624 |
| 2 | 414 | 778 | 101 | 164 | 132 | 397 | 105 | 2,035 | 12,106 | 1,271 |
| 3 | 415 | 1,193 | 50 | 137 | 129 | 316 | 117 | 2,532 | 14,638 | 1,713 |
| 4 | 405 | 1,598 | 111 | 151 | 150 | 412 | 131 | 2,138 | 16,777 | 2,198 |
| 5 | 303 | 1,901 | 105 | 103 | 125 | 333 ^b | 129 | 140 | 16,916 | 2,182 |
| 6 | 178 | 2,079 | | | | | 132 | 84 | 17,001 | 2,244 |
| 7 | 110 | 2,189 | | | | | 129 | 249 | 17,250 | 2,225 |
| 8 | 43 | 2,232 | | | | | 115 | 213 | 17,463 | 2,008 |
| 9 | 40 | 2,272 | | | | | 131 | 3,232 | 20,695 | 2,711 |
| 10 | 117 | 2,389 | 286 | 167 | 48 | 501 | 131 | 7,879 | 28,574 | 3,743 |
| 11 | 386 | 2,775 | 306 | 589 | 184 | 1,079 | 110 | 4,270 | 32,844 | 3,613 |
| 12 | 698 | 3,473 | 210 | 175 | 320 | 705 ^a | 113 | 303 | 33,147 | 3,746 |
| 13 | 280 | 3,753 | 13 | 20 | 109 | 142 ^a | 113 | 2,592 | 35,739 | 4,039 |
| 14 | 87 | 3,840 | 111 | 23 | 36 | 170 ^a | 111 | 1,079 | 36,818 | 4,087 |
| 15 | 108 | 3,948 | 45 | 7 | 36 | 88 | 109 | 159 | 36,977 | 4,031 |

(continued)

Table 22. (Page 2 of 2)

| Period ¹ | Number of Fish | | | | | Total |
|---------------------------------|----------------|--------------|---------------|--------------|--------------|----------------|
| | Sockeye | Chinook | Chum | Pink | Coho | |
| 31 | 637 | 1 | 87 | 251 | 5 | 981 |
| 8/02 | 305 | 5 | 159 | 597 | 2 | 1,068 |
| 03 | 116 | | 37 | 197 | | 350 |
| 04 | 215 | 2 | 41 | 293 | | 551 |
| 08 | 90 | | 41 | 172 | 78 | 381 |
| 09 | 262 | 2 | 76 | 404 | 143 | 887 |
| 10 | 84 | 1 | 27 | 203 | 86 | 401 |
| 11 | 47 | 3 | 27 | 104 | 107 | 288 |
| 15 | 48 | | 16 | 84 | 718 | 866 |
| 16 | 51 | | 19 | 68 | 615 | 753 |
| 17 | 28 | | 17 | 52 | 357 | 454 |
| 18 | 9 | 2 | 11 | 44 | 148 | 214 |
| 29 | 2 | | 1 | 2 | 615 | 620 |
| 30 | | | | 4 | 736 | 740 |
| 31 | 34 | 1 | 7 | 9 | 851 | 902 |
| 9/01 | 22 | | | 9 | 404 | 435 |
| Total | 136,325 | 1,454 | 60,215 | 9,444 | 4,892 | 212,330 |
| Percent of Section Total | 64.2 | 0.7 | 28.4 | 4.4 | 2.3 | 100.0 |

1 Kulukak Section open four days per week. See emergency order table in 1988 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 25. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1988.^a

| District and River System | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--------------------------------|------------|---------|-----------|---------|---------|------------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | | | | |
| Kvichak River | 2,706,667 | | | | | |
| Branch River | 127,430 | | | | | |
| Naknek River | 715,325 | | | | | |
| Total | 3,549,422 | 6,677 | 298,966 | 625,551 | 28,352 | 4,508,968 |
| <u>EGEGIK DISTRICT</u> | | | | | | |
| | 6,400,126 | 3,023 | 244,745 | 4,437 | 49,407 | 6,701,738 |
| <u>UGASHIK DISTRICT</u> | | | | | | |
| | 1,531,615 | 3,319 | 92,360 | 210 | 52,272 | 1,679,776 |
| <u>NUSHAGAK DISTRICT</u> | | | | | | |
| Wood River | 979,304 | | | | | |
| Igushik River | 255,178 | | | | | |
| Nushagak-Mulchatna | 473,557 | | | | | |
| Total | 1,708,039 | 16,501 | 370,223 | 248,656 | 53,125 | 2,396,544 |
| <u>TOGIK DISTRICT</u> | | | | | | |
| Togiak Section | 674,715 | 13,206 | 380,219 | 42,757 | 7,772 | 1,118,669 |
| Kulukak Section | 136,325 | 1,454 | 60,215 | 9,444 | 4,892 | 212,330 |
| Matogak Section | 4,510 | 228 | 15,954 | 4,390 | 4,860 | 29,942 |
| Osviak Section | 1,232 | 727 | 14,333 | 425 | 1,071 | 17,788 |
| Total | 816,782 | 15,615 | 470,721 | 57,016 | 18,595 | 1,378,729 |
| TOTAL BRISTOL BAY | 14,005,984 | 45,135 | 1,477,015 | 935,870 | 201,751 | 16,665,755 |
| SPECIES PERCENT | 84.0 | 0.3 | 8.9 | 5.6 | 1.2 | 100.0 |

a Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak Districts is preliminary.

Table 29. (Page 2 of 2)

| Date | Aerial Survey | | | | | | River Test Fishing | | | |
|--------------|---------------|--------------|-----------------------|----------------------|-------|------------------------------------|--------------------|---------------|--------------------------|--|
| | Tower Count | | Nakeen to Index | Index to Tower | Total | Fish Per Index Pt. ¹ | Index Points | | Cumulative Escapement | |
| | Daily | Cum. | | | | | Daily | Cum. | | |
| 16 | 42 | 3,990 | | | | 107 | 1,230 | 38,208 | 4,088 | |
| 17 | 31 | 4,020 | | | | 107 | 127 | 38,335 | 4,102 | |
| 18 | 25 | 4,046 | | | | | | | | |
| 19 | 12 | 4,057 | | | | | | | | |
| 20 | 4 | 4,062 | | | | | | | | |
| 21 | 3 | 4,065 | | | | | | | | |
| Total | | 4,065 | | | | | | 38,335 | 4,102 | |

1 Fish per index point was based on lag time and/or catchability factors.

a Poor survey conditions.

b Average of two surveys on this date.

Table 30. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods in thousands of fish, Egegik River, Bristol Bay, 1988.

| Date | Tower Count | | Aerial Survey | | Fish per Index Pt. ¹ | River Test Fishing Index Points | | Cumulative Escapement |
|------|-------------|-------|---------------|-------|---------------------------------|------------------------------------|--------|-----------------------|
| | Daily | Cum. | Lagoon | Total | | Daily | Cum. | |
| 6/17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | 1 | 1 | | 151 | 151 | |
| 21 | | | 1 | 1 | 55 | 27 | 178 | 10 |
| 22 | 10 | 10 | | | 55 | 13 | 191 | 11 |
| 23 | 7 | 17 | | | 55 | 40 | 230 | 13 |
| 24 | 6 | 23 | | | 55 | 447 | 677 | 37 |
| 25 | 2 | 25 | | | 55 | 344 | 1,021 | 56 |
| 26 | 7 | 32 | 25 | 225 | 64 | 374 | 1,395 | 89 |
| 27 | 17 | 49 | 71 | 187 | 111 | 387 | 1,782 | 198 |
| 28 | 96 | 145 | | | 106 | 334 | 2,116 | 224 |
| 29 | 111 | 256 | 105 | 157 | 106 | 1,092 | 3,208 | 340 |
| 30 | 66 | 323 | 97 | 117 | 120 | 222 | 3,430 | 412 |
| 7/1 | 39 | 362 | | | 90 | 1,435 | 4,865 | 438 |
| 2 | 58 | 420 | 75 | 75 | 95 | 1,008 | 5,873 | 558 |
| 3 | 110 | 530 | | | 85 | 4,481 | 10,354 | 880 |
| 4 | 126 | 656 | 193 | 193 | 85 | 2,010 | 12,363 | 1,051 |
| 5 | 159 | 815 | 137 | 137 | 85 | 1,156 | 13,520 | 1,149 |
| 6 | 135 | 950 | 120 | 120 | 76 | 457 | 13,977 | 1,062 |
| 7 | 82 | 1,032 | | | 81 | 360 | 14,337 | 1,161 |
| 8 | 116 | 1,148 | 57 | 57 | 81 | 401 | 14,738 | 1,194 |
| 9 | 65 | 1,212 | | | 82 | 760 | 15,498 | 1,271 |
| 10 | 79 | 1,291 | | | 82 | 857 | 16,355 | 1,341 |
| 11 | 104 | 1,395 | | | 85 | 543 | 16,898 | 1,436 |
| 12 | 42 | 1,437 | 24 | 99 | 83 | 3,018 | 19,916 | 1,653 |
| 13 | 54 | 1,491 | | | 74 | 418 | 20,334 | 1,505 |
| 14 | 80 | 1,571 | | | 77 | 432 | 20,766 | 1,599 |
| 15 | 10 | 1,580 | | | 76 | 93 | 20,858 | 1,585 |

-continued-

Table 30. (Page 2 of 2)

| Date | <u>Tower Count</u> | | <u>Aerial Survey</u> | | <u>River Test Fishing</u> | | | Cumulative Escapement |
|--------------|--------------------|--------------|----------------------|-------|---------------------------------|---------------------|---------------|-----------------------|
| | Daily | Cum. | Lagoon | Total | Fish per Index Pt. ¹ | <u>Index Points</u> | | |
| | | | | | | Daily | Cum. | |
| 7/16 | 5 | 1,586 | | | 76 | 261 | 21,119 | 1,605 |
| 17 | 8 | 1,594 | | | | | | |
| 18 | 11 | 1,605 | | | | | | |
| 19 | 5 | 1,610 | | | | | | |
| 20 | 2 | 1,612 | | | | | | |
| 21 | 1 | 1,613 | | | | | | |
| Total | | 1,613 | | | 76 | | 21,119 | 1,605 |

1 Fish per index point was based on recent historic average (1985-87) until June 26 when lag-time relationship began to yield reasonable results.

Table 31. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods in thousands of fish, Ugashik River, Bristol Bay, 1988.

| Date | <u>Tower Count</u> | | <u>Aerial Survey</u> | | Fish per Index Pt. ¹ | <u>River Test Fishing</u> <u>Index Points</u> | | Cumulative Escapement |
|------|--------------------|------|----------------------|-------|------------------------------------|--|--------|--------------------------|
| | Daily | Cum. | Lagoon | Total | | Daily | Cum. | |
| 6/21 | | | | | | 0 | 0 | 0 |
| 22 | | | | | 33 | 6 | 6 | 0 |
| 23 | | | | | 33 | 11 | 17 | 1 |
| 24 | | | | | 33 | 26 | 44 | 1 |
| 25 | | | | | 33 | 32 | 75 | 2 |
| 26 | | | 0 | 0 | 33 | 45 | 120 | 4 |
| 27 | | | | | 33 | 24 | 144 | 5 |
| 28 | | | | | 33 | 15 | 160 | 5 |
| 29 | | | | | 33 | 34 | 193 | 6 |
| 30 | | | 0 | 0 | 33 | 27 | 221 | 7 |
| 7/ 1 | | | | | 33 | 39 | 259 | 9 |
| 2 | | | | | 33 | 44 | 303 | 10 |
| 3 | 0 | 0 | | | 33 | 120 | 424 | 14 |
| 4 | 4 | 4 | | | 33 | 123 | 547 | 18 |
| 5 | 2 | 6 | 0 | 0 | 33 | 61 | 608 | 20 |
| 6 | 1 | 7 | | | 33 | 71 | 679 | 22 |
| 7 | 0 | 7 | | | 33 | 66 | 746 | 25 |
| 8 | 0 | 8 | 2 | 2 | 33 | 88 | 834 | 28 |
| 9 | 3 | 11 | | | 33 | 56 | 890 | 29 |
| 10 | 1 | 12 | 2 | 2 | 33 | 223 | 1,112 | 37 |
| 11 | 1 | 12 | 5 | 5 | 33 | 793 | 1,905 | 63 |
| 12 | 1 | 13 | | | 33 | 1,420 | 3,325 | 110 |
| 13 | 12 | 25 | 4 | 4 | 33 | 1,195 | 4,520 | 149 |
| 14 | 66 | 91 | 2 | 2 | 33 | 4,355 | 8,875 | 293 |
| 15 | 97 | 188 | | | 33 | 2,380 | 11,255 | 371 |
| 16 | 130 | 318 | 23 | 23 | 35 | 1,046 | 12,302 | 431 |
| 17 | 35 | 353 | 34 | 34 | 32 | 680 | 12,982 | 415 |
| 18 | 53 | 406 | | | 34 | 753 | 13,734 | 467 |
| 19 | 55 | 461 | 1 | 1 | 35 | 615 | 14,350 | 502 |
| 20 | 36 | 497 | | | 36 | 569 | 14,919 | 537 |

-continued-

Table 24. Commercial salmon catch by period and species, in numbers of fish, Osviak Section, Bristol Bay, 1988.

| Period ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------------------|---------|---------|--------|------|-------|--------|
| 6/08 | | 16 | 6 | | | 22 |
| 09 | 1 | 12 | 24 | | | 37 |
| 13 | 3 | 42 | 495 | | | 540 |
| 14 | 13 | 6 | 286 | | | 305 |
| 15 | 33 | 45 | 664 | | | 742 |
| 16 | 30 | 88 | 651 | | | 769 |
| 17 | 94 | 65 | 2,184 | | | 2,343 |
| 18 | 91 | 66 | 1,053 | | | 1,210 |
| 20 | 68 | 43 | 725 | | | 836 |
| 21 | 112 | 58 | 1,773 | | | 1,943 |
| 22 | 196 | 127 | 2,264 | | | 2,587 |
| 23 | 130 | 46 | 2,173 | | | 2,349 |
| 24 | 106 | 90 | 1,548 | | | 1,744 |
| 25 | 51 | 22 | 380 | | | 453 |
| 8/03 | 86 | | 83 | 133 | 2 | 304 |
| 09 | 77 | | 14 | 162 | 26 | 279 |
| 17 | 99 | | 5 | 87 | 709 | 900 |
| 18 | 42 | 1 | 5 | 43 | 334 | 425 |
| Total | 1,232 | 727 | 14,333 | 425 | 1,071 | 17,788 |
| Percent of Section Total | 6.9 | 4.1 | 80.6 | 2.4 | 6.0 | 100.00 |

1 Osviak Section open five days per week. See emergency order table in 1988 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 25. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1988.^a

| District and River System | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--------------------------------|------------|---------|-----------|---------|---------|------------|
| <u>NAKNEK-KVICHAK DISTRICT</u> | | | | | | |
| Kvichak River | 2,706,667 | | | | | |
| Branch River | 127,430 | | | | | |
| Naknek River | 715,325 | | | | | |
| Total | 3,549,422 | 6,677 | 298,966 | 625,551 | 28,352 | 4,508,968 |
| <u>EGEGIK DISTRICT</u> | 6,400,126 | 3,023 | 244,745 | 4,437 | 49,407 | 6,701,738 |
| <u>UGASHIK DISTRICT</u> | 1,531,615 | 3,319 | 92,360 | 210 | 52,272 | 1,679,776 |
| <u>NUSHAGAK DISTRICT</u> | | | | | | |
| Wood River | 979,304 | | | | | |
| Igushik River | 255,178 | | | | | |
| Nushagak-Mulchatna | 473,557 | | | | | |
| Total | 1,708,039 | 16,501 | 370,223 | 248,656 | 53,125 | 2,396,544 |
| <u>TOGIK DISTRICT</u> | | | | | | |
| Togiak Section | 674,715 | 13,206 | 380,219 | 42,757 | 7,772 | 1,118,669 |
| Kulukak Section | 136,325 | 1,454 | 60,215 | 9,444 | 4,892 | 212,330 |
| Matogak Section | 4,510 | 228 | 15,954 | 4,390 | 4,860 | 29,942 |
| Osviak Section | 1,232 | 727 | 14,333 | 425 | 1,071 | 17,788 |
| Total | 816,782 | 15,615 | 470,721 | 57,016 | 18,595 | 1,378,729 |
| TOTAL BRISTOL BAY | 14,005,984 | 45,135 | 1,477,015 | 935,870 | 201,751 | 16,665,755 |
| SPECIES PERCENT | 84.0 | 0.3 | 8.9 | 5.6 | 1.2 | 100.0 |

a Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak Districts is preliminary.

Table 31. (Page 2 of 2)

| Date | Tower Count | | Aerial Survey | | River Test Fishing | | | Cumulative Escapement |
|-------|-------------|------|---------------|-------|---------------------------------|--------------|--------|-----------------------|
| | Daily | Cum. | Lagoon | Total | Fish per Index Pt. ¹ | Index Points | | |
| | | | | | | Daily | Cum. | |
| 7/21 | 30 | 527 | 1 | 1 | 36 | 222 | 15,141 | 545 |
| 22 | 26 | 553 | | | 36 | 355 | 15,496 | 558 |
| 23 | 21 | 574 | | | 36 | 283 | 15,779 | 568 |
| 24 | 11 | 585 | | | 36 | 390 | 16,169 | 582 |
| 25 | 15 | 600 | | | 36 | 266 | 16,435 | 592 |
| 26 | 26 | 626 | | | | | | |
| 27 | 6 | 632 | | | | | | |
| 28 | 2 | 634 | | | | | | |
| 29 | 2 | 636 | | | | | | |
| 30 | 3 | 639 | | | | | | |
| 31 | 2 | 641 | | | | | | |
| 8/ 1 | 1 | 642 | | | | | | |
| 2 | 1 | 643 | | | | | | |
| Total | | 643 | | | 39 | | 16,435 | 592 |

1 Fish per index point was based on recent historic average (1985-87) until July 16 when lag-time relationship began to yield reasonable results.

Table 32. Comparison of daily sockeye salmon escapement estimates by tower count and aerial survey enumeration methods, in thousands of fish, Wood River, Bristol Bay, 1988.

| Date | Tower Count | | Aerial Survey ¹ | |
|-------|-------------|------|----------------------------|---|
| | Daily | Cum. | Number | Comments |
| 6/24 | 1 | 1 | | Poor visibility. |
| 25 | 10 | 11 | 3 | Excellent. |
| 26 | 28 | 39 | 8 | Good. |
| 27 | 19 | 58 | 9 | Excellent. |
| 28 | 22 | 80 | 6 | Excellent. |
| 29 | 14 | 94 | 6 | Good. |
| 30 | 3 | 97 | | |
| 7/ 1 | 1 | 98 | | |
| 2 | 2 | 100 | + | Fair to good. |
| 3 | 37 | 137 | 130 | Excellent (Poor condition A.M. flight due to high tide) |
| 4 | 108 | 245 | 30 | Fair to Good |
| 5 | 46 | 291 | 11 | Excellent |
| 6 | 15 | 306 | + | Fair to good. |
| 7 | 16 | 322 | 1 | Excellent |
| 8 | 20 | 342 | 3 | Good visibility A.M. flight 1,300. |
| 9 | 64 | 406 | 9 | Good visibility A.M. flight 10,000 |
| 10 | 83 | 489 | 17 | A.M. flight P.M. flight 6,400 |
| 11 | 164 | 653 | 43 | P.M. flight A.M. flight 8,200. |
| 12 | 162 | 815 | 7 | Good |
| 13 | 24 | 839 | | |
| 14 | 4 | 843 | | |
| 15 | 2 | 845 | | |
| 16 | 4 | 849 | | |
| 17 | 10 | 859 | | |
| 18 | 5 | 864 | | |
| 19 | 1 | 865 | | |
| 20 | 1 | 866 | | |
| Total | | 866 | | |

1 Estimated number of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 33. Inseason comparison of ocean age composition of sockeye salmon escapement using length frequency and scale analysis methods, Wood River, Bristol Bay, 1988.^a

| Date | 2-Ocean (%) | | 3-Ocean (%) | | LF Sample Size | Scale Sample Size ¹ |
|-------------------|------------------|--------|------------------|--------|----------------|--------------------------------|
| | Length Frequency | Scales | Length Frequency | Scales | | |
| 6/25 | 18 | 10 | 82 | 90 | 137 | 114 |
| 26 | 29 | 22 | 71 | 77 | 200 | 162 |
| 28 | 32 | 30 | 68 | 70 | 200 | 169 |
| 29 | 27 | 15 | 73 | 85 | 197 | 166 |
| 7/04 | 50 | 31 | 50 | 68 | 200 | 151 |
| 08 | 45 | 38 | 55 | 62 | 291 | 226 |
| 12 | 53 | 41 | 47 | 58 | 156 | 448 |
| 17 | 40 | 55 | 60 | 42 | 89 | 67 |
| FINAL | 38 | 36 | 62 | 62 | 1,470 | 1,178 |
| MODIFIED FORECAST | 43 | | 57 | | | |

1 Actual number of readable scales.

a Age composition as collected and analyzed on a daily inseason basis.

Table 34. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Igushik River, Bristol Bay, 1988.

| Date | <u>Tower Count</u> | | <u>Aerial Survey</u> ¹ | | | <u>River Test Fishing</u> | | | |
|-------|--------------------|------|-----------------------------------|-------|-------|------------------------------------|---------------------|-------|--------------------------|
| | Daily | Cum. | Lagoon | River | Total | Fish Per Index Pt. ² | <u>Index Points</u> | | Cumulative Escapement |
| | | | | | | | Daily | Cum. | |
| 6/22 | 0 | 0 | | | | | 6 | 21 | |
| 23 | + | + | | | | | 14 | 35 | |
| 24 | 1 | 2 | | | | | 47 | 81 | |
| 25 | 3 | 5 | | 1 | 1 | | 46 | 127 | |
| 26 | 4 | 9 | | | | | 31 | 158 | |
| 27 | 6 | 15 | | | | | 148 | 306 | 1 |
| 28 | 9 | 24 | | 1 | 1 | 16.3 | 80 | 386 | 3 |
| 29 | 6 | 30 | | 1 | 1 | 16.3 | 368 | 754 | 10 |
| 30 | 4 | 34 | | | | 16.3 | 448 | 1,202 | 13 |
| 7/ 1 | 5 | 39 | | | | 16.3 | 296 | 1,498 | 20 |
| 2 | 12 | 51 | + | 1 | 1 | 24.2 | 275 | 1,774 | 29 |
| 3 | 9 | 60 | | | | 32.7 | 144 | 1,918 | 36 |
| 4 | 9 | 69 | + | 2 | 2 | | 274 | 2,182 | 49 |
| 5 | 9 | 78 | | | | | 650 | 2,842 | 58 |
| 6 | 11 | 89 | | | | | 855 | 3,698 | 62 |
| 7 | 10 | 99 | | 3 | 3 | 32.3 | 875 | 4,573 | 67 |
| 8 | 10 | 109 | | | | 30.6 | 645 | 5,217 | 75 |
| 9 | 10 | 119 | 1 | 1 | 2 | 34.2 | 372 | 5,589 | 80 |
| 10 | 9 | 128 | | | | | 107 | 5,696 | 88 |
| 11 | 7 | 135 | | | | 16.9 | 196 | 5,892 | 93 |
| 12 | 6 | 141 | | | | 16.3 | 423 | 6,315 | 96 |
| 13 | 4 | 145 | | | | | 245 | 6,560 | |
| 14 | 8 | 153 | | | | | | | |
| 15 | 7 | 160 | | | | | | | |
| 16 | 3 | 163 | | | | | | | |
| 17 | 3 | 166 | | | | | | | |
| 18 | 2 | 168 | | | | | | | |
| 19 | 1 | 169 | | | | | | | |
| 20 | 1 | 170 | | | | | | | |
| Total | | 169 | | | | | | 6,315 | |

1 Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

2 Fish per index point was originally based on the correlation between escapements and test fishing indices, and was periodically adjusted during the season based on lag time analysis.

Table 35. Comparison of daily sockeye salmon escapement estimates by sonar count and aerial survey enumeration methods, in thousands of fish, Nushagak/Nuyakuk Rivers, Bristol Bay, 1988.

| Date | Nushagak River Sonar Count | | Nuyakuk River Tower Count ¹ | | Aerial Survey ² | |
|------|-------------------------------|------|---|------|----------------------------|--|
| | Daily | Cum. | Daily | Cum. | Number | Comments |
| 6/25 | 9 | 9 | | | | |
| 26 | 20 | 29 | | | | |
| 27 | 15 | 44 | | | 11 | Fair. |
| 28 | 16 | 60 | | | | |
| 29 | 6 | 66 | | | 1 | Fair to Good. |
| 30 | 2 | 68 | | | | |
| 7/ 1 | 2 | 70 | 7 | 7 | | |
| 2 | 2 | 72 | 20 | 27 | 0 | Fair to poor. |
| 3 | 4 | 76 | 13 | 40 | 40 | Excellent P.M. flight. A.M. flight poor. |
| 4 | 46 | 122 | 9 | 49 | 84 | Good. |
| 5 | 43 | 165 | 4 | 53 | 9 | Excellent. |
| 6 | 10 | 175 | 2 | 55 | | |
| 7 | 11 | 186 | 5 | 60 | 2 | Good. |
| 8 | 11 | 197 | 19 | 79 | 3 | A.M. flight. 14 P.M. flight Good.. |
| 9 | 53 | 250 | 30 | 109 | 26 | A.M. 26 P.M. flight Good. |
| 10 | 57 | 307 | 27 | 136 | 24 | Fair |
| 11 | 57 | 364 | 12 | 148 | 25 | Good A.M. 57 P.M. flight. |
| 12 | 86 | 450 | 12 | 160 | | Fog no survey. |
| 13 | 11 | 461 | 29 | 189 | | |
| 14 | 3 | 464 | 34 | 223 | | |
| 15 | 1 | 465 | 35 | 258 | | |
| 16 | 1 | 466 | 40 | 298 | | |
| 17 | 2 | 468 | 14 | 312 | | |
| 18 | 2 | 470 | 3 | 315 | | |
| 19 | 1 | 471 | 2 | 317 | | |
| 20 | 1 | 472 | 2 | 319 | | |

(continued)

Table 35. (Page 2 of 2)

| Date | Nushagak River Sonar Count | | Nuyakuk River Tower Count ¹ | | Aerial Survey ² | |
|-------|-------------------------------|------|---|------|----------------------------|----------|
| | Daily | Cum. | Daily | Cum. | Number | Comments |
| 21 | 2 | 474 | 1 | 320 | | |
| 22 | 2 | 476 | | | | |
| 23 | + | 477 | | | | |
| 24 | + | 477 | | | | |
| 25 | 1 | 478 | | | | |
| 26 | + | 478 | | | | |
| 27 | + | 478 | | | | |
| 28 | + | 479 | | | | |
| 29 | + | 479 | | | | |
| 30 | + | 479 | | | | |
| 31 | + | 480 | | | | |
| 8/ 1 | + | 480 | | | | |
| 2 | + | 480 | | | | |
| 3 | + | 480 | | | | |
| 4 | + | 480 | | | | |
| 5> | + | 480 | | | | |
| Total | | 483 | | 320 | | |

- 1 Due to high turbid water conditions, tower counting was discontinued early.
- 2 Estimated total number of salmon in clear water index areas from Black Pt. to Portage Creek in lower Nushagak River.

Table 36. Daily sockeye salmon tower counts and aerial survey escapement estimates, in thousands of fish, Togiak River, Bristol Bay, 1988.

| Date | Tower Count | | Aerial Survey ¹ | | | | Comments |
|-------|-------------|------|----------------------------|---------------------|------------------------|--------|----------|
| | Daily | Cum. | Togiak to Gech. | Gechiak to Ongi. | Ongivinuck to tower | Total | |
| 6/29 | | | | | 2,000 | 2,000 | |
| 30 | | | | | | | |
| 7/ 1 | 2 | 2 | | | | | |
| 2 | 3 | 5 | | | | | |
| 3 | 5 | 10 | | | | | |
| 4 | 4 | 14 | | | | | |
| 5 | 6 | 20 | | | | | |
| 6 | 16 | 36 | | | | | |
| 7 | 30 | 66 | | | | | |
| 8 | 22 | 88 | | | | | |
| 9 | 13 | 101 | | | | | |
| 10 | 9 | 110 | | | | | |
| 11 | 7 | 117 | | | | | |
| 12 | 9 | 126 | | 10,000 | 4,000 | 14,000 | |
| 13 | 15 | 141 | | | | | |
| 14 | 17 | 158 | | | | | |
| 15 | 8 | 166 | | | | | |
| 16 | 12 | 178 | | | | | |
| 17 | 9 | 187 | | | | | |
| 18 | 7 | 194 | | | | | |
| 19 | 10 | 204 | | | | | |
| 20 | 17 | 221 | | | | | |
| 21 | 10 | 231 | | | | | |
| 22 | 6 | 237 | | | | | |
| 23 | 7 | 244 | | | | | |
| 24 | 10 | 254 | | | | | |
| 25 | 3 | 257 | | | | | |
| 26 | 7 | 264 | | | | | |
| 27 | 4 | 268 | | | | | |
| 28 | 3 | 271 | | | | | |
| 29 | 3 | 274 | | | | | |
| 30 | 1 | 275 | | | | | |
| 31 | 1 | 276 | | | | | |
| 8/ 1 | + | 276 | | | | | |
| Total | | 276 | | | | | |

1 These unexpanded counts include estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 37. Aerial survey escapement estimates of sockeye and coho salmon by major river drainage, in numbers of fish, Togiak District, 1988.^a

| Date | Sockeye Salmon ¹ | | | Coho Salmon | | |
|--------------------|-----------------------------|---------------|--------------------------|--------------|---------------|---------------|
| | Togiak River | Kulukak River | Tithe Creek ² | Togiak River | Gechiak Creek | Kulukak River |
| 6/29 | 2,000 | 8,200 | | | | |
| 7/12 | 13,300 | 12,100 | 200 | | | |
| 8/09 | 16,200 | | | | | |
| 8/12 | | 15,850 | | | | |
| 10/05 ^b | | | | 7,060 | 1,530 | |
| 10/06 ^b | | | | | | 1,840 |

¹ Unexpanded counts.

² Tithe Creek Ponds is the major producer of the Kanik River system.

^a Escapement estimates reflect numbers of fish sighted at time of the survey; generally an expansion factor of 2 to 3 will approximate the total spawning population.

^b Surveys were conducted by Togiak Refuge biologists with USFWS.

Table 38. Commercial salmon processors and buyers operating by district, Bristol Bay, 1988.^a

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|------------------------------|---|-----------------------------------|---------|-------|--------|-------|---|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| NAKNEK-KVICHAK DISTRICT | | | | | | | |
| 1. All Alaskan Seafoods | P/V Northern Alaskan | | Floater | | | | |
| 2. American Eagle Seafoods | M/V Aleutian Dragon | | Floater | | | | |
| 3. Bering Pacific Coop. | M/V Pribilof, Lafayette | | Floater | | | | Cons. w/Lafayette. |
| 4. Big Creek, Inc. | Big Creek | | Shore | | | | |
| 5. Clark Fish Co. | Coffee Point | | | | Air | | |
| 6. Dagnet Fisheries | M/V Alaskan 1 | | Floater | | | | Cons. w/Kenai Packers. |
| 7. FAVCO | Anchorage | | | | Air | | |
| 8. Farwest Fisheries | Naknek | | | | Air | | |
| 9. Grewe, Rick | Naknek | | | | Air | | |
| 10. Icicle Seafoods | P/V Arctic Star, Bering Star | | Floater | | Air | | |
| 11. Inlet Salmon | M/V Trident | | Floater | | | | |
| 12. Kemp Pacific Fisheries | M/V Bering Trader | | Floater | | | | |
| 13. King Crab, Inc. | Naknek | | Shore | | Air | | |
| 14. Lafayette Fisheries | M/V Pribilof, Lafayette | | Floater | | | | W/Bering Pacific. Cons. w/Kemp Pacific |
| 15. Leader Creek Fish Buying | Dillingham (Buyer only - no production) | | | | | | |
| 16. Nelbro Packing Co. | Naknek | 1 1-lb. 3 1/2 lb. 1 1/4 lb. | Shore | | Air | | |
| 17. New West | M/V New West | | Floater | | | | |
| 18. North Coast Seaf. Proc. | M/V Polar Bear | | Floater | | | | |
| 19. Oceanic Seafoods | M/V Pacific Harvest, Harvester Barge | | Floater | | | | |
| 20. Pan Pacific Seafoods | M/V Pacific Producer | | floater | | | | |
| 21. Pederson Point | Pederson Point | | Shore | | | | Cons. w/North Pacific Processors. |
| 22. Peter Pan Seafoods | M/V Blue Wave | | Floater | | | | |
| 23. Red Salmon Co. | Naknek | | Shore | | Air | | W/So. Naknek Seafoods, Ward Cove. |

Table 3B. (Page 2 of 7)

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|----------------------------------|----------------------------|----------------------|---------|-------|--------|-------|---|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| NAKNEK-KVICHAK DISTRICT (con't.) | | | | | | | |
| 24. Snopac Products | M/V Snopac Alaska, Beccara | | Floater | | | | |
| 25. South Naknek Seafoods | South Naknek | | Shore | | | | Cons. w/Wards Cove Red Salmon. |
| 26. T.E.A.M. Seafoods | Togiak | | | | | | |
| 27. Trident Seafoods | South Naknek | 1 1-lb. 3 1/2-lb. | Floater | | | | M/V Alaska Packer, Bountiful, Bristol Monarch, Neptune. |
| 28. Unisea/Dutch Harbor Seaf. | Omnisea | | Floater | | | | |
| 29. Wards Cove Packing | Naknek | 2 1-lb. 1 1/2-lb. | Shore | | Air | | Cons. w/So. Naknek Seafoods. |
| 30. Western Fish Producers | M/V Nicolle N. | | Floater | | | | |
| 31. Woodbine Ak. Fish Co. | Woodbine Ak. Fish Co. | | Floater | | Air | | |
| 32. YAK, Inc. | M/V Yardarm Knot | | Floater | | | | |
| Total Naknek/Kvichak District: | | 3 | 25 | 0 | 10 | 0 | |

EGEGIK DISTRICT

| | | | | | | | |
|----------------------------|------------------------------|--|---------|--|-----|--|--|
| 1. All Alaskan Seafoods | P/V Northern Alaskan | | Floater | | | | |
| 2. American Eagle Seafoods | M/V Aleutian Dragon | | Floater | | | | |
| 3. Bering Pacific Coop | M/V Pribilof, Lafayette | | Floater | | | | |
| 4. Big Creek Fish, Inc. | Bfg Creek | | Shore | | Air | | |
| 5. Clarks Fish Co. | Coffee Point | | | | Air | | |
| 6. Dragnet Fisheries | M/V Alaskan 1 | | Floater | | | | |
| 7. Farwest Fisheries | Naknek | | | | Air | | |
| 8. Icicle Seafoods | P/V Arctic Star, Bering Star | | Floater | | Air | | |
| 9. Internat. Seafoods | Egegik Beach | | | | Air | | |
| 10. Kemp Pacific Fisheries | M/V Bering Trader | | Floater | | | | |

(continued)

Table 38. (Page 3 of 7)

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|-------------------------------|---|-------------------|---------|-------|--------|-------|---|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| EGEGIK DISTRICT (con't.) | | | | | | | |
| 11. Lafayette Fisheries | M/V Pribilof, Lafayette | | Floater | | | | |
| 12. Nelbro Packing Co. | Naknek | | | | | | |
| 13. New West Fish, Inc. | M/V New West | | Floater | | | | |
| 14. North Coast Seaf. Proc. | M/V Polar Bear | | Floater | | | | |
| 15. Oceanic | M/V Pacific Harvest, Harvester Barge | | Floater | X | | | |
| 16. Pan Pacific | M/V Pacific Producer | | Floater | | | | |
| 17. Peter Pan Seafoods | M/V Blue Wave | | Floater | | | | |
| 18. Pederson Point | Pederson Point | | | | | | Cons. w/North Pacific Processors. |
| 19. Red Salmon Co. | Naknek | | | | | | W/So. Naknek Seaf., Ward Cove. |
| 20. Snopac Products | M/V Snopac Alaska, Baccara | | Floater | | | | |
| 21. South Naknek Seafoods | South Naknek | | | | | | Cons. w/Wards Cove Packing. Cannery lines removed. |
| 22. Tenth & M | Anchorage | | | | Air | | |
| 23. Trident Seafoods | South Naknek | | Floater | | | | M/V Alaska Packer, Bountiful, Bristol Monarch, Neptune. |
| 24. Unisea/Dutch Harbor Seaf. | Omnisea | | Floater | | | | |
| 25. Wards Cove Packing | Ekuk | | | | | | Cons. w/So. Naknek Seafoods. |
| 26. Western Fish Producers | M/V Nicolle N. | | Floater | | | | |
| 27. Woodbine Ak. Fish Co. | Woodbine Ak. Fish Co. | | Floater | | | | |
| 28. YAK, Inc. | M/V Yardarm Knot | | Floater | | | | |
| Total Egegik District: | | 0 | 19 | 1 | 6 | 0 | |

(continued)

Table 38. (Page 4 of 7)

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|-------------------------------|---|-------------------|---------|-------|--------|-------|----------|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| UGASHIK DISTRICT | | | | | | | |
| 1. Alaska Gourmet Seaf. | Anchorage | | | | | Air | |
| 2. All Alaskan Seafoods | P/V Northern Alaskan | | Floater | | | | |
| 3. American Eagle Seafoods | M/V Aleutian Dragon | | Floater | | | | |
| 4. Anpac | M/V Nushagak | | Floater | | | | |
| 5. Bering Pacific Coop | M/V Pribilof, Lafayette | | Floater | | | | |
| 6. Big Creek Fish, Inc. | Big Creek | | | | | | |
| 7. Briggs Way Co. | Ugashik | X | | | | | |
| 8. Clarks Fish Co. | Coffee Point | | | | | Air | |
| 9. Dragnet Fisheries | M/V Alaskan 1 | | Floater | | | | |
| 10. Farwest Fisheries | Naknek | | | | | Air | |
| 11. FAVCO | Anchorage | | | | | Air | |
| 12. Icicle Seafoods | P/V Arctic Star, Bering Star | | Floater | | | Air | |
| 13. Internat. Seafoods | Egegik Beach | | | | | Air | |
| 14. Kemp Pacific Fisheries | M/V Bering Trader | | Floater | | | | |
| 15. Lafayette Fisheries | M/V Pribilof, Lafayette | | Floater | | | | |
| 16. New West Fish, Inc. | M/V New West | | Floater | | | | |
| 17. North Coast Seaf. Proc. | M/V Polar Bear | | Floater | | | | |
| 18. Oceanic Seafoods | M/V Pacific Harvester, Harvester Barge | | Floater | X | | | |
| 19. Pan Pacific | M/V Pacific Producer | | Floater | | | | |
| 20. Peter Pan Seafoods | M/V Blue Wave | | Floater | | | | |
| 21. Seafisher Products | M/V Arctic Fisher | | Floater | | | | |
| 22. Snopac Products | M/V Snopac Alaska, Baccara | | Floater | | | | |
| 23. Sonny's Refrigeration | Pilot Point | | Shore | | | | |
| 24. Trident Seafoods | South Naknek | | Floater | | | | |
| 25. Unisea/Dutch Harbor Seaf. | Omnisea | | Floater | | | | |
| 26. Western Fish Producers | M/V Nicolle N. | | Floater | | | | |
| 27. Woodbine Ak. Fish Co. | Woodbine Ak. Fish Co. | | Floater | | | | |
| 28. YAK, Inc. | M/V Yardarm Knot | | Floater | | | | |
| Total Ugashik District: | | 1 | 21 | 1 | 6 | 0 | |

(continued)

Table 38. (Page 5 of 7)

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|-----------------------------|------------------------------|-------------------|---------|-------------------------------|--------|-------|-----------------------------------|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| <u>NUSHAGAK DISTRICT</u> | | | | | | | |
| 1. All Alaskan Seafoods | P/V Northern Alaskan | | Floater | | | | |
| 2. Anpac | M/V Donna Merie/Togiak | | | | Air | | |
| 3. Dragnet Fisheries | M/V Alaskan 1 | | Floater | | | | |
| 4. Icicle Seafoods | P/V Arctic Star, Bering Star | | Floater | | Air | | |
| 5. Kemp Pacific fisheries | M/V Bering Trader | | Floater | | | | |
| 6. Lafayette Fisheries | M/V Pribilof, Lafayette | | Floater | | | | |
| 7. Leader Creek Fish Buying | Dillingham | | | (Buyer only - NON-PROCESSING) | | | All del. to Kemp. |
| 8. North Coast Seaf. Proc. | M/V Polar Bear | | Floater | | | | |
| 9. Pederson Point | Pederson Point | | Shore | | | | Cons. w/North Pacific Processors. |
| 10. Peter Pan Seafoods | Dillingham, | 2 1-lb. | Shore, | | | | |
| | | 2 1/2-lb. | Floater | | | | |
| 11. Queen Fisheries | Clarks Slough | 1 1-lb. | Shore | | | | Freezer vessel Mr. B. |
| | | 1 1/2-lb. | Floater | | | | |
| 12. Red Salmon | Naknek | | | | | | Tendered to N/K. |
| 13. Snopac Products | M/V Snopac Alaska, Baccara | | Floater | | | | |
| 14. T.E.A.M. Seafoods | Togiak | | | | Air | | Tendered to Togiak. |
| 15. Trident Seafoods | South Naknek | | Floater | | | | |
| 16. Unisea(Dutch Harbor) | M/V Omnisea | | | | | | Tendered to N/Kvi. |
| 17. Wards Cove Packing | Ekuk | 1-1/2 lb. | Shore | | Air | | |
| 18. Western Fish Producers | M/V Nicolle N. | | Floater | | | | |
| 19. Woodbine Ak. Fish Co. | M/V Woodbine | | Floater | | | | |
| Total Nushagak District: | | 3 | 17 | 0 | 4 | 0 | |

(continued)

Table 38. (Page 6 of 7)

| Name of Operator/Buyer | Base of Operations | Processing Method | | | Export | | Comments |
|----------------------------|----------------------------------|-------------------|---------------|-------|--------|-------|-------------------------|
| | | Canned | Frozen | Cured | Fresh | Brine | |
| <u>TOGIAC DISTRICT</u> | | | | | | | |
| 1. All Alaskan Seafoods | P/V Northern Alaskan | | Floater | | | X | Tendered to Kusko-kwim. |
| 2. Anpac | M/V Donna Marie, M/V Nushagak | | Floater | | Air | | |
| 3. Kemp Pacific Fisheries | M/V Bering Trader | | | | | | Tendered to Nush. |
| 4. North Coast Seaf. Proc. | M/V Polar Bear | | Floater | | | | |
| 5. Peter Pan Seafoods | Dillingham, M/V Blue Wave | | | | | | Tendered to Nush. |
| 6. T.E.A.M. Seafoods | Togiak | | Shore/floater | | | | |
| 7. Togiak Fisheries | Togiak | | Shore | | | | |
| 8. Trident Seafoods | South Naknek | | | | | | Tendered to Nush. |
| Total Togiak District: | | 0 | 6 | 0 | 1 | 1 | |

(continued)

Table 38. (Page 7 of 7)

FISHERY OPERATOR SUMMARY

| District | Number of Operators | | | | | | Number of Canning Lines ¹ | | | |
|----------------|---------------------|-------------------|--------|-------|--------|-------|--------------------------------------|---------|---------|-------|
| | Total ² | Processing Method | | | Export | | 1 lb. | 1/2 lb. | 1/4 lb. | Total |
| | | Canned | Frozen | Cured | Fresh | Brine | | | | |
| Waknek-Kvichak | 33 | 3 | 25 | 0 | 10 | 0 | 4 | 7 | 1 | 12 |
| Egegik | 28 | 0 | 19 | 1 | 6 | 0 | | | | |
| Ugashik | 28 | 1 | 21 | 1 | 6 | 0 | (Sm. jars) | | | |
| East Side | 41 | 4 | 29 | 1 | 14 | 0 | 4 | 7 | 1 | 12 |
| Nushagak | 19 | 3 | 17 | 0 | 4 | 0 | 3 | 4 | 0 | 7 |
| Togiak | 8 | 0 | 6 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| West Side | 19 | 3 | 19 | 0 | 4 | 1 | 3 | 4 | 0 | 7 |
| TOTAL BAY | 42 | 7 | 32 | 1 | 17 | 1 | 7 | 11 | 1 | 19 |

1 Number of canning lines available for operation.

2 Because some companies operate in more than one district, the total is less than the sum of the column.

a Indicates operators with either a physical plant or processing facility in a district or those operators from other areas buying fish and/or providing tender and support service for fishermen in districts away from the facility.

