

# MEMORANDUM

# State of Alaska

TO: Report Recipients

DATE: February, 1982

FILE NO:

TELEPHONE NO: 842-5227

FROM: Michael L. Nelson *mam*  
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Division of Commercial Fisheries  
Dillingham

SUBJECT: 1979 Bristol Bay Annual  
Management Report

The attached report represents our continuing and most recent efforts to update and upgrade fishery statistics useful in describing the Bristol Bay fishery, and to bring up to date the Bristol Bay annual management report file.

Many of the new data tables first included in 1975 have been continued. I believe this edition of our annual management report will be most useful in explaining and describing management rationale, as well as a better source for compiled catch, escapement and production information on all species of fish harvested in Bristol Bay in 1979.

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Please route needed corrections or comments to me here in Dillingham.

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ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1979-

BRISTOL BAY AREA

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February, 1982

## PREFACE

The 1979 Bristol Bay Management Report is the twentieth consecutive annual volume reporting on and detailing management activities of the Division of Commercial Fisheries staff in Bristol Bay. This review emphasizes a descriptive account of the administration of the Bristol Bay commercial fishery resources, as well as outlining management objectives and procedures. Our basic objective in producing this document is to assist in creating a better understanding of the commercial fisheries management program in Bristol Bay.

Extensive reorganization of the documentation in this review, which was begun in 1975, represents our continued efforts to update and evaluate all information deemed necessary to fully explain the rationale behind management decisions formulated in 1979. The extensive set of tables represents our efforts to update information and to record material previously unlisted that may be useful and informative. All 1979 catch data are preliminary pending receipt of final computer listings of fish ticket catches. This report is considered to be "FOR INTER-DEPARTMENTAL USE ONLY."

Corrections or comments on the contents of this report should be directed to the area office at Dillingham, Attention: Editor.

Michael L. Nelson, Editor  
Senior Area Management Biologist  
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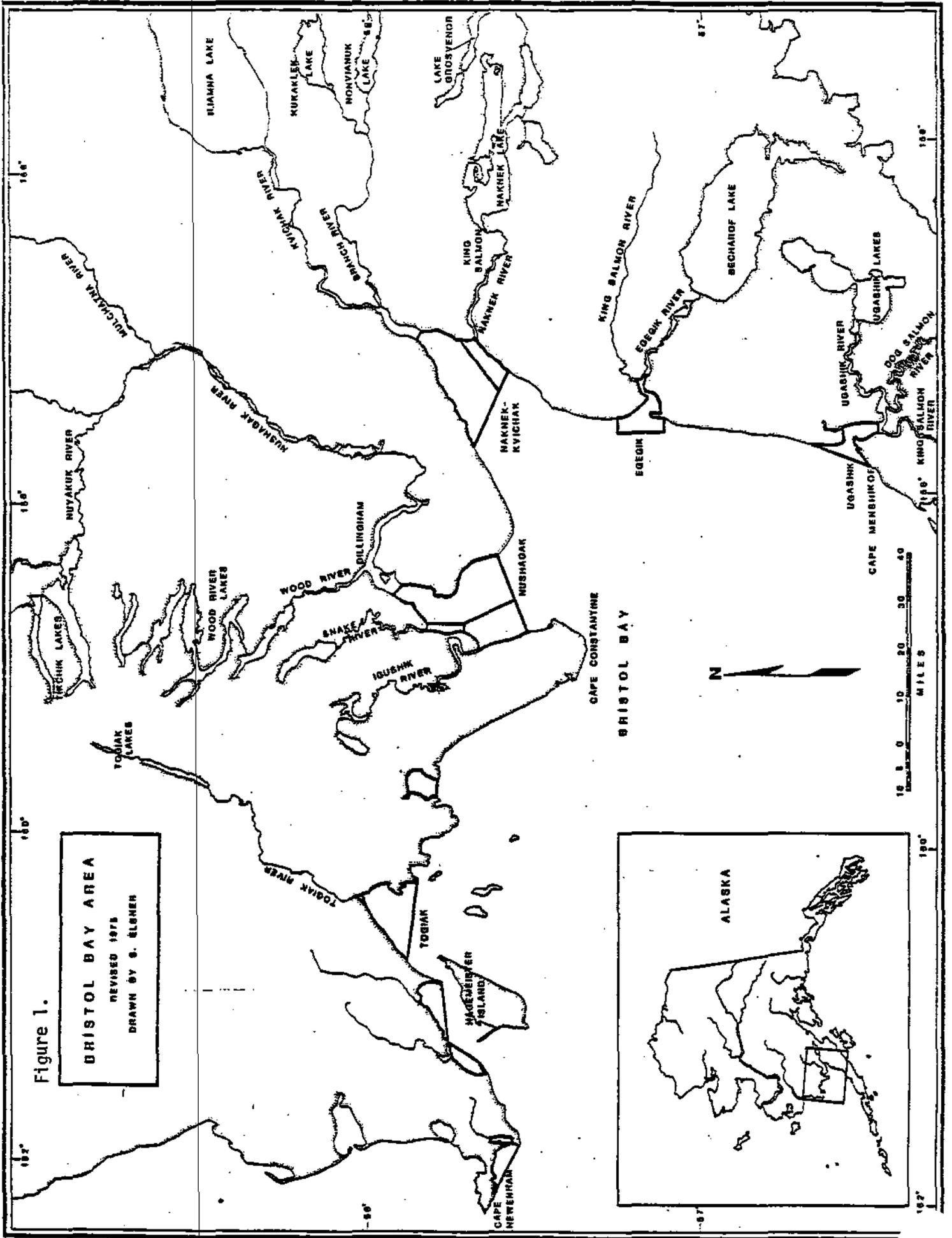
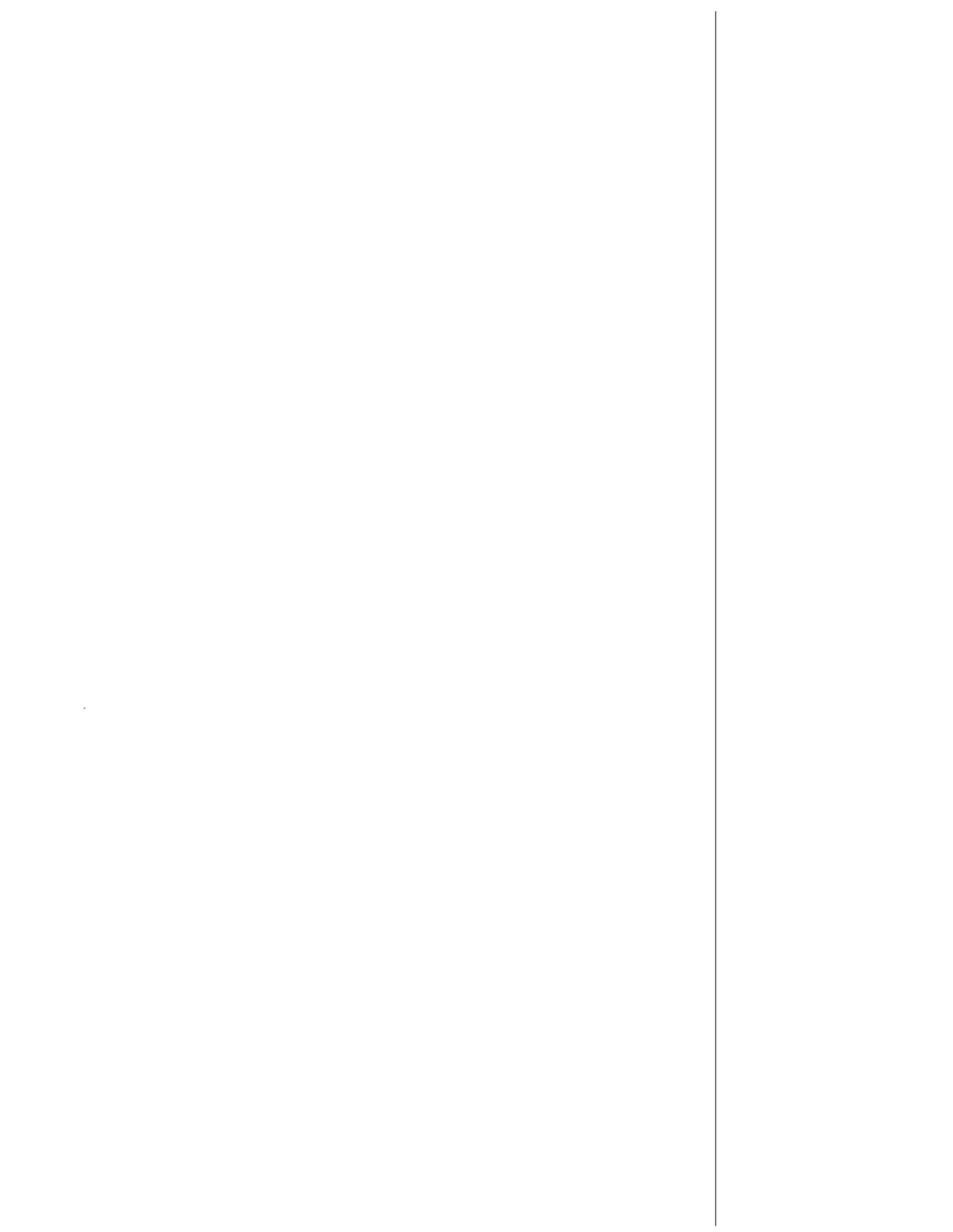


