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**DIVISION OF COMMERCIAL FISHERIES MANAGEMENT AND
DEVELOPMENT**

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-1996-

BRISTOL BAY AREA



Regional Information Report¹ No. 2A97-14

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PREFACE

The 1996 Bristol Bay Management Report is the thirty-seventh consecutive annual volume reporting on management activities of the Division of Commercial Fisheries Management and Development 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 1996. 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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BRISTOL BAY

SALMON

FISHERY

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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 six major river systems: Naknek, Kvichak, Egegik, Ugashik, Nushagak, 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.

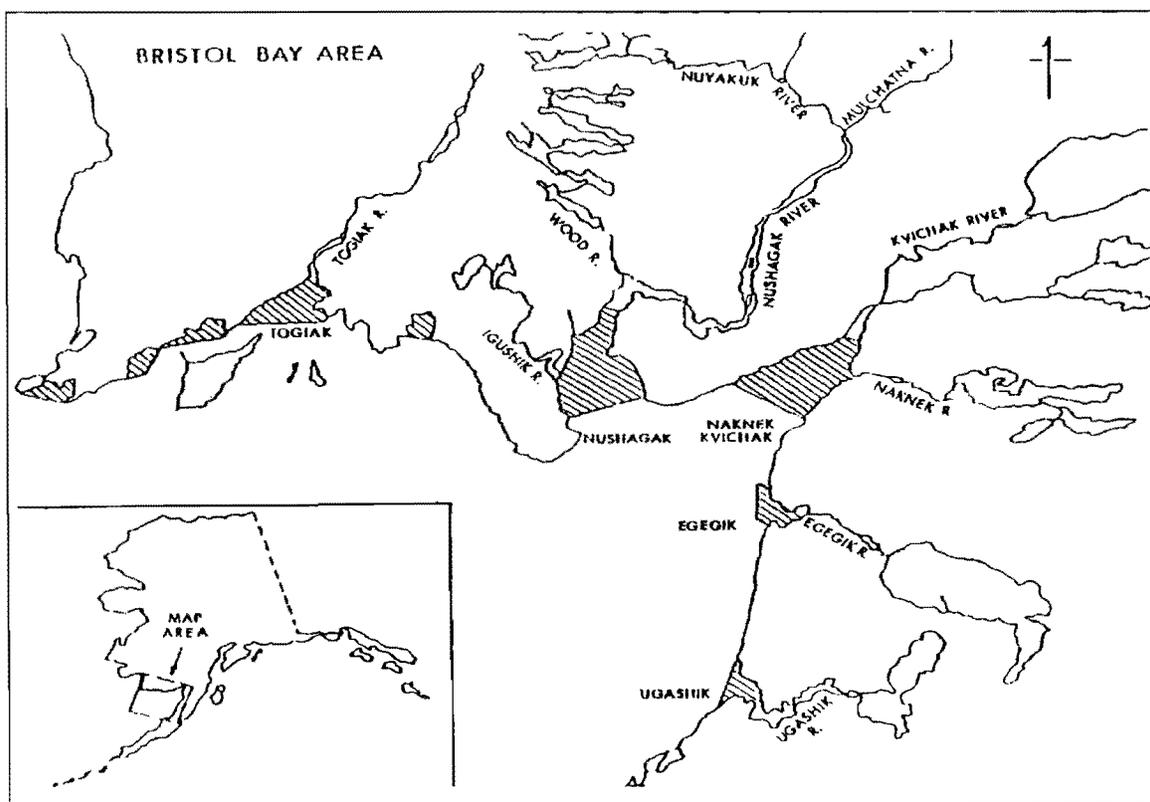


Figure 1. Bristol Bay Area Commercial Fisheries Salmon Management Districts.

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 (1976-1995) average 23.9 million sockeye salmon, 117 thousand chinook, 1.2 million chum, 203 thousand coho, and 1.6 million (even-years only) pink salmon (Appendix Tables 5-9). Since 1986, the value of the commercial salmon harvest in Bristol Bay has averaged \$161 million, with sockeye salmon being the most valuable, worth an average \$158 million (Appendix Table 37). Subsistence catches average approximately 168 thousand salmon and are also comprised primarily of sockeye salmon (Appendix Table 39). Sport fisheries harvest all species of salmon, with most effort directed toward chinook and coho stocks. Approximately 46,000 salmon are harvested annually by sportfishermen in Bristol Bay.

Management of the commercial fishery in Bristol Bay is focused on discrete stocks with 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 (150f) and set (50f) gillnets. Drift fishermen are the most numerous; 1,891 drift permits were registered in 1996. Setnet permits registered in 1996 totaled 1,017 (Appendix Table 3).

1996 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 1996 was forecasted to be 43.4 million fish (Table 1). A run of that size would be 17% above the 20-year (1976 - 1995) average inshore run of 37.1 million, and 4% greater than recent 10-year average inshore run of 41.7 million (Appendix Table 20). The inshore sockeye harvest was predicted to reach approximately 34.6 million fish. Runs were expected to exceed spawning escapement goals for all river systems. The projected inshore harvest for sockeye salmon was 21% greater than the previous 10-year average of 28.6 million (Appendix Table 5).

The 1996 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 east side river systems, but was included in calculations for west side river systems. Using recent years production data rather than all data reduced prediction errors for east side rivers during years tested (1984-1994). To further correct this tendency of under forecasting, the 1996 forecasts for the Kvichak, Egegik and Ugashik Rivers were increased by their respective prediction errors for the years 1984-95. The 1996 adjustments did not result in an overall increase in accuracy of the Bristol Bay forecast.

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" has changed a great deal over the years, but presently it is set at 700,000 chums.

The sockeye harvest allocation for the South Peninsula June fishery this season was 3,130,000 (2,564,000 for South Unimak and 566,000 for the Shumagins), based on the 1996 projected harvest in Bristol Bay. Preliminary catch information indicates that the Shumagin Island fishery landed 456,000 sockeye, and the South Unimak fishery landed 572,000 sockeye. The total catch for the June fishery of 1,029,000 was 67% under the total allocation. Due to the low incidental harvest of chum salmon (360,000) in the directed sockeye fishery, the allowable cap of 700,000 was not exceeded. Continuous fishing from 6:00 a.m., June 15 through midnight, June 30 was allowed for a total of 378 hours of fishing time at South Unimak. The Shumagin fishery was allowed a total of 276 hours of fishing time during 13 days. In summary, even though the amount of fishing time was the greatest allowed in the last ten years of the fishery only 33% of the allocation was caught. The Bristol Bay sockeye return was only 17.5% below preseason forecast, however, the usual abundance of sockeye was not available to the June South Peninsula fishery in 1996. Reasons listed were lost fishing time due to high winds, and delay of fisheries due to poor sockeye/chum ratios found in the test fishery.

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 fished specific loran stations on a transect line 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 influences 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. This was due 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 1996, the exvessel value of the commercial salmon inshore harvest was estimated at \$140.9 million (Appendix Table 28), the ninth largest exvessel value since the fishery began. The 1976 to 1995 average exvessel value of Bristol Bay commercial salmon fisheries is about \$126 million. This was the fourteenth consecutive year that the exvessel value has exceeded \$100 million.

During the 1996 season, 7 companies canned, 33 companies froze and 4 companies cured salmon in Bristol Bay. In addition, 17 companies exported fresh fish by air, and 29 companies shipped salmon out by sea in refrigerated sea water (RSW) or brine (Table 33). A total of 36 processors/buyers reported catches from Bristol Bay in 1996 compared with an average (1982-95) of 46 companies and a range from 72 in 1982 to 32 in 1995 (ADF&G AMRs 1982-95).

In both the Nushagak and Togiak Districts in 1996, the problem of processors not buying all species of salmon surfaced late in the season. This situation resulted from diminishing markets for pink and chum salmon. The situation was resolved differently in the two districts, and is discussed in following sections.

Run and Harvest Performance by Species

The combined commercial salmon harvest in Bristol Bay totaled 30.7 million fish in 1996 . This was the eighth largest in the last 20 years (Appendix Table 10) for Bristol Bay.

Sockeye Salmon

The 1996 inshore sockeye return of 36.9 million fish was approximately 18% less than the preseason forecast of 43.4 million (Table 1). Actual runs to individual districts were: 26% less than the forecast for the Naknek/Kvichak District, 42% less than the forecast for the Egegik District, 22% less than the forecast for the

Ugashik District, 30% greater than the forecast for the Nushagak District, and 6% less than the forecast for the Togiak District (Table 1).

Sockeye salmon dominated the inshore commercial harvest, and totaled 41.8 million fish (Table 4). Sockeye escapement goals were met or exceeded in five of the eight river systems where spawning requirements have been defined. Point goals were achieved in Naknek, Egegik, Wood, Igushik and Togiak Rivers, and were not met in the Kvichak, Ugashik, and Nushagak Rivers (Table 1).

Chinook Salmon

Chinook salmon harvests in 1996 were below the recent 20-year averages in all districts (Appendix Table 6). The 1996 bay-wide commercial harvest of 87,600 chinook was 25% below the 20-year average of 117,600. There were seven years with lower and twelve years with higher chinook harvests in the recent 20 years in the bay.

Chum Salmon

In 1996, the inshore commercial harvest of 842,200 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, with the exception of Ugashik District. Chum salmon harvest levels in recent years result to some degree from market conditions more so than actual abundance.

Pink Salmon

Bristol Bay has a dominant even-year pink salmon cycle. The 1996 return produced a harvest of only 37,800 fish which is the lowest on record for an on-cycle year (Appendix Table 8). Pink salmon harvest levels in recent years result more from market conditions than actual abundance.

Coho Salmon

The 1996 bay-wide commercial harvest of coho salmon totaled 124,000 fish, which was well below the recent 20-year average of 203,000 (Appendix Table 9). Coho catches were below average in most of the districts with the exception of Egegik and Ugashik. The Nushagak District had an early, strong run of coho salmon and would have harvested additional coho, but the fishery was closed due to certain processors not buying pink salmon caught incidentally to the coho.

Season Summary By District

Naknek-Kvichak District

The total run of sockeye salmon to the Naknek-Kvichak District was projected at nearly 13.9 million fish (Table 1). Escapement goals were set at 4.0 million (range 4.0-8.0 million) for the Kvichak River and 1.0 million (range 0.8-1.4 million) for the Naknek River (App. Table 1). The district harvest forecast totaled 8.7 million sockeye. The actual run to the district totaled 11.0 million sockeye, and the actual harvest totaled 8.2 million.

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 3, 1996 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 1996 salmon season in the Naknek-Kvichak District started by regulation on June 3, 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 first significant catches of sockeye occurred on June 17 after the three-day weekend closure. The weekly fishing schedule ended at 9:00 a.m. Friday, June 21 with the harvest totaling 186,849 sockeye, 1,917 chinook and 18,248 chums. The sockeye catch for the pre-emergency order period was 25 percent greater than the 20 year average.

The emergency order period in the Naknek-Kvichak District started at 9:00 a.m. on June 23. The strategy early in the E.O. period 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 closure could occur post July 1 when historically Kvichak stocks increase in abundance.

On June 21 the Naknek tower project started counting, the Kvichak tower began their counts on June 23 (Table 24). The Kvichak inside test fish project started drifting on June 21 (Table 26). In the morning of June 23 an

announcement was made that the district was on short notice. The Naknek section would be the only area under consideration for a possible opening. Catches in the subsistence nets in the Naknek River had been increasing over the last few days. A district test boat had good indices at the mouth of the river on the afternoon tide. An 8.5 hour period was announced for the Naknek section only at 8:00 p.m.. The catch for the period totaled 140,000 fish (Table 13).

Over the next four days, there was a one tide opening each day in the Naknek section only. Through June 27, the Naknek River escapement totaled 155,000 fish while the Kvichak river escapement totaled just 36,000 fish (Table 26). Catches in the Naknek section were greater than average for the early part of the season (Table 13). Escapement rates into the Naknek River dropped significantly on the evening of June 27. The Naknek section was allowed to close for 15 hours until the morning of June 29, this extended one tide closure resulted in excess of 100,000 fish escaping. This was a sign of things to come as far as the strength of the overall run to the Naknek River.

Through July 1, there were four 8-hour periods given to the Kvichak section setnets because of the allocation plan that ties fishing time in the Naknek section to fishing time in the Kvichak setnet fishery. Their catches were very light even though there was no pressure from the drift fleet. Escapement into the Kvichak River was behind schedule with just 41,000 fish past the tower as of July 2, while the Naknek had 375,000 fish which put it two days ahead of schedule. Three more periods were given to Naknek section fishers from July 2 until the morning of July 4 (Table 26).

Through July 1, the Port Moller test fishery estimated 33.6 million fish had passed enroute to Bristol Bay. The ages of the Port Moller catches showed only 13% were two-ocean fish while the forecast called for 54% of the run to be two-ocean fish. The forecasted two-ocean component of the Kvichak run was 66% of the total. This difference between the forecast and the actual caused great concern inseason for the overall run strength returning to the Kvichak River.

As early as July 2, the fleet was advised of the increasing possibility that the Naknek inriver fishery could occur as early as the morning of July 4, based on the total inriver count of the Kvichak. At 8:00 p.m. on July 3, the announcement was made that the drift fleet would be moving into the Naknek River at 3:00 p.m. July 4; the Naknek section 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 6:00 p.m. the cumulative escapement past the Kvichak tower was 224,000 fish. Through the third of July the drift fleet had harvested 3.8 million fish all of which was caught in the Naknek section. The drift fleet fished in the Naknek River for 40 hours between July 4 and July 8; they caught 1.35 million fish, while setnetters fishing in the section with half of their legal gear caught 420,000 fish. During this

time, the Kvichak setnetters had three 8-hour periods based on the fishing time of the Naknek Section setnetters, the Kvichak setnetters could only use half of their legal gear during these openings. Escapement into the Kvichak River was monitored very closely, from July 4 to July 7 there was only a 100,000 fish increase in escapement bringing the total to 420,000 fish, which was 6 days behind schedule. At this time it was determined that the Kvichak River's final escapement would be less than the minimum biological goal of 4.0 million. The decision was made to attempt to conserve every Kvichak bound fish; the district would close to all fishing, and Egegik district would be restricted to fishing east of the Loran C line 110.

A teleconference with the Commissioner's office was held to discuss possible closures or reductions in subsistence and sport fisheries that occur in the Iliamna watershed. Together, the two fisheries on average take 65,000 sockeye; and historically these fisheries take the average amount even in years of very low overall escapement. Based on directives from A.D.F.&G. headquarters, no action would be taken in the upriver fisheries.

As of July 8, the entire Naknek-Kvichak fishery was occurring in the Naknek River special harvest area. The inriver fishery was open to both gear types a total of 218 hours over a period of eleven days (Table 13). A total of 3.2 million fish were caught, with 2.9 million taken by the drift fleet and 300,000 by the setnets (Table 13). During the inriver fishery several one-tide closures were attempted to allow for escapement of other species. These attempts were not very successful, due to the strength of the Naknek run and the fact that the fish were allowed to build up just offshore of the mouth of the river. When a closure occurred, the escapement rate increased to unacceptable levels. The E.O. period was extended from 9:00 a.m., July 17 until 9:00 a.m., July 19 in order to obtain additional escapement into the Kvichak River. On July 22, the Naknek-Kvichak district was reopened to commercial fishing on the fall schedule of 4 days a week.

The Naknek tower was pulled on July 20 with total escapement reaching 1,078,098 fish, 78,000 fish above the point goal of 1.0 million. The Kvichak tower finished counting on July 23 with a total escapement of 1,450,578 fish, which was more than 2.5 million fish short of the 4.0 million goal. This was the lowest escapement into the Kvichak River since 1986 when the total reached only 1.2 million fish. Within the last twenty years, the 1996 escapement of 1.5 million fish was the fourth lowest; only in 1977, 1982, and 1986, was the overall escapement less.

The week of July 22-26 saw catches of sockeye salmon drop to a daily total of less than 4,000 fish. 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 250 a day. Only four buyers were buying during the last week of July. Two buyers remained in the district for the next week of fishing. Deliveries dropped off sharply to a daily combined total of 70.

The last deliveries in the district occurred on August 16. A total of 25 buyers purchased fish in the Naknek-Kvichak District in 1996. The sockeye salmon harvest totaled 8.2 million, the lowest catch since 1988. The chum salmon harvest totaled 124,137 fish, which is less than half of the recent 20-year average of 274,000 (Appendix Table 7). The commercial harvest of 4,047 chinook was lower than the recent ten-year average catch of 5,500 chinook (Appendix Table 6). Coho salmon harvest reached 3,816 fish, far below the 20-year average catch of 9,000. There are several possible reasons for this drop in catch. First, effort levels were below average late in the season, and secondly, the district normally has deliveries until the middle of August which is when the bulk of the coho are caught. Subsistence catches are listed in Table 35; harvest levels are average.

Egegik District

The 1996 sockeye salmon run to the Egegik District of 11.9 million fish, was the sixth largest run on record, but it was about five million less than the preseason forecast of 16.9 million sockeye. The harvest of 10.8 million was the fourth largest commercial harvest recorded over the 102-year history of the fishery.

An escapement of approximately 1.1 million fish was achieved, which was slightly above the 1.0 million point goal, but well within the goal range of 800 thousand to 1.4 million (Table 1). Total Egegik District sockeye runs during the past four comparable cycle years dating back to 1976 have ranged from 1.8 to 9.6 million fish with an average of 5.6 million, so the 1996 run ranks as the highest in recent years and it was over twice the recent cycle-year average (Appendix Table 15).

The 1996 ADF&G preseason Bristol Bay sockeye salmon forecast projected a total inshore run of 43.4 million fish, and a surplus of approximately 34.6 million fish. The projected Egegik District harvest of 15.9 million sockeye was 46% of the predicted bay-wide harvest. (Table 1).

Commercial salmon fishing began in the Egegik District on June 3 (Table 14). Effort was light, but sockeye catches per unit of effort were better than average. A gillnet mesh restriction of no larger than five and one-half 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 9:00 a.m. on June 16.

Daily test fishing, which provides estimates of sockeye passage into the lower portions of Egegik River, began on June 15 at the usual sites just upstream of Wolverine Creek (Table 27). The Egegik River salmon counting towers which provide daily estimates of sockeye passage into Becharof Lake, began operation on June 19 (Table 24).

Initial inriver test fishing sockeye catches were above average and by June 16 catches indicated that approximately 57,000 sockeye salmon had passed the commercial fishing district and were safely making their way upriver. An aerial survey of Egegik River/Lagoon revealed an estimate of approximately 4,300 sockeye, which is above the average count for this date. With the large Egegik inshore forecast of 16.9 million sockeye salmon and a steady movement of fish inriver, the first fishing period of the emergency order period, a 10-hour period, was scheduled for 12:30 p.m., June 17.

Participation in the June 17 opening was moderate with approximately 213 driftnet and 89 setnet deliveries reported. The catch of approximately 64,000 sockeye (Table 14), was well above average for this date. Sockeye catches per delivery were particularly good for setnetters averaging over 100 fish per delivery compared to the 1960 to 1995 average for this date of 18 per delivery. Inriver test fishing results through June 17 suggested that about 94,000 sockeye salmon had entered the Egegik River system. With this estimate of escapement and some good strength in sockeye catches, another 10-hour commercial opening was scheduled for June 18.

The June 18 opening started at 1:00 p.m. An aerial survey around 2:00 p.m. revealed light catch success, and the harvest for this period was around 53,000 sockeye salmon. Drift effort was up 50% with about 300 deliveries made. The inriver test fishery was slowing down, but the estimated level of escapement was still good, with around 10% of the goal upriver. Another 10-hour fishing period was scheduled for June 19.

The June 19 opening started at 2:00 p.m. and ended at midnight. A total of about 403 driftnet deliveries and 92 setnet deliveries were reported yielding a catch of approximately 90,000 sockeye. This was the largest sockeye catch ever reported for the district for June 19, and it brought the cumulative catch through June 19 to approximately 219,000 or about 1% of the expected surplus of 15.6 million fish. Inriver test fishing was still falling off so the fishery remained closed June 20, but reopened at 3:30 a.m., June 21. As of June 19, the sockeye escapement count past the Egegik towers was 11,000 fish, or about two days ahead of schedule with normal run timing to reach the goal of 1 million fish.

The June 21 opening produced a sockeye harvest of only 48,000 fish bringing the cumulative catch total to 267,000. This total harvest was slightly below the 10-year average for this date of 380,000. Inriver test fishing was still slow; the fishery closed as scheduled and would stay closed pending better sockeye salmon movement into the Egegik River. Test fishing picked up on the morning of June 23 with an average index of 2,200, indicating a very good push of sockeye into the river. The tower sockeye count through June 22 was 23,000 which was on schedule for achieving the 1 million fish goal. Assuming a lag time between test fishing and the towers of two to four days, more than 23,000 sockeye should have been counted by the

towers. Nonetheless, the high test fish indices on the morning of June 23 could not be ignored, and an 8-hour period was announced for 5:30 p.m., June 23. Inriver test fish indices remained high on the afternoon drifts of June 23, and the estimated number of inriver sockeye salmon was now 140,000 to 200,000 fish, or 14 to 20 percent of the escapement goal. Applying a two to four day lag time to the tower would put this escapement level ahead of schedule for meeting the goal of one million fish. With this excellent movement of sockeye into the river and the harvest total to date of less than 2% of the expected surplus, the current fishing period was extended to 1:00 p.m., June 24.

Catch for this 19.5-hour period was indicative of the increased movement of sockeye salmon into the river and totaled approximately 581,000 sockeye salmon bringing the cumulative harvest to 848,000. This total was well above the 10-year average catch by this date of 767,000. The tower count of 70,000 sockeye salmon through 6:00 p.m., June 24 was also well above the average of 50,000 for this date. Therefore, another 8-hour period was scheduled for June 25, starting at 5:30 a.m.

Inriver test fishing on the morning of June 25 revealed a strong movement of sockeye salmon into the river with an average index of 1,200. Given this information and above average catch and tower count totals, it was announced at noon that the Egegik fishery would remain open until 5:30 a.m., June 26.

The 24-hour period produced a harvest of approximately 500,000 sockeye salmon for a cumulative catch of approximately 1.3 million or about 8% of the expected surplus. With the management strategy of trying to provide as many window closures as possible, the fishery was allowed to close as scheduled, but not for long. On the morning of June 26, inriver test fishing again revealed a good movement of sockeye salmon up the Egegik River (Table 27). At 12:00 noon, another fishing period was announce to start at 8:00 p.m. that evening. This period would be 12 hours in length to help avoid any need to extend fishing. The Egegik tower sockeye count was now 97,000, with an additional 140,000 estimated in the river below the towers.

The 12-hour period ended at 8:00 a.m. on June 27, and produced another harvest of around 500,000 fish. The Egegik cumulative sockeye catch now totaled about 1.8 million fish, or 11.5% of the expected surplus. The 10-year average cumulative sockeye catch for this date is 1.7 million fish. The effect of the extended fishing and the brief one-tide closure was a marked decrease in sockeye escapement as the tower counts on June 26 and 27 combined were only few thousand fish (Table 24). The tower sockeye escapement count now totaled 99,000, with an additional 100,000 fish estimated in the river. This level of escapement was on schedule for an escapement goal of one million. The next fishing period was a 10-hour period scheduled to begin at 8:00 a.m. on June 28.

The June 28 opening yielded a harvest of 743,000 sockeye salmon, bringing the cumulative catch to 2.6 million or 17% of the expected surplus. This was the best 10-hour harvest so far this season and it was starting to look like the strength of Egegik run had arrived. In fact, over the next four days, inriver test fishing revealed steady numbers of fish entering the river and the tower counts leveled out at around 36,000 sockeye salmon per day. From June 29 through July 3, fishing periods were scheduled every other tide and they were 10 to 11 hours in length. The daily harvest was fairly constant as well with about one million fish taken each day (Table 14). The cumulative sockeye harvest through July 3 now totaled 7.1 million or about 45% of the expected surplus. The cumulative tower count was 348,000 with an additional 70,000 estimated in the river. This escapement level was about on schedule, so an 8-hour period was announced for July 4.

The July 4 harvest of 599,000 brought the cumulative harvest to 7.7 million or 49% of the expected surplus. The tower count had increased to approximately 379,000 with an estimate of an additional 60,000 inriver. The escapement was slightly behind schedule with inriver test fishing numbers steadily declining, but the large harvests of the recent fishing periods between one-tide closures did not support taking more of a rest. Therefore another 8-hour period was scheduled for July 5.

The July 5 opening was another productive one with a harvest of about 734,000 sockeye salmon. However, inriver test fishing numbers had fallen off substantially and the time had come to augment the escapement that was falling behind schedule. A two-tide closure was taken and the next fishing period was scheduled for July 7. Catch success for the July 7 opening was about average for both setnet and driftnet gear operators. The opening yielded a harvest of 498 thousand sockeye salmon and closed on schedule at 1:00 p.m.

The Naknek/Kvichak District fishery had been operating with a Naknek inriver fishery for drift vessels since July 4. Inseason concerns for the Kvichak return were increasing with each day until on July 8 the Naknek/Kvichak setnetters were also brought in to fish inriver with the drift gillnetters. At this same time, per the Egegik River Sockeye Salmon Special Harvest Plan, the Egegik District was reduced with the western boundary changed to the Loran C Line 9990-Z-45110. The next opening for Egegik proceeded at 5:30 a.m. on July 8 with this line change in place until further notice.

Drift boat registration for the July 8 opening was approximately 544 vessels (Table 12). About 150 driftnetters transferred out of the district since it was announced on Friday, July 5, that the Egegik District could be reduced to the 110 line as early as Monday, July 8. By this action, the size of the Egegik District

was reduced by almost half, making the smallest district in Bristol Bay even smaller. An aerial survey at 7:30 a.m. revealed the expected congestion, with over 70 vessels squeezed into the inner part of the district. Catches ranged from fair to excellent for most setnetters on the north side of the district. Most south side setnetters continued to struggle, as they had been all season, with only moderate catches. Driftnetters had some initial success along the middle of the new western boundary, and some of the 70 plus boats on the inner part of the district had sustained good catches.

Overall, most driftnetters did not like going to the 110 loran line, and there was a lot of negative comments as to the hardship this line change inflicted. Questions were raised about the actual benefit to Kvichak fish. Still, there were some driftnetters with shallow draft vessels that didn't mind the boundary change. Setnetters as a whole didn't complain much about the line change, in fact, the new boundary increased the average total setnet percent of the district's harvest to approximately 16% between July 8 and July 22. Between these dates, the percent of harvest for setnet gear ranges from 10% to 24 %. The Egegik District reverted to its normal boundaries on July 22.

The total harvest between July 8 and 22 of approximately 1.8 million sockeye salmon was 20% higher than the 1960 to 1995 average of 1.5 million fish for these dates. Catch per delivery was about 128 fish less than the 1960 to 1995 average for driftnetters and 15 fish more than average for setnetters. The final Egegik tower escapement count of approximately 1.1 million sockeye was 10% over the point goal of one million. From this manager's perspective, fishing with the 110 loran line restriction did not jeopardize or weaken the management of the Egegik District.

By the end of the E.O. Period, the district's cumulative sockeye catch totaled approximately 10.5 million fish, or 34% below the preseason district harvest forecast. At 9:00 a.m., Monday, July 22, the fishery reverted to its normal 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 10,842,000 fish. ADF&G personnel continued salmon escapement counts at Egegik River tower from August 8 to September 11 recording a total count of 1,076,460 sockeye, 103,116 pink and 24,918 coho salmon. Tower counting between August 8 and September 11 was funded by the U.S. Fish & Wildlife Service. Peak passage occurred on July 10 and 11, when over 200,000 sockeye salmon passed the towers on each of these days. The escapement sex ratio was 50% males to 50% females.

The age composition of the 1996 Egegik District sockeye run was as follows:

<u>Age Group</u>	<u>Catch</u>	<u>Escapement</u>
1.2	3%	3%
2.2	24%	34%
1.3	34%	18%
2.3	38%	40%
<u>Other</u>	<u>1%</u>	<u>5%</u>
Totals	100%	100%

The sockeye run was comprised primarily (57%) of progeny from the 1991 escapement of 2.79 million fish (5-year olds) with the 1990 escapement of 2.17 million producing an additional 39% (6-year olds). An above average showing of age 2.1 jacks (4.7% of the escapement) from the 1992 escapement of 1.94 million fish was evident, suggesting these may have survived well and will be a stronger contributor in 1997.

Egegik District fishermen harvested 91% of the Egegik inshore sockeye run, well above the 1952 to 1995 (44-year) average of 78%. Preliminary catch data indicates drift gillnets took 90% of the sockeye harvest while set gillnets took 10%. Over the period 1960 to 1995, drift gillnets have taken an average of 89% of the catch while set gillnets have averaged 11%. The 9,758,000 sockeye salmon delivered by driftnet fishers was the fifth largest volume on record for that gear type, and the 1,084,000 sockeye delivered by setnet fishers was the fourth largest catch on record for that gear group. Peak day in the fishery based on volume landed (1.14 million sockeye) was June 29, and peak catch per hour, 114,000/hr, occurred on that same day. Peak catch per delivery for drift gillnets occurred June 30 with an average of 1,349 sockeye per delivery. This compares to the 1960 to 1995 average peak drift date of July 3 and catch of 1,158 sockeye salmon per delivery. July 1 yielded the peak catch per delivery for setnets, with an average of 456 sockeye per delivery. The historical peak setnet catch date is July 4 with an average of 273 fish per delivery. During the emergency order period, June 16 to July 17, a total of 296 hours were fished in the district, 40% of the 744 hours available. This total was a 6% increase from the 279 hours fished in 1995.

The commercial harvest of other salmon species in the Egegik District totaled 124,000 fish, or 1% of the total harvest. The chinook harvest totaled approximately 960 fish, or less than a quarter of the 1976 to 1995 (20-year) average of 2,900 (Appendix Table 6). Part of this below average chinook harvest was due to prohibiting the use of gill nets with mesh sizes larger than 5.5 inches in the fishery from June 3 to July 1. The district chum harvest of approximately 83,000 fish was 18% below the recent 20-year average of 101,000, but the highest harvest since 1992 (Appendix Table 7). Window closures were provided

throughout the commercial fishery during late June and most of July. Essentially no pink salmon were harvested this season, though the 20-year even-numbered-year average is around 4,500. The district coho salmon harvest of 39,300 fish was slightly above the recent 20-year average of 34,600 (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 920 chinook, 1,660 chum, and 9,043 coho salmon. The chinook and chum salmon indices were below average. The coho index represents the third system-wide index on record for this species. It was conducted September 27 and 28 and included 539 coho salmon noted in the King Salmon River drainage and 8,504 observed in the Egegik River drainage. A total of 5,664 of these were observed in areas upstream of the Egegik River counting tower. Additionally, the department conducted coho escapement counts at Egegik River from counting towers from August 7 to September 11. Based on these counts, a total of 24,900 coho salmon escaped into the Egegik River and Becharof Lake. Adding elements from the two counting methods together at least 25,500 coho salmon can be accounted for in the system-wide escapement.

A total of 26 buyers operated in the district this season, up from 22 in 1995 (Table 33). Most of the harvest was taken aboard floating freezer processors or tendered to other districts for processing. There were no additional high volume shore-based buyers. 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 fishermen on delivery limits at any time.

In summary, the salmon season at Egegik was very productive with the fourth largest harvest on record. Fish volume was high, drift fleet size was smaller than preseason expectations, and catch success was very good. Setnet catch performance was good, especially for nets located on the inner north shoreline, with setnetters harvesting about 10% of the run. Escapement needs were slightly exceeded with the final sockeye escapement count of approximately 1,100,000. Evaluation of the district's sockeye escapements during the past decade should continue.

Ugashik District

The 1996 Ugashik District total inshore sockeye salmon return was approximately 5.1 million fish, or 17% below the preseason forecast of 6.2 million (Table 1). The commercial sockeye harvest of approximately 4.4 million fish was the fourth largest harvest ever recorded. The sockeye escapement of approximately 667 thousand fish was 5% under the point goal of 700 thousand. Comparable cycle-year sockeye returns over the last four cycles dating back to 1976 have ranged from 531 thousand to 6 million fish with an average of 3.8 million, so the 1996 run was 34% above the cycle-year average.

With the preseason forecast for the Ugashik District indicating a potential harvest of 5.5 million sockeye salmon, and the history of Ugashik sockeye salmon movement into the river that is equivalent to a sudden tidal wave, the management approach, again this year, was to fish early and fish often. Accordingly, commercial fishers were advised that fishing periods in late June and early July would likely be associated with indications of sockeye abundance within the district. Given this approach, a larger than normal number of drift vessels, over 100, decided to start their season at the onset of the emergency order period in the Ugashik District (Table 12).

Initial landings occurred in the district June 10 (Table 15) with a few chinook salmon delivered. Small catches were reported for the remainder of that week as only a few driftnet permit holders were actually fishing. During the week of June 17, effort and sockeye catches were increasing and by the onset of the emergency order period, at 9:00 a.m., June 23, the cumulative district harvest was approximately 109,000 sockeye, 350 chinook, and 5,900 chum salmon. These pre-emergency order period cumulative catches were well above the recent 36-year (1960 to 1995) average of 32,000 for sockeye salmon and 2,500 for chum salmon, but well below the average for chinook salmon. The district was allowed to close at the onset of the emergency order period and district test fishing was scheduled to start June 24.

Inriver test fishing, operating about three miles upstream of Ugashik Village, started June 23 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 28). On June 24, district test fishing (Table 9) indicated a fair abundance of sockeye salmon in the district and with the expected surplus of 5.5 million, a 12-hour period was announced for June 25, beginning at 4:30 a.m..

A total of 130 driftnet vessels were registered for the district, and 2 setnet landings were made during the first emergency order opening of the season. The June 25 opening yielded a harvest of approximately 157 thousand sockeye salmon. Although this catch was good, inriver test fishing indicated that only about 6,000 sockeye had entered the lower Ugashik River and the fishery closed as scheduled. The Ugashik River counting towers would not be operational for another week.

District test fishing continued June 26 through June 28, and indicated a moderate number of sockeye salmon were starting to show at the district's outer, offshore, perimeter. The season's second emergency order fishing period, an 8-hour period, was announced for June 29. The period began at 8:00 a.m. and produced a harvest of approximately 259,000 sockeye salmon. An estimated 183 driftnet vessels and 13 setnetters participated in this opening. Drift vessels averaged around 1,400 fish per delivery while setnetters averaged about 82 per delivery. Inriver test fishing success was improving (Table 28) and indicated that about 13,000 sockeye salmon had now

entered the river. The fishery closed as scheduled and another round of district test fishing was scheduled for June 30.

Test fish catches at inner district stations and above the inner district boundary markers indicated that a fair number of fish were beginning to move up and into the river. Inriver test fishing estimated that several thousand were now in the lower Ugashik River. With the district's total harvest around 543 thousand sockeye salmon or 10% of the expected 5.5 million harvest, another 8-hour opening was scheduled for 10:00 a.m. July 1.

An aerial survey of the fishery revealed good catches in the inner part of district and at Ugashik Village. The average setnet catch was 383 sockeye salmon per delivery which was almost three times the average for this date. Driftnet vessels averaged about 1,200 sockeye per delivery. The fishery closed as scheduled.

Through July 1, inriver test fishing results indicated that approximately 42,000 sockeye salmon had escaped. The total district harvest through the last period now stood at approximately 780 thousand fish, or 14% of the expected harvest. With indications of good fish abundance in the lower river area, another 8-hour fishing period was announced to start at 11:00 a.m., Tuesday, July 2. Overall fishing success was not as good as the previous two periods, with driftnet landings averaging only 720 sockeye per delivery, however setnet catches were respectable with 317 fish per delivery. The fishery closed as scheduled and fishers were asked to standby at regular announcement times for the next possible opening. Inriver test fishing, through July 2, indicated another 60,000 fish had entered the river bringing the total to approximately 100,000 (Table 28)

On the morning of July 3, inriver test fishing results indicated the strongest push of fish this season into the lower Ugashik River. Staff were concerned that left unchecked, the escapement would increase rapidly ahead of the amount needed at this point in the run, so at 12:00 noon, a brief 4-hour fishing period was announced to start at 2:00 p.m. to slow the escapement rate down. This was a very productive period with approximately 198 thousand sockeye salmon harvested. Setnetters averaged 309 sockeye per landing, while 188 drift vessels made deliveries averaging 980 salmon. The district's total catch was now approximately 1.2 million or 22% of the expected harvest. The fishery closed as scheduled. However, with very good setnet catches at Ugashik Village, and if inriver test fish indices continued to be strong, it would not be closed for long.

Inriver test fishing indices held up and through July 3 it had accrued a cumulative total of 4,190 index points indicating that the escapement was now around 250 thousand fish, or 36% of the goal. The Ugashik tower count was approximately 5,600 (Table 25) or one and a half to two days ahead of schedule. With a total of about 23 million fish passing Port Moller seven days earlier (Table 6), it was apparent that some of this abundance was

showing in the Ugashik District. Given the above information, a 12-hour fishing period was scheduled for July 4 to begin at 1:00 p.m..

The July 4 opening was another very productive one with approximately 300 thousand fish reported caught on that date. Driftnet and setnet catches averaged 1,760 and 303 sockeye salmon per delivery, respectively. The Ugashik counting tower count jumped to 34,000 placing the tower count three to four days ahead of schedule. For the next couple of days, inriver test fishing results still showed strength as the tower count would reach 250 thousand sockeye by July 7, or five to six days ahead of schedule. Consequently, the commercial fishery was extended several times until a total of 52 hours of nonstop fishing had occurred. During this period, approximately 1.5 million sockeye salmon were harvested bringing Ugashik's season total to about 2.7 million fish.

After a 13 hour pause, the next fishing period, a 12-hour period, was scheduled for 4:00 p.m. July 7. This period was subsequently extended for 13 more hours as the total escapement, tower count and inriver fish, was now estimated at 500 thousand, or 71% of the point goal and still several days ahead of schedule. The 25-hour period produced a harvest of over 400 thousand sockeye salmon. Another brief 12-hour pause was taken, followed by 21 hours of continuous fishing. At the close of this period, cumulative total harvest was around 3.6 million fish.

At this point, tower counts were declining, and it was becoming clear that the fish-per-index multiplier used to calculate inriver fish was too high. A pause was needed and a round of test fishing was scheduled for July 10. Test fishing was very slow, and it would continue for the next four days into July 14. July 13 indices picked up but there was little movement into the inner part of the district and almost no movement of fish into the river as verified by very low inriver test fishery catches. Things turned around on the 14th when an index of 1,604 was attained above the inner district boundary line. But since the tower escapement count had stalled at about 320 thousand fish, which was on schedule for this date, only an 8-hour period was scheduled to start at 9:30 p.m. on July 14. There were some requests by fishermen to hold off the opening until the next day so a daylight period could be scheduled, but test fish indications were that this was a substantial mass of fish and that they were not about to turn around and go back out into the district. Not fishing on them until the morning would have meant another tide's worth of escapement which sometimes can be as high as 500 thousand fish in Ugashik. Management staff felt that an open period that evening would prevent escapement from increasing too rapidly. An aerial survey at 10:00 p.m. revealed good catches in the inner part of the district especially for setnetters. The total catch for this period was around 330 thousand fish. Setnet catches averaged 360 sockeye per delivery, while driftnet catches averaged 622 sockeye. The district's total sockeye harvest was now almost 4 million fish.

Inriver test fish indices increased dramatically on July 15, and in addition to the tower count of 340 thousand, 200 thousand fish were estimated in the river. That total put the estimated escapement at the lower end of the escapement goal range and the next fishing period was announced for 11:30 a.m., July 16. This period was scheduled to be eight hours in length, but inriver test fishing indices and tower counts kept increasing, so the current period was extended twice until 12:00 midnight July 17. Because the escapement goal 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 the morning of July 18, the tower count had reached 500 thousand fish, and there was an additional 200 thousand sockeye estimated in the river. The escapement goal, at least on paper, had been reached. For the remainder of the sockeye season, management scheduled longer fishing periods interspersed with short closures. The counting tower was operated through July 26, the final tally was 667 thousand sockeye salmon.

An additional 17,400 sockeye salmon in Dog Salmon River, and 7,200 sockeye salmon in King Salmon River were later counted during an aerial survey on August 12, bringing the Ugashik drainage sockeye escapement total to 692,000. The peak daily sockeye counts at the counting tower occurred July 6, and 17 when approximately 90 thousand sockeye passed on each of those days. The management objective of avoiding large pulses of escapement succeeded this year. The escapement was fairly represented throughout all segments of the run. The sockeye escapement sex ratio was 54% males to 46% females.