Table 39. Case pack and commercial production of frozen and cured salmon by species and district, Bristol Bay, 1988.^a

| Category/ District | No. Operators ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--|-------------------------------|-------------------|----------------|------------------|------------------|------------------|-------------------|
| I. CASE PACK (48 - 1 lb. talls) | | | | | | | |
| Naknek/Kvichak | 4 | 79,605 | 719 | 6,155 | 619 | 9 | 87,107 |
| Egegik | | | | | | | |
| Ugashik | | | | | | 21 | 21 |
| Nushagak | 3 | 28,898 | 26 | 6,725 | 4,738 | 280 | 40,667 |
| Togiak | | | | | | | |
| Total | 7 | 108,503 | 745 | 12,880 | 5,357 | 310 | 127,795 |
| II. FROZEN (pounds) | | | | | | | |
| Naknek/Kvichak | 26 | 15,744,626 | 119,535 | 1,183,650 | 1,447,865 | 203,947 | 18,699,623 |
| Egegik | 24 | 33,683,520 | 33,195 | 1,752,077 | 3,768 | 414,979 | 35,887,539 |
| Ugashik | 21 | 8,379,984 | 17,942 | 459,978 | 841 | 432,921 | 9,291,666 |
| Nushagak | 18 | 9,923,925 | 283,167 | 1,314,253 | 359,211 | 346,833 | 12,227,389 |
| Togiak | 9 | 5,744,068 | 264,242 | 4,710,172 | 1,663,598 | 143,039 | 12,525,119 |
| Total | | 73,476,123 | 718,081 | 9,420,130 | 3,475,283 | 1,547,719 | 88,631,336 |
| III. CURED (pounds) | | | | | | | |
| Naknek/Kvichak | | | | | | | |
| Egegik | 1 | 117,988 | | | | | 117,988 |
| Ugashik | 1 | 492,389 | | | | | 492,389 |
| Nushagak | | | | | | | |
| Togiak | | | | | | | |
| Total | 1 | 610,377 | | | | | 610,377 |

(continued)

Table 39. (Page 2 of 2)

| Category/ District | No. Operators ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-------------------------------------|-------------------------------|------------|---------|-----------|-----------|-----------|------------|
| IV. TOTAL FROZEN AND CURED (pounds) | | | | | | | |
| Naknek/Kvichak | 26 | 15,744,626 | 119,535 | 1,183,650 | 1,447,865 | 203,947 | 18,699,623 |
| Egegik | 24 | 33,801,508 | 33,195 | 1,752,077 | 3,768 | 414,979 | 36,005,527 |
| Ugashik | 21 | 8,872,373 | 17,942 | 459,978 | 841 | 432,921 | 9,784,055 |
| Nushagak | | 9,923,925 | 283,167 | 1,314,253 | 359,211 | 346,833 | 12,227,389 |
| Togiak | | 5,744,068 | 264,242 | 4,710,172 | 1,663,598 | 143,039 | 12,525,119 |
| Total | 30 | 74,086,500 | 718,081 | 9,420,130 | 3,475,283 | 1,541,719 | 89,241,713 |

¹ Includes only fish processed in Bristol Bay. Data extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

^a Because some companies operate in more than one district, the total may be less than the sum of the column.

Table 40. Salmon transported out of the area for processing, by district and species, in pounds, Bristol Bay, 1988.^a

I. FRESH EXPORT BY AIR¹

| District | No. Operators ² | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--------------------|----------------------------|-----------|---------|---------|---------|---------|-----------|
| Naknek/Kvichak | 6 | 865,789 | 17,750 | 51,832 | 876,580 | 91,805 | 1,903,756 |
| Egegik | 7 | 2,402,770 | 26,894 | 86,874 | 13,659 | 299,428 | 2,829,625 |
| Ugashik | 3 | 110,155 | 50,449 | 1,506 | | 329 | 162,439 |
| Nushagak Togiak | | | | | | | |
| Total | 10 | 3,378,714 | 95,093 | 140,212 | 890,239 | 391,562 | 4,895,820 |

II. BRINE EXPORT BY SEA^{1 3}

| District | No. Operators | No. of Tenders | No. Fish | Pounds |
|---|---------------|----------------|----------|--------|
| Naknek/Kvichak Egegik Ugashik Nushagak Togiak | 1 | 3 | 12,954 | 82,663 |
| Total | 1 | 3 | 12,954 | 82,663 |

1 Export information extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

2 Because some companies operate in more than one district, the total is less than the sum of the column.

3 Some processors report mixed sockeye and chums and complete species breakdown is generally not available until fish are final processed.

a Includes all fish exported from Bristol Bay in either brine or refrigerated sea water by sea-going tenders, or by air transportation.

Table 41. Mean round weight of the commercial salmon catch, by species and district, in pounds, Bristol Bay, 1988.^a

| District | Sockeye | Chinook | Chum | Pink | Coho | Total |
|--|---------|---------|-------|-------|-------|---------|
| Naknek/Kvichak | 5.99 | 20.41 | 5.95 | 3.72 | 7.15 | |
| Egegik | 6.24 | 21.47 | 6.51 | 3.90 | 8.33 | |
| Ugashik | 6.19 | 20.59 | 6.51 | 3.72 | 8.31 | |
| Nushagak | 6.22 | 18.16 | 6.80 | 3.44 | 7.07 | |
| Togiak | 7.38 | 17.66 | 8.10 | 3.49 | 7.71 | |
| Mean Weight | 6.23 | 18.69 | 7.04 | 3.64 | 7.78 | |
| Total Weight of Catch, All Districts ¹ | 87,964 | 831 | 9,433 | 3,343 | 1,545 | 103,116 |

1 Total weight shown in thousands of pounds, and is derived from preliminary catch data.

a Data extracted from "Bristol Bay Final Operations Reports" (BB-CF/303) and "Bristol Bay Salmon Catch Reports" (BB-CF/301), and is weighted by the catch of each processor against the total catch.

Table 42. Price paid per pound and exvessel value of the commercial salmon catch in thousands of dollars, by species and district, Bristol Bay, 1988.^a

| PRICE PAID PER POUND ¹ | | | | | |
|-----------------------------------|----------|----------|----------|----------|----------|
| District | Sockeye | Chinook | Chum | Pink | Coho |
| Naknek/Kvichak | \$1.9432 | \$1.0113 | \$.3895 | \$.35 | \$1.1191 |
| Egegik | 1.9369 | 1.0719 | .4845 | .19 | 1.2697 |
| Ugashik | 1.8695 | 1.2122 | .3992 | .26 | .8000 |
| Nushagak | 1.9885 | .9241 | .4075 | .31 | 1.3064 |
| Togiak | 1.9059 | 1.1652 | .4372 | .33 | 1.3789 |
| Weighted Average | \$1.9349 | \$1.0515 | \$.4271 | \$.3367 | \$1.1373 |

| TOTAL EXVESSEL VALUE ² | | | | | | |
|-----------------------------------|-----------|---------|---------|---------|---------|-----------|
| District | Sockeye | Chinook | Chum | Pink | Coho | Total |
| Naknek/Kvichak | \$42,005 | \$ 140 | \$ 559 | \$ 808 | \$ 228 | \$ 43,740 |
| Egegik | 77,304 | 56 | 640 | 4 | 527 | 78,531 |
| Ugashik | 17,853 | 83 | 218 | - | 347 | 18,501 |
| Nushagak | 21,553 | 274 | 944 | 248 | 454 | 23,473 |
| Togiak | 11,489 | 321 | 1,668 | 66 | 197 | 13,741 |
| Total | \$170,204 | \$ 874 | \$4,029 | \$1,126 | \$1,753 | \$177,986 |

1 Average price per pound derived from individual company price schedules and is weighted by the catch of each processor against the total catch. This is on ground exvessel value; price changes and bonuses may occur later.

2 Preliminary catch in pounds times district average price; totals may not equal the sum of district values due to rounding.

a Data extracted from "Bristol Bay Final Operations Report" (BB-CF/303).

Table 43. Subsistence salmon catch by species, in number of fish, district and village area, Bristol Bay, 1988.^a

| Area/River System | Permits Issued ¹ | Sockeye | Chinook | Chum | Pink | Coho | Total |
|---------------------------------|-----------------------------|---------|---------|-------|-------|-------|--------|
| <u>NAKNEK-KVICHAK DISTRICT:</u> | | | | | | | |
| Naknek River ² | 223 | 10,343 | 911 | 307 | 853 | 506 | 12,920 |
| <u>Kvichak River:</u> | | | | | | | |
| Iliamna/Newhalen | 61 | 29,756 | 66 | 12 | 11 | 11 | 29,856 |
| King Salmon | 3 | 812 | 15 | 78 | 15 | 0 | 920 |
| Kokhanok | 22 | 14,401 | 10 | 0 | 21 | 207 | 14,639 |
| Levelock | 19 | 3,469 | 43 | 190 | 17 | 89 | 3,808 |
| Nondalton | 31 | 20,669 | 8 | 0 | 0 | 0 | 20,677 |
| Pedro Bay | 13 | 5,533 | 2 | 0 | 0 | 0 | 5,535 |
| Port Alsworth | 19 | 3,162 | 2 | 1 | 0 | 0 | 3,165 |
| TOTAL | 168 | 77,802 | 146 | 281 | 64 | 307 | 78,600 |
| TOTAL N/K | 391 | 88,145 | 1,057 | 588 | 917 | 813 | 91,520 |
| <u>ELEGIK DISTRICT:</u> | | | | | | | |
| Egegik River ³ | 52 | 1,405 | 97 | 87 | 54 | 333 | 1,976 |
| <u>UGASHIK DISTRICT:</u> | | | | | | | |
| Ugashik River ⁴ | 23 | 1,400 | 84 | 55 | 35 | 330 | 1,904 |
| <u>NUSHAGAK DISTRICT:</u> | | | | | | | |
| Wood River ⁵ | 50 | 3,996 | 474 | 505 | 2,155 | 622 | 7,752 |
| Nushagak Bay ⁶ | 294 | 12,056 | 4,266 | 2,112 | 2,772 | 3,070 | 24,276 |
| <u>Iqushik River</u> | | | | | | | |
| Manokotak | 38 | 4,922 | 101 | 71 | 2 | 398 | 5,494 |
| <u>Nushagak River</u> | | | | | | | |
| Ekwok | 15 | 2,525 | 1,106 | 1,281 | 620 | 602 | 6,134 |
| Koliganek | 6 | 3,441 | 728 | 1,504 | 0 | 0 | 5,673 |
| New Stuyahok ⁷ | 38 | 4,146 | 3,404 | 2,761 | 767 | 531 | 11,609 |
| TOTAL | 441 | 31,086 | 10,079 | 8,234 | 6,316 | 5,223 | 60,938 |

(continued)

Table 43. (Page 2 of 2)

| Area/River System | Permits Issued ¹ | Number of Fish | | | | | Total |
|-------------------------|-----------------------------|----------------|---------|-------|-------|-------|---------|
| | | Sockeye | Chinook | Chum | Pink | Coho | |
| <u>TOGIAC DISTRICT:</u> | | | | | | | |
| Togiak | 29 | 2,413 | 429 | 716 | 45 | 792 | 4,395 |
| TOTAL BRISTOL BAY | 936 | 124,449 | 11,746 | 9,680 | 7,367 | 7,491 | 160,733 |

- 1 Number of permits issued for subsistence fishing in each village area. May include permits issued to non-residents of the community, area, or district.
- 2 Includes the communities of Igiugig, Naknek, South Naknek, and King Salmon.
- 3 Includes communities of Egegik and North Egegik.
- 4 Includes communities of Pilot Point and Ugashik.
- 5 Includes permits issued in Aleknagik, Dillingham, and New Stuyahok.
- 6 These permits were issued in Dillingham and catches may include fish taken at Ekuk, Clarks Pt., Clarks Slough (Queen), Nushagak Pt., Kanakanak, and Dillingham. (Includes residents of Aleknagik, Clarks Pt., Dillingham, Ekuk, Koliganek and Portage Creek.
- 7 Includes fish taken at Lewis Point fish camp.
- a Extrapolated totals, based on 88.7% return.

Table 44. Personal use salmon catch by species, in number of fish, Nushagak District, 1988.

| Permits Issued | Permits Returned | Sockeye | Chinook | Chum | Pink | Coho | Total |
|----------------|------------------|---------|---------|------|------|------|--------------------|
| 44 | 35 | 1,569 | 77 | 125 | 4 | 0 | 1,759 ^a |

a Extrapolated.

Appendix Table 1. Forecast and inshore sockeye salmon return, in thousands of fish, Bristol Bay, 1969-88.

| | Forecast | | | | Inshore Return ⁵ | Forecast Error (%) | | | |
|--------------------|-----------------------|--------------------|-----------------------|---------------------|--------------------------------|--------------------|-------|----------|--------|
| | Modified ¹ | ADF&G ² | Japanese ³ | Pooled ⁴ | | Modified | ADF&G | Japanese | Pooled |
| 1969 | | 21,274 | | | 19,043 | | 12 | | |
| 70 | | 55,812 | | | 39,399 | | 42 | | |
| 71 | | 15,170 | | | 15,825 | | -4 | | |
| 72 | | 9,744 | | | 5,400 | | 80 | | |
| 73 | | 6,194 | 9,500 | | 2,444 | | 153 | 289 | |
| 1974 | | 5,004 | 7,600 | | 10,966 | | -54 | -31 | |
| 75 | | 11,960 | 21,600 | | 24,232 | | -51 | -11 | |
| 76 | | 11,969 | 22,300 | | 11,539 | | 4 | 93 | |
| 77 | | 8,380 | 19,300 | | 9,722 | | -14 | 99 | |
| 78 | | 11,534 | 22,600 | | 19,924 | | -42 | 13 | |
| 1979 | | 22,650 | 22,300 | | 39,904 | | -43 | -44 | |
| 80 | | 54,542 | 73,600 | | 62,489 | | -13 | 18 | |
| 81 | | 26,700 | 26,800 | | 34,475 | | -23 | -22 | |
| 82 | | 34,625 | 28,300 | | 22,208 | | 56 | 27 | |
| 83 | | 27,117 | 43,500 | 33,360 | 45,908 | | -41 | -5 | -27 |
| 1984 | | 41,514 | 14,362 | 31,139 | 41,110 ^a | | 1 | -65 | -24 |
| 85 | | 25,321 | 41,900 | 35,028 | 36,858 ^a | | -31 | 14 | -5 |
| 86 | | 24,275 | 19,100 | 22,936 | 23,850 ^a | | 2 | -20 | -4 |
| 87 | | 16,146 | 17,500 | 16,785 | 27,500 ^a | | -41 | -36 | -39 |
| 88 | 28,300 ^b | 18,100 | 15,100 | 16,700 | 23,436 ^a | 21 | -23 | -36 | -29 |
| Mean Percent Error | | | | | | 21 | -1 | 15 | -18 |

1 Forecast by Fisheries Research Institute based on purse seine data gathered south of Adak, and is not broken down by river system.

2 Inshore river system forecast by the Department is based on cycle analysis, smolt production and ratio of 2-ocean to 3-ocean age return.

(continued)

Appendix Table 3. Commercial salmon catch by the Japanese mothership and land-based drift net high seas fisheries, by species, in thousands of fish, 1969-88.^a

| Year | Sockeye | | Chinook | | Chum | | Pink | | Coho | | Total | |
|-----------------|---------|-------|---------|-----|--------|--------|--------|--------|-------|-------|--------|--------|
| | MS | LB | MS | LB | MS | LB | MS | LB | MS | LB | MS | LB |
| 1969 | 5,935 | 2,495 | 554 | 83 | 7,721 | 4,908 | 6,972 | 23,610 | 1,306 | 3,328 | 22,488 | 34,424 |
| 70 | 6,944 | 2,966 | 437 | 101 | 9,638 | 6,585 | 1,726 | 13,403 | 180 | 2,259 | 18,925 | 25,314 |
| 71 | 3,554 | 3,026 | 206 | 134 | 9,968 | 6,250 | 8,202 | 16,977 | 454 | 2,373 | 22,384 | 28,760 |
| 72 | 3,184 | 3,711 | 261 | 103 | 13,373 | 8,598 | 3,795 | 14,839 | 614 | 2,421 | 21,227 | 29,672 |
| 73 | 2,613 | 3,308 | 119 | 162 | 7,857 | 7,614 | 12,018 | 20,650 | 989 | 3,794 | 23,596 | 35,528 |
| 1974 | 2,282 | 3,155 | 361 | 186 | 9,283 | 12,179 | 7,756 | 11,242 | 1,085 | 3,559 | 20,767 | 30,321 |
| 75 | 2,171 | 2,969 | 162 | 135 | 7,367 | 11,480 | 14,654 | 15,347 | 356 | 3,550 | 24,710 | 33,481 |
| 76 | 2,266 | 3,291 | 283 | 201 | 10,436 | 10,646 | 7,207 | 10,879 | 828 | 2,751 | 21,020 | 27,768 |
| 77 | 1,508 | 1,289 | 93 | 146 | 5,996 | 6,230 | 9,100 | 15,041 | 79 | 1,722 | 16,776 | 24,428 |
| 78 | 1,882 | 1,292 | 105 | 210 | 3,802 | 3,488 | 1,853 | 7,846 | 609 | 2,512 | 8,251 | 15,348 |
| 1979 | 2,186 | 756 | 126 | 161 | 3,277 | 2,661 | 3,405 | 11,190 | 281 | 1,199 | 9,275 | 15,967 |
| 80 | 2,412 | 787 | 704 | 160 | 3,098 | 2,697 | 561 | 11,612 | 656 | 1,205 | 7,431 | 16,461 |
| 81 | 2,224 | 859 | 88 | 190 | 2,539 | 2,509 | 4,094 | 11,292 | 615 | 1,209 | 9,560 | 16,059 |
| 82 | 1,738 | 723 | 107 | 165 | 3,217 | 2,930 | 1,654 | 11,035 | 1,183 | 1,201 | 7,899 | 16,054 |
| 83 | 1,655 | 828 | 87 | 178 | 3,081 | 2,395 | 4,324 | 11,308 | 297 | 1,122 | 9,444 | 15,831 |
| 1984 | 1,597 | 305 | 82 | 92 | 3,275 | 2,214 | 1,430 | 9,727 | 786 | 894 | 7,170 | 13,232 |
| 85 | 1,138 | 155 | 66 | 100 | 2,836 | 1,432 | 2,717 | 9,973 | 128 | 766 | 6,885 | 12,426 |
| 86 | 729 | 148 | 60 | 76 | 1,925 | 959 | 390 | 4,513 | 65 | 483 | 3,169 | 6,179 |
| 87 | 667 | 143 | 39 | 77 | 1,822 | 920 | 966 | 4,442 | 35 | 468 | 3,529 | 6,050 |
| 88 ^b | 225 | 116 | 26 | 47 | 892 | 751 | 56 | 5083 | 0 | 293 | 1,199 | 6,290 |
| 20 Year Average | 2,346 | 1,616 | 198 | 135 | 5,570 | 4,872 | 4,644 | 12,000 | 527 | 1,855 | 13,285 | 20,480 |
| 1969-78 Average | 3,234 | 2,750 | 258 | 146 | 8,544 | 7,798 | 7,328 | 14,983 | 650 | 2,827 | 20,014 | 28,504 |
| 1979-88 Average | 1,457 | 482 | 139 | 125 | 2,596 | 1,947 | 1,960 | 9,018 | 405 | 884 | 6,556 | 12,455 |

^a Mothership fishery (MS) and land-based fishery (LB).

^b Preliminary data.

(Sources: 1 and 19)

Appendix Table 4. Japanese mothership commercial catch of maturing and immature sockeye salmon of Bristol Bay origin, in thousands of fish, 1969-88.

| Year | Matures ¹ | Immatures ² | Total |
|-----------------|----------------------|------------------------|-------|
| 1969 | 1,240 | 517 | 1,757 |
| 70 | 3,451 | 1,207 | 4,658 |
| 71 | 842 | 592 | 1,434 |
| 72 | 710 | 214 | 924 |
| 73 | 625 | 259 | 884 |
| 1974 | 251 | 708 | 959 |
| 75 | 645 | 222 | 867 |
| 76 | 779 | 228 | 1,007 |
| 77 | 540 | 328 | 868 |
| 78 | 124 | 236 | 360 |
| 1979 | 68 | 410 | 478 |
| 80 | 180 | 681 | 861 |
| 81 | 137 | 380 | 517 |
| 82 | 63 | 228 | 291 |
| 83 | 96 | 240 | 336 |
| 1984 | 51 | 260 | 311 |
| 85 | 0 | 264 | 264 |
| 86 | 34 | 95 | 129 |
| 87 | 70 | 64 | 134 |
| 88 ^a | | | |
| 19 Year Average | 521 | 375 | 897 |
| 1969-78 Average | 921 | 451 | 1,372 |
| 1979-87 Average | 78 | 291 | 369 |

1 Includes May and June 1-10 catches east of 170 degrees east, June 11-20 catches east of 175 degrees east, and June 21-30 catches east of 180 degrees.

2 Includes sockeye salmon taken on the high seas at times and in areas where immature Bristol Bay sockeye salmon are in large majority. These are mostly .2 ocean age fish that otherwise would be expected to mature and return to Bristol Bay as .3 ocean fish. Includes July and August catches east of 170 degrees east and June 21-30 catches between 170 degrees east and 180 degrees east.

a Data unavailable.

(Sources: 1 and 19)

Appendix Table 5. Inshore domestic and Japanese mothership high seas commercial catch of sockeye salmon of Bristol Bay origin, in thousands of fish, 1969-88.

| Year | Bristol Bay Catch | | | Bristol Bay | | Percent Japanese Catch of: | |
|-----------------|---------------------|-----------------------|--------|-------------|---------------------------|----------------------------|---------------|
| | Inshore | Japanese ¹ | Total | Escapement | Total Return ² | Total Catch | Total Bay Run |
| 1969 | 6,622 | 2,031 | 8,653 | 12,421 | 21,074 | 23 | 10 |
| 70 | 20,721 | 3,968 | 24,689 | 18,679 | 43,368 | 16 | 9 |
| 71 | 9,584 | 2,049 | 11,633 | 6,241 | 17,874 | 18 | 11 |
| 72 | 2,416 | 1,302 | 3,718 | 2,984 | 6,702 | 35 | 19 |
| 73 | 761 | 839 | 1,600 | 1,683 | 3,283 | 52 | 26 |
| 1974 | 1,362 | 510 | 1,872 | 9,603 | 11,475 | 27 | 4 |
| 75 | 4,899 | 1,353 | 6,252 | 19,333 | 25,585 | 22 | 5 |
| 76 | 5,619 | 1,001 | 6,620 | 5,920 | 12,540 | 15 | 8 |
| 77 | 4,878 | 768 | 5,646 | 4,844 | 10,490 | 14 | 7 |
| 78 | 9,928 | 452 | 10,380 | 9,996 | 20,376 | 4 | 2 |
| 1979 | 21,429 | 304 | 21,733 | 18,475 | 40,208 | 1 | 1 |
| 80 | 23,762 | 590 | 24,352 | 38,727 | 63,079 | 2 | 1 |
| 81 | 25,603 | 818 | 26,421 | 8,872 | 35,293 | 3 | 2 |
| 82 | 15,104 | 443 | 15,547 | 7,104 | 22,651 | 3 | 2 |
| 83 | 37,372 | 324 | 37,696 | 8,536 | 46,232 | 1 | 1 |
| 1984 | 24,710 | 291 | 25,001 | 16,400 | 41,401 | 1 | 1 |
| 85 | 23,703 | 260 | 23,963 | 13,156 | 37,119 | 1 | 1 |
| 86 | 15,889 ^a | 298 | 16,187 | 7,960 | 24,147 | 2 | 1 |
| 87 | 16,048 ^a | 165 | 16,213 | 11,452 | 27,665 | 1 | 1 |
| 88 ^b | | | | | | | |
| 19 Year Average | 14,232 | 935 | 15,167 | 11,705 | 26,872 | 13 | 6 |
| 1969-78 Average | 6,679 | 1,427 | 8,106 | 9,170 | 17,277 | 23 | 10 |
| 1979-87 Average | 22,624 | 388 | 23,013 | 14,520 | 37,533 | 2 | 1 |

1 Includes immature fish caught in previous year.

2 Includes Bristol Bay catch and escapement and Japanese catch.

a Preliminary.

b Data unavailable.

(Sources: 1, 5, and 19)

Appendix Table 6. Japanese mothership commercial catch of chinook salmon of western Alaska origin, in thousands of fish, 1969-88.

| Year | Mothership Catch | Catch of Western Alaska Origin | |
|-----------------|---------------------|-----------------------------------|---------|
| | | Number | Percent |
| 1969 | 554 | 367 | 66 |
| 70 | 437 | 312 | 71 |
| 71 | 206 | 132 | 64 |
| 72 | 261 | 189 | 72 |
| 73 | 119 | 56 | 47 |
| 1974 | 361 | 208 | 58 |
| 75 | 162 | 108 | 67 |
| 76 | 283 | 117 | 41 |
| 77 | 93 | 55 | 59 |
| 78 | 105 | 36 | 34 |
| 1979 | 126 | 69 | 55 |
| 80 | 704 | 416 | 59 |
| 81 | 88 | 30 | 34 |
| 82 | 107 | 45 | 42 |
| 83 | 87 | 31 | 36 |
| 1984 | 82 | 36 | 44 |
| 85 | 66 | 25 | 38 |
| 86 | 60 | 24 | 40 |
| 87 | 39 | 20 | 51 |
| 88 ^a | | | |
| 19 Year Average | 207 | 120 | 52 |
| 1969-78 Average | 258 | 158 | 58 |
| 1979-87 Average | 151 | 77 | 44 |

a Data unavailable.

(Sources: 1 and 19)

Appendix Table 7. Salmon fishing license and entry permit registration by gear type and residency, Bristol Bay, 1969-88.^a

| Year | Drift Net ¹ | | | Set Net ¹ | | | Total |
|-------------------|------------------------|--------------|-------|----------------------|--------------|-------|-------|
| | Resident | Non-Resident | Total | Resident | Non-Resident | Total | |
| 1969 | 1,110 | 818 | 1,928 | 804 | 166 | 970 | 2,898 |
| 70 | 1,057 | 824 | 1,881 | 747 | 143 | 890 | 2,771 |
| 71 | 1,034 | 831 | 1,865 | 710 | 136 | 846 | 2,711 |
| 72 | 993 | 771 | 1,764 | 722 | 132 | 854 | 2,618 |
| 73 | 2,041 | 1,162 | 3,203 | 902 | 108 | 1,010 | 4,213 |
| 1974 ^b | 634 (634) | 238 (238) | 872 | 530 (530) | 95 (95) | 625 | 1,497 |
| 75 | 1,217 (450) | 843 (194) | 2,060 | 751 (159) | 169 (45) | 920 | 2,980 |
| 76 | 987 (69) | 734 (30) | 1,721 | 625 (5) | 139 (0) | 764 | 2,485 |
| 77 | 999 (52) | 729 (13) | 1,728 | 684 (15) | 156 (1) | 840 | 2,568 |
| 78 | 1,039 (66) | 738 (11) | 1,777 | 749 (16) | 161 (3) | 910 | 2,687 |
| 1979 | 1,046 (73) | 754 (10) | 1,800 | 764 (19) | 170 (5) | 934 | 2,734 |
| 80 | 1,060 (92) | 767 (18) | 1,827 | 760 (29) | 187 (5) | 947 | 2,774 |
| 81 | 1,056 (89) | 771 (18) | 1,827 | 754 (37) | 202 (5) | 956 | 2,783 |
| 82 | 1,050 (85) | 774 (15) | 1,824 | 744 (36) | 213 (5) | 957 | 2,781 |
| 83 | 1,071 (79) | 750 (16) | 1,821 | 740 (33) | 220 (3) | 960 | 2,781 |
| 1984 | 1,050 (73) | 768 (16) | 1,818 | 744 (28) | 218 (3) | 962 | 2,780 |
| 85 | 1,061 (83) | 772 (13) | 1,833 | 733 (24) | 217 (4) | 950 | 2,783 |
| 86 | 1,059 (78) | 775 (17) | 1,834 | 727 (18) | 223 (4) | 950 | 2,784 |
| 87 ^c | 1,054 (76) | 782 (16) | 1,836 | 730 (14) | 220 (4) | 950 | 2,786 |
| 88 ^d | 1,035 (78) | 802 (12) | 1,837 | 727 (14) | 222 (3) | 949 | 2,786 |
| 20 Year Average | 1,083 | 770 | 1,853 | 732 | 175 | 907 | 2,760 |
| 1969-78 Average | 1,111 | 769 | 1,880 | 722 | 141 | 863 | 2,743 |
| 1979-88 Average | 1,054 | 772 | 1,826 | 742 | 209 | 952 | 2,777 |

(continued)

Appendix Table 7. (Page 2 of 2)

| Year | Drift Net ¹ | | | Set Net ¹ | | | Total |
|------|------------------------|--------------|-------|----------------------|--------------|-------|-------|
| | Resident | Non-Resident | Total | Resident | Non-Resident | Total | |

- 1 Allowable gear per license/permit is 150 fathoms for drift and 50 fathoms for set with the following exceptions: 1968 and 1975 - 75 F. drift and 25 F. set; 1969 - 125 F. drift; 1973 - 25 F. drift and 12 1/2 F. set.
- a Total license/permit registration; not all license/permittee's actually fished.
- b Limited Entry went into effect. Figures in parenthesis are interim-use permits, and are included in the totals.
- c Does not include two drift and eleven set net permits available but not renewed for 1987.
- d Does not include two drift and nine set net permits available but not renewed in 1988.

(Sources: 2 and 15)

Appendix Table 8. Salmon fishing license and entry permit registration by gear type and residency, Bristol Bay, 1969-88.^a

| Year | Drift Net ¹ | | | Set Net ¹ | | | Total |
|-------------------|------------------------|--------------|-------|----------------------|--------------|-------|-------|
| | Resident | Non-Resident | Total | Resident | Non-Resident | Total | |
| 1969 | 1,110 | 818 | 1,928 | 804 | 166 | 970 | 2,898 |
| 70 | 1,057 | 824 | 1,881 | 747 | 143 | 890 | 2,771 |
| 71 | 1,034 | 831 | 1,865 | 710 | 136 | 846 | 2,711 |
| 72 | 993 | 771 | 1,764 | 722 | 132 | 854 | 2,618 |
| 73 | 2,041 | 1,162 | 3,203 | 902 | 108 | 1,010 | 4,213 |
| 1974 ^b | 634 (634) | 238 (238) | 872 | 530 (530) | 95 (95) | 625 | 1,497 |
| 75 | 1,217 (450) | 843 (194) | 2,060 | 751 (159) | 169 (45) | 920 | 2,980 |
| 76 | 987 (69) | 734 (30) | 1,721 | 625 (5) | 139 (0) | 764 | 2,485 |
| 77 | 999 (52) | 729 (13) | 1,728 | 684 (15) | 156 (1) | 840 | 2,568 |
| 78 | 1,039 (66) | 738 (11) | 1,777 | 749 (16) | 161 (3) | 910 | 2,687 |
| 1979 | 1,046 (73) | 754 (10) | 1,800 | 764 (19) | 170 (5) | 934 | 2,734 |
| 80 | 1,060 (92) | 767 (18) | 1,827 | 760 (29) | 187 (5) | 947 | 2,774 |
| 81 | 1,056 (89) | 771 (18) | 1,827 | 754 (37) | 202 (5) | 956 | 2,783 |
| 82 | 1,050 (85) | 774 (15) | 1,824 | 744 (36) | 213 (5) | 957 | 2,781 |
| 83 | 1,071 (79) | 750 (16) | 1,821 | 740 (33) | 220 (3) | 960 | 2,781 |
| 1984 | 1,050 (73) | 768 (16) | 1,818 | 744 (28) | 218 (3) | 962 | 2,780 |
| 85 | 1,061 (83) | 772 (13) | 1,833 | 733 (24) | 217 (4) | 950 | 2,783 |
| 86 | 1,059 (78) | 775 (17) | 1,834 | 727 (18) | 223 (4) | 950 | 2,784 |
| 87 ^c | 1,054 (76) | 782 (16) | 1,836 | 730 (14) | 220 (4) | 950 | 2,786 |
| 88 ^d | 1,036 (80) | 802 (12) | 1,838 | 727 (14) | 222 (3) | 949 | 2,787 |
| 20 Year Average | 1,083 | 770 | 1,853 | 732 | 175 | 907 | 2,760 |
| 1969-78 Average | 1,111 | 769 | 1,880 | 722 | 141 | 863 | 2,743 |
| 1979-88 Average | 1,054 | 772 | 1,826 | 742 | 209 | 952 | 2,777 |

(continued)

Appendix Table 8. (Page 2 of 2)

| Year | Drift Net ¹ | | | Set Net ¹ | | | Total |
|------|------------------------|--------------|-------|----------------------|--------------|-------|-------|
| | Resident | Non-Resident | Total | Resident | Non-Resident | Total | |

- 1 Allowable gear per license/permit is 150 fathoms for drift and 50 fathoms for set with the following exceptions: 1968 and 1975 - 75 F. drift and 25 F. set; 1969 - 125 F. drift; 1973 - 25 F. drift and 12 1/2 F. set.
- a Total license/permit registration; not all license/permittee's actually fished.
- b Limited Entry went into effect. Figures in parenthesis are interim-use permits, and are included in the totals.
- c Does not include two drift and eleven set net permits available but not renewed for 1987.
- d Does not include one drift and eight set net permits available but not renewed for 1988.

(Sources: 2 and 15)

Appendix Table 9. Sockeye salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek-Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|-----------------|----------------|-----------|-----------|-----------|---------|------------|
| 1969 | 4,655,072 | 889,322 | 169,845 | 773,207 | 134,252 | 6,621,698 |
| 70 | 17,803,805 | 1,403,509 | 171,541 | 1,188,534 | 153,377 | 20,720,766 |
| 71 | 5,857,378 | 1,306,682 | 954,068 | 1,256,799 | 209,060 | 9,583,987 |
| 72 | 1,102,365 | 839,820 | 17,440 | 381,347 | 75,261 | 2,416,233 |
| 73 | 168,249 | 221,337 | 3,920 | 272,093 | 95,723 | 761,322 |
| 1974 | 538,163 | 172,253 | 2,151 | 510,571 | 139,341 | 1,362,479 |
| 75 | 3,085,416 | 964,024 | 14,558 | 645,902 | 188,914 | 4,898,814 |
| 76 | 2,547,276 | 1,329,788 | 174,923 | 1,265,422 | 301,883 | 5,619,292 |
| 77 | 2,167,214 | 1,780,567 | 92,623 | 619,025 | 218,451 | 4,877,880 |
| 78 | 5,123,668 | 1,207,294 | 7,995 | 3,137,166 | 452,016 | 9,928,139 |
| 1979 | 14,991,826 | 2,257,332 | 391,118 | 3,327,346 | 460,984 | 21,428,606 |
| 80 | 15,120,457 | 2,623,066 | 885,875 | 4,497,787 | 634,561 | 23,761,746 |
| 81 | 10,992,809 | 4,361,406 | 2,116,066 | 7,493,093 | 639,707 | 25,603,081 |
| 82 | 5,005,802 | 2,447,514 | 1,139,192 | 5,916,187 | 595,696 | 15,104,391 |
| 83 | 21,559,372 | 6,755,256 | 3,349,451 | 5,119,744 | 588,208 | 37,372,031 |
| 1984 | 14,546,710 | 5,190,413 | 2,658,376 | 1,992,681 | 322,126 | 24,710,306 |
| 85 | 8,179,093 | 7,537,273 | 6,468,862 | 1,307,889 | 209,766 | 23,702,883 |
| 86 ^a | 2,889,894 | 5,008,779 | 4,928,502 | 2,757,730 | 303,677 | 15,888,582 |
| 87 ^a | 4,949,015 | 5,386,845 | 2,119,188 | 3,252,902 | 339,884 | 16,047,834 |
| 88 ^a | 3,549,422 | 6,400,126 | 1,531,615 | 1,708,039 | 674,715 | 13,863,917 |
| 20 Year Average | 7,241,650 | 2,904,130 | 1,359,865 | 2,371,173 | 336,880 | 14,213,699 |
| 1969-78 Average | 4,304,861 | 1,011,460 | 160,906 | 1,005,007 | 196,828 | 6,679,061 |
| 1979-88 Average | 10,178,440 | 4,796,801 | 2,558,825 | 3,737,340 | 476,932 | 21,748,338 |

a Preliminary

(Sources: 1 and 5)

Appendix Table 10. Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek- Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|-----------------|--------------------|--------|---------|----------|--------|---------|
| 1969 | 19,016 | 2,801 | 2,107 | 80,803 | 20,181 | 124,908 |
| 70 | 19,037 | 3,765 | 1,498 | 87,547 | 28,664 | 140,511 |
| 71 | 10,254 | 2,187 | 779 | 82,769 | 27,026 | 123,015 |
| 72 | 2,262 | 1,097 | 166 | 46,045 | 19,976 | 69,546 |
| 73 | 951 | 1,475 | 292 | 30,470 | 10,856 | 44,044 |
| 1974 | 480 | 1,133 | 1,200 | 32,053 | 10,798 | 45,664 |
| 75 | 964 | 237 | 111 | 21,454 | 7,226 | 29,992 |
| 76 | 4,064 | 1,138 | 338 | 60,684 | 29,744 | 95,968 |
| 77 | 4,373 | 3,694 | 2,167 | 85,074 | 35,218 | 130,526 |
| 78 | 6,930 | 3,126 | 5,935 | 118,548 | 57,000 | 191,539 |
| 1979 | 10,415 | 5,547 | 9,568 | 157,321 | 30,022 | 212,873 |
| 80 | 7,517 | 5,610 | 4,900 | 64,958 | 12,543 | 95,528 |
| 81 | 11,048 | 5,468 | 3,416 | 193,461 | 23,911 | 237,304 |
| 82 | 12,425 | 4,834 | 7,170 | 195,287 | 33,786 | 253,502 |
| 83 | 8,955 | 4,758 | 9,276 | 137,123 | 38,497 | 198,609 |
| 1984 | 8,972 | 4,680 | 4,767 | 61,378 | 22,179 | 101,976 |
| 85 | 5,697 | 4,015 | 5,840 | 67,783 | 37,106 | 120,441 |
| 86 ^a | 3,552 | 1,895 | 2,977 | 63,859 | 19,895 | 92,178 |
| 87 ^a | 5,000 | 2,004 | 3,733 | 47,592 | 17,618 | 75,947 |
| 88 ^a | 6,677 | 3,023 | 3,319 | 16,501 | 15,615 | 45,135 |
| 20 Year Average | 7,469 | 3,130 | 3,486 | 86,011 | 25,381 | 125,477 |
| 1969-78 Average | 6,833 | 2,065 | 1,459 | 64,545 | 24,669 | 99,571 |
| 1979-88 Average | 8,026 | 4,183 | 5,497 | 100,526 | 25,117 | 143,349 |

a Preliminary.

(Sources: 1 and 5)

Appendix Table 11. Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek-Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|-----------------|----------------|---------|---------|----------|---------|-----------|
| 1969 | 42,535 | 7,835 | 1,995 | 214,235 | 66,389 | 332,989 |
| 70 | 120,279 | 43,854 | 17,969 | 435,033 | 100,711 | 717,846 |
| 71 | 151,465 | 27,073 | 14,506 | 360,015 | 123,847 | 676,906 |
| 72 | 115,737 | 42,172 | 9,689 | 310,126 | 178,885 | 656,609 |
| 73 | 123,610 | 23,034 | 6,092 | 336,331 | 195,431 | 684,498 |
| 1974 | 41,347 | 4,022 | 2,334 | 157,941 | 80,710 | 286,354 |
| 75 | 79,740 | 4,094 | 1,634 | 152,891 | 87,058 | 325,417 |
| 76 | 317,550 | 46,955 | 9,924 | 801,064 | 153,559 | 1,329,052 |
| 77 | 340,228 | 83,121 | 4,465 | 899,701 | 270,649 | 1,598,164 |
| 78 | 185,451 | 44,480 | 1,449 | 651,743 | 274,967 | 1,158,090 |
| 1979 | 196,398 | 38,004 | 12,174 | 440,279 | 219,942 | 906,797 |
| 80 | 204,515 | 78,556 | 36,343 | 681,930 | 299,682 | 1,301,026 |
| 81 | 355,943 | 87,581 | 36,275 | 795,143 | 229,886 | 1,504,828 |
| 82 | 198,019 | 84,329 | 53,204 | 434,817 | 151,000 | 921,369 |
| 83 | 351,769 | 127,490 | 105,171 | 725,060 | 322,691 | 1,632,181 |
| 1984 | 447,259 | 178,096 | 210,611 | 850,114 | 336,660 | 2,022,740 |
| 85 | 210,107 | 126,736 | 131,576 | 396,740 | 203,302 | 1,068,461 |
| 86 ^a | 208,066 | 93,781 | 98,782 | 461,966 | 269,722 | 1,132,317 |
| 87 ^a | 440,783 | 148,156 | 96,067 | 403,399 | 421,684 | 1,510,089 |
| 88 ^a | 298,966 | 244,745 | 92,360 | 370,223 | 470,721 | 1,477,015 |
| 20 Year Average | 221,488 | 76,706 | 47,131 | 493,938 | 222,875 | 1,062,137 |
| 1969-78 Average | 151,794 | 32,664 | 7,006 | 431,908 | 153,221 | 776,593 |
| 1979-88 Average | 291,183 | 120,747 | 87,256 | 555,967 | 292,529 | 1,347,682 |

a Preliminary.

(Sources: 1 and 5)

Appendix Table 12. Pink salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek-Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|------------------------------|----------------|--------|---------|-----------|--------|-----------|
| 1969 | 205 | 5 | 1 | 263 | 1,396 | 1,870 |
| 70 | 28,301 | 41 | | 417,834 | 10,735 | 456,911 |
| 71 | 2 | | | 37 | 173 | 212 |
| 72 | 57,074 | 12 | | 67,953 | 1,984 | 127,023 |
| 73 | 109 | | 1 | 61 | 216 | 387 |
| 1974 | 508,534 | 4,405 | 340 | 413,613 | 13,086 | 939,978 |
| 75 | 6 | 9 | 2 | 126 | 279 | 422 |
| 76 | 264,631 | 4,121 | 116 | 739,590 | 28,085 | 1,036,543 |
| 77 | 19 | | 5 | 3,017 | 1,476 | 4,517 |
| 78 | 734,880 | 11,430 | 530 | 4,348,336 | 57,524 | 5,152,700 |
| 1979 | 134 | 6 | 9 | 1,787 | 1,913 | 3,849 |
| 80 | 288,363 | 2,476 | 51 | 2,202,545 | 70,033 | 2,563,468 |
| 81 | 194 | 222 | 29 | 345 | 6,490 | 7,280 |
| 82 | 127,560 | 1,997 | 170 | 1,339,272 | 23,417 | 1,492,416 |
| 83 | 51 | 92 | | 137 | 204 | 484 |
| 1984 | 211,306 | 5,759 | 2,387 | 3,127,153 | 19,468 | 3,366,073 |
| 85 | 39 | 51 | 3 | 48 | 316 | 457 |
| 86 ^a | 85,723 | 2,656 | 101 | 280,623 | 24,509 | 393,612 |
| 87 ^a | 5 | 1 | 81 | 5 | 24 | 116 |
| 88 ^a | 625,551 | 4,437 | 210 | 248,656 | 57,016 | 935,870 |
| 20 Year Average ¹ | 293,192 | 3,733 | 391 | 1,318,558 | 30,586 | 1,646,459 |
| 1969-78 Average | 318,684 | 4,002 | 197 | 1,197,465 | 22,283 | 1,542,631 |
| 1979-88 Average | 267,701 | 3,465 | 584 | 1,439,650 | 38,889 | 1,750,288 |

1 Includes even years only.

a Preliminary.

(Sources: 1 and 5)

Appendix Table 13. Coho salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek- Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|-----------------|--------------------|--------|---------|----------|---------|---------|
| 1969 | 17 | 5,548 | 9,292 | 37,799 | 28,720 | 81,376 |
| 70 | 53 | 7,027 | 1,695 | 3,688 | 2,027 | 14,490 |
| 71 | 89 | 923 | 469 | 8,036 | 3,192 | 12,709 |
| 72 | 402 | 1,249 | | 3,654 | 8,652 | 13,957 |
| 73 | 255 | 2,701 | 2,307 | 28,709 | 23,070 | 57,042 |
| 1974 | 916 | 1,156 | 4,055 | 12,569 | 25,049 | 43,745 |
| 75 | 43 | 951 | 4,595 | 7,342 | 33,350 | 46,281 |
| 76 | 1,195 | 2,321 | 3,561 | 6,778 | 12,791 | 26,646 |
| 77 | 2,883 | 2,685 | 3,884 | 52,562 | 45,201 | 107,215 |
| 78 | 913 | 2,256 | 2,024 | 44,740 | 44,338 | 94,271 |
| 1979 | 12,355 | 15,148 | 17,886 | 129,607 | 119,403 | 294,399 |
| 80 | 7,802 | 22,537 | 19,419 | 147,726 | 151,000 | 348,484 |
| 81 | 1,229 | 32,759 | 30,220 | 220,290 | 29,207 | 313,705 |
| 82 | 10,586 | 74,989 | 50,803 | 349,669 | 133,765 | 619,812 |
| 83 | 7,282 | 25,954 | 7,816 | 81,338 | 5,711 | 128,101 |
| 1984 | 3,209 | 66,589 | 68,451 | 260,310 | 176,053 | 574,612 |
| 85 | 10,474 | 32,667 | 60,815 | 20,230 | 38,636 | 162,822 |
| 86 ^a | 3,078 | 34,500 | 25,562 | 72,896 | 48,440 | 184,476 |
| 87 ^a | 5,082 | 29,643 | 20,494 | 13,098 | 1,433 | 69,750 |
| 88 ^a | 28,352 | 49,407 | 52,272 | 53,125 | 18,595 | 201,751 |
| 20 Year Average | 4,811 | 20,551 | 20,296 | 77,708 | 47,432 | 169,782 |
| 1969-78 Average | 677 | 2,682 | 3,542 | 20,588 | 22,639 | 49,773 |
| 1979-88 Average | 8,945 | 38,419 | 35,374 | 134,829 | 72,224 | 289,791 |

a Preliminary.

