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DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1998-

BRISTOL BAY AREA

Regional Information Report[1] No. 2A99-18

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PREFACE

The 1998 Bristol Bay Management Report is the thirty-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 1998. 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 office. Attention: Editor.

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INTRODUCTION

Management Area Description

The Bristol Bay management area includes all coastal waters and inland waters east of a line from Cape Newenham to Cape Menshikof (Figure 1). The area includes eight major river systems: Naknek, Kvichak, Egegik, Ugashik, Wood, Nushagak, Igushik and Togiak. Collectively, these rivers are home to the largest commercial sockeye salmon fishery in the world. Sockeye salmon are by far the most abundant salmon species that return to Bristol Bay each year, but chinook, chum, coho, and (in even-years) pink salmon returns are important to the fisheries as well.

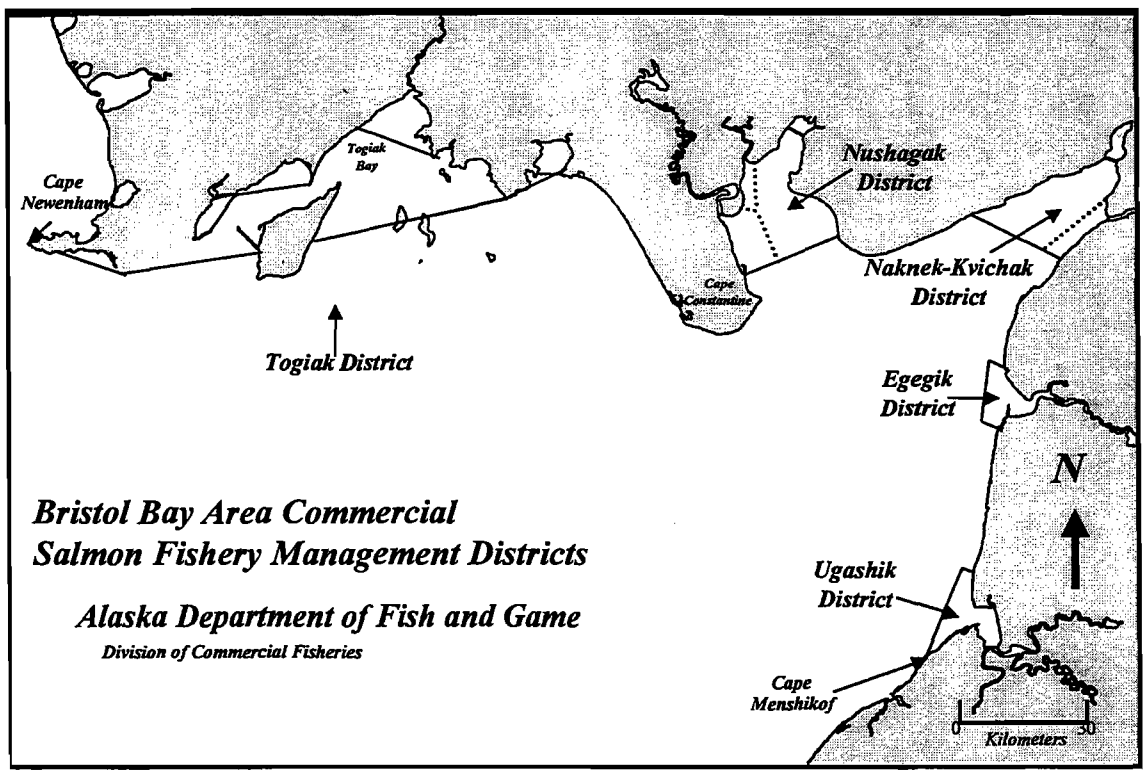

Figure 1.

The Bristol Bay area is divided into five management districts (Naknek-Kvichak, Egegik, Ugashik, Nushagak, and Togiak) that correspond to the major river drainages. The management objective for each river is to achieve desired escapement goals for the major salmon species while harvesting all fish in excess of the escapement requirement through orderly fisheries. In addition, regulatory management plans have been adopted for individual species in certain districts.

Overview of the Bristol Bay Salmon Fisheries

The five species of pacific salmon found in Bristol Bay are the focus of major commercial, subsistence and sport fisheries. Annual commercial catches (1978-1997) average 25.5 million sockeye salmon, 114 thousand chinook, 1.2 million chum, 206 thousand coho, and 1.5 million (even-years only) pink salmon (Appendix Tables 5-9). Since 1988, the value of the commercial salmon harvest in Bristol Bay has averaged $154 million, with sockeye salmon being the most valuable, worth an average $151 million (Appendix Table 29). Subsistence catches average approximately 168 thousand salmon and are also comprised primarily of sockeye salmon (Appendix Table 31). Sport fisheries harvest all species of salmon, with most effort directed toward chinook and coho stocks. Approximately 45,000 salmon are harvested annually by sportfishermen in Bristol Bay.

Management of the commercial fishery in Bristol Bay is focused on discrete stocks with harvests directed at terminal areas around the mouths of major river systems. Each stock is managed to achieve a spawning escapement goal based on maximum sustained yield. Escapement goals are achieved by regulating fishing time and area by emergency order and/or adjusting weekly fishing schedules. Legal gear for the commercial salmon fishery includes both drift (150 fathoms) and set (50 fathoms) gillnets. Drift fishermen are the most numerous; 1,899 drift permits were registered in 1998. Setnet permits registered in 1998 totaled 1,015 (Appendix Table 3).

1998 COMMERCIAL SALMON FISHERY

Run Strength Indicators

Fishery managers in Bristol Bay have several early indicators of sockeye run size, including: the preseason forecast, the False Pass fishery, the Port Moller test boat, the district test program, and the early performance of the commercial fishery. Evaluated individually, each of these pieces of information may not give a correct assessment of run size. Collectively they form patterns such as missing year classes, discrepancies with the forecast, or differences in run timing that can be important to the successful management of the commercial

fishery. Management success is easily measured each season by comparing actual escapements to the goals published for the individual river systems and species.

Preseason Forecasts

Total inshore sockeye salmon production for Bristol Bay in 1998 was forecasted to be 30.2 million fish (Table 1). The inshore sockeye harvest was predicted to reach approximately 20.6 million fish. Runs were expected to exceed spawning escapement goals for all river systems.

The 1998 forecast was based on spawner-return, sibling-return, and smolt-return relationships for each river where data were available. Return information prior to 1978 was omitted in calculations for eastside river systems, but was included in calculations for westside river systems. Using recent year's production data rather than all data reduced prediction errors for eastside rivers during tested years (1984-1994). To further correct this tendency of under forecasting, the 1998 forecasts for the Kvichak, Egegik and Ugashik Rivers were increased by their respective prediction errors for the years 1984 to 1997.

South Unimak/Shumagin Island Fishery

The inseason development of the South Unimak/Shumagin Island intercept sockeye fishery is closely monitored by Bristol Bay fishery managers for indications of migration timing, relative abundance, age composition and fish size in the incoming Bristol Bay run. Indications from these fisheries give the terminal fisheries managers notice of what to expect, and provides advanced warning of any potential differences that may exist between actual and forecasted run statistics. However, data obtained from these two fisheries have not always given an accurate picture of the Bristol Bay run size. Onshore winds tend to move the fish into areas more accessible to the fleet, resulting in a higher catch per unit of effort, and high winds affect the fleet's ability to harvest their quota. Those variables in addition to unusual fish size or run timing can make the information difficult to interpret.

These fisheries are managed under a guideline harvest (quota) specified in 5 AAC 09.365, the South Unimak/Shumagin Islands June Fishery Management Plan initially adopted in 1974 by the Alaska Board of Fisheries. The original intent of the Alaska Board of Fisheries was to prevent over harvest of sockeye runs bound for individual river systems in Bristol Bay.

The management plan was brought before the Board for review in February 1988. At that time the Board elected to maintain a traditional harvest pattern, and set maximum allowable harvest levels at 6.8% of the forecasted inshore harvest for Bristol Bay for the South Unimak fishery, and 1.5% of the forecasted harvest for the Shumagin Island fishery. In addition the Board set a maximum allowable catch of chums that could occur during

the South Unimak/Shumagin Islands June Fishery. The "chum cap" often changes, recently, it was lowered from 700,000 to a floating cap that can range from 350,000 to 650,000 fish depending on a Arctic-Yukon-Kuskokwim (A-Y-K) harvest projection based on the previous year's harvest of summer chum salmon in A-Y-K.

The sockeye harvest allocation for the South Peninsula June fishery this season was 1,865,000 (1,528,000 for South Unimak and 337,000 for the Shumagins), based on the 1998 projected harvest in Bristol Bay. Preliminary catch information indicates that the Shumagin Island fishery landed 313,000 sockeye, and the South Unimak fishery landed 958,000 sockeye. The total catch for the June fishery of 1,271,000 was 32% under the total allocation. Due to the low incidental harvest of chum salmon (239,000) in the directed sockeye fishery, the allowable floating cap was not breached.

Port Moller Test Fishery

For many years the Department of Fish and Game ran a test fish program out of the community of Port Moller. A large vessel would fish specific loran stations on transect lines across the migration path of sockeye on route to Bristol Bay. Data collected was used to estimate run strength, timing, age, and size composition. Though the performance was not always good, the project was very popular with salmon processors as it gave an additional indication of run size, which influenced production capacity and the price paid to fishermen.

Through voluntary funding from the industry, the Port Moller test fish project was resumed and has been operated by staff from the Fisheries Research Institute (FRI), University of Washington since 1987. When the project changed leadership a newer more modern type of gear was employed, and a different method of fishing was used. Though the program is still plagued with gaps in the data due to unfishable weather and equipment breakdowns, recent data collected has provided a more accurate assessment of run size. Information concerning the project is shared with the department on a daily basis inseason and analyzed extensively by the Commercial Fisheries research staff in King Salmon.

Economics and Market Production

Until 1991, price disputes had not been a factor in the Bristol Bay salmon fishery for many years - attributable to the large increase in the number of floating fish processors and the establishment of individual market agreements with small groups of fishermen. However, a large expected reduction in the sockeye price in 1991 resulted in a major price dispute between fishermen and processors. A settlement was achieved and the fishery harvested approximately of 25.8 million sockeye salmon (Appendix Table 5) from a total run of 41.9 million (Appendix Table 20). There have been no price disputes since 1991.

In 1998, the exvessel value of the commercial salmon inshore harvest was estimated at $64.9 million (Appendix Table 29), the second lowest exvessel value since 1978. The 1978 to 1997 average exvessel value of Bristol Bay commercial salmon fisheries is about $133 million.

During the 1998 season, 8 companies canned, 26 companies froze and 5 companies cured salmon in Bristol Bay. In addition, 12 companies exported fresh fish by air, and 21 companies shipped salmon out by sea in refrigerated seawater (RSW) or brine (Table 33). A total of 29 processors/buyers reported catches from Bristol Bay in 1998.

Run and Harvest Performance by Species

The combined commercial salmon harvest in Bristol Bay totaled 10.7 million fish in 1998. This was the smallest catch in the last 20 years (Appendix Table 10) for Bristol Bay.

Sockeye Salmon

The 1998 inshore sockeye return of 18.3 million fish was approximately 39% less than the preseason forecast of 30.2 million (Table 1). Actual runs to individual districts were: 50% less than the forecast for the Naknek/Kvichak District, 46% less than the forecast for the Egegik District, 49% less than the forecast for the Ugashik District, 2% greater than the forecast for the Nushagak District, and 38% less than the forecast for the Togiak District (Table 1).

Sockeye salmon dominated the inshore commercial harvest, and totaled 9.9 million fish (Tables 1 and 4). Sockeye escapement goals were met or exceeded in all of the eight river systems where spawning requirements have been defined. Point goals were achieved in Naknek, Egegik, Wood, Igushik, Togiak, Kvichak, Ugashik Rivers but was not met in the Nushagak River (Table 1).

Chinook Salmon

Chinook salmon harvests in 1998 were below the recent 20-year averages in all districts except Nushagak (Appendix Table 6). The 1998 bay-wide commercial harvest of 126,200 chinook was 10% above the 20-year average of 114,400.

Chum Salmon

In 1998, the inshore commercial harvest of 389,100 chum salmon was the second smallest since 1976 and well below the 20-year average of 1.2 million (Appendix Table 7). Chum salmon catches were below average in all districts.

Pink Salmon

Bristol Bay has a dominant even-year pink salmon cycle. The 1998 return produced a harvest of only 25,500 fish, which is the lowest on record for an on-cycle year (Appendix Table 8).

Coho Salmon

The 1998 bay-wide commercial harvest of coho salmon totaled 125,400 fish, which was well below the recent 20-year average of 205,600 (Appendix Table 9). Coho catches were below average in most of the districts with the exception of Togiak.

SEASON SUMMARY BY DISTRICT

Naknek-Kvichak District

The total run of sockeye salmon to the Naknek-Kvichak District was projected at nearly 12.6 million fish (Table 1). Escapement goals were set at 4.5 million (2.0-10.0 million range) for the Kvichak River and 1.1 million (0.8-1.4 million range) for the Naknek River (Appendix Table 1). The district harvest forecast totaled 6.8 million sockeye. The actual run to the district totaled 6.3 million sockeye, and the actual harvest totaled 2.6 million sockeye.

Preseason management strategy for sockeye salmon called for some openings early in the season to monitor both run size and age composition in the District. Catches and age composition at False Pass and Port Moller were monitored for marked differences from the forecast. Commercial catches and age class in the Egegik and Ugashik Districts were also closely monitored. There was preseason concern over the strength of sockeye run to the Kvichak River, indications of run strength would be closely watched as the season progressed.

No forecast is made for chinook salmon in the Naknek-Kvichak District. Chinook catches have been declining in the district in recent years, though effort levels have increased (Appendix Table 6). Due to a 500% increase in effort over the last twenty years observed during the pre-emergency order fishery and a 200% increase noted in the post-emergency order fishery, it was necessary to reduce the weekly fishing schedule from five to four days per week. In addition, on June 1, 1998 an emergency order went into effect that prohibited the use of gillnet mesh larger than 5.5 inches until July 17, to afford additional protection to the chinook salmon stocks.

The 1998 salmon season in the Naknek-Kvichak District started by regulation on June 2, but the first recorded commercial landings did not occur until June 10 and consisted of small catches of sockeye and chinook salmon (Table 13).

The actively managed (tide by tide) fishery in the Naknek-Kvichak District started on June 23. The strategy was to exploit the Naknek bound fish at a high rate to try and keep the escapement low. With escapement being low as the season progressed more frequent closures could occur post July 1 when historically Kvichak stocks increase in abundance.

On June 23 the Naknek tower project started counting, the Kvichak tower began their counts on June 24 (Table 24). The Kvichak inside test fish project started drifting on June 21 (Table 26). The catch through June 23 was 53,000 sockeye. The district closed on June 23, a district test boat fished the District on June 25, June 26, June 27 and June 28 with no change in fish abundance (Table 7). The District test boat on June 28 did encounter higher indices on the evening flood. Through June 29 the Naknek River escapement was 3 days behind the schedule required to meeting the spawning goal. The District test boat continued to fish the district with little change in the indices from June 30 until July 2. The Naknek river escapement on July 2 jumped to 125,000 for the highest daily of the season but with the overall escapement lagging by more than two days. Through July 3 the Kvichak escapement totaled 35,000 by the tower with an additional 150,000 fish in the river. Escapement into both the Kvichak and the Naknek rivers continued to be slow. On July 5 it was announced that within 48 hours the Egegik District's western Loran line could be moved into the 110 line if the Kvichak escapement rate did not increase.

At 6:00 p.m. on July 6, the announcement was made that the drift fleet would be moving into the Naknek River at 9:30 a.m. July 7; the Naknek-Kvichak District would remain open to the setnets, but they would only be allowed to fish 25 fathoms of gear. This action was taken based on the Kvichak River's escapement being two days behind in trying to reach the point goal of 4.0 million, as of 10:00 a.m. the cumulative escapement past the Kvichak tower was 504,000 fish. From July 7 until July 11 the drift boats fished in the Naknek River. The inriver fishery was managed on the allocation plan that dictated that the Drift boats should catch 84% of the sockeye catch with the remaining 16% going to the setnets. Based on the allocation the drift boats fished a total of 59 hours from July 7 until July 11 while the setnets fished 11.5 hours. The total catch for the inriver Drift fishery and the District setnet fishery was 776,000 sockeye.

The escapement rates into the Naknek and Kvichak Rivers increased significantly through July 11. The total Naknek escapement stood at 1,084,000 and the Kvichak escapement was 1,940,000. During the time period from July 7 until July 9 the department was projecting the total run to the Kvichak River. It was decided that based on the best available information that the total run to the Kvichak would not exceed 4.0 million. This total run projection set the escapement goal at its minimum during an off-cycle year of 2.0 million. On July 12 it was announced that the district would reopen to both gear groups at 2:30 p.m. on July 12. Fishing time was extended for an additional 25 hours. At 12:00 p.m. on July 13 the 48-hour district transfer period was waived for the Naknek-Kvichak District. The Naknek escapement stood at 1,107,000 with the Kvichak escapement at 2,135,000.

The emergency order period was extended in the Naknek-Kvichak District from 9:00 a.m. July 17 until 9:00 a.m. July 20. This was done to allow for additional fishing time since both escapement goals had been reached. Fishing time between the gear groups varied based on the allocation plan through July 20 (Table 13). As of 9:00 a.m. July 20 the District went to its fall fishing schedule of 4 days a week, 9:00 a.m. Mondays until 9:00 a.m. Fridays.

The Naknek tower was pulled on July 19 with total escapement reaching 1,202,172 fish, 102,172 fish above the midpoint of 1.1 million. The Kvichak tower finished counting on July 21 with a total escapement of 2,296,074 fish, which was 296,074 fish above the point goal of 2.0 million. This was an improvement over the 1997 escapement, which was the lowest since 1986.

The week of July 20-24 saw catches of sockeye salmon higher than normal with a weekly catch of over 90,000. Coho catches were somewhat lower than normal, however historically significant catches do not begin until the first week of August. Effort levels were low with combined gear deliveries averaging 200 a day. Only four buyers were operating during the last week of July. Two buyers remained in the district for the next week of fishing. Starting on August 11 only one small catcher/processor remained operating in the District, they made their last delivery on September 1.

A total of 20 buyers purchased fish in the Naknek-Kvichak District in 1998. The sockeye salmon harvest totaled 2.6 million, significantly higher than the 1997 catch of 600,000. The chum salmon harvest totaled 47,650 fish, which is less than a quarter of the recent 20-year average of 273,000 (Appendix Table 7). The commercial harvest of 2,505 chinook was less than half the recent 10-year average catch of 5,500 chinook (Appendix Table 6). The coho salmon harvest reached 1,566 fish, far below the 20-year average catch of 9,000. The most significant reason for this drop in catch can be attributed effort levels being far below average late in the season. Subsistence catches are listed in Table 35; harvest levels are average.

Egegik District

The 1998 sockeye salmon run to the Egegik District of 4.7 million fish was the fifth smallest run in the last 20 years (Appendix Table 20). The 1998 run was about 3.9 million less than the preseason forecast of 8.6 million sockeye. The harvest of 3.6 million was below the 1978-1987 average harvest of 3.9 million, and well below the 1988-1997 average harvest of 11.3 million fish. The point goal for escapement of approximately 1.1 million fish was achieved. Total Egegik District sockeye runs during the past four comparable cycle years dating back to 1978 have ranged from 2.1 to 23.1 million fish with an average of 10.1 million, so the 1998 run ranks as the lowest run in recent years and it was poor for the recent cycle years (Appendix Table 15).

The 1998 ADF&G preseason Bristol Bay sockeye salmon forecast projected a total inshore run of 30.2 million fish, and a surplus of approximately 20.6 million fish. The projected Egegik District harvest of 7.5 million sockeye was 36% of the predicted bay-wide harvest (Table 1).

Commercial salmon fishing was opened in the Egegik District on June 1 (Table 14). Effort was light, but sockeye catches per unit of setnet effort were better than average through June 16. A gillnet mesh restriction of no larger than 5.5 inches was invoked from the beginning of the season until July 1 to protect chinook salmon. By regulation, the district is managed by emergency order openings beginning at 9:00 a.m. on June 1. The first two weeks in June fishing was allowed 9:00 a.m. Mondays to 9:00 a.m. Wednesdays and from 9:00 a.m. Thursdays to 9:00 a.m. Fridays until Tuesday June 16.

Daily test fishing, which provides estimates of sockeye passage into the lower portions of Egegik River, began on June 14 at the usual sites just upstream of Wolverine Creek (Table 28). The Egegik River salmon counting towers which provide daily estimates of sockeye passage into Becharof Lake, began operation on June 18 (Table 25).

Initial inriver test fishing sockeye catches were above average and by June 16 catches indicated that approximately 49,000 sockeye salmon had passed the commercial fishing district and were safely making their way upriver. With the large Egegik inshore forecast of 8.6 million sockeye salmon and a steady movement of fish inriver, the second fishing period of the emergency order period, a 6-hour period, was scheduled for 6:00 p.m. June 17.

Participation in the June 17 opening was moderate with approximately 211 driftnet and 78 setnet deliveries reported. The catch of approximately 16,000 sockeye (Table 14), was low for this date. Sockeye catches per delivery were below average for setnetters with only 90 fish per delivery compared to the 1960 to 1996 average for this date of 104 fish per delivery. Inriver test fishing results through June 17 suggested that about 55,000 sockeye salmon had entered the Egegik River system. Test fishing indices remained below expected catches for several tides. This indicator, coupled with lower than expected escapement past the Egegik River tower, indicated

that surplus fish were not available. The commercial fishery remained closed for six days. An aerial survey flown on June 22 revealed about 9,000 sockeye in Egegik Lagoon. The inriver test fishing indices increased fourfold on two consecutive tides. The inriver estimate was approximately 80,000 sockeye salmon.

The commercial fishery reopened on June 23 at 9:30 a.m. for six hours. Catch success for setnet fishers was below average with slightly over 70 fish per delivery. Drift catches were modest and averaged about 280 fish for 660 deliveries. The total period harvest was approximately 197,000 sockeye salmon bringing the district's cumulative harvest to about 228,000 fish. The inriver test fishery was still showing a good movement of fish into the Egegik River and was now estimating approximately 157,000 sockeye salmon, or 14% of the escapement goal in the river (Table 28). Another 6-hour fishing period was scheduled for June 25.

The June 25 opening started at 12:30 p.m. and ended at 6:30 p.m.. A total of about 791 driftnet deliveries and 195 setnet deliveries were reported, yielding a catch of approximately 170,000 sockeye salmon. This was a decrease in catch from the previous period and the number of fish per delivery decreased to less than 200 fish. This harvest brought the cumulative catch through June 25 to approximately 398,000 or about 5% of the expected surplus of 7.5 million fish. An aerial survey flown of the Egegik Lagoon resulted in a count of approximately 28,000 fish. Inriver test fishing revealed about half the fish movement of the previous day and the fishery stayed closed. As of June 26, the sockeye escapement count at the Egegik Tower was 90,600 fish. This was about one day behind schedule with normal run timing to reach the goal of 1.1 million fish. Another 6 hour period was scheduled for June 27.

The June 27 opening produced a sockeye harvest of 219,000 fish bringing the cumulative catch total to 615,000. This total harvest was about 18% below the 10-year average for this date of 264,000. The inriver indices jumped up on the 27th resulting in an inriver estimate of 150,000 sockeye. The tower count increased throughout June 27. Fish were starting to move into the district and a short 4-hour fishing period was scheduled for 6:30 p.m. on June 30.

The effort during the 4-hour period was 719 driftnet and 209 setnet permits. The catch of 257,000 fish is an average of 280 fish per drift permit. This is well below the average of 800 per boat for this date. The tower count rose to 20,000 by 10:00 a.m. July 1 and the inriver estimate was 160,000 fish. Escapement was on schedule so a 6-hour period was scheduled to begin at 6:00 p.m. on July 1.

The six hour period produced a harvest of around 273,000 sockeye salmon for a cumulative catch of approximately 1.1 million or about 15% of the expected surplus. Inriver test fishing and tower counts had dropped off and the fishery remained closed until 6:30 p.m. July 2 when another period was scheduled; 4.5 hours for drift and 5.5 for setnet. This difference in gear group time was to help balance the allocation percentage set

by the Board of Fish. The July 2 opening yielded a harvest of 412,000 sockeye salmon, which was the peak period catch for the 1998 season. The cumulative harvest for this date of approximately 1.5 million is below the recent 10-year average of 4.4 million.

Escapement into the Egegik River began to slow during the next two tides. Escapement at the tower began to lag behind and the fishery remained closed until July 4 when it opened for a 6 hour period beginning at 6:30 a.m. The drift fleet had increased up to 780 permit holders registered in the district in anticipation of the usual July 4 peak. The harvest from the July 4 period was 196,000 fish which is only 33% of the most recent 10-year average for the date. The Egegik Tower count through the 4th was 490,000 fish or 45% of the escapement goal of 1.1 million.

Port Moller indices indicated that age class 2.2 fish were weak, and other indications from the catch samples also showed this component of the run to be weak. The forecast for age class 2.2 returning to the Egegik River drainage was approximately 43% of the run. It appeared that the run was weak, unlikely that it was late, and management became conservative to ensure that the escapement point goal of 1.1 million would be reached. The fleet was told during the next announcement to not expect another opening until the early tide on July 6.

The inriver test fishery only increased moderately on July 5 and the tower count totaled 498,000 fish, which was about one half of a day behind schedule. After numerous reports of jumpers, an aerial survey was flown of the district but there did not appear to be a large volume of fish present. On July 6 the test fishery indicated that fish were entering the Egegik District and there was an inriver estimate of 180,000 fish. The Egegik District reopened at 10:00 p.m. July 6; 7 hours for the set gillnets and 4 hours for the drift fleet. The separation of the gear groups was intended to balance the allocation.

The July 6 opening produced a harvest of about 272,000 sockeye salmon and the cumulative district harvest now totaled approximately 2.2 million. The inriver estimate was now at 200,000 fish and the tower had a cumulative of 664,000 fish at 6:00 p.m.. An opening was announced only for the drift fleet for 4 hours beginning at 10:00 p.m. July 7. They would go back in the water again on July 8 for 4 hours beginning at 10:00 a.m. along with the setnet gear group. The setnetters were allowed to fish for 6 hours until 4:00 p.m. July 8. This separation of gear group openings was intended to meet the Board of Fish allocation plan of 86% drift gillnet and set gillnet 14%.

The July 8 opening produced a harvest of about 379,000 sockeye salmon and the cumulative district harvest now totaled approximately 2.6 million. By 6:00 p.m. July 8, the tower count increased to 706,000 fish and an additional 200,000 fish were estimated in the river. The next fishing period was announced at 8:00 p.m.. Another 8-hour period scheduled to start at 11:00 a.m. July 9. During the 8:00 p.m. announcement to the fleet in

Egegik, they were put on notice that with the closure of the Naknek-Kvichak District, the Egegik District's western boundary would move in from the loran C line 45135 to the Loran C line 45110 until further notice. The July 9 catch of 144,000 sockeye salmon brought the district's season total sockeye harvest to about 2.7 million. This light catch may have helped precipitate the transfer of 100 permits out of the Egegik District. The tower escapement was over 724,000 fish. The gear allocation still needed to be balanced because the set gillnets were at 12 percent. A setnet only period was announced at 8:00 p.m. July 9 for another 8-hour period to begin at 11:30 a.m. July 10. The Egegik District western boundary remained at the loran C 45110 line.

The July 10 harvest was approximately 38,000 sockeye salmon, bringing the total harvest to 2.7 million. Drift effort began to shift to other districts with only 545 registered on July 10. The setnet only opening allowed some fish to escape through the district and the tower count was on track. The next fishing period was set to start at 12:30 p.m. July 11 for 8 hours. The fleet was told to standby at 9:00 a.m. on July 11 regarding the movement of the Egegik District western boundary. Escapement increased significantly in the Naknek-Kvichak District so that the Egegik District western boundary was moved back to the loran c line 45135 as of 9:00 a.m. July 11.

The July 11 8-hour period resulted in a harvest of only 250,000 fish, which was an average catch for the date. The tower count continued to stay on track with escapement but not ahead of schedule. Another 8-hour period was announced starting at 2:00 a.m. on July 13; a setnet only opening. The intention was to provide a balance to the allocation and ensure that escapement into the Egegik River was going to remain on track. After reports of fish moving into the upper portions of the district, and the inriver test fishery estimating 70,000 fish inriver a second opening for both gear groups was announced. This 8 hour opening began at 2:30 p.m. on July 13.

An aerial survey flown of the Egegik Lagoon on July 13 estimated 45,000 sockeye salmon. The inriver estimate was 50,000 fish. Two further periods were announced for 8 hours each beginning at 2:30 a.m. on July 14 and again on the second tide of the 14th beginning at 3:30 p.m. The cumulative district harvest now totaled approximately 3.1 million.

Another period was allowed on July 15 for 8 hours. This period was extended until noon on July 16. An aerial survey revealed only 300 fish in the Egegik Lagoon on July 16 and the escapement was 60,000 fish shy of the point goal of 1.1 million. Therefore, on July 16, the E.O. period was extended until July 20 in order to ensure the escapement point goal was reached. As of July 20, the 48 hour waiting period no longer applied to the Egegik District. Further commercial fishing was allowed as the run progressed and the district reverted to its fall fishing schedule, 9:00 a.m. Mondays until 9:00 a.m. Fridays.

Sockeye landings in the district continued throughout July and August (Table 14), reaching a preliminary seasonal cumulative total of about 3,558,000 fish. The counting towers ceased operation on July 20 and the final count

totaled 1,110,888 (Table 28). Peak passage occurred on July 1 and 7 when nearly 100,000 sockeye salmon passed the towers on each of these days. The escapement sex ratio was 51% males to 49% females.

The age composition of the 1998 Egegik District sockeye run was as follows:

Age Group	Catch	Escapement
1.2	8%	9%
2.2	15%	24%
1.3	13%	5%
2.3	63%	54%
Other	1%	8%
Totals	100%	100%

The sockeye run was comprised primarily (54%) of progeny from the 1992 escapement of 1.9 million fish (6-year-olds) with the 1993 escapement of 1.5 million producing an additional 24% (5-year-olds).

Egegik District fishermen harvested 76% of the Egegik inshore sockeye run, slightly below the recent 20-year average of 85%. Preliminary catch data indicates drift gillnets took 86% of the sockeye harvest while set gillnets took 14% which is equal to the percentage allocation set by the Board of Fish. The 3,069,000 sockeye salmon delivered by driftnet fishers was the lowest volume on record for that gear type since 1982, and the 505,000 sockeye delivered by setnet fishers was the smallest catch on record for that gear group in the last 20 years.. The peak day in the fishery based on volume landed (412,000 sockeye) was July 2, and the peak catch rate per landing was 482 sockeye salmon per hour and occurred on July 1. During the emergency order period when the fishery was not on a weekly fishing schedule during June 16 to July 20, a total of 174 hours were fished in the district, or 18% of the 991 available hours. This total was an 33% decrease from the 258 hours fished in 1997.

The commercial harvest of other salmon species in the Egegik District totaled 57,000 fish, or 1% of the total harvest. The chinook harvest totaled approximately 748 fish, or 47% less than 1988 to 1997 (10-year) average of 1,400 (Appendix Table 6). The Egegik chinook salmon run was average in 1998 and escapement indices were slightly below average. A decrease in commercial fishing time as well as the restriction of the use of gill nets with mesh sizes larger than 5.5 inches in the fishery from June 1 to July 1 probably contributed to the decrease in the commercial harvest of chinook salmon. The district chum salmon harvest of approximately 26,000 fish was 75% below the recent 10-year average of 103,000 (Appendix Table 7). Essentially no pink salmon were harvested again this season. The district coho salmon harvest of 30,000 fish was 20% below average (Appendix Table 9).

Aerial surveys were conducted in the Egegik and King Salmon River systems to provide escapement indices for chinook, chum, and coho salmon. The resulting indices totaled 1,063 chinook, 2,560 chum, and 6,075 coho

salmon. The chinook index was average while the chum salmon index was below average. Aerial index counts of chum salmon escapement on Gertrude Creek, and perhaps on many other systems, are at best, a very marginal indicator of true chum salmon escapements. The coho index represents the total count for several tributary streams of Becharof Lake and the 950 coho salmon enumerated through the U.S. Fish and Wildlife Service weir on Gertrude Creek (Table 5).

A total of 20 buyers operated in the district this season, which was six less than last year (Table 33). Most of the harvest was taken aboard floating freezer processors or tendered to other districts for processing. Fish volume was never very high with most fishing period harvests less than 400,000 fish. Consequently, there were no reports this season of individual buyers in the district reaching processing capacity limits leading to suspensions of buying, or of any processors placing commercial fishers on delivery limits of any kind.

In summary, the salmon season at Egegik was less than expected . A total of 21 fishing periods during the emergency order (EO) period were 6-hours in length and no extensions to fishing time were issued until July 15. The drift fleet size was larger than last year with a peak registration of 808 vessels (Table 12). Setnet catch performance as a whole was very good, with setnet fishers harvesting about 14% of the run. Escapement needs were met with the final sockeye salmon escapement count of approximately 1.1 million.

Ugashik District

The 1998 Ugashik District total inshore sockeye salmon return was approximately 1.6 million fish, or 49% below the preseason forecast of 3.2 million (Table 1). The commercial sockeye harvest of approximately 724,000 fish was the smallest harvest since 1979 and was well below the 1978 to 1997 average harvest of 2.8 million. The sockeye escapement to Ugashik River was approximately 890,000 and was 4% over the midpoint objective of 850,000. Comparable cycle-year sockeye returns over the last four cycles dating back to 1978 have ranged from 90 thousand to 5 million fish with an average of 3 million, so the 1998 run was about 47% below the cycle-year average.

The preseason forecast for the Ugashik District suggested a harvest of 2.4 million sockeye salmon, but the two previous seasons had been over-estimated. With the lowest smolt count on record taken in 1996, there was some suspicion that this year's forecast might be over-judged as well. Therefore, a more cautious approach would be taken in managing the 1998 run. Accordingly, commercial fishers were advised that fishing before July was highly unlikely, and the possibility for very little, if any, commercial fishing time also existed. Given this scenario, only 16 drift vessels decided to start their season on June 24 in the Ugashik District (Table 12).

Initial landings occurred in the district June 10 (Table 15) with a few chinook salmon landed. During the week of June 15, effort and sockeye catches were increasing, but harvest were still light. By 9:00 a.m. June 23, the cumulative district harvest was approximately 15,000 sockeye, and 300 chinook salmon. Fewer than 100 chum salmon were taken. The 1998 sockeye harvest through June 23 was 43% less than the long term (1960 to 1997) average catch of 26,000, but it was 73% below the recent 10- year (1988 to 1997) average of 56,000. The district closed on June 23 and pending better abundance of sockeye salmon, it would stay closed.

Inriver test fishing, operating about three miles upstream of Ugashik Village, started June 26 and provided a daily estimate of sockeye passage into the lower part of the Ugashik River. Over the next several days, inriver test fishing documented few fish entering the Ugashik River (Table 29). On June 28, the first round of district test fishing was scheduled (Table 9). Results were not encouraging and another test fishing trip was set for the next day. Results were again disappointing and district test fishing was suspended for a few days.

District test fishing was planned for July 1, but weather and logistic problems delayed test fishing until July 2. July 2 results were more encouraging than previous outings with a high index of 2,392 near South Spit (Table 9), indicating that a fair body of fish had moved half way into the district, however; inriver test fishing was still showing little fish movement into the Ugashik River. District test fishing continued for the next several days, but it was not until July 9 when there was enough sign to warrant a fishery. Very good indices were observed in district test fishing for a couple of days in a row at several stations, and inriver test fishing predicted a cumulative passage of about 61,000 fish. Large proportions of fish within the district were also starting to show fresh water marking.

A 4-hour period was schedule to begin at 11:00 a.m. on July 10. Approximately 120 vessels and 67 setnetters participated in this opening and produced a sockeye harvest of approximately 133,000 fish. This harvest was 70,000 fish less than the average harvest for this date, but the catch per drift vessel delivery was about average. The fact that this was only a 4-hour opening had likely influenced the small harvest. The fishery closed at 3:00 p.m. and another round of district test fish was scheduled for the next day.

July 11 test fishing results gave one of the largest indices collected in the history of Ugashik District Test Fishing when and index of over 3,000 points was collected above the inner district boundaries (Table 9). Inriver test fishing was also verifying the movement of a good abundance of sockeye salmon in the lower Ugashik River (Table 29). Given this information, another 4-hour period was scheduled to start at 2:00 p.m. on July 11.

For this opening, approximately 250 vessels and 68 setnetters participated in harvesting a total of approximately 284,000 sockeye salmon. Both total harvest and catch per vessel were better than average for this date and again, because of only a 4-hour fishing period this harvest was even more remarkable. Total sockeye catch for the

district to date was approximately 450,000 fish, which was about half the average harvest for the district through July 11. With the overall lack of age 2-ocean sockeye salmon in the Bay run, and the fact that age 2-ocean fish were predicted to be 59% of the Ugashik run this year, it was highly likely that this season's harvest would be one of the lowest harvests sustained in the Ugashik District since the 1970's.

District test fishing continued the on July 12, but results showed a much-reduced abundance within the district. However, inriver test fishing still showed strength with an estimated 122,000 fish passing the test fishery on July 12, (Table 29). District test fishing was continued the following morning and an aerial survey was also conducted.

The July 13 district test fishing indices showed a three to four fold increased from the previous day at sites above the inner district boundaries (Table 9). An aerial survey revealed 30,000 sockeye in the Ugashik Lagoon just below the towers, but the number of fish in the river above the inriver test fish sites was estimated to be around 150,000. The tower count as of noon was 160,000 and inriver test fishing was estimating over 200,000 fish in the river. Given these results, another 4-hour period was scheduled to start at 5:00 p.m. on July 13.

Approximately 280 vessels and 41 setnetters made landings for this opening. Harvests were light with only a total of 85,000 sockeye salmon landed. The average catch for this date is 170,000. Total harvest was now approximately 518,000, which was also about half the 1960 to 1997 average, but was well below the recent 10-year average through this date of 2 million. District test fishing resumed the following day, but results were not encouraging. Inriver test fishing indicators were also dropping off, but the July 14 tower count was the largest of the season with approximately 163,000 sockeye salmon passing the towers (Table 29). The cumulative tower count was now just over 400,000 or approximately on schedule for July 14.

For the next several days test fishing continued, but revealed very little abundance of fish. Tower counts dropped off and fell to three days behind expected levels and to fewer than 20,000 fish per day by July 17. The cumulative tower count through July 17 was 539,000 sockeye salmon. Because the midpoint of the escapement goal range was not yet assured at the tower, the emergency order period, which would have expired at 9:00 a.m. on July 17, was extended until further notice. By July 20, both inriver and district test fishing were suspended, as it seemed highly unlikely that the midpoint sockeye escapement objective of 850,000 would be met by the time the counting tower project was terminated in late July. Commercial fishers were advised that at the present daily passage rate it would take a couple of weeks before the sockeye escapement would reach the midpoint objective. At this escapement rate, the Ugashik Fishery would likely stay closed for the rest of the sockeye season.

On July 23 an aerial survey revealed a good show of sockeye salmon jumping in the Pilot Point to Muddy Point area of the district. Many local residents called the department office in King Salmon to make sure staff was aware of the show and to express their belief that there was a million fish or more in the district. However, it was not

known if these fish were destined for the Ugashik River or if they would be returning to the King Salmon or Dog Salmon Rivers, as was the case last year. Aerial surveys were flown the next couple of days and it was confirmed that some of these fish were moving up the King and Dog Salmon Rivers, but some were also going up the Ugashik River. Indeed, sockeye escapement tower counts picked up on July 25 and showed a good pace on Sunday morning, July 26. Travel time between the district and towers was taking about two to three days. With the sockeye escapement at approximately 700,000, and the towers scheduled to cease operation around the July 29, it was announced on Sunday, July 26, that the Ugashik District would reopen on Monday, July 27, to the fall fishing schedule of 9:00 a.m. Mondays to 9:00 a.m. Fridays.

About 100 vessels and 42 setnetters made landings on Monday for a total harvest of approximately 84,000 sockeye salmon. The next day, approximately 63,000 fish were landed; and so the week continued until a total of about 192,000 sockeye salmon were caught during this week. Likewise, the daily tower counts increased to 81,000 for Sunday, 51,000 for Monday and 40,000 for Tuesday. By the end of the project on Thursday, July 30, a total of 891,000 sockeye salmon had passed the counting towers, exceeding the midpoint objective by 41,000 fish. This late push of fish was a healthy one, though unexpected, and brought the district's total sockeye harvest to 710,000. By the end of the season the total sockeye harvest was approximately 724,000 fish which was 74% below the 1978 to 1997 average catch of 2.8 million.

The harvest between the gear groups ended up at 15% for setnetters and 85% for drift fishers, or 5% more for setnetters and 5% less for drift net fishers than their allocations. There were only three openings for a total of 12 hours between June 23 and July 27 in the Ugashik District, so there was not much opportunity to balance the allocation.

Sockeye escapements to the Dog Salmon and King Salmon Rivers were again very large this year as they were in 1997. An aerial survey on August 15 revealed 27,000 sockeye in the King Salmon River drainage and 7,000 sockeye in the Dog Salmon River drainage, bringing the Ugashik drainage sockeye escapement total to 924,000. The peak count at the counting tower occurred July 14 when 163,000 sockeye salmon were tallied. The escapement was somewhat distributed throughout the run, but 50% of the total escapement occurred July 11 to 15 and 23% occurred July 25 to 28. The sockeye escapement sex ratio was 56% males to 44% females.

The age composition of the Ugashik District sockeye return was as follows:

Age Group	Catch	Escapement
1.2	6%	16%
2.2	9%	17%
1.3	21%	12%
2.3	64%	52%
Other	0%	3%
Totals	100%	100%

The commercial harvest of other salmon species totaled approximately 23,600 fish or 3% of the total district's harvest. The harvest of 350 chinook salmon was 91% below the 20-year (1978 to 1997) average of 3,900 (Appendix Table 6). Ugashik chinook escapement indices ranged from below average to above average. The total drainage count of 4,770 was 2% above the 1980 to 1997 average of 4,670. The chum salmon harvest of approximately 9,700 fish was the smallest harvest in 20 years, while the coho harvest of 13,300 fish was about half of the recent 10-year average but above the recent 5-year average (Appendix Tables 7 and 9). Chum salmon escapement indices were below average with a cumulative drainage count of 22,400. Pink salmon harvest in the Ugashik District was about average for the recent 10-year even number year catches (Appendix Table 8).