Figure 1.

**BRISTOL BAY AREA**  
 REVISED 1975  
 DRAWN BY G. ELSNER



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BRISTOL BAY AREA  
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INTRODUCTION

The Bristol Bay area includes all coastal waters and inland drainages east of a line from Cape Newenham to Cape Mensehikof (Figure 1). Important commercial fisheries include harvests of salmon, herring and herring roe-on-kelp.

The area wide salmon catch during the 1979 season amounted to 23.4 million fish of all species, accounting for 26% of the entire statewide harvest (Figure 2). The harvest of 22.0 million sockeye salmon from the five major fishing districts dominated the catch (Figure 3). The inshore run of sockeye salmon to Bristol Bay totaled 40.4 million fish, almost 18 million above the preseason forecast and was the largest non-peak year run since 1938 (Table 1). The sockeye salmon harvest, alone worth over \$132 million to the fishermen, comprised the majority of the \$148 million exvessel value for all salmon and herring products this season. Sockeye escapement goals were achieved for the sixth consecutive year in all systems including the Ugashik River which has had limited commercial fishing during recent years (Table 1).

The exceptional sockeye returns in 1979 are a direct result of adequate escapements achieved through strict harvest management during the middle 1970's and improved survival conditions in recent years. Drastic curtailment of foreign high seas gill net fishing has reduced the interceptions of Bristol Bay stocks and also contributed to increased inshore returns.

Above average harvests were also realized for the other species of salmon and were highlighted by record or near record catches of king and coho salmon (Table 19).

Figure 2.