(Sources: 1 and 5)

Appendix Table 14. Total salmon commercial catch by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Maknek-Kvichak | Egegik | Ugashik | Mushagak | Togiak | Total |
|-----------------|----------------|-----------|-----------|-----------|-----------|------------|
| 1969 | 4,716,845 | 905,511 | 183,240 | 1,106,307 | 250,938 | 7,162,841 |
| 70 | 17,971,475 | 1,458,196 | 192,703 | 2,132,636 | 295,514 | 22,050,524 |
| 71 | 6,019,188 | 1,336,865 | 969,822 | 1,707,656 | 363,298 | 10,396,829 |
| 72 | 1,277,840 | 884,350 | 27,295 | 809,125 | 284,758 | 3,283,368 |
| 73 | 293,174 | 248,547 | 12,612 | 667,664 | 325,296 | 1,547,293 |
| 1974 | 1,089,440 | 182,969 | 10,080 | 1,126,747 | 268,984 | 2,678,220 |
| 75 | 3,166,169 | 969,315 | 20,900 | 827,715 | 316,827 | 5,300,926 |
| 76 | 3,134,716 | 1,384,323 | 188,862 | 2,873,538 | 526,062 | 8,107,501 |
| 77 | 2,514,717 | 1,870,067 | 103,144 | 1,659,379 | 570,995 | 6,718,302 |
| 78 | 6,051,842 | 1,268,586 | 17,933 | 8,300,533 | 885,845 | 16,524,739 |
| 1979 | 15,211,128 | 2,316,037 | 430,755 | 4,056,340 | 832,264 | 22,846,524 |
| 80 | 15,628,654 | 2,732,245 | 946,588 | 7,594,946 | 1,167,819 | 28,070,252 |
| 81 | 11,361,223 | 4,487,436 | 2,186,006 | 8,702,332 | 929,201 | 27,666,198 |
| 82 | 5,354,392 | 2,613,663 | 1,250,539 | 8,235,232 | 937,664 | 18,391,490 |
| 83 | 21,927,429 | 6,913,550 | 3,471,714 | 6,063,402 | 955,311 | 39,331,406 |
| 1984 | 15,217,456 | 5,445,537 | 2,944,592 | 6,291,636 | 876,486 | 30,775,707 |
| 85 | 8,405,410 | 7,700,742 | 6,667,096 | 1,792,690 | 489,126 | 25,055,064 |
| 86 ^a | 3,190,313 | 5,141,611 | 5,055,924 | 3,637,074 | 666,243 | 17,691,165 |
| 87 ^a | 5,399,885 | 5,566,649 | 2,239,563 | 3,716,996 | 780,567 | 17,703,660 |
| 88 ^a | 4,508,968 | 6,701,738 | 1,679,776 | 2,396,544 | 1,378,729 | 16,665,755 |
| 20 Year Average | 7,622,013 | 3,006,397 | 1,429,957 | 3,684,925 | 655,096 | 16,398,388 |
| 1969-78 Average | 4,623,541 | 1,050,873 | 172,659 | 2,121,130 | 408,852 | 8,377,054 |
| 1979-88 Average | 10,620,486 | 4,961,921 | 2,687,255 | 5,248,719 | 901,341 | 24,419,722 |

a Preliminary.

(Sources: 1 and 5)

Appendix Table 15. Commercial salmon catch in percent by gear type and species, Bristol Bay, 1966-85.

| Year | Sockeye | | Chinook | | Chum | | Pink ¹ | | Coho | | Total | |
|-----------------|---------|-----|---------|-----|-------|-----|-------------------|-----|-------|-----|-------|-----|
| | Drift | Set | Drift | Set | Drift | Set | Drift | Set | Drift | Set | Drift | Set |
| 1966 | 89 | 11 | 95 | 5 | 87 | 13 | 89 | 11 | 76 | 24 | 89 | 11 |
| 67 | 89 | 11 | 97 | 3 | 96 | 4 | 74 | 26 | 81 | 19 | 90 | 10 |
| 68 | 90 | 10 | 98 | 2 | 95 | 5 | 89 | 11 | 76 | 24 | 90 | 10 |
| 69 | 88 | 12 | 96 | 4 | 95 | 5 | 84 | 16 | 75 | 25 | 89 | 11 |
| 70 | 93 | 7 | 94 | 6 | 94 | 6 | 82 | 18 | 45 | 55 | 93 | 7 |
| 1971 | 90 | 10 | 98 | 2 | 94 | 6 | 85 | 15 | 64 | 36 | 90 | 10 |
| 72 | 93 | 7 | 98 | 2 | 95 | 5 | 75 | 25 | 84 | 16 | 93 | 7 |
| 73 | 92 | 8 | 97 | 3 | 96 | 4 | 86 | 14 | 75 | 25 | 93 | 7 |
| 74 | 79 | 21 | 97 | 3 | 95 | 5 | 89 | 11 | 75 | 25 | 84 | 16 |
| 75 | 91 | 9 | 96 | 4 | 94 | 6 | 61 | 39 | 80 | 20 | 91 | 9 |
| 1976 | 90 | 10 | 94 | 6 | 96 | 4 | 89 | 11 | 63 | 37 | 91 | 9 |
| 77 | 89 | 11 | 96 | 4 | 96 | 4 | 88 | 12 | 83 | 17 | 90 | 10 |
| 78 | 88 | 12 | 97 | 3 | 95 | 5 | 89 | 11 | 76 | 24 | 89 | 11 |
| 79 | 87 | 13 | 94 | 6 | 92 | 8 | 73 | 27 | 79 | 21 | 88 | 12 |
| 80 | 86 | 14 | 89 | 11 | 91 | 9 | 88 | 12 | 78 | 22 | 86 | 14 |
| 1981 | 84 | 16 | 92 | 8 | 92 | 8 | 67 | 33 | 73 | 27 | 85 | 15 |
| 82 | 87 | 13 | 92 | 8 | 90 | 10 | 74 | 26 | 74 | 26 | 86 | 14 |
| 83 | 89 | 11 | 88 | 12 | 93 | 7 | 45 | 55 | 55 | 45 | 90 | 10 |
| 84 | 90 | 10 | 88 | 12 | 87 | 13 | 79 | 21 | 77 | 23 | 88 | 12 |
| 85 | 90 | 10 | 81 | 19 | 89 | 11 | 54 | 46 | 63 | 37 | 90 | 10 |
| 20 Year Average | 89 | 11 | 94 | 6 | 93 | 7 | 84 | 16 | 73 | 27 | 89 | 11 |
| 1966-75 Average | 89 | 11 | 97 | 3 | 94 | 6 | 85 | 15 | 73 | 27 | 90 | 10 |
| 1976-85 Average | 88 | 12 | 91 | 9 | 92 | 8 | 84 | 16 | 72 | 28 | 88 | 12 |

1 Averages include even years only.

(Source: 5)

Appendix Table 16. Commercial salmon catch in percent by gear type and district, Bristol Bay, 1966-85.^a

| Year | Naknek-Kvichak | | Egegik | | Ugashik | | Nushagak | | Togiak | | Total | |
|-----------------|----------------|-----|--------|-----|---------|-----|----------|-----|--------|-----|-------|-----|
| | Drift | Set | Drift | Set | Drift | Set | Drift | Set | Drift | Set | Drift | Set |
| 1966 | 93 | 7 | 88 | 12 | 83 | 17 | 72 | 28 | 98 | 2 | 89 | 11 |
| 67 | 91 | 9 | 90 | 10 | 81 | 19 | 86 | 14 | 95 | 5 | 90 | 10 |
| 68 | 85 | 15 | 93 | 7 | 81 | 19 | 91 | 9 | 98 | 2 | 90 | 10 |
| 69 | 91 | 9 | 80 | 20 | 82 | 18 | 83 | 17 | 99 | 1 | 89 | 11 |
| 70 | 96 | 4 | 84 | 16 | 76 | 24 | 77 | 23 | 99 | 1 | 93 | 7 |
| 1971 | 92 | 8 | 87 | 13 | 89 | 11 | 82 | 18 | 100 | | 90 | 10 |
| 72 | 94 | 6 | 90 | 10 | 46 | 54 | 93 | 7 | 100 | | 93 | 7 |
| 73 | 89 | 11 | 89 | 11 | 84 | 16 | 94 | 6 | 99 | 1 | 93 | 7 |
| 74 | 84 | 16 | 77 | 23 | 53 | 47 | 83 | 17 | 94 | 6 | 84 | 16 |
| 75 | 93 | 7 | 90 | 10 | 85 | 15 | 83 | 17 | 93 | 7 | 91 | 9 |
| 1976 | 92 | 8 | 90 | 10 | 89 | 11 | 90 | 10 | 93 | 7 | 91 | 9 |
| 77 | 90 | 10 | 88 | 12 | 87 | 13 | 93 | 7 | 93 | 7 | 90 | 10 |
| 78 | 90 | 10 | 83 | 17 | 94 | 6 | 89 | 11 | 87 | 13 | 89 | 11 |
| 79 | 90 | 10 | 77 | 23 | 83 | 17 | 84 | 16 | 86 | 14 | 88 | 12 |
| 80 | 89 | 11 | 71 | 29 | 88 | 12 | 87 | 13 | 86 | 14 | 86 | 14 |
| 1981 | 88 | 12 | 76 | 24 | 89 | 11 | 83 | 17 | 82 | 18 | 85 | 15 |
| 82 | 86 | 14 | 81 | 19 | 84 | 16 | 87 | 13 | 86 | 14 | 86 | 14 |
| 83 | 92 | 8 | 86 | 14 | 93 | 7 | 85 | 15 | 84 | 16 | 90 | 10 |
| 84 | 90 | 10 | 91 | 9 | 91 | 9 | 82 | 18 | 84 | 16 | 88 | 12 |
| 85 | 87 | 13 | 92 | 8 | 96 | 4 | 70 | 30 | 82 | 18 | 90 | 10 |
| 20 Year Average | 90 | 10 | 85 | 15 | 83 | 17 | 85 | 15 | 92 | 9 | 89 | 11 |
| 1966-75 Average | 91 | 9 | 87 | 13 | 76 | 24 | 84 | 16 | 98 | 3 | 90 | 10 |
| 1976-85 Average | 89 | 11 | 84 | 17 | 89 | 11 | 85 | 15 | 86 | 14 | 88 | 12 |

a All salmon species combined.

(Source: 5)

Appendix Table 17. Sockeye salmon escapement by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek-Kvichak ¹ | Egegik ² | Ugashik ³ | Nushagak ⁴ | Togiak ⁵ | Total |
|-----------------|-----------------------------|---------------------|----------------------|-----------------------|---------------------|------------|
| 1969 | 9,907,896 | 1,015,554 | 160,380 | 1,212,586 | 125,066 | 12,421,482 |
| 70 | 14,844,868 | 919,734 | 735,024 | 1,966,156 | 212,896 | 18,678,678 |
| 71 | 3,510,448 | 634,014 | 529,752 | 1,353,382 | 213,242 | 6,240,838 |
| 72 | 1,747,668 | 546,402 | 79,428 | 528,650 | 81,970 | 2,984,118 |
| 73 | 618,510 | 328,842 | 38,988 | 581,307 | 114,930 | 1,682,577 |
| 1974 | 5,889,750 | 1,275,630 | 61,854 | 2,267,468 | 108,492 | 9,603,194 |
| 75 | 15,267,616 | 1,173,840 | 429,336 | 2,273,038 | 189,162 | 19,332,992 |
| 76 | 3,367,854 | 509,160 | 356,308 | 1,486,276 | 200,590 | 5,920,188 |
| 77 | 2,527,000 | 692,514 | 201,520 | 1,220,056 | 202,634 | 4,843,724 |
| 78 | 5,192,066 | 895,698 | 82,434 | 3,485,532 | 340,076 | 9,995,806 |
| 1979 | 12,437,996 | 1,032,042 | 1,706,904 | 3,073,571 | 224,838 | 18,475,351 |
| 80 | 25,447,866 | 1,060,860 | 3,335,284 | 8,310,438 | 572,450 | 38,726,898 |
| 81 | 3,632,788 | 694,680 | 1,327,699 | 2,850,637 | 365,910 | 8,871,714 |
| 82 | 2,529,692 | 1,034,628 | 1,185,551 | 2,012,742 | 341,424 | 7,104,037 |
| 83 | 4,554,496 | 792,282 | 1,001,364 | 1,948,492 | 239,610 | 8,536,244 |
| 1984 | 11,948,514 | 1,165,320 | 1,270,318 | 1,814,686 | 200,778 | 16,399,616 |
| 85 | 9,179,014 | 1,095,192 | 1,006,407 | 1,684,796 | 190,082 | 13,155,491 |
| 86 | 3,387,147 | 1,151,750 | 1,015,582 | 2,133,398 | 271,184 | 7,959,061 |
| 87 | 7,281,896 | 1,273,553 | 686,894 | 1,895,961 | 316,076 | 11,454,380 |
| 88 | 5,297,708 | 1,612,680 | 642,972 | 1,524,754 | 340,712 | 9,418,826 |
| 20 Year Average | 7,428,540 | 945,219 | 792,700 | 2,181,196 | 242,606 | 11,590,261 |
| 1969-78 Average | 6,287,368 | 799,139 | 267,502 | 1,637,445 | 178,906 | 9,170,360 |
| 1979-88 Average | 8,569,712 | 1,091,299 | 1,317,898 | 2,724,948 | 306,306 | 14,010,162 |

1 Includes Kvichak, Branch and Naknek Rivers.

2 Includes King Salmon River when survey data is available.

3 Includes Mother Goose River system 1967 and 1976-86; and Dog Salmon River system 1984-86.

4 Includes Wood, Igushik, Nuyakuk, Nushagak-Mulchatna and Snake Rivers.

5 Includes Togiak River, Lake and tributaries, Kulukak system and other miscellaneous river systems.

(Sources: 1 and 7)

Appendix Table 18. Inshore commercial catch and escapement of sockeye salmon in the Naknek-Kvichak District by river system, in numbers of fish, Bristol Bay, 1969-88.

| Year | Catch | Escapement | | | Total | Total Run |
|-----------------|------------------------|----------------------|---------------------|---------------------|------------|------------|
| | | Kvichak ¹ | Branch ² | Naknek ^a | | |
| 1969 | 4,655,072 | 8,394,204 | 182,490 | 1,331,202 | 9,907,896 | 14,562,968 |
| 70 | 17,803,805 | 13,935,306 | 177,060 | 732,502 | 14,844,868 | 32,648,673 |
| 71 | 5,857,378 | 2,387,392 | 187,302 | 935,754 | 3,510,448 | 9,367,826 |
| 72 | 1,102,365 | 1,009,962 | 151,188 | 586,518 | 1,747,668 | 2,850,033 |
| 73 | 168,249 | 226,554 | 35,280 | 356,676 | 618,510 | 786,759 |
| 1974 | 538,163 | 4,433,844 | 214,848 | 1,241,058 | 5,889,750 | 6,427,913 |
| 75 | 3,085,416 | 13,140,450 | 100,480 | 2,026,686 | 15,267,616 | 18,353,032 |
| 76 | 2,547,276 | 1,965,282 | 81,822 | 1,320,750 | 3,367,854 | 5,915,130 |
| 77 | 2,167,214 | 1,341,144 | 100,000 | 1,085,856 | 2,527,000 | 4,694,214 |
| 78 | 5,123,668 | 4,149,288 | 229,400 | 813,378 | 5,192,066 | 10,315,734 |
| 1979 | 14,991,826 | 11,218,434 | 294,200 | 925,362 | 12,437,996 | 27,429,822 |
| 80 | 15,120,457 | 22,505,268 | 297,900 | 2,644,698 | 25,447,866 | 40,568,323 |
| 81 | 10,992,809 | 1,754,358 | 82,210 | 1,796,220 | 3,632,788 | 14,625,597 |
| 82 | 5,005,802 | 1,134,840 | 239,300 | 1,155,552 | 2,529,692 | 7,535,494 |
| 83 | 21,559,372 | 3,569,982 | 96,220 | 888,294 | 4,554,496 | 26,113,868 |
| 1984 | 14,546,710 | 10,490,670 | 215,370 | 1,242,474 | 11,948,514 | 26,495,224 |
| 85 | 8,179,093 | 7,211,046 | 118,030 | 1,849,938 | 9,179,014 | 17,358,107 |
| 86 | 2,889,894 ^a | 1,179,322 | 230,180 | 1,977,645 | 3,387,147 | 6,277,041 |
| 87 | 4,949,015 ^a | 6,065,880 | 154,210 | 1,061,806 | 7,281,896 | 12,230,911 |
| 88 | 3,549,422 ^a | 4,065,216 | 194,630 | 1,037,862 | 5,297,708 | 8,847,130 |
| 20 Year Average | 7,241,650 | 6,008,922 | 169,106 | 1,250,512 | 7,428,540 | 14,670,190 |
| 1969-78 Average | 4,304,861 | 5,098,343 | 145,987 | 1,043,038 | 6,287,368 | 10,592,228 |
| 1979-88 Average | 10,178,440 | 6,919,502 | 192,225 | 1,457,985 | 8,569,712 | 18,748,152 |

1 Tower count.

2 Tower count 1969-76 and aerial survey estimates 1977-88.

a Preliminary.

(Sources: 1, 7 and 14)

Appendix Table 19. Inshore sockeye salmon total run by river system, Naknek-Kvichak District, Bristol Bay, 1969-88.

| Year | Number of Fish in Thousands and Percent of Total Run | | | | | | Total Run ¹ |
|-------------------|--|----|--------|----|--------|----|------------------------|
| | Kvichak | | Branch | | Naknek | | |
| | Number | % | Number | % | Number | % | |
| 1969 | 12,155 | 83 | 273 | 2 | 2,135 | 15 | 14,563 |
| 70 | 30,517 | 93 | 407 | 1 | 1,726 | 5 | 32,650 |
| 71 | 6,152 | 66 | 509 | 5 | 2,706 | 29 | 9,367 |
| 72 | 1,352 | 47 | 183 | 6 | 1,315 | 46 | 2,850 |
| 73 | 248 | 32 | 37 | 5 | 501 | 64 | 786 |
| 1974 | 4,582 | 71 | 225 | 4 | 1,621 | 25 | 6,428 |
| 75 | 14,746 | 80 | 114 | 1 | 3,493 | 19 | 18,353 |
| 76 | 3,423 | 58 | 137 | 2 | 2,354 | 40 | 5,914 |
| 77 | 2,081 | 44 | 150 | 3 | 2,463 | 52 | 4,694 |
| 78 | 7,965 | 77 | 455 | 4 | 1,896 | 18 | 10,316 |
| 1979 | 24,637 | 90 | 573 | 2 | 2,219 | 8 | 27,429 |
| 80 | 35,248 | 87 | 561 | 1 | 4,759 | 12 | 40,568 |
| 81 | 6,989 | 48 | 311 | 2 | 7,326 | 50 | 14,626 |
| 82 | 2,993 | 40 | 772 | 10 | 3,770 | 50 | 7,535 |
| 83 | 20,105 | 77 | 557 | 2 | 5,452 | 21 | 26,114 |
| 1984 ^a | 22,783 | 87 | 537 | 2 | 2,866 | 11 | 26,186 |
| 85 ^a | 13,372 | 77 | 262 | 2 | 3,681 | 21 | 17,315 |
| 86 ^a | 1,966 | 31 | 399 | 6 | 3,913 | 62 | 6,278 |
| 87 ^a | 9,362 | 77 | 285 | 2 | 2,584 | 21 | 12,231 |
| 88 ^a | 6,772 | 77 | 322 | 4 | 1,753 | 20 | 8,847 |
| 20 Year Average | 11,372 | 67 | 353 | 3 | 2,927 | 29 | 14,653 |
| 1969-78 Average | 8,322 | 65 | 249 | 3 | 2,021 | 31 | 10,592 |
| 1979-88 Average | 14,423 | 69 | 458 | 3 | 3,832 | 28 | 18,713 |

1 Due to rounding of river system total runs, the district total run may not equal the actual shown on Appendix Table 18.

a Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 20. Inshore commercial catch and escapement of sockeye salmon in the Egegik District by river system, Bristol Bay, 1969-88.

| Year | Catch | Escapement | | Total Run |
|-----------------|------------------------|------------------------|--------------------------|------------------------|
| | | Egegik ¹ | King Salmon ² | |
| 1969 | 889,322 | 1,015,554 | | 1,904,876 |
| 70 | 1,403,509 | 919,734 | | 2,323,243 |
| 71 | 1,306,682 | 634,014 | | 1,940,696 |
| 72 | 839,820 | 546,402 | | 1,386,222 |
| 73 | 221,337 | 328,842 | | 550,179 |
| 1974 | 172,253 | 1,275,630 | | 1,447,883 |
| 75 | 964,024 | 1,173,840 | | 2,137,864 |
| 76 | 1,329,788 | 509,160 | | 1,838,948 |
| 77 | 1,780,567 | 692,514 | | 2,473,081 |
| 78 | 1,207,294 | 895,698 | | 2,102,992 |
| 1979 | 2,257,332 | 1,032,042 | | 3,289,374 |
| 80 | 2,623,066 | 1,060,860 | | 3,683,926 |
| 81 | 4,361,406 | 694,680 | | 5,056,086 |
| 82 | 2,447,514 | 1,034,628 | | 3,482,142 |
| 83 | 6,755,256 | 792,282 | | 7,547,538 |
| 1984 | 5,190,413 | 1,165,320 | 25 | 6,355,758 |
| 85 | 7,537,273 | 1,095,192 | | 8,632,465 |
| 86 | 5,008,770 ^a | 1,151,320 | 430 | 6,160,950 ^a |
| 87 | 5,386,845 ^a | 1,272,978 | 575 | 6,660,398 ^a |
| 88 | 6,400,126 ^a | 1,612,745 ^b | | 8,012,871 ^a |
| 20 Year Average | 2,904,130 | 945,193 | | 3,849,375 |
| 1969-78 Average | 1,011,460 | 799,139 | | 1,810,598 |
| 1979-88 Average | 4,796,800 | 1,091,248 | | 5,888,151 |

1 Tower count.

2 Aerial survey.

a Preliminary.

b Includes 65 fish from Shosky Creek.

(Source: 1 and 7)

Appendix Table 21. Inshore commercial catch and escapement of sockeye salmon in the Ugashik District by river system, Bristol Bay, 1969-88.

| Year | Catch | Escapement | | | Total Run |
|-----------------|------------------------|----------------------|--------------------------|-------------------------|------------------------|
| | | Ugashik ¹ | King Salmon ² | Dog Salmon ² | |
| 1969 | 169,845 | 160,380 | | | 330,225 |
| 70 | 171,541 | 735,024 | | | 906,565 |
| 71 | 954,068 | 529,752 | | | 1,483,820 |
| 72 | 17,440 | 79,428 | | | 96,868 |
| 73 | 3,920 | 38,988 | | | 42,908 |
| 1974 | 2,151 | 61,854 | | | 64,005 |
| 75 | 14,558 | 429,336 | | | 443,894 |
| 76 | 174,923 | 341,808 | 14,500 | | 531,231 |
| 77 | 92,623 | 201,486 | 34 | | 294,143 |
| 78 | 7,995 | 70,434 | 12,000 | | 90,429 |
| 1979 | 391,118 | 1,700,904 | 6,000 | | 2,098,022 |
| 80 | 885,875 | 3,321,384 | 13,900 | | 4,221,159 |
| 81 | 2,116,066 | 1,326,762 | 937 | | 3,443,765 |
| 82 | 1,139,192 | 1,157,526 | 28,025 | | 2,324,743 |
| 83 | 3,349,451 | 1,000,614 | 750 | | 4,350,815 |
| 1984 | 2,658,376 | 1,241,418 | 17,100 | 11,800 | 3,928,694 |
| 85 | 6,468,862 | 998,232 | 7,400 | 775 | 7,475,269 |
| 86 | 4,928,502 ^a | 1,001,492 | 4,310 | 9,780 | 5,944,084 ^a |
| 87 | 2,119,188 ^a | 668,964 | 15,855 | 2,075 | 2,806,082 ^a |
| 88 | 1,531,615 ^a | 642,972 | 8,360 | 3,080 | 2,186,027 ^a |
| 20 Year Average | 1,359,865 | 785,438 | | | 2,153,137 |
| 1969-78 Average | 160,906 | 264,849 | | | 428,409 |
| 1979-88 Average | 2,558,825 | 1,306,027 | 10,264 | 5,502 ^b | 3,877,866 |

1 Tower count.

2 Aerial survey.

a Preliminary.

b (1984-88) only.

(Source: 1 and 7)

Appendix Table 22. Inshore commercial catch and escapement of sockeye salmon in the Nushagak District by river system, in numbers of fish, Bristol Bay, 1969-88.

| Year | Catch | Escapement | | | | | Total | Total Run |
|-----------------|------------------------|-------------------|----------------------|----------------------|-----------------------|--------------------|-----------|------------|
| | | Wood ¹ | Igushik ¹ | Nuyakuk ¹ | Nush/Mul ² | Snake ³ | | |
| 1969 | 773,207 | 604,338 | 512,328 | 69,828 | 16,792 | 9,300 | 1,212,586 | 1,985,793 |
| 70 | 1,188,534 | 1,161,964 | 370,920 | 364,648 | 44,824 | 23,800 | 1,966,156 | 3,154,690 |
| 71 | 1,256,799 | 851,202 | 210,960 | 224,382 | 58,336 | 8,500 | 1,353,380 | 2,610,179 |
| 72 | 381,347 | 430,602 | 60,018 | 28,596 | 7,434 | 2,000 | 528,650 | 909,997 |
| 73 | 272,093 | 330,474 | 59,508 | 110,016 | 80,394 | 915 | 581,307 | 853,400 |
| 1974 | 510,571 | 1,708,836 | 358,752 | 154,614 | 30,000 | 15,266 | 2,267,468 | 2,778,039 |
| 75 | 645,902 | 1,270,116 | 241,086 | 669,918 | 82,400 | 9,518 | 2,273,038 | 2,918,940 |
| 76 | 1,265,422 | 817,008 | 186,120 | 425,220 | 45,200 | 12,728 | 1,486,276 | 2,751,698 |
| 77 | 619,025 | 561,828 | 95,970 | 232,554 | 320,400 | 9,304 | 1,220,056 | 1,839,081 |
| 78 | 3,137,166 | 2,267,238 | 536,154 | 576,666 | 87,400 | 18,074 | 3,485,532 | 6,622,698 |
| 1979 | 3,327,346 | 1,706,352 | 859,560 | 360,120 | 139,100 | 8,439 | 3,073,571 | 6,400,917 |
| 80 | 4,497,787 | 2,969,040 | 1,987,530 | 3,026,568 | 290,800 | 36,500 | 8,310,438 | 12,808,225 |
| 81 | 7,493,093 | 1,233,318 | 591,144 | 834,204 | 177,400 | 14,571 | 2,850,637 | 10,343,730 |
| 82 | 5,916,187 | 976,470 | 423,768 | 537,864 | 63,000 | 11,640 | 2,012,742 | 7,928,929 |
| 83 | 5,119,744 | 1,360,968 | 180,438 | 318,606 | 85,400 | 3,080 | 1,948,492 | 7,068,236 |
| 1984 | 1,992,681 | 1,002,792 | 184,872 | 472,596 | 120,586 | 33,840 | 1,814,686 | 3,807,367 |
| 85 | 1,307,889 | 939,000 | 212,454 | 429,162 | 69,300 | 34,880 | 1,684,796 | 2,992,685 |
| 86 | 2,757,730 ^a | 818,652 | 307,728 | 821,898 | 168,340 | 16,780 | 2,133,398 | 4,891,128 |
| 87 | 3,252,902 ^a | 1,337,172 | 169,236 | 163,000 | 225,033 | 1,520 | 1,895,961 | 5,148,863 |
| 88 | 1,708,039 ^a | 866,778 | 170,454 | 319,992 | 163,208 | 4,320 | 1,524,752 | 3,232,791 |
| 20 year Average | 2,371,173 | 1,160,707 | 385,950 | 507,023 | 113,767 | 13,749 | 2,181,196 | 4,552,369 |
| 1969-78 Average | 1,005,007 | 1,000,361 | 263,182 | 285,644 | 77,318 | 10,941 | 1,637,445 | 2,642,452 |
| 1979-88 Average | 3,737,340 | 1,321,054 | 508,718 | 728,401 | 150,217 | 16,557 | 2,724,947 | 6,462,287 |

1 Tower count.

2 Tower counts 1969-70 and 1973-74, aerial survey estimates 1977-83, 1985, and 1987; sonar count 1984. Tower not operated in 1971-72 and 1975-76; escapement estimates for these years and 1986 were based on the average ratio of Nuyakuk/Nushagak-Mulchatna River system in those years when data was available.

3 Aerial survey estimate 1967-72, 1980 and 1982-86; weir count 1973-79 and 1981.

a Preliminary.

Appendix Table 23. Inshore sockeye salmon total run by river system, Nushagak District, Bristol Bay, 1969-88.

| Year | Number of Fish in Thousands and Percent of Total Run | | | | | | | | | | Total Run ¹ |
|-----------------|--|----|---------|----|---------|----|-----------|----|--------|---|------------------------|
| | Wood | | Igushik | | Nuyakuk | | Nush-Mul. | | Snake | | |
| | Number | % | Number | % | Number | % | Number | % | Number | % | |
| 1969 | 1,056 | 53 | 752 | 38 | 129 | 6 | 39 | 2 | 9 | 1 | 1,985 |
| 70 | 1,758 | 56 | 671 | 21 | 604 | 19 | 97 | 3 | 24 | 1 | 3,154 |
| 71 | 1,438 | 55 | 619 | 24 | 432 | 17 | 113 | 4 | 9 | + | 2,611 |
| 72 | 587 | 65 | 157 | 17 | 146 | 16 | 17 | 2 | 3 | + | 910 |
| 73 | 444 | 52 | 96 | 11 | 176 | 21 | 136 | 16 | 1 | + | 853 |
| 1974 | 2,132 | 77 | 421 | 15 | 172 | 6 | 36 | 1 | 19 | 1 | 2,780 |
| 75 | 1,493 | 51 | 387 | 13 | 889 | 30 | 133 | 5 | 17 | 1 | 2,919 |
| 76 | 1,443 | 52 | 328 | 12 | 856 | 31 | 101 | 4 | 24 | 1 | 2,752 |
| 77 | 825 | 45 | 149 | 8 | 365 | 20 | 486 | 26 | 13 | 1 | 1,838 |
| 78 | 4,059 | 61 | 1,075 | 16 | 1,262 | 19 | 194 | 3 | 33 | 1 | 6,623 |
| 1979 | 3,544 | 55 | 1,814 | 28 | 743 | 12 | 282 | 5 | 18 | + | 6,401 |
| 80 | 4,488 | 35 | 3,072 | 24 | 4,720 | 37 | 473 | 4 | 55 | + | 12,808 |
| 81 | 4,251 | 41 | 2,314 | 22 | 3,076 | 30 | 654 | 6 | 48 | + | 10,343 |
| 82 | 3,713 | 47 | 1,837 | 23 | 2,305 | 29 | 63 | 1 | 12 | + | 7,930 |
| 83 | 4,388 | 62 | 873 | 12 | 1,719 | 24 | 85 | 1 | 3 | + | 7,068 |
| 84 | 2,258 | 57 | 447 | 11 | 1,120 | 28 | 119 | 3 | 20 | 1 | 3,964 |
| 85 | 1,720 | 57 | 390 | 13 | 794 | 26 | 69 | 2 | 35 | 1 | 3,008 |
| 86 ^a | 1,823 | 37 | 939 | 19 | 1,944 | 40 | 168 | 3 | 17 | 0 | 4,891 |
| 87 ^a | 3,037 | 59 | 691 | 13 | 595 | 12 | 822 | 16 | 1 | 0 | 5,146 |
| 88 ^a | 1,846 | 57 | 426 | 13 | 794 | 25 | 163 | 5 | 4 | 0 | 3,233 |
| 20 Year Average | 2,315 | 54 | 873 | 18 | 1,142 | 22 | 213 | 6 | 18 | 0 | 4,561 |
| 1969-78 Average | 1,524 | 57 | 466 | 18 | 503 | 19 | 135 | 7 | 15 | 1 | 2,643 |
| 1979-88 Average | 3,107 | 51 | 1,280 | 18 | 1,781 | 26 | 290 | 5 | 21 | 0 | 6,479 |

1 Due to rounding of river system total runs, the district total run may not equal the actual shown on Appendix Table 22.

a Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 24. Inshore commercial catch and escapement of sockeye salmon in the Togiak District by river system, in numbers of fish, Bristol Bay, 1969-88.

| Year | Catch | | | | Escapement | | | | | Total Run |
|------------------------------|---------|---------|---------------------|----------------------|-------------------|--------------------|-------------------------------|----------------------|---------|-----------|
| | Togiak | Kulukak | Os/Mat ¹ | Total | Togiak | | Tribu- taries ⁴ | Kulukak ⁵ | Total | |
| | | | | | Lake ² | River ³ | | | | |
| 1969 | 129,615 | 3,411 | 1,226 | 134,252 | 109,266 | 7,400 | 8,400 | 125,066 | 259,318 | |
| 70 | 152,748 | | 629 | 153,377 | 192,096 | 10,800 | 10,000 | 212,896 | 366,273 | |
| 71 | 200,507 | 7,927 | 626 | 209,060 | 190,842 | 9,400 | 13,000 | 213,242 | 422,302 | |
| 72 | 51,354 | 17,244 | 6,663 | 75,261 | 74,070 | 4,500 | 3,400 | 81,970 | 157,231 | |
| 73 | 75,694 | 15,551 | 4,478 | 95,723 | 95,730 | 11,200 | 8,000 | 114,930 | 210,653 | |
| 1974 | 110,886 | 13,615 | 14,840 | 139,341 | 82,992 | 12,000 | 8,600 | 4,900 | 108,492 | 247,833 |
| 75 | 184,856 | 3,821 | 237 | 188,914 | 160,962 | 12,200 | 7,400 | 8,600 | 189,162 | 378,076 |
| 76 | 293,016 | 4,822 | 4,045 | 301,883 | 158,190 | 15,000 | 16,200 | 11,200 | 200,590 | 502,473 |
| 77 | 201,004 | 16,252 | 1,195 | 218,451 | 133,734 | 4,400 | 24,400 | 40,100 | 202,634 | 421,085 |
| 78 | 422,100 | 29,668 | 248 ^B | 452,016 | 273,576 | 15,000 | 17,600 | 33,900 | 340,076 | 792,092 |
| 1979 | 393,337 | 66,629 | 1,018 | 460,984 | 171,138 | 14,200 | 12,900 | 26,600 | 224,838 | 685,822 |
| 80 | 591,470 | 42,811 | 280 | 634,561 | 461,850 | 27,900 | 37,000 | 45,700 | 572,450 | 1,207,011 |
| 81 | 620,288 | 19,246 | 173 | 639,707 | 208,080 | 21,150 | 77,900 | 58,780 | 365,910 | 1,005,617 |
| 82 | 581,718 | 13,952 | 26 | 595,696 | 244,824 | 3,450 | 40,400 | 52,750 | 341,424 | 937,120 |
| 83 | 529,775 | 55,906 | 2,527 | 588,208 | 191,520 | 7,200 | 13,920 | 26,970 | 239,610 | 827,818 |
| 1984 | 213,213 | 96,709 | 12,204 | 322,126 | 95,448 | 15,830 | 39,700 | 49,800 | 200,778 | 522,904 |
| 85 | 133,263 | 44,120 | 32,383 | 209,766 | 136,542 | 3,600 | 13,340 | 36,600 | 190,082 | 399,848 |
| 86 | 192,285 | 93,896 | 17,496 | 303,677 ^b | 168,384 | 20,000 | 15,000 | 42,800 | 246,184 | 549,861 |
| 87 | 271,577 | 45,061 | 23,246 | 339,884 ^b | 249,676 | 10,400 | 18,200 | 37,800 | 316,076 | 655,960 |
| 88 | 674,715 | 136,325 | 5,742 | 816,782 ^b | 276,612 | 18,800 | 13,600 | 31,700 | 340,712 | 1,157,494 |
| 20 Year Average ⁶ | 301,171 | 38,261 | 6,464 | 343,983 | 183,777 | 13,409 | 19,973 | 27,550 | 241,356 | 585,340 |
| 1969-78 Average | 182,178 | 12,479 | 3,419 | 196,828 | 147,146 | 11,720 | 11,750 | 14,150 | 178,906 | 375,734 |
| 1979-88 Average | 420,164 | 61,466 | 9,510 | 491,139 | 220,407 | 14,253 | 28,196 | 40,950 | 303,806 | 794,946 |

(continued)

Appendix Table 24. (Page 2 of 2)

| Year | Catch | | | | Escapement | | | | | Total Run |
|------|--------|---------|---------------------|-------|-------------------|--------------------|-------------------------------|----------------------|-------|-----------|
| | Togiak | Kulukak | Os/Mat ¹ | Total | Togiak | | Tribu- taries ⁴ | Kulukak ⁵ | Total | |
| | | | | | Lake ² | River ³ | | | | |

1 Catches in the Osviak and Matogak Sections were combined.

2 Tower count.

3 Aerial survey estimate.

4 Aerial survey estimate includes Gechiak, Pungokebuk, Ongivinuck, Negukthlik/Ungalikthluk, and other miscellaneous river systems.

5 Aerial survey estimate includes Kulukak River and Lake and Tithe Creek ponds.

6 Only years and systems with catch/escapement data were included in calculating averages.

a Includes 248 fish from Cape Peirce Section.

b Preliminary.

(Sources: 1, 7 and 13)

Appendix Table 25. Inshore total run of sockeye salmon by district, in numbers of fish, Bristol Bay, 1969-88.

| Year | Naknek- Kvichak | Egegik | Ugashik | Nushagak | Togiak | Total |
|-----------------|--------------------|-----------|-----------|------------|-----------|------------|
| 1969 | 14,562,968 | 1,904,876 | 330,225 | 1,985,793 | 259,318 | 19,043,180 |
| 70 | 32,648,673 | 2,323,243 | 906,565 | 3,154,690 | 366,273 | 39,399,444 |
| 71 | 9,367,826 | 1,940,696 | 1,483,820 | 2,610,181 | 422,302 | 15,824,825 |
| 72 | 2,850,033 | 1,386,222 | 96,868 | 909,997 | 157,231 | 5,400,351 |
| 73 | 786,759 | 550,179 | 42,908 | 853,400 | 210,653 | 2,443,899 |
| 1974 | 6,427,913 | 1,447,883 | 64,005 | 2,778,039 | 247,833 | 10,965,673 |
| 75 | 18,353,032 | 2,137,864 | 443,894 | 2,918,940 | 378,076 | 24,231,806 |
| 76 | 5,915,130 | 1,838,948 | 531,231 | 2,751,698 | 502,473 | 11,539,480 |
| 77 | 4,694,214 | 2,473,081 | 294,143 | 1,839,081 | 421,085 | 9,721,604 |
| 78 | 10,315,734 | 2,102,992 | 90,429 | 6,622,698 | 792,092 | 19,923,945 |
| 1979 | 27,429,822 | 3,289,374 | 2,098,022 | 6,400,917 | 685,822 | 39,903,957 |
| 80 | 40,568,323 | 3,683,926 | 4,221,159 | 12,808,225 | 1,207,011 | 62,488,644 |
| 81 | 14,625,597 | 5,056,086 | 3,443,765 | 10,343,730 | 1,005,617 | 34,474,795 |
| 82 | 7,535,494 | 3,482,142 | 2,324,743 | 7,925,929 | 937,120 | 22,205,428 |
| 83 | 26,113,868 | 7,547,538 | 4,350,815 | 7,068,236 | 827,818 | 45,908,275 |
| 1984 | 26,186,469 | 6,466,518 | 3,931,648 | 3,979,353 | 519,641 | 41,083,629 |
| 85 | 17,314,824 | 8,552,487 | 7,352,896 | 3,008,288 | 400,552 | 36,629,047 |
| 86 ^a | 6,277,041 | 6,160,529 | 5,944,084 | 4,891,128 | 574,861 | 23,847,643 |
| 87 ^a | 12,230,911 | 6,660,398 | 2,806,082 | 5,148,863 | 655,960 | 27,484,284 |
| 88 ^a | 8,847,130 | 8,012,806 | 2,174,587 | 3,232,793 | 983,727 | 23,251,043 |
| 20 Year Average | 14,670,190 | 3,849,350 | 2,150,712 | 4,551,439 | 573,174 | 25,794,865 |
| 1969-78 Average | 10,592,228 | 1,810,598 | 428,409 | 2,642,452 | 375,734 | 15,849,421 |
| 1979-88 Average | 18,748,152 | 5,888,101 | 3,873,015 | 6,460,427 | 770,615 | 35,740,309 |

a Preliminary

(Sources: 1, 7, and 17)

Appendix Table 26. Comparisons of inshore sockeye salmon forecasts versus actual runs, and escapement goals versus actual escapements for the Kvichak and Naknek River systems, in thousands of fish, Bristol Bay, 1969-88.

| Year | Kvichak River | | | | | | Naknek River | | | | | |
|-----------------|---------------|--------|----------------------------|------------|--------|--------------------------------|--------------|--------|----------------------------|------------|--------|--------------------------------|
| | Inshore Run | | | Escapement | | | Inshore Run | | | Escapement | | |
| | Forecast | Actual | Percent Error ¹ | Goal | Actual | Percent Deviation ¹ | Forecast | Actual | Percent Error ¹ | Goal | Actual | Percent Deviation ¹ |
| 1969 | 12,780 | 12,155 | 5 | 6,000 | 8,394 | -29 | 2,741 | 2,135 | 28 | 1,000 | 1,331 | -25 |
| 70 | 43,732 | 30,517 | 43 | 19,000 | 13,935 | 36 | 2,904 | 1,726 | 68 | 1,000 | 733 | 36 |
| 71 | 6,349 | 6,152 | 3 | 2,500 | 2,387 | 5 | 2,189 | 2,706 | -19 | 900 | 936 | -4 |
| 72 | 3,859 | 1,352 | 185 | 2,000 | 1,010 | 98 | 1,446 | 1,315 | 10 | 800 | 587 | 36 |
| 73 | 2,396 | 248 | 866 | 2,000 | 227 | 781 | 936 | 501 | 87 | 800 | 357 | 124 |
| 1974 | 3,029 | 4,582 | -34 | 6,000 | 4,434 | 35 | 647 | 1,621 | -60 | 800 | 1,241 | -36 |
| 75 | 6,338 | 14,746 | -57 | 14,000 | 13,140 | 7 | 1,144 | 3,493 | -67 | 800 | 2,027 | -61 |
| 76 | 4,593 | 3,423 | 34 | 2,000 | 1,965 | 2 | 1,883 | 2,354 | -20 | 800 | 1,321 | -39 |
| 77 | 2,269 | 2,081 | 9 | 2,000 | 1,341 | 49 | 2,097 | 2,463 | -15 | 800 | 1,086 | -26 |
| 78 | 5,089 | 7,965 | -36 | 2,000 | 4,149 | -52 | 1,697 | 1,896 | -10 | 800 | 813 | -2 |
| 1979 | 12,349 | 24,637 | -50 | 6,000 | 11,218 | -47 | 1,744 | 2,219 | -21 | 800 | 925 | -14 |
| 80 | 40,064 | 35,248 | 14 | 14,000 | 22,505 | -38 | 2,703 | 4,759 | -43 | 800 | 2,665 | -70 |
| 81 | 10,419 | 6,989 | 49 | 2,000 | 1,754 | 14 | 3,345 | 7,326 | -54 | 800 | 1,796 | -55 |
| 82 | 13,079 | 2,993 | 337 | 2,000 | 1,135 | 76 | 3,812 | 3,770 | 1 | 800 | 1,156 | -31 |
| 83 | 9,738 | 20,105 | -52 | 2,000 | 3,570 | -44 | 2,944 | 5,452 | -46 | 800 | 888 | -10 |
| 1984 | 16,704 | 23,014 | -27 | 10,000 | 10,491 | -5 | 2,982 | 2,926 | 2 | 1,000 | 1,242 | -19 |
| 85 | 12,182 | 13,394 | -9 | 10,000 | 7,211 | 39 | 4,868 | 3,699 | 32 | 1,000 | 1,850 | -46 |
| 86 ^a | 4,463 | 1,966 | 127 | 5,000 | 1,179 | 324 | 3,178 | 3,913 | -19 | 1,000 | 1,978 | -49 |
| 87 ^a | 2,716 | 9,567 | -72 | 5,000 | 6,066 | -18 | 2,054 | 2,369 | -13 | 1,000 | 1,062 | -6 |
| 88 ^a | 8,718 | 6,772 | 29 | 5,000 | 4,065 | 23 | 2,295 | 1,753 | 31 | 1,000 | 1,038 | -4 |
| 20 Year Average | 11,043 | 11,395 | -3 | 5,925 | 6,009 | -1 | 2,380 | 2,920 | -18 | 875 | 1,252 | -30 |
| 1969-78 Average | 9,043 | 8,322 | 9 | 5,750 | 5,098 | 13 | 1,768 | 2,021 | -12 | 850 | 1,043 | -19 |
| 1979-88 Average | 13,043 | 14,469 | -10 | 6,100 | 6,919 | -12 | 2,993 | 3,819 | -22 | 900 | 1,460 | -38 |

¹ Percent Error = (Forecast minus actual)/actual (multiplied by 100).

^a Preliminary catch apportionment.