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

<u>Age Group</u>	<u>Catch</u>	<u>Escapement</u>
1.2	3%	8%
2.2	12%	7%
1.3	58%	75%
2.3	26%	7%
<u>Other</u>	<u>1%</u>	<u>3%</u>
Totals	100%	100%

The commercial harvest of other salmon species totaled approximately 113,000 fish or 2.5% of the total district's harvest. The harvest of 520 chinook salmon was 87% below the 20-year (1976 to 1995) average of 3,940 (Appendix Table 6). Ugashik chinook escapement indices ranged from below to above average. The total drainage count of 2,788 was 48% below the 1980 to 1995 average of 5,330. The chum salmon harvest of approximately 103,400 fish was well above average, while the coho harvest of 9,200 fish was 66 below the recent

20-year average (Appendix Tables 7 and 9). Chum salmon escapement indices were below average with a cumulative drainage count of 27,300. Pink salmon harvest in the Ugashik District was negligible in 1996 (Appendix Table 8).

The Ugashik District fishery harvested approximately 86% of the sockeye return in 1996 which was above the recent 20-year (1976-1995) average exploitation rate of 66%. Peak catch-per-hour occurred July 15 when approximately 332 thousand sockeye salmon were landed in eight hours, or 41,500 per hour. Peak catch-per-unit-effort in the district occurred July 4 for drift gillnets with 1,759 sockeye salmon landed per permit, and July 1 for set gillnets with approximately 383 sockeye salmon landed per permit. Based on preliminary catch totals it appears drift gillnets took about 96% of the sockeye harvest while set gillnets caught 4%. The 20-year (1976 to 1995) average percentages of the sockeye harvest by gear type are 90% for drift and 10% for set gillnet. The fishery was open 177.5 hours or 31% of the 576 hours available during the emergency order period, or 61% more time than was given last year.

A total of 18 buyers operated in the district during the season (Table 33), five 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 processing capacity being exceeded during the sockeye season. The strategy of allowing more fishing time early in the emergency order period held the interest of both commercial fishers and processors, and the quality of most of this year's harvest was reported to be very good.

Nushagak District

In January, 1996, the Alaska Board of Fisheries enacted several regulations that directly affected management of the Nushagak District. The Board adopted the Nushagak Coho Salmon Management Plan, adopted the Wood River Special Harvest Area Management Plan and increased the minimum mesh size the department may allow, by emergency order, when attempting to target surplus chinook salmon and minimize sockeye exploitation early in the sockeye run. These actions are discussed in more detail in the following sections.

Chinook

The Nushagak Chinook Salmon Management Plan directs the Department to manage the Nushagak commercial fishery for an inriver goal of 75,000 chinook. That goal provides for a biological escapement goal of 65,000 spawners and additional fish harvested in subsistence and sport fisheries above the sonar site below Portage Creek. The forecast for the 1996 chinook run totaled 150,000 fish, which left a projected surplus of 75,000 fish potentially available to the commercial and lower river subsistence fisheries (Appendix Table 21). 1996 was the fifth consecutive year that commercial fishing was expected to be directed at chinook salmon.

Recent chinook runs have been healthy, the 1991-1995 average run of 172,000 fish compared closely to the 1976-1995 average (Appendix Table 21). Although the 1996 forecast was low relative to the 1991-1995 average, the expected run was within the range of run sizes observed since 1992 (142,000 - 229,000). Since commercial fishing re-opened for chinook salmon in 1992, the inriver run goal has been exceeded each year by 8,000-23,000 chinook, and the spawning goal has been exceeded by 10,000-24,000 fish.

Product quality is an important factor in the chinook fishery; the predominant demand in the chinook market is for fresh fish. Like other salmon, chinook have a tendency to become "blushed" after exposure to freshwater. The milling nature of chinook compounds the issue, because the number of blushed fish that remain in the district and appear in the harvest increases through mid-June. An apparent 2-week delay between peak commercial catches in the commercial district and peak daily escapement rates at the sonar site makes inseason run strength predictions unreliable and further complicates management.

Commercial fishery managers anticipated a moderately aggressive management strategy for the 1996 chinook fishery. Barring any indications that the chinook run was markedly stronger or weaker than the forecast, the directed chinook fishery would be managed to harvest the forecasted commercial surplus in 1996. To ensure harvest quality and peak value, managers anticipated fishing early in June before blushing becomes a significant problem, but before escapement reaches 50% of the goal. The 1996 management strategy would be similar to that applied from 1992 through 1994, when runs increased from 142,000 to 229,000 fish. From 1992-1994, managers permitted commercial fishing after subsistence setnet catch rates near Dillingham increased, indicating that a large number of chinook salmon passed the commercial fishing district. In 1995, the strategy was more aggressive, when commercial fishing was permitted both immediately after marked increases in subsistence setnet catch rates, and during lulls to increase exploitation.

Subsistence catch reports of chinook salmon indicated the first significant abundance at Clark's Point the evening of June 6 (13 chinook in three nets) and the morning of June 7, followed by large catches on Kanakanak (six chinook/net), and Scandinavian (19 chinook/net) Beaches during both tides June 7. Reports on the morning of June 8 showed significant increases at Lewis Point the previous evening and early that morning (50 and 100 chinook/net). By noon June 8, the pattern of reports indicated a strong progressive movement of fish from Clark's Point to Lewis Point.

Fishery managers announced the first commercial opening for Sunday, June 9 (Table 11). Fishing effort during this opening was low, partly because the department announced the opening when department offices were closed and a limited number of fishermen were registered under the district registration regulations. In spite of low effort, harvest from the 8-hour opening was four times greater than the average (1969-95) for that date. Over

12,000 chinook were landed in 113 deliveries, and individual landings were the largest recorded on June 9 since 1969.

Escapement monitoring began June 9 at the Portage Creek sonar (Table 25). Initial sample sizes prevented apportioning sonar counts by species, but chinook comprised the majority of samples. Over 9,300 salmon recorded by June 12 were assumed to be predominantly chinook, and escapement rates were estimated at four to five days ahead of levels expected, based on average run timing and an escapement goal of 75,000 fish.

The second opening took place June 13 on the basis of strong escapement and commercial catch rates. Here fishery managers deviated from the strategy of scheduling a commercial opening after a pulse in subsistence catches. In fact, subsistence catches June 9 declined and remained low through June 12. While escapement was ahead of the level expected by June 12, commercial catch quickly fell behind expected levels. Staff felt that a commercial opening at this time would allow the commercial harvest to increase to expected levels and balance the surplus in river. Strong escapement and catch rates through June 12 indicated an early run and/or a run stronger than forecast.

After the second opening, chinook harvest totaled 23,000 fish, escapement rates declined and inriver species composition remained unknown. On June 14, fishery managers advised the public that the next opening would follow the next spike observed in subsistence catch rates.

Subsistence catch rates of chinook salmon accelerated again early June 16 near Dillingham and at Lewis Point. At that time, escapement (16,000 chinook) was estimated to be six days ahead of expected levels. Although sample sizes for species composition were lower than desired at the sonar, biologists began to feel that species composition estimates were not likely to change significantly. Winds on June 16 were relatively calm, and if the weather outlook for the following day (SE 20) actually occurred, inriver fish movement would likely continue. The third opening was scheduled for June 17 when reports confirmed large subsistence catches at Lewis Point.

Escapement through June 16 was estimated at 17,000 chinook. On June 17, sonar counts and subsistence catch rates near Dillingham continued to increase. Nets at Kanakanak and Scandinavian Beaches averaged 34 and 66 chinook each, for an estimated subsistence harvest of over 1,000 chinook for one tide. Chinook abundance in the district also appeared very strong when companies and fishermen reported large catches of chinook hours after the opening began. Managers interpreted the large catch and escapement rates to indicate a chinook run larger than forecast, and felt additional exploitation was needed to balance the catch with the apparent large push of fish in river. A fourth opening was announced mid-period, during the third opening.

Concern for the impending sockeye run contributed to the decision to open the district for the fourth time. Reports early in the third period indicated the first significant sockeye catches of the season. Setnet fishermen at Combine Flats, Clark's Point and Ekuk Beach were reportedly landing as much as 1,000 lb. of sockeye per net early in the opening, and drift boats using small mesh gillnets were also delivering catches predominated by sockeye salmon. Fishermen and companies reported that a large majority of drift vessels used large mesh gear during the third opening, but the sockeye catch was significant.

The apparent sockeye abundance triggered the possibility of restricting gillnets to large mesh sizes to protect that species. However, samples from chinook escapement contained a smaller component (46%) of large, older (age-5 through age-7) fish than the forecast (84%), and a restriction placed on small mesh nets would likely continue to skew the age and sex composition of future escapement. At this point the chinook run appeared to be larger than forecasted, and managers viewed the risk associated with potential production loss resulting from poor escapement quality to be greater than the risk of not achieving the inriver run goal. Therefore the fourth opening was scheduled to harvest the apparent surplus of chinook while the majority of the fleet was still using large mesh gear, but before sockeye abundance increased further.

Chinook run strength indications began to change June 18. Although escapement rates increased at the sonar project June 17, previous species apportionment estimates were substantially revised. Estimated chinook escapement declined from 17,000 June 16 to 13,700 June 17 in spite of a daily escapement of nearly 28,000 additional salmon June 17. Salmon passage remained high throughout the following days, but as the total escapement increased, more fish were re-apportioned to chum from previous counts. The final estimate of chinook salmon escapement through June 17 totaled only 9,100 fish (Table 25).

Following the fourth and final opening directed at chinook, harvest was estimated at 56,000 chinook, 34,000 sockeye and 50,000 chum salmon (Table 16). Incidental harvest taken during the remainder of the commercial fishing season totaled 17,000 chinook salmon (1992-1995 average: 15,000). The commercial harvest of chinook salmon (73,365 fish) exceeded the forecasted surplus available to the commercial fishery by approximately 10,000 fish.

Peak effort during the directed chinook fishery was estimated at 252 drift vessels by an aerial count June 13. Effort may have been slightly higher during openings on June 17 and 18, aerial surveys were not conducted, but number of deliveries increased slightly over the June 13 opening. Fishing effort directed at chinook in 1996 was not as large as the 1995 fleet (347 drift vessels), and marked the first decrease in effort since 1992. Similar to recent years, market demand and price paid to fishermen (\$0.50/lb.) remained low.

The 1996 chinook run to the Nushagak District fell short of the forecast by 12,000 fish (Appendix Tables 2 and 21). Age composition of the run generally appeared to be similar to the forecast; but the component of age 1.2 fish was larger, and the component of age 1.4 fish was smaller than forecasted. The proportion of age-1.4 chinook was forecasted to be less than average due to a poor return of age-1.3 fish in 1995, and the size of the 1996 sibling return supports the notion of poor production from the 1990 brood year. Timing of the run was early. One half of the chinook escapement passed the Portage Creek sonar June 21, seven days earlier than average (1986-1995). The mid-point of the commercial harvest was only one day earlier than average when compared to years with regular fishing patterns (1969-73, 76-83 and 1986), but timing of the 1996 harvest was greatly influenced by the timing of fishery openings.

	Age					Age 5-7
	1.1	1.2	1.3	1.4	1.5	
Forecasted Run	0.4	15.2	48.6	31.3	4.5	84.4
Commercial Harvest	0.0	13.6	57.4	25.4	3.6	86.4
In River Run	4.1	32.2	41.2	21.5	0.5	63.2
Total Run	0.9	23.4	43.2	28.5	2.0	73.7

The chinook salmon escapement (52,127 fish at the sonar) was approximately 23,000 fish short of the inriver goal, and the smallest observed since 1986 (Appendix Table 21). Failure to achieve the inriver goal resulted in the department restricting the sport fishery to catch and release fishing only on July 9. However, the shortage of chinook salmon was not severe enough to trigger a closure of the sport fishery or management action in the subsistence fishery. The level of commercial exploitation was the primary cause of the shortfall in the Nushagak River in 1996. The fishery was managed to exceed the forecasted surplus designated for commercial harvest, when inseason catch and escapement rates, larger than expected due to early run timing, were interpreted to mean a run larger than forecast. Other factors that led to the shortfall in river included a run smaller than forecast and inseason revisions of escapement estimates.

The quality of the chinook salmon escapement was a concern in 1996. The percentage of large, older (age-5 through age-7) fish in river (63%) was significantly less than the age composition of the total run (74%) for the second consecutive year. Conversely, samples collected in the 1995 and 1996 commercial fisheries contained a significantly larger component of large (age-5 through age-7) fish than the total run. Although sport, subsistence and commercial fisheries that target Nushagak chinook salmon all select for large fish, the commercial fishery for Nushagak chinook was the primary cause of the escapement quality concern because it accounts for the overwhelming majority of the harvest.

Sockeye

The pre-season forecast for the sockeye run to the Nushagak District totaled 5.8 million salmon, the largest projected run since 1982 (Table 1). Strength of the forecasted Wood and Igushik runs was above average (1986-95), but the Nushagak run was expected to be low; 1.50 million fish compared to 1.74 million fish average (1986-95). Season outlooks, management performance and fishery statistics are summarized below for Nushagak, Igushik and WRSHA Sections.

Nushagak Section: The low forecast and potential problems with sockeye production in the Nushagak River presented concern for the Nushagak sockeye stocks. Age composition of recent Nushagak River runs, aerial survey results of the Tikchik Lake spawning populations and a very poor Nushagak River run in 1995 suggest that production in the Tikchik Lake system is declining. The effects of such a change are unknown, but may impact sockeye production for the Nushagak River system as a whole. To ensure that potential problems were not exacerbated, achieving Nushagak River escapement requirements became the management objective with the highest priority in 1996.

The Nushagak Section sockeye fishery was managed to achieve biological escapement goals of 550,000 (range 340-760 thousand) spawners in the Nushagak River and 1 million (range 700 thousand to 1.2 million) spawners in the Wood River in 1996. However, a preliminary review of escapement and smolt-return data for Wood and Nushagak River sockeye salmon in the spring of 1996 showed that Wood River produced high returns from spawning escapements between 700 thousand to 1.7 million sockeye, a much broader range of escapements than the published goal range. A variable escapement policy in place for the Wood River system that allows fishery managers to adjust the sockeye escapement goal to optimize spawner distribution was not expected to be used.¹

Assuming that harvests were not selective for Nushagak or Wood River stocks, any balance of escapement shortfall and surplus between the Wood and Nushagak Rivers was expected to be minimal. The forecasted ratio of relative run size between Wood and Nushagak River (2-to-1) was similar to the ratio between the Wood and Nushagak River escapement goals. Should the actual ratio of Wood to Nushagak River runs exceed two-to-one, fishery managers would attempt to balance escapement shortfall in the Nushagak River with surplus in the Wood River, while keeping escapements within escapement ranges in season. Should differences in strength become extreme, managers would allow up to 1.7 million sockeye into the Wood River to achieve the lower end of the escapement goal range in the Nushagak River.

¹ The variable escapement policy allows the Department to adjust the escapement goal in Wood River from 800,000 to 1.2 million fish based on age composition of the sockeye escapement. When the department projects the 3-ocean component to comprise 60% or more of the age composition of the escapement, it may reduce the goal to 800,000 fish. If more than 60% of the escapement consists of 2-ocean sockeye, the department may adjust the goal upward to 1.2 million. About 54% of the 1996 sockeye run to the Wood River system was expected to be 3-ocean fish, while 46% was expected to be 2-ocean sockeye (Table 2).

Run timing of Nushagak and Wood River sockeye overlaps and few tools exist to manage the stocks independently in the Nushagak District. However, the Nushagak River component of the total (Wood and Nushagak River combined) escapement appears to peak earlier in the season and decline through time. Therefore, fishery openings may be timed to provide some conservation of Nushagak River sockeye salmon; if stock proportions in the escapement represent stock proportions in the district, and harvests are not selective, limiting early season fishing may conserve Nushagak River sockeye.

To minimize impact to Nushagak River stocks, managers intended to limit commercial fishing early in the sockeye run, when the Nushagak River component is assumed to represent a large proportion of the total. Commercial fishing would not be directed at sockeye salmon until escapement counts at Wood River tower advanced, or until test fish or subsistence catch rates indicated tower counts would advance, to a level several days ahead of expected escapement. Commercial fishing would be limited early in the season to allow as many fish into the two river systems as possible, but keep the Wood River tower count to a level within several days of expected escapement, based on average timing and the goal of 1 million. Mid- and late-season fishing would be based on the observed ratio of Wood to Nushagak River escapement and strength of the run.

Sockeye abundance remained low throughout the directed chinook fishery; sockeye catches incidental to chinook slightly exceeded expected levels, but early escapement estimates in the Nushagak River were low (Tables 16 and 24). The first large abundance of sockeye above the district was detected early June 24, when test fish indices in the lower Wood River and upper Nushagak Bay increased substantially (Table 10). Results of a morning aerial survey and fishermen reports supported the test fish indices, and all indicated that escapement rates would increase that day (Table 30). Sockeye escapement in the Nushagak and Wood Rivers was 1-3 days ahead of expected levels when hourly counts at Wood River tower increased early June 24 (Table 24). By 2:00 p.m., counts averaged nearly 2,000 fish per hour. At 3:00 p.m., managers announced the first district-wide opening in the Nushagak, to begin at 8:00 p.m. June 24 (Table 11).

Commercial openings early in the sockeye run were scheduled to keep Nushagak and Wood River escapement levels with a few days of expected, based on average historical timing and respective escapement goals. By providing surplus escapement early in the run, managers intended to ensure the conservation of Nushagak sockeye and lower the risk of not achieving escapement goals, should run timing be early. Openings were scheduled every two to three tides during the last week of June. Daily and cumulative ratios of Wood River to Nushagak River escapement prior to July 1 were less than 1.7-to-1.0, very favorable for achieving the escapement goals in both rivers, barring any significant change throughout the season (Tables 24 & 25).

A need for additional conservation towards Nushagak River sockeye became apparent during the last days of June, when the daily ratio of Wood to Nushagak River escapement increased, exceeded 3:1 and remained at or above that level for several days. Aerial survey results indicated a continued decline in Nushagak River escapement rates, and by July 2, Nushagak River escapement had fallen below expected levels, based on average timing. The change in the relative escapement rates between Wood and Nushagak River indicated that surplus escapement would be necessary in Wood River to achieve the lower end of the Nushagak River range, and heightened the need to increase escapement rates before the ratio became more extreme. In response, managers reduced the rate of commercial openings; fishing in the Nushagak Section was permitted for only two tides from July 1 through July 5.

Late July 5, the Wood River sockeye escapement reached a level that was three times the Nushagak River escapement, and within 17% of the goal. The Nushagak River escapement equated to 50% of the Nushagak River escapement goal, and was 65,000 fish short of the low end of the range. Daily escapement rates in the Wood River exceeded 100,000 fish from July 2 through July 4, due in part to the conservative fishing schedule. On July 5, results from an afternoon survey of Wood River and reports of large subsistence catches near Dillingham, indicated that daily escapement rates in the Wood River would increase further, and that total Wood River escapement would exceed the goal within two days. At 8:00 p.m., a 12-hour opening was announced for 5:00 a.m., July 6.

Fishermen and industry representatives reported very large catches within two hours of the July 6 opening. The largest deliveries were reported at Coffee Point, Ekuk and Clark's Point. Wood River escapement was within 13% of the goal by 10:00 a.m., and hourly counts remained high throughout the morning. Managers expected high escapement rates to continue until the effect of the fishery could be observed at the counting tower, or until the evening of July 7. The opening was extended for another 12 hours, closing at 5:00 a.m., July 7 when catch reports indicated that fishing success declined.

The Wood River escapement goal was achieved early July 7, when Nushagak River escapement (300,000 fish) was within 15% of the lower range. A morning survey again surprised managers when over 40,000 fish were observed in the upper Wood River, and heavy sign was visible below. Apparently, either a large abundance of fish migrated above the district prior to the most recent opening and were now migrating slowly into the river, or a large abundance migrated through the district during the opening. The survey results indicated that continued high passage rates at Wood River tower and achievement of the lower range of the Nushagak River goal were both likely. A decision was made shortly after the aerial survey to re-open the district at the next available tide, 6:30 p.m., July 7.

Fishing was extended until 8:30 p.m., July 9. Catch and escapement rates remained high through July 8, but fish passage dropped considerably early July 9. Escapement through July 8 reached 1.25 million in Wood River and 337 thousand in Nushagak River. Nushagak escapement was expected to reach the lower end of the range (340,000 fish) that day. Wood River escapement exceeded the goal by 25%, while Nushagak sockeye were 39% short of the desired point goal. The Nushagak Section remained closed for one tide following the extension, providing a larger potential fishing effort in Igushik Section, where an inriver push of fish was expected to boost escapement past the goal in that system.

Commercial fishing was permitted district-wide, beginning at 8:30 a.m., July 10, for the remainder of the season to maximize sockeye harvest while the abundance of coho remained low. In spite of a large fishing effort (424 vessels registered July 9, increasing to 465 July 11), escapement rates remained moderately high and stable through July 14, with Wood River daily escapements outnumbering Nushagak escapements by four to seven times. Weather impacted fishing effort beginning July 10, and by July 12, some fishing vessels were pulled out of the water for the season and vessel registration began to decline. Through July 14, Wood River escapement exceeded the goal by 50%, and escapement in Nushagak River exceeded the minimum range but fell short of the goal by 25%.

The Nushagak Section closed for the season at 1:30 a.m. July 15, after fishermen and company reports indicated that coho salmon harvest exceeded 10,000 fish. When the closure was announced (8:00 p.m., July 14), the department also announced that the Igushik Section and the newly created Wood River Special Harvest Area (WRSMA) would open to commercial fishing to target sockeye. Fishing in the WRSMA and Igushik Section is summarized below.

Igushik Section: The forecast for a strong Igushik River sockeye run combined with large Igushik River escapements in recent years prompted the most aggressive management strategy for that stock since 1989.² Managers advised fishermen to anticipate regular openings in Igushik Section in June as often as every two tides, once fish were documented in river. This strategy was applied to increase exploitation of Igushik River sockeye salmon over that of recent years, to harvest sockeye surplus to the Igushik River escapement goal and to provide regular catch rate information as an indicator of abundance. By allowing more regular early season openings, managers intended to control the escapement better than past years (Appendix Table 1).

The first fish were detected in the Igushik River when department test fish indices increased June 17 (Table 31). Exploitation on Igushik sockeye during previous district-wide chinook openings was minimal (Table 16). The

² Sockeye production in the Igushik system declined when escapements exceeded the upper range of the escapement goal. Since 1989, escapement in the Igushik system exceeded the point goal every year, and exceeded the upper range in four years.

final district-wide opening directed at chinook salmon closed at 11:00 p.m., June 18, and the commercial fishery began targeting sockeye when the June 18 opening was extended for 12 hours in Igushik Section only (Table 11).

Commercial openings were scheduled every two to three tides in the Igushik Section in spite of low inriver test fish indices, and catches remained small through June 22. The first significant indication of sockeye abundance was provided by the inriver test fish project on June 24, during the first district-wide opening targeting sockeye salmon. Igushik Section was opened immediately following the district-wide opening, then extended after inriver test fish indices indicated a large number of sockeye passing the test fish site.

Igushik River escapement increased at the counting tower site June 26, and continued to build at high rates through June 28 (Table 24). By June 29, sockeye escapement approximated one-third of the escapement goal and was over one week ahead of expected (average timing) levels. Regular openings were scheduled intermittently with district-wide openings through July 1 to continue to exploit Igushik sockeye, and to slow escapement rates. Intensive commercial fishing district-wide, beginning July 6, severely restricted opportunity to direct fishing effort toward Igushik stocks using Igushik Section only openings.

From June 30 through July 7, daily escapement rates at the counting tower were slightly lower than expected, and by July 9, escapement surplus was reduced to about two days. However, a second major surge of sockeye into the river was detected at the test fish site July 6, and at the counting tower July 9. District-wide fishing, continuous since July 7, was restricted to Igushik Section only for one tide (July 10) to focus effort on Igushik River sockeye. The Igushik River escapement goal was achieved July 12, and high escapement rates (greater than 10,000 fish per day) continued through July 17.

Late season fishing was permitted independently in Igushik Section for the first time in 1996 (Tables 16 & 17). Two openings were permitted in Igushik Section to assess late-season sockeye and coho catch potential following the closure of Nushagak Section. Both openings occurred simultaneous to openings in the WRSWA, for 7-hour durations July 15 and 16. Fishing effort was estimated during the July 15 opening by aerial survey at 34 drift boats and 62 set nets; effort was not estimated during the second opening, but fishermen reported a larger drift effort. Sockeye catch for the July 15 opening was not accurately estimated because company reports for that date included deliveries from Nushagak Section, but may have approximated 15-20,000 sockeye based on informal reports. Sockeye catch in Igushik Section July 16 was reported at 11 thousand fish.

Igushik Section remained closed to commercial fishing after the July 16 opening, for coho conservation. Companies reported coho harvests of only 400-600 fish for each opening, but fishermen reported much higher incidental coho catch rates. During the July 16 opening, fishermen reported delivering catches ranging from 10-

50% coho. If 30% of the average delivery was coho salmon, the July 16 catch may have approximated 3-4,000 coho, or five to six times the catch reported by companies. The magnitude of discrepancy between company and fishermen reports prohibited an accurate estimate of the coho catch in the 1996 late season Igushik Section openings, and prompted the decision to leave the area closed for the remainder of the season.

Wood River Special Harvest Area: The Wood River Special Harvest Area Management Plan allows commercial fishing in a portion of the Wood River when the Nushagak Section is closed for conservation of coho salmon, and the sockeye escapement goal has been reached in the Wood River. The intent of the plan is to provide an opportunity to harvest sockeye salmon surplus to escapement requirements, while minimizing impact to Nushagak River sockeye after late-season district closures. The impetus for this plan stemmed from closures of the commercial sockeye fishery for the conservation of coho salmon during 1994-1995. In addition to establishing criteria that specify when the department may open the area, the plan defines area, gear specifications and distance requirements, and addresses potential conflicts between commercial and subsistence users. Specifics of the plan that pertain to management restrict the department to open the WRSHA only when the Wood River sockeye escapement goal is achieved and the Nushagak Section is closed for coho conservation; and specify that the WRSHA may be opened to commercial fishing only when subsistence fishing in the area is closed.

Two major concerns were related to the exploratory aspect of fishing in the Wood River for the first time. First was a concern for the potential impact to other species made present by fishing closer to spawning areas and possibly on more concentrated stocks. To address the concern, timely and accurate catch reporting would be necessary to monitor individual period harvests by species. In addition, migrating fish should be allowed to pass through the area in regular pulses throughout the duration of the fishery. Second was a concern for potential logistical and enforcement problems in the new area. Regular closures would be necessary to allow F&WP officers and ADF&G managers to assess potential logistical and enforcement problems throughout changing tide stages and opening times, estimate harvest by species and allow managers enough time to close the fishery in an orderly, timely manner when necessary.

In keeping with the intent of the plan, the department opened the WRSHA soon after both of the plan's criteria were met July 15. On July 14 at 8:00 p.m., the department announced that commercial fishing in the Nushagak District would close at 1:30 a.m. July 15, and open simultaneously in the WRSHA and in Igushik Section for a 7-hour period, beginning at 1:00 p.m., July 15 (Table 11). The WRSHA and Igushik Section were opened simultaneously to provide the opportunity to harvest sockeye surplus and ease congestion in the WRSHA. Subsistence fishing in the WRSHA closed indefinitely at 9:00 a.m., July 15, with 11 hours notice.

Commercial fishing in the WRSWA was permitted during eight periods from July 15 through July 22 (Tables 11, 16 & 17). Openings generally occurred each day for durations of seven to eight hours and were initially timed similar to openings in the Nushagak District, i.e. two and one-half to three hours prior to high tide on tides 18 ft and less, but later periods opened approximately 1.5 hours prior to high water book time. Managers varied opening times relative to tide stage to compensate for the difference in the tide stage between Clark's Point and Wood River, to assess effects in the catch proportion by gear type and observe potential effects to migratory behavior.

Fishing effort was largest during the first opening (Table 16). A total of 200 drift boats and 45 set nets were counted in the area during an aerial survey, but only 90 drift boats were observed actively fishing. Effort during subsequent openings was much lower; drift effort ranged from 23 to 42 boats, and setnet effort ranged from 22 to 36 nets. Most effort counts were conducted one to two hours after each opening, and were thought to provide an adequate index of effort. However, effort decreased during most openings, and surveys conducted within one to two hours prior to closures documented no drift effort and fewer set nets.

Commercial harvest in the WRSWA totaled approximately 68,000 sockeye, and ranged from 1,500-17,600 sockeye per opening. The majority (57%) of the sockeye harvest was landed by set nets. Catches averaged 117 sockeye per drift net and 111 sockeye per set net.

Fishing success between gear types appeared to be related to opening time with respect to tide stage, and/or magnitude of the tide. Openings from July 15 - July 18 occurred on the lower high tide each day and opened approximately 2.5 hours before high water (Clark's Point). After July 18, fishing occurred on the higher high tide, and began approximately 1.5 hours prior to high water. Set net catch rates through July 18 exceeded those for drift nets, while drift net catch rates after July 18 exceeded those of set nets. The same pattern was apparent for relative harvests: prior to July 18, set net landings comprised the majority of the harvest, and after July 18, the minority. The relative effect of the two changes made July 18 is unknown.

Commercial fishing in the WRSWA exploited Wood River sockeye at a rate of about 33%. Exploitation was calculated using escapement estimated past the counting tower from 1:00 p.m., July 15, coincident with the first opening time, to 11:00 p.m. July 22, ten hours following the closure of the final inriver fishing period. The method of calculating exploitation assumes that all fish above the lower WRSWA boundary migrated upriver at a constant rate and were of Wood River origin.

Openings in the Wood River appeared to have a large influence on hourly escapement rates at the counting tower. A regular pulse-type rhythm became evident at the counting tower shortly after the first opening. Hourly counts

oscillated in cycles that appeared to be directly related to commercial fishery timing in the lower river, where hourly counts at the cycle peaks were generally eight to ten times larger than counts during the low periods. The largest decrease between two adjacent hourly counts occurred from six to ten and one-half hours (mean = seven hours) following each opening, and the largest increase between two adjacent hourly counts occurred from 11 to 13 hours (mean 12 hours) following each closure. Assuming a constant swimming speed, results from the WRSHA fishery can be used to estimate general travel times for sockeye salmon in the Wood River: seven hours from the Muklung River to the counting tower and five hours from the lower WRSHA boundary to the Muklung River. Mean travel time from the lower area boundary to the counting tower totaled 12 hours.

Impact to species other than sockeye from the 1996 WRSHA fishery remains unknown. Chinook, chum, pink and coho escapement in the Wood River system was not monitored, and catch reporting problems prevented adequate catch estimates for species other than sockeye salmon. Fishermen and company representatives reported an unknown quantity of fish kept for personal use and not reported as required. Companies also expressed difficulty in accurately estimating catches of species other than sockeye due to relative harvest size differences and logistical difficulties. Harvests of other species in the WRSHA presented in Table 17 were derived from these company reports and are not accurate.

Logistical and enforcement problems did not impact management of the fishery. However, fishermen reported intense site competition between set net permit holders at the lower boundary of the WRSHA on both sides of the river, and F&WP was involved in disputes among fishermen. Several drift boats were observed aground during the first opening, but none in subsequent openings. The most common enforcement concern reported was of drift vessels intentionally grounding nets on shore. Drift vessels were observed fishing close to shore with portions of net dry on shore during each opening; during some openings the majority of drift vessels were observed fishing in this manner.

Sockeye runs to the Nushagak District in 1996 totaled 8.3 million, 43% greater than the forecasted run and the third largest run since 1951 (Table 1, Appendix Tables 17 and 20). Wood River sockeye comprised the majority (63%), followed by Nushagak River (21%) and Igushik River (16%) sockeye (Appendix Table 18). Sockeye runs to all three systems were larger than forecast, but the difference between the actual and forecasted run size was greatest for Wood River. Most of the difference was due to a larger 3-ocean component than forecasted (Appendix Tables 2 and 3). However, in contrast with all other systems in Bristol Bay, the return of 2-ocean sockeye was much stronger (72%) than expected in Wood River.

A balance of escapement was necessary because the Wood River run was three times as large as the Nushagak River run, where the ratio between escapement goals was 2-to-1. The final ratio of Wood to Nushagak River

escapement (3.4 to 1) was greater than the inseason ratio (2.8 to 1) between runs, suggesting that the fishery was selective for Nushagak River stocks. Daily ratios of Wood to Nushagak River escapement began at less than 2-to-1 early in the season, and generally increased throughout the season. Increase in the escapement ratios may indicate a difference in run timing between stocks and/or selectivity in the fishery. Daily ratios early in the season were less than the ratio between runs, suggesting some difference in timing between the two stocks.

Sockeye escapement in the Wood and Nushagak Rivers was within desired ranges for both river systems (Appendix Table 1). The management strategy of balancing escapement shortfall in the Nushagak River with surplus in the Wood River was moderately successful, but surplus sockeye in Wood River exceeded the shortfall in Nushagak River. Sockeye salmon escapement in the Nushagak River (504,000 sockeye) fell short of the escapement goal by 9%, while Wood River escapement (1.65 million) surpassed the point goal by 65%. Total escapement in the two rivers combined was greater than the number necessary to balance Wood River surplus with Nushagak River shortfall. Factors that contributed to the large escapement included a run much larger than forecast, a low exploitation rate relative to a large fishing effort, the earliest closure of the Nushagak Section in recent history and a strong late-season abundance of sockeye salmon.

Escapement into the Nuyakuk River (251,000) was over three times larger than the 1995 escapement, but low when compared with other years when tower counts were conducted, between 1976 and 1995 (average 613,000) (Appendix Table 17). Unlike 1995, the Nuyakuk escapement comprised a substantial proportion (50%) of the Nushagak River escapement counted at the sonar site.

Sampling results in 1995 suggested that the age composition of Nuyakuk River sockeye may differ from the age composition of sockeye destined for other areas within the Nushagak River. In 1995, age 0.X sockeye comprised a small proportion (10%) of the Nuyakuk escapement - much smaller than the proportion at Portage Creek (47%). Unlike 1995 and other past years, age 0.X sockeye were present at Nuyakuk and Portage Creek sites in similar proportions (23% of the escapement sampled at Portage Creek, and 22% of the escapement sampled at the Nuyakuk tower) in 1996. Sampling results in 1996 suggest that the proportion of age 0.X sockeye may not provide a general indication of the Nuyakuk proportion at the sonar site.

Igushik Section was exclusively opened to fishing in 1996 more times, and for more hours, than any other year in the history of the fishery, yet Igushik River escapement was twice as large as the escapement goal (Appendix Table 1). Eleven openings, including two late-season openings, occurred exclusively in Igushik Section during 1996, for over 140 hours of fishing time. 1996 marks the eighth consecutive year that the Igushik River sockeye salmon escapement goal was exceeded.

The sockeye harvest (5.75 million) in the Nushagak District during 1996 was the tenth largest in the history of the fishery, and 42% larger than forecasted (Table 1, Appendix Tables 5 and 17). Commercial fishing effort observed by aerial survey July 7 and 9 was large (355 drift vessels), but not as large as the registered fishing effort July 11 (465 drift vessels)(Tables 12 and 16). Peak drift effort during 1996 was the largest observed since 1991. Sockeye harvested by set nets comprised 19.2% of the 1996 harvest, the lowest percentage since 1954.

Pink and Coho

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 was developed in response to recent poor Nushagak River coho runs and highly allocative impacts associated with management actions. The plan identifies specific management actions to be applied in each of three run strength scenarios. The plan directs the commercial fishery to be managed to achieve an inriver escapement of 100,000 coho salmon at the sonar site.

The strength of the 1996 run could not be projected prior to the commercial fishery because parental escapement was unknown. Due to low runs sizes and poor production trends, the department chose to manage the fisheries as if coho salmon run strength would fall within the middle range defined in the Nushagak Coho salmon management plan, or 60,000 - 100,000 fish. When run size is projected to fall within this range, the plan directs the department to close the targeted coho salmon fishery by July 23. Under this scenario, the plan also directs the department to manage the commercial fishery to achieve a pink salmon escapement goal range of 1.2 to 2.4 million (0.3 to 1.5 million above the pink salmon escapement point goal) and close the directed pink fishery no later than August 1. However, pink salmon run strength was not expected to be strong enough to support a commercial harvest in 1996, because parental escapement levels were poor. Subsistence fishing would be permitted to continue normally, unless inriver run strength was projected to fall below 60,000 coho during the season. Commercial fishing was anticipated to close in the Nushagak District once the abundance of coho salmon became significant in the sockeye fishery.

Managers set an objective to not exceed 10% of the expected coho run in the commercial catch in 1996, or 6-10 thousand fish. Unfortunately, most companies indicated that coho harvest could not be accurately estimated in season until fish were sorted during processing, because most salmon were delivered unsorted by species. Still other companies reported that reliable coho catch information could not be attained even during processing, until coho comprised a majority of the harvest. Standard company reports were not adequate to provide a basis for management action. Managers used informal reports from companies and fishermen to estimate coho harvest magnitude in season.

Coho harvests were expected to exceed 10,000 fish through July 14; informal reports suggested a coho harvest of approximately 8,000 fish through July 13, and most companies reported an increase in catch rates July 14. For comparison, traditional company reports provided an estimate at that time of approximately 2,000 coho salmon (Table 16). The Nushagak Section closed to commercial fishing at 1:30 a.m., July 15 for the conservation of coho salmon (Table 11). The Nushagak Section remain closed through July due to the incidental coho harvest, but commercial fishing continued in Igushik Section and the WRSHA. The Nushagak Section closed earlier than any other year in which late season closures were aimed at conserving coho salmon.

Escapement rates provided the first inseason indication that the coho run was larger than 100,000 fish (Table 25). Coho escapement rates increased July 23, and more than 80,000 coho were estimated at the sonar site between July 28 and July 30. The inriver goal was achieved and exceeded July 30, and escapement rates decreased July 31. Pink salmon escapement through July 30 totaled 416,000 fish and high passage rates continued through the end of July.

The revised coho run projection of greater than 100,000 fish provided for a commercial fishery for coho salmon as directed in the Nushagak Coho Management Plan. Effective at 3:00 p.m., August 1, the Nushagak District was closed to subsistence fishing to allow for a commercial opening the following day. Commercial fishing was permitted for one 15-hour period to target coho salmon, beginning at 3:30 p.m., August 2 (Table 11).

Limited markets and the presence of pink salmon posed a potential for waste in the August 2 opening. Three of the five companies remaining in Bristol Bay indicated an interest in buying coho prior to the opening, and one of those indicated that they would not buy pink salmon. Fishermen were advised that markets were limited and urged to verify a market prior to fishing. Two companies purchased salmon during the opening, but only one purchased pink salmon. Coho harvest was reported at 1,800 fish. Pink harvest was reported at 300 fish. Reports from fishermen indicated that pink salmon were wasted as a result of limited markets, and processor reports and informal reports from fishermen indicated a relatively even catch of pink and coho salmon. If fishermen and company reports provide any indication, the magnitude of waste that occurred as a result of the August 2 opening was probably similar to the reported coho harvest, or approximately 2,000 pink salmon.

The district was re-opened for a second, 25-hour opening to target coho on August 5. Over 4,700 coho and 0 pinks were reported by the remaining buyer. Again, fishermen reported pink waste as a result of no market. Catch rates of pink and coho salmon reported during the first of the two commercial openings, and in August 1

through August 5 subsistence catches, indicated that the magnitude of pink salmon waste during the second opening was, like the first opening, similar to the coho harvest, or several thousand fish. Commercial fishing remained closed after the August 5 opening due to a lack of a market and the demonstrated waste of pink salmon.

Approximately 6,500 coho salmon were harvested during the two commercial openings directed at coho salmon in August (Table 16). Fishing effort was low relative to other years; 60 drift net and 17 setnet deliveries were reported for both openings combined. The total number of pink salmon wasted was unknown, but fishermen and company reports and subsistence catches indicated that about 50% of the salmon harvested during the August 2 and August 5 openings were wasted. The subsistence fishery in the commercial district was opened from 3:00 p.m. August 6 through September 30.

The coho salmon inriver run goal was achieved for the first time since the fishery was managed for inriver escapement goals. The inriver run estimated at the sonar site through August 25 (187,000 coho salmon) was 87% above the inriver run goal and the third largest since estimates became available in 1980. Over 50% of the inriver run occurred over one 4-day period (Table 25).