## TOTAL SALMON CATCH BY YEAR, BRISTOL BAY

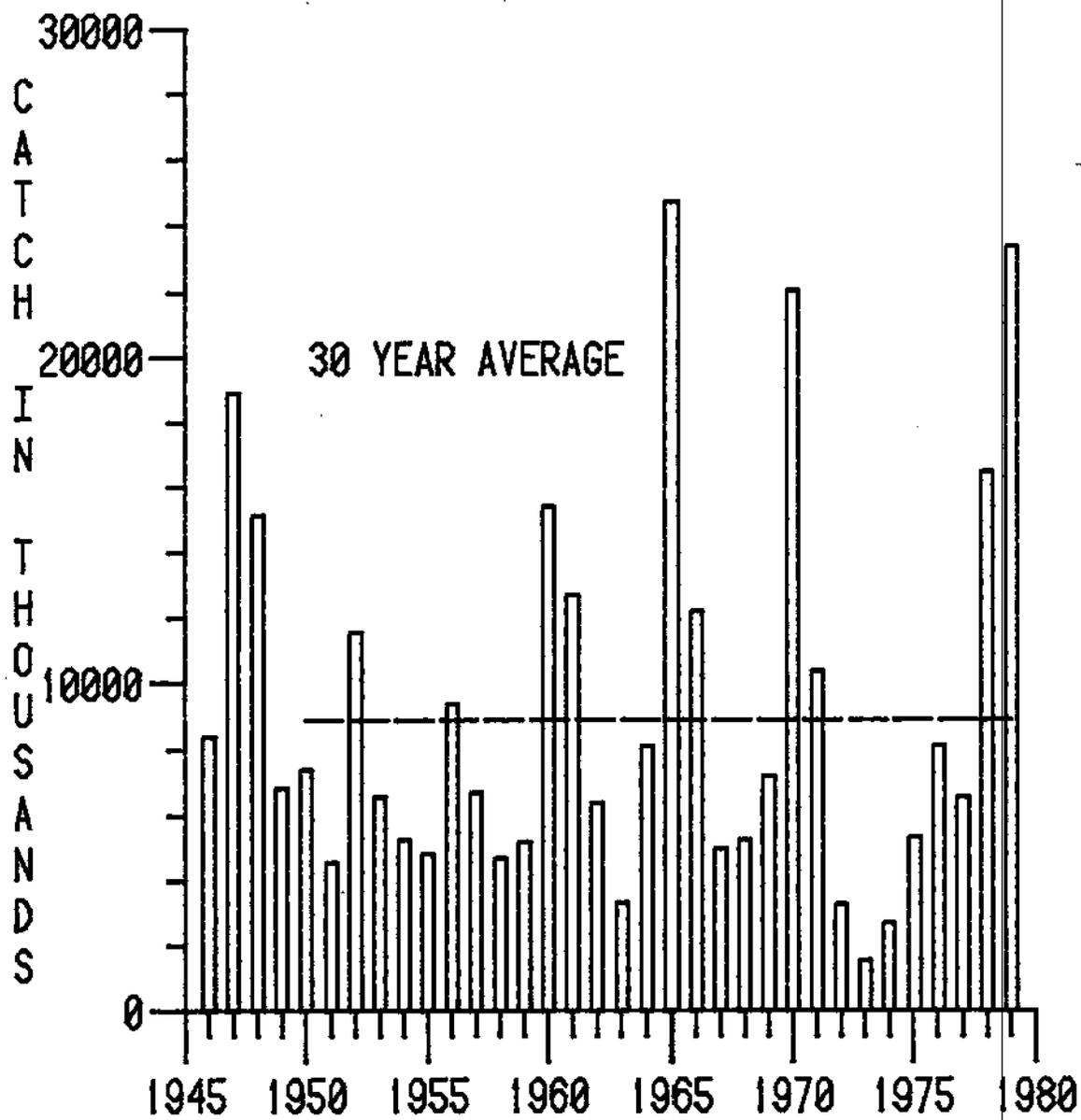
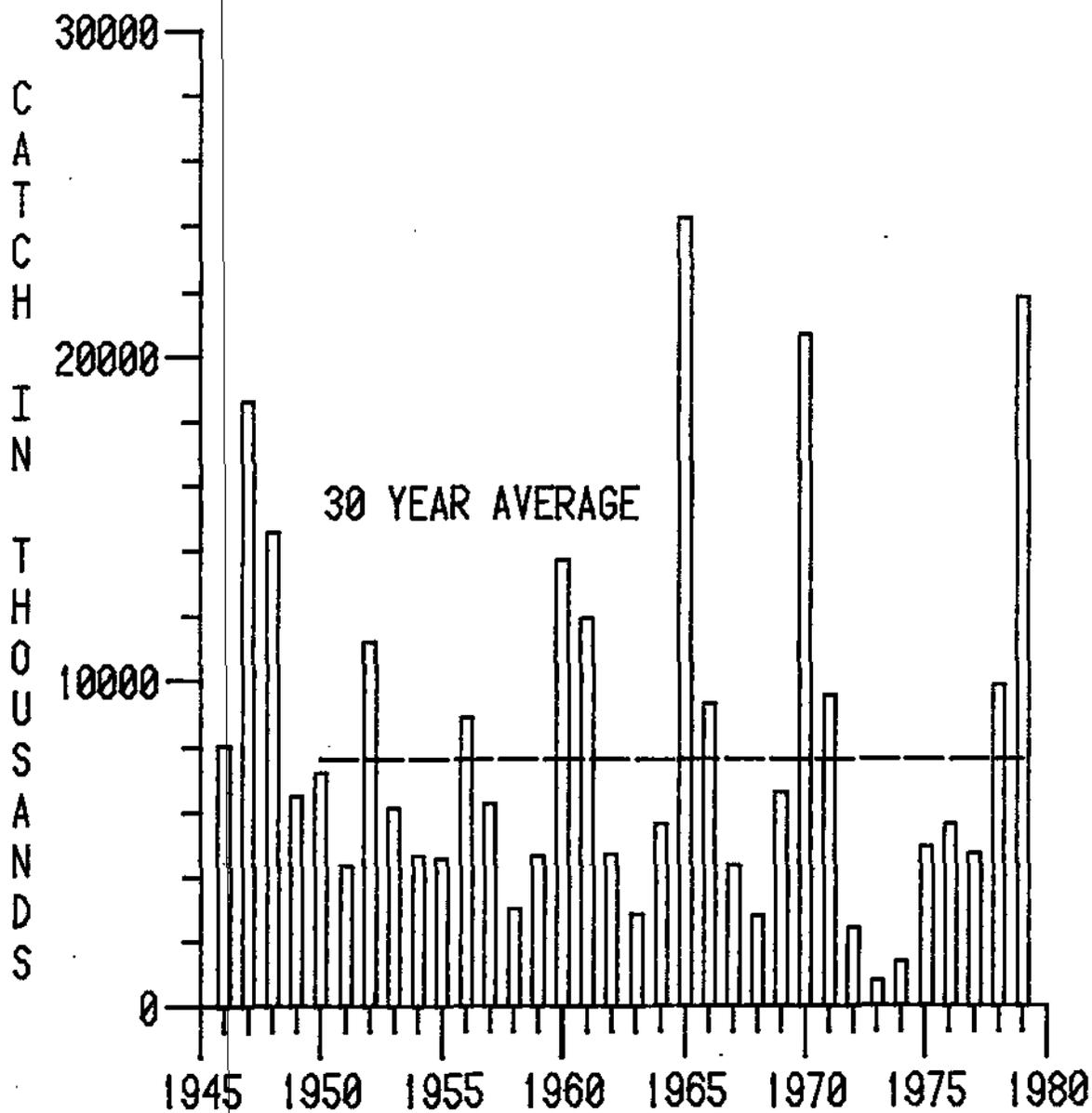