(Sources: 1 and 7)

Appendix Table 27. Comparisons of inshore sockeye salmon forecasts versus actual runs, and escapement goals versus actual escapements for the Egegik and Ugashik River systems, in thousands of fish, Bristol Bay, 1969-88.

| Year | Egegik River | | | | | | Ugashik River | | | | | |
|------|--------------|--------|----------------------------|------------|--------|--------------------------------|---------------|--------|----------------------------|-------------------------|--------|--------------------------------|
| | Inshore Run | | | Escapement | | | Inshore Run | | | Escapement ¹ | | |
| | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation ³ | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation ³ |
| 1969 | 1,972 | 1,905 | 4 | 700 | 1,016 | -31 | 712 | 330 | 116 | 400 | 160 | 150 |
| 70 | 4,050 | 2,323 | 74 | 1,000 | 920 | 9 | 1,252 | 907 | 38 | 700 | 735 | -5 |
| 71 | 2,113 | 1,941 | 9 | 600 | 634 | -5 | 1,150 | 1,484 | -23 | 500 | 530 | -6 |
| 72 | 1,575 | 1,386 | 14 | 600 | 546 | 10 | 265 | 97 | 173 | 450 | 79 | 470 |
| 73 | 1,009 | 550 | 83 | 500 | 329 | 52 | 188 | 43 | 337 | 188 | 39 | 382 |
| 1974 | 169 | 1,448 | -88 | 600 | 1,276 | -53 | 90 | 64 | 41 | 500 | 62 | 706 |
| 75 | 1,400 | 2,138 | -35 | 600 | 1,174 | -49 | 259 | 444 | -42 | 500 | 429 | 17 |
| 76 | 1,357 | 1,839 | -26 | 600 | 509 | 18 | 689 | 517 | 33 | 500 | 356 | 40 |
| 77 | 1,607 | 2,473 | -35 | 600 | 693 | -13 | 257 | 294 | -13 | 500 | 202 | 148 |
| 78 | 1,524 | 2,103 | -28 | 600 | 896 | -33 | 247 | 78 | 217 | 500 | 82 | 510 |
| 1979 | 2,171 | 3,289 | -34 | 600 | 1,032 | -42 | 983 | 2,092 | -53 | 500 | 1,707 | -71 |
| 80 | 3,445 | 3,684 | -6 | 600 | 1,061 | -43 | 1,488 | 4,207 | -65 | 500 | 3,335 | -85 |
| 81 | 3,173 | 5,056 | -37 | 600 | 695 | -14 | 3,029 | 3,443 | -12 | 500 | 1,328 | -62 |
| 82 | 4,236 | 3,482 | 22 | 600 | 1,035 | -42 | 2,065 | 2,297 | -10 | 500 | 1,186 | -58 |
| 83 | 3,415 | 7,548 | -55 | 600 | 792 | -24 | 4,177 | 4,350 | -4 | 500 | 1,001 | -50 |

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Appendix Table 27. (Page 2 of 2)

| Year | Egegik River | | | | | | Ugashik River | | | | | |
|-----------------|--------------|--------|----------------------------|------------|--------|--------------------------------|---------------|--------|----------------------------|-------------------------|--------|--------------------------------|
| | Inshore Run | | | Escapement | | | Inshore Run | | | Escapement ¹ | | |
| | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation ³ | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation ³ |
| 1984 | 3,541 | 6,356 | -44 | 1,000 | 1,165 | -14 | 1,916 | 3,929 | -51 | 700 | 1,270 | -45 |
| 85 | 6,590 | 8,632 | -24 | 1,000 | 1,095 | -9 | 5,621 | 7,475 | -25 | 700 | 1,006 | -30 |
| 86 ^a | 5,416 | 6,160 | -12 | 1,000 | 1,152 | -13 | 4,896 | 5,930 | -17 | 700 | 1,016 | -31 |
| 87 ^a | 4,865 | 6,660 | -27 | 1,000 | 1,274 | -22 | 3,116 | 2,806 | 11 | 700 | 687 | 2 |
| 88 ^a | 5,568 | 8,013 | -31 | 1,000 | 1,613 | -38 | 3,206 | 2,186 | 47 | 700 | 654 | 7 |
| 20 Year Average | 2,960 | 3,849 | -23 | 720 | 945 | -24 | 1,780 | 2,149 | -17 | 537 | 793 | -32 |
| 1969-78 Average | 1,678 | 1,811 | -7 | 640 | 799 | -20 | 511 | 426 | 20 | 474 | 267 | 77 |
| 1979-88 Average | 4,242 | 5,888 | -28 | 800 | 1,091 | -27 | 3,050 | 3,872 | -21 | 600 | 1,319 | -55 |

1 Includes Mother Goose Lake and Dog Salmon River.

2 Percent error = (forecast minus actual)/actual (multiplied by 100).

3 Percent deviation = (goal minus actual)/actual(multiplied by 100).

a Preliminary catch totals.

(Sources: 1 and 7)

Appendix Table 28. Comparisons of inshore sockeye salmon forecasts versus actual runs and escapement goals versus actual escapements for the Wood and Igushik River systems, in thousands of fish, Bristol Bay, 1969-88.

| Year | Wood River | | | | | | Igushik River | | | | | |
|-----------------|-------------|--------|----------------------------|-------------------|--------|--------------------------------|---------------|--------|----------------------------|------------|--------|--------------------------------|
| | Inshore Run | | | Escapement | | | Inshore Run | | | Escapement | | |
| | Forecast | Actual | Percent Error ¹ | Goal ² | Actual | Percent Deviation ¹ | Forecast | Actual | Percent Error ¹ | Goal | Actual | Percent Deviation ¹ |
| | | | | | | | | | | | | |
| 1969 | 1,618 | 993 | 63 | 750 | 604 | 24 | 424 | 831 | -49 | 200 | 512 | -61 |
| 70 | 1,865 | 1,806 | 3 | 1,000 | 1,162 | -14 | 680 | 617 | 10 | 200 | 371 | -46 |
| 71 | 1,644 | 1,607 | 2 | 750 | 851 | -12 | 565 | 439 | 29 | 150 | 211 | -29 |
| 72 | 1,414 | 718 | 97 | 750 | 431 | 74 | 422 | 117 | 261 | 150 | 60 | 150 |
| 73 | 779 | 479 | 63 | 700 | 330 | 112 | 320 | 87 | 268 | 150 | 60 | 150 |
| 1974 | 399 | 2,099 | -81 | 800 | 1,709 | -53 | 73 | 442 | -83 | 150 | 359 | -58 |
| 75 | 1,497 | 1,640 | -9 | 800 | 1,270 | -37 | 445 | 319 | 39 | 150 | 241 | -38 |
| 76 | 1,205 | 1,438 | -16 | 800 | 817 | -2 | 324 | 345 | -6 | 150 | 186 | -19 |
| 77 | 958 | 834 | 15 | 800 | 562 | 42 | 408 | 146 | 179 | 150 | 96 | 56 |
| 78 | 1,720 | 4,117 | -58 | 800 | 2,267 | -65 | 243 | 1,084 | -78 | 150 | 536 | -72 |
| 1979 | 2,579 | 3,638 | -29 | 800 | 1,706 | -53 | 857 | 1,842 | -53 | 150 | 860 | -83 |
| 80 | 2,338 | 4,529 | -48 | 800 | 2,969 | -73 | 1,425 | 3,126 | -54 | 150 | 1,988 | -92 |
| 81 | 2,336 | 4,568 | -49 | 800 | 1,233 | -35 | 1,994 | 2,229 | -11 | 150 | 591 | -75 |
| 82 | 4,900 | 3,713 | 32 | 800 | 976 | -18 | 1,827 | 1,837 | -1 | 150 | 424 | -65 |
| 83 | 3,256 | 4,388 | -26 | 1,000 | 1,361 | -27 | 640 | 873 | -27 | 200 | 180 | 11 |
| 1984 | 2,666 | 2,258 | 18 | 1,000 | 1,003 | 0 | 837 | 447 | 87 | 200 | 185 | 8 |
| 85 | 2,334 | 1,720 | 36 | 1,000 | 939 | 6 | 307 | 390 | -21 | 200 | 212 | -6 |
| 86 ^a | 1,701 | 1,823 | -7 | 800 | 819 | -2 | 703 | 939 | -25 | 200 | 308 | -35 |
| 87 ^a | 1,965 | 3,038 | -35 | 1,200 | 1,337 | -10 | 518 | 692 | -25 | 200 | 169 | 18 |
| 88 ^a | 3,021 | 1,846 | 64 | 800 | 867 | -8 | 1,166 | 426 | 174 | 200 | 170 | 18 |
| 20 Year Average | 2,010 | 2,363 | 2 | 848 | 1,161 | (8) | 709 | 861 | 31 | 170 | 386 | (13) |
| 1969-78 Average | 1,310 | 1,573 | 8 | 795 | 1,000 | 7 | 390 | 443 | 57 | 160 | 263 | 3 |
| 1979-88 Average | 2,710 | 3,152 | (4) | 900 | 1,321 | (22) | 1,027 | 1,280 | 4 | 180 | 509 | (30) |

1 Percent Error = (Forecast minus actual)/actual (multiplied by 100).

2 Although the published escapement goal for this river is 1 million, Department policy states that inseason adjustment of the goal may be necessary to compensate for an imbalanced 2-ocean/3-ocean proportion in age composition. The policy is designed to maximize productivity of the spawning grounds.

a Preliminary catch apportionment.

Appendix Table 29. Comparisons of inshore sockeye salmon forecasts versus actual runs and escapement goals versus actual escapements for the Nuyakuk and Togiak River systems, in thousands of fish, Bristol Bay, 1969-88.

| Year | Nuyakuk River | | | | | | Togiak River | | | | | |
|-----------------|---------------|--------|----------------------------|------------|--------|-------------------|--------------|--------|----------------------------|-------------------------|--------|-------------------|
| | Inshore Run | | | Escapement | | | Inshore Run | | | Escapement ¹ | | |
| | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation | Forecast | Actual | Percent Error ² | Goal | Actual | Percent Deviation |
| 1969 | 334 | 118 | 183 | 150 | 70 | 114 | 180 | 246 | -27 | 100 | 109 | -8 |
| 70 | 400 | 613 | -35 | 214 | 365 | -41 | 272 | 356 | -24 | 100 | 192 | -48 |
| 71 | 293 | 498 | -41 | 132 | 224 | -41 | 363 | 401 | -9 | 115 | 191 | -40 |
| 72 | 137 | 65 | 111 | 71 | 29 | 145 | 126 | 130 | -3 | 70 | 74 | -5 |
| 73 | 166 | 162 | 2 | 150 | 110 | 36 | 119 | 183 | -35 | 80 | 96 | -17 |
| 1974 | 158 | 187 | -16 | 250 | 155 | 61 | 297 | 215 | 38 | 100 | 83 | 20 |
| 75 | 320 | 868 | -63 | 250 | 670 | -63 | 178 | 365 | -51 | 100 | 161 | -38 |
| 76 | 506 | 845 | -40 | 250 | 425 | -41 | 273 | 482 | -43 | 100 | 158 | -37 |
| 77 | 249 | 358 | -30 | 250 | 233 | 7 | 255 | 364 | -30 | 100 | 134 | -25 |
| 78 | 310 | 1,302 | -76 | 250 | 577 | -57 | 289 | 728 | -60 | 100 | 274 | -64 |
| 1979 | 786 | 764 | 3 | 250 | 360 | -31 | 467 | 592 | -21 | 100 | 171 | -42 |
| 80 | 2,167 | 4,826 | -55 | 250 | 3,027 | -92 | 531 | 1,118 | -53 | 100 | 462 | -78 |
| 81 | 1,192 | 3,318 | -64 | 250 | 834 | -70 | 647 | 927 | -30 | 100 | 208 | -52 |
| 82 | 2,603 | 2,305 | 13 | 250 | 538 | -54 | 937 | 870 | 8 | 100 | 245 | -59 |
| 83 | 1,586 | 1,719 | -8 | 300 | 319 | -6 | 589 | 742 | -21 | 100 | 192 | -48 |
| 1984 | 1,560 | 1,120 | 39 | 500 | 473 | 6 | 453 | 362 | 25 | 150 | 95 | 58 |
| 85 | 1,706 | 794 | 115 | 500 | 429 | 17 | 949 | 277 | 243 | 150 | 145 | 3 |
| 86 ^a | 1,437 | 1,944 | -26 | 500 | 822 | -39 | 521 | 395 | 32 | 150 | 168 | -11 |
| 87 ^a | 850 | 596 | 43 | 500 | 163 | 207 | 401 | 656 | -39 | 150 | 316 | -53 |
| 88 ^a | 1,834 | 794 | 131 | 500 | 320 | 56 | 733 | 984 | -26 | 150 | 309 | -51 |
| 20 Year Average | 930 | 1,160 | 9 | 288 | 507 | 6 | 429 | 520 | (6) | 111 | 189 | (30) |
| 1969-78 Average | 287 | 502 | (1) | 197 | 286 | 12 | 235 | 347 | (24) | 97 | 147 | (26) |
| 1979-88 Average | 1,572 | 1,818 | 19 | 380 | 729 | (1) | 623 | 692 | 12 | 125 | 231 | (33) |

1 Does not include Togiak River and tributaries.

2 Percent Error = (Forecast minus actual)/actual (multiplied by 100).

a Preliminary catch apportionment.

Appendix Table 30. Kvichak River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|--------|--------|-------|----|---------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 9,433 | 14 | 24,280 | 13,425 | 1,308 | 0 | 39,027 | 4.14 |
| 57 | 2,843 | 8 | 243 | 3,577 | 261 | 2 | 4,091 | 1.44 |
| 58 | 535 | 0 | 77 | 183 | 26 | 3 | 289 | 0.54 |
| 59 | 680 | 0 | 213 | 323 | 11 | 0 | 547 | 0.80 |
| 60 | 14,630 | 0 | 1,449 | 47,306 | 6,493 | 6 | 55,254 | 3.78 |
| 1961 | 3,706 | 1 | 334 | 2,483 | 684 | 0 | 3,502 | 0.94 |
| 62 | 2,581 | 0 | 106 | 4,825 | 420 | 4 | 5,355 | 2.07 |
| 63 | 339 | 0 | 52 | 689 | 369 | 9 | 1,119 | 3.30 |
| 64 | 957 | 8 | 2,337 | 2,748 | 655 | 3 | 5,751 | 6.01 |
| 65 | 24,326 | 25 | 10,337 | 33,421 | 1,240 | 1 | 45,024 | 1.85 |
| 1966 | 3,775 | 15 | 513 | 5,347 | 385 | 1 | 6,261 | 1.66 |
| 67 | 3,216 | 0 | 356 | 1,084 | 87 | 0 | 1,527 | 0.47 |
| 68 | 2,557 | 0 | 293 | 112 | 137 | 2 | 544 | 0.21 |
| 69 | 8,394 | 0 | 137 | 4,543 | 613 | 11 | 5,304 | 0.63 |
| 70 | 13,935 | 1 | 83 | 14,480 | 1,261 | 7 | 15,832 | 1.14 |
| 1971 | 2,387 | 0 | 263 | 2,263 | 305 | 0 | 2,831 | 1.19 |
| 72 | 1,010 | 0 | 256 | 1,365 | 319 | 0 | 1,940 | 1.92 |
| 73 | 227 | 0 | 580 | 1,303 | 574 | 0 | 2,457 | 10.82 |
| 74 | 4,434 | 9 | 6,639 | 18,734 | 793 | 5 | 26,180 | 5.90 |
| 75 | 13,140 | 5 | 5,984 | 31,495 | 601 | 0 | 38,085 | 2.90 |
| 1976 | 1,965 | 5 | 5,352 | 4,941 | 277 | 0 | 10,575 | 5.38 |
| 77 | 1,341 | 54 | 1,941 | 1,140 | 99 | 0 | 3,234 | 2.41 |
| 78 | 4,149 | 0 | 1,851 | 2,474 | 845 | 6 | 5,176 | 1.25 |
| 79 | 11,218 | 58 | 18,406 | 19,882 | 3,486 | 0 | 41,832 | 3.73 |
| 80 | 22,505 | 2 | 2,944 | 9,710 | 415 | 0 | 13,071 | 0.58 |
| 1981 | 1,754 | 0 | 820 | 1,161 | 166 | 0 | 2,147 | 1.22 |
| 82 | 1,135 | 23 | 448 | 1,063 | 145 | | 1,679 ^b | 1.48 ^b |
| 83 | 3,570 | 1 | 8,590 | 4,240 | | | 12,831 ^b | 3.59 ^b |
| 84 | 10,491 | 0 | 2,595 | | | | 2,595 ^b | 0.25 ^b |
| 85 | 7,211 | 11 | | | | | 11 ^b | 0.00 ^b |

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Appendix Table 30. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | | Return Per Spawner |
|----------------------|------------|----------------|-------|-------|-----|---|--------|-----------------------|
| | | 3 | 4 | 5 | 6 | 7 | Total | |
| 1986 | 1,179 | | | | | | | |
| 87 | 6,066 | | | | | | | |
| 88 | 4,065 | | | | | | | |
| Average ¹ | 6,001 | 8 | 3,302 | 8,808 | 840 | 2 | 12,960 | 2.16 |
| Percent ¹ | | 0 | 25 | 68 | 6 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 31. Branch River sockeye salmon escapement and return by brood year, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-------|-----|-----|---|------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 784 | 5 | 1,885 | 458 | 41 | 0 | 2,389 | 3.05 |
| 57 | 127 | 0 | 5 | 66 | 13 | 1 | 85 | 0.67 |
| 58 | 95 | 0 | 43 | 53 | 52 | 0 | 148 | 1.56 |
| 59 | 825 | 0 | 301 | 387 | 76 | 2 | 766 | 0.93 |
| 60 | 1,241 | 0 | 105 | 320 | 31 | 0 | 456 | 0.37 |
| 1961 | 90 | 10 | 90 | 192 | 0 | 0 | 292 | 3.24 |
| 62 | 91 | 19 | 129 | 94 | 19 | 0 | 261 | 2.87 |
| 63 | 203 | 0 | 200 | 174 | 2 | 0 | 376 | 1.85 |
| 64 | 249 | 5 | 102 | 211 | 17 | 0 | 335 | 1.35 |
| 65 | 175 | 6 | 104 | 171 | 17 | 0 | 298 | 1.70 |
| 1966 | 174 | 13 | 282 | 274 | 11 | 0 | 580 | 3.33 |
| 67 | 203 | 9 | 301 | 97 | 7 | 0 | 414 | 2.04 |
| 68 | 194 | 8 | 127 | 43 | 3 | 0 | 181 | 0.93 |
| 69 | 182 | 0 | 5 | 160 | 25 | 0 | 190 | 1.04 |
| 70 | 177 | 0 | 73 | 77 | 2 | 0 | 152 | 0.86 |
| 1971 | 187 | 2 | 26 | 59 | 37 | 2 | 126 | 0.67 |
| 72 | 151 | 1 | 91 | 24 | 14 | 0 | 130 | 0.86 |
| 73 | 35 | 0 | 98 | 148 | 2 | 0 | 248 | 7.09 |
| 74 | 215 | 4 | 297 | 146 | 8 | 0 | 455 | 2.12 |
| 75 | 100 | 15 | 415 | 343 | 2 | 0 | 775 | 7.75 |
| 1976 | 82 | 26 | 211 | 188 | 55 | 0 | 480 | 5.85 |
| 77 | 100 | 27 | 142 | 699 | 12 | 0 | 880 | 8.80 |
| 78 | 229 | 1 | 102 | 107 | 142 | 0 | 352 | 1.54 |
| 79 | 294 | 3 | 464 | 317 | 3 | 0 | 787 | 2.68 |
| 80 | 298 | 0 | 102 | 220 | 11 | 1 | 334 | 1.12 |
| 1981 | 82 | 0 | 56 | 223 | 12 | 0 | 291 | 3.55 |
| 82 | 239 | 0 | 173 | 145 | 3 | | 321 ^b | 1.34 ^b |
| 83 | 96 | 0 | 148 | 165 | | | 313 ^b | 3.26 ^b |
| 84 | 215 | 1 | 161 | | | | 162 ^b | 0.75 ^b |
| 85 | 118 | 3 | | | | | 3 ^b | 0.03 ^b |

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Appendix Table 31. (page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-----|----|---|-------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 230 | | : | | | | | |
| 87 | 154 | | | | | | | |
| 88 | 195 | | | | | | | |
| Average ¹ | 253 | 6 | 221 | 202 | 24 | 0 | 453 | 1.79 |
| Percent ¹ | | 1 | 49 | 45 | 5 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catches of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 32. Naknek River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-------|-------|-------|----|--------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 1,773 | 1 | 474 | 1,703 | 321 | 1 | 2,500 | 1.41 |
| 57 | 635 | 0 | 55 | 834 | 678 | 3 | 1,570 | 2.47 |
| 58 | 278 | 0 | 116 | 749 | 172 | 2 | 1,039 | 3.74 |
| 59 | 2,232 | 0 | 355 | 1,093 | 704 | 0 | 2,152 | 0.96 |
| 60 | 828 | 1 | 1,418 | 1,322 | 1,279 | 3 | 4,023 | 4.86 |
| 1961 | 351 | 0 | 242 | 1,060 | 642 | 8 | 1,952 | 5.56 |
| 62 | 723 | 0 | 80 | 581 | 412 | 1 | 1,074 | 1.49 |
| 63 | 905 | 0 | 145 | 1,223 | 634 | 1 | 2,003 | 2.21 |
| 64 | 1,350 | 1 | 472 | 1,399 | 188 | 1 | 2,061 | 1.53 |
| 65 | 718 | 5 | 584 | 1,093 | 438 | 1 | 2,121 | 2.95 |
| 1966 | 1,016 | 5 | 731 | 2,471 | 630 | 1 | 3,838 | 3.78 |
| 67 | 756 | 0 | 334 | 1,026 | 356 | 1 | 1,717 | 2.27 |
| 68 | 1,023 | 3 | 152 | 317 | 271 | 2 | 745 | 0.73 |
| 69 | 1,331 | 0 | 50 | 1,283 | 1,214 | 3 | 2,550 | 1.92 |
| 70 | 733 | 1 | 173 | 2,163 | 382 | 0 | 2,719 | 3.71 |
| 1971 | 936 | 1 | 422 | 1,987 | 1,847 | 17 | 4,274 | 4.57 |
| 72 | 587 | 3 | 248 | 402 | 611 | 1 | 1,265 | 2.16 |
| 73 | 357 | 0 | 494 | 1,143 | 598 | 0 | 2,235 | 6.26 |
| 74 | 1,241 | 2 | 235 | 1,254 | 789 | 5 | 2,285 | 1.84 |
| 75 | 2,027 | 1 | 436 | 3,139 | 1,642 | 8 | 5,226 | 2.58 |
| 1976 | 1,321 | 4 | 1,087 | 5,624 | 1,513 | 29 | 8,257 | 6.25 |
| 77 | 1,086 | 12 | 642 | 2,362 | 464 | 6 | 3,486 | 3.21 |
| 78 | 813 | 1 | 335 | 2,814 | 525 | 0 | 3,675 | 4.52 |
| 79 | 925 | 4 | 2,443 | 1,731 | 419 | 3 | 4,600 | 4.97 |
| 80 | 2,645 | 1 | 725 | 2,667 | 837 | 2 | 4,232 | 1.60 |
| 1981 | 1,796 | 4 | 804 | 3,038 | 946 | 3 | 4,795 | 2.67 |
| 82 | 1,156 | 3 | 189 | 1,354 | 484 | | 2,030 ^b | 1.76 ^b |
| 83 | 888 | 0 | 172 | 827 | | | 999 ^b | 1.13 ^b |
| 84 | 1,242 | 1 | 495 | | | | 496 ^b | 0.40 ^b |
| 85 | 1,850 | 2 | | | | | 2 ^b | 0.00 ^b |

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Appendix Table 32. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-------|-----|---|-------|-----------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 1,979 | | | | | | | |
| 87 | 1,062 | | | | | | | |
| 88 | 1,038 | | | | | | | |
| Average ¹ | 1,092 | 2 | 510 | 1,711 | 712 | 4 | 2,938 | 2.69 |
| Percent ¹ | | 0 | 17 | 58 | 25 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 33. Egegik River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-------|-------|-------|-----|--------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 1,104 | 6 | 2,026 | 4,110 | 687 | 12 | 6,841 | 6.20 |
| 57 | 391 | 0 | 37 | 1,139 | 996 | 62 | 2,234 | 5.71 |
| 58 | 246 | 0 | 45 | 890 | 324 | 3 | 1,262 | 5.13 |
| 59 | 1,072 | 0 | 75 | 1,201 | 481 | 25 | 1,782 | 1.66 |
| 60 | 1,799 | 8 | 469 | 4,775 | 2,609 | 51 | 7,912 | 4.40 |
| 1961 | 702 | 0 | 85 | 675 | 819 | 10 | 1,589 | 2.26 |
| 62 | 1,027 | 0 | 22 | 1,019 | 403 | 30 | 1,474 | 1.44 |
| 63 | 998 | 0 | 18 | 652 | 581 | 7 | 1,258 | 1.26 |
| 64 | 850 | 1 | 132 | 1,524 | 315 | 12 | 1,984 | 2.33 |
| 65 | 1,445 | 0 | 139 | 2,088 | 854 | 21 | 3,102 | 2.15 |
| 1966 | 804 | 0 | 251 | 1,352 | 898 | 10 | 2,511 | 3.12 |
| 67 | 637 | 0 | 64 | 922 | 624 | 3 | 1,613 | 2.53 |
| 68 | 339 | 0 | 41 | 143 | 260 | 14 | 458 | 1.35 |
| 69 | 1,016 | 0 | 13 | 1,208 | 1,418 | 115 | 2,754 | 2.71 |
| 70 | 920 | 0 | 59 | 885 | 270 | 25 | 1,239 | 1.35 |
| 1971 | 634 | 0 | 46 | 1,586 | 1,044 | 56 | 2,732 | 4.31 |
| 72 | 546 | 0 | 60 | 1,570 | 1,311 | 18 | 2,959 | 5.42 |
| 73 | 329 | 0 | 76 | 713 | 887 | 4 | 1,680 | 5.11 |
| 74 | 1,276 | 0 | 149 | 2,324 | 550 | 3 | 3,026 | 2.37 |
| 75 | 1,174 | 0 | 158 | 2,692 | 810 | 3 | 3,663 | 3.12 |
| 1976 | 509 | 2 | 674 | 3,792 | 850 | 0 | 5,318 | 10.45 |
| 77 | 693 | 2 | 824 | 2,648 | 720 | 13 | 4,207 | 6.07 |
| 78 | 896 | 0 | 406 | 6,587 | 2,249 | 12 | 9,254 | 10.33 |
| 79 | 1,032 | 3 | 721 | 3,624 | 1,642 | 0 | 5,990 | 5.80 |
| 80 | 1,061 | 1 | 857 | 6,746 | 953 | 0 | 8,557 | 8.07 |
| 1981 | 695 | 0 | 613 | 4,349 | 1,465 | 7 | 6,434 | 9.26 |
| 82 | 1,035 | 4 | 1,031 | 3,681 | 1,646 | | 6,362 ^b | 6.15 ^b |
| 83 | 792 | 3 | 1,763 | 5,957 | | | 7,723 ^b | 9.75 ^b |
| 84 | 1,165 | 1 | 697 | | | | 698 ^b | 0.60 ^b |
| 85 | 1,095 | 5 | | | | | 5 ^b | 0.00 ^b |

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Appendix Table 34. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-------|-----|---|-------|-----------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 1,015 | | | | | | | |
| 87 | 687 | | | | | | | |
| 88 | 654 | | | | | | | |
| Average ¹ | 618 | 2 | 609 | 1,157 | 209 | 1 | 1,978 | 3.20 |
| Percent ¹ | | 0 | 31 | 58 | 11 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 35. Wood River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-------|-------|-----|---|--------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 773 | 0 | 822 | 650 | 0 | 0 | 1,472 | 1.90 |
| 57 | 289 | 0 | 177 | 291 | 0 | 0 | 468 | 1.62 |
| 58 | 960 | 1 | 2,146 | 463 | 32 | 0 | 2,642 | 2.75 |
| 59 | 2,209 | 0 | 988 | 757 | 56 | 2 | 1,803 | 0.82 |
| 60 | 1,016 | 6 | 1,474 | 1,146 | 108 | 0 | 2,734 | 2.69 |
| 1961 | 461 | 0 | 266 | 1,209 | 21 | 1 | 1,497 | 3.25 |
| 62 | 874 | 2 | 994 | 459 | 49 | 0 | 1,504 | 1.72 |
| 63 | 721 | 0 | 537 | 844 | 46 | 0 | 1,427 | 1.98 |
| 64 | 1,076 | 1 | 458 | 685 | 74 | 2 | 1,220 | 1.13 |
| 65 | 675 | 3 | 481 | 1,089 | 213 | 1 | 1,787 | 2.65 |
| 1966 | 1,209 | 7 | 1,004 | 1,034 | 76 | 1 | 2,122 | 1.76 |
| 67 | 516 | 3 | 663 | 344 | 82 | 0 | 1,092 | 2.12 |
| 68 | 649 | 1 | 514 | 570 | 23 | 0 | 1,108 | 1.71 |
| 69 | 604 | 0 | 61 | 646 | 126 | 0 | 833 | 1.38 |
| 70 | 1,162 | 2 | 1,539 | 1,235 | 26 | 0 | 2,802 | 2.41 |
| 1971 | 851 | 3 | 475 | 774 | 50 | 0 | 1,302 | 1.53 |
| 72 | 431 | 4 | 801 | 663 | 46 | 0 | 1,514 | 3.51 |
| 73 | 330 | 2 | 213 | 1,223 | 48 | 0 | 1,486 | 4.50 |
| 74 | 1,709 | 3 | 2,965 | 2,119 | 76 | 0 | 5,163 | 3.02 |
| 75 | 1,270 | 60 | 1,606 | 2,383 | 735 | 0 | 4,784 | 3.77 |
| 1976 | 817 | 3 | 2,281 | 3,162 | 316 | 0 | 5,762 | 7.05 |
| 77 | 562 | 20 | 1,028 | 2,441 | 27 | 0 | 3,516 | 6.26 |
| 78 | 2,267 | 0 | 1,363 | 1,798 | 127 | 0 | 3,288 | 1.45 |
| 79 | 1,706 | 10 | 2,773 | 1,740 | 21 | 0 | 4,544 | 2.66 |
| 80 | 2,969 | 3 | 496 | 1,173 | 103 | 0 | 1,775 | 0.60 |
| 1981 | 1,233 | 0 | 633 | 1,268 | 95 | 0 | 1,994 | 1.62 |
| 82 | 976 | 3 | 503 | 1,083 | 53 | | 1,642 ^b | 1.68 ^b |
| 83 | 1,361 | 1 | 1,957 | 1,282 | | | 3,240 ^b | 2.38 ^b |
| 84 | 1,003 | 0 | 544 | | | | 544 ^b | 0.54 ^b |
| 85 | 939 | 11 | | | | | 11 ^b | 0.01 ^b |

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Appendix Table 35. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-------|-------|----|---|-------|-----------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 819 | | | | | | | |
| 87 | 1,337 | | | | | | | |
| 88 | 867 | | | | | | | |
| Average ¹ | 1,052 | 5 | 1,029 | 1,160 | 99 | 0 | 2,294 | 2.18 |
| Percent ¹ | | 0 | 45 | 51 | 4 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 36. Igushik River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-----|-------|-----|---|------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 400 | 0 | 169 | 534 | 39 | 0 | 742 | 1.86 |
| 57 | 130 | 0 | 2 | 54 | 20 | 0 | 76 | 0.58 |
| 58 | 107 | 0 | 15 | 91 | 28 | 0 | 134 | 1.25 |
| 59 | 644 | 0 | 101 | 248 | 22 | 0 | 371 | 0.58 |
| 60 | 495 | 0 | 62 | 355 | 57 | 0 | 474 | 0.96 |
| 1961 | 294 | 0 | 34 | 386 | 17 | 0 | 437 | 1.49 |
| 62 | 16 | 0 | 28 | 290 | 9 | 0 | 327 | 20.44 |
| 63 | 92 | 0 | 257 | 225 | 25 | 0 | 507 | 5.51 |
| 64 | 129 | 0 | 163 | 718 | 49 | 0 | 930 | 7.21 |
| 65 | 181 | 0 | 371 | 638 | 79 | 0 | 1,088 | 6.01 |
| 1966 | 206 | 0 | 66 | 390 | 15 | 0 | 471 | 2.29 |
| 67 | 282 | 0 | 59 | 103 | 12 | 0 | 174 | 0.62 |
| 68 | 195 | 0 | 43 | 121 | 12 | 0 | 176 | 0.90 |
| 69 | 512 | 0 | 1 | 432 | 104 | 0 | 537 | 1.05 |
| 70 | 371 | 0 | 27 | 211 | 71 | 0 | 309 | 0.83 |
| 1971 | 211 | 0 | 48 | 225 | 30 | 0 | 303 | 1.44 |
| 72 | 60 | 0 | 93 | 115 | 21 | 0 | 229 | 3.82 |
| 73 | 60 | 0 | 19 | 676 | 30 | 0 | 725 | 12.08 |
| 74 | 359 | 0 | 449 | 1,096 | 29 | 0 | 1,574 | 4.38 |
| 75 | 241 | 0 | 783 | 2,693 | 505 | 0 | 3,981 | 16.52 |
| 1976 | 186 | 0 | 554 | 1,605 | 247 | 0 | 2,406 | 12.94 |
| 77 | 96 | 0 | 300 | 1,736 | 16 | 0 | 2,052 | 21.38 |
| 78 | 536 | 0 | 62 | 445 | 16 | 0 | 523 | 0.98 |
| 79 | 860 | 0 | 456 | 437 | 4 | 0 | 897 | 1.04 |
| 80 | 1,988 | 0 | 15 | 268 | 60 | 0 | 343 | 0.17 |
| 1981 | 591 | 0 | 143 | 858 | 53 | 0 | 1,054 | 1.78 |
| 82 | 424 | 0 | 54 | 517 | 19 | | 590 ^b | 1.39 ^b |
| 83 | 180 | 0 | 151 | 324 | | | 475 ^b | 2.64 ^b |
| 84 | 185 | 0 | 92 | | | | 92 ^b | 0.50 ^b |
| 85 | 212 | 1 | | | | | 1 ^b | 0.00 ^b |

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Appendix Table 36. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-----|----|---|-------|-----------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 308 | | | | | | | |
| 87 | 169 | | | | | | | |
| 88 | 170 | | | | | | | |
| Average ¹ | 355 | 0 | 166 | 575 | 60 | 0 | 802 | 2.25 |
| Percent ¹ | | 0 | 21 | 71 | 8 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 37. Nuyakuk River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-----|-------|-----|---|------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 30 | 0 | 217 | 162 | 0 | 0 | 379 | 12.63 |
| 57 | 67 | 0 | 4 | 13 | 1 | 0 | 18 | 0.27 |
| 58 | 196 | 0 | 93 | 338 | 11 | 0 | 442 | 2.26 |
| 59 | 49 | 0 | 71 | 60 | 9 | 0 | 140 | 2.86 |
| 60 | 146 | 5 | 154 | 403 | 12 | 0 | 574 | 3.93 |
| 1961 | 80 | 1 | 74 | 319 | 1 | 0 | 395 | 4.94 |
| 62 | 38 | 0 | 21 | 37 | 2 | 0 | 60 | 1.58 |
| 63 | 167 | 0 | 29 | 197 | 6 | 0 | 232 | 1.39 |
| 64 | 103 | 2 | 18 | 65 | 2 | 0 | 87 | 0.84 |
| 65 | 203 | 0 | 79 | 639 | 61 | 0 | 779 | 3.84 |
| 1966 | 161 | 1 | 123 | 531 | 7 | 0 | 662 | 4.11 |
| 67 | 20 | 1 | 11 | 64 | 7 | 0 | 83 | 4.15 |
| 68 | 97 | 0 | 20 | 211 | 7 | 0 | 238 | 2.45 |
| 69 | 70 | 2 | 27 | 95 | 9 | 0 | 133 | 1.90 |
| 70 | 365 | 0 | 99 | 877 | 93 | 0 | 1,069 | 2.93 |
| 1971 | 224 | 1 | 104 | 813 | 41 | 1 | 960 | 4.29 |
| 72 | 29 | 0 | 59 | 309 | 167 | 0 | 535 | 18.45 |
| 73 | 110 | 0 | 50 | 1,104 | 2 | 0 | 1,156 | 10.51 |
| 74 | 155 | 0 | 117 | 256 | | 0 | 373 | 2.41 |
| 75 | 670 | 7 | 531 | 4,621 | 247 | 1 | 5,407 | 8.07 |
| 1976 | 425 | 4 | 432 | 2,999 | 311 | 0 | 3,746 | 8.81 |
| 77 | 233 | 0 | 342 | 2,130 | 213 | 0 | 2,685 | 11.52 |
| 78 | 577 | 0 | 123 | 1,175 | 16 | 0 | 1,314 | 2.28 |
| 79 | 360 | 1 | 421 | 1,031 | 6 | 0 | 1,459 | 4.05 |
| 80 | 3,027 | 1 | 126 | 582 | 148 | 0 | 857 | 0.28 |
| 1981 | 834 | 0 | 255 | 1,765 | 29 | 0 | 2,049 | 2.46 |
| 82 | 538 | 2 | 100 | 502 | 70 | | 674 ^b | 1.25 ^b |
| 83 | 319 | 0 | 92 | 572 | | | 664 ^b | 2.08 ^b |
| 84 | 473 | 0 | 160 | | | | 160 ^b | 0.34 ^b |
| 85 | 429 | 11 | | | | | 11 ^b | 0.03 ^b |

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Appendix Table 37. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-----|----|---|-------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 822 | | | | | | | |
| 87 ^c | 388 | | | | | | | |
| 88 | 320 | | | | | | | |
| Average ¹ | 324 | 1 | 138 | 800 | 54 | 0 | 994 | 3.06 |
| Percent ¹ | | 0 | 14 | 81 | 5 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Includes Nushagak-Mulchatna River fish; Nuyakuk River escapement count incomplete in 1987.

(Sources: 1 and 18)

Appendix Table 38. Togiak River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-88.^a

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|------------|------------|----------------|-----|-----|-----|---|--------------------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1956 | 225 | 0 | 107 | 328 | 14 | 0 | 449 | 2.00 |
| 57 | 25 | 2 | 58 | 90 | 37 | 0 | 187 | 7.48 |
| 58 | 72 | 2 | 71 | 173 | 25 | 0 | 271 | 3.76 |
| 59 | 210 | 0 | 142 | 147 | 7 | 0 | 296 | 1.41 |
| 60 | 192 | 0 | 194 | 299 | 52 | 0 | 545 | 2.84 |
| 1961 | 122 | 1 | 88 | 231 | 20 | 0 | 340 | 2.79 |
| 62 | 62 | 0 | 55 | 107 | 8 | 0 | 170 | 2.74 |
| 63 | 116 | 0 | 44 | 84 | 24 | 0 | 152 | 1.31 |
| 64 | 105 | 0 | 44 | 125 | 6 | 0 | 175 | 1.67 |
| 65 | 96 | 0 | 156 | 212 | 37 | 0 | 405 | 4.22 |
| 1966 | 104 | 1 | 205 | 424 | 11 | 1 | 642 | 6.17 |
| 67 | 81 | 1 | 24 | 115 | 41 | 0 | 181 | 2.23 |
| 68 | 50 | 0 | 50 | 196 | 16 | 0 | 262 | 5.24 |
| 69 | 117 | 0 | 33 | 167 | 16 | 0 | 216 | 1.85 |
| 70 | 203 | 0 | 55 | 282 | 71 | 1 | 409 | 2.01 |
| 1971 | 200 | 0 | 111 | 379 | 69 | 2 | 561 | 2.81 |
| 72 | 79 | 1 | 95 | 172 | 101 | 0 | 369 | 4.67 |
| 73 | 107 | 1 | 161 | 409 | 15 | 0 | 586 | 5.48 |
| 74 | 104 | 0 | 258 | 343 | 48 | 1 | 650 | 6.25 |
| 75 | 181 | 0 | 258 | 935 | 58 | 0 | 1,251 | 6.91 |
| 1976 | 189 | 0 | 190 | 682 | 166 | 0 | 1,038 | 5.49 |
| 77 | 163 | 0 | 256 | 650 | 15 | 0 | 921 | 5.65 |
| 78 | 306 | 1 | 154 | 500 | 19 | 0 | 674 | 2.20 |
| 79 | 198 | 2 | 267 | 317 | 6 | 0 | 592 | 2.99 |
| 80 | 527 | 0 | 43 | 238 | 11 | 0 | 292 | 0.55 |
| 1981 | 307 | 0 | 52 | 299 | 15 | 0 | 366 | 1.19 |
| 82 | 289 | 0 | 96 | 257 | 31 | | 384 ^b | 1.33 ^b |
| 83 | 213 | 0 | 271 | 936 | | | 1,207 ^b | 5.67 ^b |
| 84 | 151 | 0 | 36 | | | | 36 ^b | 0.24 ^b |
| 85 | 153 | 0 | | | | | 0 ^b | 0.00 ^b |

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Appendix Table 38. (Page 2 of 2)

| Brood Year | Escapement | Return by Year | | | | | Total | Return Per Spawner |
|----------------------|------------|----------------|-----|-----|----|---|-------|--------------------|
| | | 3 | 4 | 5 | 6 | 7 | | |
| 1986 | 203 | | | | | | | |
| 87 | 278 | | | | | | | |
| 88 | 309 | | | | | | | |
| Average ¹ | 159 | 0 | 122 | 304 | 35 | 0 | 462 | 2.90 |
| Percent ¹ | | 0 | 26 | 66 | 8 | 0 | 100 | |

- 1 Averages and percentages computed from years with complete returns, 1956-81.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 39. Inshore commercial catch and escapement of chinook salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1969-88.^a

| Year | Nushagak District | | | Togiak District | | |
|-----------------|---------------------|-------------------------|-----------|---------------------|--------------------|-----------|
| | Catch | Escapement ¹ | Total Run | Catch | Escapement | Total Run |
| 1969 | 80,803 | 35,000 | 115,803 | 20,181 | 8,000 | 28,181 |
| 70 | 87,547 | 50,000 | 137,547 | 28,664 | 15,000 | 43,664 |
| 71 | 82,769 | 40,000 | 122,769 | 27,026 | 20,000 | 47,026 |
| 72 | 46,045 | 25,000 | 71,045 | 19,976 | 14,000 | 33,976 |
| 73 | 30,470 | 35,000 | 65,470 | 10,856 | 11,000 | 21,856 |
| 1974 | 32,053 | 70,000 | 102,053 | 10,798 | 15,000 | 25,798 |
| 75 | 21,454 | 70,000 | 91,454 | 7,226 | 11,000 | 18,226 |
| 76 | 60,684 | 100,000 | 160,684 | 29,744 | 14,000 | 43,744 |
| 77 | 85,074 | 65,000 | 150,074 | 35,218 | 20,000 | 55,218 |
| 78 | 118,548 | 130,000 | 248,548 | 57,000 | 40,000 | 97,000 |
| 1979 | 157,321 | 95,000 | 252,321 | 30,022 | 20,000 | 50,022 |
| 80 | 64,958 | 141,000 | 205,958 | 12,543 | 12,000 | 24,543 |
| 81 | 193,461 | 150,000 | 343,461 | 23,911 | 27,000 | 50,911 |
| 82 | 195,287 | 147,000 | 342,287 | 33,786 | 17,000 | 50,786 |
| 83 | 137,123 | 162,000 | 299,123 | 38,497 | 22,000 | 60,497 |
| 1984 | 61,378 | 81,000 | 142,378 | 22,179 | 26,000 | 48,179 |
| 85 | 67,783 | 116,000 | 183,783 | 37,106 | 14,000 | 51,106 |
| 86 | 63,859 ^b | 43,000 | 106,859 | 19,895 ^b | 8,000 ^c | 27,895 |
| 87 | 47,592 ^b | 84,000 | 131,592 | 17,618 ^b | 11,000 | 28,618 |
| 88 | 16,501 ^b | 57,000 | 73,501 | 15,615 ^b | 10,000 | 25,615 |
| 20 Year Average | 82,536 | 84,800 | 167,336 | 24,893 | 16,750 | 41,643 |
| 1969-78 Average | 64,545 | 62,000 | 126,545 | 24,669 | 16,800 | 41,469 |
| 1979-88 Average | 100,526 | 107,600 | 208,126 | 25,117 | 16,700 | 41,817 |

1 Escapements were estimated from the following:

1969-70 - comprehensive aerial surveys.

1971 - mean exploitation rates from 1966-70 and 1972-76.

1972-81 - comprehensive aerial surveys.

1982-85 - correlation between index counts and total escapement estimates when aerial surveys were complete.

1986-88 - sonar estimate.

a Escapement estimates supersede those previously reported and are rounded to the nearest thousand fish.

b Preliminary.

c Minimal estimate based on incomplete data.