The Ugashik District fishery harvested approximately 44% of the sockeye return in 1998 which was substantially below the recent 20-year (1978 to 1997) removal rate average of 63%, and the lowest exploitation since 1980. Peak catch per hour occurred July 11 when approximately 284,000 sockeye salmon were landed in 4 hours, or 71,000 per hour. Peak catch per unit effort in the district occurred July 11 for both drift and set gillnets with 977 sockeye salmon per drift net landing and 622 sockeye salmon per set net landing. The fishery was open for a total of just 12 hours or 1.5% of the 816 hours available from June 23 to July 27. This was the least amount of fishing time for the Ugashik District between these dates on record.

A total of 16 buyers operated in the district during the season (Table 33), four less than last year. Nearly all the catch was either frozen on floating processors or tendered to other districts for processing. There were no reported instances of lack of processing capacity during the sockeye season. Fish quality was not as good as in the previous two seasons, but lack of fish forced a more conservative approach and taking more harvest earlier in the run was not as feasible as it has been in recent years.

Nushagak District

In November 1997, the Alaska Board of Fisheries adopted several regulatory changes affecting the Nushagak District for the 1998 season. These new regulations included a sockeye salmon allocation plan based on historic

harvest percentages by gear type. Between June 1 and September 30, 74% of the sockeye harvest was allocated to the drift gillnet fishery, while the remaining 26% was allocated to the set gillnet fishery. The set gillnet percentage was further allocated by section: 20% to the Nushagak Section and 6% to the Igushik Section. A provision in the allocation plan allowed the Department to schedule openings for each gear type at different times to achieve the above percentages. Management actions and implications resulting from the allocation plan are discussed in their respective sections below. The Snake River Section was closed to commercial fishing due to lack of enumeration and continued exploitation of this stock in the other sections. The Board also modified the Wood River Special Harvest Area (WRSHA) Management Plan to include a larger open area from Hansen Point upstream to a marker approximately two miles below Silver Salmon Creek with a closed area one-quarter mile either side of the Muklung River. Provisions were also included to open WRSHA under several different escapement scenarios based on sockeye salmon escapement rates in the Nushagak and Wood Rivers. The Board modified the Nushagak-Mulchatna Chinook Salmon Management Plan to include language directing the Department to attempt to schedule commercial openings to provide pulses of chinook salmon into the Nushagak River that have not been exposed to commercial gear. The Board also repealed the statistical area registration and the 48-hour transfer requirements for setnets moving between statistical areas in the Nushagak District.

Chinook

Peak chinook salmon production in the early 1980's resulted in record commercial harvests and development of a growing sport fishery. Declining run sizes and the question of how to share the burden of conservation among users precipitated the development of a management plan for Nushagak chinook salmon. Since 1992, management of the Nushagak chinook salmon fisheries has been governed by the Nushagak-Mulchatna Chinook Salmon Management Plan (NMCSMP) (5 AAC 06.361). The plan was adopted in 1992 and amended twice in 1995 and 1997.

The purpose of this management plan is to ensure an adequate spawning escapement of chinook salmon into the Nushagak River system. The plan directs the Department to manage the commercial fishery for an inriver goal of 75,000 chinook salmon past the sonar site at Portage Creek. The inriver goal provides (1) a biological escapement goal of 65,000 spawners, (2) a reasonable opportunity for inriver subsistence harvest and (3) a sport guideline harvest of 5,000 fish. The plan addresses poor run scenarios by specifying management actions to be taken in subsistence, commercial and sport fisheries depending on the severity of the conservation concern. Management decisions are heavily dependent upon the cumulative estimates of inriver passage by the sonar. The 1998 season was the 6th year the Department has managed under this plan.

Trends in age composition of chinook spawning escapements in 1995 and 1996 raised concerns about the quality of chinook escapements in the Nushagak River. The proportion of large (age-5 to age-7) fish was less than

desired, and the age composition of the escapement from the first half of the run differed substantially from the escapement from the second half of the run. Differences in age composition between escapement and total run and between early and late season escapement result from size selective harvests. To address this concern, the Department adopted a strategy of allowing detectable pulses of chinook into the Nushagak River before opening a commercial period. Allowing untargeted fish into the river was intended to lessen the effects of selectivity in the commercial fishery and allow fish with a desirable age distribution to enter the river. In November 1997, additional language directing the Department to allow pulses of chinook salmon into the Nushagak River that were not exposed to commercial fishing gear was added to the NMCSMP.

The Department adjusts commercial fishing time and area in an attempt to harvest chinook salmon surplus to the inriver goal. Management decisions are based on the preseason forecast and inseason indicators of run strength, including commercial harvest performance, subsistence harvest rates and inriver passage by the sonar. To maintain quality and value, chinook salmon are commercially harvested early in the run (June 8 to June 20) before the majority of fish discolor and become soft, and before many fish migrate into the mainstem of the Nushagak River. Chinook escapement typically peaks 10 days after commercial harvests; only 15% of the escapement is counted past the sonar when commercial harvests peak. This difference in run timing prohibits reliable estimates of run size until after the peak of the fishery. Early commercial openings are justified on forecasted surplus, quality concerns and in accordance with the added language in the NMCSMP.

The 1998 Nushagak District chinook salmon forecast was 159,000 fish. About 72,000 chinook salmon were projected to be available for commercial harvest, assuming an inriver goal of 75,000 fish and an average lower river subsistence harvest (12,000). Projecting an average incidental harvest during the sockeye fishery of 20,000 chinook salmon left about 52,000 chinook available for a directed commercial harvest. A subsistence catch monitoring project operated at Lewis Point for the second year, in 1998, to improve the ability to detect when pulses of chinook salmon were moving into the river.

Unrestricted harvest potential in the sport fishery, given an inriver abundance of 75,000 fish, was estimated to be over 10,000 chinook salmon, or 100% greater than the guideline harvest level of 5,000 chinook. Included in the Alaska Board of Fisheries November 1997 amendments to the NMCSMP were restrictions on the sport fishery to reduce the sport harvest potential. These restrictions were intended to reduce the harvest in the sport fishery to the guideline harvest level prescribed in the management plan.

Five directed commercial openings were allowed between June 15 and June 27 for a total of 40 hours of fishing time (Table 11). These openings were based on the preseason forecast, inseason cumulative escapement, subsistence harvests and age composition analysis. All these sources indicated the actual run strength was above forecasted level. The highest effort observed was 197 boats and 73 setnets, however these were incomplete counts

due to weather conditions. Commercial harvest during these directed periods accounted for 96,000 chinook salmon (Table 16). Another 13,000 were taken during the sockeye fishery. Commercial harvest for the season totaled 108,651 chinook salmon, or 50% greater than the projected commercial harvest, based on the forecast.

Final sonar escapement estimate was 117,495 chinook salmon (Table 25). In early August, escapement surveys of the majority of chinook salmon spawning areas were conducted with marginal counting conditions. Spawning escapement level was observed to be commensurate with the sonar estimate.

The 1998 chinook salmon run was approximately 241,000 fish, or 51% over the preseason forecast (Appendix Tables 2 and 21). Because of the relatively short duration of the openings, and the fact that the five periods were spread out over approximately 10 days, the processors were able to ship the majority of the harvest "fresh" to domestic markets. Thus, doubling the exvessel value of the chinook salmon fishery to the local fishermen.

Sockeye

The Nushagak District sockeye fishery is managed to achieve biological escapement goals of 550,000 (range 340 thousand to 760 thousand) spawners in the Nushagak River and 1 million (range 700 thousand to 1.2 million) spawners in the Wood River. The Igushik River run can be managed independently to a large degree by opening and closing the Igushik Section of the Nushagak District to harvest or conserve that stock. Sockeye returning to the Igushik River are managed for a biological escapement goal of 200,000 fish (range 150,000 to 250,000).

The preseason forecast for the sockeye run to the Nushagak District totaled 5.3 million salmon (Table 1), which was slightly above the 20-year average of 5.1 million sockeye. Strength of the forecasted Wood River run (3.056 million) was 20% above the 1988-1997 average actual return, while the Nushagak River sockeye run (1.175 million) was expected to be 12% below recent 10-yrear average; the forecasted return to Igushik River (1.05 million) was about 13% above the 1988-1997 average. Management of the Igushik and Nushagak Sections are discussed separately below.

Nushagak Section. Few tools exist to manage Nushagak and Wood River stocks independently because timing and migratory routes overlap to a high degree. The Wood River Special Harvest Area Management Plan was adopted in 1996 as a means to conserve coho salmon. The department, by emergency regulation during the 1997 season, modified it. Formally, the Board modified it in November 1997 to provide a stock specific management tool to target Wood River sockeye salmon. The plan allows opening the Wood River for the conservation of Nushagak River sockeye salmon. Nushagak River sockeye escapement peaks slightly earlier than escapement in Wood River. If stock proportions in the escapement represent stock abundance in the district, and harvests are not stock selective, delaying the sockeye openings should help to conserve the Nushagak stocks. However,

without an additional stock-specific means to exploit sockeye, Wood River sockeye surplus cannot be fully harvested without sacrificing the Nushagak River escapement goal particularly when the Wood River run is on the order of three times as large as the Nushagak River run.

Since 1994, Wood River runs have been more than three times larger than Nushagak River runs due to high production in the Wood River and low production in the Nushagak River. In each of these years, sockeye escapement in the Wood River exceeded the upper range of the escapement goal, while escapement in the Nushagak River fell below the point goal. A similar ratio of Wood River to Nushagak River sockeye was forecast for 1998. To conserve Nushagak stocks, the department intended to limit commercial fishing early in the sockeye run. If Wood River sockeye returned at forecasted levels, the department would again strive to balance shortfall in the Nushagak River with surplus in the Wood River.

Commercial fishing was not permitted in the Nushagak Section after the June 27 period for chinook salmon. Between June 27 and the weekend of July 4, testfishing was being conducted on almost every tide unless there was some mechanical or logistical problem prohibiting it. Some high individual indices were observed off Pile Driver beach below Nushagak Point beginning on June 28, but no other test fish stations above the district indicated a strong presence of sockeye including those in the lower Wood River (Table 10). Escapement trends in the Wood, Nushagak and Igushik Rivers during this period were all declining relative to their required entry curves. Wood River had gone from one and a half days ahead to a half day ahead of the curve to reach the point goal. The Nushagak had regressed to 4 days behind the point goal curve and a day and a half behind the curve required to reach the low end of it's range. The Igushik had slipped to 6 days behind the point goal curve. Early season fishing effort was large. By July 1, the drift gillnet fleet registered 447 vessels in the Nushagak District (Table 12). The large fishing effort and early indications of a large difference between the size of the Wood and Nushagak River runs heightened concern for achieving the Nushagak River escapement goal.

In addition to the declining trends in the rivers of the Nushagak District, sockeye returns to the eastside districts of Bristol Bay were not showing at forecasted levels. Both management and research staff of the department recommended a "very conservative" management approach in all districts of Bristol Bay. Through 12:00 midnight July 3, Wood River escapement totaled 292,000 sockeye salmon, or 29% of the biological escapement goal (Tables 24 and 30). About 113,000 sockeye were estimated in the Nushagak River, which comprised only 21% of the Nushagak escapement goal (Table 25). Igushik River had an estimated 5,000 sockeye which was only 3% of the point goal.

Test fish indices from the morning ebb on July 4 were strong at Clark's Point in the district (9,625 index points) and Hansen Point in the Wood River (6,415 index points). These levels are indicative of fish passage but much higher indices have been collected in the past when the Wood River sockeye begin to push. Indices from most of

the other stations were not available because the test boat got stuck on a sand bar and could not complete the other sets. After receiving the tower counts through 6:00 a.m. on July 4, no major increase in passage rates was evident. The Wood River tower had counted another 31,000 sockeye through 6:00 a.m., which was good passage but not indicative of a 200 thousand to 300 thousand fish day. The sonar counters at Portage Creek had another 21,000 counts which should apportion mostly to sockeye based on the gillnet information. This was encouraging as far as gaining on the escapement curve but not indicative of a strong push of sockeye into the Nushagak River. Igushik towers had passed another 1,300 sockeye through 6:00 a.m., which was diverging further from the required entry curve. With this information, the decision not to put the fleet on short notice was made prior to the 9:00 a.m. announcement.

Department staff flew an aerial survey of the upper district, the lower Nushagak and Wood Rivers in the afternoon. A very strong movement of sockeye was observed in both the Wood and Nushagak Rivers. The decision to have a commercial opening as soon as possible was made at 4:00 p.m. on the July 4 aerial survey. At 8:00 p.m., July 4, the first commercial opening was announced for July 5. Since the fleet was not on short notice and needed a high tide to get out of the harbor, the earliest an opening could occur within the guidelines of the opening time agreement with the Nushagak Advisory Committee was 10:00 a.m. Because the Nushagak and Igushik Rivers were well below their escapement curves, and the large fleet size, the duration of the Nushagak District opening was held to 4 hours. Conditions set forth in the newly modified Wood River Special Harvest Area Management Plan specifying Wood River openings be concurrent with district openings were met the evening of July 4, and a 6-hour opening for the WRSHA was also announced, which would begin at 10:00 a.m., July 5.

Escapement rates in the Wood River climbed to almost record levels on July 4. The daily count past the Wood River towers was over 520,000 sockeye, or 52% of the escapement goal in 24 hours! This brought the cumulative escapement to 812,000 sockeye. Nushagak River received an apportioned daily count of 52,000 sockeye while the Igushik River tower estimated almost 15,000 sockeye for the daily count for July 4. These two rivers advanced on their escapement curves but remained 2 and 3 days behind respectively. Considering the lack of exploitation prior to July 5, escapement levels indicated that the sockeye run was late and/or smaller than forecast in both the Nushagak and Igushik Rivers.

Near record escapement rates continued in the Wood River through July 5 with almost 300,000 additional sockeye past the towers between 12:00a.m. and 6:00 a.m. bringing the cumulative total to almost 1.1 million fish or 110% of the point goal. The Nushagak River's escapement had advanced but was still more than 2 days behind the point goal curve while Igushik's escapement had advanced to just over 3 days behind it's point goal curve. The commercial opening in the district and WRSHA began as scheduled with reports of good opening sets but a noticeable decrease in abundance in the southern half of the district midway through the period. This information

gave the impression that there wasn't a lot of strength behind this initial push of sockeye through the district. At 3:00 p.m., July 5, an additional 7-hour WRSHA opening was announced, which would begin at 1:00 a.m., July 6; this was followed by an 8:00 p.m. announcement of another 8-hour opening in the WRSHA from 12:00 noon to 8:00 p.m. on July 6.

Preliminary catch estimates (295,000 sockeye salmon) for the July 5 period were above average for that date (Table 16). At 8:00 a.m., July 6, the daily tower counts for July 5 were received via SSB radio from Portage Creek sonar and the counting towers on the Wood and Igushik Rivers. The Wood River had received another near-record daily passage of 512,000 sockeye on July 5 with the cumulative escapement reaching 1.32 million or 120 thousand over the upper end of the desired escapement goal range. The Nushagak River had it's peak daily passage on July 5 with 117,000 sockeye passing the sonar counters, which brought the cumulative escapement to less than a day behind the point goal curve. Igushik tower reported a daily count of 32,000 sockeye bringing the cumulative escapement to 52,000 fish, very close to the desired point goal curve. The test boat worked the morning ebb and reported low indices in the lower Wood River but returned an index of over 8,000 off Ekuk Beach. At 12:00 noon, July 6, an announcement for a 10-hour period in the Nushagak District beginning at 12:00 midnight and another 8-hour opening in the WRSHA beginning at 1:00 a.m., July 7.

At 9:00 a.m., July 7, after receiving the daily escapement counts for July 6, a 4-hour extension to the commercial opening in the Nushagak District was announced and an additional 8-hour period was announced for the WRSHA. Through July 6, escapement in the Wood River (1,385,000 sockeye) was 185,000 over the upper end of the escapement goal range for that system, while the Nushagak River escapement (365,000) was only 25,000 above the low end of the escapement goal range. Using a one-day lag for the Nushagak River timing, Wood River escapement through July 6 was almost four times as large as the Nushagak escapement: indicating that the inshore return of Wood River sockeye was almost four times as large as the inshore return of Nushagak River sockeye.

Commercial openings were held in the entire Nushagak District daily from July 7 through the evening of July 13. The opening on July 7 was the peak sockeye harvest with almost 800,000 fish taken concurrently in the Nushagak District and the WRSHA. At this time, the escapement in the Nushagak River had reached 440,000 but had digressed to 2 days below the point goal curve. The Nushagak Section closed at 7:00 p.m., July 13 and remained closed for a period of two tide cycles to increase the sockeye escapement rate into that river. This was the last management action directed at coming closer to the point goal in the Nushagak River. Meanwhile, since the Igushik River remained ahead of it's point goal curve, the Igushik Section remained open 24 hours per day in order to harvest the surplus sockeye salmon.

On July 15, commercial fishing reopened in the Nushagak Section daily. The two-tide closure resulted in commercial harvest of over 100,000 sockeye for that period. Daily catches remained substantial for several days

and then subsided after July 20. Commercial openings continued with reduced daily catches in the Nushagak Section through 7:00 p.m., July 23. Commercial fishing in the Nushagak Section closed on July 23 under the Nushagak River Coho Salmon Management Plan because the Department could not project achieving the specified 100,000 coho salmon inriver goal.

The Nushagak District Commercial Set and Drift Gillnet Sockeye Salmon Fisheries Management and Allocation Plan adopted by the Alaska Board of Fisheries in November 1997 was implemented for the first time in the 1998 season. The plan specified a target sockeye allocation by gear type of 74% by drift gillnets and 26% by set gillnets. The 26% allocation for set gillnets was further subdivided into 20% for Nushagak Section set gillnets, and 6% for Igushik Section set gillnets. Differential fishing time for the two gear types was invoked on several occasions in order to achieve the specified harvest percentages. Beginning on July 15, with the sockeye harvest percentages calculated at 73% to drift gillnets, 23% to set gillnets, drift gillnets were allowed to start 1 or 2 hours before set gillnets in the commercial openings to increase their percentage of the harvest. Since no noticeable shift in percentage occurred with this management action, a 12-hour drift only opening was held on July 18. After this opening, it became apparent that the drift gillnet effort had diminished and the daily harvest levels were not sufficient to shift the percentages noticeably. Two more periods were held with drift gillnets starting before set gillnets by a few hours; no shift in the harvest percentages occurred. The final sockeye allocation percentages calculated for the Nushagak District were: 72% by drift gillnets, 24% by Nushagak Section set gillnets.

Wood River Section. Commercial fishing was permitted in Wood River in 1996 for the first time since the early part of the century, and was allowed again under an emergency regulation in 1997. The commercial openings in 1996 were conducted under a recently adopted Wood River Sockeye Salmon Special Harvest Area Management Plan to conserve Nushagak River coho salmon while providing an opportunity to harvest surplus Wood River sockeye during the late portion of the run. In 1997, the commercial fishing occurred in the Wood River predominantly for sockeye salmon management concerns. After the 1997 season, the Board modified the WRSHA Management Plan to include provisions and criteria for sockeye salmon management, specifically to harvest surplus Wood River sockeye while conserving Nushagak River bound sockeye salmon. The newly modified plan was in effect for the first season in 1998.

Peak effort levels in Wood River occurred July 6, when the Wood River was open without a concurrent district opening. There were 363 drift deliveries and 94 setnet deliveries made during 15 hours (two periods) of fishing on July 6. Effort levels were substantially less during the remainder of the open periods because the district was open concurrently and most permit holders opted to fish the district.

The Wood River was opened to commercial fishing 28 times between July 5 and July 23, for 368 hours. During 26 of these openings, fishing was permitted concurrently in the Nushagak Section. Opening times and duration

were changed as the season progressed to maximize exploitation of Wood River sockeye and distribute fish throughout the harvest area prior to each opening.

Based on the experience with the Wood River fishery in 1997, the first openings of 1998 were scheduled around high water. The first openings began 2.5 hours prior to high water (Nushagak book time); similar to timing used in the district. After discussion with permit holders and members of the Nushagak Advisory Committee, later openings beginning July 14 were scheduled around low water to increase the effectiveness of the gillnet gear. Based on analysis of catch results, openings around low water improved efficiency of both gear types.

Initial opening duration of 6 hours around high water appeared to result in substantial numbers of sockeye escaping through the fishery. Opening duration was increased to 8 hours beginning July 5 to increase exploitation rates. Later openings were increased to 10 hours, then 11 hours, and finally continuous fishing was allowed with set gillnets beginning July14 with drift gillnets fishing 8-hour periods around each low tide.

Overall exploitation of Wood River sockeye salmon in the WRSHA in 1997 was estimated at 51%. To estimate exploitation, WRSHA sockeye harvest was divided by the sum of the WRSHA harvest plus the Wood River escapement measured at the counting towers while the fishery was open. In 1998, the overall efficiency of the WRSHA fishery was estimated to be 22%. The reduction is attributed to several factors including reduced effort, reduced open area from 1997, and increased flow levels in the Wood River. After looking at the fishery closer postseason, the reduction in effort was clearly the predominant factor.

The new sockeye salmon allocation plan that went into effect for the 1998 season was also applied to the WRSHA by regulation. The plan called for a target allocation percentage of 74% to drift gillnets and 26% to set gillnets in the Wood River fishery. Based on the percentage of harvest by gear type (55% - drift, 45% - set) during the 1997 fishery with both gear types fishing concurrently, it appeared that some adjustment in relative fishing time would have to be made to achieve the allocation percentages specified in the plan. During the first period in 1998 on July 5, drift gillnets were allowed to fish 6 hours while set gillnets fished 2 hours. The next period (July 6) was announced prior to having harvest results from the first period with drift gillnets fishing 7 hours and set gillnets fishing 4 hours. After receiving catch reports from the first two periods and seeing the extremely high percentage of the harvest taken by drift gillnets, subsequent periods were announced with both gear types fishing the same duration. On July 14, the WRSHA sockeye harvest consisted of 83% drift gillnet catch and 17% set gillnet catch; periods were announced with set gillnets fishing 11-hour periods while drift gillnets were allowed to fish 6-hour periods. Set gillnets were extended to continuous fishing on July 15 while drift gillnets were allowed to fish 8-hour periods around low water. Final sockeye harvest by gear type was calculated to be 76% drift nets and 24% set gillnets. In retrospect, without the allocation plan, there would have been more gear in the Wood River during the early openings when sockeye passage rate was the highest, potentially resulting in higher exploitation.

Commercial harvest in the Wood River totaled approximately 165,000 sockeye salmon in 1998 (Tables 16 and 17). Daily sockeye harvests peaked July 6 (35,708 fish) when WRSHA was the only section open, and declined to less than 10,000 fish July 10. Impacts to other species of salmon and resident species in the Wood River are always a concern with an inriver fishery. There is little data on the size of chinook, chum and coho salmon stocks in the Wood River and even less data available on resident species populations. Sockeye salmon represented 96.2% of the 1998 commercial harvest in the Wood River. Harvests of other species included approximately 200 chinook, 1,700 chum and over 200 coho salmon. Staff conducted aerial surveys of chinook spawning escapement in the Muklung River in an effort to monitor effects of the fishery. The aerial count of 150 chinook salmon in the Muklung River was one of the lowest since 1967, when surveys were first conducted on this river. However, the low commercial harvest of this species in the fishery was an indication that overall run strength was down and that exploitation of Muklung chinook was not above normal levels.

Postseason, the WRSHA management plan was reviewed by staff, permit holders and the Nushagak Advisory Committee. The Department submitted an agenda change request after discussion with the local advisory committee, to change the criteria for allowing openings in the WRSHA. As adopted in November 1997, paragraph (c)(1) requires concurrent openings in the district in order to open commercial fishing in WRSHA. When Nushagak River sockeye escapement is below the level needed to achieve the low end of the escapement goal range, commercial openings in the district would be detrimental to obtaining the required escapement. In 1998, the criteria to fish in the WRSHA under this paragraph was not met until the evening of July 4, when over 800,000 sockeye were already past the Wood River counting towers. The Department's intent for the agenda change request is to allow commercial fishing earlier in the Wood River which will increase exploitation of Wood River sockeye and remove the concurrent opening requirement specified in (c)(1) that would result in additional exploitation of Nushagak River sockeye salmon.

Igushik Section. The 1998 sockeye run forecasted for Igushik River was similar in size to recent years at 1.05 million fish. Sockeye salmon escapements in the Igushik River from 1989 to 1996 exceeded the biological escapement goal range (150 thousand - 250 thousand) in spite of extensive commercial fishing in the Igushik Section (Appendix Table 1). In 1997, the Igushik sockeye run failed, as did most other river systems in Bristol Bay, with less than 300 thousand fish in the total inshore return. This failure in 1997 set the stage for a conservative management strategy in 1998.

The first sockeye were detected in the Igushik River June 24, after eight days of unsuccessful test fishing (Table 31). Through 12:00 noon July 28, the Igushik test fish project was yielding an estimate of 8,000 sockeye past the test fish site in the lower Igushik River. However, there were no sockeye past the Igushik counting towers on the upper Igushik River. The tower count indicated either a late or weak sockeye return in progress to the Igushik

River. By July 4, the Igushik river sockeye escapement had lagged to almost 6 days behind the 200,000-point goal curve with a cumulative total of 5,300 fish.

After a substantial increase in sockeye escapement rate at Igushik towers July 4, the first commercial opening was announced for 10:00 a.m., July 5 in the entire Nushagak District including the Igushik Section. Both drift and set gillnets participated in the 4-hour opening. Sockeye escapement rates at Igushik towers continued at elevated levels through July 6, bringing the cumulative total of 87,000 fish up to the point goal curve. Another commercial opening, 10 hours in duration was announced for July 7. Igushik Section was allowed to fish daily from July 7 to July 23 with continuous fishing occurring from July 14 on.

Commercial fishing time in Igushik Section totaled 354 hours, excluding directed chinook openings. Although drift harvests are not estimated for Igushik Section, Igushik Section setnet harvests totaled approximately 123,000 sockeye salmon (Table 17), which is approximately half of the recent 10-year (1988-1997) average. Sockeye salmon escapement in the Igushik River totaled 216,000 fish or 8% over the escapement goal. The 1998 Igushik River sockeye return came in at 45% below the preseason forecast.

The new sockeye allocation plan specified a target of 6% of the sockeye harvest of the Nushagak District to be taken by Igushik Section setnets. Management actions were implemented to achieve this target. Commercial openings between July 5 and July 10 were for both drift and set gillnets fishing concurrently. Beginning July 10, because the calculated Igushik Section set gillnet harvest percentage was only 4%, drift gillnets were excluded from the openings until July 14. While the allocation percentage to Igushik setnets began to increase slightly during this time, the escapement rate past the counting towers also began to increase noticeably. After 4 days of fishing with set gillnets only, because of the allocation plan and projecting going over the point goal, drift gillnets were included in the openings and the two gear types fished concurrently throughout the rest of the season. The final sockeye harvest percentage for Igushik Section set gillnets was 4.4%.

Sockeye runs to Nushagak District systems totaled 5.4 million, 2% above the 1998 forecast but still below the recent 10-year average (Table 4, Appendix Table 18). Wood River comprised the majority (73%) of the sockeye return, followed by Nushagak (16%) and Igushik (11%). The Wood River run, for the second successive year, was the only run in Bristol Bay to exceed the forecast. The Nushagak run was 26% less than forecast. The Igushik return of 573,000 fish represented only 55% of the forecast for that river system.

The preliminary sockeye harvest estimate (3.0 million) for Nushagak District was 16% less than forecast and well below the 1978-1997 average of 3.7 million. Sockeye escapement in the three major Nushagak District river systems reflected the disparity in run strengths (Appendix Tables 1 and 17). Escapement in the Wood River (1.75 million) exceeded the upper range of the Wood River goal by 46%. In the Nushagak River, the escapement goal

range was achieved; the final escapement estimate (459,000) exceeded the low end of the range, and was 16% short of the point goal. Although the 1998 Nushagak River escapement was greater than the 1997 estimate, escapement into Nuyakuk River (146,000) was much less than the 1997 escapement into that tributary and far below the desired range. The escapement goal for the Igushik River was achieved; escapement in that system (216,000) was 8% above the point goal.

Coho Salmon

The Nushagak Coho Salmon Management Plan established spawning and inriver escapement goals and provides guidance to the department in managing sport, subsistence and commercial fisheries that harvest coho salmon. The plan directs the department to manage the commercial fishery in the Nushagak District to achieve an inriver run goal of 100,000 coho salmon in the Nushagak River. The inriver run goal provides for a biological escapement goal of 90,000 spawners and upriver sport and subsistence harvests. Based on the parent-year escapement of approximately 80,000 coho in 1994 and poor recent production trends, the 1998 coho return was not expected to be strong. The coho plan directs the department, when the total inriver run in the Nushagak River is projected to be less than 100,000 but at least 60,000, to close the commercial fishery by July 23. In 1998, commercial fishing in the Nushagak District was closed July 23 as directed by the Nushagak River Coho Salmon Management Plan because the Department was unable to project obtaining the inriver goal. Through July 22, the cumulative coho salmon escapement past the Portage Creek sonar project was 8,000 fish, which was almost 7 days behind the level needed to achieve the goal. Approximately 2,600 coho salmon were reported in the commercial catch prior to the closure; reporting problems relating to coho salmon identification in the commercial harvest would indicate that the actual catch was greater than reported catch. Subsistence and sport fishing would be permitted to continue normally, unless inriver run strength was projected to fall below 60,000 coho during the season.

Directives in the Nushagak River Coho Salmon Management Plan call for a closure of the sport fishery, and restrictions in the subsistence fishery, when the inriver run is projected to be less than 60,000. Through August 2, the estimated coho salmon escapement was 15,000, or 60% of the expected escapement for that date. Total escapement was projected, based on current escapement counts and average run timing, to be just over 60,000.

On August 3, over 15,000 coho salmon were counted at the Portage Creek sonar project bringing the cumulative total to over 30,000 and raising the projection to over 100,000. At 12:00 noon August 4, a 12-hour commercial opening in the Nushagak District was announced, which would begin at 10:30 a.m., August 5. A daily count of over 22,000 coho was recorded for August 4 putting the cumulative coho escapement at over 53,000 fish, well ahead of the inriver goal curve. Additional fishing time was needed to harvest the surplus coho salmon. Between

August 5 and August 25, eight fishing periods were allowed totaling 157 hours of fishing time. Final reported commercial harvest of coho salmon was approximately 22,000 fish (Table 16, Appendix Table 25)

In response to evidence of sonar counting problems with chinook and coho salmon in 1997, the Department initiated a gillnet test fishery to examine the distribution of coho salmon in the Nushagak River beyond the range of the sonar counters; this test fishery was continued through the 1998 season. Results indicated that a substantial portion of the catch per unit effort occurred offshore of the sonar beam and, therefore, the sonar did not count a segment of the coho salmon escapement. The department will continue to assess offshore distribution for all species of salmon as an integral part of the sonar project. The objective will be to estimate the proportion of chinook, coho and other salmon species that migrate offshore of the sonar beam and to define how variable the offshore component is between years. Results of this work will be used to determine whether the technology associated with the Department's original sonar counters remains adequate to the task of counting chinook and coho salmon in the Nushagak River.

Togiak District

Forecast

Sockeye Salmon. The 1998 inshore sockeye run to the Togiak River was forecasted to reach 466,000 sockeye salmon, of which 70% were projected to be 3-ocean fish and 30% 2-ocean fish (Table 2). With an escapement goal of 150,000 sockeye past the towers at Togiak Lake, and an additional 25,000 fish (20-year average) spawning in the tributaries below the towers, 291,000 sockeye would be potentially available as harvestable surplus in the Togiak River Section if the run returned as forecast. This was expected to be one of the lowest harvests in the last 20 years. Smaller sockeye runs to other drainages in the district (primarily Kulukak Section) occur, but these are not included in the forecast because age composition and escapement data are not complete. The projected sockeye harvest for 1998 in the Togiak Section was below the average (1978-1997) harvest of 363,000 fish (Appendix Table 19). Therefore, a conservative management approach was planned.

Chinook Salmon. No formal forecast is issued for chinook salmon runs in the Togiak River. Chinook run strength declined from 1984 to 1991; and chinook escapements fell short of the goal (10,000) from 1985 to 1992 (Appendix Table 22). The chinook goal was reached from 1993 to 1995, with extensive commercial closures and mesh size restrictions. In 1996, with only minor reductions in the weekly fishing schedule, chinook escapement again fell short of the goal. A reduced weekly schedule of approximately 48 hours per week in late June seems to be a sustainable amount of fishing time to achieve the escapement goal and harvest the surplus chinook salmon.

Coho Salmon. A forecast is not produced for coho salmon in the Togiak District. Parent-year escapement estimates from aerial surveys of spawning coho are the only preseason indicator of run strength available. Coho salmon escapement for the parent year (1994) in the Togiak River was not available due to water and weather conditions. Togiak District's commercial coho harvest in 1994 was 96,000 fish. This was the largest harvest since 1984 and almost twice the 20-year average. Without parent-year escapement information and with only parent-year commercial harvest as an indicator for potential run strength, an optimistic but cautious management approach based on catch performance was planned.

Togiak District is managed differently than other districts in Bristol Bay. The district uses a fixed fishing schedule of 3 days per week in the Kulukak Section, 4 days per week in Togiak River Section, and 5 days per week in the Osviak, Matogak and Cape Pierce Sections. The Togiak District Salmon Management Plan (TDSMP) adds 36 hours to the schedule for the Togiak River Section between July 1 and July 16. This schedule is adjusted by emergency order, as necessary to achieve desired objectives. In addition, the TDSMP restricts the transfer in and out of the Togiak District by prohibiting boats that had fished in any other district to fish in the Togiak District until July 24. It also prohibits boats that had fished in the Togiak District to fish in any other Bristol Bay district until the same date.

Chinook Fishery

At a public meeting in Togiak June 18, department staff discussed the concern for achieving the chinook escapement goal in the Togiak River. Staff announced that fishermen should again anticipate some reduction in the weekly fishing schedule during the last 2 weeks of June for all sections of the district to reduce the exploitation of chinook salmon. The TDSMP would increase exploitation of this stock in early July with the increased fishing schedule. Staff also announced that management focus would shift to sockeye salmon June 29. The extended fishing schedule would begin at that time for the Togiak River Section. In addition, staff cautioned fishermen that given the low forecast for sockeye, there was potential for early July restrictions on the weekly fishing schedule.

Fishing opened with a regular weekly schedule on June 1. However, the first landings of the 1998 season occurred on June 15 (Table 19). The weekly schedule was shortened 24 hours and by the close of fishing on June 18, the cumulative chinook catch in Togiak Section was 70 fish, well below the historical average for that date. Effort (number of deliveries) was significantly below average, and catch rates (number of fish per delivery) were also significantly below average. No definitive indications of chinook run strength were apparent given the low effort and shortened weekly schedule. The department announced via public radio on June 19 that commercial fishing would be allowed in all sections of the Togiak District from 9:00 a.m., Monday, June 22 until 9:00 a.m.,

Wednesday, June 24. This was a reduction of 48 hours from the normal weekly fishing schedule in the Togiak River Section for the conservation of chinook salmon. In addition, subsistence fishing was open in the commercial district for 48 hours prior to June 22.

Effort increased in the chinook fishery the 4th week in June, but was about half of the historical average effort for that date. Daily catch rates increased to above average levels. The resulting chinook harvest reached 2,190 fish in the Togiak River Section for the 48-hour opening. Following this opening subsistence fishing was once again allowed in the commercial district for 72 hours.

Cumulative chinook harvest for Togiak District through June 24 was 2,430 fish, which was less than half of the historical average but near 1998 expectations and similar to recent years. Overall, effort for June was 37% below average. The Kulukak Section had contributed 170 fish to this cumulative total. Togiak residents and sportfishing lodge operators indicated that chinook abundance in the Togiak River was comparable to or less than recent years.

Chinook have usually passed their peak migration when sockeye management begins on the Togiak River. As sockeye management began it was evident that the chinook run was late and a larger portion of the run would be subject to incidental harvest during the sockeye fishery. Catch per delivery numbers remained at or above average levels during early July and the chinook peak harvest occurred on July 7 and July 8 with 1,500 fish each day (Table 20).

Total chinook harvest for the Togiak River Section was 12,900 fish. The 5-year average catch is 9,000, while the 20-year mean is 18,000 fish. Despite a late run, the escapement goal of 10,000 was essentially achieved. An escapement estimate of 9,860 chinook was derived from aerial surveys. Commercial exploitation of the Togiak River chinook was 57% (not counting sport and subsistence harvests), just over the average (1980-1997) of 56%. District-wide, 14,155 chinook were harvested, approximately 29% of the 20-year average (Appendix Table 22). Escapement estimates totaled 938 for Kulukak River, with an additional 873 estimated in the Quigmy, Osviak, Matogak, Slug, Negukthlik and Ungalikthluk Rivers combined. The total district escapement of 11,666 chinook was 28% below the 20-year average of 16,226. A combined total run of 25,821 chinook to Togiak District was 1% higher than the recent 5-year average. This ended a 3-year decline in the total run strength, which began in 1995 (Appendix Table 22).

Sockeye Fishery

Sockeye salmon management began June 29 along with the extended weekly fishing schedule implemented by the TDSMP. In some years sockeye escapements have exceeded the goal (Appendix Table 19) in the Togiak River

when restrictions were implemented in late June for the conservation of chinook salmon. Limited efficiency of the small gillnet fleet, and extended lag time from the district to the counting tower, necessitated increasing fishing exploitation early in the sockeye run to control escapement excesses. The 36 hours that were added to the weekly schedule by the management plan would do this before overall sockeye run strength could be assessed in season.

On June 30, 20 drift fishing vessels and 63 set net permits were registered for Togiak District. Both setnet and driftnet effort was slightly lower than normal for the first week of July. With the district registration restrictions of the TDSMP, both set and drift gillnet effort was expected to remain stable through July 23, which has historically been the 85% point in the sockeye harvest for Togiak District.

Department personnel set up camp and began operation of the counting towers at Togiak Lake on June 27 several days earlier than scheduled due to additional funding supplied by USFWS. Adult sockeye salmon were present June 28, but daily passage rates remained zero for several days following. Cumulative sockeye escapement rapidly diverged from expected levels.

Reported daily harvests during the first 2 days of the weekly schedule were below average. Although effort was comparable to previous years, catch rates were below average. The cumulative sockeye harvest was 40% of expected levels for the Togiak River Section. With the relatively poor performance of the commercial sockeye fishery in the Togiak Section to date, staff announced 6:00 p.m. June 30 that commercial fishing would close in the Togiak River Section 24 hours early. After the close of fishing, the first week of July, the daily catches were well below average and the cumulative sockeye harvest in the Togiak River Section was 21,000 fish, 50% of the expected level. Catch per unit effort was significantly below average. In Kulukak Section, sockeye catches were reported to be well above average and effort was two to four times the average.

The first aerial surveys of the Togiak River were conducted June 29 and July 7 under poor conditions. Turbid and high water conditions were consistent for the first 2 weeks of July. These two surveys were unproductive. On July 7, an aerial survey of Kulukak River resulted in observing 500 sockeye in the lower river with chinook salmon present.

When the Togiak District reopened on Monday, July 6, daily catches in the Togiak River Section again were below average. Catches and catch rates continued to be low on Tuesday. Effort had increased, but the cumulative harvest was 30% of the historical average in the Togiak River Section. District registration increased to 29 drift and 71setnet permit holders due to previously unregistered individuals. Tuesday evening, July 7, staff announced that the Kulukak Section would close 24 hours early due to high fishing effort and low aerial survey counts.

On July 9, staff announced that the commercial fishery would close Friday, July 10 at 9:00 a.m. in all remaining sections of the Togiak District due to lagging escapements and poor catch rates. This shortened Togiak River Section's weekly schedule by 36 hours. Through July 10, with average run timing, approximately 40% of the sockeye harvest would have been taken. The Togiak River Section's cumulative harvest was less than 43,000 sockeye or 45% of the expected level. Cumulative tower counts for sockeye was 252 fish (Table 25), well over a week behind the level required to achieving the escapement goal of 150,000 fish. Effort was average and catch rates were 55% below average. Cumulative sockeye harvest for the Togiak District was 106,000 through this date. Considering cumulative harvest and escapement, the 1998 sockeye run appeared to be late or weak.

The third aerial survey of the season was conducted on July 10 with marginal survey conditions, staff observed less than 200 fish in the upper Togiak River. Under fair conditions, July 10, the Kulukak River was also surveyed; just over 1,000 sockeye were observed, low numbers given the date. The Togiak River continued to be turbid and high for several more days, conditions improved gradually each day. Aerial surveys were flown frequently. During a survey flown July 11, 1,100 sockeye were detected, well below normal. Because of the lag time when fish leave the commercial fishing district and when they pass the Togiak River counting station, aerial surveys play an important role in managing the Togiak salmon fishery. However, in 1998 the aerial surveys weren't as reliable for early inseason management (Table 32).

On July 11, staff announced that commercial fishing would reopen in all sections of the Togiak District for a 48-hour period at 9:00 a.m., July 13. The performance of the commercial fishery on what should be the peak of the commercial harvest would tell if sockeye abundance had built up in the district.

Daily sockeye escapement at the counting towers increased substantially on July 12 with the count nearing 5,000 fish. The cumulative escapement, however, was still 7 days behind at 5,500 sockeye. Normally, 21% of the sockeye escapement has past the towers by this date with average run timing. Sockeye aerial surveys were flown July 12 and July 13 under optimum light conditions, but poor water conditions. The surveys estimated 6,500 on July 12 and 10,500 on July 13, indicating movement of sockeye into the river.

Reported cumulative harvest in the Togiak River Section through Wednesday, July 15 was 82,000 sockeye, about 45% of expected. Effort had been average with catch rates below average, but daily harvests had increased significantly. Daily escapement past the counting towers at Togiak Lake had dropped to less than 1,500 fish per day. Togiak River cumulative escapement was only 12,500 fish by this date, which was tracking about 7 days behind expected levels. Kulukak cumulative sockeye harvest was 76,000 fish, more than twice the average. During July, fishing effort in the Kulukak section was three to four times the average. Aerial surveys conducted on July 14 and 15 were inconclusive due to light and water conditions. Conservation of sockeye salmon for spawning escapement was quickly becoming an issue for the department staff. However, to test and assess run

strength in the commercial district, a 24 hour period was scheduled from 9:00 a.m. Friday, July 17 in the Togiak River Section.

When the 24-hour period closed, 20,800 sockeye were harvested, bringing the Togiak River Section's cumulative harvest to 103,000 fish. The cumulative harvest was 50% of what was expected. Tower counts had briefly increased, bringing the cumulative escapement into the Togiak Lake to 26,500 fish, which was 5 days behind expected levels. By July 18, with normal run timing, 71% of the sockeye harvest has occurred and 47% of the escapement has occurred. Staff announced that unless river escapement increased to normal levels, additional fishing time would not occur for the next weekly schedule.