Figure 3.

### SOCKEYE SALMON CATCH BY YEAR, BRISTOL BAY



Management efforts in the salmon fishery emphasized the achievement of sockeye salmon escapement goals in all systems while allowing the harvest of those fish excess to escapement requirements. In the Nushagak district where a large run of king salmon occurs, early season management strategies also require adjustments in fishing time whenever necessary to achieve adequate escapements of this species (Appendix A).

Continued expansion in the catch and processing capacity resulted in a record catch in the Togiak district herring sac roe fishery. The harvest of over 10,000 metric tons of herring surpassed the previous mark set a year earlier by over 3,000 m. t. Estimates of relative herring abundance based on aerial surveillance indicated a strong run of herring again this year with widespread spawning observed on important beaches throughout the district. A record harvest of 415,000 pounds of herring roe-on-kelp also occurred this season (Table 36).

#### Price Negotiations/Exvessel Value

Unresolved price negotiations between the industry and the two active fishermen associations in Bristol Bay resulted in minimal or drastically reduced catches depending on the fishing district. Western Alaska Cooperative Marketing Association (WACMA), which represent the majority of fishermen in the Nushagak and Togiak districts, settled prices in mid-June just prior to commencement of the emergency regulatory period on June 16. Fishermen on the east side of Bristol Bay, primarily in the Naknek-Kvichak and Egegik districts, are primarily represented by the Alaska Independent Fishermen's Marketing Association (AIFMA). AIFMA did not reach a settlement until June 28, and the delayed participation by most fishermen, eventually was estimated to have cost those fishermen over 3.5 million fish in lost harvest between

June 24-28. Lost harvest was highest in the Naknek-Kvichak (3.0 million fish), while lesser production loss was estimated for Egegik district (425,000 fish) and Nushagak district (90,000 fish). The exvessel value of the lost harvest due to unresolved price negotiations was estimated at \$20.8 million.

The eventual price settlement saw all-time record high prices paid for most species. The 1979 price paid for sockeye salmon also marked the first time that a canned (\$.80 per pound) - frozen (\$1.25 per pound) price differential was established.

The high sockeye salmon price coupled with an exceptionally strong sockeye run and resultant catch, plus record king and coho salmon catches, as well as one of the larger chum catches in history, produced a fishery worth \$141 million to the fishermen in 1979, six times higher than the average exvessel value.

#### Japanese High Seas Fishery

The Japanese high seas mothership fishery success on Bristol Bay salmon continues to be diminished. The recent re-negotiation of the INPFC treaty, which first went into effect for the 1978 fishing season, continues to restrict, by area and time, the movements and fishing patterns of the mothership fleet, and this curtailment in turn has drastically reduced high seas interceptions of Bristol Bay sockeye salmon.

In 1979 the Japanese high seas mothership fleet caught only 68,000 mature sockeye of Bristol Bay origin. The immature catch of Bristol Bay sockeye in the spring of 1978 amounted to 236,000, or 304,000 fish, immature and mature fish combined, and less than 1% of the total Bay sockeye run. This level of interception is well below the 20 year average of 10% and 1.9 million fish.

### South Unimak/Shumagin Fishery

The South Unimak/Shumagin Island cape intercept fisheries in June were again managed under a guideline harvest policy originally adopted in 1973 by the Alaska Board of Fisheries to prevent over harvest of sockeye runs to individual river systems in Bristol Bay.

The inseason development of the Unimak/Shumagin fishery is closely monitored by Bristol Bay fishery managers because this fishery can be helpful indications of migration timing, relative abundance, age composition, and fish size of the incoming Bristol Bay run.

There was no fishing effort in the Shumagin fishery prior to June 13 and effort was light at South Unimak prior to the June 13 price settlement. The Shumagin Islands June fishery harvested 179,000 sockeye salmon, 111,000 pinks and 41,000 chums. The fishery was terminated after June 28 due to large numbers of immature salmon being gilled in purse seines. Had it not been for the immature salmon problem, this fishery would probably have reached its June quota of 200,000 sockeye.