(Sources: 1, 5 and 13)

Appendix Table 40. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1969-88.^a

| Year | Nushagak District | | | Togiak District | | |
|-----------------|----------------------|-------------------------|-----------|----------------------|-------------------------|-----------|
| | Catch | Escapement ¹ | Total Run | Catch | Escapement ² | Total Run |
| 1969 | 214,235 | 130,000 | 344,235 | 66,389 | 85,000 | 151,389 |
| 70 | 435,033 | 273,000 | 708,033 | 100,711 | 241,000 | 341,711 |
| 71 | 360,015 | 226,000 | 586,015 | 123,847 | 229,000 | 352,847 |
| 72 | 310,126 | 195,000 | 505,126 | 178,885 | 170,000 | 348,885 |
| 73 | 336,331 | 200,000 | 536,331 | 195,431 | 163,000 | 358,431 |
| 1974 | 157,941 | 100,000 | 257,941 | 80,710 | 161,000 | 241,710 |
| 75 | 152,891 | 80,000 | 232,891 | 87,058 | 114,000 | 201,058 |
| 76 | 801,064 | 500,000 | 1,301,064 | 153,559 | 392,000 | 545,559 |
| 77 | 899,701 | 609,000 | 1,508,701 | 270,649 | 496,000 | 766,649 |
| 78 | 651,743 | 293,000 | 944,743 | 274,967 | 396,000 | 670,967 |
| 1979 | 440,279 | 166,000 | 606,279 | 219,942 | 293,000 | 512,942 |
| 80 | 681,930 | 969,000 | 1,650,930 | 299,682 | 415,000 | 714,682 |
| 81 | 795,143 | 177,000 | 972,143 | 229,886 | 331,000 | 560,886 |
| 82 | 434,817 | 256,000 | 690,817 | 151,000 | 86,000 | 237,000 |
| 83 | 725,060 | 164,000 | 889,060 | 322,691 | 165,000 | 487,691 |
| 1984 | 850,114 | 362,000 | 1,212,114 | 336,660 | 204,000 | 540,660 |
| 85 | 396,740 | 288,000 | 684,740 | 203,302 | 212,000 | 415,302 |
| 86 | 461,966 ^b | 200,000 | 661,966 | 269,722 ^b | 330,000 | 599,722 |
| 87 | 403,399 ^b | 147,000 | 550,399 | 421,684 ^b | 361,000 | 782,684 |
| 88 | 370,224 ^b | 186,000 | 556,224 | 470,721 ^b | 282,000 | 752,721 |
| 20 Year Average | 493,938 | 276,050 | 699,989 | 222,875 | 256,300 | 435,613 |
| 1969-78 Average | 431,908 | 260,600 | 629,553 | 153,221 | 244,700 | 361,746 |
| 1979-88 Average | 555,967 | 291,500 | 770,425 | 292,529 | 267,900 | 509,481 |

1. Escapements were estimated from the following:

1970-72 - average catch/escapement ratio for 1968-69 and 1973-81;

1973-74 - tower enumeration and aerial survey data;

1975-78 - aerial survey data;

1979-86 - adjusted sonar estimate from Portage Creek site.

2. Escapement estimates based on aerial surveys; however, surveys were not conducted in 1986 due to budget constraints. Estimate based on catch/escapement proportion using most recent 10-year average data.

a. Escapement estimates supersede those previously reported and are rounded to the nearest thousand fish.

b. Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 41. Escapement and inshore return of chinook salmon by brood year, Nushagak District Bristol Bay, 1966-88.

| Brood Year | Escapement | Return by Age Group | | | | | | Total | Return Per Spawner ¹ |
|----------------------|------------|---------------------|------|------|------|-----|-----|-------|---------------------------------|
| | | 3 | 4 | 5 | 6 | 7 | 8 | | |
| 1966 | 40 | | 21 | 32 | 39 | 5 | 1 | 99 | 2.45 |
| 67 | 65 | | 10 | 18 | 47 | 25 | | 100 | 1.54 |
| 68 | 70 | | 14 | 19 | 68 | 9 | | 110 | 1.57 |
| 69 | 35 | | 1 | 15 | 30 | 3 | | 49 | 1.40 |
| 1970 | 50 | | 1 | 57 | 75 | 5 | 1 | 139 | 2.78 |
| 71 | 40 | | 2 | 57 | 96 | 20 | | 175 | 4.38 |
| 72 | 25 | | 33 | 53 | 128 | 15 | | 229 | 9.16 |
| 73 | 35 | | 2 | 82 | 106 | 13 | | 203 | 5.80 |
| 74 | 70 | | 24 | 44 | 51 | 5 | | 124 | 1.77 |
| 1975 | 70 | 1 | 95 | 146 | 140 | 17 | | 399 | 5.70 |
| 76 | 100 | 2 | 8 | 112 | 152 | 7 | | 281 | 2.81 |
| 77 | 65 | | 96 | 155 | 207 | 15 | | 473 | 7.28 |
| 78 | 130 | 2 | 27 | 47 | 56 | 22 | | 154 | 1.18 |
| 79 | 95 | 3 | 49 | 70 | 86 | 12 | | 220 | 2.32 |
| 1980 | 141 | | 11 | 48 | 51 | 3 | | 113 | 0.80 |
| 81 | 150 | 1 | 33 | 43 | 86 | 10 | | 173 | 1.15 |
| 82 | 147 | 1 | 4 | 37 | 30 | | | 72 | 0.49 |
| 83 | 162 | | 18 | 21 | | | | 39 | 0.24 |
| 84 | 81 | 1 | 21 | | | | | 22 | 0.27 |
| 1985 | 72 | 2 | | | | | | 2 | 0.03 |
| 86 | 33 | | | | | | | 0 | 0.00 |
| 87 | 84 | | | | | | | 0 | 0.00 |
| 88 | 57 | | | | | | | 0 | 0.00 |
| Average ¹ | 64 | 2 | 27 | 65 | 92 | 12 | 1 | 197 | 4 |
| Percent ¹ | | 0.2 | 13.9 | 32.9 | 46.5 | 6.3 | 0.1 | 100.0 | |

1 Averages and percentages computed from 1966-79.

(Sources: 1 and 13)

Appendix Table 42. Inshore commercial catch and escapement of pink salmon in the Nushagak District, by river system, in numbers of fish, Bristol Bay, 1958-88.^a

| Year | Catch | Escapement | | | | | Total | Total Run |
|------------------------------|----------------------|-------------------|----------------------|----------------------|------------------------|--------------------|-----------|------------|
| | | Wood ¹ | Igushik ² | Nuyakuk ³ | Nush/Mul. ⁴ | Snake ⁵ | | |
| 1958 | 1,113,794 | | | 4,000,000 | | | 4,000,000 | 5,113,794 |
| 60 | 289,781 | | | 146,359 | | | 146,359 | 436,140 |
| 62 | 880,424 | 25,000 | 12,000 | 493,914 | 6,100 | 6,000 | 543,014 | 1,423,438 |
| 64 | 1,497,817 | 1,560 | 450 | 883,500 | 25,000 | 50 | 910,560 | 2,408,377 |
| 66 | 2,337,066 | | | 1,442,424 | | | 1,442,424 | 3,779,490 |
| 1968 | 1,705,150 | | | 2,161,116 | | | 2,161,116 | 3,866,266 |
| 70 | 417,834 | | | 152,580 | | | 152,580 | 570,414 |
| 72 | 67,953 | | | 58,536 | | | 58,536 | 126,489 |
| 74 | 413,613 | 44,800 | 7,500 | 529,216 | 3,100 | 900 | 585,516 | 999,129 |
| 76 | 739,580 | 21,986 | 5,070 | 794,478 | 41,800 | 100 | 863,434 | 1,603,014 |
| 1978 | 4,348,336 | 205,000 | 16,210 | 8,390,184 | 771,600 | 3,483 | 9,386,477 | 13,734,813 |
| 80 | 2,202,545 | 31,150 | 3,500 | 2,626,746 | 123,000 | 800 | 2,785,196 | 4,987,741 |
| 82 | 1,339,272 | 36,100 | 8,430 | 1,592,096 | 19,130 | 900 | 1,656,656 | 2,995,928 |
| 84 | 3,127,153 | 81,400 | 6,190 | 2,760,312 | 73,050 | 5,500 | 2,926,452 | 6,053,605 |
| 86 | 280,623 ^b | | | 72,189 ^c | | | 72,189 | 352,812 |
| 1988 | 248,656 ^b | | | 494,610 ^c | | | 494,610 | 743,266 |
| 16 Year Average ⁶ | 1,313,100 | 55,875 | 7,419 | 1,662,391 | 132,848 | 2,217 | 1,761,570 | 3,074,670 |

1 Aerial survey estimate 1962 and 1974-84; tower count 1964.

2 Aerial survey estimate 1962-80; aerial survey estimate and tower count 1976 and 1982-84.

3 Tower count 1960-84; aerial survey estimate 1958, and below counting tower 1962-64 and 1974-84.

4 Aerial survey estimate.

5 Aerial survey estimate 1962-64, 1974-76 and 1980-84, and weir count 1978.

6 Only years and systems with escapement data were included in averages.

a Includes even-years only.

b Preliminary.

c Sonar estimate from Portage Creek; no tower count conducted; Nush/Mul. included in the estimate.

(Sources: 1, 5, 13 and 20)

Appendix Table 43. Nushagak District pink salmon escapement and return by brood year, in numbers of fish, Bristol Bay, 1958-88.^a

| Brood Year | Escapement | Return | Return Per Spawner |
|-----------------|------------|--------------------|--------------------|
| 1958 | 4,000 | 436 | 0.11 |
| 1960 | 146 | 1,423 | 9.75 |
| 62 | 543 | 2,408 | 4.43 |
| 64 | 911 | 3,779 | 4.15 |
| 66 | 1,442 | 3,866 | 2.68 |
| 68 | 2,161 | 570 | 0.26 |
| 1970 | 153 | 126 | 0.82 |
| 72 | 59 | 999 | 16.93 |
| 74 | 586 | 1,603 | 2.74 |
| 76 | 863 | 13,735 | 15.92 |
| 78 | 9,386 | 4,988 | 0.53 |
| 1980 | 2,785 | 2,996 | 1.08 |
| 82 | 1,657 | 6,054 | 3.65 |
| 84 | 2,926 | 353 ^b | 0.12 |
| 86 | 72 | 743 ^b | 10.32 |
| 88 | 495 | | |
| 16 Year Average | 1,762 | 2,939 ^c | 4.90 ^c |

a Includes even-years only. All escapements and returns are rounded to the nearest thousand fish.

b Preliminary.

c Average computed from 1958-86.

(Sources: 1, 5, 13 and 20)

Appendix Table 44. Inshore commercial catch and escapement of coho salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1980-88.^a

| Year | Nushagak District | | | Togiak District | | |
|-----------------|-------------------|-------------------------|-----------|-----------------|----------------------|-----------|
| | Catch | Escapement ¹ | Total Run | Catch | Escapement | Total Run |
| 1980 | 147,726 | 232,000 | 379,726 | 151,000 | 96,000 ^c | 247,000 |
| 81 | 220,290 | 180,000 ^b | 400,290 | 29,207 | 61,000 ^d | 90,207 |
| 82 | 349,669 | 234,000 | 583,669 | 133,765 | 81,000 ^c | 214,765 |
| 83 | 81,338 | 51,000 | 132,338 | 5,711 | 12,000 ^e | 17,711 |
| 84 | 260,310 | 171,000 | 431,310 | 176,053 | 104,000 ^f | 280,053 |
| 85 | 20,230 | 89,500 | 109,730 | 38,636 | 61,300 ^g | 99,936 |
| 86 ^h | 72,896 | 52,800 | 125,696 | 48,440 | 30,200 ^c | 78,640 |
| 87 ^h | 13,098 | 20,200 | 33,298 | 1,433 | 64,900 ⁱ | 66,333 |
| 88 ^h | 53,125 | 131,101 | 184,226 | 18,595 | 86,330 ^j | 104,925 |
| 9 Year Average | 135,409 | 116,160 | 238,028 | 66,982 | 66,303 | 119,957 |

- 1 Sonar enumeration has not always covered the complete season; in these cases a proportional method was used to estimate escapement after the sonar operation terminated.
- a Escapement estimates based on data collected from sonar enumeration and on aerial surveys of the spawning grounds; these escapement estimates supersede previously reported escapements.
- b Sonar enumeration precluded by lack of funding; escapement was estimated from mean exploitation rates from 1980 and 1982-84.
- c Includes Togiak and Kulukak River drainages.
- d Includes Togiak, Kulukak, Ungalikthluk/Kukayachagak and Nunavachak drainages.
- e Aerial escapement precluded by adverse weather and water conditions; estimate based on exploitation rate.
- f Togiak, Kulukak, Slug, Osviak and Matogak River drainages.
- g Togiak, Kulukak, Quigmy, Matogak, and Osviak drainages.
- h Catches are preliminary.
- i Estimate of Togiak River drainage derived from sonar enumeration (USFWS) in conjunction with aerial surveys of Kulukak, Osviak, Matogak, Quigmy, and Ungalikthluk drainages.
- j Togiak, Kulukak, Slug, Osviak, Matogak, Quigmy, Negukthlik, and Ungalikthluk.

(Sources: 1, 5 and 13)

Appendix Table 45: Average round weight of the commercial salmon catch in pounds, by district and species, Bristol Bay, 1969-88.^a

| Year | Naknek-Kvichak | Egegik | Ugashik | Nushagak | Togiak | Average Bristol Bay |
|-----------------------|----------------|--------|---------|----------|--------|---------------------|
| <u>SOCKEYE SALMON</u> | | | | | | |
| 1969 | 5.1 | 5.5 | | 5.5 | 5.5 | 5.3 |
| 70 | 4.8 | 4.8 | | 5.7 | 5.8 | 4.9 |
| 71 | 5.6 | 5.9 | | 6.2 | 7.0 | 6.0 |
| 72 | 6.1 | 6.0 | 6.1 | 6.0 | 6.4 | 6.0 |
| 73 | 6.7 | 7.1 | 7.3 | 7.1 | 7.9 | 7.1 |
| 1974 | 5.5 | 5.7 | 5.2 | 5.7 | 7.0 | 5.8 |
| 75 | 5.2 | 5.7 | 5.2 | 6.1 | 6.7 | 5.5 |
| 76 | 5.8 | 5.9 | 6.2 | 6.6 | 7.5 | 6.1 |
| 77 | 6.63 | 6.33 | 6.76 | 7.49 | 7.88 | 6.69 |
| 78 | 5.50 | 6.31 | 6.20 | 6.29 | 7.32 | 5.93 |
| 1979 | 5.76 | 5.98 | 5.97 | 6.12 | 7.15 | 5.87 |
| 80 | 5.44 | 5.57 | 5.51 | 6.11 | 6.82 | 5.62 |
| 81 | 6.07 | 6.01 | 6.25 | 6.40 | 6.75 | 6.19 |
| 82 | 6.26 | 6.40 | 6.51 | 6.40 | 7.36 | 6.40 |
| 83 | 5.52 | 5.82 | 5.73 | 5.87 | 6.65 | 5.66 |
| 1984 | 5.41 | 5.79 | 5.61 | 6.16 | 6.80 | 5.60 |
| 85 | 5.62 | 5.78 | 5.82 | 5.88 | 6.50 | 5.75 |
| 86 | 6.14 | 5.93 | 6.14 | 5.88 | 6.67 | 6.04 |
| 87 | 5.80 | 5.91 | 6.13 | 6.03 | 6.89 | 6.01 |
| 88 | 5.99 | 6.24 | 6.19 | 6.22 | 7.38 | 6.23 |
| <u>CHINOOK SALMON</u> | | | | | | |
| 1969 | 18.0 | | | 19.2 | 23.0 | 19.7 |
| 70 | 21.5 | 19.6 | | 18.3 | 17.0 | 18.4 |
| 71 | 27.0 | 21.7 | | 21.7 | 22.3 | 22.1 |
| 72 | 25.5 | 21.6 | 17.3 | 19.8 | 21.1 | 20.3 |
| 73 | 23.5 | 21.4 | 21.0 | 22.6 | 24.1 | 23.0 |
| 1974 | 20.8 | 18.6 | 20.7 | 23.2 | 21.0 | 22.4 |
| 75 | 25.0 | 19.5 | 18.1 | 18.8 | 14.0 | 17.8 |
| 76 | 27.6 | 18.6 | 13.5 | 18.7 | 12.1 | 17.0 |
| 77 | 30.50 | 22.12 | 23.80 | 23.36 | 20.76 | 22.87 |
| 78 | 28.32 | 23.64 | 29.20 | 22.34 | 26.10 | 23.91 |
| 1979 | 21.75 | 21.16 | 22.72 | 21.06 | 22.20 | 21.32 |
| 80 | 20.47 | 20.96 | 21.89 | 19.61 | 18.02 | 19.69 |
| 81 | 20.76 | 18.61 | 18.93 | 19.63 | 13.14 | 18.98 |
| 82 | 19.39 | 18.46 | 20.07 | 20.40 | 15.40 | 19.55 |
| 83 | 20.81 | 20.19 | 21.51 | 20.96 | 20.69 | 20.91 |

(continued)

Appendix Table 45. (Page 2 of 3)

| Year | Naknek- Kvichak | Egegik | Ugashik | Nushagak | Togiak | Average Bristol Bay |
|-----------------------------------|--------------------|--------|---------|----------|--------|---------------------------|
| <u>CHINOOK SALMON</u> (continued) | | | | | | |
| 84 | 19.95 | 18.69 | 19.52 | 20.78 | 20.32 | 20.45 |
| 85 | 19.04 | 17.27 | 19.07 | 16.90 | 19.26 | 17.86 |
| 86 | 15.63 | 16.83 | 18.60 | 19.87 | 16.34 | 18.84 |
| 87 | 23.19 | 20.04 | 20.16 | 19.73 | 19.43 | 20.51 |
| 88 | 20.41 | 21.47 | 20.59 | 18.16 | 17.66 | 18.69 |
| <u>CHUM SALMON</u> | | | | | | |
| 1969 | | 6.1 | 5.4 | 6.0 | 5.7 | 5.9 |
| 70 | 5.8 | 6.5 | | 5.9 | 6.3 | 5.9 |
| 71 | 6.5 | | | 6.4 | 6.7 | 6.5 |
| 72 | 6.5 | 6.4 | 5.7 | 6.5 | 6.6 | 6.5 |
| 73 | 7.3 | 6.9 | 7.7 | 7.0 | 7.3 | 7.1 |
| 1974 | 6.4 | 6.4 | 7.2 | 6.2 | 7.4 | 6.6 |
| 75 | 6.3 | 6.2 | 6.1 | 6.1 | 6.6 | 6.3 |
| 76 | 5.9 | 5.8 | | 6.9 | 7.1 | 6.8 |
| 77 | 7.32 | 6.46 | 6.70 | 7.33 | 8.21 | 7.43 |
| 78 | 6.58 | 6.70 | 6.20 | 7.08 | 8.05 | 7.21 |
| 1979 | 6.81 | 7.20 | 7.52 | 6.24 | 7.79 | 6.78 |
| 80 | 6.23 | 6.60 | 6.27 | 5.94 | 6.68 | 6.19 |
| 81 | 6.52 | 6.77 | 7.16 | 6.58 | 7.41 | 6.72 |
| 82 | 6.31 | 6.61 | 6.83 | 6.67 | 7.30 | 6.71 |
| 83 | 6.05 | 6.70 | 6.33 | 6.43 | 7.56 | 6.61 |
| 1984 | 6.41 | 6.85 | 6.49 | 6.54 | 7.80 | 6.77 |
| 85 | 6.62 | 6.60 | 6.81 | 6.30 | 7.51 | 6.76 |
| 86 | 6.51 | 6.21 | 6.62 | 6.49 | 7.39 | 6.70 |
| 87 | 5.95 | 6.14 | 6.38 | 6.39 | 7.43 | 6.46 |
| 88 | 5.95 | 6.51 | 6.51 | 6.80 | 8.10 | 7.04 |
| <u>PINK SALMON</u> | | | | | | |
| 1970 | 2.9 | | | 3.0 | 3.7 | 3.0 |
| 72 | 3.4 | | | 3.1 | 3.8 | 3.1 |
| 74 | 4.3 | 3.9 | 4.1 | 3.6 | 4.4 | 4.0 |
| 76 | 3.7 | 3.8 | | 3.3 | 4.1 | 3.4 |
| 78 | 3.59 | 3.20 | 3.30 | 3.11 | 3.77 | 3.19 |

(continued)

Appendix Table 45. (Page 3 of 3)

| Year | Naknek- Kvichak | Egegik | Ugashik | Nushagak | Togiak | Average Bristol Bay |
|--------------------------------|--------------------|--------|---------|----------|--------|---------------------------|
| <u>PINK SALMON (continued)</u> | | | | | | |
| 1980 | 3.57 | 3.41 | | 3.36 | 3.80 | 3.39 |
| 82 | 3.56 | | 4.08 | 3.45 | 3.52 | 3.46 |
| 84 | 3.64 | 3.75 | 3.06 | 3.18 | 3.78 | 3.21 |
| 86 | 4.00 | 3.78 | 3.41 | 3.27 | 3.91 | 3.47 |
| 88 | 3.72 | 3.90 | 3.72 | 3.44 | 3.49 | 3.64 |
| <u>COHO SALMON</u> | | | | | | |
| 1969 | | 6.3 | 7.6 | 6.2 | 8.7 | 7.0 |
| 70 | | | | 5.7 | 8.2 | 6.8 |
| 71 | | | | 6.3 | | 6.3 |
| 72 | | 6.1 | | 6.3 | 7.6 | 7.0 |
| 73 | 5.6 | 6.3 | 6.8 | 6.0 | 7.5 | 6.7 |
| 1974 | 6.7 | 6.5 | 7.2 | 6.7 | 8.6 | 7.9 |
| 75 | 6.7 | 7.2 | 7.2 | 6.1 | 9.2 | 8.6 |
| 76 | 5.5 | 6.9 | | 6.0 | 8.3 | 7.6 |
| 77 | | | | 6.46 | 9.35 | 7.80 |
| 78 | 6.38 | 6.25 | | 6.79 | 8.19 | 7.45 |
| 1979 | 5.16 | 7.27 | 8.41 | 6.71 | 9.04 | 7.78 |
| 80 | 6.84 | 6.79 | 7.80 | 6.08 | 7.95 | 7.01 |
| 81 | 6.17 | 6.32 | 7.59 | 6.02 | 7.75 | 6.35 |
| 82 | 7.18 | 7.07 | 7.72 | 6.81 | 8.65 | 7.31 |
| 83 | | 6.68 | 7.15 | 6.52 | 7.14 | 6.62 |
| 1984 | 6.03 | 6.94 | 7.69 | 6.60 | 8.94 | 7.45 |
| 85 | 7.04 | 7.65 | 7.89 | 7.28 | 9.13 | 8.03 |
| 86 | 5.47 | 6.71 | 7.06 | 5.91 | 7.79 | 6.71 |
| 87 | 6.71 | 6.81 | 7.66 | 6.55 | 7.11 | 6.97 |
| 88 | 7.15 | 8.33 | 8.31 | 7.07 | 7.71 | 7.78 |

1 Average weight in pounds is weighted by the number of fish reported by each buyer.

(Sources: 4 and 10)

Appendix Table 46. Exvessel value of the commercial salmon catch in thousands of dollars, by species, Bristol Bay, 1969-88.^a

| Year | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------|---------|---------|-------|--------------------|-------|---------|
| 1969 | 8,423 | 443 | 216 | | 103 | 9,185 |
| 70 | 24,368 | 465 | 466 | 151 | 18 | 25,468 |
| 71 | 14,951 | 652 | 528 | | 16 | 16,147 |
| 72 | 3,914 | 339 | 512 | 47 | 20 | 4,832 |
| 73 | 1,892 | 284 | 829 | | 115 | 3,120 |
| 1974 | 3,793 | 460 | 567 | 1,053 | 142 | 6,015 |
| 75 | 11,047 | 214 | 615 | | 151 | 12,027 |
| 76 | 17,139 | 742 | 2,892 | 1,093 | 82 | 21,948 |
| 77 | 19,434 | 1,940 | 4,275 | | 445 | 26,094 |
| 78 | 40,034 | 3,206 | 3,173 | 5,424 | 435 | 52,272 |
| 1979 | 128,992 | 4,541 | 2,480 | | 2,387 | 138,400 |
| 80 | 76,118 | 1,881 | 2,738 | 2,173 | 1,392 | 84,302 |
| 81 | 120,907 | 5,557 | 4,106 | | 1,461 | 132,031 |
| 82 | 68,122 | 6,088 | 2,145 | 1,111 | 3,199 | 80,665 |
| 83 | 129,900 | 2,853 | 3,216 | | 337 | 136,306 |
| 1984 | 94,681 | 2,158 | 4,040 | 2,414 | 3,072 | 106,365 |
| 85 | 115,402 | 2,188 | 2,218 | | 923 | 120,731 |
| 86 ^b | 136,707 | 1,789 | 2,326 | 203 | 854 | 141,879 |
| 87 ^b | 130,214 | 1,868 | 2,826 | | 356 | 135,264 |
| 88 ^b | 170,204 | 874 | 4,029 | 1,126 | 1,754 | 177,987 |
| 20 Year Average | 65,812 | 1,927 | 2,210 | 1,480 ^c | 863 | 71,552 |
| 1969-78 Average | 14,500 | 875 | 1,407 | 1,554 | 153 | 17,711 |
| 1979-88 Average | 117,125 | 2,980 | 3,012 | 1,405 | 1,574 | 125,393 |

a Value paid to the fishermen. Derived from price per fish or pounds times commercial catch.

b Preliminary.

c Includes even-years only.

(Sources: 1, 5, 9, and 10)

Appendix Table 47. Salmon case pack by species, Bristol Bay, 1969-88.^a

| Year | 48 1-lb. Cans Per Case | | | | | Total |
|-----------------|------------------------|---------|---------|---------------------|-------|---------|
| | Sockeye | Chinook | Chum | Pink | Coho | |
| 1969 | 457,911 | 17,860 | 30,997 | | 2,198 | 508,966 |
| 70 | 117,163 | 19,401 | 58,766 | 16,772 | 802 | 212,904 |
| 71 | 694,199 | 23,118 | 56,852 | | 437 | 774,606 |
| 72 | 197,495 | 9,666 | 53,756 | 5,002 | 547 | 266,466 |
| 73 | 61,429 | 1,946 | 42,044 | | 1,456 | 106,875 |
| 1974 | 87,723 | 6,461 | 23,789 | 39,550 | 7,012 | 164,535 |
| 75 | 290,646 | 1,920 | 22,667 | | 373 | 315,606 |
| 76 | 393,698 | 6,889 | 104,935 | 36,616 | 1,068 | 543,206 |
| 77 | 353,133 | 3,119 | 137,838 | | 2,383 | 496,473 |
| 78 | 551,648 | 6,982 | 76,926 | 163,230 | 2,916 | 801,702 |
| 1979 | 688,882 | 3,058 | 34,517 | | 1,236 | 727,693 |
| 80 | 571,347 | 820 | 63,616 | 48,055 | 3,767 | 687,605 |
| 81 | 783,222 | 5,304 | 66,430 | | 943 | 855,899 |
| 82 | 193,321 | 1,700 | 17,320 | 26,789 | 7,510 | 246,640 |
| 83 | 800,390 | 6,178 | 47,227 | | 705 | 854,500 |
| 1984 | 649,315 | 1,740 | 69,026 | 108,206 | 9,765 | 838,052 |
| 85 | 297,884 | 2,257 | 18,367 | | 430 | 318,938 |
| 86 | 205,015 | 1,037 | 11,168 | 2,024 | 502 | 219,746 |
| 87 | 274,130 | 1,952 | 21,967 | | | 298,049 |
| 88 | 108,503 | 745 | 12,880 | 5,357 | 310 | 127,795 |
| 20 Year Average | 388,853 | 6,108 | 48,554 | 45,160 ^b | 2,335 | 468,313 |
| 1969-78 Average | 320,505 | 9,736 | 60,857 | 52,234 | 1,919 | 419,134 |
| 1979-88 Average | 457,201 | 2,479 | 36,252 | 38,086 | 2,796 | 517,492 |

a Includes only fish canned in Bristol Bay.

b Includes even-years only.

(Sources: 1, 4, and 17)

Appendix Table 48. Commercial production of frozen salmon by species, in pounds, Bristol Bay, 1969-88.^a

| Year | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------|-------------|-----------|-----------|------------------------|-----------|-------------|
| 1969 | 421,248 | 353,256 | 6,537 | | 7,669 | 788,710 |
| 70 | 3,234,500 | 535,159 | 175,504 | 33,368 | 50 | 3,978,581 |
| 71 | 1,812,864 | 356,422 | 115,388 | | 40,925 | 2,325,599 |
| 72 | 54,571 | 362,653 | 60,466 | 790 | 24,308 | 502,788 |
| 73 | 186,663 | 557,422 | 307,790 | | 98,115 | 1,149,990 |
| 1974 | 147,475 | 281,821 | 7,212 | 113,241 | 582 | 550,331 |
| 75 | 101,751 | 230,045 | 133,339 | | 444,344 | 909,479 |
| 76 | 883,620 | 570,837 | 163,030 | 215,176 | 117,603 | 1,950,266 |
| 77 | 586,098 | 1,155,791 | 336,283 | | 235,607 | 2,313,779 |
| 78 | 6,306,661 | 1,848,951 | 761,029 | 1,580,236 | 145,355 | 10,642,232 |
| 1979 | 38,031,872 | 2,291,378 | 1,231,334 | | 1,350,300 | 42,904,884 |
| 80 | 31,855,642 | 1,189,870 | 1,391,797 | 3,040,765 | 828,114 | 38,306,188 |
| 81 | 49,613,633 | 2,602,066 | 1,371,467 | | 1,065,573 | 54,652,739 |
| 82 | 57,636,789 | 3,045,713 | 2,183,075 | 2,346,198 | 2,746,413 | 67,958,188 |
| 83 | 103,432,084 | 2,723,637 | 2,372,852 | | 415,890 | 108,944,463 |
| 1984 | 67,355,538 | 1,256,414 | 1,898,387 | 1,939,511 | 2,219,281 | 74,669,131 |
| 85 | 91,318,967 | 1,238,975 | 2,569,767 | | 467,440 | 95,595,149 |
| 86 | 75,010,887 | 1,421,379 | 6,130,639 | 1,175,236 | 1,072,983 | 84,811,124 |
| 87 | 63,798,249 | 1,071,656 | 5,985,150 | | 86,243 | 70,941,298 |
| 88 | 73,476,123 | 718,081 | 9,420,130 | 4,517,077 | 1,215,901 | 89,347,312 |
| 20 Year Average | 33,263,262 | 1,190,576 | 1,831,059 | 1,496,160 ^b | 629,135 | 37,662,112 |
| 1969-78 Average | 1,373,545 | 625,236 | 206,658 | 388,562 | 111,456 | 2,511,176 |
| 1979-88 Average | 65,152,978 | 1,755,917 | 3,455,460 | 2,603,757 | 1,146,814 | 72,813,048 |

a Includes only fish processed in Bristol Bay.

b Includes even-years only.

(Source: 3)

Appendix Table 49. Commercial production of cured salmon by species, in pounds, Bristol Bay, 1969-88.^a

| Year | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------|-----------|---------|---------|---------------------|---------|-----------|
| 1969 | 330,443 | 394,217 | 371,321 | | 409,114 | 1,505,095 |
| 70 | 37,298 | 153,503 | 86,795 | 509 | 14,026 | 292,131 |
| 71 | 14,922 | 148,354 | 12,778 | | 5,682 | 181,736 |
| 72 | 10,526 | 3,959 | 8,614 | 32 | 28,547 | 51,678 |
| 73 | 23,851 | 4,617 | 27,768 | | 17,539 | 73,775 |
| 1974 | 24,977 | 5,402 | 2,505 | 65 | 4,530 | 37,479 |
| 75 | 11,863 | 20,660 | 81 | | 0 | 32,604 |
| 76 | 4,210 | 62 | 90 | 0 | 0 | 4,362 |
| 77 | 3 | 20 | 90 | | 3,171 | 3,284 |
| 78 | 680,402 | 4,664 | 17,388 | 97,390 | 3,410 | 803,254 |
| 1979 | 3,651,146 | 16,824 | 136,585 | | 1,000 | 3,805,555 |
| 80 | 4,242,063 | 9,603 | 286,113 | 9,649 | 6,653 | 4,554,081 |
| 81 | 4,956,561 | 23,663 | 148,051 | | 6,526 | 5,134,801 |
| 82 | 3,222,798 | 75,752 | 277,013 | 12,780 | 1,466 | 3,589,809 |
| 83 | 5,045,048 | 22,259 | 266,005 | | 595 | 5,333,907 |
| 1984 | 1,608,948 | 12,200 | 131,915 | 8,545 | 79,540 | 1,841,148 |
| 85 | 2,059,078 | 5,344 | 50,612 | | 0 | 2,115,034 |
| 86 | 1,447,014 | 1,231 | 42,453 | 0 | 2,185 | 1,492,883 |
| 87 | 648,792 | 0 | 526 | | 0 | 649,318 |
| 88 | 610,377 | 0 | 0 | 0 | 0 | 610,377 |
| 20 Year Average | 1,431,516 | 45,117 | 93,335 | 12,897 ^b | 29,199 | 1,605,616 |
| 1969-78 Average | 113,850 | 73,546 | 52,743 | 19,599 | 48,602 | 298,540 |
| 1979-88 Average | 2,749,183 | 16,688 | 133,927 | 6,195 | 9,797 | 2,912,691 |

a Includes only fish processed in Bristol Bay.

b Includes even-years only.

(Source: 3)

Appendix Table 50. Fresh export of salmon by air transportation, by species, in pounds, Bristol Bay, 1969-88.^a

| Year | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------|------------|-----------|-----------|----------------------|-----------|------------|
| 1969 | | 75,293 | 2,372 | | 217 | 77,882 |
| 70 | 676 | 185,564 | 661 | | | 186,901 |
| 71 | | 232,912 | | | | 232,912 |
| 72 | 20,754 | 359,533 | 6,442 | | 4,837 | 391,566 |
| 73 | 163,447 | 326,372 | 238,851 | | 134,260 | 862,930 |
| 1974 | 253,879 | 253,695 | 35,102 | 104,230 | 15,116 | 662,022 |
| 75 | 374,588 | 128,032 | 71,744 | | 10,313 | 584,677 |
| 76 | 498,014 | 445,386 | 213,118 | 96,038 | 22,559 | 1,275,115 |
| 77 | 997,899 | 1,134,791 | 961,537 | | 409,058 | 3,503,285 |
| 78 | 5,149,427 | 1,548,439 | 984,408 | 1,967,420 | 341,212 | 9,990,906 |
| 1979 | 22,838,654 | 1,652,904 | 1,176,549 | | 933,539 | 26,601,646 |
| 80 | 23,284,065 | 514,638 | 617,989 | 612,276 | 1,196,502 | 26,225,470 |
| 81 | 25,943,037 | 1,302,979 | 817,991 | | 800,432 | 28,864,439 |
| 82 | 20,416,684 | 2,056,650 | 1,027,817 | 166,672 | 1,576,761 | 25,244,584 |
| 83 | 26,641,032 | 978,050 | 552,536 | | 248,582 | 28,420,200 |
| 1984 | 7,487,073 | 565,038 | 713,898 | 92,837 | 1,351,689 | 10,210,535 |
| 85 | 12,282,823 | 789,267 | 1,094,089 | | 518,574 | 14,684,753 |
| 86 | 3,604,592 | 286,482 | 281,327 | 6,357 | 104,724 | 4,283,482 |
| 87 | 2,496,702 | 272,358 | 1,128,880 | | 209,799 | 4,107,739 |
| 88 | 3,378,714 | 95,093 | 140,212 | 890,239 | 391,562 | 4,895,820 |
| 20 Year Average | 8,657,337 | 660,174 | 529,764 | 492,009 ^b | 459,430 | 9,565,343 |
| 1969-78 Average | 932,336 | 469,002 | 279,359 | 722,563 | 117,197 | 1,776,820 |
| 1979-88 Average | 14,837,338 | 851,346 | 755,129 | 353,676 | 733,216 | 17,353,867 |

a Includes all fish exported out of Bristol Bay by air in fresh condition regardless of final processing.

b Includes even-years only.

(Source: 3)

Appendix Table 51. Brine export of salmon by sea-going transportation, Bristol Bay, 1969-88.^a

| Year | Number ^b | | Number | Pounds |
|-----------------|---------------------|---------|-----------|------------|
| | Operators | Tenders | | |
| 1969 | | | 297,973 | 1,592,593 |
| 70 | 7 | (60) | 2,712,837 | 13,327,829 |
| 71 | 5 | (12) | 523,784 | 3,162,326 |
| 72 | 1 | (1) | 59,750 | 365,386 |
| 73 | 0 | | 0 | 0 |
| 1974 | 2 | (2) | 78,620 | 456,430 |
| 75 | 5 | (20) | 933,728 | 5,135,799 |
| 76 | 5 | (21) | 728,420 | 4,466,126 |
| 77 | 5 | 15 | 623,523 | 3,603,382 |
| 78 | 9 | (33) | 1,602,224 | 9,304,376 |
| 1979 | 12 | (61) | 2,987,456 | 17,557,354 |
| 80 | 14 | 101 | 4,987,000 | 27,780,210 |
| 81 | 18 | 80 | 3,300,118 | 20,512,734 |
| 82 | 8 | 27 | 565,891 | 3,582,904 |
| 83 | 13 | 85 | 4,428,741 | 25,199,944 |
| 1984 | 9 | 55 | 2,672,519 | 14,919,944 |
| 85 | 9 | 26 | 973,826 | 5,521,739 |
| 86 | 4 | 17 | 715,646 | 4,349,044 |
| 87 | 6 | 27 | 1,010,438 | 5,963,716 |
| 88 | 1 | 3 | 12,954 | 82,663 |
| 20 Year Average | 7 ^c | 36 | 1,460,772 | 8,344,225 |
| 1969-78 Average | 4 | 21 | 756,086 | 4,141,425 |
| 1979-88 Average | 9 | 48 | 2,165,459 | 12,547,025 |

a Includes only fish exported from Bristol Bay in brine or chilled sea water by sea-going tenders for eventual processing.

b Number of operators and tenders unavailable prior to 1970. Figures in parentheses are estimates.

c Nineteen year average.

(Source: 3)

Appendix Table 52. Commercial production and disposition of sockeye salmon, in thousands of pounds, Bristol Bay, 1969-88.^a

| Year | Export ¹ | | | | | | | | | | Total |
|-----------------|---------------------|----|---------|----|--------|---|--------|----|--------------------|----|---------|
| | Canned | | Frozen | | Cured | | Fresh | | Brine ² | | |
| | Pounds | % | Pounds | % | Pounds | % | Pounds | % | Pounds | % | |
| 1969 | 32,750 | 93 | 421 | 1 | 331 | 1 | | | 1,593 | 5 | 35,095 |
| 70 | 84,932 | 84 | 3,236 | 3 | 37 | + | 1 | + | 13,328 | 13 | 101,534 |
| 71 | 52,514 | 91 | 1,813 | 3 | 15 | + | | | 3,162 | 5 | 57,504 |
| 72 | 14,045 | 97 | 55 | + | 11 | + | 21 | + | 365 | 3 | 14,497 |
| 73 | 5,030 | 93 | 187 | 3 | 24 | + | 163 | 3 | | | 5,404 |
| 1974 | 7,020 | 89 | 147 | 2 | 25 | + | 254 | 3 | 456 | 6 | 7,902 |
| 75 | 21,319 | 79 | 102 | + | 12 | + | 375 | 1 | 5,136 | 19 | 26,944 |
| 76 | 28,426 | 83 | 884 | 3 | 4 | + | 498 | 1 | 4,466 | 13 | 34,278 |
| 77 | 27,495 | 84 | 586 | 2 | | | 988 | 3 | 3,603 | 11 | 32,672 |
| 78 | 37,136 | 63 | 6,307 | 11 | 680 | 1 | 5,149 | 9 | 9,304 | 16 | 58,576 |
| 1979 | 44,350 | 35 | 38,032 | 30 | 3,651 | 3 | 22,839 | 18 | 17,557 | 14 | 126,429 |
| 80 | 46,379 | 35 | 31,856 | 24 | 4,242 | 3 | 23,284 | 17 | 27,780 | 21 | 133,541 |
| 81 | 57,456 | 36 | 49,614 | 31 | 4,957 | 3 | 25,943 | 17 | 20,513 | 13 | 158,483 |
| 82 | 11,808 | 12 | 57,637 | 60 | 3,223 | 3 | 20,417 | 21 | 3,583 | 4 | 96,668 |
| 83 | 54,571 | 25 | 103,432 | 48 | 5,045 | 2 | 26,641 | 12 | 25,200 | 12 | 214,889 |
| 1984 | 46,787 | 34 | 67,356 | 49 | 1,609 | 1 | 7,487 | 5 | 14,920 | 11 | 138,159 |
| 85 | 23,730 | 18 | 91,319 | 68 | 2,059 | 1 | 12,283 | 9 | 5,522 | 4 | 134,913 |
| 86 ^b | 11,536 | 12 | 75,011 | 78 | 1,447 | 1 | 3,605 | 4 | 4,349 | 5 | 95,948 |
| 87 ^b | 15,191 | 17 | 63,149 | 73 | 649 | + | 2,497 | 3 | 5,964 | 7 | 87,450 |
| 88 ^b | 6,677 | 8 | 73,929 | 87 | 610 | 1 | 3,379 | 4 | 83 | | 84,678 |
| 20 Year Average | 31,458 | | 33,254 | | 1,507 | | 8,657 | | 8,783 | | 82,278 |
| 1969-78 Average | 31,067 | | 1,374 | | 127 | | 931 | | 4,601 | | 37,441 |
| 1979-88 Average | 31,849 | | 65,134 | | 2,749 | | 14,838 | | 12,547 | | 127,116 |

1 Includes all sockeye exported out of Bristol Bay regardless of final processing.

2 Primarily sockeye salmon exported out of Bristol Bay regardless of final processing.

a Frozen and cured production includes some mixed fish (mostly chums).

b Preliminary.

(Sources: 1, 3, and 4)

Appendix Table 53. South Unimak and Shumagin Island sockeye and chum salmon preseason quota and actual commercial catch, in thousands of fish, Alaska Peninsula, 1969-88.^a

| Year | South Unimak | | | Shumagin Islands | | | Total | | |
|-----------------|--------------|--------------------|------|------------------|--------------------|------|---------|-------|-------|
| | Sockeye | | Chum | Sockeye | | Chum | Sockeye | | Chum |
| | Actual | Quota ¹ | | Actual | Quota ¹ | | Actual | Quota | |
| 1969 | 781 | | 254 | 76 | | 13 | 857 | | 267 |
| 70 | 1,530 | | 403 | 153 | | 49 | 1,683 | | 452 |
| 71 | 565 | | 554 | 45 | | 115 | 610 | | 669 |
| 72 | 443 | | 468 | 76 | | 108 | 519 | | 576 |
| 73 | 239 | | 189 | 23 | | 23 | 262 | | 212 |
| 1974 | 60 | 50 | 15 | | 25 | | 60 | 75 | 15 |
| 75 | 190 | 165 | 65 | 49 | 50 | 36 | 239 | 304 | 101 |
| 76 | 235 | 350 | 327 | 72 | 75 | 74 | 307 | 634 | 401 |
| 77 | 193 | 195 | 93 | 46 | 42 | 22 | 239 | 332 | 115 |
| 78 | 419 | 428 | 105 | 68 | 94 | 18 | 487 | 592 | 123 |
| 1979 | 683 | 900 | 64 | 179 | 200 | 41 | 862 | 926 | 105 |
| 80 | 2,731 | 2,513 | 457 | 572 | 555 | 71 | 3,303 | 3,760 | 528 |
| 81 | 1,474 | 1,442 | 521 | 351 | 318 | 54 | 1,825 | 2,346 | 575 |
| 82 | 1,670 | 1,850 | 934 | 451 | 408 | 160 | 2,121 | 3,055 | 1,094 |
| 83 | 1,545 | 1,469 | 615 | 416 | 324 | 169 | 1,961 | 2,576 | 784 |
| 1984 | 1,131 | 1,111 | 228 | 257 | 245 | 109 | 1,388 | 1,616 | 337 |
| 85 | 1,495 | 1,380 | 345 | 367 | 305 | 134 | 1,862 | 2,207 | 479 |
| 86 | 314 | 907 | 252 | 156 | 200 | 99 | 470 | 722 | 351 |
| 87 | 652 | 635 | 406 | 141 | 140 | 37 | 793 | 1,199 | 443 |
| 88 | 474 | 1,263 | 465 | 282 | 279 | 62 | 756 | 1,542 | 527 |
| 20 Year Average | 841 | | 338 | 199 | | 73 | 1,030 | | 408 |
| 1969-78 Average | 466 | | 247 | 68 | | 51 | 526 | | 293 |
| 1979-88 Average | 1,217 | 1,347 | 429 | 317 | 297 | 94 | 1,534 | 1,995 | 522 |

1 The sockeye quota management system was initiated in 1974, and is based on the final Bristol Bay projected inshore harvest and traditional harvest patterns.

a South Unimak includes statistical area 284 in June and July, while Shumagin Islands includes statistical area 282 in June only.