Aerial surveys documented an increase of sockeye salmon escapement into the Togiak River (Table 32). July 17 was again poor for surveying, but numbers had increased slightly. On July 19, a survey resulted in 14,700 sockeye under poor conditions. Water conditions improved on July 21 and with fair conditions, 24,300 sockeye were counted throughout the mainstem of the Togiak River. This was indicative that the conditions had been hampering the accuracy of aerial surveys. Through July 21, the cumulative tower count had risen to 43,800 fish and was continuing to count steadily, although not significantly enough to catch up. The escapement had now lagged to 8 days behind the level needed to reach the 150,000 goal. During a meeting held in Togiak on July 22, staff advised permit holders that the commercial sockeye fishery was unlikely to reopen and that reaching the escapement goal was improbable.

Subsistence fishing in the commercial district was opened July 23 and continued through August 4.

Four aerial surveys were conducted from July 22 to July 29 with poor to good conditions. Togiak mainstem sockeye numbers remained steady until July 27 then they began to drop. Sockeye escapement increased in the Togiak River with the peak daily escapement of 11,300 fish occurring on July 23. Daily escapement past the towers remained in the 5,000 to 9,000 fish range for the next several days and then rapidly declined August 5. Normally, daily escapement would have declined steadily after July 24, but the late run brought the cumulative escapement numbers up to expected levels by August 5. The counting tower operated through August 7, and when counting ceased, final escapement was 153,576 fish or 2% over the escapement goal of 150,000 sockeye (Table 25, Appendix Tables 1 and 19). Combining the final tower escapement into the lake with the escapement estimate for the tributaries and mainstem resulted in a Togiak River drainage escapement of 175,500 Sockeye. Sockeye escapement into the Kulukak Section totaled 12,950, 49% below the recent 10-year average.

An additional 10,000 sockeye were harvested during the August coho fishery bringing the preliminary total Togiak River Section harvest to 113,000 fish (Table 20). This was 69% below the 1978-1997 average (Appendix

Table 19). Escapement plus the Togiak River Section catch yielded a total run to the Togiak River of 288,500 sockeye, 38% below the preseason forecast.

Kulukak Section harvested 76,000 sockeye, 1,000 were caught in the Matogak Section and Osviak Section harvested less than 400 (Table 24). Combined district sockeye harvest was 190,400, 58% below the 20-year average of 455,000 and the third lowest on record (Appendix Tables 5, 19).

The 1998 Togiak District chum salmon harvest of 67,595 was 72% below the 1978-1997 mean (Appendix Table 23). The commercial catch combined with the district-wide escapement estimate of 102,455 fish determined from aerial survey, produced a total run estimate of 170,050 chum salmon, approximately 37% of the 1978-997 mean.

The 1998 pink salmon catch of 6,435 fish was 88% below the recent (1988-1996) even-year average for the Togiak District (Appendix Table 8).

The weekly fishing schedule as described by the TDSMP was changed by emergency order. July's actual fishing schedule accounted for 276 hours of fishing or 50% of the TDSMP schedule. The TDSMP places restrictions on district registrations, which were expected to stabilize effort until July 24. However, permit holders continued to register throughout early July, bringing the total drift registration to 30 and setnet registration to 76 permit holders.

Coho Fishery

Typically, Togiak sockeye runs diminish during the first week of August and coho abundance begins to build; management emphasis usually turns to coho salmon at that time. Given the late sockeye run into the Togiak River, the Department wasn't able to project that the Togiak escapement goal was going to be met until August 3. Since no indications of run strength were available for coho, commercial fishing was cautiously allowed in the district for 48 hours beginning August 5 to continue sockeye catches and to initiate coho abundance assessments.

The reported harvest from this first coho period was 5,000 sockeye and 900 coho. Coho catch rates were above average and effort was normal for this time. It was still early in the coho run to accurately assess run strength. Aerial surveys are generally not productive in assessing coho salmon abundance in the Togiak River until mid to late August, due to low numbers of coho and high numbers of other salmon species. The commercial catch rates provide the only indication of coho run strength available in early August. Staff, still cautious, superceded the next weekly schedule in the district Monday, August 10 with another 48-hour period.

The daily catches and catches per delivery in the Togiak River Section were well above average; effort was slightly above average. Based on this catch rate, another 24-hour opening was scheduled for August 14 and staff announced that a full weekly schedule would begin August 17. Cumulative coho harvest for Togiak River Section by the close of the fishing on August 12 was 4,700 fish, 63% higher than average.

Catch per delivery remained well above average throughout the week of August 17. The cumulative coho harvest in the Togiak River Section reached 13,300 fish, also above average. Daily catch totals and effort fluctuated. Reports from village residents and sport fishing guides indicated that coho were entering the Togiak River in good numbers. An aerial survey flown August 18 yielded a raw count of approximately 5,900 coho salmon in the Togiak River's mainstem. Using normal expansion factors for coho salmon in the Togiak River, this raw count estimated escapement at approximately 18,000 fish. With the fishery's performance, another full weekly commercial fishing schedule was announced to begin August 24.

The week of August 24 is usually the peak of the commercial coho salmon harvest. Throughout the week the catch rate remained 20% above average. Fishing effort increased 41% above normal and the cumulative coho harvest in the Togiak River Section reached 31,000 fish, also 41% above average. From appearances, it was an apparently strong coho run. However, several Togiak residents reported unusual fishing activities occurring in the Togiak River. Reportedly, commercial fishermen were entering the river late at night and drifting nets through pools of coho salmon, then selling their catch to the processor. It was announced that another full weekly fishing schedule would begin August 31.

Fishing effort in the Matogak Section was steady in August. Cumulative coho harvest in the Matogak Section had reached nearly 4,000 fish by August 27. The Matogak system usually supports a coho run of less than 5,000 fish. Concern for over exploitation of coho became an issue and when fishing effort continued in the Matogak Section in early September, staff shortened the weekly schedule in the western sections by 24 hours starting September 4.

Catch rates started very high during the week of August 31 and then slowly diminished throughout the week. Overall, the catch rate was 19% above average for the week. Fishing effort remained high, 53% above average, and the cumulative coho harvest in the Togiak River Section reached 48,600 fish. The cumulative harvest was 52% above average. An aerial survey flown September 2 over the Togiak River mainstem, in fair conditions, estimated an expanded escapement estimate of approximately 30,000 coho. The escapement goal would likely be met. Based on the catch rates and harvest to date, staff announced that commercial fishing would resume for the next week beginning September 7, except in the western sections, which would close 24 hours early due to the elevated fishing effort. Togiak residents continued to complain about more "commercial" fishing activities in the lower Togiak River.

Fish and Wildlife Protection officers attempted to observe the reported commercial fishing activities on the Togiak River and were unsuccessful. River users continued to call the office with reports of the commercial fishing activities. Therefore, feeling that the coho escapement goal for the Togiak River was in jeopardy due to illegal commercial fishing, staff announced that commercial fishing for the Togiak District would cease, Wednesday, September 9 at 9:00 p.m. for a period of one week as allowed by 5ACC 39.185. When the 1-week closure had ended, no buyers were left in the Togiak District to purchase salmon and the season ended.

The 1998 commercial catch of coho salmon in the Togiak River Section (52,630 fish) was the third highest in 10 years and 46% above the 1980-1997 average (Appendix Table 26). Postseason aerial survey estimates of spawning escapement were conducted on all streams in the Togiak District in 1998. Coho salmon escapement in the Togiak River and tributaries was estimated to be 25,335 fish, which was 40% of the 1980-1997 average and missed the escapement goal of 50,000. District-wide, 58,000 coho were harvested and total escapement was 58,700 fish, the Negukthlik River was uncounted.

1998 SUBSISTENCE SALMON FISHERY

In spite of numerous social, economic, and technological changes, Bristol Bay residents continue to depend on salmon and other fish species as an important source of food. Residents have relied on fish to provide nourishment and sustenance for thousands of years. Subsistence harvests still provide important nutritional, economic, social, and cultural benefits to most Bristol Bay households. All five species of salmon are utilized for subsistence purposes in Bristol Bay, 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, and 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

Permits are required to harvest salmon for subsistence purposes in Bristol Bay. Since 1990, all Alaska State residents have been eligible to participate in subsistence salmon fishing in all Bristol Bay drainages. In 1998, with two exceptions, only gillnets were recognized as legal subsistence gear In the Togiak District, spear fishing was also allowed. In 1998, the Board of Fisheries adopted new regulations for the taking of "redfish" (spawned sockeye salmon) in portions of the Naknek District. Gillnets, spears, and dipnets may be used along a 100 yard length of the west short of Naknek Lake near the outlet to the Naknek River from August 20 through September

30; at Johnny's Lake from August 15 through September 25; and at the mouth of the Brooks River from October 1 through November 15. In the Bristol Bay Area in 1998, gillnet lengths were limited to 10 fathoms in the Naknek, Egegik, and Ugashik rivers, Dillingham beaches, and within the Nushagak commercial district during emergency openings. Up to 25 fathoms could be used in the remaining areas, except that nets were limited to 5 fathoms in the special "redfish" harvest areas in the Naknek District.

In Dillingham and the Naknek, Egegik, and Ugashik rivers subsistence fishing was limited to several fishing periods per week during the peak of the sockeye run. All commercial districts were open for subsistence fishing during commercial openings. In addition, all commercial districts were open for subsistence fishing in May and September, from Monday to Friday. In recent years, declining chinook and coho stocks resulted in longer commercial closures and some residents had an increasingly difficult time obtaining fish for home use. The Nushagak commercial district, starting in 1988, has been opened for subsistence fishing by emergency order during extended commercial closures.

Inseason Management

Including all the districts of Bristol Bay, 13 emergency orders relating to subsistence were issued. Descriptions of these emergency orders are located in Table 11 by drainage.

In the Nushagak District, seven subsistence emergency orders were issued. Subsistence fishing was allowed from 9:00 a.m., June 2 to 9:00 a.m., June 8; from 9:00 p.m., June 10 to 9:00 p.m., June 12; from 9:00 a.m., June 18 to 9:00 a.m., June 19; from 6:00 p.m., June 30 to 6:00 p.m., July 1-extended to 6:00 p.m., July 2; from 9:00 a.m., July 28 to 12:00 midnight, September 30. This last emergency order was superceded: from 9:00 p.m., August 4 to 12:00 midnight, September 30 the commercial district was returned to the status of "open to subsistence fishing only during open commercial periods or by emergency order" due to expected commercial openings for coho in the district.

In the Wood River Special Harvest Area there were two emergency orders issued. Subsistence fishing in the Wood River Special Harvest Area was closed indefinitely starting 9:00 a.m., July 5. Subsistence fishing was reopened 9:00 a.m., July 28 to 12:00 midnight, September 30.

In the Togiak District, four subsistence emergency orders were issued for 1998. Subsistence fishing was opened in all sections of the district from 9:00 a.m., June 18 to 9:00 a.m., June 20; from 9:00 a.m., June 25 to 9:00 a.m., June 28; and indefinitely starting 9:00 a.m., July 23 until further notice. August 4, 9:00 p.m., subsistence

in the district was returned to "open during commercial periods or open by emergency order" status for the remainder of the season.

Permit System

A permit system was gradually introduced throughout the region in the late 1960s to document the harvest of salmon for subsistence. Much of the increase in the number of permits issued during these years reflects: 1) a greater compliance with the permitting and reporting requirements, 2) an increased level of effort expended by the department in making permits available, contacting individuals, and reminding them to return the harvest forms, and 3) a growing regional population. Most fishermen are obtaining permits and reporting their catches, and overall permit returns have averaged between 85% and 90%. However, fish removed for home use from commercial catches are not included in most reported subsistence harvest totals. Also, fish caught later in the season, such as coho and spawning salmon are probably not documented as consistently as chinook and sockeye.

In 1998, a total of 1,234 permits were issued for Bristol Bay; the largest number were for the Nushagak (562 permits) and Naknek/Kvichak (567 permits) districts. For the Nushagak and Naknek/Kvichak districts, more permits were issued in 1998 than the average for the past 10 years, due in part to permits being available to all state residents. Fewer permits were issued for the Egegik and Ugashik districts in 1998 than the average for the past 10 years. The number of permits issued for the Togiak District (42) was the highest since 1991. The number of permits returned in 1998 for the Bristol Bay Area was 1,155, 93.6% of those issued.

Harvest

The estimated total Bristol Bay subsistence salmon harvest in 1998 was 143,368 fish (Table 35). This number is below both the 20-year average of 167,723 salmon and recent 10-year average of 159,325 salmon. Only the chinook harvest was above the recent 20-year average (Appendix Table 31).

In 1998 as over the last several decades, most of the subsistence harvest was taken in the Naknek/Kvichak (62%) and the Nushagak (32%) districts. The Naknek/Kvichak total harvest of 88,967 fish was below the recent 10-year average of 93,817 (Appendix Table 31). The 1998 sockeye harvest in the Kvichak River drainage was the lowest recorded for the last 20 years. Kvichak drainage residents (and other permit holders fishing in the Kvichak drainage) harvested an estimated 53,656 sockeye salmon, compared to a recent 10-year average of 67,156 and a 20-year average of 72,293 sockeye salmon. All Kvichak drainage communities, except Igiugig, harvested sockeye salmon at levels below their recent 10-year averages (Appendix Table 32).

In the Nushagak District the total estimated subsistence harvest in 1998 was 46,355 salmon. The recent 10-year average is 55,282. All species were harvested in the Nushagak District at levels below their recent 10-year averages, with the sockeye harvest of 25,217 slightly above the historical lows of about 23,000 sockeyes in 1995 and 1996 (Appendix Table 31). The Nushagak chinook harvest in 1998 of 12,258 was the lowest since 1989, and was down notably from the 15,318 chinook estimated for 1997.

Harvests of all species in the Togiak District in 1998 were up from the year before, due in large part to the increased number of permits obtained and returned by drainage residents. The estimated subsistence harvest in the Ugashik District in 1997 was 1,942. This is down from 3,327 salmon estimated for 1997 and below the 10-year average of 2,264. In the Egegik District the estimated subsistence salmon harvest of 2,314 was below the recent 10-year average. However the number of permits issued for this district has dropped notably since peaking at 80 in 1992; 36 permits were issued for 1998 (Appendix Table 31).

In 1998, the Bristol Bay subsistence salmon harvest was composed of 79.2% sockeye, 10.9% chinook, 5.6% coho, 2.6% chum, and 1.6% pink salmon.

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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, 1998.[a]

District and River System	Inshore Run			Escapement				Inshore Catch		
	Forecast	Actual[1]	Percent Deviation[2]	Goal	Range	Actual[1]	Percent Deviation[2]	Projected Harvest	Actual[1]	Percent Deviation[2]
NAKNEK-KVICHAK DISTRICT										
Kvichak River	8,880	3,368	164%	2,000	2,000-10,000	2,296	-13%	4,380	1,073	308%
Branch River	350	388	-10%	185	170-200	252	-27%	165	136	21%
Naknek River	3,407	2,546	34%	1,100	800-1,400	1,202	-8%	2,307	1,344	72%
Total	12,637	6,302	101%	3,285	6,970-11,600	3,750	-12%	6,852	2,553	168%
EGEGIK DISTRICT	8,620	4,669	85%	1,100	800-1,400	1,111	-1%	7,520	3,558	111%
UGASHIK DISTRICT	3,235	1,649	96%	850	500-1,200	891	-5%	2,385	724	229%
NUSHAGAK DISTRICT										
Wood River	3,056	3,948	-23%	1,000	700-1,200	1,756	-43%	2,056	2,193	-6%
Igushik River	1,055	574	84%	200	150-250	216	-7%	855	358	139%
Nushagak-Mulchatna	1,175	869	35%	550	340-760	459	20%	625	410	52%
Total	5,286	5,391	-2%	1,750	1,190-2,210	2,431	-28%	3,536	2,961	19%
TOGIAK DISTRICT	466	288	62%	150	100-200	154	-3%	316	113	180%
TOTAL BRISTOL BAY	30,244	18,299	65%	7,135	9,560-16,610	8,337	-14%	20,609	9,909	108%

[1] Unless otherwise noted, inshore total runs and catches are preliminary, while escapement data is final.
[2] Percent deviation = (forecast - actual)/actual.
[3] These systems cannot be managed seperatley from the major system in the district.
[a] The Bristol Bay inshore forecast does not include several minor river systems, including the Snake River drainage in Nushagak District, and the Kulukak, Osviak, Matogak, and Slug River systems in Togiak District. Catches, escapements, and total runs for these smaller systems are not included in this table for the sake of comparison. Therefore, actual District totals reported here may represent only a portion of the District, and actual Bristol Bay totals reported here include only a portion of the District, and actual Bristol Bay totals reported here include only a portion of the Bristol Bay catch, catch, escapement, and inshore run. Totals may not equal column sums due to rounding.

Table 2. Inshore forecast of sockeye salmon returns by age class, river system and district, in thousands of fish, Bristol Bay, 1998.

District and River System	2-Ocean			3-Ocean			Other	Total
	1.2 (1993)	2.2 (1992)	Total	1.3 (1992)	2.3 (1991)	Total		
NAKNEK-KVICHAK DISTRICT								
Kvichak River	3,519	4,043	7,562	1,363	502	1,865	-	9,427
Branch River	177	93	270	87	15	102	-	372
Naknek River	782	849	1,631	1,257	729	1,986	-	3,617
Total	4,478	4,985	9,463	2,707	1,246	3,953	-	13,416
EGEGIK DISTRICT	682	3,886	4,568	1,082	3,502	4,584	-	9,152
UGASHIK DISTRICT	894	1,119	2,013	670	751	1,421	-	3,434
NUSHAGAK DISTRICT								
Wood River	1,449	167	1,616	1,569	60	1,629	-	3,245
Igushik River	236	40	276	813	31	844	-	1,120
Nushagak River	105	8	113	691	10	701	434	1,248
Total	1,790	215	2,005	3,073	101	3,174	434	5,613
TOGIAK DISTRICT	120	28	148	310	37	347	-	495
TOTAL BRISTOL BAY[1]								
Number	7,964	10,233	18,197	7,842	5,637	13,479	434	32,110
Percent	25	32	57	24	18	42	1	100

[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, 1998.[a]

District and River System		1.2	2.2	2-Ocean	0.3	1.3	2.3	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT									
Kvichak River									
	Number	1,749	590	2,339	1	838	142	981	3,320
	Percent	52.7	17.8	70.5	0.0	25.2	4.3	29.5	100
Branch River									
	Number	153	77	230	0	144	8	152	382
	Percent	40.1	20.2	60.2	0.0	37.7	2.1	39.8	100
Naknek River									
	Number	480	443	923	1	1,268	317	1,586	2,509
	Percent	19.1	17.7	36.8	0.0	50.5	12.6	63.2	100
Total	Number	2,382	1,110	3,492	2	2,250	467	2,719	6,211
	Percent	38.4	17.9	56.2	0.0	36.2	7.5	43.8	100
EGEGIK DISTRICT									
	Number	358	841	1,199	0	529	2,801	3,330	4,529
	Percent	7.9	18.6	26.5	0.0	11.7	61.8	73.5	100
UGASHIK DISTRICT									
	Number	322	228	550	4	321	739	1,064	1,614
	Percent	20.0	14.1	34.1	0.2	19.9	45.8	65.9	100
NUSHAGAK DISTRICT									
Wood River									
	Number	2,774	132	2,906	1	982	46	1,029	3,935
	Percent	70.5	3.4	73.9	0.0	25.0	1.2	26.1	100
Igushik River									
	Number	283	19	302	0	293	22	315	617
	Percent	45.9	3.1	48.9	0.0	47.5	3.6	51.1	100
Nush-Mulchat. River									
	Number	81	1	82	43	678	10	731	813
	Percent	10.0	0.1	10.1	5.3	83.4	1.2	89.9	100
Total	Number	3,138	152	3,290	44	1,953	78	2,075	5,365
	Percent	58.5	2.8	61.3	0.8	36.4	1.5	38.7	100
TOGIAK DISTRICT[b]									
	Number	42	6	48	3	209	27	239	287
	Percent	14.6	2.1	16.7	1.0	72.8	9.4	83.3	100
TOTAL BRISTOL BAY[c]									
	Number	6,196	2,336	8,579	51	5,262	4,113	9,427	18,006
	Percent	34.4	13.0	47.6	0.3	29.2	22.8	52.4	100

[a] The inshore run data does not include the 1998 False Pass/Ak. Peninsula catch of Bristol Bay sockeye or any high seas by-catch of immatures.

[b] Does not include rivers other than Togiak River.

[c] Approximately 343,000 additional sockeye salmon of several minor age classes, as well as fish returning to minor Bristol Bay drainages in 1998 that are not included in this total.

Table 4. Inshore commercial catch and escapement of sockeye salmon, Bristol Bay, in numbers of fish, 1998.[a]

District and River System	Catch	Escapement	Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River	1,072,760	2,296,074	3,368,834
Branch River	136,006	252,200	388,206
Naknek River	1,343,955	1,202,172	2,546,127
Total	2,552,721	3,750,446	6,303,167
EGEGIK DISTRICT	3,558,347	1,110,938 [b]	4,669,285
UGASHIK DISTRICT	724,327	924,853	1,649,180
NUSHAGAK DISTRICT			
Wood River	2,192,786	1,755,768	3,948,554
Igushik River	358,054	215,904	573,958
Nushagak-Mulchatna	410,360	458,874	869,234
Total	2,961,200	2,430,546	5,391,746
TOGIAK DISTRICT[1]			
Togiak Lake	112,718	153,576	266,294
Togiak River/Tributaries	76,332	21,900	98,232
Kulukak System	994	12,950	13,944
Other Systems	381	26,200	26,581
Total	190,425	214,626	405,051
TOTAL BRISTOL BAY	9,987,020	8,431,409	18,418,429

[1] Catch includes Togiak River Section only, "Other Systems" escapement includes Negukthlik, Ungalikthluk, Osviak, Matogak and Slug River systems.

[a] Catch apportionment by river system is preliminary until catch and escapements are final.

[b] Includes Egegik River Tower count and peak aerial counts for King Salmon River Shosky Creek.

Table 5. Inshore commercial catch and escapement of pink salmon, in numbers of fish, Bristol Bay, 1998.

District and River System	Catch [1]	Escapement [2]	Total Run
KAKNEK-KVICHAK DISTRICT			
Kvichak River Branch River Naknek River		3,200	
Naknek-Kvichak Total	11,433	3,200	14,633
EGEGIK DISTRICT	606	12 [a]	618
UGASHIK DISTRICT	253	342 [a]	595
NUSHAGAK DISTRICT	6,808	133,344 [b]	140,152
TOGIAK DISTRICT			
Togiak Section	6,070	121,350	127,420
Kulukak Section	280	6,600	6,880
Other [c]	85	6,825	6,910
Togiak Total	6,435	134,775	141,210
Total Bristol Bay	25,535	271,673	297,208

[1] Inshore district catches are preliminary and escapement figures are final.
[2] Estimated by aerial survey unless otherwise noted.
[a] Tower count.
[b] Sonar count, except 942 from Wood river tower.
[c] Includes Matogak and Osviak section's catch. Escapement includes Slug, Osviak, Matogak, Quigmy and Negukthlik/Ungalikthluk rivers.

Table 6. Offshore test fishing catch indices of sockeye salmon, Port Moller, Bristol Bay, 1998.

Date	No. of Stations Fished	Sockeye Catch	Running Mean Length (mm)	Index[1] Daily		Index[1] Cum.
6/11	0			5	*	5
12	4	16	565	6		11
13	4	13	538	5		16
14	3	6	542	11	*	27
15	4	41	547	22		49
16	4	65	545	36		85
17	4	90	545	43		128
18	4	64	529	22		150
19	4	71	540	28		178
20	4	98	547	46		224
21	0			43	*	267
22	4	104	541	53		320
23	4	102	557	43		363
24	0	169	550	61	*	424
25	4	114	551	47		471
26	4	116	542	52		523
27	4	124	557	60		583
28	4	198	549	76		659
29	4	341	545	118		777
30	4	267	549	90		867
7/1	4	355	547	119		986
2	3	73	537	48	*	1,034
3	4	361	548	131		1,165
4	4	197	540	82		1,247
5	4	332	545	130		1,377
6	4	255	550	102		1,479
7	4	69	542	42		1,521
8	4	205	547	75		1,596
9	4	228	549	97		1,693

[1] Indices are based on fish/100 fathom-hours and include interpolations for missed days and stations.*

Table 7. Summary of district sockeye salmon test fishing indices in the Naknek-Kvichak District, by index area and date, Bristol Bay, 1998.[a]

Date	Naknek R. Mouth	Pederson Point	Cutbank & Graveyard	Kvichak R. Mouth	Gravel Spit	Ships Anchorage	Half Moon Bay	Middle Naknek	Johnston Hill	Division Buoy	Deadman Sands	Low Point	Clark's Point
06/25/98	65								7	91			
06/26/98	230					153		390	27	403			
06/27/98	39					184		130	20	9			
06/28/98	138					75		423	0	1050			
06/29/98	88					646		100		453			
06/30/98	486					591		362	30	1780			
07/01/98	1294					359		356	69	1552			
07/02/98	1050		120			268		563		397			
07/03/98	713					712		236		399			
07/04/98	572	1060	1190	120		777		186					
07/05/98	68	125	932	28	0	200	0	184					

[a] All indices expressed in numbers of fish/100 fathoms-hour to the nearest whole index point.

Table 8. Summary of district sockeye salmon test fishing in the Egegik District, by index area and date, 1998.[a]

Index Area	Date

(No District Test Fishing was conducted in 1998.)

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

Table 9. Summary of district sockeye salmon test fishing in the Ugashik District, by index area and date, Bristol Bay, 1998.[a]

Index Area	June		July														
	28	29	2	3	5	6	7	8	9	11	12	13	14	15	16	17	19
Cape Grieg	89	9[b]	567[b]	182[b]		295[b]	393[b]	560	141				29		729		
Four Miles North of Smoky Point (Nearshore)	0	132		138		567	94	902	990	441			110[b]		343		
Four Miles North of Smoky Point (Outer line)	161	18	57			157	204	62					58[b]	0	94		
Three Miles North of Smoky Point (Outer line)							46		71								
Two Miles North of Smoky Point (Outer line)	29		83[b]	14		21								47			
Two Miles North of Smoky Point (Nearshore)						213[b]			930						40		
Smoky Point Bar North Side (Inshore)						662		469	520		80						
Smoky Point Bar (Offshore)									672[b]					26	51		
Smoky Point Entrance				975		29	9		1118b	328	73[b]						32
Mid Outer Line	80[b]	95	948	184		507	222[b]	534		681			0	4	69		
Bell Buoy								37									
Seven Miles North of Cape Menshikof	49	171		438									0		77		
Four Miles North of Cape Menshikof (Offshore)	14			558		345			93	666			53		200		
Six Miles North of Cape Menshikof (Nearshore)								97						5			
Four Miles North of Cape Menshikof (Nearshore)			422	594[b]	96	201	147[b]	120	404				14	732[b]	96		
Two Miles North of Cape Menshikof (Nearshore)									30					238[b]	160		
Two Miles North of Cape Menshikof (OffShore)	0	14					724		56				5	186	104		
Four Miles South of South Spit (Nearshore)									8						557		
Three Miles South of South Spit (Nearshore)			413	33		522	60	742			24				536		
South Spit			2,392	741	932[b]	823	151	1444	277[b]		42			56	301[b]		36
Dago Creek Mouth					4			84	827	221	28						91

(Continued)

Table 9. (page 2 of 2)

Index Area	June		July														
	28	29	2	3	5	6	7	8	9	11	12	13	14	15	16	17	19
Pilot Point					5				931	422[b]	5					96	
Between Pilot Point and Muddy Point								278		3174	24					107	
Below inner district boundary line west side.													24				
Above inner district boundary line east side								136	142[b]							68	
Below inner districtboundary line east side									822		263					1246	
Between Dog Salmon and King Salmon Rivers								185	168		77	408[b]				865[b]	38[b]
Near Mouth of Dog Salmon River									116		132	348				204[b]	118[b]
Below Ugashik Village																	23

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

[b] Average of two or more drifts.

Table 10. Summary of district sockeye salmon test fishing indices in the Nushagak District, by index area and date, 1998. [a]

Date	Start Time	Hanson Point	Across Hanson Pt.	Tule Point	Across Tule Point	Picnic Point	Grassy Island	Lower Grassy Is.	Nushagak Point	Pile Driver	Below Pile Driver	Queen Slough	Below Queeen's	Clark's Point	Ekuk Bluff	Ekuk Beach	Olsen Ville	Coffee Pt.	Upper W. Marker
06/21/98	13:47	0	0	170		0 0		0		0									0
06/22/98	14:40	0	665	663		0		164		0 0									0
06/23/98	15:32	0	1,452	0		0		354		6,691									
06/24/98	16:30	0	712	1,698		2,190		0 456											
06/27/98	08:15	3,232	642	382 1,928		2,545		376		1146									0
	19:40	559	1,329	1,863		1,703		4,599		4,573									532
06/28/98	08:55	181	0	1,265		3,760		1,725		16,753									0
06/29/98	09:30	0	1,574	2,124		6,081		3,841		9,028									0
	21:33	181	1,941	4,300		4,832		0		4,400									180
06/30/98	10:13	186	0	958 1,355		2,644		1,373		12,871									193
	22:41	0	2,385	568		1,359		0 0		7,218									388
07/01/98	11:06	179	1,688	355		2,927		1,129		2,667									574
07/02/98		0	583	2,532 174		1,091		5,012		7,597 8,491									3,354
07/03/98	0:40	383	2,031	1,329		7,215		1,534		2,532									7,147
	12:01	194	2,115	3,738 2,083		8,626		7,429		9,545	3,985	5,040 9,643		2,416					3,654
07/04/98	13:07	194 6,415	5,849 5,472	1,917		16,146		12,078		3,624		549 1,377		9,625 2,809				189	13,556
07/06/98	03:25			556 962		561		1,200		0		196		3,794	2,626	1,684			
07/07/98	15:13			762		7,925		1,600		792		397	629	400		6,931			2,353

[a] All indices expressed in number of fish/100 fathoms-hours to the nearest full index point.

Table 11. Commercial Fishing Emergency Orders, by district, Bristol Bay, 1998.

Number[1]	Date and Time					Effective time
Naknek-Kvichak District						
AKN.03	June 01	9:00 a.m.	to	June 23	9:00 a.m.	Regulatory [18]
AKN.13	July 07	9:30 a.m.	to	July 07	3:30 p.m.	6 hrs. [12]
AKN.23	July 11	1:30 p.m.	to	July 11	7:00 p.m.	5.5 hrs. [12]
AKN.24	July 12	2:30 p.m.	to	July 13	3:30 p.m.	25 hrs. [13]
AKN.26	July 13	3:30 p.m.	to	July 14	4:30 p.m.	25 hrs. [13]
AKN.27	July 14	4:30 p.m.	to	July 15	5:30 p.m.	25 hrs. [13]
AKN.28	July 16	5:30 a.m.	to	July 17	6:30 a.m.	25 hrs. [3]
AKN.29	July 17	6:30 a.m.	to	July 17	7:30 p.m.	13 hrs. [3]
AKN.30	July 17	7:30 p.m.	to	July 18	8:30 p.m.	25 hrs. [12]
AKN.31	July 18	8:30 p.m.	to	July 19	9:30 p.m.	25 hrs. [12]
AKN.39	July 19	12:00 noon	to	July 19	9:30 p.m.	9.5 hrs [13]
Naknek Section						
AKN.23	July 11	1:30 p.m.	to	July 11	9:30 p.m.	8 hrs. [13]
AKN.24	July 12	2:30 p.m.	to	July 13	3:30 p.m.	25 hrs. [12]
AKN.26	July 13	3:30 p.m.	to	July 14	4:30 p.m.	25 hrs. [12]
AKN.27	July 14	4:30 p.m.	to	July 15	2:30 a.m.	10 hrs. [12]
AKN.30	July 18	7:30 a.m.	to	July 18	8:30 p.m.	13 hrs. [13]
Kvichak Section						
AKN.26	July 13	3:30 p.m.	to	July 14	1:30 a.m.	10 hrs. [12]
AKN.27	July 14	4:30 p.m.	to	July 15	2:30 a.m.	10 hrs. [12]
Naknek River Special Harvest Area						
AKN.13	July 07	9:30 a.m.	to	July 07	5:30 p.m.	8 hrs. [13]
AKN.14	July 08	10:30 a.m.	to	July 08	6:30 p.m.	8 hrs. [13]
AKN.16	July 09	12:00 noon	to	July 09	9:00 p.m.	9 hrs. [13]
AKN.18	July 10	1:30 a.m.	to	July 10	6:30 a.m.	5 hrs. [13]
AKN.18	July 10	1:00 p.m.	to	July 10	10:00 p.m.	9 hrs. [13]
AKN.21	July 10	10:00 p.m.	to	July 11	10:00 a.m.	12 hrs. [13]
Egegik District						
AKN.01	June 01	9:00 a.m.	to	July 16	9:00 a.m.	Regulatory [18]
AKN.04	June 17	6:00 p.m.	to	June 17	12:00 midnight	6 hrs. [3]
AKN.05	June 23	10:30 a.m.	to	June 23	4:30 p.m.	6 hrs. [3]

(Continued)

Table 11. (Continued)

Number[1]	Date and Time					Effective time
AKN.06	June 25	12:30 p.m.	to	June 25	6:30 p.m.	6 hrs. [3]
AKN.07	June 27	2:00 p.m.	to	June 27	8:00 p.m.	6 hrs. [3]
AKN.08	June 30	6:30 p.m.	to	June 30	10:30 p.m.	4 hrs. [3]
AKN.09	July 01	6:00 p.m.	to	July 01	12:00 midnight	6 hrs. [3]
AKN.10	July 02	6:30 p.m.	to	July 03	12:30 a.m.	6 hrs. [3,11]
AKN.11	July 04	6:30 a.m.	to	July 04	12:30 p.m.	6 hrs. [3]
AKN.12	July 06	10:00 p.m.	to	July 07	5:00 a.m.	7 hrs. [3,11]
AKN.15	July 07	10:00 p.m.	to	July 08	4:00 p.m.	8 hrs. [3,11]
AKN.17	July 09	11:00 a.m.	to	July 09	7:00 p.m.	8 hrs. [3,14]
AKN.19	July 10	11:30 a.m.	to	July 10	7:30 p.m.	8 hrs. [12]
AKN.22	July 11	12:30 p.m.	to	July 11	8:30 p.m.	8 hrs. [3,14]
AKN.25	July 13	2:00 a.m.	to	July 13	10:00 a.m.	8 hrs. [12]
AKN.33	July 13	2:30 p.m.	to	July 13	10:30 p.m.	8 hrs. [3]
AKN.34	July 14	2:30 a.m.	to	July 14	10:30 a.m.	8 hrs. [3]
AKN.34	July 14	3:30 p.m.	to	July 14	11:30 p.m.	8 hrs. [3]
AKN.35	July 15	3:30 a.m.	to	July 15	11:30 a.m.	8 hrs. [3]
AKN.36	July 15	4:30 p.m.	to	July 16	12:00 noon	19.5 hrs. [3]
AKN.37	July 18	6:00 a.m.	to	July 18	2:00 p.m.	8 hrs. [3]
AKN.38	July 19	7:00 a.m.	to	July 19	3:00 p.m.	8 hrs. [3]
AKN.41	July 17	9:00 a.m.	to	July 20	9:00 a.m.	Regulatory [19]
Ugashik District						
AKN.02	July 01	9:00 a.m.	to	June 23	9:00 a.m.	Regulatory [18]
AKN.20	July 10	11:00 a.m.	to	July 10	3:00 p.m.	4 hrs. [3]
AKN.32	July 13	5:00 p.m.	to	July 13	9:00 p.m.	4 hrs. [3]
AKN.40	July 11	2:00 p.m.	to	July 11	6:00 p.m.	4 hrs. [3]
AKN.41	July 17	9:00 a.m.	to	Sept. 30	12:00 midnight	Regulatory [19]
AKN.42	July 27	9:00 a.m.	to	Sept. 30	12:00 midnight	Regulatory [19,15]
Nushagak District						
DLG.01	June 02	9:00 a.m.	to	June 08	9:00 a.m.	Subsistence [7]
DLG.02	June 10	9:00 p.m.	to	June 12	9:00 p.m.	Subsistence [7]
DLG.04	June 18	9:00 a.m.	to	June 19	9:00 a.m.	Subsistence [7]
DLG.14	June 30	6:00 p.m.	to	July 01	6:00 p.m.	Subsistence [7]
DLG.15	July 01	6:00 p.m.	to	July 02	6:00 p.m.	Subsistence [10]
DLG.46	July 28	9:00 a.m.	to	Sept. 30	12:00 midnight	Subsistence [7]
DLG.49	August 04	9:00 p.m.	to	Sept. 30	12:00 midnight	Subsistence [16]

(Continued)

Table 11. (Continued)

Number[1]	Date and Time					Effective time
Nushagak Section						
DLG.03	June 15	5:30 a.m.	to	June 15	11:30 a.m.	6 hrs. [3]
DLG.07	June 21	11:00 p.m.	to	June 22	7:00 a.m.	8 hrs. [3]
DLG.09	June 24	1:00 a.m.	to	June 24	9:00 a.m.	8 hrs. [3,2]
DLG.11	June 25	1:00 p.m.	to	June 25	9:00 p.m.	8 hrs. [3,2]
DLG.12	June 27	4:00 a.m.	to	June 27	2:00 p.m.	10 hrs. [3,2]
DLG.17	July 05	10:00 a.m.	to	July 05	2:00 p.m.	4 hrs. [3]
DLG.20	July 07	12:00 a.m.	to	July 07	10:00 a.m.	10 hrs. [3]
DLG.21	July 07	10:00 a.m.	to	July 07	2:00 p.m.	4 hrs. [5]
DLG.22	July 08	12:30 a.m.	to	July 08	2:30 p.m.	14 hrs. [3]
DLG.24	July 08	2:30 p.m.	to	July 09	2:30 p.m.	24 hrs. [5]
DLG.25	July 10	2:00 a.m.	to	July 10	2:00 p.m.	12 hrs. [3]
DLG.27	July 10	2:00 p.m.	to	July 11	5:30 a.m.	15.5 hrs. [5]
DLG.28	July 11	2:30 p.m.	to	July 12	6:00 p.m.	27.5 hrs. [3]
DLG.29	July 13	4:00 a.m.	to	July 13	7:00 p.m.	15 hrs. [3]
DLG.33	July 15	5:00 a.m.	to	July 15	11:00 p.m.	18 hrs. [3,11]
DLG.34	July 16	5:00 a.m.	to	July 16	12:00 midnight	19 hrs. [3,11]
DLG.35	July 17	5:00 a.m.	to	July 18	1:00 a.m.	20 hrs. [3,11]
DLG.37	July 18	7:30 a.m.	to	July 18	7:30 p.m.	12 hrs. [3,13]
DLG.38	July 18	7:30 p.m.	to	July 19	12:00 midnight	28.5 hrs. [5,11]
DLG.39	July 20	12:00 a.m.	to	July 20	12:00 noon	12 hrs. [5,11]
DLG.41	July 20	11:00 p.m.	to	July 21	5:00 p.m.	18 hrs. [3]
DLG.42	July 22	12:00 a.m.	to	July 22	6:00 p.m.	18 hrs. [3]
DLG.43	July 22	6:00 p.m.	to	July 23	7:00 p.m.	25 hrs. [5]
DLG.48	Aug. 05	10:30 a.m.	to	Aug. 05	10:30 p.m.	12 hrs. [3]
DLG.52	Aug. 07	12:00 noon	to	Aug. 07	12:00 midnight	12 hrs. [3]
DLG.55	Aug. 19	11:00 a.m.	to	Aug. 20	11:00 a.m.	24 hrs. [3]
DLG.56	Aug. 20	11:00 a.m.	to	Aug. 21	12:00 noon	25 hrs. [5]
DLG.57	Aug. 21	12:00 noon	to	Aug. 25	12:00 midnight	108 hrs. [5]
Igushik Section						
DLG.03	June 15	5:30 a.m.	to	June 15	11:30 a.m.	6 hrs. [3]
DLG.07	June 21	11:00 p.m.	to	June 22	7:00 a.m.	8 hrs. [3]
DLG.09	June 24	1:00 a.m.	to	June 24	9:00 a.m.	8 hrs. [3,2]
DLG.11	June 25	1:00 p.m.	to	June 25	9:00 p.m.	8 hrs. [3,2]
DLG.12	June 27	4:00 a.m.	to	June 27	2:00 p.m.	10 hrs. [3,2]
DLG.17	July 05	10:00 a.m.	to	July 05	2:00 p.m.	4 hrs. [3]
DLG.20	July 07	12:00 a.m.	to	July 07	10:00 a.m.	10 hrs. [3]
DLG.21	July 07	10:00 a.m.	to	July 07	2:00 p.m.	4 hrs. [5]
DLG.22	July 08	12:30 a.m.	to	July 08	2:30 p.m.	14 hrs. [3]

(Continued)

Table 11. (Continued)

Number[1]	Date and Time				Effective time
DLG.24	July 08	2:30 p.m.	to July 09	2:30 p.m.	24 hrs. [5]
DLG.25	July 10	2:00 a.m.	to July 10	2:00 p.m.	12 hrs. [3]
DLG.27	July 10	2:00 p.m.	to July 11	5:30 a.m.	15.5 hrs. [5,12]
DLG.28	July 11	2:30 p.m.	to July 12	6:00 p.m.	27.5 hrs. [3,12]
DLG.29	July 13	4:00 a.m.	to July 13	7:00 p.m.	15 hrs. [3,12]
DLG.31	July 13	7:00 p.m.	to July 14	7:00 p.m.	24 hrs. [5,12]
DLG.32	July 14	7:00 p.m.	to July 15	9:00 p.m.	26 hrs. [5]
DLG.34	July 15	9:00 p.m.	to July 16	9:00 p.m.	24 hrs. [5]
DLG.35	July 16	9:00 p.m.	to July 17	9:00 p.m.	24 hrs. [5]
DLG.37	July 17	9:00 p.m.	to July 18	9:00 p.m.	24 hrs. [5]
DLG.38	July 18	9:00 p.m.	to July 19	12:00 midnight	27 hrs. [5]
DLG.39	July 20	12:00 a.m.	to July 20	12:00 midnight	24 hrs. [5]
DLG.41	July 21	12:00 a.m.	to July 21	5:00 p.m.	17 hrs. [5]
DLG.42	July 21	5:00 p.m.	to July 22	5:00 p.m.	24 hrs. [5]
DLG.43	July 22	5:00 p.m.	to July 23	7:00 p.m.	26 hrs. [5]
DLG.48	Aug. 05	10:30 a.m.	to Aug. 05	10:30 p.m.	12 hrs. [3]
DLG.52	Aug. 07	12:00 noon	to Aug. 07	12:00 midnight	12 hrs. [3]
DLG.55	Aug. 19	11:00 a.m.	to Aug. 20	11:00 a.m.	24 hrs. [3]
DLG.56	Aug. 20	11:00 a.m.	to Aug. 21	12:00 noon	25 hrs. [5]
DLG.57	Aug. 21	12:00 noon	to Aug. 25	12:00 midnight	108 hrs. [5]
Wood River Special Harvest Area					
DLG.16	July 05	9:00 a.m.	to	until further notice	Subsistence [8]
DLG.17	July 05	10:00 a.m.	to July 05	4:00 p.m.	6 hrs. [3,11]
DLG.18	July 06	1:00 a.m.	to July 06	8:00 a.m.	7 hrs. [3,11]
DLG.19	July 06	12:00 noon	to July 06	8:00 p.m.	8 hrs. [3,11]
DLG.20	July 07	1:00 a.m.	to July 07	9:00 a.m.	8 hrs. [3]
DLG.21	July 07	1:00 p.m.	to July 07	9:00 p.m.	8 hrs. [3]
DLG.22	July 08	2:00 a.m.	to July 08	10:00 a.m.	8 hrs. [3]
DLG.22	July 08	12:00 noon	to July 08	8:00 p.m.	8 hrs. [3]
DLG.24	July 09	2:00 a.m.	to July 09	10:00 a.m.	8 hrs. [3]
DLG.24	July 09	2:00 p.m.	to July 09	10:00 p.m.	8 hrs. [3]
DLG.25	July 10	3:00 a.m.	to July 10	11:00 a.m.	8 hrs. [3]
DLG.25	July 10	3:00 p.m.	to July 10	11:00 p.m.	8 hrs. [3]
DLG.27	July 11	3:00 a.m.	to July 11	11:00 a.m.	8 hrs. [3]
DLG.27	July 11	3:00 p.m.	to July 11	11:00 p.m.	8 hrs. [3]
DLG.28	July 12	4:00 a.m.	to July 12	12:00 noon	8 hrs. [3]
DLG.28	July 12	4:00 p.m.	to July 12	12:00 midnight	8 hrs. [3]
DLG.29	July 13	5:00 a.m.	to July 13	1:00 p.m.	8 hrs. [3]
DLG.29	July 13	5:00 p.m.	to July 14	1:00 a.m.	8 hrs. [3]