The coho run totaled 205,000 fish, the largest run documented since 1984 (Appendix Table 25).³ The strength of the run could not be anticipated prior to the season. Although the parental escapement size was unknown, the probability of a run that large was low due to the trend of low run size and production evidenced since 1991. Due to the unpredictable nature of coho salmon migration patterns, managers could not project the actual magnitude of the run until greater than 50% of the run was accounted for. Nor could managers project a run strong enough to trigger a change in management, as described in the Nushagak Coho Salmon Management Plan, until July 31 - over two weeks after the sockeye fishery was closed, and after the escapement goal for coho salmon was achieved.

The 1996 pink salmon run (824,000, not including waste) remained well below the 1958-1994 average (2.8 million) (Appendix Table 24). Due to the lack of commercial fishing, nearly the entire pink salmon run migrated into the Nushagak River; escapement through August 25 at the Portage Creek sonar site (821,000) equated to 91% of the escapement goal. Although companies reported 2,400 pink salmon harvested, informal reports indicated that the actual harvest, considering wasted fish, was at least three times the reported harvest.

³ A post-season industry poll resulted in a revised harvest estimate for July of 17,000 coho salmon. However, the revised estimate was incomplete because some companies were unable to provide an estimate, and other indicated "minimum" estimates. Combining the revised estimate for July harvests with harvest estimates for August puts the total harvest estimate at 23,500 coho salmon. When combined with preliminary sport and subsistence harvests, and the inriver run, the Nushagak River coho salmon run totaled about 216,000 fish.

Fall commercial fishing in the Nushagak District was plagued with three problems in 1996: inaccurate catch estimates, an inability to estimate coho run strength early enough to provide opportunity to harvest surplus coho and sockeye salmon, and pink salmon waste. To compensate, management of the commercial fishery in 1996 was conservative and the effect to the resource was a larger inriver coho salmon run and larger sockeye salmon escapements. Logistical problems associated with processor operations, the unpredictable nature of coho salmon migratory and production patterns and poor future market outlooks for pink salmon suggest that each of these problems will continue. Unless solutions are found, management of the fall commercial fishery will necessarily remain conservative.

Togiak District

Regulatory Action

The Alaska Board of Fisheries adopted the Togiak District Salmon Management Plan (TDSMP) in January, 1996. This plan set forth certain management guidelines for the Togiak District. The plan: (1) added 36 hours of fishing time to the weekly fishing schedule between July 1 and July 16 for the Togiak River Section; (2) limited the length of extensions to the weekly fishing schedule to 48 hours (eliminated continuous fishing); (3) imposed a mesh restriction of 5 and 1/2 inches or less from June 15 through July 15 for chinook conservation; (4) restricted district registration and re-registration by prohibiting boats that had fished in any other district to fish in the Togiak District until July 24, and conversely, prohibiting boats that had fished in the Togiak District to fish in any other Bristol Bay district until the same date.

Forecast

The 1996 inshore sockeye run to the Togiak River was forecasted to reach 605,000 sockeye salmon (Table 1), of which 76% were projected to be 3-ocean fish and 24% 2-ocean fish (Table 2). With an escapement goal of 150,000 at Togiak Lake, and an additional 25,000 fish (20-year average) spawning in the tributaries below the towers, 430,000 sockeye were potentially available as harvestable surplus in the Togiak River Section. 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 1996 in the Togiak Section was slightly below the average (1976-1995) harvest of 449,000 fish (Appendix Table 19), therefore, a moderate management approach was planned.

No formal forecast is issued for chinook salmon runs in the Togiak River. Chinook run strength declined from 1984 through 1991; and chinook escapements in the Togiak River fell short of the goal (10,000) from 1985 through 1992 (Appendix Table 22). Although the chinook goal was reached in 1993, 1994, and 1995, commercial closures and mesh size restrictions were necessary; runs since 1991 have increased moderately. Therefore, a reduced weekly schedule in late June, instead of complete closures, were planned for the 1996 season.

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 (1992) in the Togiak River was estimated to be 80,100 fish, the highest since 1980, or 60% over the escapement goal of 50,000 fish. Coho escapement for the entire Togiak District was estimated to be 118,000 fish for 1992. Good parent year escapement was the basis for an optimistic but cautious management strategy for coho salmon in 1996.

Togiak District is managed differently than other areas of Bristol Bay. The district uses a fixed fishing schedule of three days per week in the Kulukak Section, four days per week in Togiak River Section, and five days per week in the Osviak, Matogak, and Cape Pierce Sections. As mentioned above, the TDSMP added 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 escapement objectives.

Subsistence fishing is allowed in each section of the Togiak District during open commercial periods. Thus with the above weekly schedule and no extended closures in 1996, subsistence fishing was allowed from 3 to 5 1/2 days per week between June 1 and September 30. It is also open 7 days per week in freshwater streams with 25 fathom set gillnets.

Chinook

At a public meeting in early June in Togiak, 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 two weeks of June for all sections of the district to reduce the exploitation of chinook salmon, particularly since the new 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 July 1. The extended fishing schedule would begin at that time for the Togiak River Section.

Since the new TDSMP restricted mesh size from June 15 through July 15, an emergency order was issued implementing the same restriction from June 1, when the season opened, to June 15. Fishing opened with a regular weekly schedule on June 3.

The first landings of the 1996 season occurred on June 10 (Table 18). By the close of fishing on June 14, the cumulative chinook catch in Togiak Section was less than 500 fish (Table 19), well below the historical average for that date. Effort (number of deliveries) was below average levels, and catch rates (number of fish per delivery) were mixed with some days being below the average, and some above. No definitive indications of chinook run strength were apparent at this point in the season; since 3 days of closure during the normal weekly schedule had been necessary to achieve the goal in 1995, a conservative approach was also called for this season to achieve the escapement goal. The department announced via public radio on June 18 that commercial fishing would close in the Togiak River, Matogak, Osviak, and Cape Peirce Sections at 9:00 p.m., Thursday, June 20; a reduction of 12 hours from the weekly fishing schedule. Kulukak Section fished a regular weekly schedule.

Based on the 1995 chinook run to the Togiak River of approximately 22,000 fish (11,000 escapement, 11,000 catch) which was a 10% reduction in run strength from 1994 (Appendix Table 22), staff expected a chinook run of similar size. Effort levels increased in the chinook fishery the third week in June to average levels, daily catch rates began to fall consistently below average levels. The resulting chinook harvest reached 1,200 fish in the Togiak River Section for the 84-hour opening ending June 20.

Cumulative chinook harvest for Togiak District through June 20 was 1,650 fish, which was well below average for that date. The department announced a 72-hour opening for the week of June 24, which was a 24-hour reduction in the weekly fishing schedule. Effort had increased to above average levels, and as the daily catches were reported, it became evident that the chinook run to the Togiak River was below the level of recent years. Togiak River Section chinook harvest from this opening was an additional 2,650 fish, bringing the cumulative harvest through June 27 to 4,300 fish or 55% of the average catch for that date (Table 19). Discussions with Togiak residents and sportfishing lodge operators indicated that chinook abundance in the Togiak River was comparable to recent years.

Sockeye

Sockeye salmon management began July 1 along with the extended weekly fishing schedule implemented by the new TDSMP. Sockeye escapements exceeded the goal in the Togiak River from 1991 through 1995, 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 in excess of the desired goal. The additional 36 hours added to the weekly schedule by the newly implemented management plan would do this even before overall sockeye run strength could be assessed in season.

There was concern among staff preseason regarding the amount of effort that would remain in the Togiak District with the restrictions implemented by the TDSMP. If effort was low, and the run exceeded forecasted levels as in 1995, there may not be sufficient effort to harvest those fish surplus to escapement needs, particularly since the new management plan prohibited continuous fishing. On July 1, 33 drift fishing vessels (Table 12), and 66 set net permits were registered for Togiak District. The setnet effort was similar to past years while the drift effort was slightly higher than normal for the first week of July, but far less than would normally be seen by mid-July. With the district registration restrictions of the TDSMP, both set and drift gillnet effort should remain stable through July 23, which was historically the 85% point in the sockeye harvest for Togiak District.

The first aerial survey of the Kulukak and Togiak Rivers was conducted July 1 under good conditions; approximately 4,800 sockeye were observed in the lower portions of Togiak River, while 1,400 sockeye were counted in the Kulukak drainage. Both drainages contained mixed chum and chinook along with the sockeye estimates. These numbers were average for this date in both drainages. Counting towers below Togiak Lake were erected and technicians began counting on July 3 with fish present. Daily sockeye harvests were above average, while catch per delivery figures remained slightly below average in both Togiak River Section and Kulukak Section during the weekly fishing period beginning July 1, there was no indication of a strong sockeye return to Togiak District.

A second aerial survey of the Togiak River was flown on July 5 with fair conditions; over 11,000 sockeye were observed. This number was above average for this date, and showed continued entry of fish into the Togiak River throughout the weekly fishing period even with strong daily catches in the district. Cumulative sockeye catch reached 99,000 in Togiak River Section (10% above average), while in Kulukuk Section the harvest had reached 22,000 sockeye (almost double the average) through the first weekly period ending July 6.

Considering the additional 36-hours of fishing time in the Togiak River Section over past years, the cumulative harvest was not indicative of a strong return.

During the weekly fishing period beginning July 8, daily catches in both Togiak River and Kulukak Sections began to drop below average. Tower counts at Togiak Lake started at average levels but leveled off after the first few days of operation, and began to lag. By July 10, only 11,000 sockeye had passed the towers, which put Togiak River escapement three days behind the expected level. Kulukuk Section daily catches were mediocre, while catch rates continued slightly below average during the week.

The third aerial survey of the season was conducted on July 14 under fair conditions. Fish were observed in all sections of the Togiak River; staff estimated approximately 14,500 fish in the mainstem below the counting towers (Table 32). Using historic escapement figures, 30% of the sockeye escapement has passed the counting towers by July 14, on average. Sockeye escapement past the towers was only 32,000 by this date (Table 24). Although 1996 was an extremely low-water year in all of southwestern Alaska, and low stream flows are known to delay entry of salmon into natal streams, concern regarding achievement of the sockeye escapement goal began to build. The number of sockeye salmon observed in Kulukuk River and Kulukuk Lake had reached 3,900 fish, which was also a relatively poor sockeye escapement for this date.

Togiak River Section and Kulukak Section cumulative sockeye harvest through July 13, the end of the 2nd weekly period in July, was 187,000 and 32,000 fish respectively. This was about 96% of the average for Togiak River Section and was 50% above average for Kulukak Section.

Daily escapement past the counting towers on the Togiak River continued in the 6,000-8,000 fish range during the week of July 15 (Table 24); the cumulative escapement reached 38,000 by this date, which was now tracking about 2 ½ days behind expected levels. The weekly fishing period opened as scheduled on Monday with daily catches and catch rates in the Togiak River Section continuing to fall farther below average. Kulukak Section showed higher than average effort, good daily catches, but catch-per-delivery was below average.

On July 16, the department announced that all sections of the Togiak District would close at 6:00 p.m., Wednesday, July 17 due to lack of escapement in both the Togiak and Kulukak Rivers (Table 11). Permit

holders were advised to standby for further announcements, and the district would reopen as scheduled on Monday, July 22.

An aerial survey on July 19 showed an increase in the number of sockeye entering the lower Togiak River, almost 32,000 sockeye were observed in the Togiak River (Table 32). Sockeye escapement past the counting towers had reached 66,000 fish by this date (Table 24), and daily passage rates had increased slightly. This would likely result in continued daily passage in the 7,000 - 8,000 fish range for several days. Based on the increased showing of fish in the river, good daily passage rates, and reports of a strong showing of fish in Togiak Bay, Togiak River Section was re-opened for a 24-hour period starting 9:00 a.m., July 20. All other sections would open on their regular schedule on Monday, July 22.

Through July 21, the cumulative sockeye harvest for Togiak River Section had reached 268,000 - or 62% of the pre-season harvest forecast; historically, 80% of the harvest had occurred by this date. The regular weekly fishing period opened on July 22. Daily catches in the Togiak River Section continued in the 8,000 - 10,000 sockeye range through the week. Sockeye escapement at the Togiak Lake counting towers had risen to over 12,000 fish per day on July 23, with the cumulative total reaching 98,000 fish. An abbreviated aerial survey was flown on July 24, which documented over 17,000 sockeye from the Ongivinuk River to the counting towers. This would account for at least three more days of the elevated passage rates observed the last few days. Kulukak Section daily sockeye harvest was declining but still in the 7,000 - 10,000 range.

On July 25, an announcement extending the fishery in Togiak River Section from 9:00 a.m., Friday, through 9:00 p.m., Saturday, July 27 a 36-hour extension (Table 11). Cumulative sockeye harvest for the section had reached 307,000, and daily passage rates continued at 12,000 - 13,000 fish per day; bringing the escapement to 109,000 fish through July 24. Daily sockeye harvest in Togiak River Section continued to average close to 10,000 fish throughout the extension.

By the beginning of the next weekly fishing period on July 29, cumulative sockeye salmon harvest for Togiak District had reached 459,000 fish, while daily catches began to drop below the 10,000 fish level (Table 18). Escapement counted past the Togiak towers had exceeded 140,000 sockeye with the daily counts still over 3,000 fish per day (Table 24). Another extension was announced on August 1, extending the fishing period for the Togiak River Section only from 9:00 a.m., Friday through 9:00 p.m. Saturday, August 3 (36 hours). This would be the final weekly fishing period directed at sockeye salmon.

Coho

When the counting towers were taken out on August 1, cumulative sockeye escapement in the Togiak River had reached 157,000 fish, or within 4% of the 150,000 escapement goal. The commercial sockeye harvest in the Togiak River Section had increased to 356,000 fish or 82% of the forecasted harvest. Kulukuk Section sockeye harvest had reached 76,500 fish, which was 75% over the long-term average for that date. District-wide sockeye harvest had reached 460,000 fish. With the sockeye escapement goal achieved, sockeye daily catches declining, and coho harvest increasing steadily, management emphasis shifted to coho salmon in the Togiak District.

The next weekly fishing period opened 9:00 a.m. Monday, August 5. The Togiak River Section daily catches were 1,000 - 2,000 sockeye and 500 - 1,000 coho (Table 19). Sockeye catches declined slowly throughout the week, while daily coho catches increased: cumulative coho harvest reached 5,700 for Togiak River Section by the close of the normal weekly fishing period on August 9, almost double the average catch for this date. Effort levels were also above average for this date.

On Thursday, August 8, an unidentified person called from Togiak to advise the department that there was only one buyer left in the Togiak District, and that buyer was only buying sockeye, chinook, and coho. The processor refused to buy pink or chum salmon. The caller was angry with the "waste" that this situation might cause. Chum and pink salmon have become less lucrative from a marketing standpoint in recent years, and after August 1, the daily catches of these species in the Togiak River Section usually drop rapidly to negligible levels. After a discussion with the processor, with several village residents, and with department headquarters, a gillnet mesh size restriction of 5 and 3/8" or larger was announced for the next weekly fishing period to further reduce the potential harvest of pink and chum salmon (Table 11). The small number of pink and chum salmon that were not sold commercially were processed for subsistence use.

Aerial surveys are generally not productive to assess 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 until that time. The commercial catch rates provide the only indication of coho run strength available in early August.

The next weekly commercial fishing period began on August 12. The daily catches and catch-per-delivery remained above average, supporting the impression of a moderate coho return. No reduction in the normal

weekly fishing schedule was required. Cumulative coho harvest for Togiak River Section through the close of the fishing period on August 16 was 21,600 fish (Table 19). This was above average for this date.

Fishing re-opened on August 19. Both daily coho catches and catch-per-delivery remained above average during the week; and reports from village residents indicated that coho were entering the Togiak River in good numbers. An aerial survey flown on August 23 yielded a raw count of approximately 16,700 coho salmon in the mainstem Togiak River, below the confluence with the Ongivinuck River. Using normal expansion factors for coho salmon in the Togiak River, this raw count yields an estimate of approximately 50,000 coho salmon escapement. With the escapement goal virtually achieved, no reductions in the weekly fishing schedule were implemented the rest of the season.

Togiak District cumulative coho harvest had reached 58,829 fish through the close of fishing on September 13; which was well above expected the long-term average. Effort had dropped to average or below the last week of the coho fishery, mostly due to inclement weather. Only one buyer was operating in Togiak after the first week of August.

Summary

One of the most important regulatory changes implemented by the TDSMP was the restriction on district re-registration. The effect of this restriction was to hold both drift and set gillnet effort constant until July 24. By the last week in June, there were 33 drift gillnet vessels, and 66 setnet permits registered to fish in the Togiak District. These numbers were verified by aerial surveys several times between July 1 and July 24. On July 24, 86 drift vessels (62 in Togiak River Section, 24 in Kulukak Section) and 76 setnets (56 in Togiak River Section, 20 in Kulukak Section) were observed fishing in the district. This was the peak for both drift and setnet effort in the Togiak District. One week later, effort had dropped to 60 drift gillnet vessels and 54 setnets. No fishing occurred in Kulukak Section after July 30. Beginning the second week in August, effort declined to much lower levels for the coho fishery; 6 drift gillnet vessels and 14 setnets were observed on August 22.

Enforcement coverage improved considerably over recent years with additional effort directed at Togiak District by Fish and Wildlife Protection. This increased presence lead to better compliance and fewer complaints inseason.

The preliminary district sockeye harvest totaled 460,063 fish (Table 18 and Appendix Table 19), 2% above the 1976-1995 average of 450,220 (Appendix Table 5). The Togiak River Section sockeye catch (381,539) was 2% below the 1976-1995 average, while the Kulukak sockeye catch (76,833) was 43% above the long-term (1976-1995) average for that section (Appendix Table 19). Matogak Section received commercial fishing effort on only 10 days throughout the 1996 season, producing a sockeye harvest of 1,543 fish (Table 21).

Escapement enumeration at Togiak Lake ended on August 1 when the tower project terminated. Togiak Lake sockeye salmon escapement was estimated at 156,954 fish, or 4% above the escapement goal (Table 32, Appendix Table 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 187,174 sockeye. Escapement plus the Togiak River Section catch yielded a total run to the Togiak River of 568,713 sockeye, 6% below the preseason forecast. Escapement into the Kulukak Section totaled 18,980 fish, 39% below the recent 10-year average, and the second lowest since 1976.

The 1996 Togiak District harvest of 8,725 chinook was approximately 69% of the 1986-1995 average (Appendix Tables 6 & 22). After three consecutive years of reaching the escapement goal, the chinook escapement in the Togiak River fell short of the desired goal (10,000). The escapement estimate of 8,300 chinook was derived from aerial survey under poor visibility conditions. Commercial exploitation of the Togiak River chinook stock in 1996 was 50% (not considering sport and subsistence harvests), less than the average (1980-1995) of 53%. Postseason aerial escapement estimates of chinook salmon on the spawning grounds were comparable to long-term average levels in most systems in the district, with the exception of a low return to Kulukak River. Escapement estimates totaled 1,745 for Kulukak River, with an additional 1,432 estimated in the Quigmy, Osviak, Matogak, Slug, and Negukthlik Rivers combined. The total district escapement of 11,476 chinook was below the long-term average, and 10% below the 1986-1995 average of 12,714. The combined total run to Togiak District of 21,401 chinook salmon was 19% below the recent 5-year average, and showed a decrease in run strength for two consecutive years since 1994 (Appendix Table 22).

The 1996 Togiak District chum salmon harvest of 207,094 was 16% below the 1976-1995 average (Appendix Table 7). The commercial catch combined with the district-wide escapement estimate of 117,240 fish

determined from aerial survey, produced a total run estimate of 324,334 chum salmon, approximately 65% of the 1976-1995 mean (Appendix Table 23).

The 1996 pink salmon catch for Togiak District was 30,588 fish, 32% below the 1976-95 even-year average (Appendix Table 8). Harvest figures do not reflect run strengths as much as market conditions for this species.

The 1996 commercial catch of coho salmon in the Togiak District (59,262 fish) was the fifth highest since 1980, and 60% above of the 1980-1995 average. Good parent-year escapement was the major factor, however, returns-per-spawner for the parent-year (1992) were slightly below average. Interception of Bristol Bay-bound coho salmon in other fisheries has been theorized as a contributing factor in the generally reduced coho returns in southwestern Alaska. Post-season aerial survey estimates of spawning escapement were conducted successfully on most streams in the Togiak District in 1996. Coho salmon escapement in the Togiak River and tributaries was estimated to be 64,980 fish, and district-wide coho escapement was over 120,000 fish with the Quigmy, Negukthlik, and Ungalikthluk Rivers uncounted. Comparative counts from previous years are provided in Appendix Table 34.

In retrospect, the Togiak District Salmon Management Plan appeared to be a workable plan which achieved the goals intended by the Togiak Advisory Committee and village residents. Effort remained constant throughout what has historically been the 86% point of the sockeye harvest (July 23). Seventy-eight percent of the Togiak River Section sockeye catch occurred through this date. Exploitation was increased on the early portion of the sockeye run with the increased weekly fishing schedule implemented by the plan. Extensions to the normal weekly schedule were required during the second half of July to harvest sockeye salmon surplus to escapement needs. These extensions were 36 hours in length; the plan allows a maximum of 48-hour extensions. Continuous fishing was not required to control escapement. Staff's preseason concern regarding having sufficient effort to control escapement was unfounded, the effort throughout most of the sockeye fishery was up from recent years. No proposals for modifying the TDSMP are planned by department staff at present.

1996 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 1996, only gillnets were recognized as legal subsistence gear, except in the Togiak district spear fishing was also allowed. Net 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.

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

Districtwide, 11 emergency orders related to subsistence were issued, 10 in the Nushagak drainage (Table 11).

Within the Nushagak commercial district subsistence fishing was allowed by emergency order from 9:00 a.m. June 1 until 9:00 a.m. June 7 and 3:00 p.m. June 7 until 3:00 p.m. June 8. It was again opened from 7:00 a.m. until 7:00 p.m. June 10, 7:00 p.m. June 10 until 7:00 p.m. June 11, and 9:00 p.m. June 14 until 10:00 a.m. June 15. Subsistence fishing was again authorized in the Nushagak Section of the commercial district beginning July 17 after the district was closed to commercial fishing on July 15. Subsistence fishing was allowed from 2:30 p.m. July 17 until midnight September 30. However, this order was rescinded at 3:00 p.m. August 1 due to the impending reopening of the commercial fishery, thus reinstating the closure of the Nushagak commercial fishing district to subsistence fishing except during open commercial fishing periods. The Nushagak commercial district was reopened to subsistence fishing from 3:00 p.m. August 6 until 12:00 midnight September 30 after the last open commercial fishing period on August 3.

The Wood River Special Harvest Area was established by the Board of Fisheries at the January 1996 meeting. Part of the regulations implementing this new fishery required closure of subsistence fishery in the area to avoid gear conflict. Subsistence fishing in the special harvest area was closed at 9:00 a.m. July 15 and reopened at 6:00 p.m. July 22 after the last commercial fishing period.

In the Naknek River Special Harvest Area an additional 24-hour period was added to the regular weekly subsistence fishing schedule from 9:00 a.m. July 11 until 9:00 a.m. July 12.

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 reflect: 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 1996, a total of 1,110 permits were issued for Bristol Bay; the largest number were for the Nushagak and Naknek/Kvichak districts. For the Nushagak and Naknek/Kvichak districts, more permits were issued in 1996 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 other districts in 1996 than the average for the past 10 years.

Harvest

The total Bristol Bay subsistence salmon harvest in 1996 was 142,813 fish (Table 35). This number is below both the 20-year average and recent 10-year average of 164,825. Only the chinook harvest was above the recent 10-year average.

Most of the harvests were taken in the Naknek/Kvichak (60%) and the Nushagak (35%) districts. The Naknek/Kvichak total harvest of 85,971 fish was below the recent 10-year average of 93,410. Kvichak drainage communities harvested sockeye salmon at levels below their recent 10-year averages, except Igiugig and Port Alsworth. Kvichak drainage residents reported harvesting 54,872 sockeye salmon, compared to a recent 10-year average of 68,908 and 20-year average of 73,969 sockeye salmon (Appendix Table 31).

In the Nushagak District the total harvest was 50,370 salmon. The recent 10-year average is 60,824 salmon. All species, except chinook, were harvested in the Nushagak District at levels below their recent 10-year averages, with the sockeye harvest of 22,935 near last year's historical low of 22,793 salmon (Appendix Table 32). The Nushagak chinook harvest of 15,941 is the second highest recorded harvest. The Nushagak chinook harvest historical high is 17,709 fish reported in 1993.

Harvests of all species in the Togiak District were below their recent 10-year averages, due in large part to the decreased number of permits obtained and returned by drainage residents. Harvests in the Ugashik district showed a decline from a fairly stable reported harvest over the past decade. The reported salmon harvest of 1,623 fish compares to the recent 10-year average of 2,060. In the Egegik District the total salmon harvest increased substantially beginning in 1991 but declined somewhat this year to 3,173 salmon (Appendix Table 30).

In 1996, the subsistence salmon harvest was composed of 75.9% sockeye, 12.7% chinook, 4.1% chum, 5.4% coho, and 1.8% 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, 1996 *

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	8,626	3,458	149%	4,000	6,000-10,000	1,451	176%	4,626	2,007	130%
Branch River	638	706	-10%	185	170-200	307	-40%	453	399	14%
Naknek River	4,610	6,860	-33%	1,000	800-1,400	1,078	-7%	3,610	5,781	-38%
Total	13,874	11,024	26%	5,185	6,970-11,600	2,836	83%	8,689	8,187	6%
EGEGIK DISTRICT										
	16,887	11,918	42%	1,000	800-1,400	1,076	-7%	15,887	10,842	47%
UGASHIK DISTRICT										
	6,198	5,078	22%	700	500-1,200	668	5%	5,498	4,410	25%
NUSHAGAK DISTRICT										
Wood River	3,056	5,030	-39%	1,000	700-1,200	1,650	-39%	2,056	3,380	-39%
Igushik River	1,248	1,502	-17%	200	150-250	401	-50%	1,048	1,102	-5%
Nushagak-Mulchatna	1,497	1,771	-15%	550	340-760	504	9%	947	1,268	-25%
Total	5,801	8,303	-30%	1,750	1,190-2,210	2,555	-32%	4,051	5,750	-30%
TOGIK DISTRICT										
	605	569	6%	150	140-250	157	-4%	455	382	19%
TOTAL BRISTOL BAY										
	43,365	36,892	18%	8,785	9,630-16,160	7,292	20%	34,580	29,571	17%

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 separately from the major system in the district

* 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, 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, 1996.

District and River System	2-Ocean			3-Ocean			Other	Total
	1.2 (1992)	2.2 (1991)	Total	1.3 (1991)	2.3 (1990)	Total		
<u>NAKNEK-KVICHAK DISTRICT</u>								
Kvichak River	3,030	2,767	5,798	1,468	1,360	2,828	-	8,626
Branch River	295	128	423	169	47	215	-	638
Naknek River	487	1,321	1,808	1,812	991	2,803	-	4,610
Total	3,812	4,216	8,028	3,449	2,397	5,846	-	13,874
<u>EGEGIK DISTRICT</u>								
EGEGIK DISTRICT	1,070	9,037	10,107	2,084	4,697	6,781	-	16,887
<u>UGASHIK DISTRICT</u>								
UGASHIK DISTRICT	1,288	2,244	3,532	1,865	800	2,666	-	6,198
<u>NUSHAGAK DISTRICT</u>								
Wood River	1,244	167	1,411	1,546	99	1,645	-	3,056
Igushik River	249	46	295	894	60	953	-	1,248
Nushagak River	117	5	121	734	15	749	627	1,497
Total	1,610	217	1,827	3,174	173	3,347	627	5,801
<u>TOGIAK DISTRICT</u>								
TOGIAK DISTRICT	122	24	146	409	49	459	-	605
<u>TOTAL BRISTOL BAY¹</u>								
Number	7,902	15,738	23,640	10,982	8,117	19,099	627	43,366
Percent	18	36	55	25	19	44	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, 1996.*

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	406	669	1,075	14	1,230	1,136	2,380	3,455
Percent	11.8	19.4	31.1	0.4	35.6	32.9	68.9	100
Branch River								
Number	93	158	251	0	220	231	451	702
Percent	13.2	22.5	35.8	0.0	31.3	32.9	64.2	100
Naknek River								
Number	252	236	488	16	5,081	1,257	6,354	6,842
Percent	3.7	3.4	7.1	0.2	74.3	18.4	92.9	100
Total								
Number	751	1,063	1,814	30	6,531	2,624	9,185	10,999
Percent	6.8	9.7	16.5	0.3	59.4	23.9	83.5	100
EGEGIK DISTRICT								
Number	324	2,979	3,303	31	3,866	4,613	8,510	11,813
Percent	2.7	25.2	28.0	0.3	32.7	39.1	72.0	100
UGASHIK DISTRICT								
Number	184	569	753	48	3,101	1,185	4,334	5,087
Percent	3.6	11.2	14.8	0.9	61.0	23.3	85.2	100
NUSHAGAK DISTRICT								
Wood River								
Number	2,318	52	2,370	56	2,425	164	2,645	5,015
Percent	46.2	1.0	47.3	1.1	48.4	3.3	52.7	100
Igushik River								
Number	43	3	46	3	1,305	145	1,453	1,499
Percent	2.9	0.2	3.1	0.2	87.1	9.7	96.9	100
Nush-Mulchat. River								
Number	220	3	223	490	994	6	1,490	1,713
Percent	12.8	0.2	13.0	28.6	58.0	0.4	87.0	100
Total								
Number	2,581	58	2,639	549	4,724	315	5,588	8,227
Percent	31.4	0.7	32.1	6.7	57.4	3.8	67.9	100
TOGIAK DISTRICT^b								
Number	48	26	74	34	418	36	488	562
Percent	8.5	4.6	13.2	6.0	74.4	6.4	86.8	100
TOTAL BRISTOL BAY¹								
Number	3,888	4,695	8,583	692	18,640	8,773	28,105	36,688
Percent	10.6	12.8	23.4	1.9	50.8	23.9	76.6	100

¹ Approximately 244,000 additional sockeye salmon of several minor age classes, or returning to minor Bristol Bay drainages, in 1996 are not included in this total.

^a The inshore run data does not include the 1996 False Pass/Alaska Peninsula catch of Bristol Bay sockeye or any high seas by-catch of immatures.

^b Does not include rivers other than Togiak River.

Table 4. Inshore commercial catch and escapement of sockeye salmon, Bristol Bay, in numbers of fish, 1996.^a

District and River System	Catch	Escapement	Total Run
<u>NAKNEK-KVICHAK DISTRICT</u>			
Kvichak River	2,006,985	1,450,578	3,457,563
Branch River	399,297	306,750	706,047
Naknek River	5,781,438	1,078,098	6,859,536
Total	8,187,720	2,835,426	11,023,146
<u>EGEGIK DISTRICT</u>			
	10,842,251	1,075,596	11,917,847
<u>UGASHIK DISTRICT</u>			
	4,410,073	667,518	5,077,591
<u>NUSHAGAK DISTRICT</u>			
Wood River	3,380,269	1,649,598	5,029,867
Igushik River	1,101,599	400,746	1,502,345
Nushagak-Mulchatna	1,267,751	503,651	1,771,402
Total	5,749,619	2,553,995	8,303,614
<u>TOGIAK DISTRICT¹</u>			
Togiak Lake	382,157	156,954	539,111
Togiak River/Tributaries		30,220	30,220
Kulukak System		18,980	18,980
Other Systems		6,370	2,137
Total	382,157	212,524	594,681
TOTAL BRISTOL BAY	29,571,820	7,345,059	36,916,879

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

^a Inshore 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, 1996.

District and River System	Catch ¹	Escapement ²	Total Run
<u>NAKNEK-KVICHAK DISTRICT</u>			
Kvichak River		126 ^a	
Branch River			
Naknek River		396 ^a	
Total	4,628		
<u>EGEGIK DISTRICT</u>	53	103,116	103,169
<u>UGASHIK DISTRICT</u>	59	616 ^a	675
<u>NUSHAGAK DISTRICT</u>	2,438	821,312 ^b	823,750
<u>TOGIAK DISTRICT</u>			
Togiak Section	27,518		
Kulukak Section	2,814		
Matogak Section	256		
Osviak Section	0		
Total	30,588		
TOTAL BRISTOL BAY	37,766		

¹ Inshore district catches are preliminary and escapement figures are final.

² Estimated by aerial survey unless otherwise noted.

^a Tower count (partial).

^b Sonar count includes Nushagak River sonar count only.

^c Includes only Togiak River and its tributaries.

Table 6. Offshore test fishing catch indices and estimated inshore daily passage rate of sockeye salmon, Port Moller, Bristol Bay, 1996.

Date	No. of Stations Fished	Sockeye Catch	Running Mean		Index ¹		Passage Rate ²	
			Length (mm)		Daily	Cum.	Daily	Cum.
6/11	0	0	0		22	22	429	429
12	4	50	558		22	44	429	858
13	4	63	557		24	68	483	1,341
14	4	173	559		53	121	1,065	2,406
15	4	106	567		39	160	771	3,177
16	4	288	557		98	258	1,953	5,130
17	4	142	565		58	316	1,166	6,296
18	4	195	556		76	392	1,516	7,812
19	4	126	566		56	448	1,114	8,926
20	4	268	553		106	554	2,107	11,033
21	4	227	566		100	654	2,003	13,036
22	4	200	564		77	732	1,544	14,580
23	4	244	560		88	820	1,762	16,342
24	0	0	0		100	920	1,993	18,335
25	4	270	558		102	1,022	2,027	20,362
26	4	341	560		132	1,154	2,640	23,002
27	4	243	566		109	1,263	2,179	25,181
28	4	261	565		111	1,374	2,209	27,390
29	4	197	560		78	1,452	1,554	28,944
30	4	293	549		131	1,583	2,606	31,550
7/1	4	223	562		104	1,687	2,073	33,623
2	4	314	560		155	1,842	3,093	36,716
3	4	240	563		117	1,959	2,331	39,047
4	4	483	563		184	2,143	3,675	42,722
5	4	180	558		108	2,251	0	42,722
6	4	375	560		157	2,408	0	42,722
7	4	103	560		59	2,467	0	42,722
8	4	230	561		96	2,563	0	42,722

¹ Indices are based on fish/100 fathom-hours and include interpolations for missed days and stations (in parentheses).

² Mean inshore return per Port Moller index (1985, 1987-1995) of 19,973 fish multiplied by the daily index.

Table 7 Summary of district sockeye salmon test fishing indices in the Naknek-Kvichak District, by index area and date, Bristol Bay, 1996 *

Date	Naknek R. Mouth	Pederson Point	Cutbank & Graveyard	Salmon Flats	Gravel Spit	Ships Anchorage	Half Moon Bay	Middle Naknek	Johnson Hill	Division Buoy	Deadman Sands	Low Point	Clark's Point	Naknek River Inside Stations			
														Red Salmon Cannery	Peter Pan	Leader Creek	Morakas Point
06/23/95	337	196						265									

* 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, Bristol Bay, 1996.*

Index Area	Date
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(No District Test Fishing was conducted in 1996.)

* 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, 1996 *

Index Area	June					July				
	24	26	27	28	30	10	11	12	13	14
Cape Grieg (Nearshore)		51	587	1,701						
Four Miles North of Smoky Point Nearshore	120	32								
Four Miles North of Smoky Point (Outer line)		120	190	277						
Two Miles North of Smoky Point (Outer line)	0							206		
Smoky Point Bar North Side Inshore	221 ^a	42						58	1,001	
Smoky Point Bar Offshore end	113 ^a						55	569 ^b		
Smoky Point Entrance			4				0		407	
Mid Outer Line							84			
Bell Buoy							102			
Four Miles North of Cape Menshikof (Nearshore)	269 ^a	65	28	14			4	232 ^a	135	
Two Miles North of Cape Menshikof (Outerline)		284	20	65			18		128	
Three Miles South of South Spit (Nearshore)	27						0	757	341	
South Spit (Mid Channel)				0		18	0	0	600	
Dago Creek Mouth										1,258
Pilot Point						0		0	13	
Between Pilot Point and Muddy Point					396					
Outer South Channel		0	0	0	92	5		7 ^a	4	510
Inner South Channel			0		244	18				
Above inner district boundary line west side			18		25					102
Above inner district boundary line east side			0	0	355	5				436
Below inner district boundary line east side							14			1,604
Between Dog Salmon and King Salmon Rivers			16	21			0		26	

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

^a Average of two or more drifts

Table 10 Summary of district sockeye salmon test fishing indices in the Nuuhegak District, by index area and date, Bristol Bay, 1996 *

Date	Start Time	Wood River W.	Wood River E.	Tule Point	Across Point	Black Slough	Picnic Point	Dagnel	Grassy Island	Nuuhegak Point	Combine Flats	Pile Driver	Queen Slough	Clark's Point	Coffee Point	Jpperline West	Jpperline East	First Creek	Ekuk Cannery	Ekuk Bluff	Ships Ch. N.W.	Middle Ch. N.W.	Snag Point	Peter Pan	Scandavian	Kanak-anek	
06/19/96	20:10	366 1,200 240		0 513			0 0		0			0															
06/20/96	20:42		1660* 1915* 553*	1,946			262		226 1,596																		
06/21/96	09:46	2,326 5,263	1,629	662 0 300			0		2,156 664			916	300	645	359	1,053											306
06/21/96	21:13	674 633	992	1,132 637 1,370			0		355															796	1,071		
06/22/96	10:16	423 665	1,127	656 1,346 4,600			423 319		1,471			1,546		460	312							0 26					
06/22/96	22:46	635 2,353 297	443	4,060			0 2,353																				
06/23/96	12:17								0 115		2,624																122 611
06/23/96	11:06	0	0	0 423			0		1,277			0															0 0
06/23/96	12:01	240 933	769	323	0		0		0																		261
06/24/96	10:46	12,113						9,123	335		674		1,224 3,500	1,200								4,352				12,000	
07/01/96	17:19	4,136 1,659	2,234				9,355		15,540																		4,756
07/02/96	16:25					15,067	4,225 1,973		2,432	2,634		5,629		4,390													
07/03/96	06:07	14,176		6,616			11,209		4,511 6,964		0 3,121 0			296										4,769			
07/03/96	17:54	5,644 3,750	26,512	10,102	33,333		13,664		6,606	645												2,575				611	
07/04/96	06:53	5,644	3,017	11,916	6,026		719		2,449 390	0	0 0																0 0
07/04/96	18:24									326	0 4,192			1,277 2,456		0		6,000 9,500	395								
07/05/96	06:46	6,514	5,616	7,347	12,737		3,279		1,471			1,027 0	2,607	3,235 0									11,603	4,266	2,369 1,766		
07/07/96	09:35	5,629	6,630	14,416	531		0		1,472	400						496 0								359		3,117	
07/09/96	00:04	7,397	4,262	3,234	496		0		1,104															360			

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

* Unable to determine West or East side of Wood River.

Table 11. Commercial Fishing Emergency Orders, by district, Bristol Bay, 1996.