Appendix Table 54. Subsistence salmon catch by district and species,
Bristol Bay, 1969-88.^a

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-------------------------|-------------------|---------|---------|-------|--------------------|-------|---------|
| NAKNEK-KVICHAK DISTRICT | | | | | | | |
| 1969 | | 76,300 | 400 | 100 | | 400 | 77,200 |
| 70 | 145 | 108,200 | 300 | 700 | 100 | 200 | 109,500 |
| 71 | 137 | 66,400 | 200 | | | 100 | 53,300 |
| 72 | 170 | 52,200 | 400 | 400 | 700 | 100 | 53,800 |
| 73 | 219 | 41,600 | 600 | 300 | | 500 | 43,000 |
| 1974 | 263 | 102,600 | 1,000 | 1,100 | 1,600 | 200 | 106,500 |
| 75 | 301 | 122,600 | 700 | 300 | | 200 | 123,800 |
| 76 | 346 | 82,200 | 900 | 900 | 1,500 | 600 | 86,100 |
| 77 | 352 | 81,400 | 1,300 | 600 | 100 | 300 | 83,700 |
| 78 | 392 | 93,000 | 1,200 | 1,000 | 1,400 | 300 | 96,900 |
| 1979 | 424 | 75,000 | 1,200 | 600 | | 1,200 | 78,000 |
| 80 | 759 | 88,200 | 1,500 | 1,200 | 2,100 | 800 | 93,800 |
| 81 | 649 | 85,100 | 1,000 | 400 | 100 | 1,100 | 87,700 |
| 82 | 350 | 71,400 | 1,100 | 600 | 900 | 1,000 | 75,000 |
| 83 | 385 | 107,900 | 1,000 | 400 | 300 | 900 | 110,500 |
| 1984 | 382 | 115,200 | 900 | 600 | 1,300 | 600 | 118,600 |
| 85 | 544 | 107,543 | 1,179 | 540 | 27 | 1,103 | 110,392 |
| 86 | 412 | 77,283 | 1,295 | 695 | 2,007 | 650 | 81,930 |
| 87 | 407 | 86,706 | 1,289 | 756 | 490 | 1,106 | 90,347 |
| 88 | 391 | 88,145 | 1,057 | 588 | 917 | 813 | 91,520 |
| 20 Year Average | 370 | 86,449 | 926 | 620 | 1,252 ^b | 609 | 88,579 |

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Appendix Table 54. (Page 2 of 6)

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|------------------------|-------------------|---------|---------|------|-----------------|------|-------|
| <u>EGEGIK DISTRICT</u> | | | | | | | |
| 1972 | 2 | | | | | 100 | 100 |
| 73 | 3 | | | | | 100 | 100 |
| 74 | 7 | 300 | | | | | 300 |
| 75 | 3 | 200 | | | | | 200 |
| 76 ^C | 2 | | | | | | |
| 1977 | 20 | 100 | | 100 | | 200 | 400 |
| 78 | 13 | 200 | | 100 | | 200 | 500 |
| 79 | 8 | 300 | | | | 100 | 400 |
| 80 | 3 | 100 | | | | | 100 |
| 81 ^C | 4 | | | | | | |
| 1982 | 19 | 2,400 | | | | | 2,400 |
| 83 | 14 | 700 | | | | | 700 |
| 84 | 24 | 500 | | 100 | | 300 | 900 |
| 85 | 23 | 582 | 14 | 21 | 1 | 203 | 821 |
| 86 | 41 | 1,052 | 69 | 58 | 21 | 319 | 1,519 |
| 1987 | 49 | 3,350 | 87 | 139 | 2 | 284 | 3,862 |
| 88 | 52 | 1,405 | 97 | 87 | 54 | 333 | 1,927 |
| 17 Year Average | 17 | 861 | 67 | 86 | 20 ^b | 214 | 949 |

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Appendix Table 54. (Page 3 of 6)

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|------------------|-------------------|---------|---------|------|------|-------|-------|
| UGASHIK DISTRICT | | | | | | | |
| 1969 | 3 | 100 | | | | 200 | 300 |
| 70 | 9 | 1,400 | + | + | | + | 1,400 |
| 71 | 9 | 300 | | | + | 100 | 400 |
| 72 | 13 | 200 | 100 | 100 | + | 300 | 700 |
| 73 | 14 | 200 | + | 100 | + | 600 | 900 |
| 1974 | 8 | 200 | 100 | + | + | 500 | 800 |
| 75 | 1 | 700 | + | + | + | 1,200 | 1,900 |
| 76 | 21 | 1,200 | 100 | 100 | 100 | 300 | 1,800 |
| 77 | 19 | 1,000 | 100 | 300 | + | 500 | 1,900 |
| 78 | 8 | 500 | 100 | 100 | + | 900 | 1,600 |
| 1979 | 8 | 200 | + | + | + | 100 | 300 |
| 80 | 10 | 200 | + | + | + | 200 | 400 |
| 81 | 12 | 600 | + | + | | 200 | 800 |
| 82 | 11 | 400 | + | + | + | 300 | 700 |
| 83 | 8 | 500 | + | + | | 100 | 600 |
| 1984 | 8 | 500 | + | + | | 200 | 700 |
| 85 | 9 | 233 | 17 | 7 | | 143 | 400 |
| 86 | 27 | 1,080 | 83 | 48 | 21 | 335 | 1,567 |
| 87 | 22 | 892 | 104 | 51 | 29 | 272 | 1,348 |
| 88 | 23 | 1,400 | 84 | 55 | 35 | 330 | 1,904 |
| 20 Year Average | 12 | 590 | 88 | 96 | 46 | 357 | 1,021 |

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Appendix Table 54. (Page 4 of 6)

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-------------------|-------------------|---------|---------|--------|--------------------|-------|---------|
| NUSHAGAK DISTRICT | | | | | | | |
| 1969 | 162 | 27,700 | 7,100 | 8,200 | 100 | 7,100 | 50,200 |
| 70 | 147 | 41,100 | 6,300 | 9,400 | 1,500 | 900 | 59,200 |
| 71 | 164 | 42,400 | 4,400 | 4,200 | | 2,300 | 53,300 |
| 72 | 168 | 24,100 | 4,000 | 8,200 | 1,200 | 1,000 | 38,500 |
| 73 | 216 | 28,000 | 6,600 | 7,600 | 100 | 2,200 | 44,500 |
| 1974 | 261 | 41,200 | 7,900 | 10,200 | 4,300 | 4,700 | 68,300 |
| 75 | 340 | 47,300 | 7,100 | 5,600 | 1,300 | 4,300 | 65,600 |
| 76 | 317 | 34,700 | 6,900 | 7,200 | 2,700 | 2,100 | 53,600 |
| 77 | 306 | 43,300 | 5,200 | 7,300 | 200 | 4,500 | 60,500 |
| 78 | 331 | 33,200 | 6,600 | 14,300 | 11,100 | 2,500 | 67,700 |
| 1979 | 364 | 40,200 | 8,900 | 6,800 | 500 | 5,200 | 61,600 |
| 80 | 425 | 76,800 | 11,800 | 11,700 | 7,600 | 5,100 | 113,000 |
| 81 | 395 | 44,600 | 11,500 | 10,200 | 2,300 | 8,700 | 77,300 |
| 82 | 376 | 34,700 | 12,100 | 11,400 | 7,300 | 8,900 | 74,400 |
| 83 | 389 | 38,400 | 11,800 | 9,200 | 500 | 5,200 | 65,100 |
| 1984 | 438 | 43,200 | 9,800 | 10,300 | 6,600 | 8,100 | 78,000 |
| 85 | 406 | 38,000 | 7,900 | 4,000 | 600 | 6,100 | 56,600 |
| 86 | 424 | 49,000 | 12,600 | 10,000 | 5,400 | 9,400 | 86,700 |
| 87 | 474 | 40,900 | 12,200 | 6,000 | 200 | 6,200 | 65,500 |
| 88 | 441 | 31,086 | 10,079 | 8,234 | 6,316 | 5,223 | 60,938 |
| 20 Year Average | 327 | 39,994 | 8,539 | 8,502 | 5,402 ^b | 4,986 | 65,027 |

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Appendix Table 54. (Page 5 of 6)

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-----------------|-------------------|---------|---------|-------|------------------|-------|--------|
| TOGLAK DISTRICT | | | | | | | |
| 1974 | 68 | 7,400 | 1,200 | 2,000 | 500 | 1,800 | 12,900 |
| 75 | 41 | 4,600 | 800 | 1,600 | | 2,800 | 9,800 |
| 76 | 30 | 2,800 | 500 | 900 | 100 | 500 | 4,800 |
| 77 | 41 | 2,100 | 400 | 800 | | 1,100 | 4,400 |
| 78 | 29 | 900 | 300 | 700 | 300 | 500 | 2,700 |
| 1979 | 25 | 800 | 200 | 300 | | 700 | 2,000 |
| 80 | 46 | 3,600 | 900 | 300 | 300 | 1,200 | 6,300 |
| 81 | 52 | 1,900 | 400 | 800 | 100 | 2,200 | 5,400 |
| 82 | 50 | 1,900 | 400 | 300 | 400 | 1,300 | 4,300 |
| 83 | 38 | 1,900 | 700 | 900 | 200 | 800 | 4,500 |
| 1984 | 41 | 3,600 | 600 | 1,700 | 500 | 3,800 | 10,200 |
| 85 | 51 | 3,400 | 600 | 1,000 | 100 | 1,500 | 6,600 |
| 86 | 29 | 2,400 | 700 | 800 | 100 | 500 | 4,500 |
| 87 | 46 | 3,600 | 700 | 1,000 | | 1,600 | 6,900 |
| 88 | 29 | 2,413 | 429 | 716 | 45 | 792 | 4,393 |
| 15 Year Average | 41 | 2,888 | 589 | 921 | 281 ^b | 1,406 | 5,980 |

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Appendix Table 54. (Page 6 of 6)

| Year | Permits Issued | Sockeye | Chinook | Chum | Pink | Coho | Total |
|-------------------|-------------------|---------|---------|--------|--------------------|--------|---------|
| TOTAL BRISTOL BAY | | | | | | | |
| 1969 | | 104,100 | 7,500 | 8,300 | 100 | 7,700 | 127,700 |
| 70 | 301 | 150,700 | 6,600 | 10,100 | 1,600 | 1,100 | 170,100 |
| 71 | 310 | 109,100 | 4,600 | 4,200 | | 2,500 | 120,400 |
| 72 | 353 | 76,500 | 4,500 | 8,700 | 1,900 | 1,400 | 93,000 |
| 73 | 452 | 69,800 | 7,200 | 8,000 | 100 | 3,300 | 88,400 |
| 1974 | 607 | 151,700 | 10,200 | 13,300 | 6,400 | 7,200 | 188,800 |
| 75 | 686 | 175,400 | 8,600 | 7,500 | 1,300 | 8,500 | 201,300 |
| 76 | 716 | 120,900 | 8,400 | 9,100 | 4,400 | 3,500 | 146,300 |
| 77 | 738 | 127,900 | 7,000 | 9,100 | 300 | 6,600 | 150,900 |
| 78 | 773 | 127,600 | 8,100 | 16,200 | 12,700 | 4,400 | 169,000 |
| 1979 | 829 | 116,500 | 10,300 | 7,700 | 500 | 7,300 | 142,300 |
| 80 | 1,243 | 168,600 | 14,100 | 13,100 | 10,000 | 7,300 | 213,100 |
| 81 | 1,112 | 132,100 | 13,000 | 11,500 | 2,600 | 12,200 | 171,400 |
| 82 | 806 | 110,800 | 13,700 | 12,400 | 8,600 | 11,500 | 157,000 |
| 83 | 834 | 149,400 | 13,500 | 10,500 | 900 | 7,100 | 181,400 |
| 1984 | 893 | 163,000 | 11,300 | 12,700 | 8,400 | 13,000 | 208,400 |
| 85 | 1,033 | 149,758 | 9,710 | 5,568 | 728 | 9,049 | 174,813 |
| 86 | 933 | 130,815 | 14,747 | 11,601 | 7,549 | 11,204 | 175,916 |
| 87 | 998 | 135,493 | 14,356 | 7,895 | 689 | 9,453 | 167,886 |
| 88 | 936 | 124,449 | 11,746 | 9,680 | 7,367 | 7,491 | 160,733 |
| 20 Year Average | 766 | 129,731 | 9,958 | 9,857 | 6,892 ^b | 7,090 | 160,442 |
| 1969-78 Average | 548 | 121,370 | 7,270 | 9,450 | 5,400 ^b | 4,620 | 145,590 |
| 1979-88 Average | 962 | 138,092 | 12,646 | 10,264 | 8,383 ^b | 9,560 | 175,295 |

a Catches prior to 1985 rounded to the nearest hundred fish.

b Includes even years only.

c No permits returned.

(Sources: 1 and 8)

Appendix Table 55. Subsistence catch of sockeye salmon by village area, in numbers of fish, Kvichak River drainage, Bristol Bay, 1969-88.^a

| Year | Levelock | Igiugig | Pedro Bay | Kokhanok | Ilimana- Newhalen | Nondalton | Port Alsworth | Total |
|-----------------|--------------------|--------------|-----------|----------|----------------------|-----------|------------------|---------|
| 1969 | 1,000 ^b | 5,100 | 4,200 | 15,000 | 4,900 | 44,000 | | 74,200 |
| 70 | 1,600 ^b | 11,200 | 11,200 | 22,300 | 16,400 | 42,900 | | 105,600 |
| 71 | 1,600 ^b | 6,500 | 10,100 | 12,800 | 8,500 | 22,100 | | 61,600 |
| 72 | 1,600 ^b | 2,200 | 4,000 | 8,300 | 10,000 | 24,100 | | 50,200 |
| 73 | 4,800 | 2,200 | 2,900 | 9,200 | 10,200 | 8,500 | 1,300 | 39,100 |
| 1974 | 8,600 | 6,200 | 14,400 | 21,500 | 16,400 | 29,500 | 1,500 | 98,100 |
| 75 | 5,300 | 6,400 | 8,300 | 18,000 | 26,700 | 48,700 | 2,100 | 115,500 |
| 76 | 5,300 | 6,800 | 4,400 | 17,100 | 16,300 | 20,500 | 5,500 | 75,900 |
| 77 | 2,600 | 6,000 | 5,600 | 14,300 | 11,400 | 27,200 | 4,900 | 72,000 |
| 78 | 8,900 | 8,800 | 11,200 | 23,700 | 11,000 | 17,300 | 3,000 | 83,900 |
| 1979 | 4,400 | 6,600 | 3,500 | 16,200 | 15,900 | 14,700 | 4,200 | 65,500 |
| 80 | 6,100 | 8,100 | 7,400 | 22,600 | 11,100 | 11,300 | 6,000 | 72,600 |
| 81 | 6,600 | 5,400 | 9,700 | 16,500 | 15,400 | 15,200 | 6,800 | 75,600 |
| 82 | 5,400 | 1,900 | 8,200 | 16,600 | 13,500 | 11,200 | 4,500 | 61,300 |
| 83 | 4,800 | 3,300 | 10,400 | 20,100 | 23,800 | 29,400 | 4,700 | 96,500 |
| 1984 | 8,100 | 6,300 | 12,100 | 24,400 | 15,900 | 29,100 | 4,600 | 100,500 |
| 85 | 6,600 | 3,400 | 12,900 | 21,900 | 22,300 | 14,900 | 4,500 | 86,500 |
| 86 | 6,400 | 1,600 | 6,700 | 18,300 | 17,000 | 6,600 | 3,300 | 59,900 |
| 87 | 5,700 | ^c | 7,300 | 16,500 | 27,500 | 11,800 | 3,200 | 72,000 |
| 88 | 3,500 | ^c | 5,500 | 14,400 | 29,800 | 20,700 | 3,200 | 77,100 |
| 20 Year Average | 4,945 | 4,900 | 8,000 | 17,485 | 16,200 | 22,485 | 3,165 | 77,180 |
| 1969-78 Average | 4,130 | 6,140 | 7,630 | 16,220 | 13,180 | 28,480 | 3,050 | 77,610 |
| 1979-88 Average | 5,760 | 4,067 | 8,370 | 18,750 | 19,220 | 16,490 | 4,500 | 76,750 |

a Catches rounded to nearest hundred fish. The totals include the harvests of all subsistence permit holders fishing in each village area, including the harvests of nonresidents of the local community, area, or district.

b Catches interpolated.

c No permits issued.

(Sources: 1 and 8)

Appendix Table 56. Subsistence salmon catch by village area, Nushagak District, Bristol Bay, 1969-88.^a

| Year | New | | | | | | Total |
|------------------------------|-------------------------|-----------|-----------|--------|----------|-----------|---------|
| | Dillingham ¹ | Manokotak | Aleknagik | Ekwok | Stuyahok | Koliganek | |
| 1969 | 33,500 | 7,700 | 3,900 | 2,600 | 1,300 | 800 | 49,800 |
| 70 | 33,300 | 8,100 | 1,200 | 10,700 | 3,000 | 2,900 | 59,200 |
| 71 | 18,100 | 8,600 | 4,200 | 10,400 | 5,600 | 6,400 | 53,300 |
| 72 | 12,600 | 3,900 | 800 | 6,700 | 7,000 | 7,500 | 38,500 |
| 73 | 19,700 | 4,700 | 1,100 | 8,600 | 6,800 | 3,600 | 44,500 |
| 1974 | 23,900 | 11,600 | 2,300 | 10,500 | 11,800 | 8,200 | 68,300 |
| 75 | 22,100 | 7,100 | 2,300 | 6,800 | 19,200 | 8,100 | 65,600 |
| 76 | 17,700 | 8,400 | 2,000 | 9,000 | 11,100 | 5,400 | 53,600 |
| 77 | 15,700 | 8,100 | 1,500 | 8,000 | 20,900 | 6,300 | 60,500 |
| 78 | 27,700 | 3,200 | 2,700 | 12,900 | 14,200 | 7,000 | 67,700 |
| 1979 | 20,600 | 7,400 | 1,000 | 7,200 | 17,200 | 8,200 | 61,600 |
| 80 | 47,900 | 8,200 | 3,500 | 10,400 | 22,200 | 20,800 | 113,000 |
| 81 | 23,900 | 6,700 | 2,900 | 8,800 | 23,600 | 11,400 | 77,300 |
| 82 | 24,700 | 2,900 | 2,400 | 7,500 | 22,600 | 14,300 | 74,400 |
| 83 | 20,100 | 5,300 | 1,900 | 5,800 | 18,700 | 13,300 | 65,100 |
| 1984 | 30,500 | 4,100 | 2,600 | 7,200 | 16,500 | 17,100 | 78,000 |
| 85 | 22,900 | 3,600 | 1,600 | 7,000 | 14,500 | 6,800 | 56,400 |
| 86 | 31,900 | 5,500 | 6,900 | 7,800 | 26,400 | 8,200 | 86,700 |
| 87 | 33,500 | 5,900 | 3,100 | 6,400 | 11,400 | 4,900 | 65,200 |
| 88 | 29,600 ^b | 5,500 | 2,400 | 6,100 | 11,700 | 5,700 | 61,000 |
| 20 Year Average ² | 25,495 | 6,325 | 2,515 | 8,020 | 14,285 | 8,345 | 64,985 |
| 1969-78 Average | 22,430 | 7,140 | 2,200 | 8,620 | 10,090 | 5,620 | 56,100 |
| 1979-88 Average | 28,560 | 5,510 | 2,830 | 7,420 | 18,480 | 11,070 | 73,870 |

1 Includes the village of Portage Creek.

2 Over the past 20 years the average Nushagak subsistence catch was comprised of 62% sockeye, 13% chinook, 13% chum, 8% pink and 8% coho salmon.

a Catches rounded to nearest hundred fish. Totals include the harvests of all subsistence permit holders fishing in each village area, including non-residents of the local community, area, or district.

b Includes permits issued in Clarks Point and Ekuk.

The following abstract is an excerpt from ADF&G Technical Fishery Report 88-05, "A Synopsis and Critique of Forecasts of Sockeye Salmon Returning to Bristol Bay, Alaska in 1988" by Stephen M. Fried, Beverly A. Cross, and Henry J. Yuen.

ABSTRACT

The total number of sockeye salmon (Oncorhynchus nerka) forecasted to return to Bristol Bay in 1988 is 28.3 million (80% confidence interval: 14.7 to 42.1 million). Returns are expected to exceed spawning escapement goals for all systems, and the total harvest is projected to be 18.6 million sockeye salmon (80% confidence interval: 5.5 to 32.4 million). This forecast was based on a modified ADF&G method which omitted data prior to the 1978 return year from calculations using spawner-recruit, sibling, and smolt data. To compare the performance of the modified ADF&G method with past methods, a hindcasting procedure was used to calculate modified ADF&G method forecasts for 1984-87. Modified ADF&G method forecasts had a lower mean percent error (a measure of bias) and a lower mean absolute percent error (a measure of accuracy) than forecasts based on the old ADF&G method (which used all available data), the Japanese Research Vessel Catch (JRVC) method (which used data on immature sockeye salmon captured during July near the Aleutian Islands in conjunction with air temperature data), and the composite of these methods. For 1988, the old ADF&G method, the JRVC method, and the composite of these methods produced total return forecasts of 18.1, 15.1, and 16.7 million sockeye salmon, respectively. However, a total return of less than 20 million sockeye salmon has not been observed since 1977. The outlook for 1988-91, based only on the spawner-recruit component of the modified ADF&G method, is for the total number of sockeye salmon returning to Bristol Bay to be greatest in 1989 (39.1 million) and least in 1991 (27.9 million), mostly due to variations in returns to the Kvichak River system.

APPENDIX B. Bristol Bay Tide Tables, May-September, 1988.

| MUSHAGAK BAY DISTRICT CORRECTION TABLE | | | | HIGH TIDES MUSHAGAK District MAY 1988 | | | | LOW TIDES MUSHAGAK District MAY 1988 | | | |
|--|--|--|--|---|--|--|--|---|--|--|--|
| <p>To correct the TIME and HEIGHT for HIGH or LOW tides for the points given below, add or subtract TIME and FEET from the MUSHAGAK District Tide Table.</p> <p>TIME FEET</p> <p>High Low High Low</p> | | | | <p>1 SUN • 4:05 17.5 3:23 14.7</p> <p>2 MON • 4:36 18.5 4:01 13.6</p> <p>3 TUE • 5:06 19.4 4:40 13.3</p> <p>4 WED • 5:21 20.1 5:22 13.2</p> <p>5 THU • 5:06 20.8 6:11 13.2</p> <p>6 FRI • 5:51 21.3 7:03 13.9</p> <p>7 SAT • 6:38 21.6 8:00 14.0</p> | | | | <p>1 SUN • 10:11 7.1 10:01 1.4</p> <p>2 MON • 11:05 7.4 10:41 0.9</p> <p>3 TUE • 11:56 7.7 10:19 0.3</p> <p>4 WED • 12:43 7.4</p> <p>5 THU • 0:05 0.7 1:13 7.2</p> <p>6 FRI • 0:28 1.0 2:18 4.8</p> <p>7 SAT • 1:17 0.8 3:07 6.1</p> | | | |
| <p>BRISTOL BAY</p> <p>Port Moller (Entrance Point) -0:32 -1.6 +0.8</p> <p>Port Moller -0:03 -1.33 +0.02 +0.4</p> | | | | <p>8 SUN • 9:29 21.7 9:05 14.8</p> <p>9 MON • 10:10 21.5 10:10 15.3</p> <p>10 TUE • 10:58 21.1 11:18 16.2</p> <p>11 WED • 11:44 20.5 12:37 17.4</p> <p>12 THU • 0:27 17.4 12:33 19.7</p> <p>13 FRI • 1:33 18.7 1:22 18.7</p> <p>14 SAT • 2:39 20.0 2:14 17.8</p> | | | | <p>8 SUN • 2:47 0.7 3:52 5.2</p> <p>9 MON • 3:28 0.7 4:41 3.7</p> <p>10 TUE • 4:26 0.7 5:30 2.4</p> <p>11 WED • 5:27 1.8 6:12 0.7</p> <p>12 THU • 6:31 3.0 7:11 -0.6</p> <p>13 FRI • 7:36 4.1 8:02 -1.8</p> <p>14 SAT • 8:41 5.0 8:52 -2.6</p> | | | |
| <p>SEKIC RIVER</p> <p>Entrance Point -0:10 -0.48 +0.78 +0.3</p> <p>Merrade Point -0:11 -0.37 -0.26</p> <p>Onakatala Point -0:11 +0.33 -0.37 -1.2</p> <p>Mahadai Air Base -0:41 -0.46 -1.1 -0.38</p> | | | | <p>15 SUN • 3:41 21.1 3:06 16.6</p> <p>16 MON • 4:40 21.9 4:01 15.7</p> <p>17 TUE • 5:36 22.3 4:54 14.9</p> <p>18 WED • 6:28 22.3 5:49 14.2</p> <p>19 THU • 7:17 22.0 6:43 13.9</p> <p>20 FRI • 8:06 21.5 7:37 13.4</p> <p>21 SAT • 8:47 20.9 8:27 13.2</p> | | | | <p>15 SUN • 9:44 5.6 9:42 -2.9</p> <p>16 MON • 10:46 5.9 10:34 -2.8</p> <p>17 TUE • 11:45 6.0 11:23 -2.3</p> <p>18 WED • 12:42 6.0</p> <p>19 THU • 0:14 1.6 1:33 5.9</p> <p>20 FRI • 1:03 2.7 2:24 5.8</p> <p>21 SAT • 1:54 3.7 3:18 5.5</p> | | | |
| <p>KIVICAN RIVER</p> <p>Mahoon -0:04 +2.81 -0.8 +0.8</p> <p>Lavotok -1:21 4.34 -0.8 -0.38</p> | | | | <p>22 SUN • 9:29 20.2 9:23 13.2</p> <p>23 MON • 10:10 19.5 10:18 13.4</p> <p>24 TUE • 10:47 18.6 11:15 13.9</p> <p>25 WED • 1:24 17.8</p> <p>26 THU • 0:09 14.7 11:59 16.9</p> <p>27 FRI • 1:06 15.6 12:34 16.1</p> <p>28 SAT • 1:58 16.7 1:09 15.3</p> | | | | <p>22 SUN • 2:41 1.3 3:59 5.2</p> <p>23 MON • 3:27 2.4 4:41 4.6</p> <p>24 TUE • 4:16 3.6 5:23 4.0</p> <p>25 WED • 5:08 4.8 6:01 3.2</p> <p>26 THU • 6:01 5.8 6:40 2.4</p> <p>27 FRI • 6:57 6.8 7:19 1.6</p> <p>28 SAT • 7:51 7.5 7:58 0.9</p> | | | |
| <p>MUSHAGAK BAY</p> <p>Protection Point -0:12 -0.92 -2.4 0.0</p> <p>Black Point -0:48 -1.09 -0.81 -0.4</p> <p>Black Rock</p> <p>Walrus Islands -0:57 -0.97 -1.01 -1.70</p> | | | | <p>29 SUN • 2:47 17.8 1:48 14.6</p> <p>30 MON • 3:36 18.9 2:27 14.0</p> <p>31 TUE • 4:21 19.9 3:09 13.7</p> | | | | <p>29 SUN • 8:50 8.0 8:39 0.2</p> <p>30 MON • 9:44 8.2 9:20 -0.4</p> <p>31 TUE • 10:36 8.2 10:02 -1.0</p> | | | |
| <p>ST. LAWRENCE ISLANDS</p> <p>Northeast Cape -1:17 -1.11 -1.12 0.0</p> <p>Fossil River Est. -1:06 -1.14 -0.8 0.8</p> <p>Northeast Bay -1:11 -1.17 -0.8 0.8</p> <p>Estuaries</p> <p>All Low water falls below -1 feet</p> <p>* Multiply height of District Tide Table to correct height of High or Low Tides</p> | | | | <p>HIGH TIDES MUSHAGAK District JUNE 1988</p> <p>1 Wed • 4:10 20.7 3:55 13.5</p> <p>2 Thu • 4:56 21.4 4:45 13.5</p> <p>3 Fri • 5:40 21.9 5:48 13.7</p> <p>4 Sat • 7:26 22.3 8:48 14.0</p> <p>5 SUN • 8:12 22.3 7:54 14.3</p> <p>6 Mon • 8:58 22.1 8:59 15.2</p> <p>7 Tue • 9:44 21.7 10:12 16.2</p> <p>8 Wed • 10:29 21.0 11:22 17.4</p> <p>9 Thu • 11:18 20.0</p> <p>10 Fri • 0:29 18.7</p> <p>11 Sat • 1:35 19.9 12:57 17.8</p> <p>12 SUN • 3:32 20.9 3:48 18.6</p> <p>13 Mon • 3:35 21.6 2:41 18.6</p> <p>14 Tue • 4:31 21.9 3:39 14.7</p> <p>15 Wed • 5:22 21.9 4:29 14.0</p> <p>16 Thu • 6:09 21.7 5:21 13.4</p> <p>17 Fri • 6:54 21.2 6:12 13.0</p> <p>18 Sat • 7:37 20.7 7:06 12.7</p> <p>19 SUN • 8:16 20.1 7:59 12.7</p> <p>20 Mon • 8:51 19.5 8:54 13.0</p> <p>21 Tue • 9:24 18.8 9:49 13.5</p> <p>22 Wed • 9:59 18.0 10:45 15.3</p> <p>23 Thu • 10:31 21.8 11:42 15.3</p> <p>24 Fri • 11:03 16.5</p> <p>25 Sat • 0:33 16.4 11:30 15.8</p> <p>26 SUN • 1:23 17.5 12:17 15.2</p> <p>27 Mon • 2:15 18.6 12:59 14.8</p> <p>28 Tue • 3:00 19.6 1:43 14.3</p> <p>29 Wed • 3:51 20.5 2:30 14.4</p> <p>30 Thu • 4:38 21.3 3:12 14.4</p> | | | | <p>LOW TIDES MUSHAGAK District JUNE 1988</p> <p>1 Wed • 11:29 8.1 10:45 1.4</p> <p>2 Thu • 12:18 7.7 11:34 1.7</p> <p>3 Fri • 1:04 7.4 1:04 7.1</p> <p>4 Sat • 0:25 1.7 1:55 6.1</p> <p>5 SUN • 1:17 1.3 2:45 4.8</p> <p>6 Mon • 2:13 0.4 3:22 3.2</p> <p>7 Tue • 3:12 0.8 4:21 1.5</p> <p>8 Wed • 4:14 2.7 5:11 -0.2</p> <p>9 Thu • 5:17 3.7 6:00 -1.6</p> <p>10 Fri • 6:22 4.9 6:49 -2.6</p> <p>11 Sat • 7:28 5.9 7:41 -3.2</p> <p>12 SUN • 8:31 6.6 8:32 -3.4</p> <p>13 Mon • 9:34 6.9 9:21 -3.1</p> <p>14 Tue • 10:34 7.0 10:12 -2.5</p> <p>15 Wed • 11:31 6.9 11:01 -1.7</p> <p>16 Thu • 12:24 6.8 11:49 -0.8</p> <p>17 Fri • 1:13 6.3</p> <p>18 Sat • 0:35 0.7 1:59 6.2</p> <p>19 SUN • 1:20 1.3 2:45 5.6</p> <p>20 Mon • 2:06 2.5 3:25 5.0</p> <p>21 Tue • 2:51 3.7 4:02 4.1</p> <p>22 Wed • 3:40 4.9 4:41 3.2</p> <p>23 Thu • 4:33 6.0 5:19 2.3</p> <p>24 Fri • 5:26 7.0 5:55 1.3</p> <p>25 Sat • 6:23 7.8 6:37 0.5</p> <p>26 SUN • 7:19 8.1 7:16 -0.4</p> <p>27 Mon • 8:14 8.6 7:58 -1.1</p> <p>28 Tue • 9:08 9.7 8:42 -1.8</p> <p>29 Wed • 10:01 10.8 9:30 -2.3</p> <p>30 Thu • 10:54 8.1 10:18 -2.6</p> | | | |
| <p>HIGH TIDES MUSHAGAK District JULY 1988</p> <p>1 Fri • 5:25 21.9 4:27 14.5</p> <p>2 Sat • 6:11 22.3 5:33 14.8</p> <p>3 SUN • 6:57 22.4 6:41 15.3</p> <p>4 Mon • 7:44 22.2 7:51 15.9</p> <p>5 Tue • 8:30 21.8 8:02 16.9</p> <p>6 Wed • 9:16 21.4 8:12 17.9</p> <p>7 Thu • 10:04 20.2 11:18 19.0</p> <p>8 Fri • 10:54 19.1</p> <p>9 Sat • 0:24 20.0 11:45 18.1</p> <p>10 SUN • 1:26 20.7 12:37 17.0</p> <p>11 Mon • 2:24 21.1 1:29 16.0</p> <p>12 Tue • 3:21 21.2 2:31 15.1</p> <p>13 Wed • 4:12 21.1 3:17 14.3</p> <p>14 Thu • 5:02 20.8 4:09 13.7</p> <p>15 Fri • 5:48 20.4 4:59 13.2</p> <p>16 Sat • 6:28 20.0 5:50 12.9</p> <p>17 SUN • 7:06 19.4 6:42 12.9</p> <p>18 Mon • 7:58 18.8 7:34 13.1</p> <p>19 Tue • 8:09 18.2 8:28 13.6</p> <p>20 Wed • 8:41 17.5 9:21 14.3</p> <p>21 Thu • 9:10 16.9 10:14 15.2</p> <p>22 Fri • 9:43 16.3 11:03 16.3</p> <p>23 Sat • 10:17 15.9 11:55 17.3</p> <p>24 SUN • 10:52 15.5</p> <p>25 Mon • 0:44 18.2 11:34 15.3</p> <p>26 Tue • 1:36 19.1 12:20 15.3</p> <p>27 Wed • 2:26 20.0 1:12 15.3</p> <p>28 Thu • 3:15 20.7 2:11 15.3</p> <p>29 Fri • 4:05 21.2 3:13 15.6</p> <p>30 Sat • 4:51 21.6 4:17 16.3</p> <p>31 SUN • 5:40 21.7 5:27 16.3</p> | | | | <p>LOW TIDES MUSHAGAK District JULY 1988</p> <p>1 Fri • 11:47 7.3 11:12 2.4</p> <p>2 Sat • 12:35 6.1</p> <p>3 SUN • 0:06 1.9 1:24 4.6</p> <p>4 Mon • 1:05 2.9 2:15 2.8</p> <p>5 Tue • 2:01 0.5 3:04 -0.7</p> <p>6 Wed • 3:04 2.0 4:02 -1.7</p> <p>7 Thu • 4:05 3.5 4:46 -2.1</p> <p>8 Fri • 5:11 4.9 5:38 -3.0</p> <p>9 Sat • 6:14 5.9 6:25 -3.4</p> <p>10 SUN • 7:17 6.6 7:21 -3.4</p> <p>11 Mon • 8:18 7.3 8:12 -3.0</p> <p>12 Tue • 9:11 8.1 9:01 -2.7</p> <p>13 Wed • 10:15 9.3 9:50 -1.6</p> <p>14 Thu • 11:07 10.3 10:38 -0.6</p> <p>15 Fri • 11:59 11.1 11:24 0.5</p> <p>16 Sat • 12:45 11.5 12:45 6.7</p> <p>17 SUN • 0:09 1.4 1:27 6.1</p> <p>18 Mon • 0:52 2.7 2:05 5.4</p> <p>19 Tue • 1:37 3.8 2:44 4.6</p> <p>20 Wed • 2:26 4.9 3:19 3.7</p> <p>21 Thu • 3:14 5.9 3:55 2.7</p> <p>22 Fri • 4:07 6.8 4:35 1.8</p> <p>23 Sat • 4:59 7.5 5:13 0.8</p> <p>24 SUN • 5:49 8.1 5:53 -0.1</p> <p>25 Mon • 6:45 8.5 6:35 -1.0</p> <p>26 Tue • 7:38 8.6 7:25 -2.1</p> <p>27 Wed • 8:30 8.5 8:12 -2.4</p> <p>28 Thu • 9:22 9.0 9:04 -2.1</p> <p>29 Fri • 10:11 9.1 9:59 -2.5</p> <p>30 Sat • 11:07 9.9 10:55 -3.9</p> <p>31 SUN • 11:59 4.2 11:54 -0.9</p> | | | | | | | |
| <p>HIGH TIDES MUSHAGAK District AUGUST 1988</p> <p>1 Mon • 6:26 21.6 6:30 17.2</p> <p>2 Tue • 7:13 21.3 7:46 18.1</p> <p>3 Wed • 8:02 20.6 8:54 18.1</p> <p>4 Thu • 8:53 19.9 10:00 19.9</p> <p>5 Fri • 9:42 18.9 11:03 20.5</p> <p>6 Sat • 10:34 18.1</p> <p>7 SUN • 0:05 20.8 11:29 17.2</p> <p>8 Mon • 1:04 20.8 12:20 16.4</p> <p>9 Tue • 2:03 20.3 1:17 15.8</p> <p>10 Wed • 3:03 20.3 2:08 14.8</p> <p>11 Thu • 3:46 19.9 3:01 14.3</p> <p>12 Fri • 4:32 19.4 3:54 13.9</p> <p>13 Sat • 5:14 18.9 4:43 13.6</p> <p>14 SUN • 5:52 18.3 5:36 13.6</p> <p>15 Mon • 6:23 17.6 6:26 13.9</p> <p>16 Tue • 6:56 17.0 7:15 14.4</p> <p>17 Wed • 7:25 16.4 8:04 15.1</p> <p>18 Thu • 7:55 15.9 8:53 15.9</p> <p>19 Fri • 8:27 15.5 9:41 16.7</p> <p>20 Sat • 9:00 15.1 10:27 17.3</p> <p>21 SUN • 9:30 15.1 11:16 18.3</p> <p>22 Mon • 10:18 15.1</p> <p>23 Tue • 0:06 19.0 11:05 15.3</p> <p>24 Wed • 0:46 19.4 11:52 15.6</p> <p>25 Thu • 1:48 20.1 12:58 16.0</p> <p>26 Fri • 2:37 20.5 2:00 16.4</p> <p>27 Sat • 3:25 20.7 3:07 17.0</p> <p>28 SUN • 4:15 20.6 4:18 17.7</p> <p>29 Mon • 5:03 20.4 5:25 18.7</p> <p>30 Tue • 5:54 20.0 6:31 19.8</p> <p>31 Wed • 6:43 19.5 7:37 20.3</p> | | | | <p>LOW TIDES MUSHAGAK District AUGUST 1988</p> <p>1 Mon • 12:51 6.4</p> <p>2 Tue • 0:53 0.3 1:43 0.6</p> <p>3 Wed • 1:55 1.8 2:35 -1.0</p> <p>4 Thu • 2:57 3.1 3:28 -2.2</p> <p>5 Fri • 3:58 4.3 4:21 -2.8</p> <p>6 Sat • 5:00 5.3 5:14 -3.2</p> <p>7 SUN • 6:00 6.0 6:08 -3.0</p> <p>8 Mon • 7:01 6.5 6:58 -2.5</p> <p>9 Tue • 7:58 6.8 7:53 -1.7</p> <p>10 Wed • 8:54 7.0 8:40 -1.0</p> <p>11 Thu • 9:46 7.0 9:31 0.1</p> <p>12 Fri • 10:37 6.9 10:16 1.1</p> <p>13 Sat • 11:23 6.5 11:02 2.1</p> <p>14 SUN • 12:06 6.1 11:47 3.2</p> <p>15 Mon • 1:02 6.2 12:44 3.5</p> <p>16 Tue • 1:54 7.9 5:14 -0.3</p> <p>17 Wed • 0:32 4.2 1:20 4.7</p> <p>18 Thu • 1:18 5.1 1:55 4.0</p> <p>19 Fri • 2:07 5.9 2:32 3.2</p> <p>20 Sat • 2:46 6.6 3:10 2.3</p> <p>21 SUN • 3:45 7.2 3:49 1.4</p> <p>22 MON • 4:33 7.6 4:29 0.5</p> <p>23 Tue • 5:24 7.9 5:14 -0.3</p> <p>24 Wed • 6:13 8.0 8:01 -1.1</p> <p>25 Thu • 7:05 7.8 6:54 -1.6</p> <p>26 Fri • 7:56 7.3 7:47 -1.9</p> <p>27 Sat • 8:43 6.3 8:42 -1.7</p> <p>28 SUN • 9:39 5.0 9:41 -1.1</p> <p>29 MON • 10:34 3.4 10:40 -0.2</p> <p>30 Tue • 11:26 1.6 11:42 0.9</p> <p>31 Wed • 0:44 2.0 1:11 -1.4</p> | | | | | | | |
| <p>HIGH TIDES MUSHAGAK District SEPTEMBER 1988</p> <p>1 Thu • 7:35 18.8 8:42 21.1</p> <p>2 Fri • 8:27 18.2 9:44 21.4</p> <p>3 Sat • 9:23 17.5 10:43 21.4</p> <p>4 SUN • 10:15 16.9 11:42 21.0</p> <p>5 Mon • 11:11 16.3 12:06 15.8</p> <p>6 Tue • 0:38 20.5 12:06 15.8</p> <p>7 Wed • 1:30 19.9 1:01 15.3</p> <p>8 Thu • 2:21 19.3 1:54 14.9</p> <p>9 Fri • 3:07 18.6 2:47 14.8</p> <p>10 Sat • 3:49 17.9 3:40 14.6</p> <p>11 SUN • 4:28 17.7 4:33 14.7</p> <p>12 Mon • 5:02 16.4 5:22 15.1</p> <p>13 Tue • 5:34 15.7 6:11 15.6</p> <p>14 Wed • 6:06 15.1 6:56 16.3</p> <p>15 Thu • 6:37 14.6 7:42 17.0</p> <p>16 Fri • 7:13 14.2 8:24 17.7</p> <p>17 Sat • 7:45 14.0 9:09 18.3</p> <p>18 SUN • 8:23 14.1 9:54 18.9</p> <p>19 Mon • 9:05 14.3 10:40 19.4</p> <p>20 Tue • 9:54 14.7 11:31 19.8</p> <p>21 Wed • 10:50 15.2 11:47 15.6</p> <p>22 Thu • 0:18 20.0 11:47 15.6</p> <p>23 Fri • 1:06 20.1 12:54 16.3</p> <p>24 Sat • 1:56 20.0 2:01 17.4</p> <p>25 SUN • 2:45 19.8 3:08 18.5</p> <p>26 Mon • 3:37 19.3 4:18 19.7</p> <p>27 Tue • 4:27 18.8 5:23 20.8</p> <p>28 Wed • 5:19 18.2 6:28 21.7</p> <p>29 Thu • 6:12 17.5 7:25 22.1</p> <p>30 Fri • 7:09 17.0 8:24 22.4</p> | | | | <p>LOW TIDES MUSHAGAK District SEPTEMBER 1988</p> <p>1 Thu • 1:47 3.0 2:05 -2.3</p> <p>2 Fri • 2:47 3.9 2:58 -2.8</p> <p>3 Sat • 3:47 4.6 3:55 -2.7</p> <p>4 SUN • 4:47 5.1 4:48 -2.3</p> <p>5 Mon • 5:43 5.5 5:43 -1.7</p> <p>6 Tue • 6:38 5.8 6:35 -0.9</p> <p>7 Wed • 7:33 6.0 7:25 0.1</p> <p>8 Thu • 8:25 6.0 8:17 1.1</p> <p>9 Fri • 9:14 5.9 9:05 2.1</p> <p>10 Sat • 9:59 5.7 9:54 3.1</p> <p>11 SUN • 10:39 5.3 10:43 4.1</p> <p>12 Mon • 11:22 4.6 11:28 4.9</p> <p>13 Tue • 12:06 4.2 12:32 5.6</p> <p>14 Wed • 0:17 5.6 12:32 3.6</p> <p>15 Thu • 1:07 6.2 1:08 3.1</p> <p>16 Fri • 1:53 6.7 1:46 2.4</p> <p>17 Sat • 2:40 7.0 2:26 1.7</p> <p>18 SUN • 3:26 7.2 3:07 1.0</p> <p>19 Mon • 4:12 7.3 3:51 0.3</p> <p>20 Tue • 4:59 7.2 4:40 -0.2</p> <p>21 Wed • 5:46 6.9 5:32 -0.6</p> <p>22 Thu • 6:36 6.2 6:28 -0.6</p> <p>23 Fri • 7:27 6.1 7:27 -0.2</p> <p>24 Sat • 8:18 5.7 8:27 0.4</p> <p>25 SUN • 9:10 5.0 9:28 1.3</p> <p>26 Mon • 10:02 0.4 10:31 2.2</p> <p>27 Tue • 10:54 1.0 11:36 3.0</p> <p>28 Wed • 11:49 2.1</p> <p>29 Thu • 0:17 3.6 12:41 -2.7</p> <p>30 Fri • 1:37 4.1 1:36 -2.8</p> | | | | | | | |

APPENDIX C

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Fisheries Research Institute. WH-10

DATE: 14 June 1988

TO: Bristol Bay Salmon Processors

FROM: Robert L. Burgner, Professor Emeritus *RLB*
Robert V. Walker, Fishery Biologist *RVW*

SUBJECT: 1988 run timing, Bristol Bay sockeye

We enclose graphs predicting the timing of the 1988 sockeye run to Nushagak and Naknek-Kvichak, based on the relationship between run timing and the combined mean Adak and Cold Bay air temperatures for May. As we have commented to you in past years, there has been a good correlation between Aleutian/Peninsula air temperatures and sea surface temperatures just south of the eastern Aleutians. Bristol Bay runs have tended to be earlier when late spring air temperatures are warmer than average. The regression relationship explains only about 50% of the annual variation in run timing. In 1987, the runs to the two districts averaged about one day later than the regression predicted.

The mean Adak-Cold Bay air temperature for May 1988 was 40.2°F, within 0.1 degree of the 1986 mean (40.1°F) and the 1960-1987 average of 40.3°F. This forecasts the midpoint date of the 1988 run for the Nushagak at 5 July (Fig. 1) and for the Naknek-Kvichak at 3 July (Fig. 2). These dates are very close to the historic means of the midpoints of these runs.

In the past two years, we have also commented on the March and April sea surface temperature data provided by charts in the government publication Oceanographic Monthly Summary. Based on those charts, we suggested the runs might be later than forecast. However, this year, that publication is running several months behind schedule and is not sufficiently current to be of use to us in evaluating our 1988 timing forecasts.

RLB:RVW:as
atts.

APPENDIX D. Alaska Board of Fisheries Regulatory Action and Management Policy Changes for Commercial Salmon and Herring Fisheries, Bristol Bay, 1988.