The South Unimak fishery was open during the entire month of June plus the first three days of July (due to stormy weather during the last week in June, although the price dispute delayed fishing prior to the June 13 settlement). The sockeye salmon catch was 683,000, well below the quota of 900,000. The purse seine fleet accounted for 482,000 sockeye, nearly all of which were taken on the west side of Unimak Bight. The chum catch was very light, totaling only 64,000 for the entire fishery.

Similar to 1978, the sockeye salmon catch at South Unimak did not indicate the exceptional run magnitude that returned to Bristol Bay. The chum salmon catches at both Unimak and Shumagins indicated a relatively weak run was in progress.

### Port Moller Test Fishery

The Department's Port Moller test boat fishery provides information on sockeye and chum salmon run timing and magnitude and age and size composition of the incoming run one week in advance of the inshore fishery.

Early year Port Moller test fishery results had substantial errors in the estimates of inshore run size. Differences between estimated and actual inshore returns can be attributed to differences in the year-to-year inshore return per test fish index point.

In 1978 a sockeye salmon gillnet catchability model using average weights of fish caught in the test fishery was developed to determine an inshore return per test fish index point used in expanding the test fishery indices into estimates of inshore return. In 1979 two catchability models based on sockeye salmon mean length were developed, one to determine inshore return per test fish index and the other to estimate total run magnitude from the size of fish caught in the test fishery, independent of CPUE data.

The forecast of sockeye salmon returns from the sum of the individual station passage rates based on daily mean weights was 19.3 million while the forecast based on accumulative mean weights and index values was 17.8 million. Both were below actual inshore returns for the comparable period of inshore run (using 7 day travel time between the test fish site and inshore systems) by 36% and 41%, respectively. The forecast of sockeye salmon returns based on the running mean length and index values was 25.8 million--only 16% in error (Table 5). The forecast of sockeye salmon total run size based on mean weight and length was 13.8 and 19.8 million, respectively, both below actual inshore returns by 66% and 51%, respectively.

The forecast of the total chum salmon run size based on the standard return of 8,730 chums per chum index point was 275,000, well below the actual return of 1.4 million (Table 6).

Peak catches in the test fishery occurred June 22, indicating an early run which was forecast to peak in the Bay on June 29, using a seven day lag time between the test fishery and the Bay. The actual peak of the run was sometime between June 28 and June 30 as forecast, approximately 4 to 5 days earlier than normal. The percent age class composition of the sockeye run was also correctly forecast by the Port Moller test fishery.

## 1979 COMMERCIAL SALMON FISHERY

### Fishing Effort

Commercial fishing effort was similar to recent high years, with 2,691 units of gear and 2,335 vessels registered to fish Bristol Bay, compared with 2,618 and 1,864 respectively in 1978 (Table 10). Of the total licensed gear units, it is estimated that only 2,137 units, or 79% actually participated in the fishery.

District registration in 1979 was similar to previous years, with Naknek-Kvichak and Nushagak districts accounting for over 76% of the total (Table 10). Registration by residency continued to show an overall resident/non-resident ratio of 2 to 1, with the usual district ratios: Naknek-Kvichak and Egegik districts with nearly equal numbers of resident and non-resident fishermen, while the remaining district fishermen were primarily residents (Table 10).

### Industry Harvest Potential

The statewide preseason processing capacity report, prepared by area for the 1978 season, was updated for the 1979 fishery (see Appendix B). In Bristol Bay the anticipated total preseason harvest projection of 14.0 million salmon (13.20 million sockeye, 0.15 million kings, 0.55 million chums and 0.10 million cohos), was well below the total estimated seasonal processing capacity of 22.6 million fish (Appendix B).

The preseason daily sustained processing capacity in February of 1979 was estimated at 1.382 million fish, while the short term processing capacity of all Bristol Bay facilities was estimated at 3.4 million fish per three day period. Just prior to the fishery, in early June of 1979, an updated daily processing capacity of all on-grounds processors, indicated a daily capacity of 1.652 million fish.

The actual daily production was under both preseason estimates: 1.169 million fish per day from June 28 - July 12.

Several factors contributed to the sudden glut of fish in Bristol Bay in 1979, and affected daily and seasonal processing schedules:

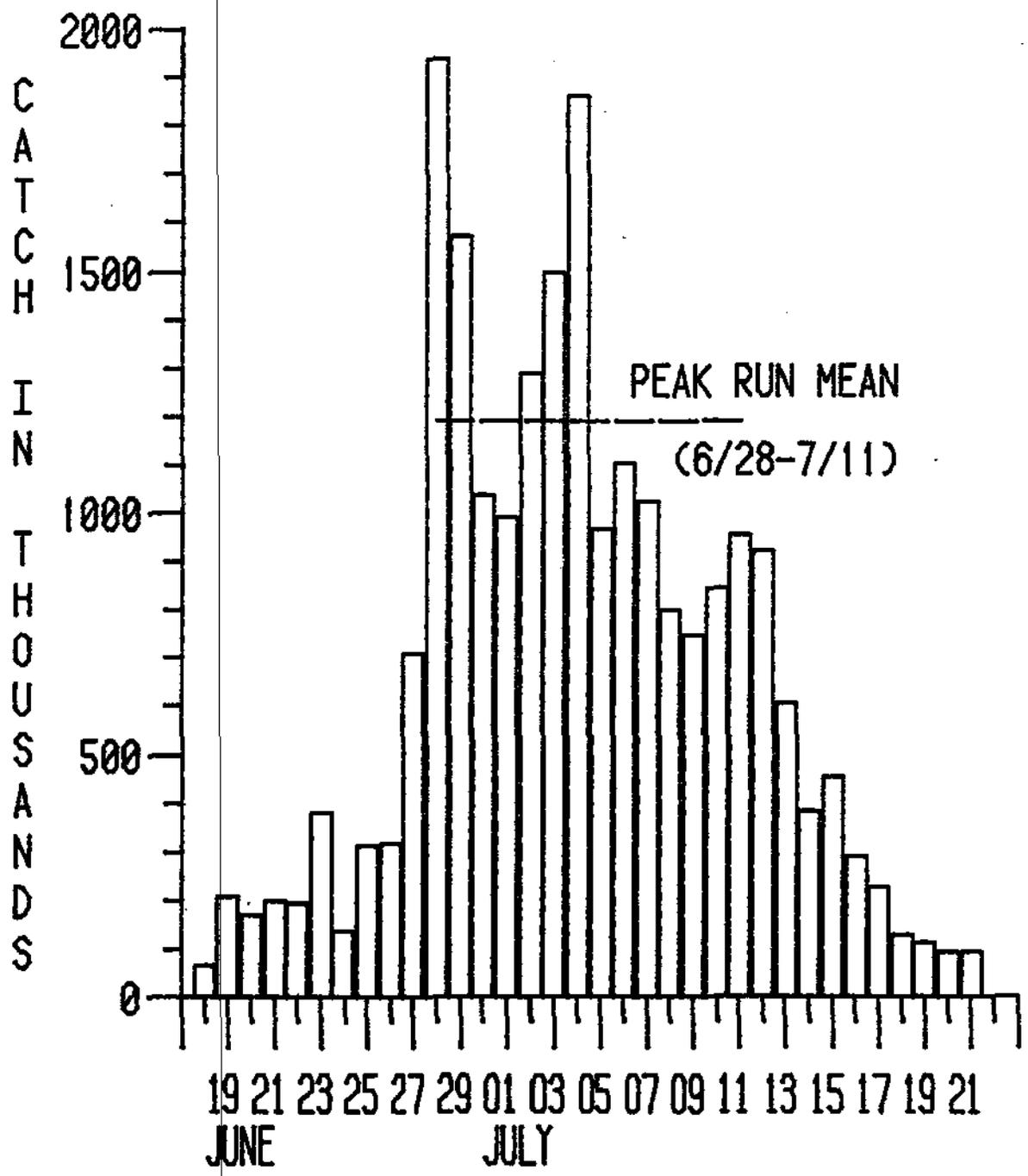
- (1) Forecast - Assuming all processors geared their operations around either the ADF&G (22.7 million) or F.R.I. (14.7 million) forecast they ultimately encountered anywhere from 18 to 26 million more sockeye salmon than they had anticipated. Since both forecasts were already above minimum escapement requirements all of these fish (about 9 million) were potentially harvestable. The preseason forecast indirectly impacted the other factors through its effects on preseason processing preparation, preseason market posture, price negotiation strategies and the Department's inseason interpretation of the run as it developed.
- (2) Price Dispute - Unresolved price negotiations resulted in minimal or drastically reduced catches in several districts until June 28 by which time the run was well in progress. Between June 24-28 there were up to 3.5 million fish lost due to the price dispute. This included 3.0 million from the Naknek-Kvichak district (6/24-400,000; 6/25-600,000; 6/26-900,000; and 6/27-1,100,000), 425,000 from Egegik (6/24-25-100,000; 6/26-150,000; 6/28-175,000) and 90,000 from the Nushagak (6/25-27).

- (3) Entry Pattern - Run timing was about 4-5 days earlier than normal and impacted the processors' ability to mobilize capacity as planned (tenders, cannery crews, air transportation, etc.). Many processors had not adequately tested crews and equipment prior to the onset of heavy catches. This factor was further exaggerated by the price dispute.
- (4) Processing Capacity - Short term and sustained processing capacity was less than anticipated due to a combination of factors. These included operational difficulties (water supply shortages, electrical generation problems, fires, mechanical breakdowns, etc.), lack of adequate preparation, shifts in operational priorities to emphasize lower volume modes of production (freezing rather than canning, canning in 1/2-lb. cans rather than talls, fresh export as opposed to local processing, etc.).

The actual average sustained daily catch of all species was almost 1.2 million during the peak period of June 28 through July 12 (from price settlement through end of waiver against foreign processing) and suggests that catches during this period were largely a function of processing capacity (Figure 4). Many companies ultimately suspended buying for various periods to allow them to catch up. Losses due to suspensions were estimated at about 740,000 fish in the Nushagak district along with an additional 50,000 due to purposeful restraint by processors in that area. No comparable estimate was made for any other district, but it's apparent that if the fleet could have fished unimpeded and processing was at indicated capacity, they might have handled the available surplus.

Figure 4.

### TOTAL SALMON CATCH BY DATE, BRISTOL BAY, 1979 ALL SPECIES



- (5) Inseason Management - Inability of the Department to accurately detect the size of the run early in the season resulted in a loss of early season catch opportunities in most districts. Although the Department correctly forecasted earlier than normal run timing the misinterpretation of the overall magnitude of the run led to overly conservative management of the run early in the season. The effects of inseason management is difficult to measure since additional fishing time in all districts would have resulted in larger harvests, but would have exaggerated the already strained processing capacity. The gains may have only been minimal since the price dispute was also in effect during some of these regulatory closures. A straight interpolation for closed periods suggests that prior to July 2 continuous fishing could possibly have netted an additional 1.1 million fish (Naknek-Kvichak - 200,000; Egegik - 150,000; Ugashik - 300,000; Nushagak - 400,000; Togiak - 80,000).

#### Salmon Market Production

Twelve companies operating 37 canning lines (Table 29) totaled a salmon case pack in 1979 of over 727,000 cases (48-1 lb. talls) compared with the long-term average case pack for all species of 596,000 (Table 30).

In 1979, about 3.0 million salmon were transported out of Bristol Bay by 11 companies for processing in other areas (Table 31). These salmon exports would be equal to over 237,000 cases of salmon provided all were canned.