Number ¹	Date and Time		Effective time
<u>Naknek-Kvichak District</u>			
AKN.02	June 03	9:00 a.m.	to July 17 9:00 a.m. Restriction ²
AKN.81	July 17	9:00 a.m.	to July 19 9:00 a.m. 48 hrs. ³
<u>Naknek Section</u>			
AKN.09	June 23	9:30 p.m.	to June 24 6:00 a.m. 8.5 hrs.
AKN.10	June 24	7:00 p.m.	to June 25 7:00 a.m. 12 hrs.
AKN.15	June 25	8:00 p.m.	to June 26 7:00 a.m. 11 hrs.
AKN.16	June 26	7:00 a.m.	to June 26 5:00 p.m. 12 hrs. ⁴
AKN.18	June 27	8:00 a.m.	to June 27 10:00 p.m. 14 hrs.
AKN.25	June 29	9:30 a.m.	to June 29 7:30 p.m. 10 hrs.
AKN.26	June 29	7:30 p.m.	to June 29 11:30 p.m. 4 hrs.
AKN.28	June 30	10:30 a.m.	to July 01 12:30 a.m. 14 hrs.
AKN.34	July 01	12:30 a.m.	to July 02 12:30 a.m. 24 hrs. ⁴
AKN.35	July 02	1:00 p.m.	to July 03 3:00 a.m. 14 hrs.
AKN.37	July 03	2:00 p.m.	to July 04 2:00 a.m. 12 hrs.
AKN.42	July 04	2:00 a.m.	to July 04 12:00 noon 10 hrs. ⁴
AKN.43	July 04	3:00 p.m.	to July 05 4:30 p.m. 14.5 hrs. ⁵
AKN.49	July 05	4:30 p.m.	to July 06 4:30 a.m. 12 hrs ⁶
AKN.51	July 06	10:00 a.m.	to July 06 6:30 p.m. 8.5 hrs. ⁵
AKN.59	July 07	10:00 p.m.	to July 08 3:00 a.m. 5 hrs. ⁵
<u>Kvichak Section</u>			
AKN.11	June 25	5:00 a.m.	to June 25 1:00 p.m. 8 hrs. ¹¹
AKN.17	June 26	8:00 p.m.	to June 27 4:00 a.m. 8 hrs. ¹¹
AKN.24	June 28	9:30 p.m.	to June 29 5:30 a.m. 8 hrs. ¹¹
AKN.29	June 30	11:30 p.m.	to July 01 7:30 a.m. 8 hrs. ¹¹
AKN.36	July 03	1:00 a.m.	to July 03 9:00 a.m. 8 hrs. ¹¹
AKN.44	July 04	1:30 p.m.	to July 04 9:30 p.m. 8 hrs. ¹¹
AKN.50	July 06	3:00 a.m.	to July 06 11:00 a.m. 8 hrs. ¹¹
AKN.52	July 07	5:00 p.m.	to July 08 1:00 a.m. 8 hrs. ¹¹
<u>Naknek River Special Harvest Area</u>			
AKN.43	July 04	3:00 p.m.	to July 05 4:30 p.m. 14.5 hrs. ⁷
AKN.49	July 05	4:30 p.m.	to July 06 4:30 a.m. 12 hrs. ⁸
AKN.51	July 06	10:00 a.m.	to July 06 6:30 p.m. 8.5 hrs. ⁷
AKN.55	July 08	6:00 a.m.	to July 09 7:00 a.m. 25 hrs. ⁹
AKN.59	July 07	10:00 p.m.	to July 08 3:00 a.m. 5 hrs. ⁷

(Continued)

Table 11. (Continued)

Number ¹	Date and Time				Effective time	
AKN.64	July 09	7:00 a.m.	to	July 10	8:00 a.m.	13 hrs. ⁹
AKN.65	July 10	8:00 a.m.	to	July 11	10:00 a.m.	26 hrs. ⁹
AKN.67	July 11	12:30 a.m.	to	July 12	9:30 a.m.	33 hrs. ⁹
AKN.72	July 12	9:30 a.m.	to	July 13	1:30 a.m.	16 hrs. ⁹
AKN.74	July 13	8:30 a.m.	to	July 14	11:00 a.m.	26.5 hrs. ⁹
AKN.75	July 14	11:30 p.m.	to	July 16	2:30 a.m.	27 hrs. ⁹
AKN.80	July 16	1:00 p.m.	to	July 17	1:30 p.m.	24.5 hrs. ⁹
AKN.85	July 18	2:30 a.m.	to	July 19	5:30 a.m.	27 hrs. ⁹
AKN.66	July 11	9:00 a.m.	to	July 12	9:00 a.m.	Subsistence ¹⁰
<u>Egegik District</u>						
AKN.01	June 01	9:00 a.m.	to	July 01	12:01 a.m.	Restriction ¹²
AKN.03	June 17	12:30 p.m.	to	June 17	10:30 p.m.	10 hrs.
AKN.04	June 18	1:00 p.m.	to	June 18	11:00 p.m.	10 hrs.
AKN.05	June 19	2:00 p.m.	to	June 19	12:00 midnight	10 hrs.
AKN.06	June 21	3:30 a.m.	to	June 21	1:30 p.m.	10 hrs.
AKN.07	June 23	5:30 p.m.	to	June 24	1:30 a.m.	8 hrs.
AKN.08	June 24	1:30 a.m.	to	June 24	1:00 p.m.	11.5 hrs ¹³
AKN.12	June 25	5:30 a.m.	to	June 25	1:30 p.m.	8 hrs.
AKN.14	June 25	1:30 p.m.	to	June 26	5:30 a.m.	16 hrs. ¹³
AKN.19	June 26	8:00 p.m.	to	June 27	8:00 a.m.	12 hrs.
AKN.20	June 28	8:00 a.m.	to	June 28	6:00 p.m.	10 hrs.
AKN.21	June 29	9:00 a.m.	to	June 29	7:00 p.m.	10 hrs.
AKN.27	June 30	9:30 a.m.	to	June 30	8:30 p.m.	11 hrs.
AKN.30	July 01	11:00 a.m.	to	July 01	10:00 p.m.	11 hrs.
AKN.33	July 02	12:00 noon	to	July 02	10:00 p.m.	10 hrs.
AKN.38	July 03	1:30 p.m.	to	July 03	11:30 p.m.	10 hrs.
AKN.40	July 04	2:30 p.m.	to	July 04	10:30 p.m.	8 hrs.
AKN.45	July 05	3:30 p.m.	to	July 05	11:30 p.m.	8 hrs.
AKN.54	July 07	5:00 a.m.	to	July 07	1:00 p.m.	8 hrs.
AKN.57	July 08	5:30 a.m.	to	further notice		¹⁴
AKN.58	July 08	5:30 a.m.	to	July 08	1:30 p.m.	8 hrs.
AKN.63	July 10	7:00 a.m.	to	July 10	3:00 p.m.	8 hrs.
AKN.68	July 11	8:00 a.m.	to	July 11	4:00 p.m.	8 hrs.
AKN.69	July 11	4:00 p.m.	to	July 12	7:00 a.m.	15 hrs. ¹³
AKN.70	July 12	7:00 a.m.	to	July 12	11:30 p.m.	16.5 hrs. ¹³
AKN.71	July 13	9:30 a.m.	to	July 13	7:30 p.m.	10 hrs.
AKN.73	July 14	10:00 a.m.	to	July 14	9:00 p.m.	11 hrs.
AKN.77	July 15	11:00 a.m.	to	July 15	10:00 p.m.	11 hrs.
AKN.78	July 16	12:00 noon	to	July 16	11:00 p.m.	11 hrs.

(Continued)

Table 11. (Continued)

Number ¹	Date and Time		Effective time
<u>Ugashik District</u>			
AKN.13	June 25	4:30 a.m. to June 25	4:30 p.m. 12 hrs.
AKN.22	June 29	8:00 a.m. to June 29	4:00 p.m. 8 hrs.
AKN.31	July 01	10:00 a.m. to July 01	6:00 p.m. 8 hrs.
AKN.32	July 02	11:00 a.m. to July 02	7:00 p.m. 8 hrs.
AKN.39	July 03	2:00 p.m. to July 03	6:00 p.m. 4 hrs.
AKN.41	July 04	1:00 p.m. to July 05	1:00 a.m. 12 hrs.
AKN.46	July 05	1:00 a.m. to July 05	2:00 p.m. 13 hrs. ¹⁵
AKN.47	July 05	2:00 p.m. to July 06	3:00 a.m. 13 hrs. ¹⁵
AKN.48	July 06	3:00 a.m. to July 06	3:00 p.m. 12 hrs. ¹⁵
AKN.53	July 06	3:00 p.m. to July 07	3:00 a.m. 12 hrs. ¹⁵
AKN.56	July 07	4:00 p.m. to July 08	4:00 a.m. 12 hrs.
AKN.60	July 08	4:00 a.m. to July 08	5:00 p.m. 13 hrs. ¹⁵
AKN.61	July 09	5:00 a.m. to July 09	5:00 p.m. 12 hrs.
AKN.62	July 09	5:00 p.m. to July 10	2:00 a.m. 9 hrs. ¹⁵
AKN.76	July 14	9:30 p.m. to July 15	5:30 a.m. 8 hrs.
AKN.79	July 16	11:30 a.m. to July 16	7:30 p.m. 8 hrs.
AKN.82	July 17	9:00 a.m. to Sept. 30	12:00 midnight Regulatory ¹⁶
AKN.83	July 16	7:30 p.m. to July 17	12:00 noon 16.5 hrs. ¹⁵
AKN.84	July 17	12:00 noon to July 17	12:00 midnight 12 hrs. ¹⁵
AKN.86	July 18	1:00 p.m. to July 19	1:00 p.m. 24 hrs.
AKN.87	July 22	9:00 a.m. to July 23	3:30 a.m. 18.5 hrs.
AKN.88	July 23	4:00 p.m. to July 24	4:00 a.m. 12 hrs.
AKN.89	July 24	4:00 a.m. to July 24	5:00 p.m. 13 hrs. ¹⁵
AKN.90	July 25	5:00 a.m. to July 25	5:30 p.m. 12.5 hrs.
AKN.91	26-Jul	6:00 a.m. to 26-Jul	6:00 p.m. 12 hrs. ¹⁷
<u>Nushagak District</u>			
DLG.02	June 01	9:00 a.m. to June 07	9:00 a.m. SUBSISTENCE ¹⁸
DLG.03	June 07	3:00 p.m. to June 08	3:00 p.m. SUBSISTENCE ¹⁸
DLG.04	June 09	7:00 a.m. to June 09	3:00 p.m. 8 hrs. ¹⁸
DLG.05	June 10	7:00 a.m. to June 10	7:00 p.m. SUBSISTENCE ¹⁸
DLG.06	June 10	7:00 p.m. to June 11	7:00 p.m. SUBSISTENCE ¹⁸
DLG.07	June 13	11:00 a.m. to June 13	7:00 p.m. 8 hrs.
DLG.08	June 14	9:00 p.m. to June 15	10:00 a.m. SUBSISTENCE ¹⁸
DLG.09	June 17	2:30 p.m. to June 18	12:30 a.m. 10 hrs.
DLG.10	June 18	3:00 p.m. to June 18	11:00 p.m. 8 hrs.
DLG.15	June 24	8:00 p.m. to June 25	4:00 a.m. 8 hrs.
DLG.18	June 26	8:30 a.m. to June 26	4:30 p.m. 8 hrs.
DLG.20	June 27	10:00 p.m. to June 28	10:00 a.m. 12 hrs.
DLG.22	June 29	10:30 a.m. to June 29	8:30 p.m. 10 hrs.

(Continued)

Table 11. (Continued)

Number ¹	Date and Time				Effective time	
DLG.24	June 30	11:30 a.m.	to	June 30	7:30 p.m.	8 hrs.
DLG.26	July 02	1:30 a.m.	to	July 02	9:30 a.m.	8 hrs.
DLG.27	July 03	2:30 p.m.	to	July 03	9:30 p.m.	7 hrs.
DLG.28	July 06	5:00 a.m.	to	July 06	5:00 p.m.	12 hrs.
DLG.29	July 06	5:00 p.m.	to	July 07	5:00 a.m.	12 hrs. ¹⁹
DLG.30	July 07	6:30 p.m.	to	July 08	8:00 p.m.	25.5 hrs.
DLG.31	July 08	8:00 p.m.	to	July 09	2:00 p.m.	18 hrs. ¹⁹
DLG.32	July 09	2:00 p.m.	to	July 09	8:30 p.m.	6.5 hrs. ¹⁹
DLG.34	July 10	8:30 a.m.	to	July 11	10:00 a.m.	25.5 hrs.
DLG.35	July 11	10:00 a.m.	to	July 12	11:00 a.m.	25 hrs. ¹⁹
DLG.36	July 12	11:00 a.m.	to	July 13	11:30 a.m.	24.5 hrs. ¹⁹
DLG.37	July 13	11:30 a.m.	to	July 15	1:30 a.m.	38 hrs. ¹⁹
DLG.44	July 17	2:30 p.m.	to	Sept.30	12:00 midnight	Subsistence ²⁰
DLG.54	Aug.02	3:30 p.m.	to	Aug.03	6:30 a.m.	15 hrs.
DLG.55	Aug.01	3:00 p.m.	to	Sept.30	12:00 midnight	Subsistence ²¹
DLG.58	Aug.06	3:00 p.m.	to	Sept.30	12:00 midnight	Subsistence ¹⁸
Wood River Special Harvest Area						
DLG.38	July 15	9:00 a.m.	to	Sept. 30	12:00 midnight	Subsistence ²²
DLG.39	July 15	1:00 p.m.	to	July 15	8:00 p.m.	7 hrs.
DLG.41	July 16	2:00 p.m.	to	July 16	9:00 p.m.	7 hrs.
DLG.45	July 17	2:30 p.m.	to	July 17	9:30 p.m.	7 hrs.
DLG.46	July 18	3:30 p.m.	to	July 18	10:30 p.m.	7 hrs.
DLG.47	July 19	5:30 a.m.	to	July 19	12:30 p.m.	7 hrs.
DLG.48	July 20	6:00 a.m.	to	July 20	2:00 p.m.	8 hrs.
DLG.50	July 21	7:00 a.m.	to	July 21	2:00 p.m.	7 hrs.
DLG.51	July 22	7:00 a.m.	to	July 22	2:00 p.m.	7 hrs.
DLG.52	July 22	6:00 p.m.	to	Sept.30	12:00 midnight	Subsistence ²³
DLG.57	Aug.05	5:30 a.m.	to	Aug.06	6:30 a.m.	25 hrs.
Iqushik Section						
DLG.12	June 18	11:00 p.m.	to	June 19	11:00 a.m.	12 hrs. ²⁴
DLG.13	June 20	4:30 p.m.	to	June 21	2:30 a.m.	10 hrs.
DLG.14	June 22	5:30 a.m.	to	June 22	3:30 p.m.	10 hrs.
DLG.16	June 25	6:00 p.m.	to	June 26	8:30 a.m.	14.5 hrs. ²⁴
DLG.19	June 27	9:00 a.m.	to	June 27	10:00 p.m.	13 hrs.
DLG.21	June 28	10:00 a.m.	to	June 28	11:00 p.m.	13 hrs.
DLG.23	June 29	8:30 p.m.	to	June 30	11:30 a.m.	15 hrs.
DLG.25	July 01	12:30 p.m.	to	July 02	1:30 a.m.	13 hrs.
DLG.33	July 09	8:30 p.m.	to	July 10	8:30 a.m.	12 hrs. ²⁴
DLG.40	July 15	1:00 p.m.	to	July 15	8:00 p.m.	7 hrs.

(Continued)

Table 11. (Continued)

Number ¹	Date and Time			Effective time
DLG.42	July 16	2:00 p.m.	to July 16	9:00 p.m. 7 hrs.
<u>Togiak District</u>				
DLG.01	June 01	9:00 a.m.	to June 15	9:00 a.m. RESTRICTION ²⁵
DLG.43	July 17	6:00 p.m.	to July 20	9:00 a.m. CLOSURE ²⁶
DLG.59	Aug.12	9:00 a.m.	to Aug.17	9:00 a.m. RESTRICTION ²⁹
DLG.60	Aug.19	9:00 a.m.	to Sept.30	12:00 midnight RESTRICTION ²⁹
Kulukak Section				
Togiak River Section				
DLG.11	June 20	9:00 p.m.	to June 22	9:00 a.m. CLOSURE ²⁷
DLG.17	June 27	9:00 a.m.	to June 29	9:00 a.m. CLOSURE ²⁷
DLG.49	July 20	4:00 a.m.	to July 21	4:00 a.m. 24 hrs.
DLG.53	July 26	9:00 a.m.	to July 27	9:00 p.m. 36 hrs. ²⁸
DLG.56	Aug.02	9:00 a.m.	to Aug.03	9:00p.m. 36 hrs. ²⁸
Matogak Section				
DLG.11	June 20	9:00 p.m.	to June 22	9:00 a.m. CLOSURE ²⁷
DLG.17	June 27	9:00 a.m.	to June 29	9:00 a.m. CLOSURE ²⁷
Osviak Section				
DLG.11	June 20	9:00 p.m.	to June 22	9:00 a.m. CLOSURE ²⁷
DLG.17	June 27	9:00 a.m.	to June 29	9:00 a.m. CLOSURE ²⁷
Cape Pierce Section				
DLG.11	June 20	9:00 p.m.	to June 22	9:00 a.m. CLOSURE ²⁷
DLG.17	June 27	9:00 a.m.	to June 29	9:00 a.m. CLOSURE ²⁷

- ⁰¹. Prefix code on emergency orders indicate where announcement originated. ("AKN" for King Salmon field office and "DLG" for Dillingham field office.)
- ⁰². Prohibits the use of gillnet mesh larger than 5 1/2 inches in Naknek-Kvichak District.
- ⁰³. Extends the emergency order period in the Naknek-Kvichak District.
- ⁰⁴. Extends the Naknek Section of the Naknek-Kvichak District to commercial salmon fishing.
- ⁰⁵. Opens the Naknek Section of the Naknek-Kvichak District to setnets only for commercial salmon fishing.

(Continued)

Table 11. (Continued)

06. Extends the Naknek Section of the Naknek-Kvichak District to setnets only for commercial salmon fishing.
07. Opens the Naknek River Special Harvest Area to drift gillnets only for commercial salmon fishing.
08. Extends the Naknek River Special Harvest Area to drift gillnets only for commercial salmon fishing.
09. Opens the Naknek River Special Harvest Area to drift and set gillnets to commercial salmon fishing.
10. Adds 24 hours of Subsistence fishing to the regular fishing schedule week in the Naknek river.
11. Opens the Kvichak Section of the Naknek-Kvichak District to set gillnets only.
12. Prohibits the use of gillnet mesh larger than 5 1/2 inches for commercial salmon fishing in the Egegik District.
13. Extends the current fishing period in the Egegik District.
14. Moves the western boundary line of the Egegik District from 9990-z-45135 Loran C to the 9990-z-45110 Loran C until further notice.
15. Extends the Ugashik District to commercial salmon fishing.
16. Extends the current fishing period in the Ugashik District.
17. Opens the Ugashik District to commercial salmon fishing from 6:00 a.m., July 26, until 6:00 p.m., July 26, and rescinds the extension of the emergency order period effective 9:00 a.m., Monday July 29.
18. Opens the Nushagak Commercial fishing district to the harvest of salmon for subsistence.
19. Extends the Emergency Order period in the Nushagak District.
20. Opens the Nushagak Section of the Nushagak District to the harvest of Salmon for subsistence.
21. Rescinds a subsistence opening in the Nushagak District and closes the area to subsistence fishing except during open commercial salmon fishing periods.
22. Closes Subsistence salmon fishing in the waters of the Wood River Sockeye Salmon Special Harvest Area.
23. Rescinds a subsistence closure in the Wood River Special Harvest Area and re-opens the area to the normal fishing schedule of seven days per week.
24. Extends the Emergency Order period in the Igushik Section.
25. Prohibits the use of gill net mesh larger than 5 1/2 inches in Togiak District.
26. Closes commercial fishing in all sections of the Togiak District.
27. Closes the Togiak River, Matogak, Osviak, and Cape Pierce Sections of the Togiak District to Commercial salmon fishing.
28. Extends commercial fishing in the Togiak River Section of the Togiak District.
29. Requires the use of gillnets with mesh size of 5 3/8 or larger in the Togiak District.

Table 12. Daily district registration of drift gillnet permit holders by district, Bristol Bay, 1996

Date	Nakek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total *
6/16	134	158	40	304	20	656
17	274	345	89	317	24	1049
18	311	428	91	290	27	1147
19	342	516	105	262	28	1253
20	353	556	114	265	28	1316
21	343	692	105	273	30	1443
22	347	702	105	273	30	1457
23	380	737	112	280	30	1539
24	429	755	130	313	31	1658
25	450	793	170	311	31	1755
26	467	775	172	322	32	1768
27	475	777	174	326	32	1784
28	490	777	185	333	32	1817
29	495	774	183	343	32	1827
30	492	773	183	343	32	1823
7/1	491	771	184	348	32	1826
2	491	774	188	359	33	1845
3	492	767	188	360	33	1840
4	440	741	190	357	33	1761
5	395	703	209	361	33	1701
6	347	671	296	397	33	1744
7	342	642	363	409	33	1789
8	331	544	396	412	33	1716
9	332	522	406	417	33	1710
10	332	500	458	449	33	1772
11	345	469	485	465	33	1797
12	349	454	463	458	33	1757
13	396	432	455	442	33	1758
14	430	442	459	435	33	1799
15	445	442	472	436	33	1828
16	456	471	479	393	33	1832
Average	393	610	247	357	31	1638

* Number of drift gillnet permit holders registered to fish in Bristol Bay districts by day. 1,891 drift permits were active in 1996.

Table 13. Commercial salmon catch by date and species, in numbers of fish, Naknek-Kvichak District, Bristol Bay, 1996.

Date	Time	Sockeye	Chinook	Chum	Pink	Coho	Total
6/10	15 hrs.	71	117	59			247
6/11	24 hrs.	414	45	101			560
6/12	24 hrs.	289	33	63			385
6/13	24 hrs.	1,313	62	181			1,556
6/14	9 hrs.	841	78	183			1,102
6/17	15 hrs.	41,668	189	3,585			45,442
6/18	24 hrs.	40,875	318	4,006			45,199
6/19	24 hrs.	39,445	543	3,499			43,487
6/20	24 hrs.	48,836	496	6,333			55,665
6/21	9 hrs.	13,097	38	238			13,373
6/23 ^a	11.5 hrs.	5,075	1	7			5,083
6/24 ^b	11 hrs.	139,356	84	2,642			142,082
6/25 ^b	11 hrs.	184,549	89	2,150			186,788
6/26 ^b	17 hrs.	175,198	58	3,067			178,323
6/27 ^b	14 hrs.	317,465	36	1,712			319,213
6/28 ^b	10 hrs.	244,239	35	3,483			247,757
6/29 ^b	14 hrs.	300,013	82	1,131			301,226
6/30 ^b	14 hrs.	671,159	21	2,778			673,958
7/1 ^b	24 hrs.	1,077,749	495	3,657			1,081,901
7/2 ^b	11.5 hrs.	594,768	21	2,736			597,525
7/3 ^b	15 hrs.	572,394	54	3,121			575,569
7/4 ^c	11 hrs.	362,432	113	2,294			364,839
7/5 ^c	24 hrs.	308,406	34	2,281			310,721
7/6 ^c	11 hrs.	429,778	56	1,909			431,743
7/7 ^c	19.5 hrs.	405,978	29	1,868			407,875
7/8 ^d	18 hrs.	303,129	45	1,687			304,861
7/9 ^d	21 hrs.	287,438	27	1,965	2		289,432
7/10 ^d	24 hrs.	443,143	50	3,434	1		446,628
7/11 ^d	21.5 hrs.	339,971	36	1,036			341,043
7/12 ^d	24 hrs.	227,501	39	803			228,343
7/13 ^d	17 hrs.	158,834	10	1,567			160,411
7/14 ^d	11.5 hrs.	104,396	34	1,093			105,523
7/15 ^d	24 hrs.	54,451	29	626	3		55,109
7/16 ^d	13.5 hrs.	62,936	10	847	1		63,794
7/17 ^d	13.5 hrs.	100,163	8	1,380			101,551
7/18 ^d	21.5 hrs.	36,224	35	661	1	7	36,928
7/19 ^d	5.5 hrs.	11,422	15	327		3	11,767
7/22	15 hrs.	41,741	78	34,884	310	648	77,661
7/23	24 hrs.	20,016	136	16,451	359	718	37,680
7/24	24 hrs.	7,073	186	1,982	708	589	10,538
7/25	24 hrs.	6,130	137	1,847	1,102	643	9,659
7/26	9 hrs.	3,136	22	289	578	136	4,161
7/29	15 hrs.	1,215	7	94	477	275	2,068
7/30	24 hrs.	1,324	6	86	476	338	2,230
7/31	24 hrs.	1,071	3	185	466	132	1,857
8/1	24 hrs.	969	6	9	138	302	1,424
8/2	9 hrs.	10			6	5	21
8/15	24 hrs.	8				7	15
8/16	9 hrs.	11	1			13	25
Total		8,187,720	4,047	124,137	4,628	3,816	8,324,348
% of District Catch		98.4	0.0	1.5	0.1	0.0	100

^a Test fishing

^b Naknek Section only.

^c Naknek in-river, drift only. Naknek setnets fishing in Naknek Section.

^d Naknek in-river fishery open to both gear groups, district closed.

Table 14. Commercial salmon catch by date and species, in numbers of fish, Egegik District, Bristol Bay, 1996.

Date	Hrs.	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
3-Jun	15.0		1	5		6			11
4-Jun	24.0		1	1	4	1			6
5-Jun	24.0		3	5	3	9			17
6-Jun	24.0				9				9
7-Jun	9.0								0
10-Jun	15.0		6	397	7	2			406
11-Jun	24.0	2	20	1,164	47	8			1,219
12-Jun	24.0	2	16	2,537	121	73			2,731
13-Jun	24.0	7	33	4,117	61	67			4,245
14-Jun	9.0	3	14	3,231	24	39			3,294
17-Jun	10.0	213	89	64,169	88	906			65,163
18-Jun	10.0	294	87	53,386	44	1,274			54,704
19-Jun	10.0	403	92	89,731	63	1,428			91,222
21-Jun	10.0	491	88	48,212	53	1,018			49,283
23-Jun	6.5	259	131	79,378	11	948			80,337
24-Jun	13.0	993	154	501,465	45	4,207			505,717
25-Jun	18.5	831	277	436,689	70	3,034			439,793
26-Jun	9.5	556	110	317,629	19	2,304			319,952
27-Jun	8.0	688	105	286,321	48	1,410			287,779
28-Jun	10.0	876	235	743,296	65	3,210			746,571
29-Jun	10.0	906	273	1,141,508	22	4,262			1,145,792
30-Jun	11.0	874	236	1,053,180	9	8,493			1,061,682
1-Jul	11.0	849	297	1,003,654	4	6,079			1,009,737
2-Jul	10.0	877	258	837,026	13	4,105			841,144
3-Jul	10.0	759	245	440,718	5	2,010			442,733
4-Jul	8.0	781	233	599,290	8	4,468			603,766
5-Jul	8.0	779	247	734,381	18	5,908			740,307
7-Jul	8.0	631	255	497,842	10	4,623			502,475
8-Jul	8.0	596	226	249,724	20	1,729			251,473
10-Jul	8.0	484	208	235,572	15	1,331			236,918
11-Jul	16.0	464	214	232,562	13	1,517			234,092
12-Jul	23.5	691	331	260,034	13	2,132			262,179
13-Jul	10.0	450	186	217,331	5	1,466			218,802
14-Jul	11.0	403	171	146,329	7	1,368		1	147,705
15-Jul	11.0	380	166	107,894	5	1,288			109,187
16-Jul	11.0	394	146	127,926		1,151		2	129,079
17-Jul	15.0	328	153	120,363	1	2,502		593	123,459
18-Jul	24.0	299	197	84,732		2,427		412	87,571
19-Jul	9.0	109	87	25,364		1,084		53	26,501
22-Jul	15.0	178	108	34,335	4	2,543	36	216	37,134
23-Jul	24.0	168	100	26,108	3	2,342	16	507	28,976
24-Jul	24.0	75	87	12,407		107	1	328	12,843
25-Jul	24.0	44	59	8,515		17		308	8,840
26-Jul	9.0	12	19	1,481		13		173	1,667
29-Jul	15.0	14	9	1,802		4		505	2,311
30-Jul	24.0	11	17	2,539	1	168		1,930	4,638
31-Jul	24.0	10	26	1,023		47		1,197	2,267
1-Aug	24.0	4	6	1,718	1	49		2,052	3,820
2-Aug	9.0	2	10	754		21		654	1,429
5-Aug	15.0	9	11	450	1	10		2,070	2,531
6-Aug	24.0	17	25	426	1	21		2,404	2,852
7-Aug	24.0	20	23	822		33		3,542	4,397

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Table 14. (Page 2 of 2)

Date	Hrs.	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
8-Aug	24.0	13	23	521		22		2,758	3,301
9-Aug	9.0	3	11	266				870	1,136
12-Aug	15.0	16	21	530		8		3,473	4,011
13-Aug	24.0	10	19	519		18		2,765	3,302
14-Aug	24.0	9	28	510		23		3,512	4,045
15-Aug	24.0	8	18	213		6		2,541	2,760
16-Aug	9.0		3	57				673	730
19-Aug	15.0	8	9	10				1,378	1,388
20-Aug	24.0	7	13	49				1,228	1,277
21-Aug	24.0	5	8	28				795	823
22-Aug	24.0	3	6	5				500	505
23-Aug	9.0	2	4					79	79
26-Aug	15.0	3	9					808	808
27-Aug	24.0	3	9					663	663
28-Aug	24.0	2	5					304	304
29-Aug	24.0		1					25	25
30-Aug	9.0								0
Total	1,096	17,328	6,278	10,842,251	961	83,339	53	39,319	10,965,923
% of District Catch				99	0	1	0	0	100

¹ Estimated number of deliveries based on daily company reports. Preliminary.

Table 15. Commercial salmon catch by date and species, in numbers of fish, Ugashik District, Bristol Bay, 1996.

Date	Hrs.	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
3-Jun	15.0								0
4-Jun	24.0								0
5-Jun	24.0								0
6-Jun	24.0								0
7-Jun	9.0								0
10-Jun	15.0	1		15	18				33
11-Jun	24.0	1		1	2				3
12-Jun	24.0	3		328	8				334
13-Jun	24.0	3		221	60				281
14-Jun	9.0								0
17-Jun	15.0	39	2	7,998	87	401			8,486
18-Jun	24.0	62		10,977	67	591			11,635
19-Jun	24.0	90		35,390	41	1,496			36,927
20-Jun	24.0	116	1	37,911	53	2,510			40,474
21-Jun	9.0	33	1	16,161	13	928			17,102
24-Jun *	0.0	1		414		2			416
25-Jun	12.0	170	2	157,380	19	5,438			162,837
26-Jun *	0.0	1		152		1			153
27-Jun *	0.0	1		215		3			218
28-Jun *	0.0	1		479		23			502
29-Jun	8.0	183	13	259,296	18	2,983			262,297
30-Jun *	0.0	1		286		2			288
1-Jul	8.0	189	73	255,139	9	2,916			258,064
2-Jul	8.0	198	71	194,085	12	5,273			199,370
3-Jul	4.0	191	36	198,417	6	4,926			203,349
4-Jul	11.0	158	61	276,928	8	5,750			282,686
5-Jul	24.0	335	59	471,238	16	5,357			476,611
6-Jul	24.0	356	80	455,859	11	4,428			460,298
7-Jul	11.0	367	38	341,247	14	3,970			345,231
8-Jul	17.0	618	62	490,358	16	5,705			496,079
9-Jul	19.0	531	33	294,594	4	7,920			302,518
10-Jul	2.0	93	4	77,805	1	2,187			79,993
11-Jul *	0.0	2		68		6			74
12-Jul *	0.0	1		766		9			775
13-Jul *	0.0	1		775		3	1		779
14-Jul *	2.5	1		884		8			892
15-Jul °	5.5	450	66	331,111	8	7,719			338,838
18-Jul	12.5	376	68	218,800	10	12,265			231,075
17-Jul	24.0	542	104	130,730	6	9,490			140,226
18-Jul	11.0	262	4	49,318	5	4,046	20	35	53,424
19-Jul	13.0	203	8	40,181	6	3,103	29	46	43,365
22-Jul	15.0	124	40	22,729	2	1,301	2	16	24,050
23-Jul	11.5	58	33	13,040		554	7	21	13,622
24-Jul	17.0	83	23	8,761		1,072		67	9,900
25-Jul	12.5	37	18	4,987		214		53	5,254
28-Jul	12.0	26	11	2,296		238		112	2,646
29-Jul	15.0								0
30-Jul	24.0		9	597		11		66	674
31-Jul	24.0	3	6	520		145		325	990
1-Aug	24.0	3	2	173		136		256	565
2-Aug	9.0								0
5-Aug	15.0								0

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Table 15. (Page 2 of 2)

Date	Hrs.	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
6-Aug	24.0	1	2	32		14		75	121
7-Aug	24.0	2	5	215		22		333	570
8-Aug	24.0		2	116				152	268
9-Aug	9.0							0	0
12-Aug	15.0	5	7	297		118		1,875	2,290
13-Aug	24.0	5	8	329		75		1,353	1,757
14-Aug	24.0	4	8	266		33		1,100	1,399
15-Aug	24.0	5	4	56				791	847
16-Aug	9.0								0
19-Aug	15.0	2	4	110				640	750
20-Aug	24.0	1	6	24				395	419
21-Aug	24.0	1	5					288	288
22-Aug	24.0							0	0
23-Aug	9.0	2						207	207
26-Aug	15.0	2						200	200
27-Aug	24.0	9	1					763	763
28-Aug	24.0								0
29-Aug	24.0								0
30-Aug	9.0								0
2-Sep	15.0								0
3-Sep	24.0								0
4-Sep	24.0								0
5-Sep	24.0								0
6-Sep	9.0								0
9-Sep	15.0								0
10-Sep	24.0								0
11-Sep	24.0								0
12-Sep	24.0								0
13-Sep	9.0								0
Total	1,245	5,953	980	4,410,073	520	103,392	59	9,169	4,523,213
% of District Catch				98	0	2	0	0	100

¹ Estimated number of deliveries based on daily company reports. Preliminary.

^a ADF&G test fishing catches.

^b Included in totals recorded for preceding day.

Table 16. Commercial salmon fishing time, effort and harvest by date, Nushagak Distct. Bristol Bay, 1996

Date	Time (hrs)			Effort ³		Harvest ⁴					Total
	District ¹	Igushik ²	WRSHA ²	Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	
9-Jun	8.0			135	5	18	12674	4131	0	0	16823
13-Jun	8.0			252	23	827	10,489	7860	0	0	19176
17-Jun	10.0				44	9,213	9,905	8,804	0	0	27922
18-Jun	8.0	1.0				23,629	23,188	28,989	0	0	75806
19-Jun		11.0		6	21	3,416	440	1,651	0	0	5507
20-Jun		7.5		55	50	6,999	22	362	0	0	7383
21-Jun		2.5				1557	1	3	0	0	1581
22-Jun		10.0		86	43	8,425	76	500	1	0	9002
24-Jun	4.0			269	239	17,505	70	1,314	0	0	16889
25-Jun	4.0	20.0		125	41	221,304	1,445	52,921	0	0	275670
26-Jun	8.0	8.5				148,939	2,988	26,342	0	0	178289
27-Jun	2.0	13.0		317	240	82,655	79	5,311	1	0	88046
28-Jun	10.0	13.0				363,618	1,740	32,793	10	1	398182
29-Jun	10.0	3.5		289	225	507,899	2,059	27,498	7	0	537463
30-Jun	8.0	11.5		280	281	505,601	1479	21,295	6	1	528382
1-Jul		11.5		208	67	145,406	158	4,052	0	0	149816
2-Jul	8.0	1.5		320		402,992	1149	14,822	2	0	418965
3-Jul	7.0			315		392,780	618	8,315	12	2	401707
4-Jul						333	0	13	0	0	346
6-Jul	19.0			345	231	719,539	1531	15,337	4	9	736420
7-Jul	10.5			355	270	288,987	753	6,314	4	7	295445
8-Jul	24.0					604,921	699	18,727	10	11	624388
9-Jul	20.5	3.5		355		547,090	722	16,909	14	66	564801
10-Jul	15.5	8.5				168,843	369	4,412	1	191	173816
11-Jul	24.0					182,983	194	5,007	6	181	188371
12-Jul	24.0					131,788	123	4,207	24	453	136595
13-Jul	24.0					69,786	96	2,144	36	1010	73052
14-Jul	24.0					71,187	78	1,927	150	1488	74810
15-Jul	1.5	7.0	7.0	124	107	45,754	68	1,533	64	433	47852
16-Jul		7.0	7.0	29	27	12,278	18	305	24	833	13256
17-Jul		7.0	7.0	28	26	11,859	48	99	45	114	11995
18-Jul		7.0	7.0	42	38	17,588	29	88	100	385	18166
19-Jul		7.0	7.0	33	25	18,028	21	81	232	686	17046
20-Jul		8.0	8.0	31	30	9,588	14	110	453	250	10395
21-Jul		7.0	7.0			4,070	10	15	295	59	4449
22-Jul		7.0	7.0	23	22	4,811	11	67	552	40	5281
2-Aug	8.5		8.5			119	1	1	95	777	993
3-Aug	8.5		8.5			144	0	4	290	1005	1443
5-Aug	18.5		18.5			142	0	0	0	2739	2881
6-Aug	8.5		8.5			74	0	0	0	1956	2030
Total	322.0	140.5	57.0	508.5		5,749,619	73,385	324,281	2,438	12,477	6,162,180
% of District Catch						93.3%	1.2%	5.3%	0.0%	0.2%	100.0%

¹ Number of hours the Nushagak District was opened to commercial fishing. Includes Nushagak and Igushik Sections prior to 9:00 a.m. July 17, and Nushagak, Igushik and Snake River Sections after 9:00 a.m. July 17.

² Number of hours each section was opened to commercial fishing, in addition to commercial openings in the Nushagak District and other sections, unless otherwise noted. WRSWA; Wood River Special Harvest Area.

³ Estimated fishing effort based on aerial survey counts.

⁴ Numbers of fish.

⁵ ADF&G test fish harvest included.

⁶ Igushik Section and WRSWA opened simultaneously for 7 hours each. Effort includes both sections; WRSWA effort included 90 drift and 45 set gillnets, Igushik Section effort included 34 drift and 62 set gillnets.

⁷ Igushik Section and WRSWA opened simultaneously for 7 hours each. Effort includes only WRSWA.

Table 17. Commercial sockeye salmon fishing time and setnet harvest by date and statistical area, Nushagak District, Bristol Bay, 1996.

Date	Time (hrs)			Harvest ²							Total	
	District ¹	Igushik ²	WRSHA ³	Total	Clark's			Wood River				
					Combine	Queen	Coffee	Point	Ekuk	Igushik		Special
Flats ⁴	Slough ⁵	Point ⁶	Beach ⁷	Beach ⁸	Beach ⁹	Area ¹⁰						
9-Jun	8.0			8.0	0	0	0	0	0	0	0	0
13-Jun	8.0			8.0	0	0	0	0	38	319		357
17-Jun	10.0			10.0	1,686	0	1,054	314	671	50		3775
18-Jun	8.0	1.0		9.0	3,553	261	1,933	124	1,142	3,835		10848
19-Jun		11.0		11.0						1,383		1383
20-Jun		7.5		7.5						2,373		2373
21-Jun		2.5		2.5						1,557		1557
22-Jun		10.0		10.0						785		785
24-Jun	4.0			4.0	7,848	1,271	3,072	1,608	0	1,370		15167
25-Jun	4.0	20.0		24.0	9,170	101	5,004	1,040	3,655	15,160		34130
26-Jun	8.0	8.5		16.5	10,939	1,547	5,714	966	1,139	7,192		27497
27-Jun	2.0	13.0		15.0	257	0	0	109	0	1,172		1538
28-Jun	10.0	13.0		23.0	2,658	229	1,658	1,138	4,772	5,868		16323
29-Jun	10.0	3.5		13.5	28,916	5,134	5,353	3,346	4,284	6,007		53040
30-Jun	8.0	11.5		19.5	13,672	5,648	1,489	4,133	38,363	11,442		74747
1-Jul		11.5		11.5	6,754					9,091		15845
2-Jul	8.0	1.5		9.5	26,136	7,623	4,647	7,186	24,932	4,865		75389
3-Jul	7.0			7.0	24,191	7,095	8,504	1,664	13,411	12,308		67173
6-Jul	19.0			19.0	47,629	19,710	36,791	15,025	36,583	38,568		194306
7-Jul	10.5			10.5	11,784	1,851	12,745	2,550	21,647	21,925		72502
8-Jul	24.0			24.0	14,191	1,199	14,505	2,612	20,222	30,032		82761
9-Jul	20.5	3.5		24.0	12,654	1,077	22,470	2,980	38,602	24,742		102525
10-Jul	15.5	8.5		24.0	14,563	11,295	7,169	4,092	11,021	6,080		54220
11-Jul	24.0			24.0	14,617	4,392	8,238	2,578	14,055	8,936		52816
12-Jul	24.0			24.0	5,002	387	10,824	1,437	7,658	12,699		38007
13-Jul	24.0			24.0	3,812	112	2,767	789	5,225	9,759		22464
14-Jul	24.0			24.0	4,486	140	4,098	1,389	9,528	8,827		28468
15-Jul	1.5	7.0	7.0	9.5	965	0	282	230	910	7,183	1,705	11275
16-Jul		7.0	7.0	7.0						5,876	874	6750
17-Jul			7.0	7.0							9,078	9078
18-Jul			7.0	7.0							11,742	11742
19-Jul			7.0	7.0							6,896	6896
20-Jul			8.0	8.0							4,575	4575
21-Jul			7.0	7.0							1,725	1725
22-Jul			7.0	7.0							1,893	1893
2-Aug	8.5			8.5	51	0	0	0	50	0		101
3-Aug	6.5			6.5	79	0	0	0	0	0		79
5-Aug	18.5			18.5	62	28	0	0	0	0		90
6-Aug	8.5			8.5	8	28	0	0	39	0		73
Total	322.0	140.5	57.0	508.5	265881	69128	158317	55310	257947	259404	38488	1104273
% of District Catch					24.1%	6.3%	14.3%	5.0%	23.4%	23.5%	3.5%	100.0%

¹ Number of hours the Nushagak District was opened to commercial fishing. Includes Nushagak and Igushik Sections prior to 9:00 a.m. July 17, and Nushagak, Igushik and Snake River Sections after 9:00 a.m. July 17.