Register , 1988 FISH AND GAME 5 AAC 06.200
5 AAC 06.320

CHAPTER 06.
BRISTOL BAY AREA

5 AAC 06.200(a), (c), and (d) are amended to read:

5 AAC 06.200. FISHING DISTRICTS, SUBDISTRICTS, AND SECTIONS.
(a) Nushagak District: all waters of Nushagak Bay north of a line from 58°33' 48" N. lat., 158°47' 12" W. long. (Nichols Hills) to 58°39' 24" N. lat., 158°19' 12" W. long. (Etolin Point).

- (1)
- (2)
- (3)

(c) Egegik District: all waters north of Loran C line 9990-Y-32630, east of Loran C line 9990-Z-45140, and south of Loran C line 9990-Y-32570.

(d) Ugashik District: all waters south of Loran C line 9990-Y-32782 and east of a line connecting an ADF&G regulatory marker at Cape Menshikof (Loran C coordinates 9990-Y-32891 and 9990-Z-45229) with a point at the intersection of Loran C lines 9990-Y-32782 and 9990-Z-45150.

(In effect before 1982; am 4/14/82, Register 82; am 5/11/85, Register 94; am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.205 is added to Article 2 to read:

5 AAC 06.205. USE OF LORAN C. Loran C boundaries, lines, and coordinates mean the electronic signal. If the Loran transmitters are not operating correctly, the boundaries, lines, and coordinates are as marked by ADF&G regulatory markers. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.310 is amended to read:

5 AAC 06.310. FISHING SEASONS. Salmon may be taken only from June 1 through September 30 and only during open commercial salmon fishing periods. (In effect before 1988; am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.320(a), (b), (c), (d), and (e) are amended to read:

5 AAC 06.320. FISHING PERIODS. (a) In the Togiak District salmon may be taken only as follows:

Register , 1988 FISH AND GAME 5 AAC 06.331

(1) in the Cape Pierce, Osviak, and Matogak Sections from 9:00 a.m. Monday to 9:00 a.m. Saturday;

(2) in the Kulukak Section from 9:00 a.m. Monday to 9:00 a.m. Thursday;

(3) in the Togiak River Section from 9:00 a.m. Monday to 9:00 a.m. Friday.

(b) In the Nushagak District

(1) from 9:00 a.m. June 1 to 9:00 a.m. July 17, salmon may be taken only during periods established by emergency order;

(2) after 9:00 a.m. July 17 salmon may be taken only from 9:00 a.m. Monday to 9:00 a.m. Saturday.

(c) In the Naknek-Kvichak District

(1) before 9:00 a.m. June 23 and after 9:00 a.m. July 17, salmon may be taken only from 9:00 a.m. Monday to 9:00 a.m. Saturday;

(2) from 9:00 a.m. June 23 to 9:00 a.m. July 17, salmon may be taken only during periods established by emergency order.

(d) In the Egegik District

(1) before 9:00 a.m. June 23 and after 9:00 a.m. July 17, salmon may be taken only from 9:00 a.m. Monday to 9:00 a.m. Friday;

(2) from 9:00 a.m. June 23 to 9:00 a.m. July 17, salmon may be taken only during periods established by emergency order.

(e) In the Ugashik District

(1) before 9:00 a.m. June 23 and after 9:00 a.m. July 17, salmon may be taken only from 9:00 a.m. Monday to 9:00 a.m. Friday;

(2) from 9:00 a.m. June 23 to 9:00 a.m. July 17, salmon may be taken only during periods established by emergency order. (In effect before 1985; am 5/11/85, Register 94; am ___/___/88, Register ___)

Authority: AS 16.05.060
AS 16.05.251

5 AAC 06.331(a)(1)(D) and (q) are added to read:

5 AAC 06.331. GILL NET SPECIFICATIONS AND OPERATIONS. (a)

Register , 1988 FISH AND GAME 5 AAC 06.335
5 AAC 06.343

Gill net mesh restrictions are as follows:

(1) in the Nushagak District

(D) gill net mesh size may not be less than 5 3/8 inches during periods established by emergency order for the protection of pink salmon;

(g) During the hours between sunset and sunrise, each gill net must display a light. For drift gill nets, the light must be located at the end of the net furthest from the fishing vessel. For set gill nets, the light must be located at the end of the net furthest from the shore. (In effect before 1984; am 4/28/84, Register 90; am 5/11/85, Register 94; am 7/14/85, Register 95; am 4/18/86, Register 98; am ___/___/88, Register ___)

Authority: AS 16.05.060
AS 16.05.251

5 AAC 06.335(c) is added to read:

5 AAC 06.335. MINIMUM DISTANCE BETWEEN UNITS OF GEAR.

(c) In the Nushagak District, no part of a drift gill net may be operated within 100 feet of the inshore end of a set gill net, except that in the locations described in 5 AAC 06.331(n) (2), (3), and (4), no part of a drift gill net may be operated inshore of a set gill net. (In effect before 1985; am 5/11/85, Register 94; ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.343 is added to Article 3 to read:

5 AAC 06.343. VESSEL IDENTIFICATION. In addition to the marking requirements contained in 5 AAC 39.119, a documented salmon gill net fishing vessel registered for the Bristol Bay Area must display its name

(1) in permanent symbols at least six inches high and with lines at least one inch wide that contrast with the background;

(2) on the transom and both sides of the bow above the water line;

(3) in a manner such as to be plainly visible and unobscured; and

(4) at all times from June 1 through September 30.

(5) In the event the vessel is not documented, the vessel's permanent license plate ADF&G number must be displayed on

Register , 1988 FISH AND GAME 5 AAC 06.350
5 AAC 06.375

the transom as described in (1) through (4) of this section. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.350(a)(2) is repealed and (3) is amended to read:

5 AAC 06.350. CLOSED WATERS. (a) The following locations in the Nushagak District are closed to the taking of salmon:

(2) repealed ___/___/88;

(3) the Snake River Section from June 1 to 9:00 a.m. July 17;

(In effect before 1982; am 4/14/82, Register 82; am 4/16/83, Register 86; am 5/11/85, Register 94; am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.370(a) and (f) are amended to read:

5 AAC 06.370. REGISTRATION AND RE-REGISTRATION. (a) Each Bristol Bay commercial salmon drift gill net CFEC permit holder shall register him or herself and the vessel he or she will be operating for a district described in 5 AAC 06.200 before taking salmon. Initial district registration is accomplished by completing a registration form provided by the department and returning the completed form to the department office in Dillingham or King Salmon.

(i) An agent representing a CFEC permit holder on matters of district registration and re-registration must be annually authorized to do so on a form provided by the department. The form must state that registration or re-registration accomplished by a CFEC permit holder's authorization agent does not waive the strict liability standard in 5 AAC 39.002 as it applies to the CFEC permit holder. (In effect before 1983; am 4/16/83, Register 86; am 5/11/85, Register 94; am 4/18/86, Register 98; am 7/12/86, Register 99; am ___/___/88, Register ___)

Authority: AS 16.05/251

5 AAC 06.375 is amended to read:

5 AAC 06.375. LANDING REQUIREMENTS. All salmon must be landed in the district in which they were taken. No vessel used to take salmon may have salmon on board when more than one mile outside the district from which the salmon were taken. A vessel used to take salmon may have on board it when outside of a district up to 50 salmon for personal use, provided the salmon have been headed and gutted. The commissioner may waive the requirements of this section when necessary. (Eff. 5/11/85,

Register , 1988 FISH AND GAME 5 AAC 06.377

Register 94; am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 06.377 is added to Article 3 to read:

5 AAC 06.377. SALMON PROCESSOR AND BUYER REPORTING REQUIREMENTS. The operator of a floating salmon processing vessel, tender, or a shore based processing operation, and a company employing aircraft used for transporting salmon shall report in person or through an authorized agent to the local representative of the department of the initial district of intended operations before the start of processing or buying operations. The report must include the location and the date of intended operations, and identify and describe each vessel or method of transport employed in hauling or processing salmon. Before moving a processing or buying operation to a new district, the operator shall notify the local representative of the department by radio, telephone, or in person. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.251

Register , 1988 FISH AND GAME 5 AAC 27.005
5 AAC 27.060

CHAPTER 27.
HERRING FISHERY

ARTICLE 1.
STATISTICAL AREAS

5 AAC 27.005(a) is amended to read:

5 AAC 27.005. STATISTICAL AREAS ESTABLISHED. (a) For the herring fishery there are established the following areas with the following code letters:

Code
Letter

- A - Southeastern Alaska Area, comprised of the waters specified in 5 AAC 27.100
- D - Yakutat Area, comprised of the waters specified in 5 AAC 27.200
- E - Prince William Sound Area, comprised of the waters specified in 5 AAC 27.300
- H - Cook Inlet Area, comprised of the waters specified in 5 AAC 27.400
- K - Kodiak Area, comprised of the waters specified in 5 AAC 27.500
- L - Chignik Area, comprised of the waters specified in 5 AAC 27.550
- M - Alaska Peninsula-Aleutian Islands Area, comprised of the waters specified in 5 AAC 27.600
- T - Bristol Bay Area, comprised of the waters specified in 5 AAC 27.800
- W - Kuskokwim Area, comprised of the waters specified in 5 AAC 27.870
- Q - Bering Sea-Kotzebue Area, comprised of the waters specified in 5 AAC 27.900

(In effect before 1985; am 5/11/85, Register 94; am ___/___/88, Register ___)

Authority: AS 16.05.251

ARTICLE 2.
GENERAL SPECIFICATIONS

5 AAC 27.060 is added to Article 2 to read:

5 AAC 27.060. BERING SEA HERRING FISHERY MANAGEMENT PLAN. (a) The department shall follow the directives of the Bering Sea Herring Management Plan, as well as the regulations that govern the individual herring fisheries, when managing the commercial herring fisheries that take place in the Bering Sea.

(b) Unless otherwise specified in this chapter, the department shall manage the fisheries so that the exploitation

rate on eastern Bering Sea herring stocks does not exceed 20 percent of the biomass of those stocks.

(c) The following thresholds are minimum biomass levels for each herring fishing district. When the department estimates, in season, that the biomass in a district is below its threshold, the department may not allow a commercial harvest of herring in that district.

| <u>District</u> | <u>Threshold(s.t.)</u> |
|-----------------|------------------------|
| Port Moller | 1,000 |
| Togiak | 35,000 |
| Security Cove | 1,200 |
| Goodnews Bay | 1,200 |
| Cape Avinof | 500 |
| Nelson Island | 2,500 |
| Nunivak Island | 1,500 |
| Cape Romanzof | 1,500 |
| Norton Sound | 7,000 |

(d) The department shall manage the herring food and bait fishery that takes place in the Unimak, Akutan, and Unalaska Districts and that portion of the Umnak District east of Samalga Pass(Dutch Harbor fishery) so that it is allocated seven percent of the allowable Togiak District herring sac-roe harvest determined under the provisions of the Bristol Bay Herring Management Plan(5 AAC 27.865).

(e) If the herring sac-roe harvest in the Togiak District exceeds its allocation by more than 20 percent, the department shall deduct the amount of herring that exceeds the Togiak District herring sac roe allocation from the Dutch Harbor fishery allocation for that season as determined in (d) of this section.

(f) If the Togiak District herring sac-roe fisheries do not take their available harvest, the unharvested amount of herring will be added to the Dutch Harbor fishery allocation as determined in (d) of this section. When making this re-allocation, the department shall consider the conditions that lead to the under harvest, the amount of herring to be re-allocated, and the status of the herring stock. When an increase of the Dutch Harbor fishery allocation is made under this section, the total allocated harvest may not exceed 3,100 s. tons.

(g) When the Togiak District is below its threshold, the Dutch Harbor fishery will be closed for that season. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.060
AS 16.05.251

Register , 1988 FISH AND GAME 5 AAC 27.805
5 AAC 27.830

Authority: AS 16.05.251

ARTICLE 12.
STATISTICAL AREA T-
BRISTOL BAY AREA

5 AAC 27.805(a) is amended to read:

5 AAC 27.805. FISHING DISTRICTS AND SECTIONS. (a) The Togiak District consists of all waters of Alaska between the longitude of the tip of Cape Constantine and the longitude of the tip of Cape Newenham.

(1) Kulukak Section: all waters between the longitude of the tip of Cape Constantine and the longitude of the tip of Right Hand Point.

(2) Nunavachak Section: all waters between the longitude of the tip of Right Hand Point and a line extending south from the westernmost tip of Anchor Point.

(3) Togiak Section: all waters between a line extending south from the westernmost tip of Anchor Point and the longitude of the terminus of the Quimgmy River.

(4) Hagemeister Section: all waters between the longitude of the terminus of the Quigmy River and the longitude of the tip of Asigyukpak Spit.

(5) Pyrite Point Section: all waters between the longitude of Asigyukpak Spit and the longitude of Cape Pierce.

(6) Cape Newenham Section: all waters between the longitude of the tip of Cape Pierce and the longitude of the tip of Cape Newenham.

(In effect before 1988; am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 27.830(a) is amended to read:

5 AAC 27.830. GEAR. (a) In the Bay District herring may be taken only by purse seines, hand purse seines, and gill nets. In the Togiak District herring may be taken only

(1) by purse seines and hand purse seines in the Togiak, Hagemeister, Pyrite Point, and Cape Newenham Sections; and

(2) by gill nets in the Kulukak and Nunavchak Sections.

(In effect before 1983; am 4/16/83, Register 86; am 5/11/85,

Register 94, am ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 27.865 is amended to read:

5 AAC 27.865. BRISTOL BAY HERRING MANAGEMENT PLAN. (a) When managing the Bristol Bay commercial herring fishery, the primary objectives of the department will be to prosecute an orderly and manageable fishery, while striving for the highest level of product quality with a minimum of waste.

(b) To ensure that no gear group is totally disadvantaged, the Board of Fisheries directs the department to take the following actions given the specified circumstances.

(1) When circumstances preclude the department from adequately assessing the biomass, the fishery shall be managed for an exploitation based on the pre-season projected return.

(2) Whenever possible, openings for both gear types must start at or near low tide.

(3) Whenever possible, openings for both gear types must begin during the hours of daylight, and special consideration will be given to afford the maximum amount of daylight.

(4) If an adequate biomass is not available for a gear type to achieve its allocation in its assigned sections, the movement of that gear group into the sections assigned to the other gear type may be accomplished by emergency order. This movement may be initiated at any time during the fishery at discretion of the department.

(5) When opening an area for the secondary gear type the department shall consider

(A) availability of herring;

(B) roe quality; and

(C) whether one of the gear types has taken its quota.

(6) When both gear types are allowed to fish in the same section, the department shall manage the fishery so that

(A) only one gear type fishes at a time; and

(B) the secondary gear type may not be allowed to fish until the primary gear type has taken at least 75 percent of its quota.

(7) The maximum exploitation rate for the Bristol Bay herring stock is 20 percent. Before opening the sac roe fishery, the department shall set aside approximately 1,500 short tons for the Togiak District herring spawn-on-kelp fishery, and seven percent of the remaining available harvest for the Dutch Harbor food and bait fishery.

(8) After the spawn-on-kelp harvest and the Dutch Harbor food and bait fishery have been subtracted, the remaining harvestable surplus is allocated to the sac roe fishery. The department shall manage for a removal of 25 percent of that surplus by the gill net fleet and 75 percent by the purse seine fleet.

(9) If a manageable separation of the year classes occurs, an exploitation rate of up to 20 percent may be allowed on the younger age herring (4 years or less), and no fishery will be considered if this recruit population is less than 20,000 short tons.

(10) Late season (post-peak) sac roe openings must be based on one or more of the following criteria:

(A) a definable increase in the biomass of herring present on the fishing grounds;

(B) a major shift in the age composition of the herring in a definable biomass that is large enough to allow a harvest; and

(C) a major improvement in the roe maturity of fish sampled over a broad area, indicating the arrival of a quantity of new herring. (In effect before 1982; am 4/14/82, Register 82; am 4/28/84, Register 90; am ___/___/88, Register ___)

Authority AS 16.05.060
AS 16.05.251

CHAPTER 39.
GENERAL PROVISIONS

5 AAC 39.250(c) is amended to read:

5 AAC 39.250. GILL NET SPECIFICATIONS AND OPERATIONS.

(c) Unless otherwise specified in this subsection, gill net web must contain at least 30 filaments.

(1) In the Southeast Alaska, Yakutat, Prince William Sound, and Cook Inlet Areas, gill net web must meet one of the following requirements:

(A) the web must contain at least 30 filaments and all filaments must be of equal diameter, or

(B) the web must contain at least six filaments, each of which must be at least 0.20 millimeter in diameter.

(2) Effective 1/1/89, the requirements contained in (1)(A) and (B) of this subsection apply in the Kodiak, Chignik, Aleutian Islands, Alaska Peninsula, Bristol Bay, Kuskokwim, Yukon, Norton Sound-Port Clarence, and Kotzebue-Northern Areas.

(In effect before 1983; am 4/16/83, Register 86; am 3/29/87, Register 101; am ___/___/88, Register ___)

Authority: AS 16.05.251

CHAPTER 77
PERSONAL USE FISHERY

ARTICLE 1

STATEWIDE PROVISIONS

5 AAC 77.010(e) is amended to read:

5 AAC 77.010. METHODS, MEANS, AND GENERAL RESTRICTIONS.

(e) Unless otherwise specified in this subsection, gill net web must contain at least 30 filaments.

(1) In the Southeast Alaska, Yakutat, Prince William Sound, and Cook Inlet Areas, gill net web must meet one of the following requirements:

(A) the web must contain at least 30 filaments and all filaments must be of equal diameter, or

(B) the web must contain at least six filaments, each of which must be at least 0.20 millimeter in diameter.

(2) Effective 1/1/89, the requirements contained in (1)(A) and (B) of this subsection apply in the Kodiak, Chignik, Aleutian Islands, Alaska Peninsula, Bristol Bay, Kuskokwim, Yukon, Norton Sound-Port Clarence, and Kotzebue-Northern Areas.

(Eff. 6/20/82, Register 82; am 7/1/86, Register 99; am 7/12/86, Register 99; am 10/26/86, Register 100; am ___/___/88, Register ___)

Authority: AS 16.05.251

ARTICLE 2.
KOTZEBUE-NORTHERN AREA

5 AAC 77.070 is added to Article 2 to read:

5 AAC 77.070. PERSONAL USE SALMON FISHERY. Salmon may be taken in accordance with the subsistence salmon fishing regulations contained in 5 AAC 01.110 -- 5 AAC 01.130. This section is repealed effective 4/15/90. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.251

5 AAC 77.080 is added to Article 2 to read:

BRISTOL BAY AREA

5 AAC 77.270 is added to Article 6 to read:

5 AAC 77.270. PERSONAL USE HERRING FISHERY. In the personal use taking of herring and herring roe on kelp

(1) herring and herring roe on kelp may be taken at any time;

(2) herring may be taken by drift and set gill nets only;

(3) during closed commercial herring fishing periods, gill nets used for the personal use taking of herring may not exceed 25 fathoms in length;

(4) herring spawn on kelp may be taken by hand picking and hand operated rakes only;

(5) herring may not be taken in those waters described in 5 AAC 27.850;

(6) there are no bag and possession limits for the taking of herring and herring roe on kelp;

(7) herring taken under personal use fishing regulations may not be used for bait in any commercial fishery. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.251

ARTICLE 6.
BRISTOL BAY AREA

5 AAC 77.280 is added to Article 6 to read:

5 AAC 77.280. PERSONAL USE SALMON FISHERY. Salmon may be taken in those waters of the Nushagak District open to subsistence salmon fishing south of a line from Snag Point to Picnic Point only as specified in this section.

(1) Salmon may be taken only from July 1 through July 31 and only during periods open for subsistence salmon fishing.

(2) Salmon may be taken only with set gill nets. No person may operate more than 10 fathoms of gill net. No gill net may have a mesh size larger than 5 3/8 inches. Each set gill net must be staked and buoyed. Distance between set gill nets is as specified in 5 AAC 01.310 and 5 AAC 01.320.

(3) No person may operate or assist in operating personal use salmon fishing gear while simultaneously operating or assisting in operating commercial salmon fishing gear.

(4) The annual harvest limit is 70 salmon, only five of which may be chinook salmon. This limit is not in addition to the limits in 5 AAC 67.020(a).

(5) Salmon may be taken only under the authority of a Nushagak Personal Use Salmon Fishing Permit. The permit is issued only through the ADF&G office in Dillingham. (Eff. ___/___/88, Register ___)

Authority: AS 16.05.060

AS 16.05.251

MEMORANDUM

State of Alaska

TO: Distribution

DATE: November 25, 1987

FILE NO:

TELEPHONE NO:

FROM: R. Eric Minard 
 Area Management Biologist
 Sport Fish Division
 Dillingham

SUBJECT: 1988 Nushagak River
 Chinook Forecast

The 1988 Nushagak River chinook salmon forecast is 139,000 (range 100,000 to 180,000), and is based on the sibling return model. Spawner-recruit and mean percent models were also run, however, hindcast performance of those two models continues to show approximately twice the error of the sibling model. The 1988 return will be comprised of age 4(2) (13%), 5(2) (37%), 6(2) (45%) and 7(2) (6%) fish. I would expect a slightly stronger 7(2) return than forecast, however, that component typically contributes so little to the overall return that I would not expect this change to result in a major deviation from forecast. The 1988 forecast is below the long-term (1960-1987) average return of 177,000. With an escapement goal of 75,000 (range 50,000 - 100,000), there is potentially 64,000 (range 25,000 - 105,000) chinook available for harvest.

I have attached a copy of the forecast evaluation (hindcast results) for your review.

Table 2. Forecast evaluation for the three possible methods.

| YEAR | NUSHAGAK CHINOOK SALMON | | | |
|------|-------------------------|-----------------|--------------|---------|
| | ACTUAL | SPAWNER RECRUIT | MEAN PERCENT | SIBLING |
| 1973 | 78.1 | 328 | 195 | 90 |
| 1974 | 109.9 | 266 | 164 | 77 |
| 1975 | 98.5 | 294 | 131 | 69 |
| 1976 | 167.6 | 249 | 136 | 118 |
| 1977 | 155.3 | 211 | 107 | 146 |
| 1978 | 255.1 | 254 | 105 | 111 |
| 1979 | 261.2 | 348 | 147 | 182 |
| 1980 | 217.7 | 329 | 206 | 162 |
| 1981 | 355 | 339 | 230 | 198 |
| 1982 | 254.4 | 319 | 256 | 213 |
| 1983 | 310.6 | 322 | 256 | 224 |
| 1984 | 152.1 | 236 | 319 | 165 |
| 1985 | 191.2 | 309 | 434 | 162 |
| 1986 | 109.2 | 299 | 543 | 168 |
| 1987 | 144.2 | 353 | 366 | 125 |
| 1988 | | | | |

Table 3. Forecast error expressed as a percentage of the actual return.

| YEAR | NUSHAGAK CHINOOK SALMON | | | |
|------|-------------------------|--------------|---------|--|
| | RECRUIT | MEAN PERCENT | SIBLING | |
| 1973 | 354.92% | 170.46% | 24.83% | |
| 1974 | 142.04% | 49.23% | -23.94% | |
| 1975 | 188.32% | 32.99% | -30.96% | |
| 1976 | 48.57% | -24.82% | -23.59% | |
| 1977 | 35.87% | -31.10% | -5.93% | |
| 1978 | -0.43% | -58.84% | -56.49% | |
| 1979 | 32.23% | -42.72% | -30.32% | |
| 1980 | 51.13% | -5.37% | -25.59% | |
| 1981 | -4.51% | -35.21% | -44.23% | |
| 1982 | -9.99% | -27.77% | -39.90% | |
| 1983 | 3.67% | -14.36% | -27.88% | |
| 1984 | 55.16% | 109.73% | 8.48% | |
| 1985 | 61.09% | 126.99% | -15.27% | |
| 1986 | 173.81% | 397.25% | 53.85% | |
| 1987 | | | | |
| 1988 | | | | |
| TRE | 1162.73% | 1127.84% | 423.31% | |
| MAPE | 83.05% | 83.56% | 30.24% | |

MEMORANDUM

State of Alaska

TO: Distribution

DATE: May 19, 1988

FILE NO.

TELEPHONE NO 344-0541 (ext.130)

FROM: Stephen M. Fried 
 Research Project Leader
 ADF&G/Commercial Fisheries
 Anchorage

SUBJECT: Revisions to
 Shumagin/Unimak
 Sockeye Salmon
 Quota for June 1988

As requested by the Board of Fisheries, I altered the procedure for determining projected Bristol Bay sockeye salmon harvests. In the past, Bristol Bay inshore harvest was estimated as the total return minus total spawning escapement goal. Beginning in 1988, total projected inshore harvest will be the total projected harvest minus projected Japanese mothership harvest, and Bristol Bay inshore harvest will be the total inshore harvest minus the Shumagin/Unimak allocation. Neither the 1988 forecast of the total number of sockeye salmon returning to Bristol Bay (28,302,000) nor the total escapement goal (9,735) have changed, so total projected harvest is the same given in my 24 December 1987 memo (18,567,000). However, the number of sockeye salmon available for harvest inshore is now estimated to be only 18,299,000 (since the projected high seas harvest is 268,000 sockeye salmon). Therefore, total guideline harvests for the June fisheries are 1,244,322 (6.8 percent of total projected inshore harvest) for Unimak and 274,485 (1.5 percent of total projected inshore harvest) for the Shumagins. These harvests represent a decrease of 22,244 from those in my 24 December memo. Revised weekly guideline harvest levels are as follows:

| <u>Weekly Period</u> | <u>South Unimak</u> | <u>Shumagin Islands</u> |
|----------------------|---------------------|-------------------------|
| June 1-4 & 5-11 | 62,217 (5%) | 24,704 (9%) |
| June 12-18 | 360,856 (29%) | 76,856 (28%) |
| June 19-25 | 634,609 (51%) | 112,538 (41%) |
| June 26-30 | 186,650 (15%) | 60,387 (22%) |
| Total | 1,244,332 (100%) | 274,485 (100%) |

Distribution: Anchorage - Florey, Haanpaa, Meacham, Randall
 Dillingham - Bucher, Skrade
 Juneau, H.Q. - Clasby, Dean, Eggers, Parker
 King Salmon - Bill, Russell
 Kodiak - McCullough, Nicholson, Schmidt, Shaul

BRISTOL BAY HERRING AND
HERRING SPAWN ON KELP FISHERIES

1988

INTRODUCTION

The Bristol Bay herring sac roe fishery began in 1967 and was followed by the spawn on kelp fishery in 1968. The capelin fishery did not really develop until 1984, but small commercial deliveries date back to the 1960's. For the first 10 years, effort levels and the number of processors remained small and the herring sac roe fishery did not operate in 1971 and 1976, due to poor market conditions.

Favorable market conditions and additional incentives provided by the Fishery Conservation and Management Act of 1976 (the 200 mile limit) resulted in a major expansion of the Togiak herring fishery in 1977.

Herring have been reported in all districts of Bristol Bay, but the major concentration occurs in and around Togiak, where the commercial fishery is centered (Figure 1). Legal gear types include purse seines and hand purse seines, which are limited to 150 fathoms in length and 16 fathoms in depth, and gill nets which also are limited to 150 fathoms, but two permit holders may both operate that amount of gear from a single vessel. The herring spawn on kelp harvest method is limited to hand picking or by hand held rakes.

Since 1981, the herring and herring spawn on kelp harvests have been regulated by emergency order, and the designated

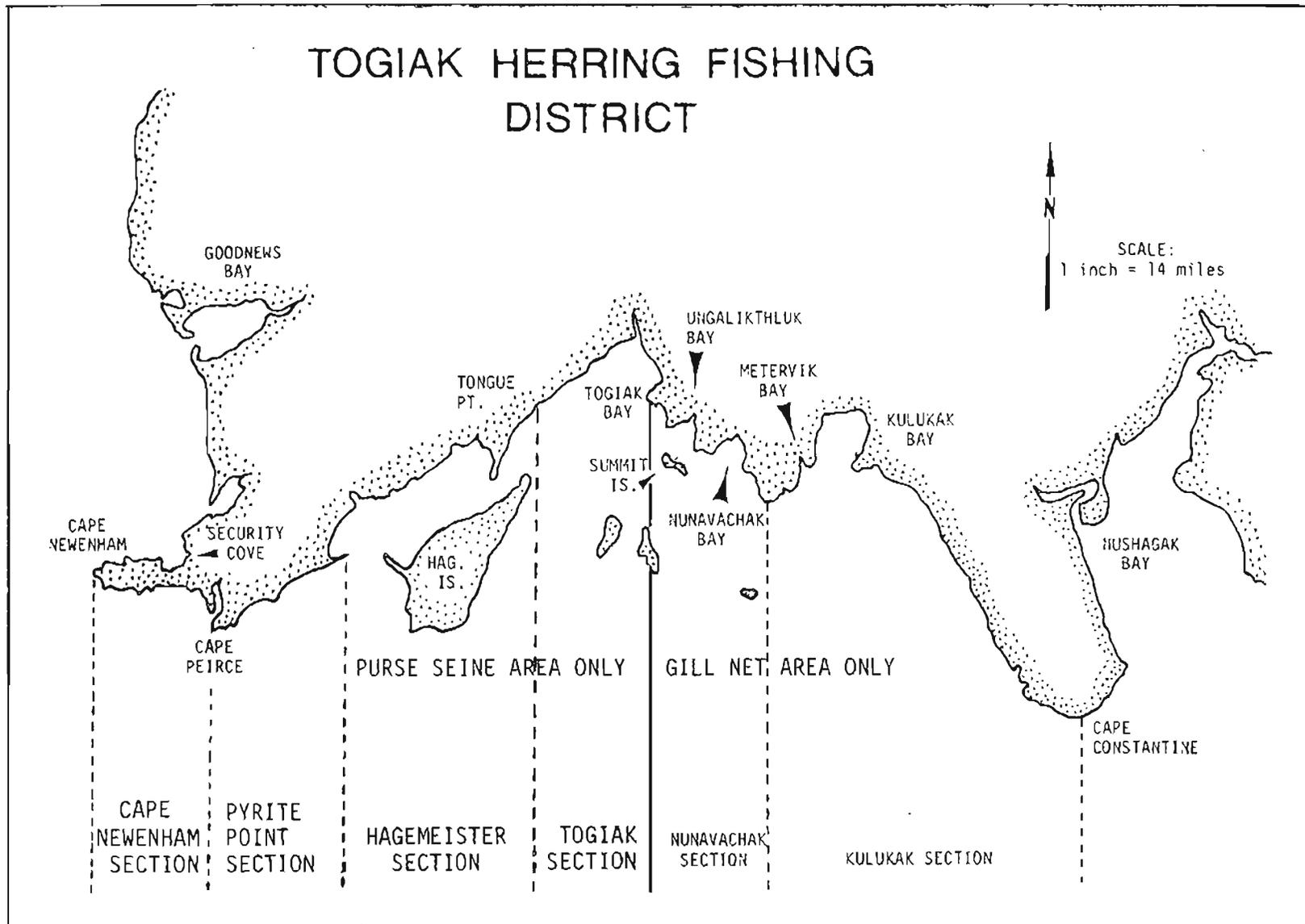


Figure 1. Togiak Herring Fishing District.

season occurs from April 25 through June 1. A regulatory management plan, 5 AAC 27.865, and other management directives to the staff, set the policies by which these fisheries are managed. The current regulatory management plan was modified extensively at the December 1987 meeting of the Alaska Board of Fisheries, and is included as Appendix A in this report. The spawn on kelp management plan was revised prior to the 1984 season and sets the maximum allowable harvest at 350,000 pounds (Appendix C, 1984 Bristol Bay Annual Management Report). This plan directs the staff to include the herring spawn on kelp removal, when calculating total exploitation.

Because the capelin fishery is still in the developmental stage, few regulations restrict this activity and the management plan for this species mainly addresses additional protection for herring (Appendix D, 1982 Bristol Bay Annual Management Report).

1988 Inseason Herring/Kelp/Management

Spring weather conditions were typical in 1988, and as late as April 21, NOAA surface maps were still showing sea ice in most of the coastal areas of Bristol Bay. Overnight temperatures in early April were below 0 in Dillingham, and there was a considerable amount of snow and ice on Summit Island until mid-May. This was in contrast to the warm early spring of 1987, when a major spawn took place before anyone reached the fishing grounds.

Due to that early spawn in 1987, and the associated problems with the late arrival of the fleet, the staff and the industry watched the other coastal fisheries very closely in 1988 in an attempt to better judge run timing at Togiak. However, run timing was considered normal in the areas south of Bristol Bay in 1988, so deployment to the grounds proceeded in an orderly fashion.

The first aerial survey by Department staff took place on April 19, and industry representatives completed their first survey on April 22. Viewing conditions were poor on both days, and no herring were sighted, but a number of California grey whales, a few sea birds, and several belugas were observed. From April 24 to April 28, several fixed wing aerial surveys were flown out of Dillingham by local spotter pilots, with similar results.

The Department-chartered helicopter arrived in Dillingham on April 27. On April 28, this aircraft traveled to the grounds, where it was used to unload the camp gear from a tender using a sling and long wire, and to complete an aerial survey of the area. Weather permitting, aerial surveys were conducted on a daily basis after that, but the first herring were not sighted until May 8. A small number of herring were caught in variable mesh gill nets as early as May 2. Samples were obtained from the first four schools of fish sighted, but only one of the schools was herring, and the rest proved to be smelt. The first herring sampled were large, old, and ripe.

Bad weather prevented any test fishing or aerial surveys on May 10, but the winds had moderated by the morning of May 11. Two gillnet test boats were deployed, but no herring were located. Aerial surveys were hampered by muddy water and a residual swell from the previous days storm. The Metervik Bay crew collected 74 herring in a variable mesh gill net, and 22 were deemed to be in a "ripe" condition.

May 12 brought improving weather, and water temperatures of +3 degrees C at all three camps. Five gill net test boats were deployed, and a total of 160 herring were caught. The fish sampled from Metervik and Ungalikthluk Bays appeared to be ripe. The morning aerial survey was unsuccessful in finding fish, but by evening, several schools were visible in Hagemeister Strait. A purse seine vessel obtained samples from that area, and tests by industry roe technicians showed that all of the fish contained immature roe (0%).

Many schools of herring were visible on May 13, and the biomass was estimated at over 31,000 tons. Bags of samples were obtained from several areas, and were dropped off at different processors for roe testing. The results of those samples ranged from a low of 0% mature, to a high of 2.6%. Water temperatures continued to increase, and had reached 4.5 degrees C at Metervik Bay, 4.0 at Summit Island, and 3.5 at Tongue Point.

A total of 10 test boats were deployed on May 14, and a large number of samples were obtained. Most of the herring

tested contained 0% mature roe and were over 400 grams. However, it was noted that many of the samples contained herring with roe that was very close to maturity. The age composition of 348 herring sampled on May 15, was 71% age 9+, compared to 66.2% in the preseason projection. By that date, 17 companies had registered to purchase herring, and 7 for spawn on kelp, while the estimated holding capacity on the grounds was approximately 14,500 tons, the lowest in many years. This was due to both the low preseason forecast and a conflict with the opelio crab fishery.

A total of 19 test boats were recruited to fish early in the morning of May 16, and public roe testing of the samples was planned for midday. A small amount of spawning occurred overnight, and a total of 3.5 linear miles of milt was documented on the morning aerial survey. The herring biomass estimate from the same aerial survey, showed an increase from 40,000 tons (reported on May 15), to approximately 52,000 tons.

The roe testing procedure on the beach went smoothly, and a total of 13 gill net and 13 purse seine samples were examined. Recoveries ranged from a low of 0% mature near Hagemeister, to a high of 13.1% near Rocky Point. In general, the gill net recoveries were slightly higher and averaged 7.5% overall, while the purse seine fish averaged 6.1%. Clearly, the roe recoveries in many of the areas sampled, were rapidly approaching marketable quality. However, very little spawn had been documented to date, and the biomass, although it was

building, was still slightly less than the preseason projection of 54,500 tons. Fishing effort (estimated via the helicopter while the fleet was concentrated during the roe testing on the beach) indicated at least 239 purse seiners, and 300 gill netters were present on the fishing grounds. With the good weather forecast for the next several days, the harvest potential was very large.

In order to secure more spawn deposition before the harvest, and in an attempt to improve roe recovery of the anticipated catch, the staff elected to put the fleet on short notice for a probable opening, to be announced on the morning of May 17. An afternoon aerial survey, beginning from Summit Island immediately after the announcement at 3:00 p.m., documented a large new volume of herring in the western sections of the district. The majority of the observed schools had not been sampled, so the age composition and roe maturity of those fish was unknown. The majority of these fish appeared to be moving from East to West, and a large volume of herring were observed exiting the Togiak District.

It was the staff's intent to obtain samples, early the next morning, from this "new" volume of herring, which now made up a high percentage of the total estimated biomass. If those fish had proved to be immature, or comprised of a younger year

class, we had the option to close a portion of the district to protect them, if necessary.

Later, the evening of May 16, herring moved to the beach in many areas of the Togiak coastline, and intensive spawning began. In retrospect, the roe recovery may have been higher in the gill net fishery, if fishing had been allowed that same night. However, at 3:00 p.m. when the decision to delay another day was made, little spawning had taken place, and the estimated biomass was less than the preseason projection. Perhaps a better approach would have been to announce a one-hour notice period, allowing more time to consider other options. In future seasons at Togiak, the staff may want to consider a defined short notice period as a management tool.

On an early morning aerial survey on May 17, an estimated 22.75 linear miles of milt (spawn) were observed in the area from Kulukak Bay to Anchor Point. It was obvious that any further delay of the fishery would reduce, rather than increase the roe recovery, so at 8:00 a.m., a four-hour gill net opening was announced for the Togiak District. The staff planned to separate the two fisheries by an interval of time, and to prosecute a purse seine fishery later the same day. Separating the two fisheries in time would benefit enforcement, the Department sampling effort, and the industry in terms of tender deployment, etc.

When the gill net fishery was announced, the purse seine fleet was advised to standby at 12:00 noon for the next update.

At the time, purse seine test boats were sampling the large biomass of herring in the western end of the district. By midmorning results from this test fishing effort became available, and it was evident that those herring were the same large old fish that were common throughout the district, and they were in a near spawning condition. Roe recoveries from the test samples ranged from 11 - 13%, among the highest reported at Togiak.

All had progressed well until approximately 10:45 a.m., when a large fog bank was observed building near the southern tip of Right Hand Point, and moving toward the West. The ships in Nunavachak Bay were quickly enveloped in fog, and it was clear that any further delay in the purse seine fishery could result in a very hazardous situation for spotter aircraft and the fleet, or a lost opportunity to harvest quality herring. This same fog pattern had developed just two days before, and remained on the grounds for almost 24 hours. The staff was concerned that if the same situation developed again, bad weather would preclude the purse seine harvest and the large volume of herring would spawn, thereby making them unavailable for a later fishery.

All of the processors were called on their respective company VHF channels, and notified to standby for an immediate announcement. A one-half hour purse seine fishery was announced for 12:30 p.m., May 17. That allowed only 85 minutes notice, and also overlapped the seine harvest with the gill net

fishery, but due to the "emergency situation" created by the fog, the staff felt that it was necessary. By the time of the opening, the fog had progressed westward and obscuring the northeast portion of Togiak Bay, and by 30 minutes after the purse seine closure, all of Togiak Bay was covered. It was a difficult decision at the time, but the harvest was successful, and for the first time in the history of the Togiak sac roe fishery, the roe recovery exceeded 10%. The harvest of just under 14,000 tons brought close to \$14,000,000 to the participants.

The remainder of May 17 was spent obtaining samples, and attempting to estimate the harvest removal. By evening, it was clear that most processors were at, or over their indicated capacity. Many loaded gill net vessels were waiting in line to deliver, and seine sets were still being pumped in several areas. Several huge purse seine sets were being off-loaded behind Tongue Point, and later one was confirmed at over 660 tons. Just before midnight, all processors that could be reached were contacted by radio, and it was evident that due to a lack of holding capacity, further fishing time could not be considered, at least for the short term. The holding capacity on the fishing grounds was approximately 16,600 tons, and we estimated that over 14,000 tons were caught. The catch per unit effort had set a new record for Togiak, and gill net vessels averaged 2.57 tons per unit per hour, and the seine fleet averaged 91.3 tons. Many lost or abandoned gill nets

were still in the water, and several large purse seine sets were still pumping, or waiting for a tender.

At 8:00 a.m. on May 18, the fleet was advised that due to a lack of holding and processing capacity, no further fishery could be considered at the time. The staff took advantage of the brief lull in the herring fishery, and collected samples of spawn on kelp from several areas, for display at a public meeting with the kelp processors and harvesters.

On the morning of May 19, 12 test boats were deployed throughout the district, in an effort to determine the quality of the herring remaining on the grounds. A meeting with interested kelp processors was also scheduled for 11:00 a.m. on Summit Island. At that meeting, it was the concensus of the kelp buyers that the egg coverage on the samples displayed, was not heavy enough in most areas, to warrant a harvest. Industry representatives present volunteered to collect additional spawn on kelp samples from areas K-4 and K-8 on the late evening low tide, and to make them available the next day for public inspection (Figure 2).

Herring collected by the test boat fleet proved to be mostly spawned out. Only three bags (of approximately fifteen tested), contained 8% mature roe, the minimum standard for salable fish. Most processors were still "plugged" and could not have taken any appreciable amount of herring, even if they had so desired.

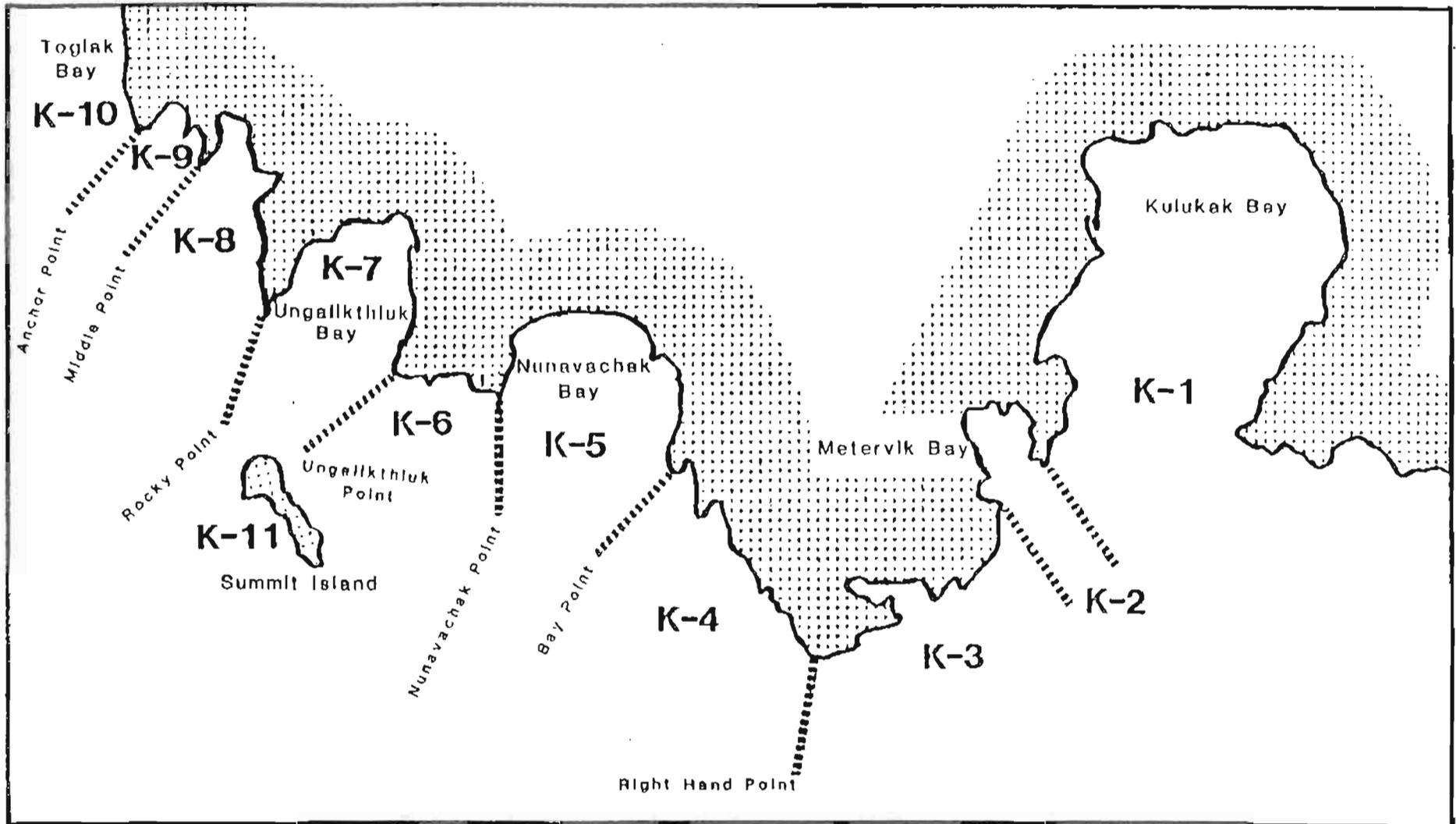


Figure 2. BRISTOL BAY TOGIAC DISTRICT SPAWN ON KELP MANAGEMENT AREAS (K-1 through K-11)

On the morning of May 20, a second kelp meeting was scheduled for 11:00 a.m. at Summit Island, but few people attended due to dense fog in the area. Those samples were visibly improved from the previous day, and most of the product was declared salable by the industry technicians present. In order to contain the kelp removal to a discrete area and to reduce the impact on surrounding eggs and plants, two small areas were designated for the harvest and a six-hour opening was announced. There was an urgency to prosecute the harvest as quickly as possible, while the product was still in good condition, to protect against a loss of quality due to silt pollution. Unfortunately the low tide that occurred during the hours of daylight was a large holdover, so we were forced to open from 10:00 p.m. to 4:00 a.m.