Production levels of fresh, frozen and cured salmon continued to increase in 1979 as market conditions improved in this area. Although there was an impressive increase in the fresh export capacity, the most important change in processing was provided by an assortment of large freezer ships that either augmented the capacity of established shore based plants or were part of a large number of new buyers operating for the first time. Over 46.7 million

pounds of salmon, the highest since adequate records were first maintained in 1960, and over four times the previous largest production of 11.4 million pounds in 1978, were produced in 1979 as demands for frozen and cured products continued to increase (Table 30). Fresh export (those fish exported from Bristol Bay by air transportation) continued to increase dramatically in 1979 with 26.6 million pounds flown out directed to fresh markets or for further processing, compared with 10.0 million pounds in 1978, the previous high (Table 31).

### Sockeye Salmon

The total sockeye salmon return in 1979 of 40.4 million fish was almost triple the average historic level for comparable years in the current five year cycle.

A majority of the run consisted of returns from the 1974 brood year (67%) along with lesser numbers from 1975 (28%) and 1973 (5%) (Table 3). Large escapements in 1974 (9.6 million) and 1975 (19.3 million) coupled with above average survival conditions during the intervening years resulted in exceptional numbers of both four and five year old returns to the Kvichak River. These two brood years included the peak magnitude escapement in 1975 (13.1 million) and a large escapement in 1974 (4.4 million) mandated by a newly adopted escapement plan for this system. This plan requires increased escapements into Kvichak River during the year immediately preceding the peak (starting in 1969) with the objective of spreading sockeye production over several years in the system's five year cycle.

Since the harvest was not expected to be evenly distributed amongst the Bay's five fishing districts, the management outlook for fishing time varied by district. Based on the forecasted surplus and demonstrated strength in the fishery, frequent early fishing was permitted in most of the major districts.

As the escapements began to build, intermittent fishing continued where run strength and indicated escapement trends were developing at or above a normal rate. Indications from early season catches along with offshore and inshore test fishing, aerial surveys and escapement counts generally pointed to a run that was earlier than normal, above forecasted strength or some combination of the two.

Information on the timing, magnitude and age composition of the run is normally available a week in advance of the inshore fishery from test fishing conducted offshore from Port Moller. Adverse weather during late June hampered offshore fishing operations and prevented continuous sampling of the peak of the run as it migrated past this area and converged on the inshore districts. As it eventually turned out the peak day of sampling at Port Moller occurred on June 22 which was several days earlier than normal.

Despite the increased production capacity that was mobilized this season the large run that ultimately materialized quickly exceeded the available capacity for over two weeks during the peak of the run. Heavy catches throughout the Bay starting in late June forced many processors to suspend buying for various periods or to impose daily catch restrictions on their fishermen. Fish buying was suspended or restricted in some form or another for 20 consecutive days from June 28 until July 17. By July 5 it was not only evident that the run had already exceeded preseason expectations, but that also there was no immediate end in sight to frequent and lengthy suspensions by processors. As a result, a limited waiver of the prohibition against the buying and processing of fish by foreigners was granted after July 6 in the Naknek-Kvichak, Egegik and Nushagak districts. The associated bays were designated as constructive ports and the limited exception in the waiver permitted foreigners to purchase, process and transport sockeye salmon from these districts under the conditions

of a permit. As it turned out, only one permit was processed on July 6 allowing a Canadian vessel to tender fish out of the Egegik district. This waiver was finally rescinded on July 10 in the Nushagak district followed by the remaining two districts on July 11 (Table 11.) By this time the lengthy suspensions and strict catch limits were on the decline and the processing capacity was beginning to more closely match the catch capacity of the fleet.

A general overview of the sockeye fishery is difficult since the run entry pattern and management requirements differ amongst the various districts. Some of the more important developments and management considerations that highlighted the fishery this season can be summarized as follows:

- (1) The total sockeye run exceeded expectations by almost 18 million fish.
- (2) Unresolved price disputes resulted in minimal or drastically reduced catches in several districts until June 28 by which time the run was well in progress.
- (3) Processing capacity was exceeded during the peak of the run and resulted in frequent suspensions and limitations of buying by processors, and prompted a five day long waiver of restrictions against foreign processing. Some instances of wastage of fish that could not be delivered or processed were also observed.
- (4) Run timing was up to several days earlier than normal in some systems and tended to exaggerate the impact of the prolonged price dispute, which hampered the Department's efforts to assess run strength and more quickly strained processing capacity.
- (5) Rapid migration of fish through the fishery was pronounced this season. In some instances the fish spent only half the time they normally do passing through the fishery and ascending the rivers.

- (6) Continuous fishing in the Naknek-Kvichak resulted in a drastic decline in the escapement rate of the relatively less abundant Naknek River stocks and necessitated a 25 hour midseason closure of the Naknek section until the trend reversed. The normal 48 hour waiting period for relocation of set nets out of the Naknek section was waived during this unpopular closure.
- (7) The inability of the Department to accurately determine the magnitude of the run prior to the peak resulted in some loss of early season catch opportunities in most districts.