(Continued)

Table 11. (Continued)

Number[1]	Date and Time				Effective time
DLG.31	July 14	3:00 a.m.	to July 14	2:00 p.m.	11 hrs. [3,11]
DLG.31	July 14	4:00 p.m.	to July 15	3:00 a.m.	11 hrs. [3,11]
DLG.32	July 15	3:00 a.m.	to July 16	3:00 a.m.	24 hrs. [5,11]
DLG.34	July 16	3:00 a.m.	to July 17	3:00 a.m.	24 hrs. [5,11]
DLG.35	July 17	3:00 a.m.	to July 18	5:00 a.m.	26 hrs. [5,11]
DLG.37	July 18	5:00 a.m.	to July 19	6:00 a.m.	25 hrs. [5,11]
DLG.38	July 19	6:00 a.m.	to July 20	7:00 a.m.	25 hrs. [5,11]
DLG.39	July 20	7:00 a.m.	to July 21	8:00 a.m.	25 hrs. [5,11]
DLG.41	July 21	8:00 a.m.	to July 22	9:00 a.m.	25 hrs. [5,11]
DLG.42	July 22	9:00 a.m.	to July 23	10:00 a.m.	25 hrs. [5,11]
DLG.43	July 23	10:00 a.m.	to July 23	12:00 midnight	14 hrs. [5,11]
DLG.46	July 28	9:00 a.m.	to Sept. 30	12:00 midnight	Subsistence [7]
Togiak District					
DLG.05	June 18	9:00 a.m.	to June 20	9:00 a.m.	Restriction [6]
DLG.06	June 19	9:00 a.m.	to June 21	9:00 a.m.	Subsistence [7]
DLG.08	June 24	9:00 a.m.	to June 27	9:00 a.m.	Restriction [6]
DLG.10	June 25	9:00 a.m.	to June 28	9:00 a.m.	Subsistence [7]
DLG.13	July 03	9:00 p.m.	to July 4	9:00 p.m.	Restriction [6]
DLG.23	July 08	9:00 a.m.	to July 9	9:00 a.m.	Restriction [6]
DLG.26	July 10	9:00 a.m.	to July 11	9:00 p.m.	Restriction [6]
DLG.30	July 15	9:00 a.m.	to July 18	9:00 a.m.	Restriction [6]
DLG.36	July 17	9:00 a.m.	to July 18	9:00 a.m.	24 hrs. [3]
DLG.40	July 20	9:00 a.m.	to July 25	9:00 a.m.	Restriction [4]
DLG.44	July 23	9:00 a.m.	to Sept. 30	12:00 midnight	Subsistence [7]
DLG.45	July 27	9:00 a.m.	to Aug. 01	9:00 a.m.	Restriction [4]
DLG.47	Aug. 03	9:00 a.m.	to Aug. 08	9:00 a.m.	Restriction [4]
DLG.50	Aug. 04	9:00 p.m.	to Sept. 30	12:00 midnight	Subsistence [16]
DLG.51	Aug. 05	9:00 a.m.	to Aug. 07	9:00 a.m.	48 hrs. [3]
DLG.53	Aug. 12	9:00 a.m.	to Aug. 15	9:00 a.m.	Restriction [6]
DLG.54	Aug. 14	9:00 a.m.	to Aug. 15	9:00 a.m.	24 hrs. [3]
DLG.58	Sept. 04	9:00 a.m.	to Sept. 05	9:00 a.m.	Restriction [6]
DLG.59	Sept. 11	9:00 a.m.	to Sept. 12	9:00 a.m.	Restriction [6]
DLG.60	Sept. 09	9:00 a.m.	to Sept. 16	9:00 a.m.	Restriction [17]

(Continued)

Table 11. (Continued)

01. Prefix code on emergency orders indicate where announcement originated. ("AKN" for King Salmon field office and "DLG" for Dillingham field office.)
02. Restricts the size of gillnet mesh size for this opening.
03. Opens area to Commercial fishing.
04. Closes area to Commercial fishing.
05. Extends the Commercial fishing time in area.
06. Reduces the Commercial fishing time in area.
07. Opens the area to Subsistence fishing.
08. Closes the area to Subsistence fishing.
09. Reduces the Subsistence fishing time in area.
10. Extends the Subsistence fishing time in area.
11. Drift gillnets and Set gillnets were allowed different fishing times to maintain the allocation percentages prescribed in the New Nushagak district commercial set and drift gillnet sockeye salmon fisheries management and allocation plan.
12. Opens area to Set gillnets only.
13. Opens area to Drift gillnets only.
14. Changes the District boundary line for commercial fishing.
15. Resumes normal fall fishing 9:00 a.m. Monday to 9:00 a.m. Friday.
16. This returns the commercial fishing district to the status of "open to subsistence fishing only during open commercial periods or by emergency order".
17. Closes District due to illegal commercial fishing.
18. Establishes a weekly fishing schedule in the District unless superseded by subsequent emergency order.
19. Changes the emergency order period in District.

Table 12. Daily district registration of drift gillnet permit holders by district, 1998.

Date	Nakek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total [a]
19-Jun	150	405	57	249	12	873
20-Jun	159	433	45	247	13	897
21-Jun	193	477	36	267	13	986
22-Jun	216	490	38	275	13	1032
23-Jun	301	627	27	308	16	1279
24-Jun	308	671	29	317	16	1341
25-Jun	323	718	16	320	18	1395
26-Jun	334	784	15	336	18	1487
27-Jun	344	795	14	363	19	1535
28-Jun	340	780	14	376	20	1530
29-Jun	331	766	16	382	20	1515
30-Jun	335	767	19	433	20	1574
1-Jul	341	766	23	447	21	1598
2-Jul	341	774	26	446	22	1609
3-Jul	341	795	30	435	26	1627
4-Jul	341	795	30	435	26	1627
5-Jul	340	792	37	434	29	1632
6-Jul	350	777	50	491	29	1697
7-Jul	388	732	59	500	29	1708
8-Jul	405	688	61	509	29	1692
9-Jul	419	631	65	508	29	1652
10-Jul	399	545	76	526	29	1575
11-Jul	399	545	76	526	29	1575
12-Jul	398	495	281	504	29	1707
13-Jul	410	446	296	440	29	1621
14-Jul	614	424	281	431	30	1780
15-Jul	714	337	268	415	30	1764
Average	353	639	74	404	23	1493

[a] Number of drift gillnet permit holders registered to fish in Bristol Bay districts by day. 1,899 drift permits were active in 1998.

Table 13. Commercial salmon catch by date and species, in numbers of fish, Naknek-Kvichak District, 1998.

Date		Time	Sockeye	Chinook	Chum	Pink	Coho	Total
6/10		24 hrs.	0	1	0	0	0	1
6/11		24 hrs.	0	2	0	0	0	2
6/12		9 hrs.	3	1	0	0	0	4
6/15		15 hrs.	400	19	4	0	0	423
6/16		24 hrs.	790	48	4	0	0	842
6/17		24 hrs.	1,500	90	11	0	0	1,601
6/18		24 hrs.	2,929	84	40	0	0	3,053
6/19		9 hrs.	1,086	32	19	0	0	1,137
6/22		15 hrs.	21,929	34	105	0	0	22,068
6/23		9 hrs.	24,754	32	110	0	0	24,896
6/25	[a]	0	107	0	0	0	0	107
6/26	[a]	0	483	0	0	0	0	483
6/27	[a]	0	257	0	0	0	0	257
6/28	[a]	0	667	0	0	0	0	667
6/29	[a]	0	1,264	4	1	0	0	1,269
6/30	[a]	0	2,461	0	0	0	0	2,461
7/1	[a]	0	1,668	2	2	0	0	1,672
7/2	[a]	0	1,938	1	6	0	0	1,945
7/3	[a]	0	1,905	0	1	0	0	1,906
7/4	[a]	0	2,386	3	0	0	0	2,389
7/5	[a]	0	545	0	0	0	0	545
7/7	[b,c]	8 hrs.	244,532	50	183	0	0	244,765
7/8	[b]	8 hrs.	157,334	14	429	0	0	157,777
7/ 9	[b]	9 hrs.	109,836	35	396	0	0	110,267
7/10	[b]	16 hrs.	79,300	23	202	0	0	79,525
7/11	[b,c,f]	18 hrs.	184,686	84	548	0	0	185,318
7/12	[g]	9.5 hrs.	167,851	20	2,348	0	0	170,219
7/13		24 hrs.	561,694	156	7,700	0	0	569,550
7/14		24 hrs.	151,826	109	2,443	5	0	154,383
7/15		17.5 hrs.	124,083	26	1,564	0	0	125,673
7/16		18.5 hrs.	365,566	200	6,007	0	0	371,773
7/17		24 hrs.	84,068	117	1,786	1	0	85,972
7/18	[c,e]	24 hrs.	106,600	154	3,347	1	0	110,102
7/19		21.5 hrs.	47,822	193	2,912	1	0	50,928
7/20		15 hrs.	28,895	134	2,557	6	1	31,593
7/21		24 hrs.	28,902	203	3,176	8	33	32,322
7/22		24 hrs.	16,162	106	3,267	25	7	19,567
7/23		24 hrs.	12,031	91	1,490	39	8	13,659
7/24		9 hrs.	6,494	47	536	39	16	7,132
7/27		15 hrs.	1,996	82	1,976	740	103	4,897
7/28		24 hrs.	1,930	103	1,853	1,371	188	5,445
7/29		24 hrs.	1,463	39	964	1,562	129	4,157
7/30		24 hrs.	1,569	45	955	3,216	109	5,894
7/31		9 hrs.	679	29	473	1,619	113	2,913
8/3		15 hrs.	210	2	182	1,568	164	2,126
8/4		24 hrs.	115	0	60	1,199	62	1,436
8/11		24 hrs.	0	1	0	0	105	106
8/12		24 hrs.	0	1	0	0	206	207
8/13		24 hrs.	0	0	0	0	78	78
8/14		9 hrs.	0	0	0	0	18	18
8/18		24 hrs.	2	0	0	0	32	34
8/19		24 hrs.	1	0	0	0	18	19
8/27		24 hrs.	2	0	0	0	49	51
8/28		9 hrs.	0	0	0	0	21	21
9/1		24 hrs.	0	0	0	0	90	90
Total			2,552,721	2,417	47,657	11,400	1,550	2,615,745
% of District Catch			97.6	0.1	1.8	0.4	0.1	100

[a] Test fishing
[b] Naknek in-river fishery open to drift nets.
[c] Naknek and Kvichak setnets only.
[d] Naknek set nets only.
[e] Kvichak Section only.
[f] Naknek Section only.
[g] All district open except Kvichak setnets.

Table 14. Commercial salmon catch by date and species, in numbers of fish, Egegik District, Bristol Bay, 1998.

Date	Hrs.[2]	Effort[1]		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
1-Jun	15								
2-Jun	24								
3-Jun	24								
4-Jun	24								
5-Jun	9								
8-Jun	15								
9-Jun	24			41					41
10-Jun	24								
11-Jun	24			24					24
12-Jun	9	1	3	112	4				116
15-Jun	15	19	34	5,511	48	67			5,626
16-Jun	9	36	28	7,140	27	38			7,205
17-Jun	6	211	78	16,377	56	41			16,474
23-Jun	6	663	173	197,380	56	1,672			199,108
25-Jun	6	791	195	170,026	85	734		1	170,846
27-Jun	6	828	173	218,864	90	664			219,618
30-Jun	4	719	209	257,527	65	1,054			258,646
1-Jul	6	481	195	272,522	45	765			273,332
2-Jul	4.5/5.5	736	232	411,713	64	980			412,757
3-Jul	0.5	521	19	166,493	5	610			167,108
4-Jul	6	788	178	194,907	35	1,626			196,568
6-Jul	2	2	33	8,906		22			8,928
7-Jul	4/5	733	168	271,948	24	754			272,726
8-Jul	6/6	1,349	177	378,273	22	1,500			379,795
9-Jul	8	619	185	143,983	17	913			144,913
10-Jul	0/8		223	37,974	22	40			38,036
11-Jul	8	526	201	254,200	11	1,792			256,003
13-Jul	8/16	436	381	186,561	16	2,309			188,886
14-Jul	16	488	293	79,361	4	917			80,282
15-Jul	15.5	394	204	63,940	1	1,174			65,115
16-Jul	12	292	127	85,224	8	1,915			87,147
18-Jul	8	220	144	41,171	4	2,788			43,963
19-Jul	8	193	116	28,217	7	1,723		1	29,948
20-Jul	15	151	122	20,933	4	123		1	21,061
21-Jul	24	103	99	10,848	4	79			10,931
22-Jul	24	99	77	11,788	9	253	1	3	12,054
23-Jul	24	58	35	8,126	2	190		4	8,322
24-Jul	9	11	11	1,982		62		1	2,045
27-Jul	15	16	20	1,029	1	53	6	83	1,172
28-Jul	24	11	29	1,261		64	34	116	1,475
29-Jul	24	9	28	1,297	3	91	46	149	1,586
30-Jul	24	10	24	899	2	92	18	178	1,189
31-Jul	9	1	3	66			11	8	85

continued

Table 14. (Page 2 of 2)

Date	Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
3-Aug	15	15	19	439		76	51	604	1,170
4-Aug	24	13	26	543	1	84	21	941	1,590
5-Aug	24	6	19	218		48	84	548	898
6-Aug	24	8	18	93		59	69	713	934
7-Aug	9	3	9	48		17	42	290	397
10-Aug	15	22	31	159	3	57	50	2,602	2,871
11-Aug	24	27	37	95	1	64	66	2,304	2,530
12-Aug	24	21	30	41	1	29	26	2,079	2,176
13-Aug	24	18	23	22		12	22	1,472	1,528
14-Aug	9	3	9	6		10	13	316	345
17-Aug	15	5	11	2		1	2	533	538
18-Aug	24	21	28	10		6	9	2,581	2,606
19-Aug	24	12	20	15		8	11	1,391	1,425
20-Aug	24	16	23	11		3	17	2,163	2,194
21-Aug	9	2	10	9		1	7	321	338
24-Aug	15	10	20	4	1	1	8	1,451	1,465
25-Aug	24	10	25	2		3	8	2,101	2,114
26-Aug	24	14	20	3		2	9	1,658	1,672
27-Aug	24	13	16				7	1,655	1,662
28-Aug	9	3	9	1		1		257	259
31-Aug	15	5	7					986	986
1-Sep	24	8	11					1,047	1,047
2-Sep	24	4	13			1		986	987
3-Sep	24	2	3	2				374	376
4-Sep	9								-
Total	991	11,776	4,654	3,558,347	748	25,588	638	29,918	3,615,239
% of District Catch				98	0	1	0	1	100

[1] Estimated number of deliveries based on weekly and daily company reports. Preliminary.

[2] First number is drift gillnet hours fished , second number is set gillnet hours fished.

Table 15. Commercial salmon catch by date and species, in numbers of fish, Ugashik District, Bristol Bay, 1998.

Date	Hrs.	Effort[1]		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
1-Jun	15.0								
2-Jun	24.0								
3-Jun	24.0								
4-Jun	24.0								
5-Jun	9.0								
8-Jun	15.0								
9-Jun	24.0								
10-Jun	24.0			2	8				10
11-Jun	24.0								
12-Jun	9.0								
15-Jun	15.0	25		1,100	74	4			1,178
16-Jun	24.0	44	1	2,003	95				2,098
17-Jun	24.0	45	2	1,721	51	35			1,807
18-Jun	24.0	34	1	2,259	19	10			2,288
19-Jun	9.0	9		571					571
22-Jun	15.0	32	2	5,411	39	21	5		5,476
23-Jun	9.0	25	1	2,247	21	12			2,280
28-Jun	0.0			115		4			119
29-Jun	0.0			124		1			125
2-Jul	0.0			1,263	1	5			1,269
3-Jul	0.0			776					776
5-Jul	0.0			496					496
6-Jul	0.0			1,212	1	3			1,216
7-Jul	0.0			715		1			716
8-Jul	0.0			1,355		5	1		1,361
9-Jul	0.0			2,393	1				2,394
10-Jul	4.0	120	67	133,824	8	1,941			135,773
11-Jul	4.0	249	68	284,161	2	2,552			286,715
12-Jul	0.0			172		4			176
13-Jul	4.0	279	41	84,908	5	1,372			86,285
14-Jul	0.0			101		3			104
15-Jul	0.0			571		5			576
16-Jul	0.0			437					437
17-Jul	0.0			857	1	9			867
19-Jul	0.0			113	1	1			115
27-Jul	15.0	101	42	84,515	7	608	1	1	85,132
28-Jul	24.0	140	48	63,319	8	1,076	3		64,406
29-Jul	24.0	126	46	31,470	5	865	6	26	32,372
30-Jul	24.0	87	20	10,454		723	9	31	11,217
31-Jul	9.0	10	5	2,435		52		5	2,492

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Table 15. (Page 2 of 2)

Date	Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
3-Aug	15.0	31	21	1,466	2	282	7	74	1,831
4-Aug	24.0	3	8	371		14		27	412
5-Aug	24.0			29			2	21	52
6-Aug	24.0	3	3	831		72		178	1,081
7-Aug	9.0								0
10-Aug	15.0			18				117	135
11-Aug	24.0			23				124	147
12-Aug	24.0	15	4	262		7	119	1,036	1,424
13-Aug	24.0	20	6	123		11	90	800	1,024
14-Aug	9.0							21	21
17-Aug	15.0			1				86	87
18-Aug	24.0			3				133	136
19-Aug	24.0							257	257
20-Aug	24.0	9	3	39		6	10	1,195	1,250
21-Aug	9.0	4	1	21		9		484	514
24-Aug	15.0	6	1	2				1,085	1,087
25-Aug	24.0	9	1	4		8		1,235	1,247
26-Aug	24.0	7	2					1,223	1,223
27-Aug	24.0							271	271
28-Aug	9.0							136	136
31-Aug	15.0	6	4					810	810
1-Sep	24.0	9	3	34				2,196	2,230
2-Sep	24.0	1	3					842	842
3-Sep	24.0							182	182
4-Sep	9.0								-
7-Sep	15.0							120	120
8-Sep	24.0							146	146
9-Sep	24.0							91	91
10-Sep	24.0							80	80
11-Sep	9.0							6	6
14-Sep	15.0							93	93
15-Sep	24.0							52	52
16-Sep	24.0							44	44
17-Sep	24.0							48	48
18-Sep	9.0							8	8
21-Sep	15.0							4	4
22-Sep	24.0							4	4
Total	1,116	1,449	404	724,327	349	9,721	253	13,292	747,942
% of District Catch				97	0	1	0	2	100

[1] Estimated number of deliveries based on weekly company reports. Preliminary.

Table 16. Commercial salmon fishing time, effort and harvest by date, Nushagak District, 1998.

	Time (*hrs*)				Effort[3]		Harvest[4]					
Date	District[1]	Nushagak[2]	Igushik[2]	WRSHA[2]	Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
15-Jun	6.0						406	9,365	516	-	-	10,287
21-Jun	1.0						80		19			99
22-Jun	7.0						19,847	26,170	9,896	-	-	55,913
24-Jun	8.0[a]						6,888	36,148	6,807	-	-	49,843
25-Jun	8.0[a]						24,008	12,245	4,329	-	-	40,582
27-Jun	10.0[a]						28,087	13,241	4,900	-	-	46,228
5-Jul	4.0			6.0			282,353	1,160	42,197	2	-	325,712
6-Jul				15.0			35,708	16	1,269	-	-	36,993
7-Jul	14.0			16.0			793,113	2,845	57,720	7	-	853,685
8-Jul	23.5			16.0			324,827	1,276	23,614	6	-	349,723
9-Jul	14.5			16.0			274,681	1,011	21,558	5	-	297,255
10-Jul	22.0		10.0[b]	16.0			329,718	650	16,960	8	-	347,336
11-Jul	15.0		15.0[b]	16.0			143,753	384	7,672	5	2	151,816
12-Jul	18.0		18.0[b]	16.0			148,355	554	9,087	11	1	158,008
13-Jul	15.0		20.0[b]	15.0			253,759	764	10,436	24	8	264,991
14-Jul			24.0[b]	20.0			18,476	42	663	-	-	19,181
15-Jul		18.0	24.0 (17.5[b])	24.0			106,441	695	7,464	43	23	114,666
16-Jul		19.0	24.0	24.0			95,566	915	5,368	30	69	101,948
17-Jul		19.0	24.0	24.0			26,649	213	2,123	67	63	29,115
18-Jul		17.5	24.0	24.0			19,024	260	1,627	47	449	21,407
19-Jul		24.0	24.0	24.0			13,890	254	2,269	69	579	17,061
20-Jul		13.0	24.0	24.0			5,716	49	968	44	167	6,944
21-Jul		17.0	24.0	24.0			4,148	101	438	44	870	5,601
22-Jul		24.0	24.0	24.0			2,840	76	399	482	369	4,166
23-Jul		19.0	19.0	24.0			2,681	47	216	1,975	221	5,140
5-Aug	12.0						138	3	40	2,654	9,099	11,934
7-Aug	12.0						45	2	-	1,285	5,921	7,253
19-Aug	13.0						-	-	-	-	1,007	1,007
20-Aug	24.0						3	-	-	-	1,121	1,124
21-Aug	24.0						-	-	-	-	270	270
23-Aug	24.0						-	-	-	-	376	376
24-Aug	24.0						-	-	-	-	867	867
25-Aug	24.0						-	-	-	-	645	645
Total	323.0	170.5	298.0	368.0			2,961,200	108,486	238,555	6,808	22,127	3,337,176
% of District Catch							88.7%	3.3%	7.1%	0.2%	0.7%	100.0%

[1] Number of hours the Nushagak District was opened to commercial fishing. Includes Nushagak and Igushik Sections.

[2] Number of hours each section was opened to commercial fishing. WRSHA = Wood River Special Harvest Area.

[3] Estimated fishing effort based on aerial survey counts.

[4] Numbers of fish.

[a] Mesh sizes less than seven and one half inches prohibited for the protection of sockeye salmon.

[b] Set gillnets only.

Table 17. Commercial sockeye salmon fishing time and setnet harvest by date and statistical area, Nushagak District, 1998.

Date	Time (*hrs*)				Harvest[3]							
	District[1]	Nushagak[2]	Igushik[2]	WRSHA[2]	Combine Flats[4]	Queen Slough[5]	Coffee Point[6]	Clark's Point[7]	Ekuk Beach[8]	Igushik Beach[9]	WRSHA[10]	Total
15-Jun	6.0				7	8	8	17	43	153		236
21-Jun	1.0				80							80
22-Jun	7.0				3,038	581	235	2,948	4,524	1,055		12,381
24-Jun [a]	8.0				2,256	173	125	438	851	415		4,258
25-Jun [a]	8.0				11,787	2,078	1,866	1,863	1,790	844		20,228
27-Jun [a]	10.0				11,815	650	496	4,298	3,313	329		20,901
5-Jul	4.0			6.0	25,009	13,259	3,738	7,183	6,709	5,991	1,452	63,341
6-Jul				15.0							4,900	4,900
7-Jul	14.0			16.0	48,073	24,162	14,558	17,123	35,508	21,403	6,914	167,741
8-Jul	23.5			16.0	50,391	17,422	5,051	14,475	29,996	15,015	4,426	136,776
9-Jul	14.5			16.0	2,175	548	2,906	1,390	18,815	10,831	2,087	38,752
10-Jul	22.0		10.0[b]	16.0	36,129	13,960	3,745	13,527	33,534	11,423	1,932	114,250
11-Jul	15.0		15.0[b]	16.0	4,676	2,558	664	1,892	7,188	8,175	1,147	26,300
12-Jul	18.0		18.0[b]	16.0	2,333	196	821	559	7,548	7,171	455	19,083
13-Jul	15.0		20.0[b]	15.0	19,593	7,750	1,745	7,745	33,703	12,425	2,443	85,404
14-Jul			24.0[b]	20.0						7,654	2,242	9,896
15-Jul		18.0	24.0(17.5[b])	24.0	10,407	4,091	567	5,648	8,725	4,422	3,440	37,300
16-Jul		19.0	24.0	24.0	3,272	1,204	2,398	3,024	11,645	7,059	3,610	32,212
17-Jul		19.0	24.0	24.0	696	280	107	712	6,471	3,891	359	12,516
18-Jul		17.5	24.0	24.0	332		60	129	2,058	2,109	288	4,976
19-Jul		24.0	24.0	24.0	990		423	72	1,903	1,836	782	6,006
20-Jul		13.0	24.0	24.0	285	59	301	36	1,267	1,154	672	3,774
21-Jul		17.0	24.0	24.0	126	50		174	1,406		1,116	2,872
22-Jul		24.0	24.0	24.0	10	16		227	1,081		776	2,110
23-Jul		19.0	19.0	24.0				65	1,658		82	1,805
5-Aug					54							54
6-Aug									52			
7-Aug						10		-	16			26
19-Aug												-
20-Aug									3			3
21-Aug									-			-
23-Aug												-
24-Aug									-			-
25-Aug									-			-
Total	166.0	170.5	298.0	368.0	233,534	89,055	39,814	83,545	219,807	123,355	39,123	828,181
% of District Catch					28.2%	10.8%	4.8%	10.1%	26.5%	14.9%	4.7%	100.0%

[1] Number of hours the entire Nushagak District was opened to commercial fishing including both Nushagak and Igushik Sections.
[2] Number of hours each section was opened to commercial fishing. WRSHA = Wood River Special Harvest Area.
[3] Numbers of fish.
[4] Sockeye salmon accounted for 96.0% of the total beach harvest. Other species landed included 3,080 chinook, 5,521 chum, 1,072 pink and 308 coho salmon.
[5] Sockeye salmon accounted for 97.7% of the total beach harvest. Other species landed included 464 chinook, 1,447 chum, 138 pink and 43 coho salmon.
[6] Sockeye salmon accounted for 93.3% of the total beach harvest. Other species landed included 1,040 chinook, 1,773 chum, 34 pink and 11 coho salmon.
[7] Sockeye salmon accounted for 94.7% of the total beach harvest. Other species landed included 997 chinook, 3,539 chum, 146 pink and 31 coho salmon.
[8] Sockeye salmon accounted for 94.5% of the total beach harvest. Other species landed included 1,915 chinook, 5,280 chum, 2,506 pink and 3,166 coho salmon.
[9] Sockeye salmon accounted for 99.4% of the total beach harvest. Other species landed included 270 chinook, 430 chum, 0 pink and 1 coho salmon.
[10] Sockeye salmon accounted for 97.9% of the total beach harvest. Other species landed included 124 chinook, 527 chum, 3 pink and 203 coho salmon.
[a] Mesh sizes less than seven and one half inches prohibited for the protection of sockeye salmon.
[b] Set gillnet only.

Table 18. Commercial salmon fishing time, effort and harvest by date, Wood River Special Harvest Area, 1998.

Date	Time (*hrs*)	Effort[1]		Harvest[2]					
		Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
5-Jul	6.0	57	20	48,994	6	2,153	0	0	51,153
6-Jul	15.0			37,951	2	84	0	0	38,037
7-Jul	16.0			15,178	9	68	0	0	15,255
8-Jul	16.0			24,231	5	118	0	0	24,354
9-Jul	16.0			11,151	7	266	0	0	11,424
10-Jul	16.0			10,954	33	226	0	0	11,213
11-Jul	16.0			3,299	0	112	0	0	3,411
12-Jul	16.0			1,283	0	44	0	0	1,327
13-Jul	15.0			3,893	11	123	0	1	4,028
14-Jul	20.0			2,467	0	45	0	0	2,512
15-Jul	24.0		9	9,451	2	247	0	0	9,700
16-Jul	24.0			5,411	1	187	0	0	5,599
17-Jul	24.0			912	3	26	0	0	941
18-Jul	24.0			822	0	24	0	0	846
19-Jul	24.0			1,265	3	3	0	6	1,277
20-Jul	24.0			1,041	11	30	0	6	1,088
21-Jul	24.0			637	7	18	0	48	710
22-Jul	24.0			326	3	81	0	108	518
23-Jul	24.0			82	0	0	0	7	89
Total	368.0			179,348	103	3,855	0	176	183,482
%				97.7%	0.1%	2.1%	0.0%	0.1%	100.0%

[1] Estimated fishing effort based on aerial survey counts.

[2] Numbers of fish.

Table 19. Commercial salmon catch by date and species, in numbers of fish, Togiak District, 1998.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/15	32	14	34	0	0	80
6/16	168	35	72	0	0	275
6/17	117	59	47	0	0	223
6/18	40	0	6	0	0	46
6/22	881	246	163	0	0	1,290
6/23	2,062	1,011	675	2	0	3,750
6/24	1,284	1,060	508	0	0	2,852
6/29	8,585	1,341	2,727	9	0	12,662
6/30	10,104	1,399	5,160	18	0	16,681
7/01	8,149	1,009	4,249	2	0	13,409
7/02	3,511	123	618	0	0	4,252
7/03	6,284	772	2,458	3	0	9,517
7/04	147	5	771	0	0	923
7/06	11,519	1,254	3,713	17	0	16,503
7/07	25,587	1,695	6,683	41	0	34,006
7/08	13,338	1,626	5,756	39	0	20,759
7/09	8,398	811	4,229	25	0	13,463
7/10	4,301	318	1,200	20	0	5,839
7/13	21,498	548	6,476	165	0	28,687
7/14	24,612	383	10,517	173	0	35,685
7/15	8,805	82	2,591	59	0	11,537
7/17	14,295	182	4,106	87	0	18,670
7/18	6,600	80	2,119	36	0	8,835
8/05	310	2	54	173	15	554
8/06	3,363	12	729	2,081	483	6,668
8/07	1,381	19	409	927	412	3,148
8/10	663	4	192	417	543	1,819
8/11	1,249	7	480	986	1,723	4,445
8/12	623	6	295	609	1,594	3,127
8/14	336	3	89	194	1,848	2,470
8/15	177	1	39	39	362	618
8/17	102	1	17	28	641	789
8/18	318	9	73	74	1,601	2,075
8/19	398	4	93	68	3,503	4,066
8/20	113	1	15	16	984	1,129
8/21	150	5	55	15	1,578	1,803
8/24	102	4	19	8	2,991	3,124
8/25	99	1	26	7	2,497	2,630
8/26	118	4	44	19	4,250	4,435
8/27	196	7	40	27	6,868	7,138
8/28	48	3	8	2	3,306	3,367
8/31	59	0	9	10	5,987	6,065
9/01	60	4	9	18	5,842	5,933
9/02	55	3	7	11	2,994	3,070
9/03	50	1	2	4	2,254	2,311
9/04	43	0	4	4	1,550	1,601
9/07	23	0	3	0	1,309	1,335
9/08	51	0	4	2	1,914	1,971
9/09	21	1	2	0	1,402	1,426
Total	190,425	14,155	67,595	6,435	58,451	337,061
% of District Total	56.5%	4.2%	20.1%	1.9%	17.3%	100.0%

[1] See table 11 for inseason adjustments to the regular weekly fishing schedule.

Table 20. Commercial salmon catch by date and species, in numbers of fish, Togiak Section, 1998.

Date[1]	Effort[2]		Sockeye	Chinook	Chum	Pink	Coho	Total
	Drift	Set						
6/15		6	8	4	0	0	0	12
6/16		6	61	14	18	0	0	93
6/17	1	12	75	53	33	0	0	161
6/22	2	24	668	206	100	0	0	974
6/23	10	37	1,202	940	283	2	0	2,427
6/24	9	22	973	1,039	395	0	0	2,407
6/29	21	61	5,008	1,161	1,831	3	0	8,003
6/30	34	67	3,701	1,207	3,579	6	0	8,493
7/01	21	58	2,198	882	2,334	2	0	5,416
7/02	2	43	1,417	99	396	0	0	1,912
7/03	21	49	5,679	764	1,500	3	0	7,946
7/06	24	54	5,521	1,146	2,621	8	0	9,296
7/07	38	86	9,376	1,468	4,250	29	0	15,123
7/08	44	70	6,708	1,536	4,916	37	0	13,197
7/09	38	88	8,292	809	4,137	25	0	13,263
7/10	18	38	4,243	318	1,127	15	0	5,703
7/13	31	80	12,063	474	4,787	53	0	17,377
7/14	43	99	12,069	323	8,414	85	0	20,891
7/15	16	37	2,914	71	1,948	21	0	4,954
7/17	46	100	14,295	182	4,106	87	0	18,670
7/18	24	58	6,600	80	2,119	36	0	8,835
8/05	3	12	310	2	54	173	15	554
8/06	30	34	3,344	12	699	2,055	479	6,589
8/07	17	30	1,381	19	409	927	412	3,148
8/10	12	30	663	4	192	417	543	1,819
8/11	28	41	1,249	7	480	986	1,723	4,445
8/12	14	18	614	6	286	609	1,516	3,031
8/14	17	11	178	3	59	149	1,154	1,543
8/15	6	8	177	1	39	39	362	618
8/17	3	9	102	1	17	28	641	789
8/18	13	24	305	9	67	69	1,386	1,836
8/19	19	15	234	4	75	66	2,604	2,983
8/20	4	20	113	1	13	15	950	1,092
8/21	19	14	150	5	55	15	1,578	1,803
8/24	26	11	102	4	19	8	2,991	3,124
8/25	25	23	99	1	26	7	2,497	2,630
8/26	25	25	111	4	44	19	3,609	3,787
8/27	33	32	126	7	30	27	5,353	5,543
8/28	20	15	48	3	8	2	3,306	3,367
8/31	28	23	59	0	9	10	5,987	6,065
9/01	39	26	60	4	9	18	5,842	5,933
9/02	27	26	55	3	7	11	2,592	2,668
9/03	18	23	50	1	2	4	2,254	2,311
9/04	7	9	22	0	2	2	784	810
9/07	12	7	23	0	3	0	1,309	1,335
9/08	17	13	51	0	4	2	1,537	1,594
9/09	9	11	21	1	2	0	1,206	1,230
Total			112,718	12,878	51,504	6,070	52,630	235,800
% of Section Total			47.8%	5.5%	21.8%	2.6%	22.3%	100.0%

[1] Togiak River Section is open five and one/half days per week from July 1thru July 15 per TDSMP. See Table 11 for inseason adjustments to the weekly fishing schedule.

[2] Effort is deliveries from processor catch reports by gear type.

Table 21. Commercial salmon catch by date and species, in numbers of fish, Kulukak Section, 1998.

Date[1]	Effort[2]		Sockeye	Chinook	Chum	Pink	Coho	Total
	Drift	Set						
6/15		2	24	10	34	0	0	68
6/16	1	4	107	21	54	0	0	182
6/17		3	42	6	14	0	0	62
6/18		1	40	0	6	0	0	46
6/22	2	4	213	40	63	0	0	316
6/23	1	21	860	71	392	0	0	1,323
6/24		7	311	21	113	0	0	445
6/29	6	36	3,577	180	896	6	0	4,659
6/30	12	40	6,403	192	1,581	12	0	8,188
7/01	9	39	5,951	127	1,915	0	0	7,993
7/02		14	2,094	24	222	0	0	2,340
7/06	6	40	5,998	108	1,092	9	0	7,207
7/07	15	76	16,211	227	2,433	12	0	18,883
7/08	9	42	6,630	90	840	2	0	7,562
7/13	9	55	9,435	74	1,689	112	0	11,310
7/14	15	66	12,543	60	2,103	88	0	14,794
7/15	8	30	5,891	11	643	38	0	6,583
8/14	3		2	0	3	1	118	124
Total			76,332	1,262	14,093	280	118	92,085
% of Section Total			82.9%	1.4%	15.3%	0.3%	0.1%	100.0%

[1] Kulukak Section open three days per week. See Table 11 for inseason adjustments to the weekly fishing schedule.

[2] Effort is number of deliveries by gear type on processor reports.

Table 22. Commercial salmon catch by date and species, in numbers of fish, Matogak Section, 1998.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
7/03	224	8	340	0	0	572
7/04	147	5	771	0	0	923
7/09	106	2	92	0	0	200
7/10	58	0	73	5	0	136
8/06	19	0	30	26	4	79
8/12	9	0	9	0	78	96
8/14	156	0	27	44	576	803
8/18	13	0	6	5	215	239
8/19	164	0	18	2	899	1,083
8/20	0	0	2	1	34	37
8/26	7	0	0	0	641	648
8/27	70	0	10	0	1,515	1,595
9/02	0	0	0	0	402	402
9/04	21	0	2	2	766	791
9/08	0	0	0	0	377	377
9/09	0	0	0	0	196	196
Total	994	15	1,380	85	5,703	8,177
% of Section Total	12.2%	0.2%	16.9%	1.0%	69.7%	100.0%

[1] Matogak and Osviak Sections open five days per week. See Table 11 for inseason adjustments to the weekly fishing schedule.

Table 23. Commercial salmon catch by date and species, in numbers if fish, Osviak Section, 1998.

Date	Sockeye	Chinook	Chum	Pink	Coho	Total
7/03	381	0	618	0	0	999
Total	381	0	618	0	0	999
% of Section Total	38.1%	0.0%	61.9%	0.0%	0.0%	100.0%

Table 24. Commercial salmon catch by district and species, in number of fish, Bristol Bay, 1998.[a]

District and River System	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT						
Kvichak River	1,072,760					
Branch River	136,006					
Naknek River	1,343,955					
Total	2,552,721	2,495	47,647	11,433	1,566	2,615,862
EGEGIK DISTRICT	3,574,195	748	9,740	638	29,918	3,615,239
UGASHIK DISTRICT	717,486	344	5,821	252	13,292	737,195
NUSHAGAK DISTRICT						
Wood River	164,596	205	6,023	4	232	171,060
Igushik River	123,355	270	430	0	1	124,056
Nushagak-Mulchatna	2,673,249	108,011	232,102	6,804	21,894	3,042,060
Total	2,961,200	108,486	238,555	6,808	22,127	3,337,176
TOGIAK DISTRICT						
Togiak Section	112,718	12,878	51,504	6,070	52,630	235,800
Kulukak Section	76,332	1,262	14,093	280	118	92,085
Matogak Section	994	15	1,380	85	5,703	8,177
Osviak Section	381	0	618	0	0	999
Total	190,425	14,155	67,595	6,435	58,451	337,061
TOTAL BRISTOL BAY	9,996,027	126,228	369,358	25,566	125,354	10,642,533
PERCENT	93.9%	1.2%	3.5%	0.2%	1.2%	100.0%

[a] Preliminary

Table 25. Daily sockeye salmon escapment tower counts by river system, Bristol Bay, 1998.

Date	Kvichak River		Naknek River		Egegik River		Ugashik River		Wood River		Igushik River		Togiak River	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/18					24	24								
19					192	216								
20					2,016	2,232								
21					1,548	3,780								
22					1,134	4,914								
23			96	96	15,066	19,980			3,558	3,558				
24	60	60	1,482	1,578	21,198	41,178			3,864	7,422				
25	24	84	9,858	11,436	27,474	68,652			13,650	21,072				
26	936	1,020	8,538	19,974	21,948	90,600			25,068	46,140				
27	2,028	3,048	10,848	30,822	32,394	122,994			16,428	62,568				
28	2,694	5,742	11,592	42,414	25,458	148,452			17,826	80,394	6	6	12	12
29	10,344	16,086	9,546	51,960	50,028	198,480			31,170	111,564	378	384	0	12
30	10,044	26,130	14,904	66,864	46,242	244,722			24,960	136,524	978	1,362	0	12
7/1	5,628	31,758	12,426	79,290	95,676	340,398			18,558	155,082	924	2,286	0	12
2	354	32,112	125,016	204,306	85,278	425,676	72	72	41,856	196,938	780	3,066	0	12
3	52,236	84,348	112,272	316,578	13,620	439,296	1,626	1,698	95,130	292,068	2,268	5,334	0	12
4	148,554	232,902	131,004	447,582	50,436	489,732	768	2,466	520,476	812,544	14,790	20,124	0	12
5	184,488	417,390	147,930	595,512	14,850	504,582	1,134	3,600	512,370	1,324,914	32,322	52,446	0	12
6	179,868	597,258	60,834	656,346	71,016	575,598	1,536	5,136	61,038	1,385,952	34,380	86,826	12	24
7	155,388	752,646	109,308	765,654	101,868	677,466	6,840	11,976	99,432	1,485,384	16,536	103,362	186	210
8	80,016	832,662	74,526	840,180	36,276	713,742	10,170	22,146	108,276	1,593,660	14,034	117,396	12	222
9	147,258	979,920	111,630	951,810	17,262	731,004	15,114	37,260	45,804	1,639,464	18,834	136,230	30	252
10	385,620	1,365,540	93,306	1,045,116	45,102	776,106	15,222	52,482	27,204	1,666,668	19,362	155,592	0	252
11	429,936	1,795,476	18,150	1,063,266	59,094	835,200	34,056	86,538	13,800	1,680,468	7,164	162,756	306	558
12	275,148	2,070,624	28,476	1,091,742	24,276	859,476	54,678	141,216	11,430	1,691,898	6,126	168,882	4,914	5,472
13	110,676	2,181,300	37,758	1,129,500	29,766	889,242	97,848	239,064	11,082	1,702,980	7,428	176,310	1,410	6,882
14	57,150	2,238,450	11,682	1,141,182	63,780	953,022	163,350	402,414	8,232	1,711,212	10,062	186,372	1,170	8,052
15	30,894	2,269,344	5,730	1,146,912	65,088	1,018,110	92,286	494,700	12,588	1,723,800	7,590	193,962	4,446	12,498

Continued

Table 25. (Page 2 of 2)

Date	Kvichak River		Naknek River		Egegik River		Ugashik River		Wood River		Igushik River		Togiak River	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
16	10,602	2,279,946	28,002	1,174,914	14,370	1,032,480	27,444	522,144	10,902	1,734,702	5,322	199,284	8,370	20,868
17	4,836	2,284,782	7,320	1,182,234	20,058	1,052,538	16,746	538,890	5,598	1,740,300	4,362	203,646	5,712	26,580
18	5,802	2,290,584	6,858	1,189,092	37,302	1,089,840	18,672	557,562	3,492	1,743,792	2,856	206,502	3,510	30,090
19	3,204	2,293,788	13,080	1,202,172	12,570	1,102,410	17,556	575,118	3,156	1,746,948	3,966	210,468	3,678	33,768
20	1,512	2,295,300			8,478	1,110,888	14,802	589,920	2,916	1,749,864	2,322	212,790	5,100	38,868
21	774	2,296,074					12,318	602,238	2,100	1,751,964	1,284	214,074	4,896	43,764
22							15,894	618,132	2,628	1,754,592	1,830	215,904	5,766	49,530
23							11,334	629,466	1,176	1,755,768			11,268	60,798
24							16,056	645,522					9,174	69,972
25							35,346	680,868					6,378	76,350
26							81,486	762,354					6,750	83,100
27							50,856	813,210					5,400	88,500
28							39,702	852,912					8,100	96,600
29							21,510	874,422					7,866	104,466
30							16,086	890,508					8,016	112,482
7/31													5,592	118,074
8/1													5,892	123,966
2													5,298	129,264
3													6,570	135,834
4													7,344	143,178
5													2,676	145,854
6													4,668	150,522
7													3,054	153,576
8														
Total		2,279,946		1,202,172		1,110,888		890,508		1,755,768		215,904		153,576

Table 26. Final daily and cumulative escapement estimates by species, Nushagak River sonar project, 1998.