Dense fog blanketed the area from 10:30 in the morning until almost midnight, so there was no aerial survey, and very little test fishing on May 20. It was not possible to survey the kelp fishery, so the harvesting effort could only be estimated. However, a combination of dense, good quality product, a large effort, and a minus low tide, resulted in a very large removal by the pickers. On the morning of May 21, the harvest was estimated at well over 400,000 lbs. with several of the 10 participating companies still not reporting. That harvest almost doubled the previous record for a single day's landings, and exceeded the 350,000 lb. quota by a significant amount.

Test boats were again limited by heavy fog on the morning of May 21, but by later in the afternoon, they were able to fish in many areas. Test catches in two areas had good quality roe, but many of the others did not, and the success rate was very low. Many of the boats made several sets and did not locate any herring. Biomass surveys were also limited by the weather, but in the areas where fish were visible, it appeared that the normal post spawning exodus to the East was occurring. On May 22, a series of test sets throughout the district found salable herring in three areas, but many others had mixed green and spawned out fish in the same school. The largest volume of fish was located in Ungalikthluk Bay, and they proved to be spawned out. The age composition of nearly 3,800 samples continued to closely match the preseason projection, but there was evidence of a higher percentage of younger herring starting to appear, particularly near Metervik Bay. With little hope of a further opening, and good traveling weather, most of the fleet departed from the fishing grounds.

A purse seine test set from the Eagle Bay area on May 23, contained mixed young and old herring, and the Metervik Bay crew caught 43% age 4 herring in their variable mesh gill net. With large numbers of spawned out herring still in the area, an apparent decline in biomass on the grounds, and evidence of some level of recruitment taking place, the possibility of further commercial openings became even more remote.

Amid considerable agitation for additional fishing time, the staff pledged to continue aerial surveys and to test fish for as long as possible. However, it was evident that only a few days remained before it would be necessary to break camp. Several attempts were made on May 24 to get "point estimates" of herring schools, but were unsuccessful because the fish proved to be spawned out and could not be sold. Finally, one small school (10.5 tons) was landed. May 25 brought high winds which increased the turbidity, and made further aerial surveys impossible for several days, so the staff returned to Dillingham.

In the process of pulling the camps, a final helicopter survey was flown on May 27, but viewing conditions were so poor that no fish were sighted. One final fixed wing survey was flown on June 1, and approximately 34,000 tons of herring were observed, and one small spawn. However, without staff members on the grounds, and few small vessels, no samples could be obtained to determine the roe maturity or age composition of the remaining fish. The final biomass was estimated to be 134,717 tons in 1988, and after all removals by sac roe, food and bait, and an incidental trawl catch were subtracted, the exploitation rate was approximately 13% of the total.

Very few capelin schools were documented at Togiak this season, no commercial harvest was reported, and no spawning was observed.

During the latter part of the season, many yellow fin sole fishermen were present on the herring grounds in large numbers, and there was much concern about their potential impact on the herring schools. On several instances, large vessels were observed dragging trawls through exiting schools of spawned out herring near Kulukak Bay. However, because these were all joint venture operations with foreign nations, United States observers were present on all of the processing vessels. When the removal of herring was calculated, only a small bycatch of herring was actually documented.

Table 1. Daily observed biomass estimates of herring by index area, in short tons, Togiak District, Bristol Bay, 1988.¹

| Date ³ | Time Surveyed | Survey Conditions | Milt Sightings | | Estimated Biomass by Index Area ² | | | | | | | | | | | Daily Total | | |
|-------------------|---------------|-------------------|----------------|--------------|--|--------|-------|-----------------|-----------------------|--------|--------|--------|--------|--------|-------|-------------|----|---------------------|
| | | | No. | Length (Mi.) | NUS | KUK | MET | KUK | UGL | TOG | TNG | MTG | HAG | OSK | PYR | | CN | |
| 4/19-5/07 | | | 0 | 0 | | | | | | | | | | | | | | 0 |
| 5/ 8 | 1545 | Good | 0 | 0 | | | | | 6 | | | | | | | | | 6 |
| 5/ 9 | 0930 | Poor | 0 | 0 | | | | | | | | | | | | | | 0 |
| 5/ 9 | 1615 | Good | 0 | 0 | | | | | 9 | | | | | | | | | 9 |
| 5/11 | 0700 | Poor | 0 | 0 | | | | | | | | | | | | | | 0 |
| 5/12 | 0645 | Good | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1,768 | 0 | 0 | 0 | 0 | 1,770 |
| 5/12 | 1900 | Fair | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5/13 | 0820 | Fair | 0 | 0 | - ^b | - | 0 | 0 | 231 | 5,671 | 700 | 697 | 5,171 | - | - | - | - | 12,470 |
| 5/13 | 1900 | Excellent | 0 | 0 | - | - | - | - | 141 | 5,908 | 14,771 | 294 | 10,752 | - | - | - | - | 31,866 |
| 5/14 | 0825 | Fair | 0 | 0 | - | - | - | - | - | 16,280 | 2,412 | - | 722 | - | - | - | - | 19,414 |
| 5/15 | 0900 | Fair | 0 | 0 | - | - | - | 1,517 | 21,875 | 9 | 195 | 140 | 904 | - | - | - | - | 24,640 |
| 5/15 | 1830 | Good | 2 | 1.50 | 0 | 0 | 46 | 662 | 3,379 | 18,820 | 17 | 10,065 | 85 | 5,373 | 410 | 0 | 0 | 38,857 |
| 5/16 | 0940 | Good | 1 | - | - | - | 0 | 2,044 | 31,315 | 9,422 | 56 | 5,682 | 67 | 3,569 | - | - | - | 52,155 ^b |
| 5/16 | 1505 | Good | 11 | 3.50 | - | - | - | - | - | 20,757 | 29,929 | 24,858 | - | 13,855 | 1,075 | 5,057 | - | 95,531 ^b |
| 5/17 | 0750 | Good | 20 | 22.75 | - | - | - | - | S P A W N S U R V E Y | | | - | - | - | - | - | - | - ^c |
| 5/18 | 1200 | Good | - | - | 7,488 | 7,551 | 9,831 | 10,093 | 4,482 | 6,514 | 2,829 | 970 | 324 | 1,919 | 363 | 336 | - | 66,686 ^d |
| 5/18 | 2200 | Good | 30 | 12.90 | - | - | - | - | S P A W N S U R V E Y | | | - | - | - | - | - | - | - |
| 5/19 | 1330 | Good | 26 | 9.10 | 720 | 7,405 | 859 | 4,499 | 3,453 | 7,711 | 1,029 | 74 | 315 | 593 | 68 | - | - | 26,726 |
| 5/21 | 1430 | Good | 3 | 0.90 | 3,221 | 13,168 | 1,313 | 53 ^e | 10,486 | 8,432 | 516 | 1,485 | 617 | 111 | - | - | - | 39,402 |

(continued)

Table 1. (Page 2 of 2)

| Date ³ | Time Surveyed | Survey Conditions | Milt Sightings | | Estimated Biomass by Index Area ² | | | | | | | | | | | | Daily Total | |
|-------------------|---------------|-------------------|----------------|-------------------|--|---------|--------|--------|-------|---------|------|------|--------|------|-----|----|-------------|--------------------|
| | | | No. | Length (Mi.) | NUS | KUK | MET | NUK | UGL | TOG | TNG | MTG | HAG | OSK | PYR | CN | | |
| 5/22 | 1130 | Excellent | 5 | 1.30 | - | 746 | 132 | 298 | 4,200 | - | - | - | - | - | - | - | - | 5,376 ^e |
| 5/22 | 1550 | Excellent | 9 | 4.10 | 1,481 | 10,945* | 2,294* | 1,006* | 2,343 | 11,049* | 512* | 538* | 1,395* | 125* | 0 | - | - | 31,688 |
| 5/23 | 1900 | Good | 1 | 3.50 | - | 7,866 | 587 | 610 | 112 | - | - | - | - | - | - | - | - | 9,175 |
| 5/24 | 1115 | Fair | 5 | 2.80 | - | 1,591 | 149 | 56 | 496 | 104 | - | - | - | - | - | - | - | 2,396 ^e |
| 5/24 | 1215 | Good | 1 | 1.00 ^f | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

1 Togiak District Pacific herring biomass was estimated at 134,718 short tons comprised of the following:

a Peak estimate of 128,959 tons observed 5/16, less 2.6% to account for presence of herring ages 3-5, equals 125,582 tons.

b Combined biomass estimates for Kulukak, Metervik, Togiak, Tongue Point, Matogak, Hagemeister and Osviak index areas (noted with asterisk on 5/22 where corresponding age composition data was available and 33% of the population (9,136 tons) representing the proportion of age 3-5 year old herring present in these combined areas.

c Summation of the 9,135 tons of herring to the revised peak estimate of 125,582 tons.

2 Index Areas: NUS-Nushagak Peninsula; KUK-Kulukak; MET-Metervik; NUK-Nunavachak; UGL-Ungalikthluk/Togiak; TOG-Togiak; TNG-Tongue Point; MTG-Matogak; HAG-Hagemeister; OSK-Osviak; PYT-Pyrite Point; CN-Cape Newenham.

3 Herring schools were only observed on 5/9 and 5/11 for surveys performed intermittently from 4/19 through 5/11. Surveys were flown regularly beginning 5/12 through 5/22.

a ' - ' denotes area not surveyed.

b Peak estimate of 128,959 short tons is the summation of the peak count in each index area from surveys conducted on 5/16.

c Date of both the gill net and purse seine fisheries. Spawn on kelp fishery occurred 5/22.

d Includes 13,986 tons removed by fishery 5/17. Observed biomass was 52,700.

e Partial survey.

f Southeast end of Summit Island only.

Table 2. Emergency order commercial herring sac roe and herring spawn on kelp fishing periods, Togiak District, Bristol Bay, 1988.

| <u>Emergency Orders¹</u> | | | | | | |
|-------------------------------------|------------------|----------------------------|---------------------|---------------|-------------------|--|
| <u>Number</u> | <u>K Area</u> | <u>Date, Time and Gear</u> | | | <u>Hours Open</u> | |
| <u>I. HERRING SAC ROE</u> | | | | | | |
| DLG 01 | | May 17 | 10:30 a.m. - May 17 | 2:30 p.m. G/N | 4.0 hours | |
| DLG 02 | | May 17 | 12:30 p.m. - May 17 | 1:00 p.m. P/S | 0.5 hours | |
| <u>II. HERRING SPAWN ON KELP</u> | | | | | | |
| DLG 03 | K-4 ^a | May 20 | 10:00 p.m. - May 21 | 4:00 a.m. | 6.0 hours | |
| | K-8 ^b | May 20 | 10:00 p.m. - May 21 | 4:00 a.m. | 6.0 hours | |

1 Prefix code on emergency orders indicate where announcements originated ("DLG" for Dillingham).

a That portion of K-4 from the southern entrance of Mud Bay in East Nunavachak, south approximately 1-1/2 miles to a temporary tripod marker.

b That portion of K-8 from the creek at the head of the Bay, south and west for approximately 1-1/2 miles to the tip of the point.

Table 3. Commercial herring catch and roe recovery by period and gear type, Togiak District, Bristol Bay, 1988.

| Period | Hours | | Short Tons | | | Roe Percent ¹ | | |
|------------------|----------|-------------|------------|-------------|--------------------|--------------------------|-------------|-------|
| | Gill Net | Purse Seine | Gill Net | Purse Seine | Total ² | Gill Net | Purse Seine | Total |
| 5/17 | 4.0 | .5 | 3,474 | 10,614 | 14,088 | 8.3 | 10.9 | 10.3 |
| Total | 4.0 | .5 | 3,474 | 10,614 | 14,088 | 8.3 | 10.9 | 10.3 |
| Percent of Catch | | | 24.7 | 75.3 | 100.0 | | | |

1 Weighted by catch and gear type.

2 Includes herring taken in Department of Fish and Game test fish program, but does not include estimated waste.

Table 4. Pacific herring catch by fishing period, time, and section, in short tons, Togiak District, Bristol Bay, 1988.^a

| Period | Time (hours) | Section | | | | | Total | |
|-------------------|--------------|-------------|-------------|----------|-------------|--------------|---------------|----------------|
| | | Kulukak | Nunavachak | Togiak | Hogemeister | Pyrite Point | | Cape Newenham |
| Gill Net | | | | | | | | |
| 5/17 a.m. | 4.0 | 1,104 | 2,315 | | | | 3,419 | |
| 5/17 ^b | | | 55 | | | | 55 | |
| 5/17 ^c | | | 145 | | | | 145 | |
| | 4.0 | 1,104 (30%) | 2,515 (70%) | | | | 3,619 (24.7%) | |
| Purse Seine | | | | | | | | |
| 5/17 a.m. | 0.5 | | | 194 | 8,423 | 1,290 | 695 | 10,602 |
| 5/17 ^d | | | | 150 | | | | 150 |
| 5/24 ^e | | | 11 | | | | | 11 |
| | 0.5 | | 11 (%) | 344 (3%) | 8,423 (78%) | 1,290 (12%) | 695 (7%) | 10,763 (75.3%) |
| Combined Gear | | | | | | | | |
| 5/17 | 4.5 | 1,104 | 2,315 | 194 | 8,423 | 1,290 | 695 | 14,021 |
| 5/17 | | | 55 | | | | | 55 |
| 5/17 | | | 145 | 150 | | | | 295 |
| 5/24 | | | 11 | | | | | 11 |
| | 4.5 | 1,104 (7%) | 2,526 (18%) | 344 (2%) | 8,423 (59%) | 1,290 (9%) | 695 (5%) | 14,382 (100%) |

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- a Preliminary
- b Herring recovered from gill nets that were lost or abandoned.
- c Estimated waste from gill nets that were not recovered.
- d Estimated waste from purse seine dead loss.
- e Herring landed by the Department staff for a point biomass estimate.

Table 5. Commercial herring spawn on kelp harvest, by day and area, in pounds, Togiak District, Bristol Bay, 1988.

| Date | Time | Hours | Kelping Area | | Daily Total | |
|-------|-------------|-------|--------------|---------|----------------------|------------|
| | | | K-4 | K-8 | Pounds | Short Tons |
| 5/20 | 21:30-03:30 | 6.0 | 215,695 | 273,625 | 489,320 | |
| Total | | 6.0 | 215,695 | 273,625 | 489,320 ^a | 244.7 |

a Using a formula adopted by the 1984 Board of Fisheries, herring spawn on kelp harvest may be converted to represent herring as follows:

$$\begin{array}{r}
 \text{(1988 Spawn On Kelp Harvest)} \\
 - \text{Estimated Plant Weight (25\%)} \\
 \hline
 \text{Weight of Eggs Harvested}
 \end{array}
 \quad \text{or} \quad
 \begin{array}{r}
 (489,320 \text{ lbs.} - 122,330 \text{ lbs.}) \\
 \hline
 366,990 \text{ lbs.} = 183.5 \text{ tons of eggs}
 \end{array}$$

1988 Average Roe Recovery = 10.3%

Thus, 183.5 tons of eggs were produced by...

$$\frac{10.3\%}{183.5} : \frac{100\%}{X} \quad X = 1,781.6 \text{ short tons of herring.}$$

This number (1,781.6 s. tons) was added to the herring harvest and included in calculating exploitation.

Table 6. Herring total run and commercial catch by year class, Togiak District, Bristol Bay, 1988.

| Year Class | Age | Total Run | | Catch | | Escapement | |
|--------------|-----|----------------|--------------|---------------|--------------|----------------|--------------|
| | | Short Tons | Percent | Short Tons | Percent | Short Tons | Percent |
| 1975 | 13+ | 2,748 | 2.0 | 101 | 0.7 | 2,647 | 2.2 |
| 76 | 12 | 3,724 | 2.8 | 475 | 3.3 | 3,249 | 2.7 |
| 77 | 11 | 22,378 | 16.6 | 2,402 | 16.7 | 19,976 | 16.6 |
| 78 | 10 | 46,645 | 34.6 | 5,249 | 36.5 | 41,396 | 34.4 |
| 79 | 9 | 24,763 | 18.4 | 2,862 | 19.9 | 21,901 | 18.2 |
| 80 | 8 | 6,476 | 4.8 | 820 | 5.7 | 5,656 | 4.7 |
| 81 | 7 | 17,124 | 12.7 | 1,841 | 12.8 | 15,283 | 12.7 |
| 82 | 6 | 1,679 | 1.3 | 115 | 0.8 | 1,564 | 1.3 |
| 83 | 5 | 6,116 | 4.5 | 460 | 3.2 | 5,656 | 4.7 |
| 84 | 4 | 2,931 | 2.2 | 43 | 0.3 | 2,888 | 2.4 |
| 85 | 3 | 135 | 0.1 | 14 | 0.1 | 120 | 0.1 |
| 86 | 2 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Total | | 134,718 | 100.0 | 14,382 | 100.0 | 120,336 | 100.0 |

Table 7. Commercial herring sac roe and herring spawn on kelp processors and buyers operating in Togiak District, Bristol Bay, 1988.^a

| Name of Operator/Buyer | Base of Operations | Processing Method | | Brine Export | Comments |
|------------------------------|-----------------------|-------------------|-------|--------------|-----------------------------|
| | | Frozen | Cured | | |
| A. HERRING SAC ROE | | | | | |
| 1. All Alaskan Seafoods Inc. | P/V Northern Alaskan | Floater | | | |
| 2. Anpac Inc. | M/V Nushagak | Floater | | | |
| 3. Blue Pacific Industries | M/V Tuxedni | Shore | | Sea | Naknek, South Naknek, Ekuak |
| 4. Icicle Seafoods | P/V Bering Star | Floater | | | |
| 5. Kemp Pacific Fisheries | M/V Maverick | Floater | | | |
| 6. King Crab, Inc. | M/V Kodiak Queen | Shore | | Sea | Kodiak |
| 7. Lafayette, Inc. | M/V Pribilof, | Floater | | | |
| 8. New West Fisheries | M/V New West | Floater | | | |
| 9. Northcoast Seaf. Proc. | M/V Polar Bear | Floater | | | |
| 10. Oceanic Seafood Co. | M/V Pacific Harvester | Floater | | | |
| 11. Pan Pacific Seafoods | M/V Pacific Producer | Floater | | | |
| 12. Peter Pan Seafoods Inc. | P/V Blue Wave | Floater | | | |
| 13. Seward Marine Services | M/V Sno Pac Alaska | Floater | | | |
| 14. Snopac Products, Inc. | M/V Snopac Alaska | Floater | | | |
| 15. T.E.A.M. Inc. | | Shore | | Sea | Togiak |
| 16. Togiak Nuka Point | | Shore | | Sea | |
| 17. Trident Seafoods | P/V Neptune, | Floater | | | |
| 18. Unisea | M/V Deborah D. | Floater | | | |
| 19. Western Fish Producer | M/V Nicole N. | Floater | | | |
| 20. Woodbine | P/V Woodbine | Floater | | | |
| 21. YAK, Inc. | M/V Yardarm Knot | Floater | | | |
| | TOTAL | 21 | | 4 | |

(continued)

Table 7. (Page 2 of 2)

| Name of Operator/Buyer | Base of Operations | Processing Method | | Brine Export | Comments |
|---------------------------------|--------------------|-------------------|-------|--------------|----------|
| | | Frozen | Cured | | |
| B. HERRING SPAWN ON KELP | | | | | |
| 1. Anpac, Inc. | | | | Floater | |
| 2. Camando Kelpers | | | | Shore | |
| 3. Hanes, Ron | | | | Shore | |
| 4. J. T. Kelpers | | | | Shore | |
| 5. Kemp Pacific Fisheries | | | | Floater | |
| 6. Northcoast Seaf. Proc. | | | | Floater | |
| 7. Team Seafoods | | | | Shore | |
| 8. Togiak Fisheries | | | | Shore | |
| 9. Whitney Foods, Inc. | | | | Shore | |
| 10. Woodbine | | | | Floater | |
| | TOTAL | | | 10 | |

a Operators with a processing facility in the district or operators from other areas buying herring or kelp and providing tender and support service for fishermen in areas away from the facility.

Appendix Table 1. Aerial estimates of surface area and tonnage conversion of herring schools, in the Togiak District, Bristol Bay, 1978-88.

| Year | Date | Estimated Tons Per 538 sq. ft. ¹ | School Size | Weight of Catch (Tons) | Actual or Est. Weight of Catch | Fish Maturity | Location of Purse Seine Set | Water Depth (Ft.) |
|------|------|---|-------------|------------------------|--------------------------------|---------------------|------------------------------|-----------------------|
| 1978 | 5/13 | 7.39 | a | a | Estimated | a | Nunavachak Bay | a |
| | 18 | 12.13 | 80 x 60 | 110 | Estimated | a | Nunavachak Bay | a |
| 1979 | 5/ 4 | 2.65 | 40 dia. | 6 | Actual | Ripe | Ungalikthluk Bay | 20 |
| 1980 | 5/15 | 1.32 | 60 x 40 | 6 | Actual | Ripe | Ungalikthluk Bay | 10 |
| | 15 | 1.76 | 40 x 30 | 4 | Estimated | Spawn-outs | Ungalikthluk Bay | 26 |
| | 16 | 1.21 ^b | 220 x 50 | 21 | Actual | Spawn-outs | Nunavachak Bay | 16 |
| | 16 | 1.32 | 65 x 20 | 3 | Estimated | Fish lost | 1 Mile West Ungalikthluk Pt. | 16 |
| | 20 | 3.31 | 70 x 70 | 30 | Estimated | Ripe | East of Eagle Bay | 20 |
| | 20 | 2.87 | 150 x 75 | 59 | Estimated | Fish lost | Eagle Bay | 20 |
| | 1981 | 5/ 3 | 1.21 | 400 x 200 | 88 | Actual | Ripe | West Side, Tongue Pt. |
| | 8 | 1.87 | 80 x 30 | 8 | Actual | Spawn-outs | Togiak Bay, Mouth | 20 |
| | 10 | 4.41 | 150 x 60 | 44 | Actual | Ripe | Asigyukpak Spit Bight | 26 |
| 1982 | 5/15 | 2.09 | 200 x 150 | 110 | Estimated | Green | Kulukak Bay | 26 |
| 1983 | 4/30 | 1.21 | 150 x 180 | 60 | Estimated | Green | Togiak Bay | 13 |
| | 30 | 1.10 | 350 x 143 | 100 | Estimated | Green | Togiak Bay | 10 |
| | 30 | 1.65 | 60 x 30 | 3 | Estimated | Green | Togiak Bay | 26 |
| | 5/11 | 1.98 | 200 x 200 | 140 | Estimated | Ripe and Spawn-outs | Togiak Bay | 10 |
| | 18 | 1.87 | 300 x 50 | 50 | Estimated | Spawn-outs | Nushagak Peninsula | 13 |
| | 18 | 2.43 | 60 x 60 | 15 | Estimated | Spawn-outs | Nushagak Peninsula | 13 |
| 1986 | 5/17 | 2.15 | 100 x 100 | 40 | Estimated | Spawn-outs | Togiak Bay | 13 |
| | 17 | 5.38 | 100 x 30 | 30 | Estimated | Spawn-outs | West Side, Tongue Point | 17 |

(continued)

Appendix Table 1. (Page 2 of 2)

| Year | Date | Estimated Tons Per 538 sq. ft. ¹ | School Size | Weight of Catch (Tons) | Actual or Est. Weight of Catch | Fish Maturity | Location of Purse Seine Set | Water Depth (Ft.) |
|------|------|---|----------------|---------------------------------|---|-------------------------|---|-------------------------|
| 1986 | 5/19 | 1.15 | 100 x 50 | 11 | Actual | Ripe | West Side, Kulukak Bay | 8 |
| | 19 | 1.12 | 100 x100 | 21 | Actual | Ripe | West Side, Kulukak Bay | 10 |
| | 5/20 | 1.08 | 100 x100 | 20 | Estimated | Spawn-outs/ Immature | East Side, Tip of Hagemeister Is. | 12 |
| | 5/21 | 11.86 | 70 x 70 | 108 | Actual | Ripe | Gravel Beach, Nunavachak Section, N. of Summit Island | 5 |
| 1987 | 5/09 | 5.49 | 70 x 70 | Released | | | Oosik Spit | 10 |
| | 5/11 | 3.40 | 70 x 70 | 31 | Actual | Ripe | Tounge Point | 13 |
| | 5/11 | 1.26 | 100 x100 | 23.5 | Actual | Ripe | Tounge Point | 11 |
| 1988 | 5/24 | 2.69 | 50 x 50 | 11.6 | Actual | Ripe | Gravel Beach Nunavachak Section, N. of Summit Island | 12 |

1 Surface area for each school is expressed as a multiple of 538 sq. ft. or 50 sq. m. This is the maximum area of a "small" school and is equal to one relative abundance index (RAI).

a Incomplete data.

b Average of two observers' estimates.

(Source: 1)

Appendix Table 2. Commercial catch of herring by gear type and product, Togiak District, Bristol Bay, 1969-88.

| Year | Number of Processors | Percent Catch ¹ | | | | | | Total Catch (S.T.) ³ |
|-----------------|----------------------|----------------------------|-------------|----------|-------------|---------|-----------|---------------------------------|
| | | Units of Gear ² | | Gear | | Product | | |
| | | Gill Net | Purse Seine | Gill Net | Purse Seine | Sac Roe | Food/Bait | |
| 1969 | 2 | 22 | 1 | 38 | 62 | 100 | 0 | 47 |
| 70 | 3 | 16 | 1 | 67 | 33 | 100 | 0 | 28 |
| 71 ^a | | | | | | | | |
| 72 | 1 | 18 | 1 | 40 | 60 | 100 | 0 | 80 |
| 73 | 2 | 26 | 1 | 100 | 0 | 100 | 0 | 51 |
| 1974 | 3 | 10 | 1 | 16 | 84 | 100 | 0 | 123 |
| 75 | 2 | 39 | 0 | 100 | 0 | 100 | 0 | 56 |
| 76 ^a | | | | | | | | |
| 77 | 6 | 43 | 6 | 11 | 89 | 100 | 0 | 2,795 |
| 78 | 16 | 40 | 25 | 8 | 92 | 100 | 0 | 7,734 |
| 1979 | 33 | 350 | 175 | 40 | 60 | 92 | 8 | 11,558 |
| 80 | 27 | 363 | 140 | 16 | 84 | 85 | 15 | 18,886 |
| 81 | 28 | 106 | 83 | 18 | 82 | 99 | 1 | 12,542 |
| 82 | 33 | 200 | 135 | 31 | 69 | 93 | 7 | 21,489 |
| 83 | 23 | 250 | 150 | 19 | 81 | 97 | 3 | 26,287 |
| 1984 | 25 | 300 | 196 | 25 | 75 | 98 | 2 | 19,300 |
| 85 | 23 | 302 | 155 | 17 | 83 | 99 | 1 | 25,616 |
| 86 | 23 | 209 | 209 | 21 | 79 | 99 | 1 | 16,260 |
| 87 | 18 | 148 | 111 | 17 | 83 | 98 | 2 | 15,204 |
| 88 | 22 | 300 | 239 | 25 | 75 | 99 | 1 | 14,382 |
| 20 Year Average | 16 | 152 | 91 | 34 | 66 | 98 | 2 | 10,691 |
| 1969-78 Average | 4 | 27 | 5 | 48 | 53 | 100 | 0 | 1,364 |
| 1979-88 Average | 26 | 253 | 159 | 23 | 77 | 96 | 4 | 18,152 |

1 Average Percent Catch is weighted by each year's total catch.

2 Prior to 1979 number of units derived from fish tickets, 1979-1988 estimated by aerial survey.

3 Catch prior to 1973 reflects sorted females only.

a Fishery not conducted.

Appendix Table 3. Estimated herring biomass and inshore commercial catch, in short tons, Togiak District, Bristol Bay, 1978-88.

| Year | Total Run | Commercial Catch | Roe Recovery (%) | | | Percent Exploitation ¹ |
|------|-----------|------------------|------------------|-------------|-------|-----------------------------------|
| | | | Gill Net | Purse Seine | Total | |
| 1978 | 190,292 | 7,734 | | | 8.2 | 4.1 |
| 79 | 239,022 | 11,558 | | | 8.6 | 4.7 |
| 80 | 68,686 | 18,886 | | | 9.2 | 35.0 |
| 81 | 158,650 | 12,542 | 6.7 | 10.1 | 9.1 | 7.9 |
| 82 | 97,902 | 21,489 | 7.4 | 9.5 | 8.8 | 22.0 |
| 83 | 141,782 | 26,287 | 6.9 | 9.3 | 8.9 | 19.1 |
| 84 | 114,880 | 19,300 | 8.4 | 10.2 | 9.8 | 18.3 |
| 85 | 131,400 | 25,616 | 7.4 | 10.0 | 9.6 | 19.7 |
| 86 | 94,770 | 16,260 | 8.8 | 9.9 | 9.7 | 18.7 |
| 87 | 88,400 | 15,204 | 8.6 | 8.9 | 8.8 | 19.1 |
| 88 | 134,717 | 14,382 | 8.3 | 10.9 | 10.3 | 13.3 |

1 The percent exploitation is calculated by dividing the adjusted total harvest, which includes all commercial landings, all documented waste, and the herring equivalent of the spawn on kelp removal, by the total run.

(Source: 1)

Appendix Table 4. Age composition of the inshore herring run, Togiak District, Bristol Bay, 1977-88.

| Year | Age Composition (%) ¹ | | | | | | | Catch (S.T.) | Total Run ² (S.T.) |
|------|----------------------------------|----|----|----|----|----|----|---------------------|-------------------------------------|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9+ | | |
| 1977 | 4 | 49 | 37 | 3 | 3 | 3 | 1 | 2,795 | - |
| 78 | 11 ^a | 44 | 33 | 9 | 1 | 1 | 1 | 7,734 | 190,292 |
| 79 | 3 | 9 | 43 | 35 | 9 | + | 1 | 11,558 | 239,022 |
| 80 | 3 | 2 | 2 | 39 | 37 | 15 | 2 | 24,586 | 68,686 |
| 81 | 2 | 48 | 5 | 1 | 25 | 15 | 4 | 12,572 | 158,650 |
| 1982 | | 16 | 56 | 3 | 1 | 13 | 11 | 21,869 | 97,902 |
| 83 | | 4 | 33 | 47 | 2 | 2 | 12 | 26,887 | 141,782 |
| 84 | | 2 | 8 | 32 | 40 | 5 | 13 | 19,470 | 114,880 |
| 85 | | 5 | 3 | 8 | 29 | 41 | 14 | 25,866 ^b | 131,400 |
| 86 | | | 7 | 4 | 18 | 40 | 31 | 16,310 ^c | 94,770 |
| 1987 | | | 1 | 11 | 10 | 28 | 50 | 15,504 ^d | 88,400 |
| 88 | | 2 | 5 | 1 | 13 | 5 | 74 | 14,382 ^e | 134,717 |

1 Age composition in 1977-78 based on number samples, and not weighted by weight at age and aerial biomass estimates; while age composition in 1979-86 is weighted by weight at age and aerial biomass estimates.

2 Includes commercial catch plus escapement.

a Includes age 1, 2 and 3.

b Includes 250 s.t. waste.

c Includes 50 s.t. waste.

d Includes 300 s.t. waste.

e Includes 295 s.t. waste.

(Source: 1)

Appendix Table 5. Commercial harvest of herring spawn on kelp in the Togiak District, Bristol Bay, 1969-88.

| Year | Processors | Permit Holders | Deliveries | Harvest (lbs.) |
|-----------------|------------|----------------|------------|----------------|
| 1969 | 1 | 3 | 20 | 10,125 |
| 70 | 1 | 5 | 23 | 38,855 |
| 71 | 1 | 12 | 43 | 51,795 |
| 72 | 1 | 12 | 32 | 64,165 |
| 73 | 1 | 10 | 11 | 11,596 |
| 1974 | 3 | 26 | 49 | 125,646 |
| 75 | 2 | 44 | 98 | 111,087 |
| 76 | 5 | 49 | 118 | 295,780 |
| 77 | 5 | 75 | 266 | 275,774 |
| 78 | 11 | 160 | 349 | 329,858 |
| 1979 | 16 | 100 | 228 | 414,727 |
| 80 | 21 | 78 | 186 | 189,662 |
| 81 | 7 | 108 | 277 | 378,207 |
| 82 | 8 | 214 | 167 | 234,924 |
| 83 | 4 | 125 | 257 | 270,866 |
| 1984 | 6 | 330 | 412 | 406,587 |
| 85 ^a | | | | |
| 86 | 3 | 204 | 351 | 374,142 |
| 87 | 5 | 187 | 334 | 307,307 |
| 88 | 10 | 259 | 330 | 489,320 |
| 20 Year Average | 6 | 105 | 187 | 230,549 |
| 1969-78 Average | 3 | 40 | 101 | 131,468 |
| 1979-88 Average | 9 | 178 | 282 | 340,638 |

a Fishery not conducted.

(Source: 1)

Appendix Table 6. Aerial observations of herring spawnings in the Togiak District, Bristol Bay, 1978-88.^a

| Date | 1978 | | 1979 | | 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | |
|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
| | No. | Miles | |
| 4/24 | | | | | | | | | | | | | | | | | | | 15 | 2.9 | | | |
| 25 | | | | | | | | | | | | | | | | | | | 17 | 5.2 | | | |
| 26 | | | | | | | | | | | | | | | | | | | 15 | 3.4 | | | |
| 27 | | | | | | | | | | | | | | | | | | | 24 | 4.3 | | | |
| 28 | | | | | | | | | | | | | | | | | | | 0 | | | | |
| 29 | | | | | | | | | | | | | | | | | | | 0 | | | | |
| 30 | | | 2 | 2.5 | | | 9 | 3.0 | | | 0 | | | | | | | | 7 | 1.7 | | | |
| 5/ 1 | 1 | 0.4 | | | | | 6 | 2.3 | | | 0 | | | | | | | | 0 | | | | |
| 2 | | | 21 | 8.3 | 11 | 4.0 | 12 | 1.9 | | | 10 | 3.6 | | | | | | | | | | | |
| 3 | 1 | 0.4 | 14 | 5.0 | 8 | 3.0 | 12 | 6.8 | | | 30 | 9.3 | | | | | | | 21 | 10.7 | | | |
| 4 | | | 8 | 3.1 | | | 4 | 2.9 | | | 40 | 12.5 | | | | | | | 15 | 6.3 | | | |
| 5 | | | 1 | 1.3 | 0 | | 6 | 2.5 | | | 27 | 7.5 | | | | | | | 21 | 23.9 | | | |
| 6 | | | | | 3 | 0.9 | 0 | | | | 8 | 2.9 | | | | | | | 9 | 8.4 | | | |
| 7 | | | 3 | 0.6 | 3 | 1.2 | 2 | 0.4 | 0 | | 8 | 1.5 | | | | | | | 7 | 3.3 | | | |
| 8 | 2 | 1.8 | | | 1 | 0.2 | 3 | 1.0 | | | 8 | 1.9 | | | | | | | | | | | |
| 9 | | | 2 | 0.4 | | | 5 | 1.4 | | | | | 1 | + | | | | | 0 | | | | |
| 10 | | | 0 | | | | 0 | | 0 | | | | | | | | | | 2 | 0.4 | | | |
| 11 | 9 | 7.7 | | | 0 | | | | | | 3 | 3.5 | | | | | | | 6 | 4.7 | 0 | 0 | |
| 12 | 3 | 1.5 | 0 | | 0 | | 15 | 4.8 | 0 | | 9 | 5.4 | | | | | | | | | 0 | 0 | |
| 13 | 12 | 8.6 | | | 0 | | 6 | 3.8 | 0 | | 0 | | | | | | 2 | 0.8 | | | 0 | 0 | |
| 14 | 11 | 5.6 | 0 | | 2 | 2.3 | 10 | 4.7 | 0 | | | | | | | | 29 | 13.8 | 1 | 0.6 | 2 | 1.5 | |
| 15 | | | | | 6 | 4.0 | 2 | 1.5 | 0 | | 2 | 1.0 | | | | | | | 53 | 18.2 | | | |
| 16 | | | 0 | | 4 | 1.2 | 0 | | 1 | 0.1 | 4 | 0.5 | 1 | 0.3 | | | | 34 | 11.1 | | 11 | 3.5 | |
| 17 | | | 0 | | | | | | 4 | 0.7 | 9 | 2.0 | 1 | 0.5 | | | | | 24 | 11.7 | | 20 | 22.8 |
| 18 | 11 | 4.2 | | | | | | | 29 | 7.3 | 19 | 6.1 | 24 | 17.6 | | | | | 3 | 0.6 | | 30 | 12.9 |
| 19 | 3 | 2.5 | | | 1 | 0.3 | | | 16 | 5.2 | 7 | 1.7 | 71 | 24.6 | | | | | 1 | 0.6 | | 26 | 9.1 |
| 20 | | | | | 4 | 0.9 | | | 19 | 14.0 | 0 | | 8 | 1.3 | 3 | 0.2 | 3 | 0.6 | | | | - | - |

(cont inued)

Appendix Table 6. (Page 2 of 2)

| Date | 1978 | | 1979 | | 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | |
|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
| | No. | Miles |
| 21 | | | 0 | | | | | | 3 | 2.0 | | | 0 | | 8 | 2.0 | 11 | 4.2 | | | 3 | 0.9 |
| 22 | | | | | 2 | 0.5 | | | 3 | 1.5 | | | 5 | 1.2 | 13 | 2.3 | 4 | 0.5 | | | 9 | 4.1 |
| 23 | | | | | | | 10 | 2.1 | 11 | 3.3 | 0 | | 3 | 1.4 | 48 | 14.2 | 4 | 1.5 | | | 1 | 3.5 |
| 24 | | | | | | | | | 5 | 1.4 | | | 6 | 2.2 | 25 | 11.7 | 11 | 2.6 | | | 5 | 2.8 |
| 25 | 8 | 4.2 | | | | | | | 1 | 0.3 | 1 | 0.1 | 3 | 1.4 | 17 | 5.2 | | | | | | |
| 26 | 2 | 2.2 | 1 | 0.7 | | | 3 | 0.2 | 0 | | 1 | 0.1 | 14 | 4.1 | 23 | 7.3 | | | | | | |
| 27 | | | | | 3 | 0.3 | | | 0 | | 2 | 0.1 | 8 | 1.2 | | | 0 | 0 | | | | |
| 28 | 0 | | | | | | | | 0 | | | | 3 | 0.1 | | | | | | | | |
| 29 | | | | | 8 | 1.6 | | | 0 | | | | 2 | 0.2 | 0 | 0 | | | | | | |
| 30 | 6 | 1.6 | | | | | | | 0 | | 0 | | 4 | 0.5 | | | 3 | 0.3 | | | | |
| 31 | | | | | 2 | 0.8 | | | 0 | | | | 12 | 4.1 | | | | | | | | |
| 6/ 1 | | | | | | | | | 7 | 2.6 | 0 | | 3 | 0.5 | 4 | 0.5 | | | | | | |
| 2 | 1 | 0.5 | | | | | | | 0 | | | | | | | | | | | | | |
| 3 | | | | | | | 1 | 0.8 | 4 | 0.2 | 1 | + | | | | | | | | | | |
| 4 | | | | | | | | | | | | | 2 | 0.2 | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | 0 | 0 | | | | |
| 7 | | | | | 6 | 3.1 | | | | | | | | | | | | | | | | |
| Total | 70 | 41.2 | 52 | 21.9 | 64 | 24.3 | 106 | 40.1 | 103 | 40.6 | 189 | 59.7 | 171 | 61.4 | 141 | 43.4 | 182 | 66.5 | 160 | 78.5 | 107 | 61.1 |

a Survey area covers Nushagak Peninsula to Cape Newenham, and shows the number of individual herring spawns and linear miles of milt visible at the time of the aerial survey.

(Source: 1)

Appendix Table 7. Exvessel value of the commercial herring and spawn on kelp harvest, in thousands of dollars, Togiak District, Bristol Bay, 1969-88.^a

| Year | Sac Roe | Food/Bait | Spawn on Kelp | Total |
|-----------------|---------|-----------|---------------|--------|
| 1969 | 4 | 0 | 1 | 5 |
| 70 | 2 | 0 | 6 | 8 |
| 71 | b | b | 8 | 8 |
| 72 | 4 | 0 | 9 | 13 |
| 73 | 2 | 0 | 2 | 4 |
| 1974 | 24 | 0 | 19 | 43 |
| 75 | 9 | 0 | 22 | 31 |
| 76 | b | b | 127 | 127 |
| 77 | 447 | 0 | 116 | 563 |
| 78 | 2,635 | 0 | 120 | 2,755 |
| 1979 | 6,561 | 180 | 249 | 6,990 |
| 80 | 3,055 | 150 | 95 | 3,300 |
| 81 | 3,988 | 1 | 250 | 4,239 |
| 82 | 6,070 | 105 | 176 | 6,351 |
| 83 | 10,450 | 67 | 284 | 10,801 |
| 1984 | 7,178 | 33 | 203 | 7,414 |
| 85 | 13,696 | 41 | b | 13,737 |
| 86 | 8,648 | 12 | 187 | 8,847 |
| 87 | 8,614 | 49 | 166 | 8,829 |
| 88 | 14,736 | 4 | 346 | 15,086 |
| 20 Year Average | 4,533 | 36 | 126 | 4,458 |
| 1969-78 Average | 347 | 0 | 43 | 356 |
| 1979-88 Average | 8,300 | 64 | 217 | 8,559 |

a Exvessel value is the value paid to the fishermen derived from price per pound times commercial harvest.

b No fishery was conducted.

(Source: 1)

ALASKA BOARD OF FISHERIES
BRISTOL BAY HERRING MANAGEMENT DIRECTIVE

THE BRISTOL BAY HERRING AND HERRING SPAWN ON KELP FISHERY WILL BE MANAGED WITHIN THE FOLLOWING GUIDELINES:

1. A MINIMUM THRESHOLD LEVEL OF BIOMASS FOR CONSERVATION OF THE STOCKS WILL BE MAINTAINED;
2. DIFFERING HARVEST RATES FOR OLDER AND YOUNGER AGE CLASSES (5 YRS. OR GREATER AND 4 YRS. OR LESS) HERRING WILL BE USED;
3. THE COMMERCIAL HARVEST WILL NOT BEGIN UNTIL THE START OF SPAWNING, THUS ENSURING THE OPPORTUNITY FOR THE HIGHEST ROE RECOVERY; AND
4. THE HARVEST MANAGEMENT SHOULD MINIMIZE WASTAGE OF THE RESOURCE.

THEREFORE, THE DEPARTMENT STAFF WILL TAKE THE FOLLOWING ACTION GIVEN THE SPECIFIED CIRCUMSTANCES:

1. WHEN THE TOTAL DAILY OBSERVED BIOMASS OF EARLY SEASON OLDER AGE CLASS HERRING EXCEEDS 5,000 METRIC TONS, AND SOME SPAWNING HAS OCCURRED, THE SEASON WILL OPEN AND THE HARVEST RATE WILL BE FROM 10% TO 20% OF THE OBSERVED BIOMASS;
2. WHEN THE TOTAL OBSERVED BIOMASS OF LATER SEASON YOUNGER AGE CLASS HERRING EXCEEDS 20,000 METRIC TONS, A HARVEST RATE OF UP TO 20% WILL BE ALLOWED;
3. THE NUMBER OF OPENINGS ALLOWED IN THE HERRING SPAWN ON KELP FISHERY WILL BE BASED ON THE FISHING TIME IN THE HERRING FISHERY, AND DENSITY AND DISTRIBUTION OF OBSERVED SPAWN;
4. WHENEVER POSSIBLE, OPENINGS FOR BOTH GEAR TYPES SHALL BE INITIATED AT LOW WATER, OR THE BEGINNING OF THE FLOOD TIDE;
5. WHENEVER POSSIBLE, SEPARATE OPENINGS SHALL BE ANNOUNCED FOR GILL NETS AND PURSE SEINES;
6. WHENEVER POSSIBLE, GILL NETS SHALL BE ALLOWED TO FISH FIRST AND ALL OPENINGS SHALL BEGIN DURING THE HOURS OF DAYLIGHT;
7. WHEN PURSE SEINE OPENINGS ARE ONE HOUR OR LESS, GILL NET OPENINGS SHALL BE AT LEAST FIVE HOURS IN DURATION;
8. IN EMERGENCY SITUATIONS SUCH AS PENDING BAD WEATHER OR A LIKELY LOSS OF ROE RECOVERY DUE TO FURTHER DELAY, THE STAFF SHALL TIME OPENINGS AS THE SITUATION REQUIRES; AND
9. LATE SEASON (POST-PEAK) HERRING OPENINGS AT TOGLAK SHALL BE BASED ON ONE OR MORE OF THE FOLLOWING CRITERIA:
 - A. A DEFINABLE INCREASE IN THE BIOMASS OF HERRING PRESENT ON THE FISHING GROUNDS.
 - B. A MAJOR SHIFT IN THE AGE COMPOSITION OF THE SAMPLES IN A DEFINABLE BIOMASS THAT IS LARGE ENOUGH TO ALLOW A HARVEST.
 - C. A MAJOR IMPROVEMENT IN THE ROE MATURITY OF FISH SAMPLED OVER A BROAD AREA, INDICATING THE ARRIVAL OF A QUANTITY OF "NEW" HERRING.

IT IS THE EXPRESSED INTENT OF THE BOARD TO FULLY UTILIZE HARVESTABLE SURPLUSES IN THE INSHORE FISHERY.