² Number of hours each section was opened to commercial fishing, in addition to commercial openings in the Nushagak District and other sections, unless otherwise noted. WRSWA; Wood River Special Harvest Area.

³ Numbers of fish.

⁴ Sockeye salmon accounted for 96.7% of the total beach harvest. Other species landed included 3,802 chinook, 4,785 chum, 50 pink and 305 coho salmon.

⁵ Sockeye salmon accounted for 99.0% of the total beach harvest. Other species landed included 127 chinook, 436 chum, 0 pink and 145 coho salmon.

⁶ Sockeye salmon accounted for 96.1% of the total beach harvest. Other species landed included 2,198 chinook, 4,147 chum, 25 pink and 35 coho salmon.

⁷ Sockeye salmon accounted for 97.3% of the total beach harvest. Other species landed included 118 chinook, 1,430 chum, 0 pink and 0 coho salmon.

⁸ Sockeye salmon accounted for 97.5% of the total beach harvest. Other species landed included 445 chinook, 5,081 chum, 170 pink and 1,045 coho salmon.

⁹ Sockeye salmon accounted for 99.8% of the total beach harvest. Other species landed included 229 chinook, 290 chum, 1 pink and 9 coho salmon.

¹⁰ Sockeye salmon accounted for 94.5% of the total beach harvest. Other species landed included 90 chinook, 218 chum, 835 pink and 1,118 coho salmon.

^a ADF&G test fish harvest included.

^b Igushik Section and WRSWA opened simultaneously for 7 hours each.

Table 18. Commercial salmon catch by date and species, in numbers of fish, Togiak District, Bristol Bay, 1996.

Date ¹	Sockeye	Chinook	Chum	Pink	Coho	Total
6/10	1	7	5	0	0	13
6/11	7	6	2	0	0	15
6/12	41	57	37	0	0	135
6/13	169	241	244	0	0	654
6/14	166	147	250	0	0	563
6/17	599	328	731	0	0	1,658
6/18	1,131	396	2,187	2	0	3,716
6/19	926	206	1,712	0	0	2,844
6/20	1,294	241	2,048	1	0	3,584
6/24	4,667	1,257	12,567	5	0	18,496
6/25	5,705	539	7,408	13	0	13,665
6/26	5,571	558	5,891	12	0	12,032
6/27	2,942	303	2,774	2	0	6,021
7/01	11,071	534	15,203	22	0	26,830
7/02	20,684	572	19,774	30	0	41,060
7/03	22,778	399	14,658	38	0	37,873
7/04	15,876	313	10,493	65	0	26,747
7/05	14,425	218	8,286	31	0	22,960
7/06	14,193	125	3,945	31	0	18,294
7/08	18,828	172	8,015	19	0	27,034
7/09	18,973	201	7,736	45	0	26,955
7/10	10,794	88	2,999	27	0	13,908
7/11	14,963	117	6,032	48	0	21,160
7/12	17,478	224	4,628	61	0	22,391
7/13	18,211	212	4,676	86	0	23,185
7/15	19,063	256	5,759	183	1	25,262
7/16	26,349	261	10,373	327	2	37,312
7/17	20,680	163	6,581	233	0	27,657
7/20	29,341	133	5,817	844	3	36,138
7/21	6,049	8	885	231	3	7,176
7/22	22,211	69	3,599	954	26	26,859
7/23	19,357	79	7,279	1,971	33	28,719
7/24	18,194	62	5,959	2,952	67	27,234
7/25	12,795	34	5,951	3,749	89	22,618
7/26	7,205	19	2,339	1,733	74	11,370
7/27	10,475	10	2,794	2,452	63	15,794
7/29	4,325	6	772	1,693	120	6,916
7/30	10,439	28	2,197	4,234	241	17,139
7/31	6,051	14	1,534	3,122	262	10,983
8/01	4,016	11	647	1,561	187	6,422

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Date ¹	Sockeye	Chinook	Chum	Pink	Coho	Total
8/02	4,734	18	1,028	2,322	373	8,475
8/03	3,548	6	778	1,489	394	6,215
8/05	1,668	8	352	0	450	2,478
8/06	2,327	10	132	0	951	3,420
8/07	1,716	4	0	0	825	2,545
8/08	1,613	11	0	0	1,604	3,228
8/09	641	2	0	0	149	792
8/12	502	2	0	0	904	1,408
8/13	1,355	6	0	0	3,734	5,095
8/14	868	5	0	0	3,851	4,724
8/15	740	13	17	0	4,524	5,294
8/16	330	7	0	0	2,933	3,270
8/19	191	3	0	0	4,574	4,768
8/20	317	5	0	0	4,829	5,151
8/21	259	3	0	0	4,397	4,659
8/22	201	0	0	0	4,016	4,217
8/23	39	1	0	0	263	303
8/26	33	1	0	0	1,272	1,306
8/27	175	0	0	0	2,995	3,170
8/28	257	2	0	0	4,135	4,394
8/29	145	0	0	0	2,302	2,447
8/30	11	0	0	0	294	305
9/02	59	1	0	0	1,398	1,458
9/03	108	0	0	0	2,251	2,359
9/04	68	1	0	0	1,614	1,683
9/05	30	0	0	0	759	789
9/06	5	0	0	0	150	155
9/09	8	0	0	0	172	180
9/10	38	2	0	0	716	756
9/11	25	0	0	0	673	698
9/12	9	0	0	0	295	304
9/13	0	0	0	0	294	294
Total	460,063	8,725	207,094	30,588	59,262	765,732
% of District						
Total	60.1%	1.1%	27.0%	4.0%	7.7%	100.0%

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

Table 19. Commercial salmon catch by date and species, in numbers of fish, Togiak Section, Bristol Bay, 1996.

Date ¹	Effort ²		Sockeye	Chinook	Chum	Pink	Coho	Total
	Drift	Set						
6/10	1		1	7	5	0	0	13
6/11	1		7	6	2	0	0	15
6/12	2	5	41	57	37	0	0	135
6/13	2	11	169	241	244	0	0	654
6/14	2	7	166	147	250	0	0	563
6/17	11	17	599	328	731	0	0	1,658
6/18	16	43	1,018	353	1,990	2	0	3,363
6/19	12	30	838	193	1,574	0	0	2,605
6/20	9	38	1,228	237	1,804	1	0	3,270
6/24	42	57	4,292	1,228	10,841	4	0	16,365
6/25	30	71	5,303	526	6,488	11	0	12,328
6/26	38	72	5,084	533	5,120	11	0	10,748
6/27	22	43	2,364	287	2,391	2	0	5,044
7/01	37	69	9,059	517	13,606	12	0	23,194
7/02	59	103	13,747	532	16,374	16	0	30,669
7/03	63	96	13,836	361	13,161	22	0	27,380
7/04	57	94	13,125	285	10,040	57	0	23,507
7/05	50	116	14,257	218	8,108	31	0	22,614
7/06	25	104	14,193	125	3,945	31	0	18,294
7/08	41	90	14,911	151	6,929	14	0	22,005
7/09	62	93	14,912	171	6,703	34	0	21,820
7/10	24	70	10,458	88	2,906	27	0	13,479
7/11	27	83	13,464	110	5,916	46	0	19,536
7/12	43	102	17,478	224	4,628	61	0	22,391
7/13	46	114	18,211	212	4,676	86	0	23,185
7/15	42	74	13,192	231	5,150	152	0	18,725
7/16	56	92	16,007	232	9,448	193	2	25,882
7/17	47	94	16,536	151	5,991	170	0	22,848
7/20	42	135	29,341	133	5,817	844	3	36,138
7/21	14	40	6,049	8	885	231	3	7,176
7/22	36	89	15,991	53	3,219	664	11	19,938
7/23	48	101	11,054	63	6,685	1,190	22	19,014
7/24	73	91	10,557	46	5,008	2,314	46	17,971
7/25	110	91	10,133	31	5,650	3,039	77	18,930
7/26	36	77	7,205	19	2,339	1,733	74	11,370
7/27	23	64	10,475	10	2,794	2,452	63	15,794
7/29	34	37	4,097	6	727	1,544	117	6,491
7/30	92	71	10,139	25	2,084	4,053	226	16,527
7/31	72	77	6,051	14	1,534	3,122	262	10,983
8/01	33	67	4,016	11	647	1,561	187	6,422

-continued-

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Date ¹	Effort ²		Sockeye	Chinook	Chum	Pink	Coho	Total
	Drift	Set						
8/02	37	64	4,702	18	1,014	2,299	352	8,385
8/03	29	55	3,548	6	778	1,489	394	6,215
8/05	13	37	1,668	8	352	0	450	2,478
8/06	22	41	2,299	10	132	0	820	3,261
8/07	16	47	1,716	4	0	0	825	2,545
8/08	17	45	1,589	11	0	0	1,546	3,146
8/09	2	20	641	2	0	0	149	792
8/12	7	30	502	2	0	0	904	1,408
8/13	27	43	1,355	6	0	0	3,734	5,095
8/14	26	42	868	5	0	0	3,851	4,724
8/15	23	38	740	13	17	0	4,524	5,294
8/16	17	22	330	7	0	0	2,933	3,270
8/19	25	29	191	3	0	0	4,574	4,768
8/20	35	43	317	5	0	0	4,829	5,151
8/21	32	39	259	3	0	0	4,397	4,659
8/22	38	30	201	0	0	0	4,016	4,217
8/23	2	6	39	1	0	0	263	303
8/26	14	7	33	1	0	0	1,272	1,306
8/27	24	22	175	0	0	0	2,995	3,170
8/28	25	25	257	2	0	0	4,135	4,394
8/29	24	17	145	0	0	0	2,302	2,447
8/30	2	4	11	0	0	0	294	305
9/02	20	7	59	1	0	0	1,398	1,458
9/03	17	23	108	0	0	0	2,251	2,359
9/04	15	23	67	1	0	0	1,586	1,654
9/05	9	13	30	0	0	0	759	789
9/06	1	4	5	0	0	0	150	155
9/09	2	4	8	0	0	0	172	180
9/10	12	12	38	2	0	0	716	756
9/11	10	6	25	0	0	0	449	474
9/12	5	2	9	0	0	0	295	304
9/13	3	1	0	0	0	0	294	294
Total			381,539	8,281	188,740	27,518	58,722	664,800
% of Section								
Total			57.4%	1.2%	28.4%	4.1%	8.8%	100.0%

¹ Togiak River Section open four days per week. See Table 12 for inseason adjustments to the weekly fishing schedule.

² Effort estimated by aerial surveys inseason.

Table 20. Commercial salmon catch by date and species, in numbers of fish, Kulukak Section, Bristol Bay, 1996.

Date ¹	Effort ²		Sockeye	Chinook	Chum	Pink	Coho	Total
	Drift	Set						
6/18		2	113	43	197	0	0	353
6/19		2	88	13	138	0	0	239
6/20		2	66	4	244	0	0	314
6/24		10	227	21	1,328	1	0	1,577
6/25		9	402	13	920	2	0	1,337
6/26		13	487	25	771	1	0	1,284
6/27		6	578	16	383	0	0	977
7/01	2	32	2,012	17	1,597	10	0	3,636
7/02	8	54	6,937	40	3,400	14	0	10,391
7/03	5	43	8,942	38	1,497	16	0	10,493
7/04	3	22	2,751	28	453	8	0	3,240
7/08	3	39	3,917	21	1,086	5	0	5,029
7/09	2	34	4,061	30	1,033	11	0	5,135
7/10		5	336	0	93	0	0	429
7/11		8	1,499	7	116	2	0	1,624
7/15	12	13	5,871	25	609	31	1	6,537
7/16	4	1	10,342	29	925	134	0	11,430
7/17	6	2	4,144	12	590	63	0	4,809
7/22	3	39	5,904	14	311	290	14	6,533
7/23	6	50	7,989	14	572	781	9	9,365
7/24	24	53	7,302	16	870	595	21	8,804
7/25	17	19	2,337	3	256	520	12	3,128
7/29	7	4	228	0	45	149	3	425
7/30	10	17	300	3	113	181	15	612
Total			76,833	432	17,547	2,814	75	97,701
% of Section Total			78.6%	0.4%	18.0%	2.9%	0.1%	100.0%

¹ Kulukak Section open three days per week. See Table 12 for inseason adjustments to the weekly fishing schedule.

² Effort estimated by aerial surveys inseason.

Table 21. Commercial salmon catch by date and species, in numbers of fish, Matogak Section, Bristol Bay, 1996.

Date ¹	Sockeye	Chinook	Chum	Pink	Coho	Total
7/05	168	0	178	0	0	346
7/22	316	2	69	0	1	388
7/23	314	2	22	0	2	340
7/24	335	0	81	43	0	459
7/25	325	0	45	190	0	560
8/02	32	0	14	23	21	90
8/06	28	0	0	0	131	159
8/08	24	0	0	0	58	82
9/04	1	0	0	0	28	29
9/11	0	0	0	0	224	224
Total	1,543	4	409	256	465	2,677
% of Section						
Total	57.6%	0.1%	15.3%	9.6%	17.4%	100.0%

¹ Matogak and Osviak Sections open five days per week. See Table 12 for inseason adjustments to the weekly fishing schedule.

Table 22. Commercial salmon catch by date and species, in numbers of fish, Osviak Section, Bristol Bay, 1996.

Date	Sockeye	Chinook	Chum	Pink	Coho	Total
6/24	148	8	398	0	0	554
Total	148	8	398	0	0	554
% of Section						
Total	26.7%	1.4%	71.8%	0.0%	0.0%	100.0%

Table 23. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1996.^a

District and River System	Sockeye	Chinook	Chum	Pink	Coho	Total
<u>NAKNEK-KVICHAK DISTRICT</u>						
Kvichak River	2,006,985					
Branch River	399,297					
Naknek River	5,781,438					
Total	8,187,720	4,047	124,137	4,628	3,816	8,324,348
<u>EGEGIK DISTRICT</u>	10,842,251	961	83,339	53	39,319	10,965,923
<u>UGASHIK DISTRICT</u>	4,410,073	520	103,392	59	9,169	4,523,213
<u>NUSHAGAK DISTRICT</u>						
Wood River	3,380,269					
Igushik River	1,101,599					
Nushagak-Mulchatna	1,267,751					
Total	5,749,619	73,365	324,261	2,438	12,477	6,162,160
<u>TOGIAK DISTRICT</u>						
Togiak Section	381,539	8,281	188,740	27,518	58,722	664,800
Kulukak Section	76,833	432	17,547	2,814	75	97,701
Matogak Section	1,543	4	409	256	465	2,677
Osviak Section	148	8	398	0	0	554
Total	460,063	8,725	207,094	30,588	59,262	765,732
TOTAL BRISTOL BAY	29,649,726	87,618	842,223	37,766	124,043	30,741,376
PERCENT	96.4%	0.3%	2.7%	0.1%	0.4%	100.0%

^a Preliminary

Table 24 Daily sockeye salmon escapement tower counts by river system, Bristol Bay, 1996.

Date	Kvichak River		Naknek River		Egegik River		Ugashik River		Wood River		Igushik River		Togalak River	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
6/19					11,220	11,220								
20					10,650	21,870								
21	0	0	30	30	90	21,960			9,090	9,090				
22	0	0	744	774	1,260	23,220			4,718	13,808				
23	0	0	23,258	24,030	21,174	44,394			7,698	21,504				
24	42	42	31,350	55,380	27,378	71,772			32,364	53,868	3,546	3,546		
25	4,062	4,104	56,742	112,122	24,468	96,240			41,010	94,878	5,168	8,712		
26	21,174	25,278	19,572	131,694	2,298	98,538			26,616	121,494	14,952	23,664		
27	11,310	36,588	23,658	155,352	888	99,428			38,232	159,726	12,390	36,054		
28	3,366	39,954	8,990	162,342	37,176	136,602			32,778	192,504	20,934	56,988		
29	1,002	40,956	105,000	267,342	35,868	172,470			13,392	205,896	11,046	68,034		
30	774	41,730	43,110	310,452	34,434	206,904			47,472	253,368	4,860	72,894		
7/1	5,574	47,304	41,418	351,870	36,222	243,126			63,166	316,554	4,038	76,932		
2	42,894	90,198	23,784	375,654	46,038	289,164			111,036	427,590	2,724	79,656		
3	133,902	224,100	157,782	533,436	60,714	349,878	5,604	5,604	134,370	561,960	3,252	82,908	1,344	1,344
4	93,732	317,832	40,638	574,074	31,116	380,994	28,688	34,470	164,094	726,054	4,206	87,114	2,208	3,552
5	43,410	361,242	12,720	586,794	17,202	398,196	63,156	97,626	107,130	833,184	4,568	91,680	2,310	5,862
6	23,724	384,966	40,842	627,638	8,604	406,800	97,320	194,946	122,814	955,998	7,632	99,312	1,218	7,080
7	35,016	419,982	83,100	710,738	34,888	441,488	51,000	245,946	138,006	1,094,004	7,684	107,196	702	7,782
8	48,390	468,372	158,674	869,610	51,342	492,828	36,660	282,606	108,468	1,202,472	11,918	119,112	858	8,640
9	99,852	568,224	22,644	892,254	82,250	555,078	13,512	296,118	50,706	1,253,178	13,770	132,882	804	9,444
10	100,518	668,742	16,350	908,604	234,648	789,728	8,834	302,952	52,104	1,305,282	17,214	150,096	1,938	11,382
11	100,266	769,008	13,314	921,918	226,074	1,015,800	8,370	311,322	75,606	1,380,888	23,694	173,790	4,626	16,008
12	90,954	859,962	22,398	944,316	20,688	1,036,488	6,672	317,994	60,342	1,441,230	32,608	206,598	6,246	22,254
13	175,452	1,035,414	13,194	957,510	2,370	1,038,858	5,292	323,286	36,138	1,477,368	40,044	246,642	3,468	25,722
14	124,392	1,159,808	6,236	963,748	3,270	1,042,128	5,676	328,962	23,160	1,500,528	32,062	278,724	6,138	31,860
15	77,856	1,237,662	30,842	996,390	9,564	1,051,692	9,608	338,568	15,912	1,516,440	21,498	300,222	6,258	38,118
16	72,318	1,309,980	9,942	1,006,332	17,790	1,069,482	57,654	396,222	11,544	1,527,984	21,636	321,858	7,128	45,246
17	22,134	1,332,114	17,544	1,023,876	6,114	1,075,596	88,814	484,838	10,074	1,538,058	11,088	332,946	5,814	51,060
18	20,640	1,352,754	32,668	1,056,744	0	1,075,596	68,930	551,768	37,692	1,575,750	9,876	342,822	7,098	58,158
19	43,956	1,396,710	12,084	1,068,828	0	1,075,596	33,444	585,210	19,092	1,594,842	8,646	351,468	7,860	66,018
20	25,726	1,422,438	9,270	1,078,098	0	1,075,596	25,718	610,926	22,488	1,617,330	8,934	360,402	5,844	71,862
21	13,344	1,435,782	0	1,075,596	0	1,075,596	11,262	622,188	15,372	1,632,702	7,800	368,202	6,330	78,192
22	9,306	1,445,088	0	1,075,596	0	1,075,596	13,344	635,532	16,896	1,649,598	7,568	375,768	7,236	85,428
23	5,490	1,450,578	0	1,075,596	0	1,075,596	13,158	648,690	0	1,649,598	8,436	384,204	12,720	98,148
24			0	1,075,596	0	1,075,596	10,326	659,016	0	1,649,598	10,104	394,308	11,046	109,194
25			0	1,075,596	0	1,075,596	4,530	663,546	0	1,649,598	6,438	400,746	13,842	123,036
26			0	1,075,596	0	1,075,596	3,972	667,518	0	1,649,598	0	400,746	9,204	132,240
27			0	1,075,596	0	1,075,596	0	667,518	0	1,649,598	0	400,746	7,224	139,464
28			0	1,075,596	0	1,075,596	0	667,518	0	1,649,598	0	400,746	6,858	146,322
29			0	1,075,596	0	1,075,596	0	667,518	0	1,649,598	0	400,746	3,126	149,448
30			0	1,075,596	0	1,075,596	0	667,518	0	1,649,598	0	400,746	3,768	153,216

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Table 24 (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.
7/31					0	1,075,596							1,668	154,884
8/1					0	1,075,596							2,070	156,954
2					0	1,075,596								
3					0	1,075,596								
4					0	1,075,596								
					0	1,075,596								
5					0	1,075,596								
6					0	1,075,596								
7					864 *	1,076,460								
Total	1,450,578		1,078,098			1,076,460		667,518		1,649,598		400,746		156,954

* Escapement from 8-7-96 thru 9-11-96 combined.

Table 25. Final daily and cumulative escapement estimates by species, Nushagak River sonar project, 1996.

Date	Sockeye		Chinook		Chum		Pink		Coho		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/09	110	110	962	962	1,547	1,547	0	0	0	0	2,619	2,619
6/10	199	309	1,242	2,204	2,312	3,859	0	0	0	0	3,753	6,372
6/11	117	426	690	2,894	1,333	5,192	0	0	0	0	2,140	8,512
6/12	142	568	765	3,659	1,589	6,781	0	0	0	0	2,496	11,008
6/13	153	721	1,242	4,901	1,992	8,773	0	0	0	0	3,387	14,395
6/14	165	886	995	5,896	1,958	10,731	0	0	0	0	3,118	17,513
6/15	172	1,058	663	6,559	2,023	12,754	0	0	0	0	2,858	20,371
6/16	79	1,137	390	6,949	968	13,722	0	0	0	0	1,437	21,808
6/17	239	1,376	2,129	9,078	3,508	17,230	0	0	0	0	5,876	27,684
6/18	3,639	5,015	8,621	17,699	21,909	39,139	0	0	0	0	34,169	61,853
6/19	901	5,916	4,947	22,646	12,684	51,823	0	0	0	0	18,532	80,385
6/20	1,078	6,994	2,751	25,397	10,515	62,338	0	0	0	0	14,344	94,729
6/21	3,912	10,906	2,807	28,204	11,063	73,401	0	0	0	0	17,782	112,511
6/22	5,798	16,704	2,831	31,035	14,955	88,356	0	0	0	0	23,584	136,095
6/23	8,927	25,631	1,331	32,366	7,758	96,114	0	0	0	0	18,016	154,111
6/24	9,896	35,527	1,399	33,765	8,448	104,562	0	0	0	0	19,743	173,854
6/25	18,041	53,568	3,282	37,047	22,596	127,158	0	0	0	0	43,919	217,773
6/26	22,147	75,715	1,776	38,823	7,325	134,483	0	0	0	0	31,248	249,021
6/27	16,513	92,228	1,010	39,833	13,954	148,437	0	0	0	0	31,477	280,498
6/28	21,166	113,394	1,411	41,244	15,147	163,584	0	0	0	0	37,724	318,222
6/29	9,786	123,180	225	41,469	2,515	166,099	0	0	0	0	12,526	330,748
6/30	14,900	138,080	297	41,766	4,155	170,254	0	0	0	0	19,352	350,100
7/01	19,093	157,173	325	42,091	7,901	178,155	0	0	0	0	27,319	377,419
7/02	21,304	178,477	1,222	43,313	8,992	187,147	0	0	0	0	31,518	408,937
7/03	40,175	218,652	616	43,929	9,843	196,990	0	0	0	0	50,634	459,571
7/04	27,231	245,883	371	44,300	5,053	202,043	0	0	0	0	32,655	492,226
7/05	29,537	275,420	294	44,594	1,256	203,299	0	0	0	0	31,087	523,313
7/06	19,431	294,851	195	44,789	1,759	205,058	0	0	0	0	21,385	544,698
7/07	24,920	319,771	401	45,190	1,674	206,732	0	0	80	80	27,075	571,773
7/08	17,535	337,306	719	45,909	2,366	209,098	0	0	135	215	20,755	592,528
7/09	14,260	351,566	513	46,422	1,909	211,007	58	58	128	343	16,868	609,396
7/10	11,098	362,664	547	46,969	1,430	212,437	270	328	157	500	13,502	622,898

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Table 25. (p 2 of 3)

Date	Sockeye		Chinook		Chum		Pink		Coho		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/11	9,794	372,458	563	47,532	855	213,292	273	601	558	1,058	12,043	634,941
7/12	11,307	383,765	439	47,971	898	214,190	341	942	419	1,477	13,404	648,345
7/13	14,442	398,207	477	48,448	1,068	215,258	475	1,417	387	1,864	16,849	665,194
7/14	10,546	408,753	325	48,773	803	216,061	329	1,746	271	2,135	12,274	677,468
7/15	7,112	415,865	415	49,188	654	216,715	187	1,933	292	2,427	8,660	686,128
7/16	7,542	423,407	333	49,521	669	217,384	198	2,131	208	2,635	8,950	695,078
7/17	3,874	427,281	141	49,662	242	217,626	453	2,584	176	2,811	4,886	699,964
7/18	14,891	442,172	254	49,916	817	218,443	1,765	4,349	553	3,364	18,280	718,244
7/19	18,421	460,593	510	50,426	1,072	219,515	2,698	7,047	1,016	4,380	23,717	741,961
7/20	7,282	467,875	306	50,732	490	220,005	796	7,843	440	4,820	9,314	751,275
7/21	3,877	471,752	262	50,994	286	220,291	613	8,456	318	5,138	5,356	756,631
7/22	7,491	479,243	83	51,077	334	220,625	2,451	10,907	890	6,028	11,249	767,880
7/23	7,905	487,148	83	51,160	352	220,977	2,255	13,162	735	6,763	11,330	779,210
7/24	7,182	494,330	34	51,194	325	221,302	2,318	15,480	1,004	7,767	10,863	790,073
7/25	534	494,864	35	51,229	240	221,542	32,951	48,431	2,589	10,356	36,349	826,422
7/26	485	495,349	40	51,269	227	221,769	29,860	78,291	2,885	13,241	33,497	859,919
7/27	861	496,210	116	51,385	440	222,209	52,386	130,677	7,481	20,722	61,284	921,203
7/28	348	496,558	122	51,507	263	222,472	65,581	196,258	20,959	41,681	87,273	1,008,476
7/29	454	497,012	133	51,640	350	222,822	80,657	276,915	21,802	63,483	103,396	1,111,872
7/30	1,024	498,036	173	51,813	633	223,455	165,951	442,866	39,448	102,931	207,229	1,319,101
7/31	259	498,295	70	51,883	199	223,654	82,605	525,471	12,642	115,573	95,775	1,414,876
8/01	317	498,612	31	51,914	35	223,689	39,307	564,778	4,614	120,187	44,304	1,459,180
8/02	868	499,480	42	51,956	398	224,087	56,063	620,841	8,608	128,795	65,979	1,525,159
8/03	38	499,518	36	51,992	170	224,257	57,074	677,915	2,311	131,106	59,629	1,584,788
8/04	695	500,213	16	52,008	126	224,383	24,795	702,710	8,379	139,485	34,011	1,618,799
8/05	1,317	501,530	28	52,036	285	224,668	28,660	731,370	12,147	151,632	42,437	1,661,236
8/06	720	502,250	21	52,057	126	224,794	29,066	760,436	9,410	161,042	39,343	1,700,579
8/07	386	502,636	18	52,075	67	224,861	18,574	779,010	5,739	166,781	24,784	1,725,363
8/08	197	502,833	10	52,085	40	224,901	7,806	786,816	2,609	169,390	10,662	1,736,025
8/09	223	503,056	16	52,101	47	224,948	8,100	794,916	2,812	172,202	11,198	1,747,223
8/10	232	503,288	19	52,120	50	224,998	9,098	804,014	3,100	175,302	12,499	1,759,722
8/11	139	503,427	3	52,123	19	225,017	5,097	809,111	1,818	177,120	7,076	1,766,798
8/12	83	503,510	2	52,125	10	225,027	2,993	812,104	1,116	178,236	4,204	1,771,002

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Table 25. (p 3 of 3)

Date	Sockeye		Chinook		Chum		Pink		Coho		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
8/13	18	503,528	1	52,126	1	225,028	1,861	813,965	992	179,228	2,873	1,773,875
8/14	16	503,544	1	52,127	1	225,029	1,827	815,792	971	180,199	2,816	1,776,691
8/15	3	503,547	0	52,127	0	225,029	681	816,473	1,060	181,259	1,744	1,778,435
8/16	7	503,554	0	52,127	0	225,029	737	817,210	1,179	182,438	1,923	1,780,358
8/17	8	503,562	0	52,127	0	225,029	383	817,593	632	183,070	1,023	1,781,381
8/18	17	503,579	0	52,127	0	225,029	530	818,123	895	183,965	1,442	1,782,823
8/19	12	503,591	0	52,127	0	225,029	555	818,678	906	184,871	1,473	1,784,296
8/20	9	503,600	0	52,127	0	225,029	309	818,987	517	185,388	835	1,785,131
8/21	1	503,601	0	52,127	0	225,029	155	819,142	256	185,644	412	1,785,543
8/22	5	503,606	0	52,127	0	225,029	175	819,317	321	185,965	501	1,786,044
8/23	5	503,611	0	52,127	0	225,029	163	819,480	294	186,259	462	1,786,506
8/24	2	503,613	0	52,127	0	225,029	213	819,693	348	186,607	563	1,787,069
8/25	3	503,616	0	52,127	0	225,029	251	819,944	421	187,028	675	1,787,744
8/26	15	503,631	0	52,127	0	225,029	804	820,748	1,339	188,367	2,158	1,789,902
8/27	18	503,649	0	52,127	0	225,029	358	821,106	643	189,010	1,019	1,790,921
8/28	2	503,651	0	52,127	0	225,029	206	821,312	335	189,345	543	1,791,464
Total	503,651		52,127		225,029		821,312		189,345		1,791,464 *	

* An additional 137 whitefish and 899 Arctic char were counted passing the sonar site in 1996.

Table 26. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Kvichak River, Bristol Bay, 1996.

Date	Tower Count		Aerial Survey	Fish per Index Pt. ¹	River Test Fishing		Cumulative Escapement
	Daily	Cum.	Total		Daily	Cum.	
6/21				111			
22				111	3	3	
23	0	0		111	6	9	
24	42	42		111	132	141	0
25	4,062	4,104		111	19	160	17,760
26	21,174	25,278		111	15	175	19,425
27	11,310	36,588		111	0	175	19,425
28	3,366	39,954		111	0	175	19,425
29	1,002	40,956		111	4	179	19,869
30	774	41,730		111	107	286	31,746
7/ 1	5,574	47,304		111	430	716	79,476
2	42,894	90,198		111	1,058	1,774	196,914
3	133,902	224,100	125,000	180	647	2,421	435,780
4	93,732	317,832		175	131	2,552	446,600
5	43,410	361,242	70,000	175	101	2,653	464,275
6	23,724	384,966		155	214	2,867	444,385
7	35,016	419,982		146	1,520	4,387	640,502
8	48,390	468,372		120	1,009	5,396	647,520
9	99,852	568,224	150,000	112	1,581	6,977	781,424
10	100,518	668,742		108	1,849	8,826	953,208
11	100,266	769,008		105	1,859	10,685	1,121,925
12	90,954	859,962		93	1,626	12,311	1,144,923
13	175,452	1,035,414		80	1,027	13,338	1,067,040
14	124,392	1,159,806	145,000	83	2,745	16,083	1,334,889
15	77,856	1,237,662		83	1,342	17,425	1,446,275
16	72,318	1,309,980		82	366	17,791	1,458,862
17	22,134	1,332,114		80	30	17,821	1,425,680
18	20,640	1,352,754					
19	43,956	1,396,710					
20	25,728	1,422,438					
21	13,344	1,435,782					
22	9,306	1,445,088					
23	5,490	1,450,578					
Total		1,450,578				17,821	1,425,680

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

Table 27. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods, in thousands of fish, Egegik River, Bristol Bay, 1996.

Date	Tower Count		Aerial Survey		Fish per Index Pt. ¹	River Test Fishing		Estimated Cumulative Escapement
	Daily	Cum.	Lagoon	Total		Index Points		
						Daily	Cum.	
6/14								
15					80	326	326	26
16			4	5	80	388	714	57
17					80	464	1,178	94
18			8	16	80	144	1,322	106
19	11	11			80	32	1,354	108
20	11	22			80	66	1,420	114
21	0	22			80	19	1,439	115
22	1	23	4	4	80	202	1,641	131
23	21	44			80	1,962	3,603	288
24	27	71	2	2	80	153	3,756	300
25	24	95			50	647	4,403	220
26	2	97			44	70	4,473	197
27	1	98			30	95	4,568	137
28	37	135	2	5	30	1,091	5,659	170
29	36	171	17	17	41	1,004	6,663	273
30	34	205			40	567	7,230	289
7/01	36	241	4	4	39	647	7,877	307
02	46	287	20	20	42	819	8,696	365
03	61	348			44	366	9,062	399
04	31	379	7	7	46	243	9,305	428
05	17	396			48	157	9,462	454
06	9	405			46	236	9,698	446
07	35	440			48	726	10,424	500
08	51	491	10	10	50	1,010	11,434	572
09	62	553			53	853	12,287	651
10	235	788	3	3	64	1,918	14,205	909
11	226	1,014			71	714	14,919	1,059
12	21	1,035			72	121	15,040	1,083
13	2	1,037						
14	3	1,040						
15	10	1,050						
16	18	1,068	1	1				
17	6	1,074						
18	1	1,075						
Total		1,075			69 *			1,083

¹ The 1985-95 mean fish per index point relationship (80 fpi) was used until June 25 when lag-time relationships began to prove more accurate.

* Calculated using the tower count through July 14 allowing for a 2-day lag between inside test passage and tower passage.

Table 28. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods, in thousands of fish, Ugashik River, Bristol Bay, 1996.

Date	Tower Count		Aerial Survey		Fish per Index Pt. ¹	River Test Fishing		Cumulative Escapement
	Daily	Cum.	Lagoon	Total		Index Points Daily	Cum.	
6/22			1	1				
23					95	29	29	3
24			0	.5	95	20	49	5
25					95	17	66	6
26					95	23	89	8
27					95	21	110	10
28			0	0	95	9	119	11
29					95	23	142	13
30					95	54	196	19
7/01			0	0	95	243	439	42
02					62	1,167	1,606	100
03	6	6			60	2,584	4,190	251
04	29	35			60	2,406	6,596	396
05	63	98			41	1,669	8,265	339
06	97	195			40	386	8,651	346
07	51	246			40	562	9,213	369
08	37	283	2	2	40	458	9,671	387
09	14	297			40	125	9,796	392
10	7	304	0	0	39	165	9,961	388
11	8	312			34	290	10,251	349
12	7	319	1	1	33	188	10,439	344
13	5	324			33	108	10,547	348
14	6	330			33	136	10,683	353
15	10	340			33	1,992	12,675	418
16	58	398	6	8	37	3,393	16,068	595
17	89	487			38	1,814	17,882	680
18	67	554			36	735	18,617	670
19	33	587						
20	26	613						
21	11	624						
22	13	637	3	3				
23	13	650						
24	10	660						
25	5	665						
26	4	669						
27								
Total		669					18,617	670

¹ The 1991-94 mean fish per index point relationship was 89 fpi, the 1985-94 mean fish per index point relationship was 58 fpi, as a compromise, 80 fpi was used until July 9 when lag-time relationships appeared to be more accurate.

Table 29. Inseason ocean age composition of sockeye salmon escapement, Wood River, Bristol Bay, 1996.

Date	<u>2-Ocean (%)</u> Scales ¹	<u>3-Ocean (%)</u> Scales ¹	Scale Sample Size ²
27-Jun	52.1	47.8	94
28-Jun	58.4	38.9	36
30-Jun	66.7	33.3	63
2-Jul	56.5	41.6	108
3-Jul	50.7	49.3	75
4-Jul	44.0	54.6	132
6-Jul	48.1	51.1	135
7-Jul	42.4	54.5	66
8-Jul	44.6	55.4	65
9-Jul	38.5	61.5	52
10-Jul	50.0	45.5	66
15-Jul	47.7	51.2	256
Final	48.9	49.9	1,148
ADF&G Forecast	46.0	54.0	

¹ Will not total 100% due to a small number of age 0.X fish not included.

² Actual number of readable scales.

Table 30. Daily sockeye salmon escapement estimates by tower and aerial survey enumeration methods, in thousands of fish, Wood River, Bristol Bay, 1996.

Date	Tower Count		Aerial Surveys ¹		
	Daily	Cum.	Number	Visibility	Comments
19-Jun			200	Poor	Schooled at Silver Salmon Cr.
20-Jun			470	Fair	450 schooled
21-Jun	9	9	1,040	Fair	Partial count on right bank
22-Jun	5	14	700	Poor	Fish in groups of 20-40 each
23-Jun	8	22	550	Fair	Left bank count only
24-Jun	32	54	930	Poor	Groups of 50 on right bank
25-Jun	41	95			Light sign in lower river
26-Jun	27	121			
27-Jun	38	160			
28-Jun	33	193			
29-Jun	13	206	2,690	Good	Groups of 20-30 fish each
30-Jun	47	253	11,400	Excellent	
1-Jul	63	317	10,600	Good	All observed above Silver Salmon Cr.
2-Jul	111	428	20,800	Excellent	Continuous fish in clear water; moderate sign below
3-Jul	134	562	19,100	Fair	Missed fish due to turbid water
4-Jul	164	726			
5-Jul	107	833	9,700	Fair	Left bank count only
6-Jul	123	956			
7-Jul	138	1,094	35,800	Excellent	Heavy sign in lower river
8-Jul	108	1,202	18,700	Excellent	
9-Jul	51	1,253			
10-Jul	52	1,305			
11-Jul	76	1,381			
12-Jul	60	1,441			
13-Jul	36	1,477			
14-Jul	23	1,501			
15-Jul	16	1,516			
16-Jul	12	1,528			
17-Jul	10	1,538			
18-Jul	38	1,576			
19-Jul	19	1,595			
20-Jul	22	1,617			
21-Jul	15	1,633			
22-Jul	17	1,650			
Total		1,650			

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, 1996.

Date	Tower Count		Aerial Surveys ¹				River Test Fishing			
	Daily	Cum.	Lower River	Lagoon	Upper River	Total Visibility	Fish per Index Pt. ^a	Index Points		
								Daily	Cumulative Escapement	
15-Jun							92	0	0	0
16-Jun							92	16	16	1
17-Jun							92	33	48	4
18-Jun							92	2	50	5
19-Jun							92	8	58	5
20-Jun							92	6	64	6
21-Jun							92	2	66	6
22-Jun							92	0	66	6
23-Jun							92	19	85	8
24-Jun	4	4					92	511	596	55
25-Jun	5	9					92	470	1,066	98
26-Jun	15	24					92	37	1,103	101
27-Jun	12	36					92	32	1,135	104
28-Jun	21	57					53	10	1,145	61
29-Jun	11	68					61	0	1,145	71
30-Jun	5	73					64	59	1,204	77
1-Jul	4	77					67	84	1,288	87
2-Jul	3	80					59	62	1,350	94
3-Jul	3	83					68	122	1,472	101
4-Jul	4	87					67	192	1,663	113
5-Jul	5	92					67	74	1,737	118
6-Jul	8	99					67	178	1,915	129
7-Jul	8	107					64	278	2,192	141
8-Jul	12	119					68	133	2,325	159
9-Jul	14	133					69	956	3,281	228
10-Jul	17	150					68	787	4,068	279
11-Jul	24	174					74	617	4,685	350
12-Jul	33	207					62	607	5,293	333
13-Jul	40	247								
14-Jul	32	279								
15-Jul	21	300								
16-Jul	22	322								
17-Jul	11	333								
18-Jul	10	343								
19-Jul	9	351								
20-Jul	9	360								
21-Jul	8	368								
22-Jul	8	376								
23-Jul	8	384								
24-Jul	10	394								
25-Jul	6	401								
26-Jul										
Total		401								

¹ The 1991-92, 1994-95 mean fish per index point relationship (92 fpi) was used until June 28 when lag-time relationships began to prove more accurate.