	Sockeye		Chinook		Chum		Pink		Coho		Total	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/09	222	222	368	368	139	139	0	0	0	0	729	729
6/10	553	775	1,053	1,421	345	484	0	0	0	0	1,951	2,680
6/11	261	1,036	543	1,964	197	681	0	0	0	0	1,001	3,681
6/12	165	1,201	355	2,319	130	811	0	0	0	0	650	4,331
6/13	127	1,328	296	2,615	112	923	0	0	0	0	535	4,866
6/14	108	1,436	238	2,853	84	1,007	0	0	0	0	430	5,296
6/15	115	1,551	261	3,114	88	1,095	0	0	0	0	464	5,760
6/16	128	1,679	234	3,348	107	1,202	0	0	0	0	469	6,229
6/17	60	1,739	122	3,470	46	1,248	0	0	0	0	228	6,457
6/18	152	1,891	257	3,727	134	1,382	0	0	0	0	543	7,000
6/19	330	2,221	628	4,355	388	1,770	0	0	0	0	1,346	8,346
6/20	6,384	8,605	11,914	16,269	8,457	10,227	0	0	0	0	26,755	35,101
6/21	3,190	11,795	5,968	22,237	3,504	13,731	0	0	0	0	12,662	47,763
6/22	3,751	15,546	7,159	29,396	12,299	26,030	0	0	0	0	23,209	70,972
6/23	2,625	18,171	6,620	36,016	12,064	38,094	0	0	0	0	21,309	92,281
6/24	3,976	22,147	5,835	41,851	9,284	47,378	0	0	0	0	19,095	111,376
6/25	8,092	30,239	5,902	47,753	15,723	63,101	0	0	0	0	29,717	141,093
6/26	6,141	36,380	3,672	51,425	12,443	75,544	0	0	0	0	22,256	163,349
6/27	6,956	43,336	4,163	55,588	14,011	89,555	0	0	0	0	25,130	188,479
6/28	7,854	51,190	1,426	57,014	5,526	95,081	0	0	0	0	14,806	203,285
6/29	7,793	58,983	1,610	58,624	5,588	100,669	0	0	0	0	14,991	218,276
6/30	10,455	69,438	1,631	60,255	7,341	108,010	0	0	0	0	19,427	237,703
7/01	6,262	75,700	738	60,993	3,962	111,972	0	0	0	0	10,962	248,665
7/02	10,675	86,375	1,014	62,007	6,624	118,596	0	0	0	0	18,313	266,978
7/03	37,050	123,425	3,806	65,813	27,448	146,044	0	0	0	0	68,304	335,282
7/04	52,668	176,093	4,218	70,031	21,653	167,697	0	0	0	0	78,539	413,821
7/05	116,872	292,965	4,327	74,358	24,007	191,704	0	0	0	0	145,206	559,027
7/06	72,184	365,149	3,588	77,946	21,323	213,027	0	0	0	0	97,095	656,122
7/07	20,985	386,134	4,762	82,708	18,917	231,944	0	0	0	0	44,664	700,786
7/08	25,902	412,036	5,712	88,420	23,583	255,527	0	0	0	0	55,197	755,983
7/09	12,095	424,131	2,739	91,159	11,201	266,728	0	0	0	0	26,035	782,018
7/10	4,647	428,778	3,579	94,738	5,645	272,373	0	0	0	0	13,871	795,889
7/11	7,003	435,781	5,359	100,097	8,801	281,174	0	0	0	0	21,163	817,052

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Table 26. (p 2 of 3)

	Sockeye		Chinook		Chum		Pink		Coho		Total	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/12	3,664	439,445	2,787	102,884	4,537	285,711	0	0	0	0	10,988	828,040
7/13	1,317	440,762	1,624	104,508	1,588	287,299	1,032	1,032	867	867	6,428	834,468
7/14	1,114	441,876	1,292	105,800	1,165	288,464	2,019	3,051	1,088	1,955	6,678	841,146
7/15	834	442,710	844	106,644	647	289,111	2,062	5,113	1,009	2,964	5,396	846,542
7/16	898	443,608	555	107,199	597	289,708	1,882	6,995	789	3,753	4,721	851,263
7/17	435	444,043	427	107,626	343	290,051	1,080	8,075	527	4,280	2,812	854,075
7/18	275	444,318	256	107,882	209	290,260	676	8,751	323	4,603	1,739	855,814
7/19	309	444,627	275	108,157	228	290,488	772	9,523	361	4,964	1,945	857,759
7/20	577	445,204	429	108,586	415	290,903	1,264	10,787	568	5,532	3,253	861,012
7/21	758	445,962	731	109,317	590	291,493	1,875	12,662	908	6,440	4,862	865,874
7/22	1,143	447,105	1,115	110,432	870	292,363	2,852	15,514	1,373	7,813	7,353	873,227
7/23	412	447,517	357	110,789	302	292,665	1,008	16,522	468	8,281	2,547	875,774
7/24	260	447,777	200	110,989	171	292,836	644	17,166	281	8,562	1,556	877,330
7/25	289	448,066	147	111,136	169	293,005	630	17,796	244	8,806	1,479	878,809
7/26	616	448,682	310	111,446	343	293,348	1,524	19,320	588	9,394	3,381	882,190
7/27	429	449,111	242	111,688	245	293,593	1,125	20,445	447	9,841	2,488	884,678
7/28	855	449,966	342	112,030	436	294,029	2,137	22,582	780	10,621	4,550	889,228
7/29	829	450,795	386	112,416	418	294,447	2,354	24,936	891	11,512	4,878	894,106
7/30	536	451,331	254	112,670	272	294,719	1,515	26,451	575	12,087	3,152	897,258
7/31	631	451,962	275	112,945	313	295,032	1,774	28,225	662	12,749	3,655	900,913
8/01	866	452,828	368	113,313	377	295,409	2,878	31,103	1,069	13,818	5,558	906,471
8/02	911	453,739	388	113,701	438	295,847	2,627	33,730	975	14,793	5,339	911,810
8/03	730	454,469	1,365	115,066	1,099	296,946	31,210	64,940	15,823	30,616	50,227	962,037
8/04	2,009	456,478	1,289	116,355	1,398	298,344	25,074	90,014	22,747	53,363	52,517	1,014,554
8/05	774	457,252	297	116,652	257	298,601	7,768	97,782	4,455	57,818	13,551	1,028,105
8/06	1,052	458,304	386	117,038	343	298,944	8,977	106,759	4,831	62,649	15,589	1,043,694
8/07	558	458,862	276	117,314	212	299,156	7,269	114,028	4,340	66,989	12,655	1,056,349
8/08	8	458,870	91	117,405	39	299,195	2,679	116,707	2,316	69,305	5,133	1,061,482
8/09	4	458,874	48	117,453	20	299,215	2,190	118,897	1,940	71,245	4,202	1,065,684
8/10	0	458,874	2	117,455	0	299,215	1,490	120,387	1,531	72,776	3,023	1,068,707
8/11	0	458,874	1	117,456	0	299,215	1,306	121,693	1,298	74,074	2,605	1,071,312
8/12	0	458,874	2	117,458	0	299,215	1,592	123,285	1,602	75,676	3,196	1,074,508
8/13	0	458,874	2	117,460	0	299,215	813	124,098	1,610	77,286	2,425	1,076,933

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Table 26. (p 3 of 3)

	Sockeye		Chinook		Chum		Pink		Coho		Total	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
8/14	0	458,874	1	117,461	0	299,215	640	124,738	1,537	78,823	2,178	1,079,111
8/15	0	458,874	1	117,462	0	299,215	499	125,237	1,352	80,175	1,852	1,080,963
8/16	0	458,874	4	117,466	0	299,215	691	125,928	3,083	83,258	3,778	1,084,741
8/17	0	458,874	17	117,483	0	299,215	2,183	128,111	9,326	92,584	11,526	1,096,267
8/18	0	458,874	8	117,491	0	299,215	1,007	129,118	4,032	96,616	5,047	1,101,314
8/19	0	458,874	2	117,493	0	299,215	456	129,574	1,936	98,552	2,394	1,103,708
8/20	0	458,874	1	117,494	0	299,215	484	130,058	1,605	100,157	2,090	1,105,798
8/21	0	458,874	1	117,495	0	299,215	551	130,609	1,368	101,525	1,920	1,107,718
8/22	0	458,874	0	117,495	0	299,215	466	131,075	781	102,306	1,247	1,108,965
8/23	0	458,874	0	117,495	0	299,215	735	131,810	1,362	103,668	2,097	1,111,062
8/24	0	458,874	0	117,495	0	299,215	379	132,189	798	104,466	1,177	1,112,239
8/25	0	458,874	0	117,495	0	299,215	213	132,402	482	104,948	695	1,112,934
Total	458,874		117,495		299,215		132,402		104,948		1,112,934 [a]	

[a] An additional 616 whitefish and 2,529 other fish (Arctic char and northern pike) were estimated passing the sonar site in 1998.

Table 27. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, Kvichak River, Bristol Bay, 1998.

	Tower Count		Aerial Survey	River Test Fishing			
				Fish per	Index Points		Cumulative
Date	Daily	Cum.	Total	Index Pt.[1]	Daily	Cum.	Escapement
6/21				81	4	4	1680
22				81	0	4	324
23	0	0		81	0	4	324
24	60	60		81	6	10	810
25	24	84		81	59	69	5,589
26	936	1,020		81	142	211	17,091
27	2,028	3,048		81	323	534	43,254
28	2,694	5,742		56	13	547	30,632
29	10,344	16,086		76	53	600	45,600
30	10,044	26,130		68	49	649	44,132
7/ 1	5,628	31,758		58	873	1,522	88,276
2	354	32,112		53	1,983	3,505	185,765
3	52,236	84,348		80	1,497	5,002	400,160
4	148,554	232,902		69	2,546	7,548	520,812
5	184,488	417,390	370,000	84	1,714	9,262	778,008
6	179,868	597,258		82	1,076	10,338	847,716
7	155,388	752,646	280,000	81	853	11,191	906,471
8	80,016	832,662		81	1,518	12,709	1,029,429
9	147,258	979,920		81	4,673	17,382	1,407,942
10	385,620	1,365,540	600,000	85	2,410	19,792	1,682,320
11	429,936	1,795,476	425,000	95	1,579	21,371	2,030,245
12	275,148	2,070,624		100	2,108	23,479	2,347,900
13	110,676	2,181,300		99	1,109	24,588	2,434,212
14	57,150	2,238,450		95	138	24,726	2,348,970
15	30,894	2,269,344		92	153	24,879	2,288,868
16	10,602	2,279,946		91	471	25,350	2,306,850
17	4,836	2,284,782					
18	5,802	2,290,584					
19	3,204	2,293,788					
20	1,512	2,295,300					
21	774	2,296,074					
Total		2,296,074				25,350	2,306,850

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

Table 28. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods, Egegik River, 1998.

	Tower Count		Aerial Survey	River Test Fishing			
					Index Points		Estimated
Date	Daily	Cum.	Total	Fish per Index Pt.[1]	Daily	Cum.	Cumulative Escapement
6/14				72	127	127	9,144
6/15				72	327	454	32,688
6/16				72	227	681	49,032
6/17				72	82	763	54,936
6/18	24	24		72	89	852	61,344
6/19	192	216		72	94	946	68,112
6/20	2,016	2,232		72	108	1,054	75,888
6/21	1,548	3,780		72	266	1,320	95,040
6/22	1,134	4,914	8,900	72	1,044	2,364	170,208
6/23	15,066	19,980		72	290	2,654	191,088
6/24	21,198	41,178		46	773	3,427	157,642
6/25	27,474	68,652		46	870	4,297	197,662
6/26	21,948	90,600	27,800	41	392	4,689	192,249
6/27	32,394	122,994		41	835	5,524	226,484
6/28	25,458	148,452		41	187	5,711	234,151
6/29	50,028	198,480		43	1,184	6,895	296,485
6/30	46,242	244,722		45	2,173	9,068	408,060
7/1	95,676	340,398		55	238	9,306	511,830
7/2	85,278	425,676		55	122	9,428	518,540
7/3	13,620	439,296		43	721	10,149	436,407
7/4	50,436	489,732		55	392	10,541	579,755
7/5	14,850	504,582		54	1,332	11,873	641,142
7/6	71,016	575,598		57	1,862	13,735	782,895
7/7	101,868	677,466		62	347	14,082	873,084
7/8	36,276	713,742		60	203	14,285	857,100
7/9	17,262	731,004		58	120	14,405	835,490
7/10	45,102	776,106		63	318	14,723	927,549
7/11	59,094	835,200		61	682	15,405	939,705
7/12	24,276	859,476		61	99	15,504	945,744
7/13	29,766	889,242	45,500	65	972	16,476	1,070,940
7/14	63,780	953,022	44,000				
7/15	65,088	1,018,110	14,300				
7/16	14,370	1,032,480	300				
7/17	20,058	1,052,538	700				
7/18	37,302	1,089,840					
7/19	12,570	1,102,410	1,050				
7/20	8,478	1,110,888					
Total		1,110,888				16,476	

[1] The 1985-97 mean fish per index point relationship (72 fpi) was used until June 23 when lag-time relationships began to prove more accurate.

Table 29. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey,and river test fishing enumeration methods, Ugashik River, 1998.

	Tower Count		Aerial Survey	River Test Fishing			
					Index Points		Estimated
Date	Daily	Cum.	Total	Fish per Index Pt. [1]	Daily	Cum.	Cumulative Escapement
6/25							
6/26				54	53	53	2,862
6/27				54	29	82	4,428
6/28				54	34	116	6,264
6/29				54	25	141	7,614
6/30				54	16	157	8,478
7/1				54	26	183	9,882
7/2	72	72		54	8	191	10,314
7/3	1,626	1,698		54	27	218	11,772
7/4	768	2,466		54	6	224	12,096
7/5	1,134	3,600		54	16	240	12,960
7/6	1,536	5,136		54	61	301	16,254
7/7	6,840	11,976	500	43	220	521	22,403
7/8	10,170	22,146		53	348	869	46,057
7/9	15,114	37,260		53	279	1,148	60,844
7/10	15,222	52,482		53	540	1,688	89,464
7/11	34,056	86,538		53	1,427	3,115	165,095
7/12	54,678	141,216		64	1,911	5,026	321,664
7/13	97,848	239,064	179,000	76	1,304	6,330	481,080
7/14	163,350	402,414	48,700	76	677	7,007	532,532
7/15	92,286	494,700	16,700	78	528	7,535	587,730
7/16	27,444	522,144		73	262	7,797	569,181
7/17	16,746	538,890	200	71	156	7,953	564,663
7/18	18,672	557,562		71	290	8,243	585,253
7/19	17,556	575,118	100				
7/20	14,802	589,920					
7/21	12,318	602,238					
7/22	15,894	618,132	550				
7/23	11,334	629,466	325				
7/24	16,056	645,522	110				
7/25	35,346	680,868	450				
7/26	81,486	762,354					
7/27	50,856	813,210					
7/28	39,702	852,912					
7/29	21,510	874,422					
7/30	16,086	890,508					
Total		890,508				21,969	

[1] The 1985-97 mean fish per index point was 54 fpi.

Table 30. Daily sockeye salmon escapement estimates by tower and aerial survey enumeration methods, in thousands of fish, Wood River, 1998.

Date	Tower Count		Aerial Surveys[1]		
	Daily	Cum.	Number	Visibility	Comments
22-Jun		0			
23-Jun	4	4			
24-Jun	4	7			
25-Jun	14	21			
26-Jun	25	46			
27-Jun	16	63			
28-Jun	18	80			
29-Jun	31	112			
30-Jun	25	137			
1-Jul	19	155			
2-Jul	42	197			
3-Jul	95	292			
4-Jul	521	813	21.2	good	steady fish all the way, stacked 10 wide in places
5-Jul	512	1,325			
6-Jul	61	1,386			
7-Jul	99	1,485			
8-Jul	108	1,594			
9-Jul	46	1,639			
10-Jul	27	1,666			
11-Jul	14	1,680			
12-Jul	11	1,692			
13-Jul	11	1,703			
14-Jul	8	1,711			
15-Jul	13	1,723			
16-Jul	11	1,734			
17-Jul	6	1,740			
18-Jul	4	1,743			
19-Jul	3	1,746			
20-Jul	3	1,750			
21-Jul	2	1,752			
22-Jul	3	1,754			
23-Jul	1	1,755			
Total		1,755			

[1] Estimated number of fish in clear water below the counting tower at the time of the survey.

Table 31. Daily sockeye salmon escapement estimates by tower, aerial survey enumeration methods, in thousands of fish, Igushik River, Bristol Bay, 1998.

	Tower Count		Aerial Surveys[1]					River Test Fishing			
			Lower		Upper			Fish per	Index Points		Cumulative
Date	Daily	Cum.	River	Lagoon	River	Total	Visibility	Index Pt.[a]	Daily	Cum	Escapement
16-Jun								61	0	0	0
17-Jun								61	0	0	0
18-Jun								61	0	0	0
19-Jun								61	0	0	0
20-Jun								61	0	0	0
21-Jun								61	0	0	0
22-Jun								61	0	0	0
23-Jun								61	0	0	0
24-Jun								61	11	11	1
25-Jun								61	36	47	3
26-Jun								61	39	86	5
27-Jun								61	6	92	6
28-Jun								61	55	147	9
29-Jun								61	16	163	10
30-Jun	1	1						61	66	229	14
1-Jul	1	2						61	82	311	19
2-Jul	1	3						33	1,081	1,392	46
3-Jul	2	5						36	2,081	3,473	125
4-Jul	15	20	0	0	0.45	0.5	fair	34	1,475	4,948	168
5-Jul	32	52						25	1,081	6,029	151
6-Jul	34	87						16	437	6,466	103
7-Jul	17	103			1.8	1.8	fair	16	958	7,424	119
8-Jul	14	117						17	775	8,199	139
9-Jul	19	136						17	332	8,531	145
10-Jul	19	155						18	185	8,716	157
11-Jul	7	163						19	192	8,908	169
12-Jul	6	169						19	172	9,080	173
13-Jul	7	176									
14-Jul	10	186									
15-Jul	8	194									
16-Jul	5	199									
17-Jul	4	203									
18-Jul	3	206									
19-Jul	4	210									
20-Jul	2	213									
21-Jul	1	214									
22-Jul	2	216									
23-Jul					0.3	0.3	fair				
24-Jul											
Total		216									

[1] Estimated number of fish in clear water below the counting tower at the time of the survey.

[a] The 1988-92, 1994-97 mean fish per index point relationship (61 fpi) was used until July 2 when lag-time relationships began to prove more accurate.

Table 32. Comparison of daily sockeye salmon escapement estimates by tower and aerial survey enumeration methods in thousands of fish, Togiak River, 1998.

	Tower Count		Aerial Surveys [1]					
Date	Daily	Cum.	Togiak to Gechiak	Gechiak to Ongivinuck	Ongivinuck to tower	Total	Visibilit	Comments
7/01								
7/02								
7/03								
7/04								
7/05								
7/06								
7/07			0			0	Poor	High, turbid water
7/08								
7/09								
7/10			0		0.2	0.2	Poor	
7/11		1	0.1	0.4	0.7	1.2	Poor	
7/12	5	6	2.2	2.5	1.8	6.5	Poor	
7/13	1	7	2.7	5.3	2.6	10.6	Poor	
7/14	1	8	1.2		4.5	5.7	Poor	
7/15	4	12	0.3	2.8	3.8	6.9	Poor	
7/16	8	20						
7/17	6	26	0.8	3.9	4	8.7	Poor	
7/18	4	30						
7/19	4	34	2.4	6.9	5.5	14.8	Poor	
7/20	5	39						
7/21	5	44	3.1	15.2	6.1	24.4	Poor	Water beginning to clear
7/22	6	50	3	13.9	7.9	24.8	Fair	
7/23	11	61						
7/24	9	70	1.9	17.1	13	32	Fair	
7/25	6	76						
7/26	7	83						
7/27	5	88	1.8	10.7	7.8	20.3	Poor	Dark overcast
7/28	8	96						
7/29	8	104	1.9	9.6	9.5	21	Fair	
7/30	8	112						
7/31	6	118						
8/01	6	124						
8/02	5	129						
8/03	6	135						
8/04	7	142						
8/05	3	145						
8/06	5	150						
8/07	3	153						
Total		153						

[1] Unexpanded counts of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 33. Commercial salmon processors and buyers operating in Bristol Bay, 1998.[a]

	Name of Operator/Buyer	Base of Operations	District[1]	Method[2]	Export
01.	Alaska Pacific Products	Egegik, AK	E	F,S	AIR
02.	American Seafoods Company	Seattle, WA	K,E,U,N	F,S	SEA
03.	Aurora Salmon	Anchorage, AK	E	F	SEA
04.	Big Creek	Warden, WA	E	F	SEA
05.	Clarks Fish Company	Cathlamet, WA	E	F	SEA
06.	Dragnet Fisheries Company	Anchorage, AK	K,E,U,N	F,EF	AIR,SEA
07.	Friedman Family Fisheries	Baltimore, MD	N	F	SEA
08.	Icicle Seafoods, Inc.	Seattle, AK	K,E,U,N	F	SEA
09.	Inlet Salmon	Kenai, AK	N	F	AIR,SEA
10.	International Seafoods of Alaska	Kodiak, AK	E	F	SEA
11.	Lady Marian Seafoods, Inc.	Anchorage, AK	K,E	F	AIR
12.	Nelbro Packing Company	Seattle, WA	K,E	C,F	SEA
13.	New West Fisheriess	Bellingham, WA	K,E,U	F	SEA
14.	North Alaska Fishereis Inc.	Anchorage, AK	T,N	EF,F	AIR
15.	Nor Quest Seafoods, Inc.	Seattle, WA	K,E,U,N	F	SEA
16.	Ocean Beauty Seafoods, Inc.	Seattle, WA	K,E,U,N	F,EF	AIR,SEA
17.	Pacman Fisheries	Naknek, AK	K	S	N/A
18.	Pederson Point	Seattle, WA	K,E,U,N	F	SEA
19.	Peter Pan Seafoods, Inc.	Seattle, WA	K,E,U,N	C,EF,F,S	SEA
20.	John Savo	Naknek, AK	K	EF	AIR
21.	Snopak Products	Seattle, WA	K,E,U,N	C,F	SEA
22.	Trident Seafoods	Seattle, WA	K,E,U,N	C,EF,F	AIR,SEA
23.	Ugashik Wild Salmon	King Salmon, AK	U	C,EF	AIR
24.	Unisea, Inc.	Redmond, WA	K,E,U,N	F	AIR
25.	Wards Cove Packing Ekuk	Seattle, WA	N	C,F	AIR
26.	Wards Cove Packing Naknek	Seattle, WA	K,E,N	F	AIR,SEA
27.	Wards Cove Packing Red Salmon	Seattle, WA	K,E,N	C,EF,F,S	SEA
28.	Woodbine Alaska Fish Company	Rio Vista, CA	K,E,U,N,T	C,F	SEA
29.	Yard Arm Knot	Seattle, WA	K,E,U,N	F	SEA

Number of processors: Canning= 8; Freezing= 26; Fresh= 8; Curing= 5; Air Export= 12; Sea Export= 21

[a] Indicates operators with a processing facility in a district or operators from other areas buying fish and/or providing suport service for fishers in districts away from the facility.

[1] K=Naknek-Kvichak; E=Egegik; U=Ugashik; N=Nushagak; T=Togiak.

[2] Type of processing: C=canned; EF=export fresh; F=frozen; S=cured; T=tendered.

Table 34. Mean round weight, price per pound, and total exvessel value of the commercial salmon catch, Bristol Bay, 1998.[a]

Species	Total Catch (lbs.)	Mean Weight (lbs.)	Mean Price ($/lb.)	Exvessel Value ($)
Sockeye	57,225,613	5.73	1.10	62,948,174
Chinook	2,231,976	17.68	0.50	1,115,988
Chum	2,494,246	6.41	0.10	249,425
Pink	83,499	3.27	0.10	8,350
Coho	1,042,835	8.36	0.50	521,418
Total	63,078,169			64,843,354

[a] Data is preliminary and is extracted from "Bristol Bay Final Operations Reports" (BB-CF/303). Price information reflects on-ground values; price changes and bonuses may occur later.

Table 35. Subsistence salmon harvest by species, in numbers of fish, by district and location fished, Bristol Bay, 1998*

Area and River System	Permits Issued	Estimated Number of Salmon Harvested					
		Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT							
Naknek River[1]	362	28,625	1,966	768	874	1,567	33,800
Kvichak River/Iliamna Lake:							
Alagnak River	1	0	0	0	0	0	0
Chekok	2	747	0	0	0	0	747
Igiugig	1	25	0	0	0	0	25
Iliamna Community	6	945	0	0	0	0	945
Iliamna Lake	28	5,684	411	4	3	0	6,102
Kokhanok	16	10,430	13	1	6	3	10,453
Kvichak River	29	3,410	16	9	0	12	3,447
Lake Clark	49	5,660	0	0	174	0	5,834
Levelock	6	2,454	20	0	0	10	2,484
Newhalen River	35	13,249	7	2	5	0	13,263
Nondalton Village	1	48	0	0	0	0	48
Pedro Bay	6	1,190	0	0	0	0	1,190
Port Alsworth	1	0	0	0	0	0	0
Six Mile Lake	24	10,628	0	0	0	0	10,628
Subtotal, Kvichak	205	54,470	467	17	188	25	55,167
TOTAL NAKNEK/KVICHAK	567	83,095	2,433	784	1,063	1,592	88,967
EGEGIK DISTRICT[2]	36	1,795	44	33	52	389	2,314
UGASHIK DISTRICT[3]	27	1,241	59	75	82	485	1,942
NUSHAGAK DISTRICT							
Wood River[4]	99	3,890	1,343	314	169	1,348	7,064
Lower Nushagak River[5]	38	980	1,607	185	2	201	2,975
Upper Nushagak River[6]	74	5,693	4,429	828	64	254	11,268
Dillingham Beaches[7]	243	8,568	3,580	943	683	2,595	16,369
Nushagak Bay Commercial[8]	68	2,697	802	183	132	653	4,467
Igushik/Snake River	34	3,374	491	35	26	266	4,192
Nushagak, Site Unspecified	6	14	7	0	0	0	21
TOTAL NUSHAGAK DISTRI	562	25,217	12,258	2,487	1,076	5,316	46,355
TOGIAK DISTRICT[9]	42	2,211	782	412	76	310	3,791
TOTAL BRISTOL BAY	1,234	113,560	15,576	3,792	2,349	8,093	143,368

* Harvests are extrapolated for all permits issued, based on those returned and on the area fished as first recorded on the permit. Of 1,234 permits issued for the management area, 1,155 were returned (93.6%).

[1] Includes Mile 5 North, Naknek River General, Powerline-North, North and South Savonoski, South Naknek Beach, and Telephone Point-North.

[2] Includes Egegik river and beach

[3] Includes Point Point and Ugashik

[4] Includes Dragnet, Aleknagik area, Muklung River, Red Bluff, and Upper and Lower Wood River General

[5] Includes Black Point, Grassy Island, and Lewis Point

[6] Includes Ekwok Area, Kokwok River, New Stuyahok Area, Koliganek Area, Mulchatna River, and Portage Creek

[7] Includes Bradford Point, City Dock, Kanakanak, Scandinavia, Skinner, Snag Point, and Squaw Creek

[8] Includes Clark's Point, Ekuk, Etolin Point, Nushagak Point, Protection Point, and Queen's Slough.

[9] Includes Togiak village and Togiak River

Source: Bristol Bay Subsistence Permit Data Base, ADF&G

Appendix Table 1. Escapement goals and actual counts of sockeye salmon by river system, Bristol Bay, 1978-98.

	Kvichak River					Naknek River				
	Point	Range			Percent	Point	Range			Percent
Year	Goal	Lower	Upper	Actual	Deviation [1]	Goal	Lower	Upper	Actual	Deviation [1]
1978	2,000			4,149	107	800			813	2
1979	6,000			11,218	87	800			925	16
1980	14,000			22,505	61	800			2,645	231
1981	2,000			1,754	(12)	800			1,796	125
1982	2,000			1,135	(43)	800			1,156	45
1983	2,000			3,570	79	800			888	11
1984	10,000	8,000	12,000	10,491	5	1,000	800	1,400	1,242	24
1985	10,000	8,000	12,000	7,211	(28)	1,000	800	1,400	1,850	85
1986	5,000	4,000	6,000	1,179	(76)	1,000	800	1,400	1,978	98
1987	5,000	4,000	6,000	6,066	21	1,000	800	1,400	1,062	6
1988	5,000	4,000	6,000	4,065	(19)	1,000	800	1,400	1,038	4
1989	8,000	6,000	10,000	8,318	4	1,000	800	1,400	1,612	61
1990	6,000	6,000	10,000	6,970	16	1,000	800	1,400	2,093	109
1991	4,000	4,000	8,000	4,223	6	1,000	800	1,400	3,579	258
1992	6,000	4,000	8,000	4,726	(21)	1,000	800	1,400	1,607	61
1993	5,000	4,000	8,000	4,025	(20)	1,000	800	1,400	1,536	54
1994	8,000	6,000	10,000	8,338	4	1,000	800	1,400	991	(1)
1995	10,000	6,000	10,000	10,039	0	1,000	800	1,400	1,111	11
1996	4,000	4,000	6,000	1,451	(64)	1,000			1,078	8
1997	4,000	4,000	6,000	1,504	(62)	1,000	800	1,400	1,026	3
20 yr Ave.	5,900			6,147	2	940			1,501	60
1978-87	5,800			6,928	20	880			1,436	64
1988-97	6,000	4,800	8,200	5,366	(16)	1,000	800	1,400	1,567	57
1998	2,000	2,000	10,000	2,296	15	1,100	800	1,400	1,202	9

	Egegik River					Ugashik River				
	Point	Range			Percent	Point	Range			Percent
Year	Goal	Lower	Upper	Actual	Deviation [1]	Goal	Lower	Upper	Actual	Deviation [1]
1978	600			896	49	500			70	(86)
1979	600			1,032	72	500			1,701	240
1980	600			1,061	77	500			3,321	564
1981	600			695	16	500			1,327	165
1982	600			1,035	73	500			1,158	132
1983	600			792	32	500			1,001	100
1984	1,000	800	1,200	1,165	17	700	500	900	1,241	77
1985	1,000	800	1,200	1,095	10	700	500	900	998	43
1986	1,000	800	1,200	1,151	15	700	500	900	1,001	43
1987	1,000	800	1,200	1,273	27	700	500	900	669	(4)
1988	1,000	800	1,200	1,613	61	700	500	900	643	(8)
1989	1,000	800	1,200	1,611	61	700	500	900	1,681	140
1990	1,000	800	1,200	2,191	119	700	500	900	730	4
1991	1,000	800	1,200	2,787	179	700	500	900	2,457	251
1992	1,000	800	1,200	1,945	95	700	500	900	2,174	211
1993	1,000	800	1,200	1,517	52	700	500	900	1,390	99
1994	1,000	800	1,200	1,968	97	700	500	900	1,081	54
1995	1,000	800	1,400	1,283	28	700	500	1,200	1,321	89
1996	1,000	800	1,400	1,076	8	700	500	1,200	668	(5)
1997	1,000	800	1,400	1,109	11	700	500	1,200	619	(12)
20 yr Ave.	880	800	1,243	1,365	55	640	500	964	1,263	105
1978-87	760	800	1,200	1,020	39	580	500	900	1,249	127
1988-97	1,000	800	1,260	1,710	71	700	500	990	1,276	82
1998	1,100	800	1,400	1,111	1	850	500	1,200	891	5

Continued

Appendix Table 1. (Page 2 of 2)

Year	Wood River Point Goal	Range Lower	Range Upper	Actual	Percent Deviation [1]	Igushik River Point Goal	Range Lower	Range Upper	Actual	Percent Deviation [1]
1978	800			2,267	183	150			536	257
1979	800			1,706	113	150			860	473
1980	800			2,969	271	150			1,988	1,225
1981	800			1,233	54	150			591	294
1982	800			976	22	150			424	183
1983	1,000			1,361	36	200			180	(10)
1984	1,000	700	1,200	1,003	0	200	150	250	185	(8)
1985	1,000	700	1,200	939	(6)	200	150	250	212	6
1986	800	700	1,200	819	2	200	150	250	308	54
1987	1,200	800	1,200	1,337	11	200	140	250	169	(16)
1988	800	800	1,200	867	8	200	140	250	170	(15)
1989	1,000	800	1,200	1,186	19	200	150	250	462	131
1990	1,000	700	1,200	1,069	7	200	150	250	366	83
1991	1,000	700	1,200	1,160	16	200	150	250	756	278
1992	1,000	700	1,200	1,286	29	200	150	250	305	53
1993	1,000	700	1,200	1,176	18	200	150	250	406	103
1994	1,000	700	1,200	1,472	47	200	150	250	446	123
1995	1,200	700	1,200	1,475	23	200	150	250	473	137
1996	1,200	700	1,200	1,650	38	200	150	250	401	101
1997	1,000	700	1,200	1,512	51	200	150	250	128	(36)
20 yr Ave.	958	723	1,200	1,366	47	188	148	250	486	182
1978-87	900			1,461	69	175			587	275
1988-97	1,022	733	1,200	1,225	25	200	148	250	395	97
1998	1,000	700	1,200	1,756	75.6	200	150	250	216	8

Year	Nushagak River [2] Point Goal	Range Lower	Range Upper	Actual	Percent Deviation [1]	Togiak River Point Goal	Range Lower	Range Upper	Actual	Percent Deviation [1]
1978	250			577	131	100			274	174
1979	250			360	44	100			171	71
1980	250			3,027	1,111	100			462	362
1981	250			834	234	100			208	108
1982	250			538	115	100			245	145
1983	300			319	6	100			192	92
1984	500	300	700	473	(5)	150	140	250	95	(37)
1985	500	300	700	429	(14)	150	140	250	137	(9)
1986	500	300	700	822	64	150	140	250	168	12
1987	500	300	700	163	(67)	150	100	200	250	67
1988	500	300	700	320	(36)	150	100	200	277	85
1989	500	300	700	513	3	150	100	200	84	(44)
1990	500	340	760	680	36	150	140	250	142	(5)
1991	500	340	760	493	(1)	150	140	250	255	70
1992	550	340	760	695	26	150	140	250	199	33
1993	550	340	760	715	30	150	140	250	177	18
1994	550	340	760	509	(7)	150	140	250	155	3
1995	550	340	760	281	(49)	150	140	250	186	24
1996	550	340	760	525	(5)	150	140	250	157	5
1997	550	340	760	373	(32)	150	100	200	132	(12)
20 yr Ave.	443			632	79	135			198	58
1978-87	355			754	162	120			220	99
1988-97	530	332	748	510	(4)	150	128	235	176	18
1998	550	340	760	459	(17)	150	100	200	154	3

[1] Percent deviation = (actual minus goal) / goal (multiplied by 100).

[2] Actual escapement from 1974-88 is based on the Nuyakuk River tower count, and from 1989-present is based on sonar count at Portage Creek.

Appendix Table 2. Forecast and inshore chinook salmon return, in thousands of fish, Nushagak District, 1978-98.

	Forecast				Forecast Error (%)		
Year	Spawner Recuit	Mean Percent	Sibling	Inshore Run[1]	Spawner Recruit	Mean Percent	Sibling
1978	254	105	111	256	-1	-59	-57
1979	348	147	182	262	33	-44	-31
1980	329	206	162	219	50	-6	-26
1981	339	230	198	356	-5	-35	-44
1982	319	256	213	356	-10	-28	-40
1983	322	266	224	313	3	-15	-28
1984	236	319	165	154	53	107	7
1985	308	434	162	193	60	125	-16
1986	299	543	168	119	151	356	41
1987	353	366	125	140	152	161	-11
1988			139	80			74
1989			129	102			26
1990			116	88			32
1991			120 [a]	135			-11
1992			196 [a]	142			38
1993			139 [a]	175			-21
1994[b]			151 [a]	229			-34
1995[b]			177 [a]	178			-1
1996[b]			150 [a]	135			11
1997[b]			157 [a]	226			-31
Mean Percent Error					49	56	-6
1998[b]			159 [a]	237 [c]			-33

[1] Inshore Nushagak River run includes commercial, subsistence and sport harvests below the sonar, and in river run estimated by sonar at Portage Creek.

[a] Adjusted (reduced) by the average forecast error from 1984 to the current year.

[b] Mean returns were used to predict age 1.1 and age 1.2, other year classes were forecast using sibling data.

[c] Preliminary

(Sources: 1, 4, 5, 6, and 14)

Appendix Table 3. Salmon entry permit registration by gear and residency, Bristol Bay, 1978-1998.[a]

Year	Drift Net[1] Resident		Non-Resident		Drift Total	Set Net[1] Resident		Non-Resident		Set Total	Total
1978[b]	1,041	(66)	735	(11)	1,776	749	(16)	161	(3)	910	2,686
1979	1,046	(73)	753	(10)	1,799	764	(19)	170	(5)	934	2,733
1980	1,061	(92)	765	(18)	1,826	758	(29)	189	(5)	947	2,773
1981	1,056	(98)	770	(18)	1,826	751	(37)	204	(5)	955	2,781
1982	1,048	(84)	776	(16)	1,824	741	(36)	216	(5)	957	2,781
1983	1,072	(79)	750	(16)	1,822	741	(33)	219	(3)	960	2,782
1984	1,049	(73)	771	(16)	1,820	743	(28)	219	(3)	962	2,782
1985	1,062	(83)	772	(13)	1,834	741	(24)	218	(4)	959	2,793
1986	1,060	(78)	778	(17)	1,838	739	(18)	223	(4)	962	2,800
1987[c]	1,044	(75)	793	(16)	1,837	736	(14)	224	(4)	960	2,797
1988[d]	1,033	(78)	806	(12)	1,839	731	(14)	227	(3)	958	2,797
1989[e]	1,036	(77)	831	(14)	1,867	785	(14)	240	(4)	1,025	2,892
1990[f]	1,039	(78)	839	(15)	1,878	783	(11)	243	(5)	1,026	2,904
1991[g]	1,020	(74)	861	(14)	1,881	771	(8)	253	(4)	1,024	2,905
1992[h]	998	(72)	885	(15)	1,883	774	(8)	251	(0)	1,025	2,908
1993[i]	984	(65)	902	(16)	1,886	763	(8)	259	(0)	1,022	2,908
1994[j]	972	(63)	915	(14)	1,887	760	(7)	259	(0)	1,019	2,906
1995[k]	969	(62)	919	(13)	1,888	762	(8)	257	(0)	1,019	2,907
1996[l]	966	(56)	925	(14)	1,891	760	(6)	257	(0)	1,017	2908
1997[m]	959	(56)	940	(14)	1,899	757	(6)	262	(0)	1,019	2,918
20 Year Ave	1,026		824		1,850	755		228		983	2,833
1978-87 Av	1,054		766		1,820	746		204		951	2,771
1988-97 Av	998		882		1,880	765		251		1,015	2,895
1998[n]	950	(43)	949	(12)	1,899	756	(6)	259	(0)	1,015	2,914

[1] Allowable gear per license/permit is 150 fathoms for drift and 50 fathoms for set with the following exceptions: 1968 and 1975-75F. Drift and 25F. Set; 1969-125F. Drift; 1973-25F. Drift and 12 1/2F. Set.

[a] Total license/permit registration; not all license/permittee's actually fished.

[b] Limited Entry went into effect in 1974. Figure in parenthesis are interim-use permits, and are included in the totals.

[c] Does not include 2 setnet permits.

[d] Does not include 3 setnet permits.

[e] Does not include 2 setnet permits.

[f] Does not include 1 setnet permit.

[g] Does not include 4 setnet permits.

[h] Does not include 2 setnet permits.

[i] Does not include 1 setnet permit.

[j] Does not include 2 setnet permits.

[k] Does not include 1 setnet permit.

[l] Does not include 3 setnet permits.

[m] Does not include 3 drift and 11 setnet permits.

[n] Does not include 13 drift and 29 setnet permits.

(Source: 12)

Appendix Table 4. Salmon fishing interim-use and permanent entry permits actually fished, by gear type, Bristol Bay, 1978-1998.