^a No test fishing conducted due to weather. Daily index was interpolated using data from July 9 and 11.

Table 32. Comparison of daily sockeye salmon escapement estimates by tower and aerial survey enumeration methods in thousands of fish, Togiak River, Bristol Bay, 1996.

Date	Tower Count		Aerial Surveys ¹			Total	Visibility	Comments
	Daily	Cum.	Togiak to Gechiak	Gechiak to Ongivinuck	Ongivinuck to tower			
7/01			2150	1875	525	4550	Good	plus 4,500 chums
7/02								
7/03	1	1						
7/04	2	3						
7/05	2	5	4655	5650	525	11770	Fair	lower % chums in upper section
7/06	1	6						
7/07	1	7						
7/08	1	8						
7/09	1	9						
7/10	2	11						
7/11	5	16						
7/12	6	22						
7/13	3	25						
7/14	6	31	3700	6200	4600	14500	Fair	plus 9,500 chums
7/15	6	37						
7/16	7	44						
7/17	6	50						
7/18	7	57						
7/19	8	65	9500	13300	8700	31500	Fair	plus 29,400 chums
7/20	6	71						
7/21	6	77						
7/22	7	84						
7/23	13	97						
7/24	11	108	3300		17700		Poor	Only A & F surveyed, plus 19,500 chums
7/25	14	122						
7/26	9	131						
7/27	7	138						
7/28	7	145						
7/29	3	148						
7/30	4	152			6300		Good	Only F surveyed, plus 10,600 chums
7/31	2	154						
8/01	2	156						
Total		156						

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, 1996.*

Name of Operator/Buyer	Base of Operations	District ¹	Method ²	Export
1 Alaska Smoked Salmon	Anchorage, AK	N	F,S	AIR
2 Alaska Pacific Products	Egegik, AK	E	F,S	AIR, SEA
3 Big Creek	Warden, WA	E	F	SEA
4 Clipper Fisheries	Seattle, WA	K,E,U	F	SEA
5 Capilano Pacific	Bellingham, WA	K,E,U,N	F	SEA
6 Clark's Fisheries Co.	Cathlamet, WA	E	F	AIR, SEA
7 Dillingham Meat & Fish	Dillingham, AK	N	F,S,EF	AIR
8 Dragnet Fisheries Co.	Kenai, AK	K,E,U,N	F,EF	AIR, SEA
9 Favco Inc.	Anchorage, AK	K	EF	AIR
10 Friedman Family Fish.	Baltimore, MD	N	F	SEA
11 Fish Business Co.	Seattle, WA	E	EF	AIR
12 Inlet Salmon	Kenai, AK	K,E,U,N	F,EF	SEA
13 International Seafoods	Seattle, WA	E	F	SEA
14 Icicle Seafoods	Seattle, WA	K,E,U,N	F,EF,C	SEA
15 Lady Marion Seafoods	Anchorage, AK	K	F	AIR
16 NorQuest Seafoods	Seattle, WA	K,E,U,N	F	SEA
17 Nelbro Packing Co.	Kenmore, WA	K,E,U,N	F,C	AIR, SEA
18 New West Fish Inc.	Bellingham, WA	K,E,U,N	F	SEA
19 North Alaska Fisheries	Anchorage, AK	T	F,EF	AIR
20 North Coast Fisheries	Seattle, WA	K,E,U,N	F,S	SEA
21 Ocean Beauty	Seattle, WA	N	F,EF	AIR, SEA
22 Oceantrawl Inc.	Seattle, WA	K,E,U,N	F	SEA
23 Pan Pacific Seafoods	Seattle, WA	K,E,U	F	SEA
24 Pederson Point	Seattle, WA	K,E,N	F	SEA
25 Peter Pan Seafoods	Seattle, WA	K,E,U,N	F,EF,C	AIR, SEA
26 Snopac Products	Seattle, WA	K,E,U,N	F	SEA
27 Salamatof Seafoods	Kenai, AK	N	EF	AIR
28 Togiak Fisheries	Seattle, WA	T	F,EF	AIR, SEA
29 Trident Seafoods	Seattle, WA	K,E,U,N	F,EF,C	AIR, SEA
30 Unisea Inc.	Redmond, WA	K,E,U,N	F,EF	SEA
31 W.C.P. / Ekuk	Seattle, WA	E,N	F,C	AIR, SEA
32 W.C.P. / South Naknek	Seattle, WA	K,E	F	AIR, SEA
33 W.C.P. / Red Salmon	Seattle, WA	K,E,N	F,EF,C	SEA
34 Woodbine Alaska Fish	Rio Vista, CA	K,E,U,T	F,C	SEA
35 Western Sea	Seattle, WA	E,U,T	F	SEA
36 Y.A.K. Inc.	Seattle, WA	K,E,U,N	F	SEA

Number of processors: Canning=7, Freezing=33, Curing=4, Air Export=17, Sea Export=29

* Indicates operators with a processing facility in a district or operators from other areas buying fish and / or providing support 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= frozed; S=cured; T=tendered.

Table 34. Mean round weight, price per pound, and total exvessel value of the commercial salmon catch, Bristol Bay, 1996.^a

Species	Total Catch (lbs.)	Mean Weight (lbs.)	Mean Price (\$/lb.)	Exvessel Value (\$)
Sockeye	185,611,153	6.26	0.75	139,208,365
Chinook	1,575,498	17.98	0.50	787,749
Chum	6,149,279	7.30	0.10	614,928
Pink	133,070	3.50	0.05	6,654
Coho	846,580	6.82	0.30	253,974
Total	194,315,580			140,871,669

^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 number of fish, by district and location fished, Bristol Bay, 1996. *

Area and River System	Permits						Total
	Issue	Sockeye	Chinook	Chum	Pink	Coho	
NAKNEK-KVICHAK DISTRICT							
Naknek River ¹	329	26,743	1,484	649	752	1,399	31,027
Kvichak River							
Branch River	1	0	0	0	0	0	0
Igiugig	9	1,933	2	85	1	44	2,065
Iliamna Lake	40	6,374	8	16	15	4	6,417
Kijik	2	110	0	0	0	0	110
Kokhanok	21	13,104	13	14	9	19	13,159
Kvichak River	16	4,242	20	34	14	0	4,310
Lake Clark	36	3,700	7	0	0	0	3,707
Levelock	9	978	17	5	0	0	1,000
Newhalen River	44	12,911	8	13	3	16	12,951
Nondalton	15	7,749	11	0	0	0	7,760
Pedro Bay	14	2,728	4	0	0	0	2,732
Port Alsworth	4	733	0	0	0	0	733
Subtotal	211	54,562	90	167	42	83	54,944
TOTAL NAKNEK/KVICHAK	540	81,305	1,574	816	794	1,482	85,971
EGEGIK DISTRICT ²	44	2,321	99	89	85	579	3,173
UGASHIK DISTRICT ³	26	1,247	50	21	7	298	1,623
NUSHAGAK DISTRICT							
Wood River ⁴	82	3,235	2,472	515	103	666	6,991
Lower Nushagak River ⁵	30	1,690	2,985	208	41	187	5,111
Upper Nushagak River ⁶	53	4,043	3,063	1,405	153	873	9,537
Dillingham Beaches ⁷	224	8,311	6,446	2,048	731	2,526	20,062
Nushagak Bay Commercial ⁸	67	2,329	786	511	540	617	4,783
Igushik	25	3,327	189	17	5	348	3,886
TOTAL NUSHAGAK	481	22,935	15,941	4,704	1,573	5,217	50,370
TOGIK DISTRICT ⁹	19	662	471	285	59	199	1,676
TOTAL BRISTOL BAY	1,110	108,470	18,135	5,915	2,518	7,775	142,813

* Harvests are extrapolated for all permits issued, based on those returned and based on area fished, as first recorded on the permit.

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

² Includes Egegik village and beach.

³ Includes Pilot 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 Ekwook Area, Kokwok River, New Stuyahok Area, Koliganek Area, Mulchatna River, and Portage Creek.

⁷ Includes Icicle, Kakanak, Scandinavia, Skinner, Snag Point, and Squaw Creek.

⁸ Includes Clark's Point, Ekuok, Etoin 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, 1976-96.

Year	Kvichak River					Naknek River				
	Point Goal	Range		Actual	Percent Deviation	Point Goal	Range		Actual	Percent Deviation
1976	2,000			1,965	(2)	800			1,321	65
1977	2,000			1,341	(33)	800			1,086	36
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
20 yr Ave	5,700			6,164	7	920			1,516	65
1976-85	5,200			6,534	22	840			1,372	64
1986-95	6,200	4,800	8,200	5,795	(8)	1,000	800	1,400	1,661	66
1996	4,000			1,451	(63)	1,000			1,078	7

Year	Egegik River					Ugashik River				
	Point Goal	Range		Actual	Percent Deviation	Point Goal	Range		Actual	Percent Deviation
1976	600			509	(15)	500			342	(32)
1977	600			693	16	500			201	(60)
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	1,813	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
20 yr Ave	840	800	1,217	1,316	54	620	500	925	1,225	101
1976-85	680	800	1,200	897	34	540	500	900	1,136	114
1986-95	1,000	800	1,220	1,734	73	700	500	930	1,315	88
1996	1,000			1,076	8	700			668	(5)

Appendix Table 1. (Page 2 of 2)

Year	Wood River					Igushik River				
	Point	Range		Actual	Percent Deviation ¹	Point	Range		Actual	Percent Deviation ¹
	Goal	Lower	Upper			Goal	Lower	Upper		
1976	800			817	2	150			186	24
1977	800			562	(30)	150			96	(36)
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
20 yr Ave	930			1,284	41	183			456	167
1976-85	860			1,383	65	165			526	241
1986-95	1,000	730	1,200	1,185	18	200	148	250	386	93
1996	1,200	700	1,200	1,650	38	200	150	250	401	101
Year	Nushagak River ²					Togiak River				
	Point	Range		Actual	Percent Deviation ¹	Point	Range		Actual	Percent Deviation ¹
	Goal	Lower	Upper			Goal	Lower	Upper		
1976	250			425	70	100			158	58
1977	250			233	(7)	100			134	34
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
20 yr Ave	413			620	84	130			198	63
1976-85	305			722	168	110			208	100
1986-95	520	324	736 #	519	(0)	150	128	235	189	26
1,996	550	340	760	525	(5)	150	140	250	157	5

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, Bristol Bay, 1976-96.

Year	Forecast			Inshore Run ¹	Forecast Error (%)		
	Spawner Recruit	Mean Percent	Sibling		Spawner Recruit	Mean Percent	Sibling
1974	266	164	77	110	142	49	-30
75	284	131	68	99	187	32	-31
76	249	126	118	168	48	-25	-30
77	211	107	146	156	35	-31	-6
78	254	105	111	256	-1	-59	-57
1979	348	147	182	262	33	-44	-31
80	329	206	162	219	50	-6	-26
81	339	230	198	356	-5	-35	-44
82	319	256	213	356	-10	-28	-40
83	322	266	224	313	3	-15	-28
1984	236	319	165	154	53	107	7
85	308	434	162	193	60	125	-16
86	299	543	168	119	151	356	41
87	353	366	125	140	152	161	-11
88			139	80			74
1989			129	102			26
90			116	88			32
91			120 ^a	135			-11
92			196 ^a	142			38
93			139 ^a	175			-21
1994 ^b			151 ^a	229			-34
95 ^b			177 ^a	178			-1
Mean Percent Error					47	42	-7
1996 ^b			150 ^a	139 ^c			8

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.

Preliminary

(Sources: 1, 5, 6, 7, and 16)

Appendix Table 3. Salmon entry permit registration by gear and residency, Bristol Bay, 1975-1996.*

Year	Drift Net ¹			Set Net ¹			Total
	Resident	Non-Resident	Total	Resident	Non-Resident	Total	
1975 ^b	1,217 (450)	843 (194)	2,060	751 (159)	169 (45)	920	2,980
76	987 (69)	734 (30)	1,721	625 (5)	139 (0)	764	2,485
77	1,001 (52)	726 (13)	1,727	684 (15)	156 (1)	840	2,567
78	1,041 (66)	735 (11)	1,776	749 (16)	161 (3)	910	2,686
79	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
81	1,056 (98)	770 (18)	1,826	751 (37)	204 (5)	955	2,781
82	1,048 (84)	776 (16)	1,824	741 (36)	216 (5)	957	2,781
83	1,072 (79)	750 (16)	1,822	741 (33)	219 (3)	960	2,782
84	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
86	1,060 (78)	778 (17)	1,838	739 (18)	223 (4)	962	2,800
87 ^c	1,044 (75)	793 (16)	1,837	736 (14)	224 (4)	960	2,797
88 ^d	1,033 (78)	806 (12)	1,839	731 (14)	227 (3)	958	2,797
89 ^e	1,036 (77)	831 (14)	1,867	784 (14)	240 (4)	1,024	2,891
1990 ^f	1,038 (78)	840 (15)	1,878	784 (11)	243 (5)	1,027	2,905
91 ^g	1,019 (74)	862 (14)	1,881	771 (8)	253 (4)	1,024	2,905
92 ^h	998 (72)	886 (15)	1,884	774 (8)	251 (0)	1,025	2,909
93 ⁱ	984 (65)	902 (16)	1,886	764 (8)	259 (0)	1,023	2,909
94 ^j	971 (63)	916 (14)	1,887	761 (7)	259 (0)	1,020	2,907
1995 ^k	969 (62)	919 (13)	1,888	762 (8)	257 (0)	1,019	2,907
20 Year Ave.	1,038	806	1,844	745	214	960	2,803
1975-84 Ave.	1,058	762	1,820	731	184	915	2,735
1985-95 Ave.	1,019	846	1,865	759	241	1,000	2,865
1996	967 (56)	924 (14)	1,891	759 (6)	258 (0)	1,017	2,908

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

^a Total permit registration: not all permittees actually fished.

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

^c Does not include 2 drift and 11 setnet permits available but not renewed.

^d Does not include 1 drift and 8 setnet permits.

^e Does not include 5 drift and 20 setnet permits.

^f Does not include 3 drift and 14 setnet permits.

^g Does not include 4 drift and 20 setnet permits.

^h Does not include 4 drift and 14 setnet permits.

ⁱ Does not include 7 drift and 18 setnet permits.

^j Does not include 7 drift and 15 setnet permits.

^k Does not include 2 drift and 14 setnet permits.

Appendix Table 4 Salmon fishing interim-use and permanent entry permits actually fished, by gear type, Bristol Bay, 1975-1996.

Year	Permits Issued			Permits Fished	
	Interim - Use	Permanent	Total	Number	Percent
Drift Gill Net					
1975	644	1,416	2,060	1,235	60%
76	99	1,622	1,721	1,353	79%
77	65	1,662	1,727	1,359	79%
78	77	1,699	1,776	1,575	89%
79	83	1,716	1,799	1,714	95%
1980	110	1,716	1,826	1,764	97%
81	107	1,719	1,826	1,785	98%
82	100	1,724	1,824	1,792	98%
83	95	1,727	1,822	1,797	99%
84	91	1,729	1,820	1,804	99%
1985	96	1,738	1,834	1,815	99%
86	95	1,743	1,838	1,823	99%
87	91	1,746	1,837	1,824	99%
88	90	1,749	1,839	1,837	100%
89	91	1,776	1,867	1,855	99%
1990	93	1,785	1,878	1,869	100%
91	88	1,793	1,881	1,873	100%
92	87	1,797	1,884	1,879	100%
93	81	1,805	1,886	1,875	99%
94	77	1,810	1,887	1,865	99%
1995	75	1,813	1,888	1,882	100%
Average	116	1,728	1,844	1,742	
1996 *	70	1,821	1,891		
Set Gill Net					
1975	204	716	920	445	48%
76	5	759	764	501	66%
77	16	824	840	498	59%
78	19	891	910	656	72%
79	24	910	934	770	82%
1980	34	913	947	807	85%
81	42	913	955	841	88%
82	41	916	957	859	90%
83	31	929	960	865	90%
84	31	931	962	869	90%
1985	28	931	959	872	91%
86	22	940	962	869	90%
87	18	942	960	899	94%
88	17	941	958	922	96%
89	18	1,006	1,024	971	95%
1990	16	1,011	1,027	971	95%
91	12	1,012	1,024	950	93%
92	8	1,017	1,025	968	94%
93	8	1,015	1,023	965	94%
94	7	1,013	1,020	939	92%
1995	8	1,011	1,019	967	95%
Average	29	931	960	829	
1996 *	6	1,011	1,017		

* Preliminary

(Source: 14)

Appendix Table 5. Sockeye salmon commercial catch by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	2,547,276	1,329,788	174,923	1,265,422	301,883	5,619,292
77	2,167,214	1,780,567	92,623	619,025	218,451	4,877,880
78	5,123,668	1,207,294	7,995	3,137,166	452,016	9,928,139
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
1981	10,992,809	4,361,406	2,116,066	7,493,093	639,707	25,603,081
82	5,005,802	2,447,514	1,139,192	5,916,187	595,696	15,104,391
83	21,559,372	6,755,256	3,349,451	5,119,744	588,208	37,372,031
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
1986	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
88	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
1991	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
93	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	44,255,217
20-Year Ave.	10,403,094	7,032,533	2,527,035	3,479,849	450,220	23,892,181
1976-85 Ave.	10,023,423	3,548,991	1,728,448	3,467,634	442,340	19,210,836
1986-95 Ave.	10,782,766	10,516,075	3,325,622	3,492,065	458,100	28,573,527
1996 *	8,187,720	10,842,251	4,410,073	5,749,619	460,063	29,650,344

* Preliminary.

(Sources: 1 and 5)

Appendix Table 6. Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1976-1996.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	4,064	1,138	338	60,684	29,744	95,968
77	4,373	3,694	2,167	85,074	35,218	130,526
78	6,930	3,126	5,935	118,548	57,000	191,539
79	10,415	5,547	9,568	157,321	30,022	212,873
80	7,517	5,610	4,900	64,958	12,543	95,528
1981	11,048	5,468	3,416	193,461	23,911	237,304
82	12,425	4,834	7,170	195,287	33,786	253,502
83	8,955	4,758	9,276	137,123	38,497	198,609
84	8,972	4,680	4,767	61,378	22,179	101,976
85	5,697	4,015	5,840	67,783	37,106	120,441
1986	3,188	1,883	2,982	65,783	19,880	93,716
87	5,175	2,959	4,065	45,983	17,217	75,399
88	6,538	3,103	3,444	16,648	15,606	45,339
89	6,611	2,034	2,112	17,637	11,366	39,760
90	5,068	1,146	1,840	14,812	11,130	33,996
1991	3,584	510	589	19,718	6,039	30,440
92	5,724	694	2,146	47,563	12,640	68,767
93	7,477	1,478	3,075	62,976	10,851	85,857
94	6,016	1,243	3,685	119,480	10,486	140,910
95	5,084	760	1,551	79,942	11,981	99,318
20-Year Ave	6,743	2,934	3,943	81,608	22,360	117,588
1976-85 Ave	8,040	4,287	5,338	114,162	32,001	163,827
1986-95 Ave	5,447	1,581	2,549	49,054	12,720	71,350
1996	4,050	960	520	73,370	8,730	87,630

* Preliminary.

(Sources 1 and 5)

Appendix Table 7. Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	317,550	46,955	9,924	801,064	153,559	1,329,052
77	340,228	83,121	4,465	899,701	270,649	1,598,164
78	185,451	44,480	1,449	651,743	274,967	1,158,090
79	196,398	38,004	12,174	440,279	219,942	906,797
80	204,515	78,556	36,343	681,930	299,682	1,301,026
1981	355,943	87,581	36,275	795,143	229,886	1,504,828
82	198,019	84,329	53,204	434,817	151,000	921,369
83	351,769	127,490	105,171	725,060	322,691	1,632,181
84	447,259	178,096	210,611	850,114	336,660	2,022,740
85	210,107	126,736	131,576	396,740	203,302	1,068,461
1986	262,925	94,666	111,112	488,375	270,057	1,227,135
87	446,908	145,259	101,074	416,476	419,425	1,529,142
88	295,571	237,888	94,545	371,196	470,132	1,469,332
89	310,869	136,185	84,673	523,903	203,178	1,258,808
90	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
92	167,168	121,472	57,170	398,691	176,123	920,624
93	43,684	70,628	73,402	505,799	144,869	838,382
94	219,118	62,961	52,127	328,267	232,559	895,032
95	236,472	68,325	62,801	390,158	221,126	978,882
20-Year Ave.	282,771	101,586	66,520	547,073	247,463	1,245,413
1976-85 Ave.	280,724	89,535	60,119	667,659	246,234	1,344,271
1986-95 Ave.	284,818	113,636	72,922	426,487	248,692	1,146,555
1996	124,137	83,339	103,392	324,261	207,094	842,223

a Preliminary.

(Sources: 1 and 5)

Appendix Table 8. Pink salmon commercial catch by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	264,631	4,121	116	739,590	28,085	1,036,543
77	19	0	5	3,017	1,476	4,517
78	734,880	11,430	530	4,348,336	57,524	5,152,700
79	134	6	9	1,787	1,913	3,849
80	288,363	2,476	51	2,202,545	70,033	2,563,468
1981	194	222	29	345	6,490	7,280
82	127,560	1,997	170	1,339,272	23,417	1,492,416
83	51	92	0	137	204	484
84	211,306	5,759	2,387	3,127,153	19,468	3,366,073
85	39	51	3	48	316	457
1986	106,919	2,749	98	267,117	24,404	401,287
87	5	0	30	2	20	57
88	648,569	4,485	218	243,890	58,084	955,246
89	75	6	29	156	172	438
90	421,690	11,593	361	54,127	8,746	496,517
1991	102	15	2	69	117	305
92	214,228	694	525	190,102	93,989	499,538
93	86	2	2	83	240	413
94	11,537	145	21	8,562	69,552	89,907
95	55	1	1	120	294	471
20-Year Ave. ¹	302,968	4,545	448	1,252,069	45,330	1,605,370
1976-85 Ave. ¹	325,348	5,157	651	2,351,379	39,705	2,722,240
1986-95 Ave. ¹	280,589	3,933	245	152,760	50,955	488,499
1996 *	4,628	53	59	2,438	30,588	37,766

¹ Includes even numbered years only.

* Preliminary.

(Sources: 1 and 5)

Appendix Table 9. Coho salmon commercial catch by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	1,195	2,321	3,561	6,778	12,791	26,646
77	2,883	2,685	3,884	52,562	45,201	107,215
78	913	2,256	2,024	44,740	44,338	94,271
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
1981	1,229	32,759	30,220	220,290	29,207	313,705
82	10,586	74,989	50,803	349,669	133,765	619,812
83	7,282	25,954	7,816	81,338	5,711	128,101
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
1986	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
88	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
1991	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
93	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
20-Year Ave.	9,125	34,572	26,925	82,355	50,564	203,540
1976-85 Ave.	5,793	27,791	26,488	131,325	75,611	267,007
1986-95 Ave.	12,456	41,353	27,361	33,385	25,518	140,073
1996*	3,816	39,319	9,169	12,477	59,351	124,132

* Preliminary.

(Sources: 1 and 5)

Appendix Table 10. Total salmon commercial catch by district, in numbers of fish, Bristol Bay, 1975-96.

Year	Naknek- Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1975	3,166,169	969,315	20,900	827,715	316,827	5,300,926
76	3,134,716	1,384,323	188,862	2,873,538	526,062	8,107,501
77	2,514,717	1,870,067	103,144	1,659,379	570,995	6,718,302
78	6,051,842	1,268,586	17,933	8,300,533	885,845	16,524,739
79	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
81	11,361,223	4,487,436	2,186,006	8,702,332	929,201	27,666,198
82	5,354,392	2,613,663	1,250,539	8,235,232	937,664	18,391,490
83	21,927,429	6,913,550	3,471,714	6,063,402	955,311	39,331,406
84	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
86	3,271,027	4,985,840	5,142,911	3,609,156	671,335	17,680,269
87	5,443,364	5,535,676	2,248,606	3,730,444	780,686	17,738,776
88	4,461,502	6,751,055	1,674,082	2,391,148	1,384,377	16,662,164
89	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
91	10,939,608	6,921,069	3,049,254	5,542,986	806,497	27,259,414
92	9,801,621	15,817,215	3,416,601	3,510,174	1,014,526	33,560,137
93	8,960,902	21,714,569	4,255,766	5,819,760	708,508	41,459,505
94	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
20-Year Ave.	11,011,570	7,222,384	2,625,681	4,858,562	809,673	26,527,870
1975-84 Ave.	9,956,773	3,000,076	1,156,103	5,460,505	799,847	20,373,305
1985-95 Ave.	12,066,367	11,444,692	4,095,260	4,256,620	819,499	32,682,436
1996 a	8,324,348	10,965,923	4,523,213	6,162,160	765,732	30,741,376

a Preliminary.

(Sources: 1 and 5)

Appendix Table 11. Commercial Sockeye salmon catch, in percent, by gear type and district, Bristol Bay, 1976-96.

Year	Naknek-Kvichak		Egegik		Ugashik		Nushagak		Togiak		Total	
	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1976	93	7	91	9	90	10	85	15	92	8	90	10
77	90	10	88	12	90	10	85	15	89	11	88	12
78	91	9	84	16	88	12	85	15	84	16	86	14
79	90	10	78	22	84	16	82	18	82	18	83	17
80	88	12	69	31	87	13	85	15	83	17	82	18
1981	86	14	77	23	89	11	81	19	79	21	82	18
82	87	13	83	17	87	13	90	10	84	16	86	14
83	92	8	86	14	93	7	86	14	80	20	87	13
84	89	11	92	8	92	8	83	17	77	23	87	13
85	87	13	93	7	96	4	65	35	75	25	83	17
1986	70	30	89	11	94	6	76	24	68	32	79	21
87	86	14	91	9	93	7	80	20	66	34	83	17
88	86	14	90	10	91	9	75	25	64	36	81	19
89	89	11	90	10	87	13	58	42	55	45	76	24
90	88	12	91	9	91	9	67	33	67	33	81	19
1991	89	11	91	9	89	11	76	24	59	41	81	19
92	89	11	91	9	90	10	65	35	62	38	79	21
93	84	16	93	7	90	10	72	28	54	46	79	21
94	90	10	92	8	94	6	68	32	52	48	79	21
95	89	11	90	10	95	5	68	32	52	48	79	21
20-Year Ave.	88	12	87	13	91	9	77	23	71	29	83	17
1976-85 Ave.	89	11	84	16	90	10	83	17	83	17	86	14
1986-95 Ave.	86	14	91	9	91	9	71	29	60	40	80	20
1996 *	83	17	90	10	96	4	80	20	44	56	79	21

* Preliminary data

(Source: 5)

Appendix Table 12. Sockeye salmon escapement by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak ¹	Egegik ²	Ugashik ³	Nushagak ⁴	Togiak ⁵	Total
1976	3,367,854	509,160	356,308	1,486,276	200,590	5,920,188
77	2,527,000	692,514	201,520	1,220,056	202,634	4,843,724
78	5,192,066	895,698	82,434	3,485,532	340,076	9,995,806
79	12,437,996	1,032,042	1,706,904	3,073,571	224,838	18,475,351
80	25,447,866	1,060,860	3,335,284	8,310,438	572,450	38,726,898
1981	3,632,788	694,680	1,327,699	2,850,637	365,910	8,871,714
82	2,529,692	1,034,628	1,185,551	2,012,742	341,424	7,104,037
83	4,554,496	792,282	1,001,364	1,948,492	239,610	8,536,244
84	11,948,514	1,165,345	1,270,318	1,814,686	200,778	16,399,641
85	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
87	7,281,896	1,273,553	686,894	1,895,961	316,076	11,454,380
88	5,297,708	1,612,745	654,412	1,524,752	340,712	9,430,329
89	9,676,244	1,611,566	1,713,287	2,189,501	125,080	15,315,678
90	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
92	6,557,157	1,945,632	2,194,927	2,286,278	266,956	13,250,950
93	5,908,799	1,517,000	1,413,454	2,296,789	242,475	11,378,517
94	9,571,245	1,967,775	1,095,068	2,449,616	233,632	15,315,776
95	11,365,573	1,282,508	1,321,108	2,254,231	240,266	16,463,686
20-Year Ave.	7,858,665	1,315,672	1,240,001	2,474,085	275,684	13,164,028
1976-85 Ave.	8,081,729	897,240	1,147,379	2,788,723	287,839	13,202,909
1986-95 Ave.	7,635,601	1,734,104	1,332,623	2,159,446	263,530	13,125,147
1996 ^a	2,835,426	1,076,460	692,167	2,553,995 ^b	212,524	7,370,572

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 and tributaries, Kulukak system and other miscellaneous river systems.

^a Preliminary.

^b Snake River not surveyed due to lack of funding.

(Sources: 1, 7, and 12)

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, 1976-96.

Year	Catch	Escapement			Total	Total Run
		Kvichak ¹	Branch ²	Naknek ¹		
1976	2,547,276	1,965,282	81,822	1,320,750	3,367,854	5,915,130
77	2,167,214	1,341,144	100,000	1,085,856	2,527,000	4,694,214
78	5,123,668	4,149,288	229,400	813,378	5,192,066	10,315,734
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
1981	10,992,809	1,754,358	82,210	1,796,220	3,632,788	14,625,597
82	5,005,802	1,134,840	239,300	1,155,552	2,529,692	7,535,494
83	21,559,372	3,569,982	96,220	888,294	4,554,496	26,113,868
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
1986	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
88	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
1991	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
93	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
20 Year Ave.	10,403,094	6,164,431	200,375	1,493,858	7,858,665	18,261,759
1976-85 Ave.	10,023,423	6,534,031	175,445	1,372,252	8,081,729	18,105,151
1986-95 Ave.	10,782,766	5,794,832	225,306	1,615,464	7,635,601	18,418,367
1996 *	8,187,720	1,450,578	306,750	1,078,098	2,835,426	11,023,146

¹ Tower count

² Tower count 1976 and aerial survey estimates 1977-96

* Preliminary apportionment.

(Sources: 1, 7, 13 and 15)

Appendix Table 14. Inshore sockeye salmon total run by river system Naknek-Kvichak District, in thousands of fish, Bristol Bay, 1976-96.

Year	Kvichak		Branch		Naknek		Total Run ¹
	Number	%	Number	%	Number	%	
1976	3,423	58	137	2	2,354	40	5,915
77	2,081	44	150	3	2,463	52	4,694
78	7,965	77	455	4	1,896	18	10,316
79	24,637	90	573	2	2,219	8	27,430
80	35,248	87	561	1	4,759	12	40,568
1981	6,989	48	311	2	7,326	50	14,626
82	2,993	40	772	10	3,770	50	7,536
83	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	17,358
1986	1,966	31	399	6	3,913	62	6,279
87	9,593	78	297	2	2,378	19	12,268
88	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
1991	8,032	43	604	3	9,918	53	18,554
92	10,445	65	487	3	5,021	31	15,953
93	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
20 Year Ave.	13,644	67	482	3	4,136	29	18,262
1976-85 Ave.	13,985	67	434	3	3,686	29	18,105
1986-95 Ave.	13,303	67	530	3	4,586	30	18,419
1996 [*]	3,458	31	706	6	6,860	62	11,024

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

^{*} Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 15. Inshore commercial catch and escapement of sockeye salmon in the Egegik District by river system, Bristol Bay, 1976-96.

Year	Catch	Escapement			Total Run
		Egegik ¹	Shosky Cr. ²	King Salmon River	
1976	1,329,788	509,160			1,838,948
77	1,780,567	692,514			2,473,081
78	1,207,294	895,698			2,102,992
79	2,257,332	1,032,042			3,289,374
80	2,623,066	1,060,860			3,683,926
1981	4,361,406	694,680			5,056,086
82	2,447,514	1,034,628			3,482,142
83	6,755,256	792,282			7,547,538
84	5,190,413	1,165,320		25	6,355,758
85	7,537,273	1,095,192			8,632,465
1986	4,852,935	1,151,750		430	6,005,115
87	5,356,669	1,272,978		575	6,630,222
88	6,456,598	1,612,680	65		8,069,343
89	8,901,994	1,610,916	50	600	10,513,560
90	10,371,762	2,191,362	0	220	12,563,344
1991	6,797,166	2,786,880	0	45	9,584,091
92	15,646,575	1,945,332	0	300	17,592,207
93	21,600,858	1,516,980	20		23,117,858
94	10,750,213	1,897,932	15	30	12,648,190
95	14,425,979	1,281,678	0	830	15,708,487
20-Year Ave.	7,032,533	1,312,043			8,344,736
1976-85 Ave.	3,548,991	897,238			4,446,231
1986-95 Ave.	10,516,075	1,726,849	15	303	12,243,242
1996 ^a	10,842,251	1,076,460			11,918,711

¹ Tower count.

² Aerial survey index count.

^a Preliminary.

(Sources: 1 and 7)

Appendix Table 16. Inshore commercial catch and escapement of sockeye salmon in the Ugashik District by river system, Bristol Bay, 1976-96.

Year	Catch	Escapement			Total Run
		Ugashik ¹ River	King Salmon ² River	Dog Salmon ² River	
1976	174,923	341,808	14,500		531,231
77	92,623	201,486	34		294,143
78	7,995	70,434	12,000		90,429
79	391,118	1,700,904	6,000		2,098,022
80	885,875	3,321,384	13,900		4,221,159
1981	2,116,066	1,326,762	937		3,443,765
82	1,139,192	1,157,526	28,025		2,324,743
83	3,349,451	1,000,614	750		4,350,815
84	2,658,376	1,241,418	17,100	11,800	3,928,694
85	6,468,862	998,232	7,400	775	7,475,269
1986	5,002,949	1,001,492	4,310	9,780	6,018,531
87	2,128,652	668,964	15,855	2,075	2,815,546
88	1,523,520	642,972	8,360	3,080	2,177,932
89	3,146,239	1,681,302	25,480	6,505	4,859,526
90	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
92	3,320,966	2,173,692	13,425	7,810	5,515,893
93	4,176,900	1,389,534	22,570	1,350	5,590,354
94	4,352,797	1,080,858	8,885	5,325	5,447,865
95	4,509,446	1,304,058	7,650	9,400	5,830,554
20-Year Ave.	2,527,035	1,224,539	11,536	3,925	3,767,035
1976-85 Ave.	1,728,448	1,136,057	10,065	1,258	2,875,827
1986-95 Ave.	3,325,622	1,313,022	13,007	6,593	4,658,243
1996 *	4,410,073	667,518	7,230	17,419	5,102,240

¹ Tower count.

² Aerial survey.

* Preliminary.

(Sources: 1 and 7)

Appendix Table 17. Inshore commercial catch and escapement of sockeye salmon in the Nushagak District by river system, in number of fish, Bristol Bay, 1976-96.

Year	Catch	Escapement						Total	Total Run
		Wood ¹	Igushik ¹	Nuyakuk ¹	Nush/Mul ²	Nushagak ³	Snake ⁴		
1976	1,265,422	817,008	186,120	425,220	45,200		12,728	1,486,276	2,751,698
77	619,025	561,828	95,970	232,554	320,400		9,304	1,220,056	1,839,081
78	3,137,166	2,267,238	536,154	576,666	87,400		18,074	3,485,532	6,622,698
79	3,327,346	1,706,352	859,560	360,120	139,100		8,439	3,073,571	6,400,917
80	4,497,787	2,969,040	1,987,530	3,026,568	290,800		36,500	8,310,438	12,808,225
1981	7,493,093	1,233,318	591,144	834,204	177,400		14,571	2,850,637	10,343,730
82	5,916,187	976,470	423,768	537,864	63,000		11,640	2,012,742	7,928,929
83	5,119,744	1,360,968	180,438	318,606	85,400		3,080	1,948,492	7,068,236
84	1,992,681	1,002,792	184,872	472,596	120,586		33,840	1,814,686	3,807,367
85	1,307,889	939,000	212,454	429,162	69,300		34,880	1,684,796	2,992,685
1986	2,719,313	818,652	307,728	821,898	168,340		16,780	2,133,398	4,852,711
87	3,254,720	1,337,172	169,236	163,000	225,033		1,520	1,895,961	5,150,681
88	1,706,716	866,778	170,454	319,992	163,208		4,320	1,524,752	3,231,468
89	2,788,185	1,186,410	461,610			513,421	28,060	2,189,501	4,977,686
90	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
92	2,789,741	1,286,250	304,920			695,108		2,286,278	5,076,019
93	5,236,557	1,176,126	405,564			715,099		2,296,789	7,533,346
94	3,393,143	1,471,890	445,920			509,326	22,480	2,449,616	5,842,759
95	4,445,883	1,482,162	473,382	69,702	211,605	281,307	17,380	2,254,231	6,700,114
20-year Ave.	3,479,849	1,284,441	455,938	613,439	154,769		17,409	2,474,085	5,953,934
1976-85 Ave.	3,467,634	1,383,401	525,801	721,356	139,859		18,306	2,788,723	6,256,357
1986-95 Ave.	3,492,065	1,185,480	386,074	343,648	192,047	555,307	16,288	2,159,446	5,651,511
1996	5,749,619 ⁴	1,649,598	400,746	250,692	252,959	503,651		2,553,995	8,303,614

¹ Tower count

² Aerial survey estimates 1977-83, 1985, and 1987. Escapement estimates for 1984, 1988, 1995 and 1996 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; weir count 1975-79 and 1981, not surveyed in 1992, 1993 or 1996 due to lack of funding.

⁵ Preliminary.

(Sources: 1, 7, and 13)

Appendix Table 18. Inshore sockeye salmon total run by river system, in thousands of fish and percent, Nushagak District, Bristol Bay, 1976-96.

Year	Wood		Igushik		Nuyakuk		Nush-Mul		Nushagak		Snake		Total Run ¹
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	
1976	1,438	52	345	13	845	31	100	4			24	1	2,752
77	834	45	146	8	358	19	488	27			12	1	1,838
78	4,117	62	1,084	16	1,302	20	87	1			33	0	6,623
79	3,638	57	1,842	29	764	12	138	2			18	0	6,400
80	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
82	3,471	44	1,818	23	2,079	26	550	7			12	0	7,930
83	4,272	60	813	12	1,379	20	601	9			3	0	7,068
84	1,982	52	435	11	906	24	451	12			34	1	3,808
85	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
87	2,828	55	617	12	589	11	1,116	22			2	0	5,152
88	1,749	54	406	13	649	20	424	13			4	0	3,232
89	2,519	51	1,214	24					1,217	24	28	1	4,978
90	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
92	2,481	49	794	16					1,802	35			5,077
93	3,725	49	1,580	21					2,228	30			7,533
94	2,957	51	1,300	22					1,543	26	42	1	5,842
95	4,022	60	1,902	28					756	11	20	0	6,700
20-Year Ave.	2,920	50	1,235	19	1,498	24	389	9	1,577	26	23	0	5,954
1976-85 Ave.	3,044	51	1,230	17	1,648	24	309	7			26	1	6,257
1986-95 Ave.	2,797	50	1,239	21	1,000	23	655	15	1,577	26	19	0	5,652
1996 ¹	5,030	61	1,502	18					1,771	21			8,303

¹ Due to rounding, the district total runs may not equal the sum of the rows.
² Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 19. Inshore commercial catch and escapement of sockeye salmon in the Togiak District by river system, in numbers of fish, Bristol Bay, 1976-96.

Year	Catch				Escapement						Total Run
	Togiak	Kulukak	Os/Mat ¹	Total	Togiak					Total	
					Lake ²	River ³	Tributaries ⁴	Kulukak ⁵	Other ⁶		
1976	293,016	4,822	4,045	301,883	158,190	15,000	16,200	11,200		200,590	502,473
77	201,004	16,252	1,195	218,451	133,734	4,400	24,400	40,100		202,634	421,085
78	422,100	29,668	248	452,016	273,576	15,000	17,600	33,900		340,076	792,092
79	393,337	56,629	1,018	460,984	171,138	14,200	12,900	26,600		224,838	685,822
80	591,470	42,811	280	634,561	461,850	27,900	37,000	45,700		572,450	1,207,011
1981	620,288	19,246	173	639,707	208,080	21,150	77,900	58,780		365,910	1,005,617
82	581,718	13,952	26	595,696	244,824	3,450	40,400	52,750		341,424	937,120
83	529,775	55,906	2,527	588,208	191,520	7,200	13,920	26,970		239,610	827,818
84	213,213	96,709	12,204	322,126	85,448	15,830	39,700	49,800		200,778	522,904
85	133,263	44,120	32,383	209,766	136,542	3,600	13,340	36,600		190,082	399,848
1986	191,158	100,466	17,064	308,688	168,384	20,000	15,000	42,800	25,000	271,184	579,872
87	274,613	45,401	22,718	342,732	249,676	10,400	18,200	37,800		316,076	658,808
88	673,408	143,112	5,567	822,087	276,612	18,800	13,600	31,700		340,712	1,162,799
89	68,375	14,116	6,441	88,932	84,480	15,200	4,560	20,840		125,080	214,012
90	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	33,425	6,437	549,221	254,683	15,980	7,740	23,940	18,370	320,713	869,934
92	610,575	108,358	7,513	726,446	199,056	6,060	10,400	26,440	25,000	266,956	993,402
93	475,799	58,616	5,518	539,933	177,185	4,600	11,330	31,800	17,560	242,475	782,408
94	321,121	76,781	2,137	400,039	154,752	6,200	13,220	29,740	29,720	233,632	633,671
95	527,143	76,056	2,129	605,328	185,718	6,520	18,988	14,620	14,420	240,266	845,594
20-Year Ave	390,608	53,688	6,561	450,220	198,371	12,452	21,800	34,584	24,221	275,684	725,904
1976-85 Ave	397,918	39,012	5,410	442,340	207,490	12,773	29,336	38,240		287,839	730,179
1986-95 Ave	383,297	68,364	7,711	458,100	189,252	12,130	14,264	30,928	24,221	263,530	721,629
1996	381,539	76,833	1,691	460,063	156,854	18,320	11,900	18,980	6,370	212,524	672,587

- ¹ Catches in the Orsviak and Matogak sections were combined.
- ² Tower count.
- ³ Aerial survey estimate.
- ⁴ Aerial survey estimate includes Gechiak, Pungokepuk, Kemuk, Nayonurun, and Ongvinsuck River systems. Aerial survey estimates prior to 1986 also include Ungakthluk, Negukthluk, Matogak, Orsviak, and other miscellaneous river systems when surveyed.
- ⁵ Aerial survey estimate includes Kulukak River and Lake and Tite Creek ponds.
- ⁶ Aerial survey estimate includes Matogak, Orsviak, Slug, Negukthluk, and Ungakthluk and Quigmy Rivers. Prior to 1986 estimates for these systems were included under tributaries when surveyed.
- ⁷ Includes 248 fish from Cape Pierce Section.
- ⁸ Based on weekly processor reports. Fish tickets were not coded by section.
- ⁹ Preliminary.

(Source: 1, 7, and 13)

Appendix Table 20. Inshore total run of sockeye by district, in numbers of fish, Bristol Bay, 1976-96.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1976	5,915,130	1,838,948	531,231	2,751,698	502,473	11,539,480
77	4,694,214	2,473,081	294,143	1,839,081	421,085	9,721,604
78	10,315,734	2,102,992	90,429	6,622,698	792,092	19,923,945
79	27,429,822	3,289,374	2,098,022	6,400,917	685,822	39,903,957
80	40,568,323	3,683,926	4,221,159	12,808,225	1,207,011	62,488,644
1981	14,625,597	5,056,086	3,443,765	10,343,730	1,005,617	34,474,795
82	7,535,494	3,482,142	2,324,743	7,928,929	937,120	22,208,428
83	26,113,868	7,547,538	4,350,815	7,068,236	827,818	45,908,275
84	26,495,224	6,355,758	3,928,694	3,807,367	522,904	41,109,947
85	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
87	12,267,898	6,630,222	2,815,546	5,150,681	658,808	27,523,155
88	8,778,544	8,069,343	2,177,932	3,231,468	1,162,799	23,420,086
89	23,486,200	10,513,560	4,859,526	4,977,686	214,012	44,050,984
90	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
92	15,953,105	17,592,207	5,515,893	5,076,019	993,402	45,130,626
93	14,816,695	23,117,858	5,590,354	7,533,348	782,408	51,840,663
94	25,899,103	12,717,988	5,447,865	5,842,759	633,671	50,541,386
95	31,645,154	15,708,487	5,830,554	6,700,114	845,594	60,729,903
20-Year Ave.	18,261,760	8,348,226	3,767,035	5,953,934	725,904	37,056,859
1976-85 Ave.	18,105,151	4,446,231	2,875,827	6,256,357	730,179	32,413,745
1986-95 Ave.	18,418,369	12,250,222	4,658,243	5,651,511	721,629	41,699,974
1996 *	11,023,146	11,918,711	5,102,240	8,303,614	672,587	37,020,298

* Preliminary

(Sources: 1 and 7)

Appendix Table 21. Chinook salmon harvest, escapement and total runs in the Nushagak District, 1966-96.*

Year	Harvests by Fishery			Total	Inriver Abundance ¹	Spawning Escapement ²	Total Run
	Commercial	Sport	Subsistence				
1966	58,184		3,700	61,884		40,000	101,884
1967	96,240		3,700	99,940		65,000	164,940
1968	78,201		6,600	84,801		70,000	154,801
1969	80,803		7,100	87,903		35,000	122,903
1970	87,547		6,300	93,847		50,000	143,847
1971	82,769		4,400	87,169		40,000	127,169
1972	46,045		4,000	50,045		25,000	75,045
1973	30,470		6,600	37,070		35,000	72,070
1974	32,053		7,900	39,953		70,000	109,953
1975	21,454		7,100	28,554		70,000	98,554
1976	60,684		6,900	67,584		100,000	167,584
1977	85,074	923	5,200	91,197		65,000	156,197
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 ³	98,595	85,622	79,147	177,742
20-Year Mean	81,608	3,253	11,118	95,816		95,250	191,066
5-Year Mean	65,936	6,356	14,823	87,115	93,317	84,751	171,866
1996	73,365 ³	5,000 ³	15,941 ³	94,306	52,127	44,864	139,170

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

² Spawning escapement estimated from the following:

1974-81 - comprehensive aerial surveys.

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

1986-96 - Inriver abundance minus inriver harvests.

Estimates for 1974-85 are rounded to the nearest thousand fish.

³ Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 22. Chinook salmon harvest, escapement and total runs in the Togiak District, 1976-96.*

Year	Harvests by Fishery				Spawning Escapement	Total Run
	Commercial	Sport	Subsistence	Total		
1976	29,744		500	30,244	14,000	44,244
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
20-Year Mean	22,360	330	591	23,232	16,778	40,009
5-Year Mean	10,399	405	793	11,598	14,981	26,579
1996	8,725 *	400 *	303 *	9,428 *	11,476	20,904

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

* Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 23. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1976-96.^a

Year	Nushagak District			Togiak District		
	Catch	Escapement ¹	Total Run	Catch	Escapement ²	Total Run
1976	801,064	500,000	1,301,064	153,559	392,000	545,559
77	899,701	609,000	1,508,701	270,649	496,000	766,649
78	651,743	293,000	944,743	274,967	396,000	670,967
79	440,279	166,000	606,279	219,942	293,000	512,942
80	681,930	969,000	1,650,930	299,682	415,000	714,682
1981	795,143	177,000	972,143	229,886	331,000	560,886
82	434,817	256,000	690,817	151,000	86,000	237,000
83	725,060	164,000	889,060	322,691	165,000	487,691
84	850,114	362,000	1,212,114	336,660	204,000	540,660
85	396,740	288,000	684,740	203,302	212,000	415,302
1986	488,375	168,275	656,650	270,057	330,000	600,057
87	416,476	147,433	563,909	419,425	361,000	780,425
88	371,196	186,418	557,614	470,132	412,000	882,132
89	523,903	377,512	901,415	203,178	143,890	347,068
90	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
92	398,691	302,678	615,712	176,123	120,000	296,123
93	505,799	217,230	632,109	144,869	98,470	243,339
94	328,267	378,928	707,195	232,559	229,470	462,029
95	390,158	212,612	602,770	221,126	163,040	384,166
20-Year Ave.	547,073	319,608	857,852	247,463	253,227	500,690
1976-85 Ave.	667,659	378,400	1,046,059	246,234	299,000	545,234
1986-95 Ave.	426,487	260,816	669,645	248,692	207,454	456,146
1996	324,261 ^b	225,331	549,592	207,094 ^b	117,240	324,334

¹ Escapements were estimated from the following:

1976-78 - aerial survey data;

1979-95 - 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, 5 and 13)

Appendix Table 24. Inshore commercial catch and escapement of pink salmon in the Nushagak District by river system, in numbers of fish, Bristol Bay, 1958-96.^a

Year	Catch	Escapement					Total	Total Run	
		Wood ¹	Igushik ²	Nuyakuk ³	Nush/Mul ⁴	Nushagak ⁵			Snake ⁶
1958	1,113,794			4,000,000			4,000,000	5,113,794	
60	289,781			146,359			146,359	436,140	
62	880,424	25,000	12,000	493,914	6,100		543,014	1,423,438	
64	1,497,817	1,580	450	883,500	25,000		910,560	2,408,377	
66	2,337,066			1,442,424			1,442,424	3,779,490	
1968	1,705,150			2,161,116			2,161,116	3,866,266	
70	417,834			152,580			152,580	570,414	
72	67,953			58,536			58,536	126,489	
74	413,613	44,800	7,500	529,216	3,100		585,516	999,129	
76	739,590	21,986	5,070	794,478	41,800		863,434	1,603,024	
1978	4,348,336	205,000	16,210	8,390,184	771,600		9,386,477	13,734,813	
80	2,202,545	31,150	3,500	2,626,746	123,000		2,785,196	4,987,741	
82	1,339,272	36,100	8,430	1,592,096	19,130		1,656,656	2,995,928	
84	3,127,153	81,400	6,190	2,760,312	73,050		2,926,452	6,053,605	
86	267,117					72,189	72,189	339,306	
1988	243,890					494,610	494,610	738,500	
90	54,127					801,430	801,430	855,557	
92	190,102								
94	7,337					191,772	191,772	199,109	
Average ⁷	1,118,047	55,875	7,419	1,859,390	132,848	390,000	2,217	1,621,018	2,790,618
1996	2,438 ^c					821,312		821,312	823,750

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.

⁸ Includes even-years only

⁹ No escapement estimate. Sonar project terminated early due to budget constraints.

^c Preliminary

(Sources: 1, 5, 13, and 19)

Appendix Table 25. Coho salmon harvest, escapement and total runs in the Nushagak Drainage, 1976-96.

Year	Harvests by Fishery				Innver Run ²	Spawning Escapement ³	Total Run
	Commercial	Subsistence ¹	Sport	Total			
1976	6,778	1,800		8,578			
77	52,562	3,500	248	56,310			
78	44,740	1,802	516	47,058			
79	129,607	4,676	212	134,495			
80	146,354	4,099	551	151,004	96,759	95,368	246,372
1981	219,310	7,930	389	227,629	144,992	141,468	369,097
82	345,903	8,044	503	354,450	297,779	294,151	648,601
83	66,109	4,880	1,498	72,487	39,261	36,885	109,372
84	257,649	7,449	473	265,571	142,841	140,804	406,375
85	20,230	6,006	130	26,366	84,034	82,258	108,624
1986	68,568	9,150	1,576	79,294	49,676	45,483	124,777
87	13,263	5,358	1,007	19,628	23,484	21,268	40,896
88	53,125	4,627	557	58,309	131,840	130,171	188,480
89	77,073	8,130	2,392	87,595	84,658	81,107	168,702
90	7,447	5,622	438	13,507	141,704	140,500	154,007
1991	5,399	10,190	874	16,463	39,733	37,584	54,047
92	84,898	6,496	752	92,146			
93	14,244	4,850	194	19,288	42,742	42,161	61,449
94	6,814	4,708	1,143	12,665	82,019	80,470	93,135
95	4,181	3,711	725	8,617	46,340	45,137	53,754
1976-1995 Avg	81,213	5,651	746	87,573	96,524	94,321	188,513
1991-1995 Avg	23,107	5,991	738	29,836	52,709	51,338	65,596
1996	12,477 *	4,683 *	1,000 ²	18,160	187,028	184,948	203,108

* Minimum estimate due to reporting problems

² 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 60% 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. Average round weight (lbs.) of the commercial salmon catch by species, Bristol Bay, 1976-1996.^a

Year	Sockeye	Chinook	Chum	Pink	Coho
1976	6.1	58.9	6.8	3.4	7.6
77	6.7	22.9	7.4		7.8
78	5.9	23.9	7.2	3.2	7.5
79	5.9	21.3	6.8		7.8
80	5.6	19.7	6.2	3.4	7.0
1981	6.2	19.0	6.7		6.4
82	6.4	19.6	6.7	3.5	7.3
83	5.7	20.9	6.6		6.6
84	5.6	20.5	6.8	3.2	7.5
85	5.8	17.9	6.8		8.0
1986	6.0	18.8	6.7	3.5	6.7
87	6.0	20.5	6.5		7.0
88	6.2	18.7	7.0	3.6	7.8
89	5.6	19.1	6.3		7.4
90	5.7	16.9	6.3	3.8	7.5
1991	5.7	15.9	6.4		7.3
92	5.7	16.8	6.4	3.7	7.0
93	6.0	17.4	6.5		6.8
94	5.5	18.0	6.5	3.7	8.2
95	5.5	19.8	6.3	3.6	6.7
20-Year Ave.	5.9	21.3	6.6	3.5	7.3
1976-85 Ave.	6.0	24.5	6.8	3.3	7.4
1986-95 Ave.	5.8	18.2	6.5	3.7	7.2
1996	6.3	18.0	7.3	3.5	6.8

^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 and 1996 data is extracted from the fish ticket system.

(Sources: 1, 4, and 9)

Appendix Table 27. Average price paid per pound for Bristol Bay salmon,
1978-1996.^a

	Sockeye	Chinook	Chum	Pink	Coho
1978	\$0.68	\$0.70	\$0.38	\$0.33	\$0.62
79	\$1.03	\$1.00	\$0.41	\$0.33	\$1.05
80	\$0.57	\$1.00	\$0.34	\$0.25	\$0.57
81	\$0.76	\$1.23	\$0.41	\$0.29	\$0.73
82	\$0.70	\$1.23	\$0.35	\$0.22	\$0.71
1983	\$0.61	\$0.69	\$0.30	\$0.16	\$0.40
84	\$0.69	\$1.03	\$0.30	\$0.22	\$0.71
85	\$0.85	\$1.02	\$0.31	\$0.20	\$0.71
86	\$1.42	\$1.03	\$0.31	\$0.15	\$0.68
87	\$1.35	\$1.24	\$0.26		\$0.69
1988	\$1.93	\$1.05	\$0.43	\$0.34	\$1.14
89	\$1.07	\$0.80	\$0.26	\$0.17	\$0.67
90 ^b	\$1.04	\$0.91	\$0.26	\$0.27	\$0.74
91	\$0.70	\$0.68	\$0.22	\$0.11	\$0.58
92	\$1.04	\$0.89	\$0.24	\$0.12	\$0.58
1993	\$0.62	\$0.76	\$0.21	\$0.11	\$0.52
94	\$0.70	\$0.47	\$0.22	\$0.04	\$0.45
95	\$0.75	\$0.65	\$0.20	\$0.11	\$0.43
18-Year Ave.	\$0.92	\$0.91	\$0.30	\$0.20	\$0.67
1978-85 Ave.	\$0.74	\$0.99	\$0.35	\$0.25	\$0.69
1986-95 Ave.	\$1.06	\$0.85	\$0.26	\$0.16	\$0.65
1996	\$0.75	\$0.50	\$0.10	\$0.05	\$0.30

^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.

(Sources: 1, 3, and 8)

Appendix Table 28. Estimated exvessel value of the commercial salmon catch by species, in thousands of dollars, Bristol Bay, 1976-96.^a

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1976	\$17,139	\$742	\$2,892	\$1,093	\$82	\$21,948
77	\$19,434	\$1,940	\$4,275		\$445	\$26,094
78	\$40,034	\$3,206	\$3,173	\$5,424	\$435	\$52,272
79	\$128,992	\$4,541	\$2,480		\$2,387	\$138,400
80	\$76,118	\$1,881	\$2,738	\$2,173	\$1,392	\$84,302
1981	\$120,907	\$5,557	\$4,106		\$1,461	\$132,031
82	\$68,122	\$6,088	\$2,145	\$1,111	\$3,199	\$80,665
83	\$129,900	\$2,853	\$3,216		\$337	\$136,306
84	\$94,681	\$2,158	\$4,040	\$2,414	\$3,072	\$106,365
85	\$115,402	\$2,188	\$2,218		\$923	\$120,731
1986	\$135,689	\$1,819	\$2,522	\$207	\$826	\$141,063
87	\$130,847	\$1,912	\$2,594		\$314	\$135,667
88	\$168,586	\$891	\$4,418	\$1,171	\$1,792	\$176,858
89	\$173,963	\$609	\$2,029		\$1,186	\$177,787
90	\$198,897	\$520	\$1,752	\$508	\$582	\$202,259
1991	\$103,750	\$328	\$1,807		\$499	\$106,384
92	\$190,368	\$1,029	\$1,359	\$222	\$767	\$193,745
93	\$152,034	\$1,131	\$989		\$257	\$154,411
94	\$138,007	\$1,190	\$1,043	\$15	\$650	\$140,905
95	\$183,262	\$1,272	\$1,240		\$129	\$185,903
20 Year Ave.	\$119,307	\$2,093	\$2,552	\$1,303 ^b	\$1,037	\$125,705
1976-85 Ave.	\$81,073	\$3,115	\$3,128	\$2,443 ^b	\$1,373	\$89,911
1986-95 Ave.	\$157,540	\$1,070	\$1,975	\$354 ^b	\$700	\$161,498
1996	\$139,208	\$788	\$615	\$7	\$254	\$140,872

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

^b Includes even-years only.

(Sources: 1, 5, 8, and 9)

Appendix Table 29. South Unimak and Shumigan Island preseason sockeye allocation, actual sockeye harvest, and chum harvest in thousands of fish, Alaska Peninsula, 1976-96.^a

Year	South Unimak			Shumigan Island			Total		
	Sockeye			Sockeye			Sockeye		
	Actual	Quota ¹	Chum	Actual	Quota ¹	Chum	Actual	Quota ¹	Chum
1976	235	350	327	72	75	74	307	425	401
77	193	195	93	46	42	22	239	237	115
78	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
1981	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
83	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
85	1,495	1,380	345	367	305	134	1,862	1,685	479
1986	314	907	252	156	200	99	470	1,107	351
87	652	635	406	141	140	37	793	775	443
88	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
1991	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
93	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
20-yr Ave	1,177	1,428	388	324	315	96	1,501	1,743	484
76-85 Ave.	1,158	1,164	369	278	257	85	1,436	1,420	454
86-95 Ave	1,196	1,692	408	370	373	107	1,566	2,066	509
1996	572	2,564	129	446	566	228	1,018	3,130	357

^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: 11)

Appendix Table 30. Subsistence salmon harvest by district and species, Bristol Bay, 1976-96. *

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK KVICHAK DISTRICT							
1976	346	82,200	900	900	1,500	600	86,100
77	352	81,400	1,300	600	100	300	83,700
78	392	93,000	1,200	1,000	1,400	300	96,900
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
83	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
88	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
93	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
20 Year Average	470	89,739	1,241	920	1,322 *	1,048	93,740
1976-1985 Average	458	90,694	1,128	684	1,440 *	790	94,069
1986-1995 Average	482	88,783	1,355	1,156	1,203 *	1,305	93,410
1996	540	81,305	1,574	816	794	1,482	85,971
EGEGIK DISTRICT							
1976 *	2						
77	20	100		100		200	400
78	13	200		100		200	500
79	8	300				100	400
80	3	100					100
1981 *	4						
82	19	2,400					2,400
83	14	700					700
84	24	500		100		300	900
85	23	582	14	21	1	203	821
1986	41	1,052	69	58	21	319	1,519
87	49	3,350	87	139	2	284	3,862
88	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
1991	70	4,549	82	141	32	430	5,234
92	80	3,322	124	270	51	729	4,496
93	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
20 Year Average	36	1,720	87	111	64 *	420	2,235
1976-1985 Average	13	610	14	80	0 *	201	778
1986-1995 Average	59	2,608	94	124	64 *	529	3,402
1996	44	2,321	99	89	85	579	3,173

Appendix Table 30. (page 2 of 3)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
UGASHIK DISTRICT							
1976	21	1,200	100	100	100	300	1,800
77	19	1,000	100	300		500	1,900
78	8	500	100	100		900	1,600
79	8	200				100	300
80	10	200				200	400
1981	12	600				200	800
82	11	400				300	700
83	8	500				100	600
84	8	500				200	700
85	9	233	17	7		143	400
1986	27	1,080	83	48	21	335	1,567
87	22	892	104	51	29	272	1,348
88	23	1,400	84	55	35	330	1,904
89	22	1,309	32	35	2	214	1,592
90	37	1,578	51	143	120	280	2,172
1991	38	1,403	121	168	42	614	2,348
92	37	2,348	106	79	8	397	2,938
93	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
20 Year Average	21	1,010	83	90	64 *	337	1,490
1976-1985 Average	11	533	79	127	100 *	294	920
1986-1995 Average	30	1,488	85	75	44 *	381	2,060
1996	26	1,247	50	21	7	298	1,623
NUSHAGAK DISTRICT							
1976	317	34,700	6,900	7,200	2,700	2,100	53,600
77	306	43,300	5,200	7,300	200	4,500	60,500
78	331	33,200	6,600	14,300	11,100	2,500	67,700
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
1981	395	44,600	11,500	10,200	2,300	8,700	77,300
82	376	34,700	12,100	11,400	7,300	8,900	74,400
83	389	38,400	11,800	9,200	500	5,200	65,100
84	438	43,200	9,800	10,300	6,600	8,100	78,000
85	408	38,000	7,900	4,000	600	6,100	56,600
1986	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
88	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
1991	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
93	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
20 Year Average	424	37,792	11,101	7,650	5,576 *	6,199	65,802
1976-1985 Average	375	42,710	9,250	9,240	7,060 *	5,640	70,780
1986-1995 Average	472	32,873	12,952	6,061	4,092 *	6,759	60,824
1996	481	22,935	15,941	4,704	573	5,217	50,370

Appendix Table 30. (page 3 of 3)

	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
TOGIAK DISTRICT							
1976	30	2,800	500	900	100	500	4,800
77	41	2,100	400	800		1,100	4,400
78	29	900	300	700	300	500	2,700
79	25	800	200	300		700	2,000
80	46	3,600	900	300	300	1,200	6,300
1981	52	1,900	400	800	100	2,200	5,400
82	50	1,900	400	300	400	1,300	4,300
83	38	1,900	700	900	200	800	4,500
84	41	3,600	600	1,700	500	3,800	10,200
85	51	3,400	600	1,000	100	1,500	6,600
1986	29	2,400	700	800	100	500	4,500
87	46	3,600	700	1,000		1,600	6,900
88	29	2,413	429	716	45	792	4,395
89	40	2,825	551	891	112	976	5,355
90	37	3,689	480	786	60	1,111	6,126
1991	43	3,517	470	553	27	1,238	5,805
92	40	3,716	1,361	626	135	1,231	7,069
93	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
20 Year Average	38	2,515	591	723	202 *	1,170	5,128
1976-1985 Average	40	2,290	500	770	320 *	1,360	5,120
1986-1995 Average	35	2,739	683	677	83 *	980	5,136
1996	19	278	303	201	19	107	908
1976	716	120,900	8,400	9,100	4,400	3,500	146,300
77	738	127,900	7,000	9,100	300	6,600	150,900
78	773	127,600	8,100	16,200	12,700	4,400	169,000
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
1981	1,112	132,100	13,000	11,500	2,600	12,200	171,400
82	806	110,800	13,700	12,400	8,600	11,500	157,000
83	834	149,400	13,500	10,500	900	7,100	181,400
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
1986	933	130,815	14,747	11,601	7,549	11,204	175,916
87	998	135,493	14,366	7,895	689	9,453	167,886
88	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
1991	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
93	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
20 Year Average	988	132,576	13,039	9,437	7,153 *	9,074	168,143
1976-1985 Average	898	136,656	10,911	10,787	8,820 *	8,195	171,461
1986-1995 Average	1,078	128,496	15,166	8,086	5,487 *	9,953	164,825
1996	1,110	108,470	18,135	5,915	2,518	7,775	142,813

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

† 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.

‡ Includes even years only.

§ No permits returned.

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

Appendix Table 31. Subsistence harvest of sockeye salmon by community, in numbers of fish, Kvichak River drainage, Bristol Bay, 1976-96. ^{a,b}

Year	Iliamna-					Port		Other ¹	Total
	Levelock	Igiugig	Pedro Bay	Kokhanol	Newhalen	Nondalton	Alsworth		
1976	5,300	6,800	4,400	17,100	16,300	20,500	5,500	75,900	
77	2,600	6,000	5,600	14,300	11,400	27,200	4,900	72,000	
78	8,900	8,800	11,200	23,700	11,000	17,300	3,000	83,900	
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	
1981	6,600	5,400	9,700	16,500	15,400	15,200	6,800	75,600	
82	5,400	1,900	8,200	16,600	13,500	11,200	4,500	61,300	
83	4,800	3,300	10,400	20,100	23,800	29,400	4,700	96,500	
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	
1986	6,400	1,600	6,700	18,300	17,000	6,600	3,300	59,900	
87	5,700	°	7,300	16,500	27,500	11,800	3,200	72,000	
88	3,500	°	5,500	14,400	29,800	20,700	3,200	77,100	
89	5,100	1,200	6,700	13,000	24,700	18,500	2,200	71,400	
90	4,700	2,200	6,600	12,400	18,800	27,300	3,200	76,600	
1991	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
93	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
20 Year Average	4,976	3,373	7,760	17,283	19,394	16,518	3,936	1,822	73,969
1976-85 Average	5,880	5,660	8,540	19,340	15,660	19,080	4,870		79,030
1986-95 Average	4,073	1,086	6,980	15,225	23,128	13,955	3,003	1,822	68,908
1996	1,120	2,309	5,219	14,011	14,787	11,856	3,263	2,307	54,872

^a Harvests are extrapolated for all permits issued, based on those returned. Harvest estimates prior to 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 32. Subsistence salmon harvest by community, Nushagak District, Bristol Bay, 1976-96. ^{a,b}

Year	New							Total
	Dillingham ^c	Manokotak	Aleknagik	Ekwok	Stuyahok	Koliganek	Other ^d	
1976	17,700	8,400	2,000	9,000	11,100	5,400		53,600
77	15,700	8,100	1,500	8,000	20,900	6,300		60,500
78	27,700	3,200	2,700	12,900	14,200	7,000		67,700
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
1981	23,900	6,700	2,900	8,800	23,600	11,400		77,300
82	24,700	2,900	2,400	7,500	22,600	14,300		74,400
83	20,100	5,300	1,900	5,800	18,700	13,300		65,100
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
1986	31,900	5,500	6,900	7,800	26,400	8,200		86,700
87	33,500	5,900	3,100	6,400	11,400	4,900		65,200
88	29,600 ^e	5,500	2,400	6,100	11,700	5,700		61,000
89	31,800 ^e	5,800	2,000	4,700	9,700	3,800		57,800
90	28,860 ^e	6,600	2,300	4,900	9,900	8,000	700	61,260
1991	34,399 ^e	5,873	3,043	4,532	8,326	5,438	2,163	63,774
92	31,702 ^e	4,317	2,184	5,971	11,325	3,708	2,635	61,842
93	25,315 ^e	3,048	2,593	2,936	12,169	4,180	2,538	52,779
94	30,145 ^e	3,491	2,289	4,343	8,056	4,513	2,322	55,159
95	24,998 ^e	2,453	1,468	2,046	6,911	2,983	2,406	43,265
20 Year Average	27,696	5,319	2,519	6,676	14,869	8,101	1,596	65,819
1976-85 Average	25,170	5,790	2,210	8,380	18,150	11,060		70,760
1986-95 Average	30,222	4,848	2,828	4,973	11,589	5,142	1,596	60,878
1996	27,161 ^e	3,883	1,733	2,866	8,892	3,319	2,113	49,967

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

^b Harvest estimates prior to 1990 are based on 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 Ekwok.

^e Includes the village of Portage Creek.

^f Subsistence harvests by non-watershed residents.

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

BRISTOL BAY

HERRING

FISHERY

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INTRODUCTION

Pacific herring *Clupea harangus pallasii* have been documented throughout Bristol Bay, but the major concentration returns to the Togiak area each spring as the focus of two commercial fisheries (Figure 1). The herring sac roe fishery began in Bristol Bay in 1967, followed by the first fishery for herring spawn on rockweed kelp *Fucus spp.* in 1968. Effort and harvest levels remained low for the first 10 years of the fishery. However, 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 major expansion of the Togiak herring fishery in 1977. Sac roe harvests since 1978 average over 18,300 tons, worth \$7.9 million annually. Spawn on kelp harvests average just over 350,000 lb. since 1978, worth over \$250,000 to participants each year.

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. In October of 1989, the Alaska Board of Fisheries reduced the legal size of purse seines to 100 fathoms in length and 16 fathoms in depth. Gillnets were also reduced to a maximum of 100 fathoms in length per permit holder with only one compliment of gear allowed to operate from a single vessel. The amount of gillnet allowed on board a fishing vessel during an open period was limited to 100 fathoms, and the department could now by emergency order authority reduce the length of gillnet fished by a single vessel to 50 fathoms.

The Board of Fisheries considered additional proposals in January, 1995 and adopted several regulations that addressed purse seine gear and fishing methods. Maximum depth of herring purse seines was re-described from the previous limitation of 16 fathoms. The new regulation permitted no more than 625 meshes in depth, of which 600 may not have a mesh size larger than 1.5 inches. The Board also restricted the amount of purse seine gear carried on board to no more than one unit. The Board worded this regulation to apply to the entire season, not only to open fishing periods. Finally, the Board limited the amount of time that herring could be held in purse seines to 36 hours after the closure of a fishing period. These regulations were adopted to address management concerns over the high efficiency of the purse seine fleet, enforcement problems, and potential waste.

The Board also changed gillnet gear regulations in January, 1995. Minimum and maximum mesh size limits were increased to reduce potential harvests of low quality recruit herring and permit the use of larger mesh gillnets.

The spawn on kelp fishery became limited to holders of interim use and permanent permits in 1990. In October 1991, the Board of Fisheries limited the role of non-permit holders in the spawn on kelp fishery to that of assisting with transporting kelp only after the close of the period. By 1993, the majority of permits became permanent. Spawn on kelp product may be harvested only by hand or hand-operated rakes.

The Bristol Bay Herring Management Plan states that the maximum exploitation of the Bristol Bay herring stock is 20%. Before opening the sac roe fishery, 1,500 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 fishery¹. After the spawn on kelp and the Dutch Harbor food and bait harvests have been 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.

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.

Rainbow smelt, *Osmerus mordax dentex*, return to lower stretches of freshwater streams of the Pacific rim countries including Alaska to spawn. These fish are the size of herring and have been harvested by indigenous people of the region for subsistence purposes for centuries. There has been only very limited commercial harvest directed at this species.

¹ A food and bait fishery occurs in July near Dutch Harbor on herring that, for management purposes, are considered part of the Togiak stock.

STOCK ASSESSMENT

Methods

Since 1978, herring biomass, spawn deposition and fishing effort was estimated by aerial surveys. Data collection methods follow those described in Lebida and Whitmore (1985). Department observers estimate herring school size using sighting tubes with known grid and focal lengths. Surface area is calculated for each school by applying altitude and focal length to measured grid distances. Biomass is estimated by applying 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 ft² of surface area to school surface area. Miles of spawn are also estimated using the sighting tube.

Herring from commercial harvests are sampled to determine age, size and sexual maturity of herring in the spawning biomass and catch. Samples from volunteer test fish catches are also collected by the department for age, size and sex analysis. Test fish and commercial harvest data is used in post-season analysis to estimate total spawning biomass.

Spawning Population

Spawning biomass of herring in the Togiak District averages (1978-94) over 133,000 tons, based on aerial survey estimates adjusted post-season (Appendix Table 2). Annual estimates range from 69,000 tons observed in 1980 to 239,000 tons documented in 1979. Abundance estimated from aerial surveys was high in the late 1970's, declined in the mid 1980's and remained relatively low and stable through 1991. Aerial survey estimates from 1992 through 1994 increased substantially to levels between 150,000 and 200,000 tons; the 1993 biomass estimate was the second largest in the history of the survey program. Aerial surveys were unsuccessful in estimating biomass on the grounds in 1995 due to high winds.

Department staff were not successful in estimating the peak herring biomass in the Togiak District in 1996 due to poor weather, water conditions and long run timing. Slower entry into the nearshore areas was evidenced by a slow increase in early daily biomass estimates, regular observations of herring apparently staging offshore near Hagemeister Island and along the Nushagak Peninsula, and presence of immature herring in samples throughout the season. These observations, combined with poor visibility suggest that conditions in 1996 were different from conditions in other years; a peak aerial survey estimate of biomass would not have been comparable with other years.

Herring were first observed in the fishing district on an aerial survey on April 28. An estimated 6,500 tons were seen distributed in small schools in the eastern portion of Togiak Bay. The following day, large schools were seen on the southeast shore of Hagemeister Island which were estimated to total 19,200 tons of herring. Biomass continued to build in other areas on a daily basis. Of interest, was unusually large schools of herring seen along the Nushagak Peninsula which seemed to be entering the district from the east; over 35,000 tons of herring biomass was observed in this area on May 3. A peak spawning biomass estimate of 88,766 tons resulted from the aerial survey on the same date.

Spawn was first observed on May 1, about 72 hours after herring were first sighted on grounds. Spawning peaked on May 4 with 13.8 linear miles of spawn recorded, and through the last aerial survey on May 31, a total of 70.6 miles of spawn was documented.

Approximately 7,000 herring were sampled for biological information from purse seine test fish sets and commercial catch from May 2 through May 9. Age 8 and 9 herring were dominant in the samples collected for the 1996 season. Sex ratio, age composition based on scale aging, average weight by age class, and by gear type will be available after post-season analysis is complete.

COMMERCIAL FISHERY OVERVIEW

Commercial sac roe and spawn on kelp fisheries have been regulated by emergency order since 1981 to achieve exploitation mandates by the Alaska Board of Fisheries and to address problems with wastage. In 1984, the Board of Fisheries adopted the Bristol Bay Herring Management Plan (5 AAC

27.865.). This regulatory management plan set the policies by which these fisheries are managed. Management objectives for the Togiak fisheries include providing for an orderly and manageable fishery, ensuring that harvest exploitation does not exceed 20% of the estimated biomass, and maximizing harvest quality.

Sac Roe

Sac roe harvests from 1978 through 1995 average approximately 18,300 tons annually, and range from 7,700 to 30,300 tons (Appendix Table 1). Industry participation in the fishery peaked between 1979 and 1982, when up to 33 processors registered to purchase herring in Togiak District. The number of companies declined in the mid-1980's and stabilized at an average (1986-95) of 18 companies.

Fishing time and area is regulated in an effort to divide the harvestable surplus using a 75%-25% allocation ratio for purse seine and gillnet vessels. The gillnet fleet is usually larger than the purse seine fleet, averaging (1978-95) 227 and 182 vessels, respectively. Purse seine vessels have generally accounted for 78% of the total harvest each year, with gillnet harvests comprising the remaining 22%.

Harvest roe recoveries have averaged approximately 9.4% for both gear types combined (Appendix Table 2). Historically, purse seine harvests have averaged 9.7% mature roe, while gillnet harvests have averaged 8.5% mature roe. Gillnet harvest roe percentages increased in recent years and since 1993 have exceeded purse seine harvest percentages.

Quality problems have surfaced in response to large harvests and a limited processing capacity on grounds. Herring harvested for sac roe in 1992 and 1994 were held for up to seven days before processing; sac roe and flesh quality suffered. Large available biomass and fleet sizes have resulted in very high levels of fishing efficiency, specifically in the purse seine fishery. Fishery managers responded by attempting to reduce fleet efficiency by restricting fishing time and area. Volunteer test fisheries were conducted up to three times each day to assess and monitor roe quality prior to opening an area to fishing. Mid-period assessments of roe quality were conducted for the past several years,

and used to extend openings when quality was high. In 1995, the Board of Fisheries addressed the concern by limiting purse seine depth and addressing enforcement problems.

Spawn on Kelp

The spawn on kelp fishery is managed under the direction of the Togiak District Herring Spawn on Kelp Management Plan (5 AAC 27.834). The plan essentially provides an allocation of 350,000 lb. of product, equivalent to 1,500 tons of herring, to this fishery. The plan also directs the department to rotate harvest areas on a two- to three-year basis and to ensure product quality (Figure 2).

Spawn on kelp harvests average (1978-95) 356,000 lb. and range from 189,000 to 560,000 lb.. Effort since 1986 averaged 310 permit holders (Appendix Table 4). The effect of limited entry can be seen in 1993, when only 173 permit holders landed product. Effort from 1985-93, prior to limited entry, averaged 362 permit holders.

Capelin

Commercial fishing for capelin is open by regulation, not managed by emergency order, and is restricted by few regulations. There is no closed season for capelin. Historically, Togiak District harvests have been small and sporadic. Harvests were documented in only three years prior to 1980, each totaling less than 100 tons. Since 1980, harvests were documented in 1984 (1,321 tons) and 1986 (139 tons), and more recently in 1993 (31 tons), 1994 (3 tons) and 1995 (6 tons). Fisheries attempted in other years failed. Harvests during these recent years were small due to limited fishing success, and the market for the smaller capelin egg skeins found in Togiak was limited. No attempts were made to find or harvest capelin in 1996.

Smelt

Commercial harvest of smelt is open by regulation in the Bristol Bay area all year. There have not been commercial harvests of this species in recent years in the Togiak District.

1996 SEASON SUMMARY

The 1996 herring run to the Togiak District was projected to reach 135,585 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 17,868 tons, gillnet sac roe 5,956 tons, spawn on kelp 175 tons (350,000 lb.), and Dutch Harbor food and bait 1,793 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 1996; the herring fisheries were managed 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.

Based on reports from companies and fishermen, staff expected a larger fishing effort than in the past years. For the fourth 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 1996 sac roe fisheries to limit the quantity held to an amount that would not exceed three days of production.

Sac Roe Fishery

The first department survey was flown under marginal conditions on April 18; large pods of gray whales with a few seals, sea lions and significant seabird activity were observed. No herring were observed, and there were no fishing vessels, processors or tenders on grounds.

Herring were first observed during an aerial survey on April 28; approximately 6,500 tons were documented in small schools in the eastern portion of Togiak Bay. By this date, inshore water temperatures reported from processing vessels in the Anchor Point area had reached 3⁰ C.

Department staff moved to the field office facility in Togiak at Togiak Fisheries Inc. on the evening of April 29. Company registration for processors intending to buy herring and spawn-on-kelp product in the Togiak District began. Nineteen companies registered within the next few days; 18 to buy gillnet fish, 18 to buy purse seine herring, and 3 companies to buy spawn-on-kelp product. Daily processing capacity was slightly less than previous years, reaching a reported 3,800 tons for 1996.

Management action would be directed at controlling individual period harvests to a level that could be processed in less than 3 days. Industry representatives have stated that limiting holding time to this level prevents a significant decline in product quality. The Alaska Board of Fisheries limited purse seine depth to 625 meshes for the 1995 season in order to reduce the purse seine fleet's efficiency. This was another step taken to assure product quality.

Purse Seine

After the first showing of herring in Togiak Bay on April 28, over 20,000 tons of herring were observed on an aerial survey the next day on the southeast shore of Hagemeister Island. Test fishing with purse seines was initiated on April 29 on these fish. Results showed all immature roe. Test sets were also made on the biomass in Togiak Bay, showing similar results. On April 30, herring started to show in other areas of the district as far east as Picnic Beach on the Nushagak Peninsula and west to Estes Point. Results from individual test sets in other areas were showing slight improvement, but nothing above 4% mature roe. By May 1, biomass had increased to an estimated 35,000 tons.

On an aerial survey the evening of May 2, approximately 56,000 tons of biomass was observed on grounds, and test sets with mature roe percentages over 8% were occurring in the areas of Tongue Point and Quigmy River. The fleet was advised at noon on May 3 that the earliest possible purse seine opening would be 9:30 p.m. that evening west of Anchor Point. Another test fishery was conducted west of Anchor Point in the afternoon and results showed only a few sets in the Estes

Point area that reached the 8 - 9% range. The fleet was advised that an opening would not occur that evening and another test fish period would begin at 7:00 a.m., the next morning.