Year	Permits Issued			Permits Fished	
	Interim -Use	Permanent	Total	Number	Percent
		Drift Gill Net			
1978	77	1,699	1,776	1,575	89%
1979	83	1,716	1,799	1,714	95%
1980	110	1,716	1,826	1,764	97%
1981	107	1,719	1,826	1,785	98%
1982	100	1,724	1,824	1,792	98%
1983	95	1,727	1,822	1,797	99%
1984	91	1,729	1,820	1,804	99%
1985	96	1,738	1,834	1,815	99%
1986	95	1,743	1,838	1,823	99%
1987	91	1,746	1,837	1,824	99%
1988	90	1,749	1,839	1,837	100%
1989	91	1,776	1,867	1,855	99%
1990	93	1,785	1,878	1,869	100%
1991	88	1,793	1,881	1,873	100%
1992	87	1,797	1,884	1,879	100%
1993	81	1,805	1,886	1,875	99%
1994	77	1,810	1,887	1,865	99%
1995	75	1,813	1,888	1,882	100%
1996	70	1,821	1,891	1,884	100%
1997	68	1,830	1,898	1,875	99%
Average	88	1,762	1,850	1,819	98%
1998[a]	55	1,847	1,902		
		Set Gill Net			
1978	19	891	910	656	72%
1979	24	910	934	770	82%
1980	34	913	947	807	85%
1981	42	913	955	841	88%
1982	41	916	957	859	90%
1983	31	929	960	865	90%
1984	31	931	962	869	90%
1985	28	931	959	872	91%
1986	22	940	962	869	90%
1987	18	942	960	899	94%
1988	17	941	958	922	96%
1989	18	1,006	1,024	971	95%
1990	16	1,011	1,027	971	95%
1991	12	1,012	1,024	950	93%
1992	8	1,017	1,025	968	94%
1993	8	1,015	1,023	965	94%
1994	7	1,013	1,020	939	92%
1995	8	1,011	1,019	967	95%
1996	6	1,011	1,017	941	93%
1997	7	1,011	1,018	921	90%
Average	20	963	983	891	91%
1998[a]	6	1,035	1,041		

[a] Preliminary (Source: 12)

Appendix Table 5. Sockeye salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	5,123,668	1,207,294	7,995	3,137,166	452,016	9,928,139
79	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
1983	21,559,372	6,755,256	3,349,451	5,119,744	588,208	37,372,031
84	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	2,892,171	4,852,935	5,002,949	2,719,313	308,688	15,776,056
87	4,986,002	5,356,669	2,128,652	3,254,720	342,732	16,068,775
1988	3,480,836	6,456,598	1,523,520	1,706,716	822,087	13,989,757
89	13,809,956	8,901,994	3,146,239	2,788,185	88,932	28,735,306
90	17,272,224	10,371,762	2,149,009	3,532,543	197,589	33,523,127
91	10,475,206	6,797,166	2,945,742	5,053,845	549,221	25,821,180
92	9,395,948	15,646,575	3,320,966	2,789,741	726,446	31,879,676
1993	8,907,876	21,600,858	4,176,900	5,236,557	539,933	40,462,124
94	16,327,858	10,750,213	4,352,797	3,393,143	400,039	35,224,050
95	20,279,581	14,425,979	4,509,446	4,445,883	605,328	44,266,217
96	8,211,983	10,809,115	4,411,055	5,693,523	462,621	29,588,297
97	589,311	7,517,389	1,402,690	2,506,818	142,569	12,158,777
20-Year Ave.	10,607,434	7,793,340 0	2,804,345 0	3,795,644 0	454,462 0	25,455,226
1978-87 Ave.	10,339,791	4,258,916 0	2,414,854 0	3,876,593 0	455,448 0	21,345,601
1988-97 Ave.	10,875,078	11,327,765 0	3,193,836 0	3,714,695 0	453,477 0	29,564,851
1998 [a]	2,552,721	3,574,195	717,486	2,961,200	190,425	9,996,027

[a] Preliminary.

(Sources: 1 and 4)

Appendix Table 6. Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	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
1980	7,517	5,610	4,900	64,958	12,543	95,528
1981	11,048	5,468	3,416	193,461	23,911	237,304
1982	12,425	4,834	7,170	195,287	33,786	253,502
1983	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
1985	5,697	4,015	5,840	67,783	37,106	120,441
1986	3,188	1,883	2,982	65,783	19,880	93,716
1987	5,175	2,959	4,065	45,983	17,217	75,399
1988	6,538	3,103	3,444	16,648	15,606	45,339
1989	6,611	2,034	2,112	17,637	11,366	39,760
1990	5,068	1,146	1,840	14,812	11,130	33,996
1991	3,584	510	589	19,718	6,039	30,440
1992	5,724	694	2,146	47,563	12,640	68,767
1993	7,477	1,478	3,075	62,976	10,851	85,857
1994	6,016	1,243	3,685	119,480	10,486	140,910
1995	5,084	760	1,551	79,942	11,981	99,318
1996	4,195	980	588	72,011	8,602	86,376
1997	2,839	2,047	1,084	64,294	6,114	76,378
20-Year Ave.	6,673	2,844	3,902	81,135	19,848	114,401
1978-87 Ave.	8,032	4,288	5,792	110,763	29,214	158,089
1988-97 Ave.	5,314	1,400	2,011	51,508	10,482	70,714
1998[a]	2,495	748	344	108,486	14,155	126,228

[a] Preliminary.

(Sources: 1 and 4)

Appendix Table 7. Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	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
1980	204,515	78,556	36,343	681,930	299,682	1,301,026
1981	355,943	87,581	36,275	795,143	229,886	1,504,828
1982	198,019	84,329	53,204	434,817	151,000	921,369
1983	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
1985	210,107	126,736	131,576	396,740	203,302	1,068,461
1986	262,925	94,666	111,112	488,375	270,057	1,227,135
1987	446,908	145,259	101,074	416,476	419,425	1,529,142
1988	295,571	237,888	94,545	371,196	470,132	1,469,332
1989	310,869	136,185	84,673	523,903	203,178	1,258,808
1990	422,276	123,087	32,013	378,223	102,861	1,058,460
1991	443,189	75,892	60,299	463,780	246,589	1,289,749
1992	167,168	121,472	57,170	398,691	176,123	920,624
1993	43,684	70,628	73,402	505,799	144,869	838,382
1994	219,118	62,961	52,127	328,267	232,559	895,032
1995	236,472	68,325	62,801	390,158	221,126	978,882
1996	124,137	83,339	103,392	324,261	207,094	842,223
1997	8,719	53,249	16,379	181,253	47,459	307,059
20-Year Ave.	256,525	101,911	71,790	487,310	238,980	1,156,516
1978-87 Ave.	285,929	100,520	79,899	588,068	272,761	1,327,177
1988-97Ave.	227,120	103,303	63,680	386,553	205,199	985,855
1998[a]	47,657	25,588	9,721	238,555	67,595	389,116

a Preliminary.

(Sources: 1 and 4)

Appendix Table 8. Pink salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	734,880	11,430	530	4,348,336	57,524	5,152,700
1979	134	6	9	1,787	1,913	3,849
1980	288,363	2,476	51	2,202,545	70,033	2,563,468
1981	194	222	29	345	6,490	7,280
1982	127,560	1,997	170	1,339,272	23,417	1,492,416
1983	51	92	0	137	204	484
1984	211,306	5,759	2,387	3,127,153	19,468	3,366,073
1985	39	51	3	48	316	457
1986	106,919	2,749	98	267,117	24,404	401,287
1987	5	0	30	2	20	57
1988	648,569	4,485	218	243,890	58,084	955,246
1989	75	6	29	156	172	438
1990	421,690	11,593	361	54,127	8,746	496,517
1991	102	15	2	69	117	305
1992	214,228	694	525	190,102	93,989	499,538
1993	86	2	2	83	240	413
1994	11,537	145	21	8,562	69,552	89,907
1995	55	1	1	120	294	471
1996	4,590	22	21	2,681	30,308	37,622
1997	39	2	0	50	27	118
20-Year Ave.[1]	276,964	4,135	438	1,178,379	45,553	1,505,477
1978-86 Ave.[1]	293,806	4,882	647	2,256,885	38,969	2,595,189
1988-96 Ave.[1]	260,123	3,388	229	99,872	52,136	415,766
1998[a]	11,433	606	253	6,808	6,435	25,535

[1] Includes even numbered years only.
[a] Preliminary.

(Sources: 1 and 4)

Appendix Table 9. Coho salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	913	2,256	2,024	44,740	44,338	94,271
79	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
1983	7,282	25,954	7,816	81,338	5,711	128,101
84	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	5,824	33,607	25,770	68,568	48,306	182,075
87	5,274	30,789	14,785	13,263	1,292	65,403
1988	29,988	48,981	52,355	52,698	18,468	202,490
89	22,668	49,175	33,942	77,077	56,972	239,834
90	16,091	43,897	32,906	7,733	2,690	103,317
91	17,527	47,486	42,622	5,574	4,531	117,740
92	18,553	47,780	35,794	84,077	5,328	191,532
1993	1,779	41,603	2,387	14,345	12,615	72,729
94	5,877	48,436	19,250	5,615	96,062	175,240
95	981	21,772	13,800	4,896	8,917	50,366
96	3,601	38,156	13,163	11,401	58,978	125,299
97	718	35,470	7,156	4,110	2,970	50,424
20-Year Ave.	9,137	38,003	27,568	80,163	50,762	205,633
1978-87 Ave.	6,495	33,730	29,799	133,574	74,771	278,368
1988-97 Ave.	11,778	42,276	25,338	26,753	26,753	132,897
1998[a]	1,566	29,918	13,292	22,127	58,451	125,354

[a] Preliminary.

(Sources: 1 and 4)

Appendix Table 10. Total salmon commercial catch by district, in numbers of fish, Bristol Bay, 1978-1998.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	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
1980	15,628,654	2,732,245	946,588	7,594,946	1,167,819	28,070,252
1981	11,361,223	4,487,436	2,186,006	8,702,332	929,201	27,666,198
1982	5,354,392	2,613,663	1,250,539	8,235,232	937,664	18,391,490
1983	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
1985	8,405,410	7,700,742	6,667,096	1,792,690	489,126	25,055,064
1986	3,271,027	4,985,840	5,142,911	3,609,156	671,335	17,680,269
1987	5,443,364	5,535,676	2,248,606	3,730,444	780,686	17,738,776
1988	4,461,502	6,751,055	1,674,082	2,391,148	1,384,377	16,662,164
1989	14,150,179	9,089,394	3,266,995	3,406,958	360,620	30,274,146
1990	18,137,349	10,551,485	2,216,129	3,987,438	323,016	35,215,417
1991	10,939,608	6,921,069	3,049,254	5,542,986	806,497	27,259,414
1992	9,801,621	15,817,215	3,416,601	3,510,174	1,014,526	33,560,137
1993	8,960,902	21,714,569	4,255,766	5,819,760	708,508	41,459,505
1994	16,570,406	10,862,998	4,427,880	3,855,157	808,698	36,525,139
1995	20,522,297	14,516,875	4,587,276	4,920,284	847,600	45,394,332
1996	8,322,312	10,933,424	4,530,995	6,111,030	724,023	30,621,784
1997	616,084	7,626,863	1,432,200	2,866,890	200,676	12,742,713
20-Year Av	11,017,709	7,939,213	2,908,196	5,039,427	785,214	27,689,759
1978-87 Av	10,787,193	4,399,931	2,530,674	5,837,671	852,574	24,408,043
1988-97 Av	11,248,226	11,478,495	3,285,718	4,241,183	717,854	30,971,475
1998 [a]	2,615,862	3,615,239	737,195	3,337,176	337,061	10,642,533

[a] Preliminary.

(Sources: 1 and 4)

Appendix Table 11. Commercial Sockeye salmon catch, in percent, by gear type and district, Bristol Bay, 1978-98.

Year	Naknek-Kvichak		Egegik		Ugashik		Nushagak		Togiak		Total [b]	
	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1978	91	9	84	16	88	12	85	15	84	16	88	12
1979	90	10	78	22	84	16	82	18	82	18	88	12
1980	88	12	69	31	87	13	85	15	83	17	86	14
1981	86	14	77	23	89	11	81	19	79	21	86	14
1982	87	13	83	17	87	13	90	10	84	16	87	13
1983	92	8	86	14	93	7	86	14	80	20	90	10
1984	89	11	92	8	92	8	83	17	77	23	90	10
1985	87	13	93	7	96	4	65	35	75	25	90	10
1986	70	30	89	11	94	6	76	24	68	32	85	15
1987	86	14	91	9	93	7	80	20	66	34	87	13
1988	86	14	90	10	91	9	75	25	64	36	86	14
1989	89	11	90	10	87	13	58	42	55	45	86	14
1990	88	12	91	9	91	9	67	33	67	33	87	13
1991	89	11	91	9	89	11	76	24	64	36	86	14
1992	89	11	91	9	90	10	65	35	62	38	88	12
1993	84	16	93	7	90	10	72	28	54	46	87	13
1994	90	10	92	8	94	6	68	32	52	48	88	12
1995	89	11	90	10	95	5	68	32	52	48	87	13
1996	83	17	90	10	95	5	81	19	52	55	86	14
1997	73	27	87	13	88	12	70	30	37	63	82	18
20-Year Ave.	86	14	87	13	91	9	76	24	66	34	87	13
1978-87 Ave.	87	13	84	16	90	10	81	19	78	22	88	12
1988-97 Ave.	86	14	90	10	91	9	70	30	56	45	86	14
1998 [a]	84	16	86	14	85	15	72	28	43	57	80	20
Allocation	84	16	86	14	90	10	84	26	n.a.	n.a.	n.a.	n.a.

[a] Preliminary data.

[b] Percentages based on total fish caught per gear group.

Appendix Table 12. Sockeye salmon escapement by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak[1]	Egegik[2]	Ugashik[3]	Nushagak[4]	Togiak[5]	Total
1978	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
1980	25,447,866	1,060,860	3,335,284	8,310,438	572,450	38,726,898
1981	3,632,788	694,680	1,327,699	2,850,637	365,910	8,871,714
1982	2,529,692	1,034,628	1,185,551	2,012,742	341,424	7,104,037
1983	4,554,496	792,282	1,001,364	1,948,492	239,610	8,536,244
1984	11,948,514	1,165,345	1,270,318	1,814,686	200,778	16,399,641
1985	9,179,014	1,095,192	1,006,407	1,684,796	190,082	13,155,491
1986	3,387,147	1,151,750	1,015,582	2,133,398	271,184	7,959,061
1987	7,281,896	1,273,553	686,894	1,895,961	316,076	11,454,380
1988	5,297,708	1,612,745	654,412	1,524,752	340,712	9,430,329
1989	9,676,244	1,611,566	1,713,287	2,189,501	125,080	15,315,678
1990	9,231,358	2,191,582	749,478	2,144,450	278,202	14,595,070
1991	8,078,885	2,786,925	2,482,016	2,419,488	320,713	16,088,027
1992	6,557,157	1,945,632	2,194,927	2,286,278	266,956	13,250,950
1993	5,908,799	1,517,000	1,413,454	2,296,789	242,475	11,378,517
1994	9,571,245	1,967,775	1,095,068	2,449,616	233,632	15,317,336
1995	11,365,573	1,282,508	1,321,108	2,254,231	240,266	16,463,686
1996	2,835,426	1,076,460	692,167	2,553,995[7]	212,524	4,816,577
1997	2,747,511	1,104,004	656,641	2,022,234	171,373	6,701,763
20-Year Ave.	7,843,069	1,364,611	1,279,550	2,568,294	274,718	13,201,828
1978-87 Ave.	8,559,148	1,019,603	1,261,844	2,921,025	306,243	14,067,862
1988-97 Ave.	7,126,991	1,709,620	1,297,256	2,176,371	243,193	12,335,793
1998 [6]	3,750,246	1,110,938	924,853	2,441,666	214,626	8,442,329

[1] Includes Kvichak, Branch and Naknek Rivers.

[2] Includes Egegik River. Also includes King Salmon River in 1986-95, and Shosky Creek in 1988-96.

[3] Includes Ugashik River. Also includes Mother Goose River system 1976-96 and Dog Salmon River system in 1984-96.

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

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

[6] Preliminary.

[7] Snake River not surveyed due to lack of funding.

(Sources: 1, 6, and 10)

Appendix Table 13. Inshore commercial catch and escapement of sockeye salmon in the Naknek-Kvichak District by river system, in numbers of fish, Bristol Bay, 1978-98.

Year	Catch	Escapement				Total Run
		Kvichak[1]	Branch[2]	Naknek[1]	Total	
1978	5,123,668	4,149,288	229,400	813,378	5,192,066	10,315,734
79	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
1983	21,559,372	3,569,982	96,220	888,294	4,554,496	26,113,868
84	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	2,892,171	1,179,322	230,180	1,977,645	3,387,147	6,279,318
87	4,986,002	6,065,880	154,210	1,061,806	7,281,896	12,267,898
1988	3,480,836	4,065,216	194,630	1,037,862	5,297,708	8,778,544
89	13,809,956	8,317,500	196,760	1,161,984	9,676,244	23,486,200
90	17,272,224	6,970,020	168,760	2,092,578	9,231,358	26,503,582
91	10,475,206	4,222,788	277,589	3,578,508	8,078,885	18,554,091
92	9,395,948	4,725,864	224,643	1,606,650	6,557,157	15,953,105
1993	8,907,876	4,025,166	347,975	1,535,658	5,908,799	14,816,675
94	16,327,858	8,337,840	242,595	990,810	9,571,245	25,899,103
95	20,279,581	10,038,720	215,713	1,111,140	11,365,573	31,645,154
96	8,211,983	1,450,578	306,750	1,078,098	2,835,426	11,047,409
97	589,311	1,503,732	218,115	1,025,664	2,747,511	3,336,822
20 Year Ave.	10,607,434	6,146,826	217,528	1,478,716	7,843,069	18,450,504
1978-87 Ave.	10,339,791	6,927,909	195,702	1,435,537	8,559,148	18,898,939
1988-97 Ave.	10,875,078	5,365,742	239,353	1,521,895	7,126,991	18,002,069
1998 [a]	2,552,721	2,296,074	252,200	1,202,172	3,750,446	6,303,167

[1] Tower count

[2] Aerial survey estimates 1978-98

[a] Preliminary apportionment.

(Sources: 1, 6, 10, 11 and 13)

Appendix Table 14. Inshore sockeye salmon total run by river system Naknek-Kvichak District, in thousands of fish, Bristol Bay, 1978-98.

Year	Kvichak		Branch		Naknek		Total Run[1]
	Number	%	Number	%	Number	%	
1978	7,965	77	455	4	1,896	18	10,316
79	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
1983	20,105	77	557	2	5,452	21	26,114
84	23,014	87	555	2	2,926	11	26,495
85	13,394	77	264	2	3,699	21	17,357
86	1,966	31	399	6	3,913	62	6,278
87	9,593	78	297	2	2,378	19	12,268
1988	6,720	77	320	4	1,739	20	8,779
89	19,774	84	534	2	3,179	14	23,487
90	17,521	66	555	2	8,427	32	26,503
91	8,032	43	604	3	9,918	53	18,554
92	10,445	65	487	3	5,021	31	15,953
1993	9,313	63	817	6	4,687	32	14,817
94	22,232	86	634	2	3,033	12	25,899
95	27,431	87	651	2	3,564	11	31,646
96	3,458	31	706	6	6,860	62	11,024
97	1,683	50	244	7	1,409	42	3,336
20 Year Ave.	13,626	67	515	4	4,309	29	18,449
1978-87 Ave.	14,590	69	474	3	3,834	27	18,899
1988-97 Ave.	12,661	65	555	4	4,784	31	18,000
1998 [a]	3,369	53	388	6	2,546	40	6,303

[1] Due to rounding of river system total runs, the district total run may not equal the sum of the rows.

[a] Preliminary apportionment.

(Sources: 1 and 6)

Appendix Table 15. Inshore commercial catch and escapement of sockeye salmon in the Egegik District by river system, 1978-98.

Year	Catch	Escapement			Total Run
		Egegik[1]	Shosky Cr.[2]	King Salmon[2] River	
1978	1,207,294	895,698			2,102,992
1979	2,257,332	1,032,042			3,289,374
1980	2,623,066	1,060,860			3,683,926
1981	4,361,406	694,680			5,056,086
1982	2,447,514	1,034,628			3,482,142
1983	6,755,256	792,282			7,547,538
1984	5,190,413	1,165,320		25	6,355,758
1985	7,537,273	1,095,192			8,632,465
1986	4,852,935	1,151,750		430	6,005,115
1987	5,356,669	1,272,978		575	6,630,222
1988	6,456,598	1,612,680	65		8,069,343
1989	8,901,994	1,610,916	50	600	10,513,560
1990	10,371,762	2,191,362		220	12,563,344
1991	6,797,166	2,786,880		45	9,584,091
1992	15,646,575	1,945,332		300	17,592,207
1993	21,600,858	1,516,980	20		23,117,858
1994	10,750,213	1,897,932	15	30	12,648,190
1995	14,425,979	1,265,862		830	15,692,671
1996	10,842,251	1,076,460			11,918,711
1997	7,517,389	1,103,964	40		8,621,393
20-Year Ave.	7,794,997	1,360,190	10	153	9,155,349
1978-87 Ave.	4,258,916	1,019,543		103	5,278,562
1988-97 Ave.	11,331,079	1,700,837	19	203	13,032,137
1998[a]	3,558,347	1,110,888	50		4,669,285

[1] Tower count.

[2] Aerial survey index count.

[a] Preliminary.

(Sources: 1 and 6)

Appendix Table 16. Inshore commercial catch and escapement of sockeye salmon in the Ugashik District by river system, 1978-98.

Year	Catch	Escapement			Total Run
		Ugashik[1] River	King Salmon[2] River	Dog Salmon[2] River	
1978	7,995	70,434	12,000		90,429
1979	391,118	1,700,904	6,000		2,098,022
1980	885,875	3,321,384	13,900		4,221,159
1981	2,116,066	1,326,762	937		3,443,765
1982	1,139,192	1,157,526	28,025		2,324,743
1983	3,349,451	1,000,614	750		4,350,815
1984	2,658,376	1,241,418	17,100	11,800	3,928,694
1985	6,468,862	998,232	7,400	775	7,475,269
1986	5,002,949	1,001,492	4,310	9,780	6,018,531
1987	2,128,652	668,964	15,855	2,075	2,815,546
1988	1,523,520	642,972	8,360	3,080	2,177,932
1989	3,146,239	1,681,302	25,480	6,505	4,859,526
1990	2,149,009	730,038	11,340	8,100	2,898,487
1991	2,945,742	2,457,306	12,195	12,500	5,427,743
1992	3,320,966	2,173,692	13,425	7,810	5,515,893
1993	4,176,900	1,389,534	22,570	1,350	5,590,354
1994	4,352,797	1,080,858	8,885	5,325	5,447,865
1995	4,509,446	1,304,058	7,650	9,400	5,830,554
1996	4,411,055	667,518	7,230	17,419	5,103,222
1997	1,402,690	618,396	27,645	10,600	2,059,331
20-Year Av	2,804,345	1,261,670	12,553	5,326	4,083,894
1978-87 Av	2,414,854	1,248,773	10,628	2,443	3,676,697
1988-97 Av	3,193,836	1,274,567	14,478	8,209	4,491,091
1998 [a]	724,327	890,508	27,425	6,920	1,649,180

[1] Tower count.

[2] Aerial survey.

[a] Preliminary.

(Sources: 1, 6 and 10)

Appendix Table 17. Inshore commercial catch and escapement of sockeye salmon in the Nushagak District by river system, in number of fish, 1978-98.

		Escapement							
Year	Catch	Wood [1]	Igushik [1]	Nuyakuk [1]	Nush/Mul [2]	Nushagak [3]	Snake [4]	Total	Total Run
1978	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
1980	4,497,787	2,969,040	1,987,530	3,026,568	290,800		36,500	8,310,438	12,808,225
1981	7,493,093	1,233,318	591,144	834,204	177,400		14,571	2,850,637	10,343,730
1982	5,916,187	976,470	423,768	537,864	63,000		11,640	2,012,742	7,928,929
1983	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
1985	1,307,889	939,000	212,454	429,162	69,300		34,880	1,684,796	2,992,685
1986	2,719,313	818,652	307,728	821,898	168,340		16,780	2,133,398	4,852,711
1987	3,254,720	1,337,172	169,236	163,000	225,033		1,520	1,895,961	5,150,681
1988	1,706,716	866,778	170,454	319,992	163,208		4,320	1,524,752	3,231,468
1989	2,788,185	1,186,410	461,610			513,421	28,060	2,189,501	4,977,686
1990	3,532,543	1,069,440	365,802			680,368	28,840	2,144,450	5,676,993
1991	5,053,845	1,159,920	756,126			492,522	10,920	2,419,488	7,473,333
1992	2,789,741	1,286,250	304,920			695,108		2,286,278	5,076,019
1993	5,236,557	1,176,126	405,564			715,099		2,296,789	7,533,346
1994	3,393,143	1,471,890	445,920			509,326	22,480	2,449,616	5,842,759
1995	4,445,883	1,482,162	473,382	69,702	211,605	281,307	17,380	2,254,231	6,700,114
1996	5,693,523	1,649,598	400,746	250,692	252,959	503,651		2,553,995	8,247,518
1997	2,618,170	1,512,396	127,704	272,982	100,053	373,035	8,394	2,021,529	4,639,699
20-year Ave.	3,801,212	1,373,599	468,256	603,861	153,870		17,630	2,567,544	6,368,756
1978-87 Ave.	3,876,593	1,461,100	545,288	754,068	142,636		17,932	2,921,025	6,797,618
1988-97 Ave.	3,725,831	1,286,097	391,223	228,342	181,956	529,315	17,199	2,214,063	5,939,894
1998	2,961,200	1,755,768	215,904	146,250	312,624	458,874	11,120	2,441,666	5,402,866

[1] Tower count. (Sources: 1, 6,10 and 11)

[2] Aerial survey estimates 1977-83, 1985, and 1987. Escapement estimates for 1984, 1988, 1995, 1996 and 1997 were derived from the difference between lower river sonar estimates and Nuyakuk Tower counts. Escapement estimates for 1976 and 1986 based on the average ratio of Nuyakuk/Mushagak-Mulchatna river system in years when data was available.

[3] Total escapements from 1989 on are determined for the entire Nushagak River drainage using Portage Creek sonar estimates.

[4] Aerial survey estimate 1980, 1982-91, 1994-95 and 1997; weir count 1975-79 and 1981, not surveyed in 1992, 1993 or 1996 due to lack of funding.

[a] Preliminary.

Appendix Table 18. Inshore sockeye salmon total run by river system, in thousands of fish and percent, Nushagak District, 1978-98.

Year	Wood		Igushik		Nuyakuk		Nush-Mul		Nushagak		Snake		Total Run[1]
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	
1978	4,117	62	1,084	16	1,302	20	87	1			33	0	6,623
1979	3,638	57	1,842	29	764	12	138	2			18	0	6,400
1980	4,529	35	3,126	24	4,826	38	291	2			37	0	12,809
1981	4,568	44	2,229	22	3,319	32	177	2			52	1	10,345
1982	3,471	44	1,818	23	2,079	26	550	7			12	0	7,930
1983	4,272	60	813	12	1,379	20	601	9			3	0	7,068
1984	1,982	52	435	11	906	24	451	12			34	1	3,808
1985	1,593	53	460	15	697	23	208	7			35	1	2,993
1986	1,772	37	877	18	1,762	36	425	9			17	0	4,853
1987	2,828	55	617	12	589	11	1,116	22			2	0	5,152
1988	1,749	54	406	13	649	20	424	13			4	0	3,232
1989	2,519	51	1,214	24					1,217	24	28	1	4,978
1990	2,610	46	1,280	23					1,757	31	29	1	5,676
1991	3,303	44	2,424	32					1,736	23	11	0	7,474
1992	2,481	49	794	16					1,802	35			5,077
1993	3,725	49	1,580	21					2,228	30			7,533
1994	2,957	51	1,300	22					1,543	26	42	1	5,842
1995	4,022	60	1,902	28					756	11	20	0	6,700
1996[a]	5,030	61	1,502	18					1,771	21			8,303
1997[a]	3,480	75	293	6					858	18	8	0	4,639
20-Year Ave	3,232	52	1,300	19	1,661	24	406	8	1,519	25	23	0	6,372
1978-87 Ave	3,277	50	1,330	18	1,762	24	404	7			24	0	6,798
1988-97 Ave	3,188	54	1,270	20	649	20	424	13	1,519	25	20	0	5,945
1998[a]	3,949	73	574	11					869	16			5,392

[1] Due to rounding, the district total runs may not equal the sum of the rows.
[a] Preliminary harvest apportionment.

(Sources: 1 and 6)

Appendix Table 19. Inshore commercial catch and escapement of sockeye salmon in the Togiak District by river system, in numbers of fish, 1974-98.

	Catch				Escapement						
					Togiak						
Year	Togiak	Kulukak	Os/Mat[1]	Total	Lake[2]	River[3]	Tributaries[4]	Kulukak[5]	Other[6]	Total	Total Run
1974	110,886	13,615	14,840	139,341	82,992	12,000	8,600	4,900		108,492	247,833
1975	184,856	3,821	237	188,914	160,962	12,200	7,400	8,600		189,162	378,076
1976	293,016	4,822	4,045	301,883	158,190	15,000	16,200	11,200		200,590	502,473
1977	201,004	16,252	1,195	218,451	133,734	4,400	24,400	40,100		202,634	421,085
1978	422,100	29,668	248[a]	451,768	273,576	15,000	17,600	33,900		340,076	791,844
1979	393,337	66,629	1,018	460,984	171,138	14,200	12,900	26,600		224,838	685,822
1980	591,470	42,811	280	634,561	461,850	27,900	37,000	45,700		572,450	1,207,011
1981	620,288	19,246	173	639,707	208,080	21,150	77,900	58,780		365,910	1,005,617
1982	581,718	13,952	26	595,696	244,824	3,450	40,400	52,750		341,424	937,120
1983	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
1985	133,263	44,120	32,383	209,766	136,542	3,600	13,340	36,600		190,082	399,848
1986	191,158	100,466	17,064	308,688	168,384	20,000	15,000	42,800	25,000	271,184	579,872
1987	274,613	45,401	22,718	342,732	249,676	10,400	18,200	37,800		316,076	658,808
1988	673,408	143,112	5,567	822,087	276,612	18,800	13,600	31,700		340,712	1,162,799
1989	68,375	14,116	6,441	88,932	84,480	15,200	4,560	20,840		125,080	214,012
1990	168,688	27,311	1,590	197,589	141,977	17,540	29,605	49,600	39,480	278,202	475,791
1991	522,090[b]	33425[b]	6437[b]	549,221	254,683	15,980	7,740	23,940	18,370	320,713	869,934
1992	610,575	108,358	7,513	726,446	199,056	6,060	10,400	26,440	25,000	266,956	993,402
1993	475,799	58,616	5,518	539,933	177,185	4,600	11,330	31,800	17,560	242,475	782,408
1994	321,121	76,781	2,137	400,039	154,752	6,200	13,220	29,740	29,720	233,632	633,671
1995	527,143	76,056	2,129	605,328	185,718	6,520	18,988	14,620	14,420	240,266	845,594
1996	381,539	76,833	1,691	460,063	156,954	18,320	11,900	18,980	6,370	212,524	672,587
1997	91,847	49,277	2,976	144,100	131,682	12,300	8,325	7,950	6,370	166,627	310,727
20-Year Ave.	363,472	57,268	6,198	454,399	198,207	13,013	20,781	33,366	20,254	274,481	728,879
1978-87 Ave.	395,094	51,491	8,839	455,424	220,104	13,873	28,596	41,170	25,000	306,243	761,666
1988-97 Ave.	331,850	63,046	3,556	453,374	176,310	12,152	12,967	25,561	19,661	242,719	696,093
1998[c]	112,718	76,332	1,375	190,425	153,576	9,780	12,120	12,950	26,200	214,626	405,051

[1] Catches in the Osviak and Matogak sections were combined.
[2] Tower count.
[3] Aerial survey estimate.
[4] Aerial survey estimate includes Gechiak, Pungokepuk, Kemuk, Nayororun, and Ongivinuck River systems. Aerial survey estimates prior to 1986 also include Ungalikthluk, Negukthlik, Matogak, Osviak, and other miscellaneous river systems when surveyed.
[5] Aerial survey estimate includes Kulukak River and Lake and Tithe Creek ponds.
[6] Aerial survey estimate includes Matogak, Osviak, Slug, Negukthlik, and Ungalikthluk and Quigmy Rivers. Prior to 1986 estimates for these systems were included under tributaries when surveyed.
[a] Includes 248 fish from Cape Pierce Section.
[b] Based on weekly processor reports. Fish tickets were not coded by section.
[c] Preliminary.
(Source: 1, 6, and 10)

Appendix Table 20. Inshore total run of sockeye by district, in numbers of fish, Bristol Bay, 1978-98.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1978	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
1980	40,568,323	3,683,926	4,221,159	12,808,225	1,207,011	62,488,644
1981	14,625,597	5,056,086	3,443,765	10,343,730	1,005,617	34,474,795
1982	7,535,494	3,482,142	2,324,743	7,928,929	937,120	22,208,428
1983	26,113,868	7,547,538	4,350,815	7,068,236	827,818	45,908,275
1984	26,495,224	6,355,758	3,928,694	3,807,367	522,904	41,109,947
1985	17,358,107	8,632,465	7,475,269	2,992,685	399,848	36,858,374
1986	6,279,318	6,005,115	6,018,531	4,852,711	579,872	23,735,547
1987	12,267,898	6,630,222	2,815,546	5,150,681	658,808	27,523,155
1988	8,778,544	8,069,343	2,177,932	3,231,468	1,162,799	23,420,086
1989	23,486,200	10,513,560	4,859,526	4,977,686	214,012	44,050,984
1990	26,503,582	12,563,344	2,898,487	5,676,993	475,791	48,118,197
1991	18,554,091	9,584,091	5,427,743	7,473,333	869,934	41,909,192
1992	15,953,105	17,592,207	5,515,893	5,076,019	993,402	45,130,626
1993	14,816,695	23,117,858	5,590,354	7,533,348	782,408	51,840,663
1994	25,899,103	12,648,190	5,447,865	5,842,759	633,671	50,471,588
1995	31,645,154	15,692,671	5,830,554	6,700,131	845,594	60,714,104
1996	11,047,409	11,885,575	5,103,222	8,247,518	675,145	36,958,869
1997	3,336,822	8,621,393	2,059,331	4,529,052	313,942	18,860,540
20-Year Av	18,450,505	9,153,693	4,083,894	6,363,224	729,181	38,780,496
1978-87 Av	18,898,939	5,278,562	3,676,697	6,797,618	761,691	35,413,507
1988-97 Av	18,002,071	13,028,823	4,491,091	5,928,831	696,670	42,147,485
1998[a]	6,303,167	4,669,285	1,649,180	5,402,866	405,051	18,429,549

[a] Preliminary

(Sources: 1 and 6)

Appendix Table 21. Chinook salmon harvest, escapement and total runs in the Nushagak District, 1978-98.[a]

Year	Harvests by Fishery				Inriver	Spawning	
	Commercial	Sport	Subsistence	Total	Abundance[1]	Escapement[2]	Total Run
1978	118,548	442	6,600	125,590		130,000	255,590
1979	157,321	654	8,900	166,875		95,000	261,875
1980	64,958	757	11,800	77,515		141,000	218,515
1981	193,461	1,220	11,500	206,181		150,000	356,181
1982	195,287	1,803	12,100	209,190		147,000	356,190
1983	137,123	2,003	11,800	150,926		161,730	312,656
1984	61,378	2,320	9,800	73,498		80,940	154,438
1985	67,783	1,809	7,900	77,492		115,720	193,212
1986	65,783	5,314	12,600	83,697	43,434	35,200	118,897
1987	45,983	3,258	12,428	61,669	84,309	78,217	139,886
1988	16,648	2,817	10,187	29,652	56,905	50,803	80,455
1989	17,637	3,613	8,122	29,372	78,302	73,095	102,467
1990	14,812	3,083	12,407	30,302	63,955	57,549	87,851
1991	19,718	5,551	13,627	38,896	104,351	96,378	135,274
1992	47,563	4,755	13,588	65,906	82,848	76,334	142,240
1993	62,976	5,899	17,709	86,584	97,812	88,568	175,152
1994	119,480	10,626	15,490	145,596	95,954	83,328	228,924
1995	79,943	4,951	13,701	98,595	85,622	79,147	177,742
1996	72,011	2,144	15,941	90,096	52,127	44,864	134,960
1997	64,294	2,538	15,318	82,150		82,000	164,150
20-Yr Mean	81,135	3,278	12,076	96,489		93,344	189,833
5-Yr Mean	79,741	5,232	15,632	100,604	82,879	75,581	176,186
1998	108,486 [a]	5,000 [a]	12,258 [a]	125,744	117,495	100,237	225,981

[1] Inriver abundance estimated by sonar below the village of Portage Creek.

[2] Spawning escapement estimated from the following: 1977-81, 97 - comprehensive aerial surveys. 1982-85 - correlation between index counts and total escapement estimates when aerial surveys were complete. 1986-96,98 - Inriver abundance estimated by sonar minus inriver harvests. Estimates for 1977-85 are rounded to the nearest thousand fish.

[a] Preliminary.

(Sources: 1, 4 and 10)

Appendix Table 22. Chinook salmon harvest, escapement and total runs in the Togiak District, 1977-98.[a]

Year	Harvests by Fishery				Spawning Escapement[1]	Total Run
	Commercial	Sport	Subsistence	Total		
1977	35,218	62	400	35,680	20,000	55,680
1978	57,000	35	300	57,335	40,000	97,335
1979	30,022	78	200	30,300	20,000	50,300
1980	12,543	34	900	13,477	12,000	25,477
1981	23,911		400	24,311	27,000	51,311
1982	33,786	231	400	34,417	17,000	51,417
1983	38,497	535	700	39,732	22,000	61,732
1984	22,179	46	600	22,825	26,000	48,825
1985	37,106	925	600	38,631	14,000	52,631
1986	19,880	618	700	21,198	8,000	29,198
1987	17,217	338	700	18,255	11,000	29,255
1988	15,606		429	16,035	10,000	26,035
1989	11,366	234	551	12,151	10,540	22,691
1990	11,130	445	480	12,055	9,107	21,162
1991	6,039	284	470	6,793	12,667	19,460
1992	12,640	271	1,361	14,272	10,413	24,685
1993	10,851	225	784	11,860	16,035	27,895
1994	10,486	663	904	12,053	19,353	31,406
1995	11,981	581	448	13,010	16,438	29,448
1996	8,602	402	471	9,475	11,476	20,951
1997	6,114	1,163	667	7,944	11,495	18,609
20-Yr Mean	19,848	395	603	20,806	16,226	36,991
5-Yr Mean	9,607	607	655	10,868	14,959	25,662
1998	14,155 [a]	600 [a]	782 [a]	15,537 [a]	11,666	27,203

[1] Spawning escapement estimated from comprehensive aerial surveys. Estimates for 1976-88 are rounded to the nearest thousand fish.

[a] Preliminary.

(Sources: 1, 4 and 10)

Appendix Table 23. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, 1978-98.[a]

	Nushagak District			Togiak District		
Year	Catch	Escapement[1]	Total Run	Catch	Escapement[2]	Total Run
1978	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
1980	681,930	969,000	1,650,930	299,682	415,000	714,682
1981	795,143	177,000	972,143	229,886	331,000	560,886
1982	434,817	256,000	690,817	151,000	86,000	237,000
1983	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
1985	396,740	288,000	684,740	203,302	212,000	415,302
1986	488,375	168,275	656,650	270,057	330,000	600,057
1987	416,476	147,433	563,909	419,425	361,000	780,425
1988	371,196	186,418	557,614	470,132	412,000	882,132
1989	523,903	377,512	901,415	203,178	143,890	347,068
1990	378,223	329,793	708,016	102,861	67,460	170,321
1991	463,780	287,280	751,060	246,589	149,210	395,799
1992	398,691	302,678	615,712	176,123	120,000	296,123
1993	505,799	217,230	632,109	144,869	98,470	243,339
1994	328,267	378,928	707,195	232,559	229,470	462,029
1995	390,158	212,612	602,770	221,126	163,040	384,166
1996	331,414	225,331	556,745	206,226	117,240	323,466
1997	181,253	61,456	242,709	47,459	106,580	154,039
20-Year Ave.	487,668	278,497	757,337	238,937	220,018	458,955
1978-87 Ave.	588,068	299,071	887,139	272,761	279,300	552,061
1988-97 Ave.	387,268	257,924	627,535	205,112	160,736	365,848
1998[b]	238,555	299,443	537,998	67,595	102,455	170,050

[1] Escapements were estimated from the following:
1976-78 - aerial survey data;
1979-98 - adjusted sonar estimate from Portage Creek site.
Estimates for 1976-85 are rounded to the nearest thousand fish.

[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.
Estimates for 1976-88 rounded to the nearest thousand fish.

[a] Escapement estimates supersede those previously reported.

[b] Preliminary.

(Sources: 1, 4 and 10)

Appendix Table 24. Inshore commercial catch and escapement of pink salmon in the Nushagak District by river system, in numbers of fish, 1960-98. [a]

Year	Catch	Escapement							Total Run
		Wood[1]	Igushik[2]	Nuyakuk[3]	Nush/Mul[4]	Nushagak[5]	Snake[6]	Total	
1960	289,781			146,359				146,359	436,140
1962	880,424	25,000	12,000	493,914	6,100		6,000	543,014	1,423,438
1964	1,497,817	1,560	450	883,500	25,000		50	910,560	2,408,377
1966	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
1970	417,834			152,580				152,580	570,414
1972	67,953			58,536				58,536	126,489
1974	413,613	44,800	7,500	529,216	3,100		900	585,516	999,129
1976	739,590	21,986	5,070	794,478	41,800		100	863,434	1,603,024
1978	4,348,336	205,000	16,210	8,390,184	771,600		3,483	9,386,477	13,734,813
1980	2,202,545	31,150	3,500	2,626,746	123,000		800	2,785,196	4,987,741
1982	1,339,272	36,100	8,430	1,592,096	19,130		900	1,656,656	2,995,928
1984	3,127,153	81,400	6,190	2,760,312	73,050		5,500	2,926,452	6,053,605
1986	267,117					72,189		72,189	339,306
1988	243,890					494,610		494,610	738,500
1990	54,127					801,430		801,430	855,557
1992	190,102					[b]			
1994	7,337					191,772		191,772	199,109
1996	2,681					821,312		821,312	823,993
1998	6,808	942				132,402		133,344	140,152
Average[7]	1,006,930	49,771	7,419	1,694,728	132,848	418,953	2,217	1,375,420	2,687,111

[1] Aerial survey estimate 1962 and 1974-84; tower count 1964.
[2] Aerial survey estimate 1962-80; aerial survey estimates and tower count 1976 and 1982-84.
[3] Tower count 1960-84; aerial survey estimate 1958, and below counting tower 1962-64 and 1982-84.
[4] Aerial survey estimate.
[5] Sonar estimate from Portage Creek.
[6] Aerial survey estimate 1962-64, 1974-76 and 1980-84, and weir count 1978.
[7] Only years and systems with escapement data were included in averages.
[a] Includes even-years only.
[b] No escapement estimate. Sonar project terminated early due to budget constraints.
[c] Preliminary.

(Sources: 1, 4, 10, and 16)

Appendix Table 25. Coho salmon harvest, escapement and total runs in the Nushagak Drainage, 1978-98.