The morning test fish results on May 4 were mixed, still showing a lot of immature fish, but general overall improvement from the previous day, particularly in the Estes Point to Cape Peirce area. Sets in this area reached 10 - 12% mature roe. The noon announcement advised the fleet that an opening on the afternoon high slack tide from Pyrite Point to Anchor Point was likely. An afternoon aerial survey resulted in a biomass estimate of 89,000 tons on grounds, and revealed a large buildup of biomass in the area being considered. Based on the presence of a large biomass of herring and still many areas with immature fish, the decision was made to test fish west of Anchor Point that afternoon instead of having a purse seine opening. Testfish results were again mixed with areas of immature fish, and the fleet was notified to stand down for the evening, and a test fishery would be initiated the next morning.

At noon on May 5, after the morning's test fish results showed little improvement in roe maturity, the first purse seine opening was announced for 1:00 p.m. in two separate areas: from Cape Newenham to Tongue Point, and a narrow area around Anchor Point. The fleet was advised that within the areas open, there were both good quality fish and immature fish, and that harvest should be selective. Approximately 1,500 tons were harvested during the first opening, with an overall average roe maturity of 9.1%. Many sets were released due to low mature roe percentage. Another opening was announced for 10:00 p.m. that evening. An additional 3,350 tons averaging 8.3% mature roe were taken in the second purse seine opening on May 5.

Three more openings were held over the next three days. The area open on May 6 was west of Rocky Point, followed on May 7 by a district-wide opening, and finally on May 8, areas opened included Oosik (Asigyukpak) Spit to Tongue Point and east of Nunavachuk Bay. Harvests were 2,600 tons (9.3% roe), 7,500 tons (9.2% roe), and 2,600 tons (9.5% roe) respectively.

Peak purse seine effort was observed on May 5 with 268 seiners participating in the first opening. Five purse seine periods were allowed for a total of 2 hours and 25 minutes of fishing time. Period duration ranged from 10 minutes to 1 hour. Area restrictions were placed on four periods, with the remaining period occurring districtwide. Total harvest for purse seines including the test fishery

and deadloss was 17,808 tons (Table 3), or within 0.3% of the harvest guideline. Overall weighted average for purse seine sac roe herring was 9.0% mature roe.

Gillnet

Gillnet testfishing began the evening of May 1 with the first available gillnet vessels. Early test sets made in the Anchor Point to Kulukak Bluffs yielded high percentages of immature roe. Testfishing continued with two sessions daily, and by the afternoon of May 3, samples from the Kulukak Bluffs and Metervik Bay area were showing 10+ % mature roe; a 2-hour gillnet period was announced for 7:30 p.m. that evening.

On the morning of May 4, processors reported a gillnet harvest of 1,100 tons with 10.5% roe recovery from the first opening; at noon, a 4-hour gillnet period was announced from 1:00 p.m. until 5:00 p.m. from Right Hand Point to Kulukak Bluffs, and the fleet was advised to standby for a possible extension. At 4:00 p.m., a 4-hour extension was announced extending the gillnet period to 9:00 p.m. The next morning, processors reported a harvest of 3,300 tons of herring with 11.4% mature roe.

After further test fishing in the same area on the morning of May 5 showing 8 - 12% mature roe, a 2-hour evening period beginning at 7:30 p.m. was announced. Only 750 tons of herring was taken, with 10.5% mature roe, bringing the cumulative gillnet harvest to 5,000 tons. This left approximately 800 tons of the gillnet harvest allocation to catch.

A gillnet test fishery was held at 8:00 a.m. on the morning of May 6 in the same area the previous openings had occurred to verify roe maturity remained consistent. Results from the test sets averaged 11.5% mature roe, and a gillnet opening was announced for 1:00 p.m. that afternoon. Processors reported a relatively light harvest of 400 tons of herring with 11% average mature roe from the afternoon period. Since over 400 tons of the gillnet allocation remained to be harvested, a second period, 4 hours in length, beginning at 7:30 p.m. was announced for the evening of May 6. Additional biomass had moved into the area late that afternoon, and when processors reported catch the next morning, the harvest from the final gillnet period reached 1,750 tons.

Peak gillnet effort occurred May 3 with a count of 461 gillnetters. Five openings were allowed over a four day period for a total of 18.0 hours of fishing time. Gillnet harvest reached 6,894 tons (Table 3), which was 938 tons (15.7%) over the guideline harvest, based on the preseason forecast. Overall weighted average mature roe content for gillnet-caught herring was 11.1%.

Spawn-on-Kelp Fishery

Spawning began May 1 in the Anchor Point area, and by May 5, over 32 linear miles of spawn had been observed throughout the district. Areas with the heaviest deposition of spawn were from Anchor Point to Rocky Point. Kelp (*Fucus distichus*) samples were collected by department staff from areas K 8, and K 9 (Figure 1), on the evening of May 5. However, it was evident that there was insufficient spawn deposition on the kelp to be marketable. On the evening of May 7, samples were again collected from the same areas, which appeared to have better deposition: a public meeting with representatives of the 3 companies registered to buy spawn-on-kelp product, and fishermen was scheduled for 10:00 a.m. on May 8. The product from areas K 8 and K 9 was judged by buyers and fishermen to be acceptable quality, and the first spawn-on-kelp opening was announced for that night in these two kelping areas. Since the daytime low tides were “holdovers” which wouldn’t expose adequate intertidal area for kelping, and the early morning tides were minus tides, the opening was scheduled for 12:00 midnight until 6:00 a.m., May 9.

On May 9, processors reported a harvest of 235,400 lbs. of medium-quality spawn-on-kelp product from 199 deliveries. Since the management plan sets forth a 350,000 harvest guideline for the fishery, a second period was announced for that night to harvest the remaining 116,000 lbs. The second kelp opening occurred on May 10, from 1:00 a.m. until 7:00 a.m., also in K 8 and K 9.

Processors reported a harvest of 220,400 lbs. from the second kelp opening, bringing the total harvest to 455,800 lbs. or 30% over the harvest guideline prescribed in the management plan. Numerous violations including non-permit holders harvesting kelp, and harvest before the opening and after the closure, were reported after the kelp fishery. These violations likely contributed to the total harvest exceeding the harvest guideline.

Smelt Fishery

Rainbow smelt have been observed regularly associated with the Togiak herring fishery. Usually, the first observations of fish in late April are smelt observed in shallow inshore waters around Togiak Bay.

This season, the department was advised that the U.S. Navy needed a limited quantity of smelt to be used for food in their marine mammal program. A smelt fishery occurred between May 12 and May 15 in Togiak Bay. One purse seine vessel made four sets over a 4 day period and delivered a cumulative total of approximately 57 tons.

EXPLOITATION

The Togiak District herring fisheries were managed for a maximum exploitation of 20%, based on the pre-season biomass forecast. Exploitation is derived based on the forecast and includes total sac roe harvest (24,701 tons), herring biomass equivalent of the spawn on kelp harvest (1,899 tons), and estimated waste (200 tons) from those fisheries. In addition, the Dutch Harbor food and bait harvest (2,048 tons) is included. Combining these fisheries, the estimated exploitation on the 1996 Togiak biomass was 21.28% (Appendix Table 2).

EX-VESSEL VALUE

The value of the 1996 Togiak herring fishery to fishermen was \$14.9 million (Appendix Table 6). The commercial value of the sac roe fishery was the second highest since the inception of the fishery. The value of the sac roe harvest to fishermen was estimated at \$14.4 million. Ex-vessel values of the gillnet and purse seine harvests were \$4.0 and \$10.4 million, respectively. Ex-vessel value of the spawn on kelp fishery was estimated at \$510,000, approximately 98% greater than the 1978-95 average value. These estimates do not include any post-season adjustments to fishermen from processors, and should therefore be treated as minimum estimates.

Initial sac roe prices paid to fishermen were high relative to previous years, reaching \$600/ton for 10% mature roe, with an adjustment of \$60/ton for each percentage point difference above or below 10%. Spawn on kelp sold for up to \$1.25/lb., similar to the price paid in 1995.

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, Bristol Bay, Alaska, 1996

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	
04/18	10:45	1.7	0.0		0	0	0	0	0	0	0	0	0		0	0	0
04/22	14:25	3.0	0.0		0	0	0	0	0	0	0	0	0		0	0	0
04/24	15:45	1.2	0.0		0	0	0	0	0	0	0	0	0	0	0	0	0
04/26	16:50	2.4	0.0		0	0	0	0	0	0	0	0	0	0	0	0	0
04/28	18:35	2.4	0.0		0	0	0	0	110	0	0	0	0		6,442	0	6,552
04/29	11:25	2.8	0.0		0	0	0	98	3	0	0	0	0		19,109	0	19,210
04/29	19:20	2.5	0.0		0	0	0	46	277	911	0	0	0		5,962	0	7,196
04/30	08:20	3.3	0.0						4,925						4,402		9,327
04/30	19:00	3.0	0.0	4,092	473	0	56	6	14,906	393	167	0	0				20,094
05/01	08:05	2.8	0.0		946										4,593		5,539
05/01	19:05	3.1	2.3	7,814	1,052	0	0	1,199	13,015	2,781	3,442	1,930			3,284	0	34,517
05/02	17:50	3.1	9.3	8,026	4,695	929	1,684	5,167	8,971	3,041	6,622	1,481	122		14,702	1,755	57,194
05/03	13:30	2.7	9.0	34,549	3,153	7,406	950	5,481	12,812	6,942	7,087	2,235			8,151		88,766
05/04	19:20	3.6	13.8	10,827	922	950	613	3,239	10,674	1,141	1,567		1,641				31,573
05/05	13:35	3.0	8.5	17,167	3,813	1,343	956	1,404	6,728	4,054	6,070	1,389	2,447		2,326		47,697
05/07	09:30	3.9	1.8	1,196	872	101	473	594	2,260	1,227	1,420	0					8,143
05/08	11:40	2.2	8.8	5,454	4,092	2,090	1,640	6,059	14,730	1,143	2,303	5,330	1,964		257		45,062
05/09	11:30	2.0	6.5					No Biomass estimate - Spawn Survey Only									
05/11	17:15	3.2	4.3	3,377	8,416	1,321	4,532	4,052	4,040	1,438	1,102	1,724	30		544		30,576
05/13	18:55	3.1	8.1	3,066	6,286	683	324	952	1,523	3,072	866	4,251			2,089	313	23,425
05/16	11:25	3.1	0.5	3,172	4,116	113	86	1,946	783	448	391	1,132					12,187
05/31	09:55	2.5	0.0	1,950	133	591	256	1,028	250	398	366	129			14		5,115
Total			72.9														

^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 Point; MTG - Matogak; HAG - Hagemeister; OSK - Osviak; PYT - Pyrite Point; CN - Cape Newenham.

Table 2. Emergency order commercial fishing periods for herring sac roe and herring spawn on Kelp, Togiak District, Bristol Bay, 1996.

Emergency Order Number	Area ¹	Date and Time	Duration
Herring Sac Roe Gillnet			
DLG-01	Right Hand Point to Kulukak Bluffs ^{2,3}	5/03 7:30 p.m. - 5/03 9:30 p.m.	2 hrs.
DLG-02	Right Hand Point to Kulukak Bluffs ^{2,3}	5/04 1:00 p.m. - 5/04 5:00 p.m.	4 hrs.
DLG-03 ⁴	Right Hand Point to Kulukak Bluffs ^{2,3}	5/04 5:00 p.m. - 5/04 9:00 p.m.	4 hrs.
DLG-05	Right Hand Point to Kulukak Bluffs ^{2,3}	5/05 7:30 p.m. - 5/05 9:30 p.m.	2 hrs.
DLG-07	Right Hand Point to Kulukak Bluffs ^{2,3}	5/06 1:00 p.m. - 5/06 3:00 p.m.	2 hrs.
DLG-08	Right Hand Point to Kulukak Bluffs ^{2,3}	5/06 7:30 p.m. - 5/06 11:30 p.m.	4 hrs.
Herring Sac Roe Purse Seine			
DLG-04	Cape Newenham to Matogak River, and Anchor Point.	5/05 1:00 p.m. - 5/05 1:10 p.m.	10 min.
DLG-06	Cape Newenham to Anchor Point, excluding upper Togiak Bay and Hagemeister Island.	5/05 10:00 p.m. - 5/05 10:20 p.m.	20 min.
DLG-09	Cape Newenham to Anchor Point, excluding upper Togiak Bay and Hagemeister Island.	5/06 9:30 p.m. - 5/06 10:15 p.m.	45 min.
DLG-10	District wide, excluding upper Togiak and Kulukak Bays.	5/07 1:30 p.m. - 5/07 2:30 p.m.	1 hr.
DLG-12	Metervik Bay to Rocky Pt. and Tongue Pt. to Asigyugpak Spit.	5/08 4:00 p.m. - 5/08 4:10 p.m.	10 min.
Herring Spawn on Kelp			
DLG-11	K-8, K-9	5/08 12:00 mid. - 5/09 6:00 a.m.	6 hrs.
DLG-13	K-8, K-9	5/10 1:00 a.m. - 5/10 7:00 a.m.	6 hrs.

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

² Metervik Bay opened.

³ Gillnet length reduced to 50 fathoms.

⁴ Period extensions.

Table 3. Preliminary commercial herring harvest (tons) by fishing section and gear type, Togiak District Bristol Bay, 1996. (Roe percentages for each opening are noted within parentheses).

Date	Time (hours)	Period	Kulukak	Nunavachak	Togiak	Hagemeister	Pyrite Point	Cape Newenham	Total
Purse Seine									
2-May		^a		170 (8.8)					170 (8.8)
5-May	0.50	1,2			972 (9.1)	3,135 (8.3)	698 (8.2)	52 (10.3)	4,857 (8.4)
6-May	0.75	3	69 (7.7)		737 (9.6)	1,578 (9.3)	249 (8.8)	9 (7.1)	2,642 (9.3)
7-May	1.00	4	2,053 (9.1)	58 (9.6)	224 (8.0)	4,611 (9.1)	193 (10.3)	375 (10.5)	7,514 (9.2)
8-May	0.17	5	597 (9.8)	57 (8.2)	10 (8.5)	1,927 (9.5)	34 (9.1)		2,625 (9.5)
	2.42		2,719 (9.2)	285 (8.8)	1,943 (10.1)	11,251 (9.0)	1,174 (8.7)	436 (10.4)	17,808 (9.0)
Gill Net									
3-May	2.00	1	1,108 (10.5)						1,108 (10.5)
4-May	8.00	2	3,316 (11.4)						3,316 (11.4)
5-May	2.00	3	720 (10.3)						720 (10.3)
6-May	6.00	4,5	1,750 (11.4)						1,750 (11.4)
	18.00		6,894 (11.1)						6,894 (11.1)
Total									
2-May		^a							170 (8.8)
3-May	2.00		1,108 (10.5)						1,108 (8.8)
4-May	8.00		3,316 (11.4)						3,316 (10.5)
5-May	2.5		720 (10.3)		972 (9.1)	3,135 (8.3)	698 (8.2)	52 (10.3)	5,577 (8.4)
6-May	6.75		1,819 (11.4)		737 (9.6)	1,578 (9.3)	249 (8.8)	9 (7.1)	4,392 (9.3)
7-May	1.00		2,053 (9.1)	58 (9.6)	224 (8.0)	4,611 (9.1)	193 (10.3)	375 (10.5)	7,514 (9.2)
8-May	0.17		597 (9.8)	57 (8.2)	10 (8.5)	1,927 (9.5)	34 (9.1)		2,625 (9.5)
	20.42		9,613 (10.6)	285 (8.8)	1,943 (9.1)	11,251 (9.0)	1,174 (8.7)	436 (10.4)	24,702 (9.0)

^a A.D.F. & G. test fish harvest.

Table 4. Commercial herring spawn on kelp harvest by date, Togiak District, Bristol Bay, Alaska, 1996.

Date	Area	Hrs.	Permits	Landings	Harvest(st)	Equivalent Herring Biomass (st) ^a
5/09	K-8, K-9	6.0	167	198	117.2	976.3
5/10	K-8, K-9	6.0	135	149	110.7	922.5
Total		12.0		347	227.9	1,898.8

^a Using a formula adopted by the 1984 Board of Fisheries, herring spawn on kelp harvest is converted to represent herring as follows:

$$\text{Herring Equivalent} = \frac{100 (\text{Harvested Egg Biomass})}{\text{Average Roe Recovery (in percent)}}$$

where;

$$\text{Harvested Egg Biomass} \approx 0.75 (\text{Spawn-on-kelp biomass})$$

For 1996;

$$\begin{aligned} \text{Herring Equivalent} &= \frac{100 (170.9)}{9.0} \\ &= 1,898.8 \text{ tons} \end{aligned}$$

Herring equivalent is included in the herring harvest to calculate total exploitation.

Table 5. Preliminary herring total run and commercial catch by year class, Togiak District, Bristol Bay, 1996.^a

Year Class	Age	Total Run		Harvest ^b		Escapement	
		(tons)	%	(tons)	%	(tons)	%
1978	18	0	0.0%	0	0.0%	0	0.0%
79	17	0	0.0%	0	0.0%	0	0.0%
80	16	0	0.0%	0	0.0%	0	0.0%
1981	15	3,796	2.8%	692	2.8%	3,105	2.8%
82	14	271	0.2%	49	0.2%	222	0.2%
83	13	3,525	2.6%	642	2.6%	2,883	2.6%
84	12	4,339	3.2%	790	3.2%	3,548	3.2%
85	11	678	0.5%	124	0.5%	554	0.5%
1986	10	2,305	1.7%	420	1.7%	1,885	1.7%
87	9	39,048	28.8%	7,114	28.8%	31,935	28.8%
88	8	33,083	24.4%	6,027	24.4%	27,056	24.4%
89	7	9,762	7.2%	1,778	7.2%	7,984	7.2%
90	6	8,406	6.2%	1,531	6.2%	6,875	6.2%
1991	5	16,541	12.2%	3,013	12.2%	13,528	12.2%
92	4	13,830	10.2%	2,519	10.2%	11,310	10.2%
93	3	0	0.0%	0	0.0%	0	0.0%
94	2	0	0.0%	0	0.0%	0	0.0%
Total		135,585 ^c	100.0%	24,701	100.0%	110,884	100.0%

^a Forecasted age composition and does not include harvest in the Dutch Harbor food and bait fishery.

^b Preliminary inshore gillnet and purse seine harvest with applied forecast age composition.

^c 1996 forecasted biomass.

Table 6. Registered Processors and Buyers of herring sac roe, herring spawn on kelp in Togiak District, Bristol Bay, 1996.

Operator / Buyer	Base of Operations	Product Purchased		
		Sac Roe		
		Gillnet	Purse Seine	Spawn-on-Kelp
1 Bay Pack	P/V Stormy Sea	X	X	
2 Capilano	North Land	X	X	
3 Dragnet Fisheries, Inc.	Dillingham Plant	X	X	
4 Icicle Seafoods, Inc.	P/B Berring Star	X	X	
5 Nelbro Packing	Naknek Plant	X	X	
6 New West Fisheries, Inc.	P/V New West	X	X	
7 North Alaska Fisheries	Togiak Plant			X
8 North Coast Seafoods Proc.	P/V Polar Queen	X	X	X
9 Norquest Seafoods, Inc.	M/V Priblof	X	X	
10 Ocean Beauty Seafoods	P/V Ocean Pride	X	X	
11 Pan Pacific Seafoods	P/V Pacific Producer	X	X	
12 Peter Pan Seafoods Inc.	P/V Blue Wave	X	X	
13 Snopac Products, Inc.	P/V Snopac	X	X	
14 Togiak Fisheries, Inc.	Togiak Plant	X	X	X
15 Trident Seafoods	P/B Neptune	X	X	
16 Unisea, Inc.	P/V Omnisea	X	X	
17 Wards Cove Packing	P/V Omnisea	X	X	
18 Woodbine Alaska Fish Co.	M/V Woodbine	X	X	
19 Y.A.K., Inc.	P/B Yard Arm Knot	X	X	

Appendix Table 1. Commercial harvest of herring by gear type and product, Togiak District, Bristol Bay, Alaska, 1978-96.

Year	Number of Processors	Effort		Harvest				Inshore Total (tons)
		Units of Gear ¹		Percent by Gear		Product		
		Gill Net	Purse Seine	Gill-net	Purse seine	Sac Roe	Food/Bait	
1978	16	40	25	8	92	100	0	7,734
79	33	350	175	40	60	92	8	11,558
80	27	363	140	16	84	85	15	18,886
81	28	106	83	18	82	99	1	12,542
82	33	200	135	31	69	93	7	21,489
1983	23	250	150	19	81	97	3	26,287
84	25	300	196	25	75	98	2	19,300
85	23	302	155	17	83	99	1	25,616
86	23	209	209	21	79	99	1	16,260
87	18	148	111	17	83	98	2	15,204
1988	22	300	239	26	74	99	1	14,382
89	19	320	310	24	76	97	3	12,258
90	16	277	221	25	75	99	1	12,253
91	16	170	200	21	79	97	3	15,070
92	18	274	301	19	81	98	2	25,808
1993	12	75	140	20	80	100	0	17,925
94	16	146	240	25	75	100	0	30,300
95	22	250	254	26	74	100	0	26,733
Mean (1978-95)	22	227	182	22	78	97	3	18,311
1986-95 Ave.	18	217	223	22	78	99	1	18,619
1996	19	461	268	27	73	100	0	24,701

¹ Derived from fish tickets in 1978. From 1979 to present, includes peak aerial survey count.

Appendix Table 2. Estimated total run biomass and inshore commercial herring catch in tons, Togiak District, Bristol Bay, 1978-1996.

Year	Total Run Biomass	Inshore Catch	Roe Recovery (%)			Percent Exploitation ²
			GillNet	Purse Seine	Mean	
1978	190,292	7,734			8.2	4
79	239,022	11,558			8.6	5
80	68,686	18,886			9.2	35
81	158,650	12,542	6.7	10.1	9.1	8
82	97,902	21,489	7.4	9.5	8.8	22
1983	141,782	26,287	6.9	9.3	8.9	19
84	114,880	19,300	8.4	10.2	9.8	18
85	131,400	25,616	7.4	10.0	9.6	20
86	94,700	16,260	8.8	9.9	9.7	19
87	88,400	15,204	8.6	8.9	8.8	19
1988	134,717	14,382	8.3	10.9	10.3	13
89	98,965	12,258	8.0	8.6	8.4	18
90	88,105	12,253	9.1	9.7	9.6	17
91	83,329	14,970	8.8	10.1	9.9	21
92	156,955	25,808	8.8	9.2	9.2	19
1993	193,847	17,925	10.1	9.6	9.7	12
94	185,454	30,316	12.1	9.5	10.2	19
95 ^{3,4}		26,732	12.0	10.2	10.6	20
Average	133,358	17,811	8.8	9.7	9.4	17
1996 ⁴	135,585	24,701	11.1	9.0	9.7	21

¹ Total run biomass represents the aerial survey estimate of the inshore herring biomass for each year in the Togiak District, revised post-season.

² Percent exploitation is calculated by dividing the adjusted commercial harvest which includes all commercial landings (Togiak sac roe fishery and Dutch Harbor food and bait fishery), all documented waste, and the equivalent herring harvest of the spawn-on-kelp removal, by the total run biomass.

³ Aerial surveys for 1995 were hampered by poor weather conditions, preventing an estimate of total run biomass.

⁴ The fisheries were managed on the forecasted biomass.

Appendix Table 3. Age composition of the inshore herring run, Togiak District, Bristol Bay, 1977-1996.

Year	Age Composition (%) ¹							Total Run ² (tons)
	1-3	4	5	6	7	8	9+	
1977	4	49	37	3	3	3	1	
78		47	36	11	1	3	2	190,292
79	1	4	48	31	13	1	2	239,022
80	8	5	1	37	35	12	2	68,686
81	1	50	7	1	22	14	5	158,650
1982		16	51	3	1	17	12	97,902
83		5	37	45	2	2	9	141,782
84		2	2	28	42	4	24	114,880
85		1	1	8	35	42	13	131,400
86			1	2	15	44	38	94,770
1987				8	10	28	54	88,400
88		2	5	1	13	5	74	134,717
89			5	11	4	15	65	98,965
90	0			6	11	3	80	88,105
91		7	1	1	16	18	57	83,329
1992	0	10	20	1	1	15	53	156,955
93			6	23	1	1	67	193,847
94			2	12	28	3	55	185,454
95		1	4	7	24	30	35	³
96		10	12	6	8	24	40	135,585 ⁴

¹ Age composition in 1978-92 is weighted by aerial survey data and weight at age; age composition for 1977 is not weighted by aerial survey data.

² Includes commercial catch, escapement, and documented waste.

³ Age contribution of the commercial purse seine harvest was used to represent the total run for the 1995 and 1996 season. Aerial surveys were hampered by poor weather conditions, preventing a biomass estimate.

⁴ 1996 forecasted age composition and biomass.

Appendix Table 4. Commercial harvest of herring spawn-on-kelp, Togiak District, Bristol Bay, Alaska, 1978-96.

Year	Processors	Permit Holders ¹	Deliveries	Harvest (lbs.)	Mature Roe % (lbs.)	Equivalent Herring Biomass (s.t.) ²
1978	11	160	349	329,858	8.2%	1,508
79	16	100	228	414,727	8.6%	1,808
80	21	78	186	189,662	9.2%	773
81	7	108	277	378,207	9.1%	1,559
82	8	214	167	234,924	8.8%	1,001
1983	4	125	257	270,866	8.9%	1,141
84	6	330	412	406,587	9.8%	1,556
85 ^a					9.6%	
86	3	204	351	374,142	9.7%	1,446
87	5	187	334	307,307	8.8%	1,310
1988	10	259	330	489,320	10.3%	1,782
89	11	487	330	559,780	8.4%	2,499
90	7	481 ^b	286	413,844	9.6%	1,617
91	7	532 ^b	248	348,357	9.9%	1,320
92	5	386	267	363,600	9.2%	1,482
1993	2	173	313	383,000	9.7%	1,481
94	3	204	212	308,400	10.2%	1,134
95	5	188	304	281,600	10.6%	996
1978-95 Avera	8	248	285	356,128	9.4%	1,436
1986-95 Avera	6	310	298	382,935	9.6%	1,507
1996	3	200	347	455,800	9.0%	1,899

¹ Based on fish tickets, unless specified otherwise.

² Based on the equation specified by the Board of Fisheries in 1984.

^a Fishery not conducted.

^b Estimated via aerial survey during the harvest; includes both limited entry interim use permit holders and crew members.

Appendix Table 5. Aerial observation of herring spawn in the Togiak District, Bristol Bay, 1978-1996.^a

Date	1978		1979		1980		1981		1982		1983		1984		1985		1986		1987		
	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	
4/24																				15	2.9
4/25																				17	5.2
4/26																				15	3.4
4/27																				24	4.3
4/28																				0	
4/29																				0	
4/30			2	2.5			9	3.0			0								7	1.7	
5/1	1	0.4					6	2.3			0								0		
5/2			21	8.3	11	4.0	12	1.9			10	3.6									
5/3	1	0.4	14	5	8	3.0	12	6.8			30	9.3							21	10.7	
5/4			8	3.1			4	2.9			40	12.5							15	6.3	
5/5			1	1.3	0		6	2.5			27	7.5							21	23.9	
5/6							0				8	2.9							9	8.4	
5/7			3	0.6	3	0.9	2	0.4	0		8	1.5							7	3.3	
5/8	2	1.8			3	1.2	3	1.0			8	1.9									
5/9			2	0.4	1	0.2	5	1.4					1+							0	
5/10			0				0		0										2	0.4	
5/11	9	7.7			0						3	3.5							6	4.7	
5/12	3	1.5	0		0		15	4.8	0	0	9	5.4									
5/13	12	8.6			0		6	3.8	0	0							2.0	0.8			
5/14	11	5.6	0		2	2.3	10	4.7	0									29	13.8	1	0.6
5/15					6	4.0	2	1.5	0		2	1.0						53	18.2		
5/16			0		4	1.2	0		1	0.1	4	0.5	1	0.3				34	11.1		
5/17			0						4	0.7	9	2.0	1	0.5				24	11.7		
5/18	11	4.2							29	7.3	19	6.1	24	17.6				3	0.6		
5/19	3	2.5			1	0.3			16	5.2	7	1.7	71	24.6				1	0.6		
5/20					4	0.9			19	14.0	0		8	1.3	3	0.2	3	0.6			
5/21			0						3	2.0			0		8	2.0	11	4.2			
5/22					2	0.5			3	1.5			5	1.2	13	2.3	4	0.5			
5/23							10	2.1	11	3.3	0		3	1.4	48	14.2	4	1.5			
5/24									5	1.4			6	2.2	25	11.7	11	2.6			
5/25	8	4.2							1	0.3	1	0.1	3	1.4	17	5.2					
5/26	2	2.2	1	0.7			3	0.2	0		1	0.1	14	4.1	23	7.3					
5/27					3	0.3			0		2	0.1	8	1.2				0			
5/28	0								0				3	0.1							
5/29					8	1.6			0				2	0.2	0						
5/30	6	1.6							0		0		4	0.5				3	0.3		
5/31					2	0.8			0				12	4.1							
6/1									7	2.6	0		3	0.5	4	0.5					
6/2	1	0.5							0												
6/3							1	0.8	4	0.2	1+										
6/4													2	0.2							
6/5																					
6/6																		0			
6/7					6	3.1															
6/8																					
Total	70	41.2	52	21.9	64	24.3	106	40.1	103	38.6	189	59.7	171	61.4	141	43.4	182	66.5	160	75.8	

Appendix Table 5. (Continued)

Date	1988		1989		1990		1991		1992		1993		1994		1995		1996	
	No.	Miles																
4/24											0				0	0		
4/25											1	0.3	0					
4/26											14	5.1						
4/27											23	21.3						
4/28											16	13.0						
4/29									0		11	6.0			0	0		
4/30											7	4.0	0					
5/1									0		3	2.2			0	0	6	2.3
5/2									0				0		0	0	8	9.3
5/3											1	1.5	0		1	0.5	8	9.0
5/4											0				6	3.5	20	13.8
5/5									0		0		0		0	0	13	8.5
5/6									0		0		0					
5/7					1	0.8			0		0				4	5.8	3	1.8
5/8			4	4.2	11	8.3							0		2	4.0	14	8.8
5/9			11	11.9	63	37.1	3	1.0	0				0		12	7.3	11	6.5
5/10			15	12.9	6	3.3	24	17.8	0				8	3.8	20	14.3		
5/11	0		7	10.0	5	1.7	21	24.5					21	21.0	14	13.5	4	4.3
5/12	0		9	3.6	2	1.8	24	20.8					17	23.0	11	9.8		
5/13	0		4	3.2	0		5	2.1	0				26	18.8			11	8.1
5/14	2	1.5			3	4.0	1	0.5					8	5.3				
5/15					1	1.0	1	0.1	0									
5/16	11	3.5	1	0.8	0		1	0.5	0				0				1	0.5
5/17	20	22.8							0									
5/18	30	12.9			0		0		0									
5/19	26	9.1			0				5	7.0								
5/20					0		2	0.2	29	19.4								
5/21	3	0.9							55	34.2								
5/22	9	4.1							24	8.5								
5/23	1	3.5							28	14.9								
5/24	5	2.8	18	5.9			5	1	9	8.8								
5/25									6	2.5								
5/26									3	1.3								
5/27									1	0.3								
5/28					1	7.0	0											
5/29																		
5/30																		
5/31					1	0.7	2	0.5										0
6/1																		
6/2																		
6/3																		
6/4																		
6/5							1	0.5										
6/6																		
6/7																		
6/8								0										
Total	107	61.1	69	52.5	94	65.7	90	69.5	160	96.9	76	53.4	80	71.9	70	58.7	99	72.9

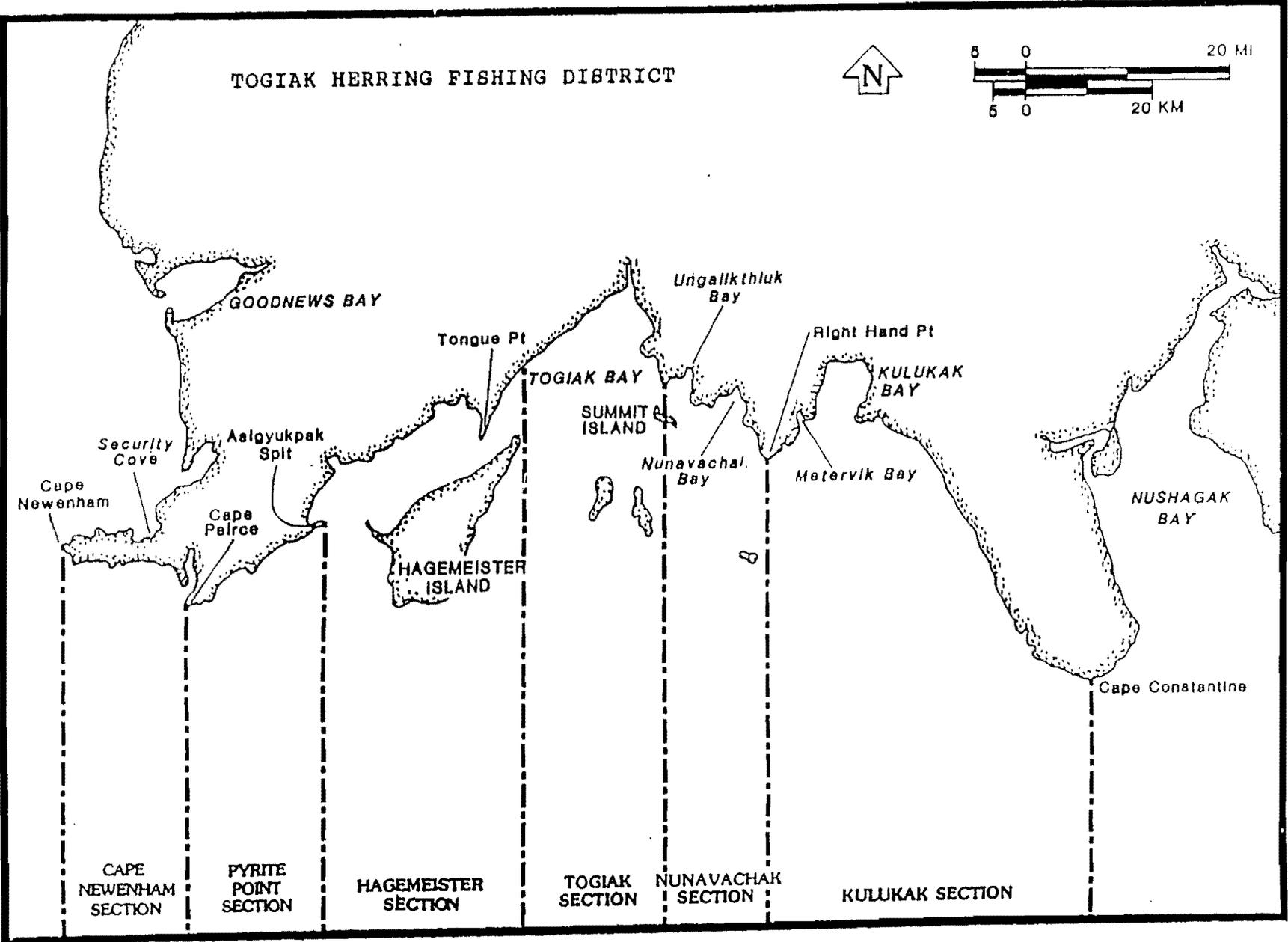
^a Survey area covers Nushagak Peninsula to Cape Newenham.

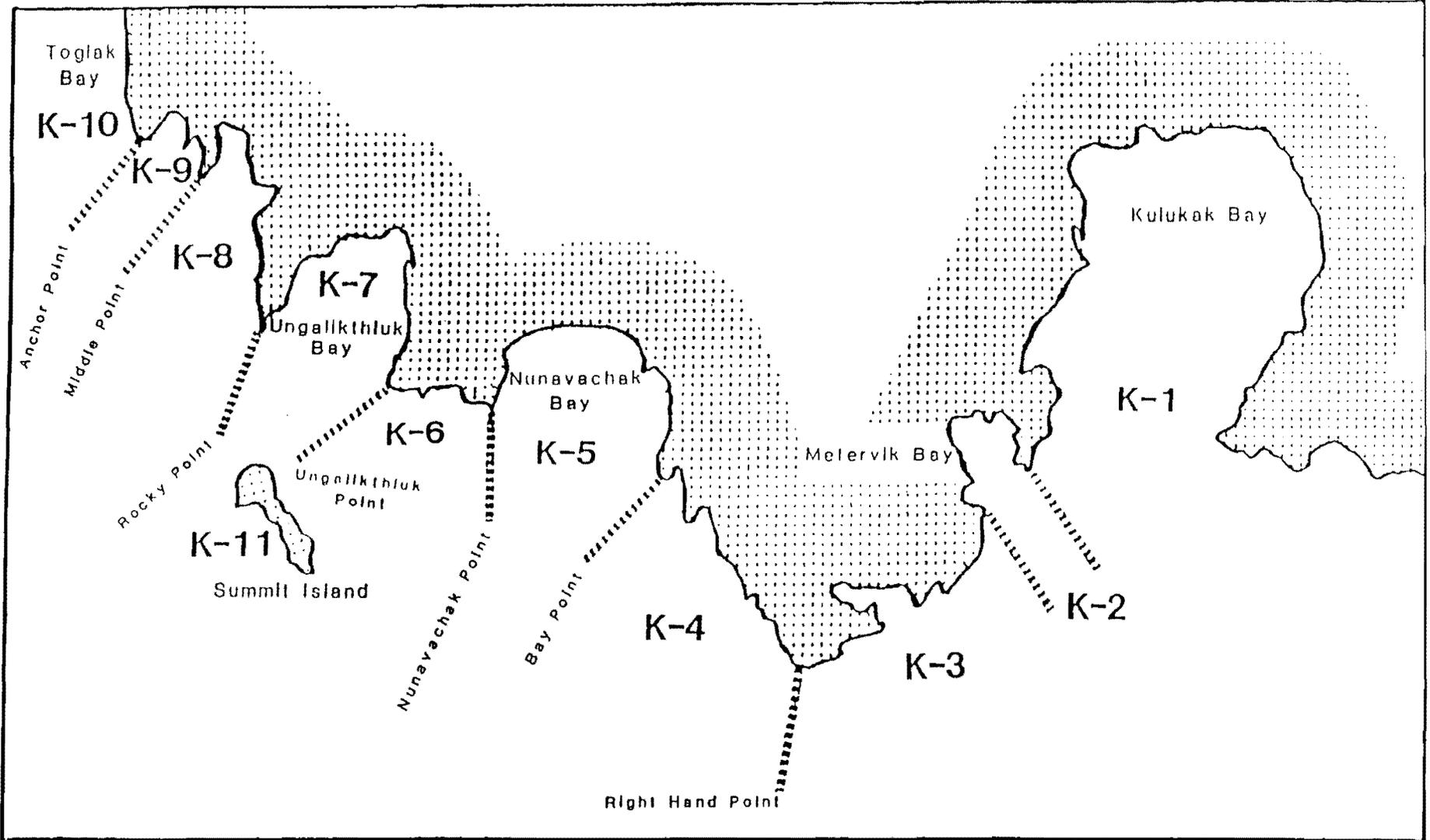
Appendix Table 6. Exvessel value of the commercial herring and spawn-on-kelp harvest, in thousands of dollars, Togiak District, Bristol Bay, Alaska, 1978-96^a

Year	Herring		Spawn-on-Kelp	Total
	Sac Roe	Food/Bait		
1978	2,635	0	120	2,755
79	6,561	180	249	6,990
80	3,055	150	95	3,300
81	3,988	1	250	4,239
82	6,070	105	176	6,351
1983	10,450	67	284	10,801
84	7,178	33	203	7,414
85	13,696	41	^b	13,737
86	8,648	12	187	8,847
87	8,614	49	166	8,829
1988	14,103	3	346	14,452
89	4,983	19	448	5,450
90	6,494	9	360	6,863
91	6,173	21	383	6,577
92	8,818	26	254	9,098
1993	5,218	3	268	5,489
94	9,090	0	212	9,302
95	16,713	0	362	17,075
Average	7,916	40	257	8,198
1996	14,395	5	510	14,910

^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.





BRISTOL BAY TOGIAC DISTRICT SPAWN ON KELP MANAGEMENT AREAS (K-1 through K-11)