Year	Harvests by Fishery								Inriver Run[2]	Spawning Escapement[3]	Total Run
	Commercial	Subsistence[1]			Sport			Total			
		Lower	Upper	Total	Lower	Upper	Total				
1978	44,740			1,802		516	516	47,058			
1979	129,607			4,676		212	212	134,495			
1980	146,354	3259	840	4,099		551	551	151,004	96,759	95,368	246,372
1981	219,310	4795	3,135	7,930		389	389	227,629	144,992	141,468	369,097
1982	345,903	4919	3,125	8,044		503	503	354,450	297,779	294,151	648,601
1983	66,109	4002	878	4,880		1,498	1,498	72,487	39,261	36,885	109,372
1984	257,649	5885	1,564	7,449		473	473	265,571	142,841	140,804	406,375
1985	20,230	4360	1,646	6,006		130	130	26,366	84,034	82,258	108,624
1986	68,568	6533	2,617	9,150		1,576	1,576	79,294	49,676	45,483	124,777
1987	13,263	4149	1,209	5,358		1,007	1,007	19,628	23,484	21,268	40,896
1988	53,125	3515	1,112	4,627		557	557	58,309	131,840	130,171	188,480
1989	77,073	6971	1,159	8,130		2,392	2,392	87,595	84,658	81,107	168,702
1990	7,447	4856	766	5,622		438	438	13,507	141,704	140,500	154,007
1991	5,399	8915	1,275	10,190		874	874	16,463	39,733	37,584	54,047
1992	84,898	4962	1,534	6,496		752	752	92,146			
1993	14,244	4463	387	4,850		194	194	19,288	42,742	42,161	61,449
1994	6,814	4302	406	4,708		1,143	1,143	12,665	82,019	80,470	93,135
1995	4,181	3233	478	3,711		725	725	8,617	46,340	45,137	53,754
1996	11,401	3603	1,080	4,683		3,713	3,713	19,797	187,028	182,235	202,032
1997	3,123			3,433		531	531	7,087	57,096	56565	63,652
1978-1997 Avg	78,972	4,866	1,365	5,792		909	909	85,673	99,529	97,271	181,963
1993-1997 Avg	7,953	3,900	588	4,277		1,261	1,261	13,491	83,045	81,314	94,804
1998	22,127 [b]	201	254	455 [b]		1,500	1,500 [b]	24,082	104,948	103,194	127,276

[a] Minimum estimate.

[b] Preliminary.

[1] Subsistence harvest estimated by expanding fishing permit returns; excludes estimates for the communities of Manokotak and Wood River. Estimates for 1976-1986 were based on community where permit was issued; 1987 based on community where permit issued and Nushagak watershed fishing site; 1988- present on community of residence and Nushagak watershed fishing site.

[2] In river run estimated by sonar through August 25 for 1982-1996. 1980 and 1981 estimated by applying exploitation rates of .602 to commercial harvest. Sonar estimates expanded for some years when the project terminated prior to August 25.

[3] Spawning escapement estimated by sonar minus sport and subsistence harvests upriver of Portage Creek sonar site.

Appendix Table 26. Coho salmon harvest by fishery, escapement and total runs for the Togiak River, 1980-98.

Year	Harvests by Fishery				Spawning Escapement[2]	Total Run
	Commercial	Subsistence[1]	Sport	Total		
1980	111,829	1,200	258	113,287	65,130	178,417
1981	19,504	2,200	119	21,823	43,500	65,323
1982	108,000	1,300	524	109,824	69,900	179,724
1983	4,977	800	294	6,071		
1984	111,631	3,800	1,295	116,726	60,840	177,566
1985	35,765	1,500	342	37,607	33,210	70,817
1986	28,030	500	2,851	31,381	21,400	52,781
1987	1,284	1,600	409	3,293	16,000	19,293
1988	8,744	792	1,238	10,774	25,770	36,544
1989	35,814	976	1,976	38,766		
1990	2,296	1,111	367	3,774	21,390	25,164
1991	4,262	1,238	500	6,000	25,260	31,260
1992	3,918	1,231	251	5,400	80,100	85,500
1993	12,613	743	330	13,686		
1994	88,522	910	531	89,963		
1995	8,910	703	408	10,021		
1996	58,369	199	1,400	59,968	64,980	124,948
1997	2,976	260	746	3,982	20,625	24,901
1980-1997 Avg	35,969	1,170	769	37,908	42,162	80,070
1993-1997 Avg	34,278	563	683	35,524	42,803	78,327
1998	52,630 [a]	310 [a]	700 [a]	53,640	25,335	78,975

[a] Preliminary.

[1] Subsistence harvest estimated by expanding fishing permit returns; Estimates for 1976-1987 were based on community where permit was issued; 1988 - present on community of residence.

[2] Expanded estimates from aerial surveys.

(Sources: 1, 4, and 10)

Appendix Table 27. Average round weight (lbs.) of the commercial salmon catch by species, Bristol Bay, 1978-98.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho
1978	5.9	23.9	7.2	3.2	7.5
1979	5.9	21.3	6.8		7.8
1980	5.6	19.7	6.2	3.4	7.0
1981	6.2	19.0	6.7		6.4
1982	6.4	19.6	6.7	3.5	7.3
1983	5.7	20.9	6.6		6.6
1984	5.6	20.5	6.8	3.2	7.5
1985	5.8	17.9	6.8		8.0
1986	6.0	18.8	6.7	3.5	6.7
1987	6.0	20.5	6.5		7.0
1988	6.2	18.7	7.0	3.6	7.8
1989	5.6	19.1	6.3		7.4
1990	5.7	16.9	6.3	3.8	7.5
1991	5.7	15.9	6.4		7.3
1992	5.7	16.8	6.4	3.7	7.0
1993	6.0	17.4	6.5		6.8
1994	5.5	18.0	6.5	3.7	8.2
1995	5.5	19.8	6.3	3.6	6.7
1996	6.3	18.0	7.3	3.5	6.8
1997	6.0	16.4	7.3	3.4	6.3
20-Year Ave.	5.9	19.0	6.7	3.5	7.2
1978-87 Ave.	5.9	20.2	6.7	3.4	7.2
1988-97 Ave.	5.8	17.7	6.6	3.6	7.2
1998	5.7	17.7	6.4	3.3	8.4

[a] Prior to 1991 and after 1992, averages are weighted by the number of fish reported by each buyer on Bristol Bay Final Operations Report BB-CF/303. 1991 ,1992 ,1995 an 1996 data is extracted from the fish ticket system.

(Sources: 1, 3, and 8)

Appendix Table 28. Average price paid per pound for Bristol Bay salmon, 1978-1998.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho
1978	$0.68	$0.70	$0.38	$0.33	$0.62
1979	$1.03	$1.00	$0.41	$0.33	$1.05
1980	$0.57	$1.00	$0.34	$0.25	$0.57
1981	$0.76	$1.23	$0.41	$0.29	$0.73
1982	$0.70	$1.23	$0.35	$0.22	$0.71
1983	$0.61	$0.69	$0.30	$0.16	$0.40
1984	$0.69	$1.03	$0.30	$0.22	$0.71
1985	$0.85	$1.02	$0.31	$0.20	$0.71
1986	$1.42	$1.03	$0.31	$0.15	$0.68
1987	$1.35	$1.24	$0.26		$0.69
1988	$1.93	$1.05	$0.43	$0.34	$1.14
1989	$1.07	$0.80	$0.26	$0.17	$0.67
1990[b]	$1.04	$0.91	$0.26	$0.27	$0.74
1991	$0.70	$0.68	$0.22	$0.11	$0.58
1992	$1.04	$0.89	$0.24	$0.12	$0.58
1993	$0.62	$0.76	$0.21	$0.11	$0.52
1994	$0.70	$0.47	$0.22	$0.04	$0.45
1995	$0.75	$0.65	$0.20	$0.11	$0.43
1996	$0.75	$0.50	$0.10	$0.05	$0.30
1997	$0.85	$0.55	$0.10	$0.05	$0.46
20-Year Ave	$0.91	$0.87	$0.28	$0.19	$0.64
1978-87 Ave	$0.87	$1.02	$0.34	$0.24	$0.69
1988-97 Ave	$0.95	$0.73	$0.22	$0.14	$0.59
1998[c]	$1.10	$0.50	$0.10	$0.10	$0.50

[a] Data prior to 1978 is unavailable. Price information for those years is reported in Annual Management Reports separately for company and independent fishermen.

[b] Price paid in Nushagak District. Bristol Bay average unavailable.

[c] Based on 1997 Final Operations Reports.

(Sources: 1, 2, and 7)

Appendix Table 29. Estimated exvessel value of the commercial salmon catch by species, in thousands of dollars, Bristol Bay, 1978-98.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1978	$40,034	$3,206	$3,173	$5,424	$435	$52,272
1979	$128,992	$4,541	$2,480		$2,387	$138,400
1980	$76,118	$1,881	$2,738	$2,173	$1,392	$84,302
1981	$120,907	$5,557	$4,106		$1,461	$132,031
1982	$68,122	$6,088	$2,145	$1,111	$3,199	$80,665
1983	$129,900	$2,853	$3,216		$337	$136,306
1984	$94,681	$2,158	$4,040	$2,414	$3,072	$106,365
1985	$115,402	$2,188	$2,218		$923	$120,731
1986	$135,689	$1,819	$2,522	$207	$826	$141,063
1987	$130,847	$1,912	$2,594		$314	$135,667
1988	$168,586	$891	$4,418	$1,171	$1,792	$176,858
1989	$173,963	$609	$2,029		$1,186	$177,787
1990	$198,897	$520	$1,752	$508	$582	$202,259
1991	$103,750	$328	$1,807		$499	$106,384
1992	$190,368	$1,029	$1,359	$222	$767	$193,745
1993	$152,034	$1,131	$989		$257	$154,411
1994	$138,007	$1,190	$1,043	$15	$650	$140,905
1995	$183,262	$1,272	$1,240		$129	$185,903
1996	$139,208	$788	$615	$7	$254	$140,872
1997	$61,728	$689	$200		$150	$62,767
20 Year Ave	$127,525	$2,033	$2,234	$1,205 [b]	$1,031	$133,485
1978-87 Av	$104,069	$3,220	$2,923	$2,266 [b]	$1,435	$112,780
1988-97 Av	$150,980	$845	$1,545	$321 [b]	$627	$154,189
1998	$62,948	$1,116	$294	$8	$521	$64,887

[a] Value paid to fishermen. Derived from price per fish or pound times commercial catch.

[b] Includes even-years only.

(Sources: 1, 4, 7, and 8)

Appendix Table 30. South Unimak and Shumigan Island preseason sockeye allocation, actual sockeye harvest, and chum harvest in thousands of fish, Alaska Peninsula, 1978-98.[a]

	South Unimak			Shumigan Island			Total		
	Sockeye			Sockeye			Sockeye		
Year	Actual	Quota[1]	Chum	Actual	Quota[1]	Chum	Actual	Quota[1]	Chum
1978	419	428	105	68	94	18	487	522	123
79	683	900	64	179	200	41	862	1,100	105
80	2,731	2,513	457	572	555	71	3,303	3,068	528
81	1,474	1,442	521	351	318	54	1,825	1,760	575
82	1,670	1,850	934	451	408	160	2,121	2,258	1,094
1983	1,545	1,469	615	416	324	169	1,961	1,793	784
84	1,131	1,111	228	257	245	109	1,388	1,356	337
86	1,495	1,380	345	367	305	134	1,862	1,685	479
86	314	907	252	156	200	99	470	1,107	351
87	652	635	406	141	140	37	793	775	443
1988	474	1,263	465	282	279	62	756	1,542	527
89	1,348	1,199	408	397	264	48	1,745	1,463	456
90	1,091	1,087	455	256	240	64	1,347	1,327	519
91	1,216	1,573	669	333	347	102	1,549	1,920	771
92	2,047	1,959	324	410	432	102	2,457	2,391	426
1993	2,365	2,375	382	607	524	150	2,972	2,899	532
94	1,001	2,938	374	460	648	208	1,461	3,586	582
95	1,451	2,987	342	653	659	195	2,105	3,646	537
96	572	2,564	129	446	566	228	1,018	3,130	357
97	1,179	1,840	196	449	406	126	1,628	2,246	322
20-yr Ave	1,243	1,621	384	363	358	109	1,606	1,979	501
78-87 Av	1,211	1,264	393	296	279	89	1,507	1,542	482
88-97 Av	1,274	1,979	374	429	437	129	1,704	2,415	503
1998	958	1528	189	313	337	50	1271	1865	239

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

[1] The sockeye quota management system was initiated in 1974, and is based on 8.3 % of the Bristol Bay projected inshore harvest and traditional harvest patterns.

(Source: 9)

Appendix Table 31. Subsistence salmon harvest by district and species, Bristol Bay, 1978-98. [a] [b]

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			NAKNEK KVICHAK DISTRICT				
1978	392	93,000	1,200	1,000	1,400	300	96,900
79	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
1983	385	107,900	1,000	400	300	900	110,500
84	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
1988	391	88,145	1,057	588	917	813	91,520
89	411	87,103	970	693	277	1,927	90,970
90	466	92,326	985	861	1,032	726	95,930
91	518	97,101	1,152	1,105	191	1,056	100,605
92	571	94,304	1,444	2,721	1,601	1,152	101,222
1993	560	101,555	2,080	2,476	762	2,025	108,898
94	555	87,662	1,843	503	460	1,807	92,275
95	533	75,644	1,431	1,159	383	1,791	80,407
96	540	81,305	1,574	816	794	1,482	85,971
97	533	85,248	2,764	478	422	1,457	90,368
20 Year Average	489	89,886	1,348	910	1,251 [c]	1,150	94,067
1978-1987 Average	470	90,733	1,166	679	1,541 [c]	876	94,317
1988-1997 Average	508	89,039	1,530	1,140	961 [c]	1,424	93,817
1998	567	83,095	2,433	784	1,063	1,592	88,967
			EGEGIK DISTRICT				
1978	13	200		100		200	500
79	8	300				100	400
80	3	100					100
81 [d]	4						
82	19	2,400					2,400
1983	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
87	49	3,350	87	139	2	284	3,862
1988	52	1,405	97	87	54	333	1,976
89	50	1,636	50	33	1	414	2,134
90	61	1,105	53	85	39	331	1,613
91	70	4,549	82	141	32	430	5,234
92	80	3,322	124	270	51	729	4,496
1993	69	3,633	128	148	15	905	4,829
94	59	3,208	166	84	153	857	4,468
95	60	2,818	86	192	100	690	3,886
96	44	2,321	99	89	85	579	3,173
97	34	2,438	101	21	5	740	3,304
20 Year Average	39	1,875	89	105	67 [c]	463	2,438
1978-1987 Average	20	1,020	57	84	21 [c]	234	1,245
1988-1997 Average	58	2,644	99	115	76 [c]	601	3,511
1998	36	1,795	44	33	52	389	2,314

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			UGASHIK DISTRICT				
1978	8	500	100	100		900	1,600
79	8	200				100	300
80	10	200				200	400
81	12	600				200	800
82	11	400				300	700
1983	8	500				100	600
84	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
1988	23	1,400	84	55	35	330	1,904
89	22	1,309	32	35	2	214	1,592
90	37	1,578	51	143	120	280	2,172
91	38	1,403	121	168	42	614	2,348
92	37	2,348	106	79	8	397	2,938
1993	39	1,766	86	107	24	495	2,478
94	31	1,587	126	42	38	579	2,372
95	20	1,513	56	18	6	290	1,883
96	26	1,247	50	21	7	298	1,623
97	28	2,785	169	39	23	311	3,327
20 Year Average	21	1,102	85	65	38 e	328	1,553
1978-1987 Average	12	511	76	52	21 e	275	842
1988-1997 Average	30	1,694	88	71	42 e	381	2,264
1998	27	1,241	59	75	82	485	1,942
			NUSHAGAK DISTRICT				
1978	331	33,200	6,600	14,300	11,100	2,500	67,700
79	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
1983	389	38,400	11,800	9,200	500	5,200	65,100
84	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	86,400
87	474	40,900	12,200	6,000	200	6,200	65,500
1988	441	31,086	10,079	8,234	6,316	5,223	60,938
89	432	34,535	8,122	5,704	407	8,679	57,447
90	441	33,003	12,407	7,808	3,183	5,919	62,320
91	528	33,161	13,627	4,688	292	10,784	62,552
92	476	30,640	13,588	7,076	3,519	7,103	61,926
1993	500	27,114	17,709	3,257	240	5,038	53,358
94	523	26,501	15,490	5,055	2,042	5,338	54,426
95	484	22,793	13,701	2,786	188	3,905	43,373
96	481	22,935	15,941	4,704	1,573	5,217	50,370
97	538	25,080	15,318	2,056	218	3,433	46,106
20 Year Average	443	36,292	12,059	7,263	5,463 e	6,302	64,921
1978-1987 Average	402	43,900	10,520	9,390	7,600 e	6,540	74,560
1988-1997 Average	484	28,685	13,598	5,137	3,327 e	6,064	55,282
1998	562	25,217	12,258	2,487	1,076	5,316	46,355

	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
				TOGIAK DISTRICT			
1978	29	900	300	700	300	500	2,700
79	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
1983	38	1,900	700	900	200	800	4,500
84	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
1988	29	2,413	429	716	45	792	4,395
89	40	2,825	551	891	112	976	5,355
90	37	3,689	480	786	60	1,111	6,126
91	43	3,517	470	553	27	1,238	5,805
92	40	3,716	1,361	626	135	1,231	7,069
1993	38	2,139	784	571	8	743	4,245
94	25	1,777	904	398	77	910	4,066
95	22	1,318	448	425	0	703	2,894
96	19	662	471	285	59	199	1,676
97	31	1,440	667	380	0	260	2,747
20 Year Average	37	2,375	603	672	198 [c]	1,113	4,889
1978-1987 Average	41	2,400	550	780	320 [c]	1,410	5,340
1988-1997 Average	32	2,350	657	563	75 [c]	816	4,438
1998	42	2,211	782	412	76	310	3,791
				TOTAL BRISTOL BAY AREA			
1978	773	127,600	8,100	16,200	12,700	4,400	169,000
79	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
1983	834	149,400	13,500	10,500	900	7,100	181,400
84	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
1988	936	124,449	11,746	9,680	7,367	7,491	160,733
89	955	127,408	9,725	7,356	799	12,210	157,498
90	1,042	131,701	13,976	9,683	4,434	8,367	168,161
91	1,197	139,731	15,452	6,655	584	14,122	176,544
92	1,204	134,330	16,623	10,772	5,314	10,612	177,651
1993	1,206	136,207	20,787	6,559	1,049	9,206	173,808
94	1,193	120,735	18,529	6,082	2,770	9,491	157,607
95	1,119	104,086	15,722	4,580	677	7,378	132,443
96	1,110	108,470	18,136	5,915	2,518	7,775	142,813
97	1,166	116,991	19,159	2,974	668	6,201	145,992
20 Year Average	1,029	131,409	14,133	8,971	6,965 [c]	9,268	167,723
1978-1987 Average	945	138,407	12,281	10,916	9,450 [c]	9,251	176,122
1988-1997 Average	1,113	124,411	15,986	7,026	4,481 [c]	9,285	159,325
1998	1,234	113,560	15,576	3,792	2,349	8,093	143,368

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvests prior to 1985 are rounded to the nearest hundred fish.

[b] Permit and harvest estimates prior to 1989 are based on the community where the permit was issued; estimates from 1989 to the present are based on the area fished, as first recorded on the permit.

[c] Includes even years only. [d] No permits returned.

Source: Bristol Bay Subsistence Permit Data Base, ADF&G.

Appendix Table 32. Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1978-98. [a] [b]

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna-Newhalen	Nondalton	Port Alsworth	Other [1]	Total
1978	8,900	8,800	11,200	23,700	11,000	17,300	3,000		83,900
79	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
1983	4,800	3,300	10,400	20,100	23,800	29,400	4,700		96,500
84	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
1988	3,500	[c]	5,500	14,400	29,800	20,700	3,200	[d]	77,100
89	5,100	1,200	6,700	13,000	24,700	18,500	2,200	[d]	71,400
90	4,700	2,200	6,600	12,400	18,800	27,300	3,200	1,400	76,600
91	1,029	1,712	9,739	17,184	29,094	4,163	2,755	1,110	66,786
92	4,374	1,056	6,932	11,477	29,633	13,163	2,954	2,559	72,148
1993	4,699	1,397	6,226	18,810	19,067	17,890	3,254	2,780	74,123
94	1,467	1,201	8,747	15,771	15,553	15,246	3,074	3,284	64,343
95	3,756	497	5,359	14,412	20,134	4,188	2,892	3,441	54,679
96	1,120	2,309	5,219	14,011	14,787	11,856	3,263	2,307	54,872
97	1,062	2,067	5,501	8,722	19,513	17,194	2,348	3,101	59,508
20 Year Average	4,690	3,280	7,796	16,849	19,724	15,585	3,697	2,498	72,293
1978-87 Average	6,300	5,044	8,940	19,680	17,340	16,150	4,480		77,430
1988-97 Average	3,081	1,515	6,652	14,019	22,108	15,020	2,914	2,498	67,156
1998	2,454	1,659	3,511	10,418	16,165	13,136	2,678	3,635	53,656

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates from 1991 are rounded to the nearest hundred fish.

[b] Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Kvichak District.

[c] No permits issued.

[d] No permits issued. Only residents of the Naknek/Kvichak watershed could obtain subsistence permits.

[1] Subsistence harvests by non-watershed residents.

Source: Bristol Bay Subsistence Permit Data Base, ADF&G

Appendix Table 33. Subsistence salmon harvest by community, Nushagak District, Bristol Bay, 1978-98. [a,b]

Year	Dillingham [1]	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other [2]	Total
1978	27,700	3,200	2,700	12,900	14,200	7,000		67,700
79	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
1983	20,100	5,300	1,900	5,800	18,700	13,300		65,100
84	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
1988	29,600 [d]	5,500	2,400	6,100	11,700	5,700		61,000
89	31,800 [d]	5,800	2,000	4,700	9,700	3,800		57,800
90	28,860 [d]	6,600	2,300	4,900	9,900	8,000	700	61,260
91	34,399 [d]	5,873	3,043	4,532	8,326	5,438	2,163	63,774
92	31,702 [d]	4,317	2,184	5,971	11,325	3,708	2,635	61,842
1993	25,315 [d]	3,048	2,593	2,936	12,169	4,180	2,538	52,779
94	30,145 [d]	3,491	2,289	4,343	8,056	4,513	2,322	55,159
95	24,998 [d]	2,453	1,468	2,046	6,911	2,983	2,406	43,265
96	27,161 [d]	3,883	1,733	2,866	8,892	3,319	2,113	49,967
97	23,255 [d]	3,988	1,989	1,797	6,427	4,179	4,598	46,233
20 Year Average	28,547	4,888	2,530	6,060	14,035	7,891	2,434	64,924
1978-87 Average	28,370	5,280	2,860	8,100	18,730	11,200		74,540
1988-97 Average	28,724	4,495	2,200	4,019	9,341	4,582	2,434	55,308
1998	24,072 [d]	4,069	1,112	3,555	5,419	3,166	4,958	46,351

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 1991are rounded to the nearest hundred fish.

[b] Harvest estimates prior to 1990 are based on the community where the permit was issued; estimates from 1990 to the present are based on community of residence and include fish caught only in the Nushagak District.

[c] No permits issued. Only residents of the Nushagak watershed could obtain subsistence permits.

[d] Includes permits issued in Clarks Point and Ekuk.

[1] Includes the village of Portage Creek.

[2] Subsistence harvests by non-watershed residents.

Source: Bristol Bay Subsistence Permit Data Base, ADF&G

BRISTOL BAY

HERRING

FISHERY

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INTRODUCTION

This report summarizes the Togiak herring stock assessment program, provides an overview of the Togiak District herring fishery from 1978 to 1997 and summarizes the 1998 season.

The Bristol Bay area includes all waters south of a line, extending west from Cape Newenham, east of the International Date Line in the Bering Sea and north of a line extending west from Cape Menshikof. The Bristol Bay area is divided into three herring fishing districts: Bay District; including all waters east of the longitude of Cape Newenham, Togiak District; including all waters between the longitude of Cape Newenham and the longitude of Cape Constantine, and General District; including all waters west of the longitude of Cape Newenham. Togiak District spans approximately 192 km (Figure 1). Togiak village lies at the center of the district, 108 km west of Dillingham.

Pacific herring (*Clupea harengus pallasi*) have been documented throughout Bristol Bay, but the major concentration returns to the Togiak area each spring as the focus of herring sac roe and spawn-on-kelp fisheries. In Togiak District, herring are commercially harvested for sac roe using gillnets and purse seines while herring spawn on rockweed kelp *(Fucus spp.)* is harvested by hand.

The herring sac roe fishery began in Togiak District in 1967, followed by the first fishery for spawn on kelp in 1968. Effort and harvest levels remained low for the first 10 years of the fishery. Increased interest, favorable market conditions and additional incentives provided by the Fishery Conservation and Management Act of 1976 (the 200-mile limit) resulted in a rapid expansion of the Togiak herring fishery in 1977.

The Togiak herring fishery is the largest in Alaska. From 1978 to 1997, sac roe harvests averaged 19,000 tons, worth $8.4 million to fishers annually. Spawn-on-kelp harvests during this period averaged 362,000 lbs., worth about $271,000 to fishers. In 1998, poor market conditions led to low prices on the grounds; sac roe harvests brought only $4 million to fishers, representing the second lowest annual value since 1981, and the spawn-on-kelp fishery remained closed due to a lack of product and industry interest (Appendix Table 6).

Capelin (Mallotus villosus), like herring, return to coastal waters near Togiak to spawn each spring. Commercial harvests of capelin, documented as early as the 1960's, have been small and sporadic. The largest harvest was taken in 1984 and the most recent harvest occurred in 1995.

STOCK ASSESSMENT

Methods

Since 1978, the department has conducted aerial surveys throughout the herring spawning season to estimate abundance, timing and distribution of pacific herring in the Togiak District. Surveys are conducted regularly from approximately April 20 until May 25 each year. Once herring are observed, surveys are conducted daily, weather permitting, until biomass declines and spawning activity subsides.

Aerial survey techniques used in Togiak have remained largely unchanged since 1978 and are described in Lebida and Whitmore (1985). Herring school surface area is estimated through a handheld tube with a measured grid and a known focal length from a known altitude. Standard conversion factors of 1.52 tons (water depths of 16 ft or less), 2.58 tons (water depths between 16 and 26 ft) and 2.83 tons (water depths greater than 26 ft) per 538 ft^2 of surface area is applied to herring school surface areas to estimate the total biomass observed during each flight.

Volunteer test fisheries, originally implemented by the department to estimate roe quality, provide samples for age, size and sex composition analysis. Samples are also collected from commercial harvest for age composition and size analysis. After the season, results are used to revise biomass estimates.

Spawning Population

Status of the Togiak herring population is considered to be stable. Annual biomass estimates range from 69,000 tons observed in 1980 to 239,000 tons documented in 1979 (Appendix Table 5). Abundance was estimated to be high in the late 1970's, declined in mid 1980's and remained relatively low and stable through 1991. Biomass levels from 1992 to 1994 increased to levels between 150,000 and 200,000 tons and estimates since 1995 range from 121,000 to 149,000 tons.

From 1983 to 1997, herring were generally first observed in the district in early May, but were observed entering near shore areas as early as April 22 and as late as May 20. Biomass increased rapidly and peaked within 1 to 7 days of the first observation in all but 2 years. In recent years, biomass declined rapidly following the peak observation, but herring continued to enter and exit the district for several weeks. Except for 2 years, spawn was first observed any time within 3 days of the first herring observation. Similar to trends observed for biomass, spawning in all but 2 years accelerated rapidly, peaked from 1 to 4 days after the first occurrence of spawn then rapidly subsided. Small "spot" spawns have been observed as late as June 7.

Herring ages- 2 through 20 have been observed in the Togiak biomass but herring generally recruit into the fishery at age-5. Herring abundance is related to year class survival. Two major recruitment events have occurred since the State began monitoring the biomass in 1978. The 1977 and 1978 year classes recruited into the fishery in 1982 and 1983 and comprised a substantial component of the biomass until the early 1990's. More recently, the 1987 and 1988 year classes were detected in the fishery in 1992 and 1993, and appeared as age -10 and 11 herring during the 1998 season.

FISHERY OVERVIEW

Sac Roe Herring Fishery

Fishing and Industry Participation

Unlike most herring fisheries in Alaska, the Togiak sac roe fishery is not a limited entry fishery. Gillnets, purse seines and hand purse seines are legal gear. Since fishing effort is not limited, effort levels can vary substantially each year. Herring market conditions are one of the leading factors influencing effort, but other factors also affect fleet size. Salmon and other markets indirectly affect effort in the herring fishery because the majority of herring fishers in Togiak participate in the Bristol Bay salmon and other fisheries. Herring prices paid to fishers the prior year and run timing also influence effort.

Fishing effort in the sac roe fishery increased through the late 1980's (Appendix Table 1). Gillnet effort peaked in 1989 then declined to the lowest levels observed since 1978 in 1993. Since 1993, gillnet effort increased substantially; gillnet effort in 1996 (461 vessels) was the largest since the inception of the fishery. Purse seine effort increased steadily from 1978 through 1989, when 310 vessels were observed. Since 1990, the purse seine fleet has fluctuated between 120 and 300 vessels. Gillnet vessels comprised the majority of the sac roe effort from 1978 to 1990 and more recently in 1998.

The Alaska Board of Fisheries reduced gear to limit harvesting capacity and control problems with waste. Prior to 1989, gillnet length was restricted to 150 fathoms. Permit holders were restricted to the use of one legal limit of gear, but up to 300 fathoms could be operated from a fishing vessel. Under these allowances, lost and abandoned nets accounted for substantial waste during some years. In 1989, the Board reduced gillnet length limit to 100 fathoms per permit holder, restricted the operation from one vessel to 100 fathoms, and granted the department the authority to reduce length to 50 fathoms inseason. Gillnet depth remains unrestricted. In October 1989, the Board reduced purse seine length to 100

fathoms. In 1995, the Board restricted purse seine depth to 625 meshes, of which 600 could be no larger than one and one-half inches. These gear restrictions have helped reduce waste and harvest capacity for both gear types.

The department first restricted herring gillnet length to 50 fathoms in 1992 to maintain an orderly fishery, help ensure roe quality and minimize potential waste. From 1994 to 1997, gear length was restricted to 50 fathoms during all gillnet openings. These restrictions appeared to control waste and preserve orderliness in the fishery without reducing harvesting capacity. In the fall of 1997, the Board restricted the length of a single herring gillnet and/or aggregate length of herring gillnets operated by a permit holder to 50 fathoms. However, through emergency order, the department may allow use of 100 fathom gillnets.

Industry participation in the fishery peaked between 1979 and 1982, when 33 processors participated in the herring fishery. Since 1987, 15 to 22 companies purchase herring or spawn on kelp each year in Togiak. Processing capacity since 1990 ranged from 2,500 to 4,850 tons per day, or approximately 11% to 25% of annual sac roe harvests (Appendix table 1).

Harvest and Management Performance

The commercial sac roe and spawn-on-kelp harvests in the Togiak District have been regulated by emergency order since 1981. From 1981 to 1987, informal policies directed the department to ensure that minimum threshold biomass levels were observed before opening the herring fishery, and to manage the fishery so that exploitation did not exceed 20%. In 1988, the Board incorporated the threshold and exploitation rate policies into the Bering Sea Herring Fishery Management Plan (5 AAC 27.060) for Togiak and other Bering Sea fisheries. Herring biomass in Togiak has been estimated at levels well above threshold requirements since 1981.

Management of the Togiak fisheries has successfully limited overall exploitation to 20% of the estimated biomass or less. Annual exploitation rates slightly exceeded 20% in 1982, 1991, 1996 and 1998, but fell at or below the maximum of 20% for all other years since 1981 (Appendix Table 2). Annual exploitation ranged from 11% to 22% and averaged 17% for the same period. Although the sac roe, spawn-on-kelp and Dutch Harbor food and bait fisheries take Togiak herring, only the sac roe harvests were used in calculating exploitation rates from 1981 to 1983. Estimates of herring biomass equivalent to spawn-on-kelp harvests and harvests in the Dutch Harbor fishery were not included when calculating exploitation rates until 1984 and 1988.

Herring purse seine and gillnet sac roe harvests are managed for allocation guidelines set forth in the Bristol Bay Herring Management Plan (BBHMP) (5 AAC 27.865). This plan states that, before opening the sac roe fishery, 1,500 short tons must be set aside for the spawn-on-kelp fishery, and 7% of the remaining available harvest is allocated to the Dutch Harbor food and bait fishery. After the spawn-on-kelp and the Dutch Harbor harvests are subtracted, the remaining

harvestable surplus is allocated to the Togiak sac roe fishery: 25% to the gillnet fleet, and 75% to the purse seine fleet. The Board adopted these guidelines in 1988. To achieve gillnet and purse seine allocations, the department establishes guideline harvest levels (tons) each year to each respective gear. The department then regulates fishing time and area to achieve each guideline harvest level.

This method has generally been successful in achieving sac roe harvest allocations. From 1988 to 1997, annual gillnet harvests were distributed above and below guideline allocations, and averaged 7% less than allocations (Appendix Table 7). Annual harvests exceeded guideline harvest levels by as much as 19% and fell short by as much as 46%. For the same period, purse seine harvests exceeded guideline harvests in six of the 10 years. Differences between actual and guideline purse seine harvests ranged from -38% to 25%, and averaged 1%. From 1988 to 1997, 24% of all sac roe harvest was taken by gillnets and 76% by purse seines.

The Board of Fisheries and the industry have directed the department to give product quality and fishery value an equal priority with exploitation objectives. Management Guidelines for Commercial Herring Sac Roe Fisheries (5 AAC 27.059) state the department may manage sac roe fisheries to enhance product value by opening areas in which sampling has demonstrated high herring roe content and large herring size, and to minimize harvest of recruit size herring. The BBHMP also states that the primary objective in the sac roe fishery is to prosecute an orderly, manageable fishery while striving for the highest level of product quality and a minimum of waste. Given these regulations and comments from industry, the department considers maximizing quality and values a primary objective in the Togiak fishery.

The department has used volunteer test fishing as a means to maximize harvest roe quality since 1982. Test fishing procedures developed and became more intensive from 1982 to 1989. By 1990, the department had established standard test fishing areas and sample sizes, coordinated test fishing start times between areas, coordinated and assisted in transporting samples to roe technicians and established criteria required for opening an area. Since then, the department has opened to commercial fishing only areas that have documented high quality roe.

Development of test fishing procedures sped the availability of results, reduced time required between test fishing and opening an area to commercial fishing and helped ensure high mature roe percents in harvests. From 1981 to 1997, sac roe harvests averaged approximately 9.3% mature roe. Purse seine harvests for this period averaged 9.5% mature roe. Annual purse seine harvests did not vary by more than 1% above or below the average and show no distinct trend through time (Appendix Table 1). Gillnet harvest area was gradually reduced in the late 1980's and early 1990's due to lack of successful test fishing or poor quality results in some areas of the district. From 1994 to 1997, gillnet fishing was opened almost exclusively in the area between Right Hand Point and Kulukak Bay. This reduction in area heightens competition among the gillnet fleet, especially when fishing effort is high.

Unlike purse seine harvest quality, mature roe percent in gillnet harvests increased substantially in 1993. Mature roe content in gillnet harvests from 1993 to 1997 averaged over 3% higher than harvests from 1981 to 1992, and ranged from 10 to 12.5%. This difference may partially be attributed to management efforts, but is primarily due to an apparent shift to larger gillnet mesh sizes. Prior to 1993, gillnets with mesh sizes smaller than 3 inches (stretched) were common. Gillnets with 3-inch mesh and larger have since become standard gear. This shift to larger mesh appears to have increased the percentage of female herring caught by herring gillnets from 44% (1982-1992) to 57% (1993-1996).

In 1992, over 20,000 tons of herring were harvested by purse seines in one 20-minute period. This magnitude combined with a limited processing capacity resulted in holding times up to 7 days and large-scale deterioration of flesh and roe quality in the 1992 harvest. Increasing market demands for high quality product and poor harvest quality, compelled the department to recognize quality problems associated with holding times. Limiting individual harvests not to exceed processing capabilities became a management objective after 1992. The Board addressed this issue in 1995 by reducing the allowable depth of purse seine gear.

Since 1993, the department has limited the purse seine fishing time and area to reduce holding times to 3 days or less. To provide harvest opportunity, yet control purse seine harvest rates, requires intensive management by the department to account for rapid changes in biomass distribution and other factors that effect harvest capacity. Since 1995, the department initially limited the area considered for an opening using test fish results. Aerial surveys were then conducted over a limited area immediately prior to scheduled announcement times, to assess the harvesting capacity of the fleet. Management decisions for time and area were primarily based on aerial survey assessment. Fishing duration announcements occurred with minimal (1 hour or less) notice. As an example, the duration of the final 1995 purse seine opening was shortened from 1.5 to 1 hour with no notice, at the beginning of the fishing period.

The impact of the reduced purse seine depth and fishing areas on product quality is difficult to measure. However, these two factors enabled managing individual harvests for an amount that will not exceed 3 days of production. Industry comments suggest that the gear and area limitations strongly contributed to higher product quality and value. Limiting harvests during individual fishing periods resulted in a larger number of openings over a longer time period. Purse seine fishing time from 1988 to 1992 totaled less than 10 hours. Fishing time totaled 59 hours from 1993 to 1997. Area limitations also heightened competition within the purse seine fleet.

Spawn-on-Kelp Fishery

Similar to the sac roe fishery, the spawn-on-kelp harvest in the Togiak District has been regulated by emergency order since 1981. Since 1984, the spawn-on-kelp fishery was managed under the direction of the Togiak District Herring Spawn on Kelp Management Plan (5 AAC 27.834). The plan essentially provides for an allocation of 350,000 lbs. of product, equivalent to 1,500 tons of herring, to this fishery. The plan also directs the department to 1) rotate harvest

areas on a 2 to 3 year basis (Figure 2), 2) ensure product quality and 3) include the herring equivalent to the spawn-on-kelp harvest when calculating exploitation.

Fishing effort in the spawn-on-kelp fishery increased steadily since its inception, and peaked at 532 participants in 1991 (Appendix Table 4). The fishery became limited to interim use and permanent, permit holders in 1990. Following the 1991 season, the Board limited the role of non-permit holders in the spawn-on-kelp fishery, to the function of assisting with transporting kelp after the period closure. By 1993, most permits issued for this fishery became permanent.

From 1984 to 1997, the fishery was opened for all years except 1985 and 1997. Actual harvests exceeded the 350,000-lb. guideline harvest level by more than 10% in five years and fell short in three (Appendix Table 7). For the four other years in which a fishery occurred, actual harvests were within 10% of the guideline. The 2 to 3 year area rotation schedule was adhered to in all years except 1987. In 1987, area K 9 was opened after harvest in area K 10 fell short of the harvest guideline. The western half of area K 9 was opened in 1986.

To ensure product quality the department, industry representatives and fishers collect spawn-on-kelp samples to display at a public meeting each season, usually once herring spawning activity begins to subside. Management decisions are based on comments from industry and users regarding sample quality.

1998 SEASON SUMMARY

The 1998 herring run to the Togiak District was projected to reach 121,000 tons. Based on the maximum exploitation of 20% and allocation guidelines in the Bristol Bay Management Plan (5AAC 27.865), the projected harvest by fishery was: purse seine sac roe 15,840 tons, gillnet sac roe 5,280 tons, spawn on kelp 175 tons (350,000 lb.), and Dutch Harbor food and bait 1,590 tons. Guideline harvest levels have been revised in season, based on the peak biomass survey estimate during most recent years. However, poor survey conditions prevented a reasonable biomass estimate in 1998. Management of the herring fisheries was based on the preseason forecast.

The Bristol Bay Herring Management Plan directs the Department to conduct an orderly and manageable fishery while striving for the highest level of product quality with a minimum of waste. For the sixth consecutive year, the department intended to control area in the purse seine fishery to limit individual harvests to a size that could be processed with little loss in quality. To enhance product quality and value, the department intended to manage the 1998 sac roe fisheries to

limit the quantity held to an amount that would not exceed 3 days of production. Staff planned to use test fisheries to estimate mature roe quality within areas of the district, and to open fishing areas only with high quality roe.

Sac Roe Fishery

In early March, The National Weather Service reported areas of warm sea surface temperatures out in the Bering Sea. Theoretically, herring would arrive to the inshore waters of the Togiak District early. Even though herring initially appeared early in the Togiak District, herring migration to inshore waters for spawning progressed slowly. Warm offshore sea surface temperatures had been reported earlier than normal, but during the sac roe fishery inshore water temperatures remained low.

Aerial surveys of the Togiak District began April 16, but no herring were detected in any inshore areas of the District until April 25. An industry representative reported herring on the northeast face of Hagemeister Island and Togiak Reef. Department staff flew a survey April 26 and observed 4,000 tons of herring primarily in Togiak Bay, and 1.2 miles of spawn in Ungalikthluk Bay. Concurrently, 4 processors, 9 tenders and 2 gillnet vessels were present. Some processing vessels, tenders and purse seiners that had expected to participate in the Togiak fishery, remained in Cook Inlet, False Pass and Port Moller due to bad weather. Processor registration began April 27 and continued throughout the season. Fifteen companies registered to purchase sac roe with a processing capacity of approximately 2,500 tons per day-a 40% reduction from recent years (Table 5). Poor aerial survey conditions existed throughout most of the 1998 season; successive days of rain, high winds and snow reduced visibility. However, despite poor conditions, 32.8 linear miles of spawn were documented, 30% of which was observed on the last survey, May 11 (Table 1). A near complete survey flown May 6, under fair conditions, estimated 4,412 tons of herring biomass on the grounds. Fishable concentrations of herring were identified throughout the season, but aerial surveys were unable to accurately document abundance in 1998.

Over 9,000 herring were collected for age composition analysis. Dominant age classes were age 9 and older fish and the age 7-8 herring. Age 6 and younger fish were present throughout the season with their proportion increasing toward the end of the fishery. Samples from the commercial purse seine harvest averaged above 300 grams and corresponded to the weight of the age 7 and greater herring. As the younger herring entered the fishing district, the average weight of the commercial purse seine samples decreased.

Purse Seine

Test fishing was initiated on April 29 and resulted in roe samples ranging from 6.0 to 10.6% mature roe with an average of 8.9%-an acceptable quality roe. Fish weighed from 310 to 345 grams. Approximately 35 seine vessels were present on the grounds and water conditions were poor. However, several thousand tons of biomass was observed between

Anchor Point and Rocky Point. The weather forecast was for northwest winds to 25 knots and 12ft seas. The purse seine opening was announced for 6:00 p.m. and would last 15 minutes. This period resulted in a total of 59 tons from five deliveries and averaged 10.5% mature roe. Test fishing was scheduled to resume April 30.

Test fishing was delayed as the weather deteriorated on April 30, low-cloud ceilings and 25-knot winds from the north. On May 1 and 2, test fishing resumed, but test fishers were unsuccessful in locating large concentrations of herring. Survey conditions were poor and vessels with sonar reported an absence of inshore fish. However, spawn was reported in Ungalikthluk Bay and north of Hagemeister Spit. Test fishing on May 3 was successful and samples ranged from 6.6 to 9.5% mature roe. Samples taken between Asigyukpak (Oosik) spit and Togiak Reef indicated high quality. Consequently, purse seine fishing was allowed for 1 hour from 5:00 to 6:00 p.m. in this area. Other areas were excluded to assure that the processing capacity wasn't exceeded-300 tons from 23 deliveries was harvested. Mature roe from this opening averaged 9.4% despite industry reporting the presence of green fish.

Meager test fishing occurred on May 4. Weather conditions were very poor, northeast winds blew 35-40 knots. However, one purse seine test fisher reported a set with mature fish in the east Nunavachuk Bay. The blustery weather conditions persisted throughout the day, after which, the department announced that a purse seine opening might occur the following morning. Herring had been on the grounds for 9 days and had been observed spawning for 8 days.

It was evident that mature roe was still present in the district, but finding it by aerial spotting was difficult due to the high water turbidity. The management strategy was beginning to change from one of controlling the harvest in a specific area to one of letting the purse seine fleet spread out and "hunt" for quality roe. Open fishing areas predominantly occurred between: Cape Newenham and Right Hand Point; Cape Newenham to Anchor Point; and Ungalikthluk to Right Hand Point for most of the season.

A 2,800-ton harvest was taken during a 4 hour opening on May 5 beginning at 9:00 a.m. and averaged 9.1% mature roe. After the catch results and processor capacities had been evaluated another 30-minute seine opening was announced for 6:00 p.m. Another 1,400-ton catch was achieved, which averaged 9.6% mature roe.

Eight more purse seine openings continue through the 10th of May, during brief windows in the poor weather. A total of 12 purse seine openings occurred, for a total fishing time of 16 hours and 30 minutes (Table 2). Harvests ranged from 60 to 3,200 tons per opening, and mature roe ranged from 8.0 to 10.1% (Table 3). Purse seine sac roe harvest, including 400 tons estimated as waste and 265 tons from test fishing, totaled 16,824 tons and exceeded the guideline harvest allocation by 6% (Appendix table 7). Purse seine harvests averaged 9.6% (Appendix table 1) mature roe overall, similar to average quality experienced since 1981. Purse seine effort peaked on May 2, when 123 purse seine vessels were counted on an aerial survey; however, the number of deliveries per opening peaked at 104.

Each purse seine opening was managed to ensure processing capacity was not exceeded. The amount of herring harvested but not processed during the fishery was estimated to be equivalent to or less than 3-day processing for most companies. Individual companies may have exceeded the 3-day holding time due to tender distribution or other logistics. When an opening was being considered, the area under consideration was specified to the fleet several hours prior to opening time. Aerial surveys of the biomass and harvest potential were conducted despite the weather in order to set the duration of the openings. The fleet was notified of each opening's duration usually within 1 hour of the start of the period.

Gillnet

On the same day that purse seine test fishing began, gillnet test fishing also began (April 29) between Anchor Point and Rocky Point and from Right Hand Point to Kulukak Bay. Mature roe in commercial quantities was found and a 1-hour opening was announced for 6:00 p.m. between Middle Point and Rocky Point. Spawning had been observed in this area prior to opening. The results of this opening were 168 tons and the mature roe was 12%. Test fishing continued around Anchor Point and Rocky Point on April 30 and another opening was announced for 4 hours after test fishing resulted in predominantly large fish and mature roe was 10%. However, the herring schools were small and the catch was light, only 16 tons were harvested and the mature roe was 12.5%.

Strong winds from the southwest prevented test fishing for 2 days. A window in the weather occurred on May 3 and test fishing resumed from Anchor Point to Rocky Point and Right Hand Point to Kulukak Bay. Samples from the test fishery produced mature roe percentages over 16%, but offshore tests contained immature herring. A 4-hour opening was announced for both of these areas, including a cautionary note to fisherman about the offshore immature herring. During the opening, inshore herring thinned out and fishermen went offshore to fish, consequently this opening resulted in the lowest mature roe content of any period (10.5%). The next break in weather was on May 5 when test fishing continued followed by another opening for 4 hours between Right Hand Point and Kulukak Bay. After a 2-hour extension, 527 tons were harvested with mature roe content as 12.6%.

Spawn outs and immature fish were mixed with good quality fish during test fishing held on May 6. Throughout the day fish volumes were low, accordingly the department asked the gillnet fleet to stand down for the day. Samples from test fishing on the 7th contained some spawn outs, but also included some excellent quality roe. A 4-hour opening was announced for fishing to occur from Anchor Point to Rocky Point and from Right Hand Point to Kulukak Bay. Only 86

tons were harvested due to the low volumes of fish present and the overall mature roe content was 13.3%. At this point in the gillnet season, five periods of fishing had accumulated less than 1,000 tons (Table 3).

Considering the low harvests and low volumes of available biomass, management began to reassess strategy. In previous years it has been observed that herring biomass built up in the warm inshore areas to mature and spawn. Apparently, given the cold water temperatures of this season and the weather conditions, herring were entering in small schools, spawning and exiting the inshore waters within one or two tides. Thus, management determined to maximize gillnet fishing time even though no large biomass was detectable.

Weather prevented test fishing until the evening of the 8th, results indicated mature roe was available but still at low volumes. Staff announced a 4-hour period for the evening. Many fishermen, via radio, advised the department staff that no opening should occur until biomass had accumulated. Soon after the opening, tenders reported an increase in the harvest. Harvest for this opening yielded 710 tons with 12.6% mature roe. Based on this expanding harvest rate, another opening was announced for the morning of May 9. This opening was extended twice for a total fishing time of 15 hours. Nearly 3,000 tons were harvested and mature roe content was 12.5%. The guideline gillnet harvest that remained was approximately 550 tons. To complete the season, another opening occurred on May 10. Catch rates were assessed from aerial surveys and the period was extended twice for a total fishing time of 8 hours. This opening resulted in a 1,300-ton harvest with mature roe content at 12.7%.

The total season gillnet harvest reached 5,952 tons and had an average of 12.5% mature roe (Appendix table 1). Herring average gram size ranged between 395 and 421 grams per period and was above 400 grams in all but one opening. The guideline harvest (Appendix table 7) of 5,280 tons was exceeded by 670 tons (12.7%). Mature roe percentage from this season was the highest on record and is a continuation of high percentage yields since 1993 (Appendix table 1). Since that time fishermen have targeted larger fish and the department has opened areas to fishing based on high roe percentage test fish results to target mature fish. Gillnet effort in 1998, peaked at 152 vessels, a decrease from the 20-year average of 244 and the lowest effort since 1994 (Appendix table 1).

Between 1994 and 1997, gillnet fishing exclusively occurred between Right Hand Point and Kulukak Bay. This season, gillnet fishing was expanded to include fishing, when possible, between Anchor Point and Rocky Point.

Spawn on kelp

Two companies indicated an interest in purchasing spawn on kelp prior to the herring season. As stated previously, successive storms occurred during the 1998 commercial herring season. During these storms onshore winds brought suspended silt and debris into areas in which the herring were spawning. As a result, the spawn-on-kelp product was not

marketable. When the buyers where notified inseason about potential siltation on the kelp product, company representatives decided against taking the risk of purchasing spawn on kelp, especially in light of unstable market conditions. Staff announced May 7 that no spawn-on-kelp fishery would occur.

Exploitation

The Togiak herring fisheries were managed for a maximum exploitation of 20% based on the preseason biomass forecast. Combining the sac roe harvest (22,776 tons) and the Dutch Harbor food and bait fishery harvest (1,994 tons) resulted in a total harvest exploitation of 24,770 tons (Appendix table 2). The exploitation rate based on the preseason forecast (121,000 tons) was calculated at 20.5% for the 1998 season. There was an estimated waste of 400 tons associated with the fishery that is not included in this rate. Of the sac roe harvest, 26% was taken by gillnets and 74% by purse seines (Appendix table 1).

Exvessel value

The value of the 1998 Togiak sac roe herring fishery to fishermen was nearly $4 million (Appendix table 6). Exvessel value of gillnet harvest was $1.04 million and the purse seine harvest was $2.94 million. The 1998 exvessel value was approximately 60% less than the average value from 1993 to 1997 and the lowest since 1980. These estimates do not include any postseason adjustments to fishermen from processors and should therefore be treated as minimum estimates. The exvessel value only includes the sac roe fishery, since no spawn-on-kelp fishery took place. Base prices paid for sac roe herring in 1998 ranged from $100 to $250 per ton for 10% mature roe. This base price, weighted by company averaged $175 per ton for 10% mature roe and was relatively low comparatively to previous years.

LITERATURE CITED

Lebida, R.C. and D.C. Whitmore. 1985. Bering Sea Herring Aerial Survey Manual. Alaska Department of Fish and Game, CFMD, Bristol Bay Data Report 85-2, Anchorage.

Table 1. Daily observed estimates (tons) of herring by index area, Togiak District, 1998.

Date	Start Time	Survey Rating[a]	Miles of Spawn	Estimated Biomass by Index Area[b]													Daily Total
				NUS	KUK	MET	NVK	UGL	TOG	TNG	MTG	OSK	PYR	CN	HAG	WAL	
16-Apr	14:00	3															
21-Apr	17:15	2.8															
24-Apr	9:20	2.9															
26-Apr	10:25	2.7	0.5		175	307		285	1,827	581					460		3,633
28-Apr	1:10	3.8					13	103									116
29-Apr	12:30	3.8	6.5		63	20	190	1,184	20								1,476
2-May	18:30	4	6.3														
5-May	6:00	4	1														
6-May	9:00	3.6	3.5			202	296	702	2,470		278	113	36		315		4,412
7-May	8:30	3	2														
8-May	13:00	3	1.8														
9-May	14:00	3	0.8														
11-May	10:25	2.8	10.4					61									61
Total			32.8														

[a] 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Unsatisfactory

[b] Index areas: NUS - Nushagak Peninsula; KUK - Kulukak; MET - Metervik; NUK - Nunavachak; UGL - Ungalikthluk/Togiak; TOG - Togiak; TNG - Tongue Pt; MTG - Matogak; HAG Hagemeister; OSK - Osviak; PYT - Pyrite Point; CN - Cape Newenham

Table 2. Emergency order commercial fishing periods for herring sac roe and spawn-on-kelp, Togiak District, 1998.

Emergency Order Number	Area[1]	Date and Time				Duration
Herring Sac Roe Gillnet						
DLG-[4]	Anchor Point to Rocky Point	4/29	6:00 p.m.	to 4/29	7:00 p.m.	1 hrs.
DLG-[4]	Anchor Point to Rocky Point	4/30	2:00 p.m.	to 4/30	6:00 p.m.	4 hrs.
DLG-[4]	Anchor Pt. to Rocky Pt. & Right Hand Pt. to Kulukak Bay	5/03	3:00 p.m.	to 5/03	7:00 p.m.	4 hrs.
DLG-	Right Hand Point to Kulukak Bay	5/05	1:00 p.m.	to 5/05	5:00 p.m.	4 hrs.
DLG-[3]	Right Hand Point to Kulukak Bay	5/05	5:00 p.m.	to 5/05	7:00 p.m.	2 hrs.
DLG-	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/07	1:00 p.m.	to 5/07	5:00 p.m.	4 hrs.
DLG-[4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/08	8:30 p.m.	to 5/09	12:30 a.m.	4 hrs.
DLG-[2,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/09	9:00 a.m.	to 5/09	3:00 p.m.	6 hrs.
DLG-[2,3,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/09	3:00 p.m.	to 5/09	7:00 p.m.	4 hrs.
DLG-[2,3,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/09	7:00 p.m.	to 5/09	12:00 midnigh	5 hrs.
DLG-[2,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/10	10:00 a.m.	to 5/10	2:00 p.m.	4 hrs.
DLG-[2,3,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/10	2:00 p.m.	to 5/10	4:00 p.m.	2 hrs.
DLG-[2,3,4]	Anchor Pt. To Rocky Pt. & Right Hand Pt. To Kulukak Bay	5/10	4:00 p.m.	to 5/10	6:00 p.m.	2 hrs.
Herring Sac Roe Purse Seine						
DLG-[4]	Anchor Point To Rocky Point	4/29	6:00 p.m.	to 4/29	6:15 p.m.	15 min.
DLG-	Oosik Spit to Togiak Reef	5/03	5:00 p.m.	to 5/03	7:00 p.m.	1 hr.
DLG-	Cape Newenham to Right Hand Point	5/05	9:00 a.m.	to 5/05	1:00 p.m.	4 hrs.
DLG-	Cape Newenham to Right Hand Point	5/05	6:00 p.m.	to 5/05	6:30 p.m.	30 min.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/06	7:00 p.m.	to 5/06	6:15 p.m.	15 min.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/07	12:00 noon	to 5/07	2:00 p.m.	2 hrs.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/07	9:00 p.m.	to 5/07	9:30 p.m.	30 min.
DLG-	Cape Newenham to Right Hand Point	5/08	1:00 p.m.	to 5/08	3:00 p.m.	2 hrs.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/08	9:00 p.m.	to 5/08	10:30 p.m.	90 min.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/09	1:00 p.m.	to 5/09	3:00 p.m.	2 hrs.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/09	9:00 p.m.	to 5/09	10:30 p.m.	90 min.
DLG-	Cape Newenham to Anchor Pt. & Ungalithluk Bay to Right Hand Pt.	5/10	2:00 p.m.	to 5/10	3:00 p.m.	1 hr.
Herring Spawn on Kelp						
	No Kelp Fishery this year.					

[1] Area descriptions are approximate. Precise boundaries are described in Emergency Orders.

[2] Gillnet length increased to 100 fathoms.

[3] Fishing period extended.

[4] Fishing within one nautical mile of shore.

Table 3. Commercial herring harvest (tons) by fishing section and gear type, and fishing period Togiak District, Bristol Bay, 1998 (roe percentages for each opening and section are noted within parentheses).

Date	Time (hours)	Periods	Kulukak	Nunavachak	Togiak	Hagemeister	Pyrite Point	Cape Newenham	Total
					Purse Seine				
29-Apr	0.25	1			59 (8.7)				59 (8.7)
3-May	1.00	2				304 (8.0)			304 (8.0)
5-May	4.50	3,4		102 (10.7)	743 (9.6)	3,314 (9.2)			4,159 (9.3)
6-May	0.25	5		584 (10.3)	91 (8.8)	338 (9.7)			1,013 (9.9)
7-May	2.50	6,7		263 (10.0)	118 (9.2)	3,532 (10.0)			3,913 (10.0)
8-May	3.50	8,9		205 (10.4)	73 (10.3)	1,341 (9.6)	24 (10.9) [d]		1,643 (9.7)
9-May	3.50	10,11		1,155 (10.1)	254 (9.3)	2,486 (9.3) [a,b]			3,896 (9.6)
10-May	1.00	12		815 (9.8)		758 (9.3)			1,573 (9.5)
11-May	0.00					63 (10.7) [c]			63 (10.7)
12-May	0.00					202 (10.0) [c]			202 (10.0)
Subtotal	16.50			3,125 (10.1)	1,337 (9.5)	12,338 (9.5)	24 (10.9)		16,824 (9.6)
					Gillnet				
29-Apr	1.00	1			168 (12.0)				168 (12.0)
30-Apr	4.00	2			16 (12.5)				16 (12.5)
3-May	4.00	3	149 (10.6)		17 (9.9)				166 (10.5)
5-May	6.00	4	527 (12.6)						527 (12.6)
7-May	4.00	5	86 (13.3)		3 (12.5)				89 (13.3)
8-May	4.00	6	704 (12.6)		6 (12.5)				710 (12.6)
9-May	15.00	7	2,973 (12.5)						2,973 (12.5)
10-May	8.00	8	1,302 (12.7)						1,302 (12.7)
Subtotal	46.00		5,741 (12.5)		211 (11.9)				5,952 (12.5)
					Total				
29-Apr	1.25				227 (11.3)				227 (11.1)
30-Apr	4.00				16 (12.5)				16 (12.5)
3-May	5.00		149 (10.6)		17 (9.9)	304 (8.0)			470 (8.9)
5-May	10.50		527 (12.6)	102 (10.7)	743 (9.6)	3,314 (9.2)			4,686 (9.7)
6-May	0.25			584 (10.3)	91 (8.8)	338 (9.7)			1,013 (9.9)
7-May	6.50		86 (13.3)	263 (10.0)	121 (9.3)	3,532 (10.0)			4,002 (10.0)
8-May	7.50		704 (12.6)	205 (10.4)	79 (10.5)	1,341 (9.6)	24 (10.9) [d]		2,353 (10.6)
9-May	18.50		2,973 (12.5)	1,155 (10.1)	254 (9.3)	2,486 (9.3) [a,b]			6,868 (10.9)
10-May	9.00		1,302 (12.7)	815 (9.8)		758 (9.3)			2,876 (11.0)
11-May	0.00					63 (10.7) [c]			63 (10.7)
12-May	0.00					202 (10.0) [c]			202 (10.0)
Total	62.50		5,741 (12.5)	3,125 (10.1)	1,548 (9.8)	12,338 (9.5)	24 (10.9)		22,776 (10.4)

[a] Includes 400 tons deadloss.

[b] Includes test fish harvest of 35 tons

[c] Test Fish Harvest.

[d] Combined harvest for 5/08and 5/09 to protect confidentiality.

Table 4. Preliminary herring total run and commercial catch by year class, Togiak District, 1998.[a]

Year Class	Age	Total Run[b] (tons)		Harvest (tons)	%	Escapement (tons)	%
1980	18			58	0.3%		
1981	17			117	0.5%		
1982	16			226	1.0%		
1983	15			503	2.2%		
1984	14			836	3.7%		
1985	13			1,042	4.6%		
1986	12			2,899	12.7%		
1987	11			4,724	20.7%		
1988	10			3,521	15.5%		
1989	9			2,581	11.3%		
1990	8			2,414	10.6%		
1991	7			2,295	10.1%		
1992	6			833	3.7%		
1993	5			722	3.2%		
1994	4			5	0.0%		
1995	3				0.0%		
1996	2				0.0%		
Total		0	0%	22,776	100%	0	0%

[a] Does not include harvest in the Dutch Harbor food and bait fishery.

[b] Biomass estimate not available due to poor weather conditions which also prevents calculation of escapement.

Table 5. Commercial herring sac roe and spawn-on-kelp buyers in Togiak District, 1998.

			Product Purchased		
			Sac Roe		
	Operator/Buyer	Base of Operation	Purse Gillnet	Purse Seine	Spawn-on-Kelp[b]
1	Capilano	F/V Pacific Sun	X	X	
2	Dragnet Fisheries, Inc.	F/V Jackie M	X	X	
3	Icicle Seafood, Inc.	P/B Berring Star	X	X	
4	Inlet Salmon	F/V Andronica	X		
5	Nelbro Packing	Naknek Plant	X	X	
6	New West Fisheries, Inc.	P/V New West	X	X	
7	Norquest Seafoods, Inc.	M/V Pribilof	X	X	
8	Ocean Beauty Seafoods	P/V Ocean Pride	X	X	
9	Peter Pan Seafoods, Inc.	P/V Blue Wave	X	X	
10	Snopac Products, Inc.	P/V Snowpac	X	X	
11	Trident Seafoods	P/B Neptune	X	X	
12	Unisea, Inc.	P/V Omnisea	X	X	
13	Wards Cove Packing	F/V Bulldog	X		
14	Woodbine	M/V Woodbine	X	X	
15	Y.A.K. Inc.	P/B Yard Arm Knot	X	X	

[a] Operators that registered in the Togiak Herring District.

[b] Companies registered for Spawn-on-kelp, no fishery occured.

Appendix Table 1. Sac roe herring industry participation, fishing effort and harvest, Togiak District, 1978-1998.

Year	Companies	Daily Processing Capacity[a]	Fishery Dates	Gillnet					Purse Seine					Total Harvest
				Effort[b]	Duration	Harvest[c]	C.P.U.E.	Roe%[d]	Effort[b]	Duration	Harvest[c]	C.P.U.E.	Roe%[d]	
1978	16		5/11-6/1	40	528.0	683	0.0	8.2	25	528.0	7,069	0.5	8.2	7,752
1979	33		5/1-6/1	350	768.0	4,459	0.0	8.6	175	696.0	6,667	0.1	8.6	11,126
1980	27		4/25-5/16	363	384.0	4,150	0.0	8.0-11.0	140	384.0	20,366	0.4	8.0-11.0	24,516
1981[e]	28		5/2-5/16	106	101.0	2,338	0.2	6.7	83	101.0	10,151	1.2	10.1	12,489
1982	33		5/14-5/24	200	60.0	7,105	0.6	7.4	135	36.0	14,716	3.0	9.5	21,821
1983	23		5/3-5/11	250	42.0	5,344	0.5	6.9	150	14.0	21,442	10.2	9.3	26,786
1984	25		5/18-5/21	300	35.0	4,934	0.5	8.4	196	11.0	14,485	6.7	10.2	19,419
1985	23		5/23-5/25	302	11.0	4,482	1.3	7.4	155	3.0	21,330	45.9	10.0	25,812
1986	23		5/14-5/15	209	10.0	3,448	1.6	8.8	209	1.0	12,828	61.4	9.9	16,276
1987	18		4/27-5/6	148	36.0	2,685	0.5	8.6	111	5.5	12,845	21.0	8.9	15,530
1988	22		5/17	300	4.0	3,695	3.1	8.3	239	0.5	10,472	87.6	10.9	14,167
1989	19		5/9-5/14	320	5.0	2,844	1.8	7.8	310	3.0	9,415	10.1	8.5	12,259
1990	16	3,100	5/8-5/20	277	66.0	3,072	0.2	9.0	221	3.0	9,158	13.8	9.7	12,230
1991	16	3,350	5/10-5/17	170	14.0	3,182	1.3	8.5	200	3.0	11,788	19.6	10.0	14,970
1992	18	3,700	5/20-5/27	274	25.5	5,030	0.7	8.8	301	0.3	20,778	230.1	9.2	25,808
1993	12	2,500	4/27-5/9	75	144.5	3,564	0.3	10.1	140	33.8	14,392	3.0	9.6	17,956
1994	16	3,300	5/11-5/20	146	76.0	7,462	0.7	12.0	240	4.6	22,853	20.7	9.4	30,315
1995	22	4,350	5/7-5/15	250	33.5	6,995	0.8	12.0	254	12.2	19,737	6.4	10.1	26,732
1996	19	4,850	5/3-5/8	461	18.0	6,863	0.8	11.1	268	2.4	18,008	27.8	9.0	24,871
1997	18	4,200	5/2-5/6	336	24.0	5,164	0.6	11.8	231	6.4	18,649	12.6	9.4	23,813
1978-97 Average	21	3,669		244	119.3	4,375	0.8	9.0	189	92.4	14,857	29.1	9.5	19,232
1993-97 Average	17	3,840		254	59.2	6,010	0.7	11.4	227	11.9	18,728	14.1	9.5	24,737
1998	15	2,475	4/29-5/10	152	46.0	5,952	0.9	12.5	123	16.5	16,824	8.3	9.6	22,776

[a] Number of tons per day based on companies registered.
[b] Peak aerial survey count.
[c] Sources: 1988-98: Fish ticket data
1980-87: Sandone and Brannian, 1988.
1978-79: ADF&G, 1981 and 1982.
[d] Source: 1989-98: Fish ticket data
1978-88: ADF&G, 1997.
[e] Fishery managed by emergency order from 1981 to present.

Appendix Table 2. Exploitation (tons) of Togiak herring, 1978-1998.

Year	Biomass Estimate	S-O-K Herring Equivalent	Dutch Harbor Food/Bait	Sac Roe			Total Harvest	Exploitation Rate
				Gillnet	Purse Seine	Total		
1978	190,292			683	7,069	7,752	7,752	4.1%
1979	239,022			4,459	6,667	11,126	11,126	4.7%
1980	68,686			4,150	20,366	24,516	24,516	35.7%
1981	158,650			2,338	10,151	12,489	12,489	7.9%
1982	97,902			7,105	14,716	21,821	21,821	22.3%
1983	141,782			5,344	21,442	26,786	26,786	18.9%
1984	114,880	1,552		4,934	14,485	19,419	20,971	18.3%
1985	131,400	0		4,482	21,330	25,812	25,812	19.6%
1986	94,700	1,446		3,448	12,828	16,276	17,722	18.7%
1987	88,400	1,309		2,685	12,845	15,530	16,839	19.0%
1988	134,717	1,782	2,004	3,695	10,472	14,167	17,953	13.3%
1989	98,965	2,499	3,081	2,844	9,415	12,259	17,839	18.0%
1990	88,105	1,617	820	3,072	9,158	12,230	14,667	16.6%
1991	83,329	1,310	1,325	3,182	11,788	14,970	17,605	21.1%
1992	156,955	1,482	1,949	5,030	20,778	25,808	29,239	18.6%
1993	193,847	1,481	2,790	3,564	14,392	17,956	22,227	11.5%
1994	185,454	1,134	3,349	7,462	22,853	30,315	34,798	18.8%
1995	149,093	996	1,748	6,995	19,737	26,732	29,476	19.8%
1996	135,585	1,899	2,239	6,863	18,008	24,871	29,009	21.4%
1997	144,887	0	1,950	5,164	18,649	23,813	25,763	17.8%
1978-98 Average	134,833	1,322	2,126	4,375	14,857	19,232	21,221	17.3%
1993-98 Average	161,773	1,102	2,415	6,010	18,728	24,737	28,255	17.8%
1998	121,000	0	1,994	5,952	16,824	22,776	24,770	20.5%

Appendix Table 3. Age composition of the inshore herring, Togiak District, 1979-1998.

Year	Age Composition (%)[1] 3 [a]	4	5	6	7	8	9	Total [2] Run (tons)
1979	1	4	48	31	13	1	2	239,022
1980	8	5	1	37	35	12	2	68,686
1981	1	50	7	1	22	14	5	158,650
1982		16	51	3	1	17	12	97,902
1983		5	37	45	2	2	9	141,782
1984		2	2	28	42	4	24	114,880
1985		1	1	8	35	42	13	131,400
1986			1	2	15	44	38	94,770
1987				8	10	28	54	88,400
1988		2	5	1	13	5	74	134,717
1989			5	11	4	15	65	98,965
1990				6	11	3	80	88,105 [b]
1991		7	1	1	16	18	57	83,329
1992		10	20	1	1	15	53	156,955 [c]
1993			6	23	1	1	67	193,847 [d]
1994			2	12	28	3	55	185,454 [d]
1995		1	4	7	24	30	35	[3]
1996		[d]	3	5	7	21	64	[3]
1997		7	5	12	11	10	55	144,887 [c]
1998		[d]	4	5	10	11	70	[3]

[1] Age composition in 1979-92 is weighted by aerial survey data and weight at age.

[2] Includes commercial catch, escapement, and documented waste.

[a] Includes age 1, 2 and 3 herring.

[b] Contributions of age groups 3, 4 and 5 are less than 5% each.

[c] Contribution of age 3 herring is less than 0.5%.

[d] Contribution of age 4 herring is less than 0.5%.

[3] Age contribution of the commercial purse seine harvest was used to represent the total run for the 1995 season. Aerial surveys to determine abundance were hampered by poor weather conditions, preventing calculation of a final season biomass estimate.

Appendix Table 4. Herring spawn-on-kelp industry participation, fishing effort, area and harvest, Togiak District, 1978-1998.

Year	Company	Fishery Dates	Hours	Effort[a]	Area	Total Harvest	Herring Equivalent	openings	mean roe%
1978	11	5/13-6/3		160	Togiak District	329,858			8.2
1979	16	5/4-5/23		100	Togiak District	414,727			0.1
1980[b]	21	5/2-5/13		78	K 3 - K10	189,662			9.2
1981	7	5/5-5/13		108	K 3 - K 9	378,207			9.1
1982	8	5/21-5/23	39.0	214	K 3 - K 9	234,924		2	8.8
1983	4	5/5-5/7	52.0	125	K 3 - K 9	270,866		3	8.9
1984[c]	6	5/21-5/24	16.0	330	K 4, K 9	406,586	1,552	3	9.8
1985		no fishery							9.6
1986	6	5/18-5/21	21.0	204	K 7, K 8, K 9	374,142	1,446	4	9.7
1987	5	4/29-5/4	26.0	187	K 9, K 10	307,307	1,309	5	8.8
1988	10	5/20	6.0	259	K 4, K 8	489,320	1,782	1	10.3
1989	11	5/14	4.0	487	K 9	559,780	2,499	1	8.3
1990	7	5/11	3.0	481	K 8	413,844	1,617	1	9.5
1991	7	5/13	2.5	532	K 4	348,357	1,310	1	9.7
1992	5	5/23	3.3	386	K 9	363,600	1,482	2	9.1
1993	2	5/1-5/2	7.0	173	K 8	383,000	1,481	2	9.7
1994	3	5/13-5/14	7.5	204	K 5	308,400	1,134	2	10.0
1995	5	5/11-5/14	14.5	188	K 2, K 3	281,600	996	3	10.6
1996	3	5/9-5/10	12.0	200	K 8, K 9	455,800	1,899	2	9.6
1997		no fishery							
1978-97 Averag	4		8.9	230		358,480	1,398		
1993-97 Averag	3		10.3	191		357,200	1,378		
1998		no fishery							

[a] 1978 - 1989 and 1992 - 1997, number of permits fished based on fish tickets. 1990 and 1991, peak aerial survey count.

[b] Management plan adopted by Board of Fisheries in December, 1979 designating 10 kelp areas, and requiring emergency order closure when 10% of the standing biomass of kelp was harvested.

[c] Management plan adopted by Board of Fisheries setting 350,000 lb. harvest guideline, specifying 2 to 3 year rotation, and including spawn-on-kelp herring equivalent in exploitation rate.

Appendix Table 5. Aerial survey estimates of herring biomass and spawn deposition, Togiak District, 1979-1998.

Year	Preseason Forecast[a]	Biomass Estimate	Spawn Estimates	
			Observations	Miles
1979		239,022	52	22
1980		68,686	64	24
1981		158,650	106	40
1982		97,902	103	39
1983		141,782	189	60
1984	106,422	114,880	171	61
1985	81,899	131,400	141	43
1986	86,310	94,700	182	67
1987	61,100	88,400	160	76
1988	54,500	134,717	107	61
1989	80,100	98,965	69	53
1990	56,000	88,105	94	66
1991	55,000	83,329	90	70
1992	60,214	156,955	160	97
1993	148,786	193,847	76	53
1994	142,497	185,454	80	72
1995	149,093	[b]149,093	70	59
1996	135,585	[b]135,585	99	73
1997	125,000	144,887	79	59
1979-97 Average	95,893	130,687	110	58
1993-97 Average	140,192	174,729	81	63
1998	121,000	[b]121,000	42	33

[a] 1993-1998 forecasts based on Age Structured Analysis. Previous years based on age composition, abundance, average growth and mortality rates. Forecasts for Togiak herring not provided prior to 1984.

[b] Biomass estimate precluded by weather conditions. Inseason management used preseason forecast.

Appendix Table 6. Exvessel value of the commercial herring and spawn-on-kelp harvest, in thousands of dollars, Togiak District, 1980-1998.[a]

Year	Herring		Spawn-on-Kelp	Total
	Sac Roe	Food/Bait		
1980	3,055	150	95	3,300
1981	3,988	1	250	4,239
1982	6,070	105	176	6,351
1983	10,450	67	284	10,801
1984	7,178	33	203	7,414
1985	13,696	41	[b]	13,737
1986	8,648	12	187	8,847
1987	8,614	49	166	8,829
1988	14,103	3	346	14,452
1989	4,983	19	448	5,450
1990	6,494	9	360	6,863
1991	6,173	21	383	6,577
1992	8,818	26	254	9,098
1993	5,218	3	268	5,489
1994	9,090	0	212	9,302
1995	16,713	0	362	17,075
1996	14,395	5	510	14,910
1997	4,306	0	[b]	4,306
1980-97 Average	8,444	30	282	8,724
1993-97 Average	9,944	2	338	10,216
1998	3,986	0[c]	[b]	3,986

[a] Exvessel value (value paid to the fisherman) is derived by multiplying price/ton by the commercial harvest. These estimates do not include any postseason adjustments to fishermen from processors and should therefore be treated as minimum estimates.

[b] Fishery not conducted.

[c] 400 ton dead loss reported, no commercial value.

Appendix Table 7. Guideline and actual harvests of sac roe herring (tons) and spawn-on-kelp (lbs), Togiak District, 1984-1998.

Year	Gillnet Sac Roe			Purse Seine Sac Roe			Spawn-on-Kelp		
	Guideline[a]	Actual	Difference[b]	Guideline[a]	Actual	Difference[b]	Guideline[a]	Actual	Difference[b]
1984							350,000	406,586	16%
1985							350,000	0	
1986							350,000	374,142	7%
1987							350,000	307,307	-12%
1988	5,647	3,695	-35%	16,943	10,472	-38%	350,000	489,320	40%
1989	3,376	2,844	-16%	10,128	9,415	-7%	350,000	559,780	60%
1990	2,993	3,072	3%	8,980	9,158	2%	350,000	413,844	18%
1991	3,143	3,182	1%	9,429	11,788	25%	350,000	348,357	0%
1992	5,662	5,030	-11%	16,985	20,778	22%	350,000	363,600	4%
1993	6,570	3,564	-46%	19,709	14,392	-27%	350,000	383,000	9%
1994	6,277	7,462	19%	18,832	22,853	21%	350,000	308,400	-12%
1995	6,582	6,995	6%	19,747	19,737	0%	350,000	281,600	-20%
1996	5,956	6,863	15%	17,868	18,008	1%	350,000	455,800	30%
1997	5,464	5,164	-5%	16,391	18,649	14%	350,000	0[c]	
Average	5,167	4,787	-7%	15,501	15,525	1%		390,978	12%
1998	5,280	5,952	13%	15,840	16,824	6%	350,000	0[c]	NA

[a] Harvest guideline derived from inseason biomass estimate when available, or preseason forecast when weather precluded an inseason estimate.

[b] Actual minus guideline divided by guideline.

[c] No fishery conducted

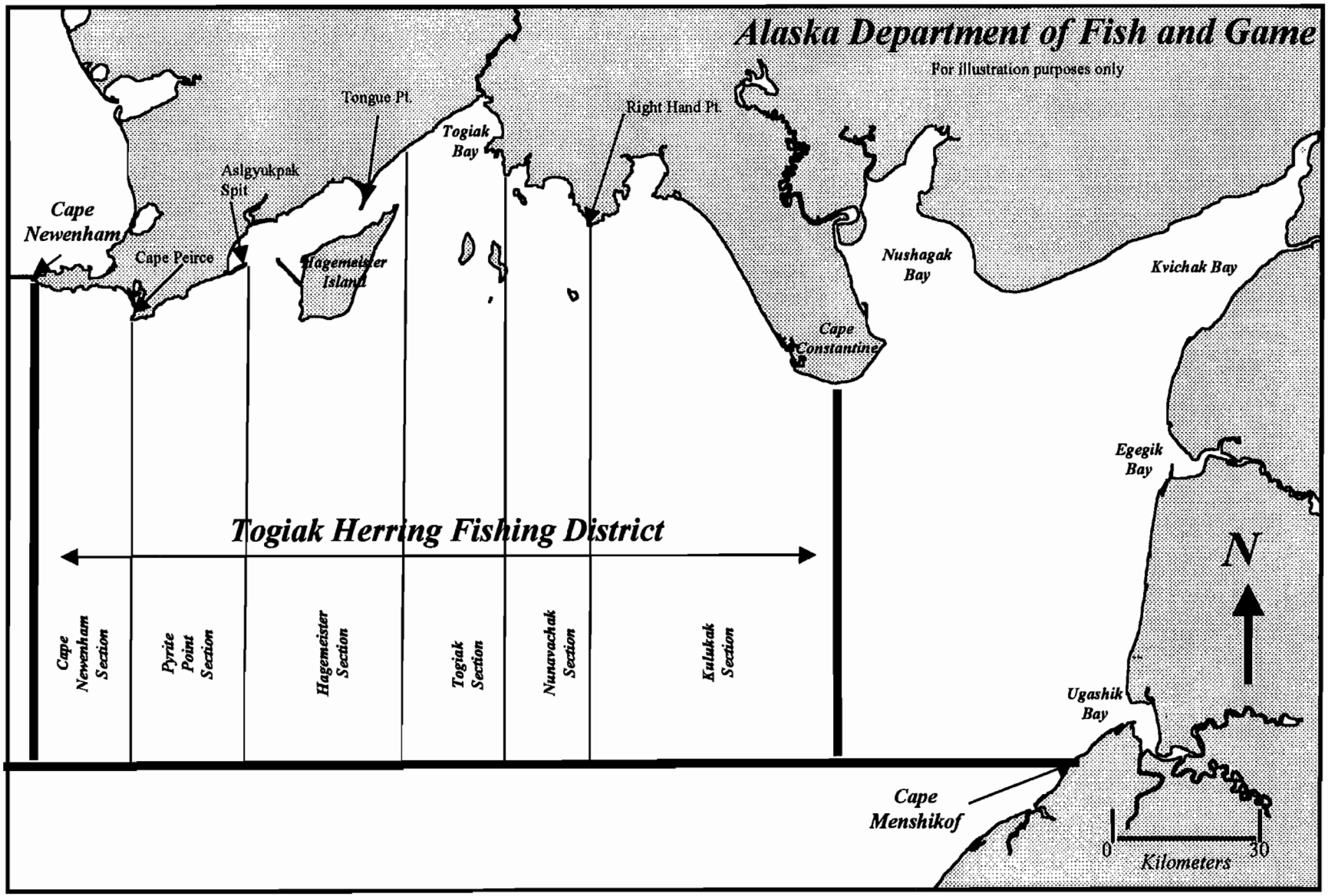
Alaska Department of Fish and Game
For illustration purposes only
Tongue Pt.
Right Hand Pt.
Togiak Bay
Aslgyukpak Spit
Cape Newenham
Cape Peirce
Hagemeister Island
Nushagak Bay
Kvichak Bay
Cape Constantine
Egegik Bay
Togiak Herring Fishing District
Cape Newenham Section
Pyrite Point Section
Hagemeister Section
Togiak Section
Nunavachak Section
Kulukak Section
N
Ugashik Bay
Cape Menshikof
0
30
Kilometers

Figure 1

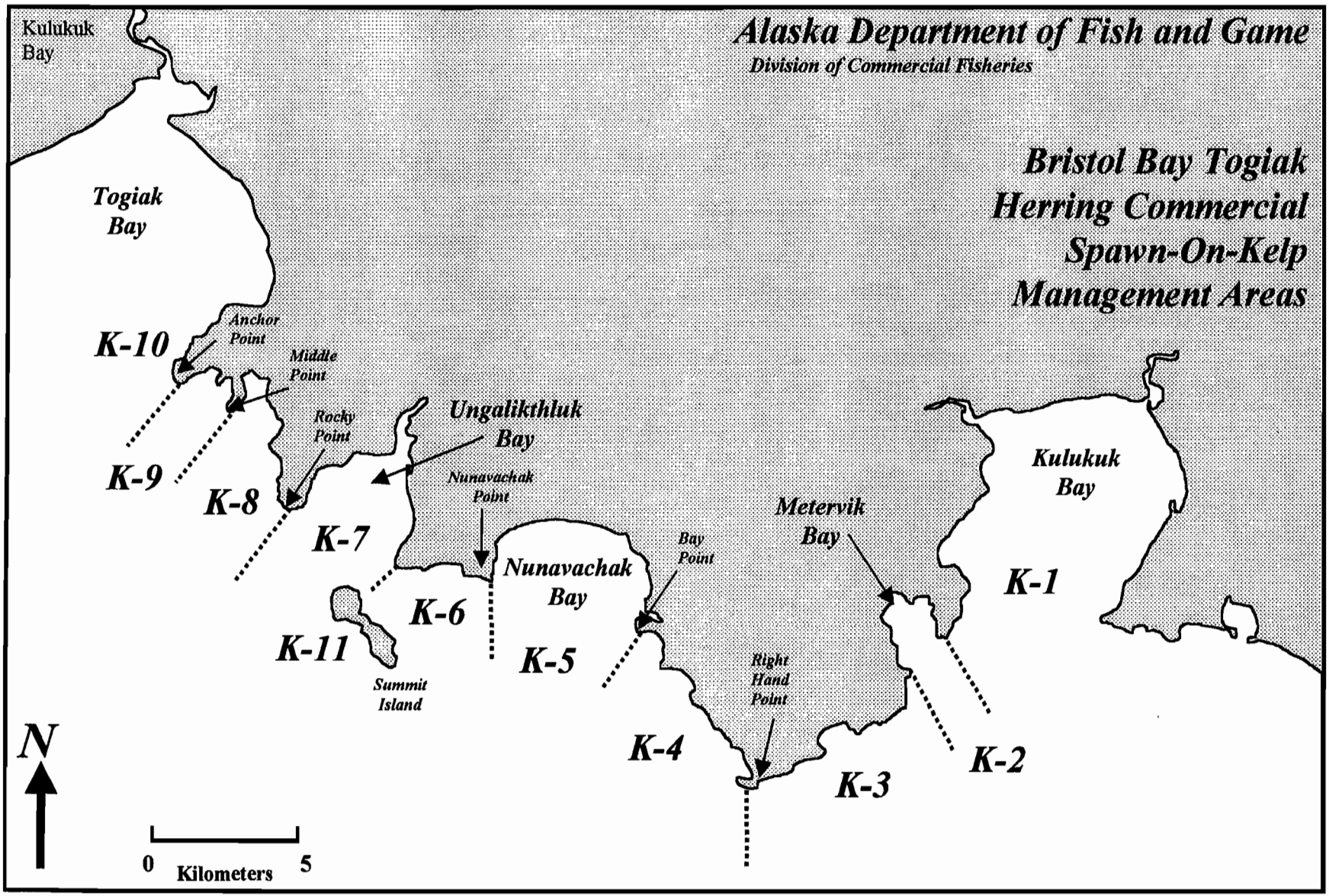
Alaska Department of Fish and Game
Division of Commercial Fisheries
Bristol Bay Togiak
Herring Commercial
Spawn-On-Kelp
Management Areas
Kulukuk
Bay
Togiak
Bay
K-10
Anchor
Point
Middle
Point
Rocky
Point
Ungalikthluk
Bay
K-9
K-8
K-7
Nunavachak
Point
Nunavachak
Bay
Bay
Point
K-6
K-11
K-5
Summit
Island
Right
Hand
Point
K-4
K-3
K-2
Metervik
Bay
Kulukuk
Bay
K-1
N
0
Kilometers
5

Figure 2