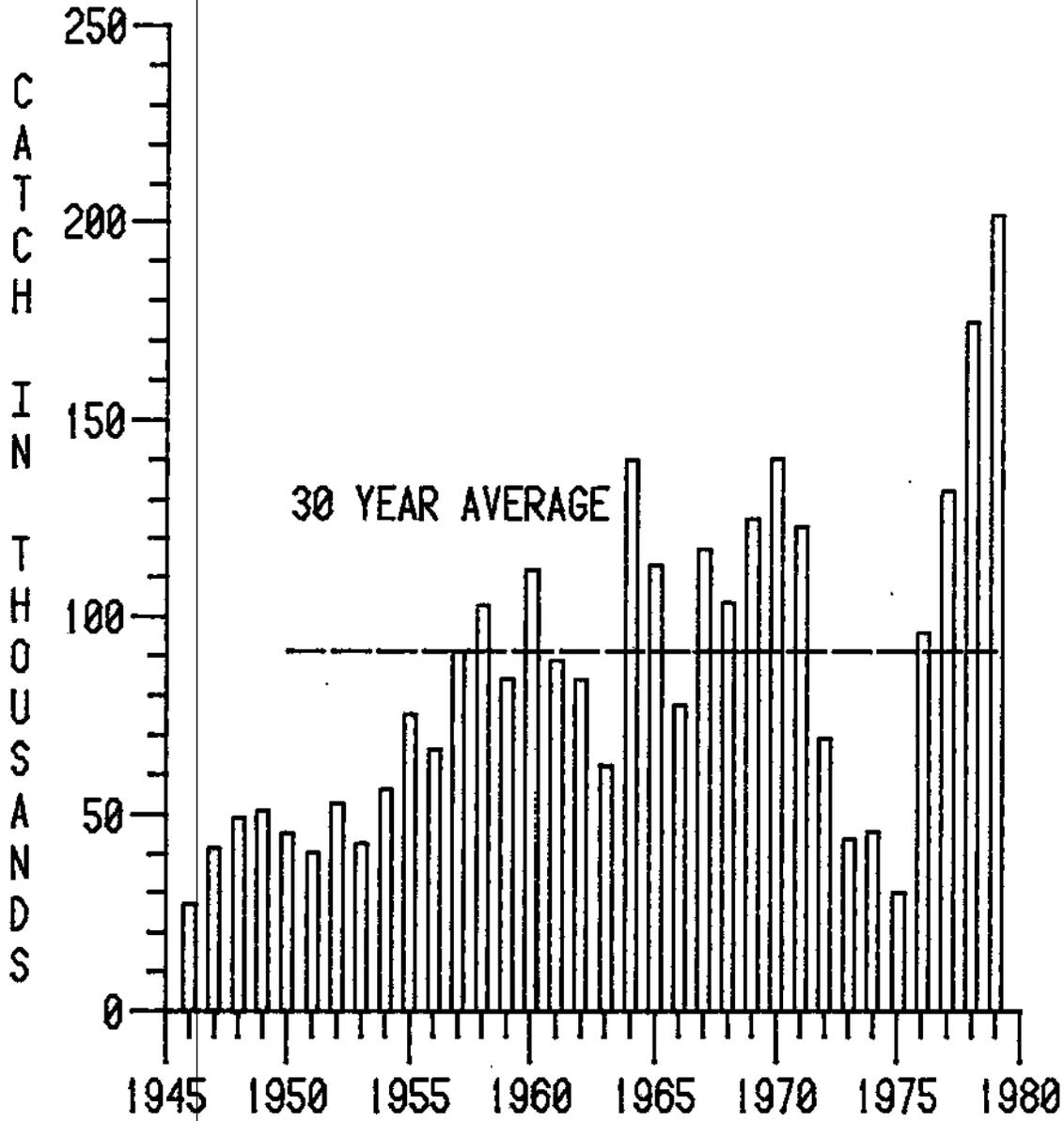
### King Salmon

The king salmon run to Bristol Bay in 1979 was exceptionally strong and sustains a four year trend of steadily increasing catches of this species (Figure 5). The commercial harvest of 202,000 was equal to a historic record harvest held since 1919 and is well above the 20 year average catch of 90,000. The Nushagak district produced over 77% of the king harvest and continues to dominate the production of this species. The estimated escapement of 95,000 kings to major Nushagak streams was also above average. It is also of particular interest that small "jack kings" comprised a significant portion of this year's run and suggests the probability of a continuation of strong king runs next year. Past experience has shown that large numbers of these younger mature males often precede years with large king returns.

Early season fishing effort directed toward king stocks was noticeably higher than previous levels. Additional effort is due to a combination of increased markets for fresh and frozen king salmon, higher prices, larger runs of this species in recent years and earlier arrival of fishermen participating in the rapidly developing Togiak herring fishery. Many fishermen are extending their season to include the herring, king and sockeye fisheries with some staying even longer into the fall coho fishery.

Figure 5.

### KING SALMON CATCH BY YEAR, BRISTOL BAY



### Chum Salmon

The area chum salmon harvest of 930,000 fish far exceeded the long term average and was the sixth largest catch ever made (Figure 6). The Nushagak district accounted for almost 52% of the total harvest (Table 9). The chum catch from the Togiak district of 222,000 was one of the largest in recent years although down from record levels set in 1977 and 1978, 271,000 and 275,000, respectively.

Escapement estimates for chum salmon are made only in the Nushagak and Togiak districts where over 70% of the Bristol Bay harvest of this species occurs. Escapements were about average in Nushagak streams with an estimated escapement of 166,000 fish while the escapements in Togiak were strong with 293,000 fish estimated for all major spawning areas.

### Pink Salmon

Bristol Bay produces insignificant runs of this species during odd years and 1979 was no exception with a total commercial harvest of less than 3,000 fish (Table 19). A majority of these fish were caught in the Togiak district and were taken incidental to the harvests of the other species.

### Coho Salmon

The commercial coho harvest of 300,000 fish for all districts combined was the largest in the history of the fishery, with the previous record catch of 293,000 occurring in 1916 (Figure 7). The Nushagak and Togiak districts accounted for 86% of the area wide harvest and was highlighted by a catch in the Togiak district of 124,000, which was almost triple the previous record of 45,000 reported in 1977. A sharp increase in coho harvests in recent years has been attributed to higher late season fishing effort and processing capacity; however, the run of this species was strong in all systems this season and escapements throughout the area appeared to also be large.

Figure 6.

### CHUM SALMON CATCH BY YEAR, BRISTOL BAY

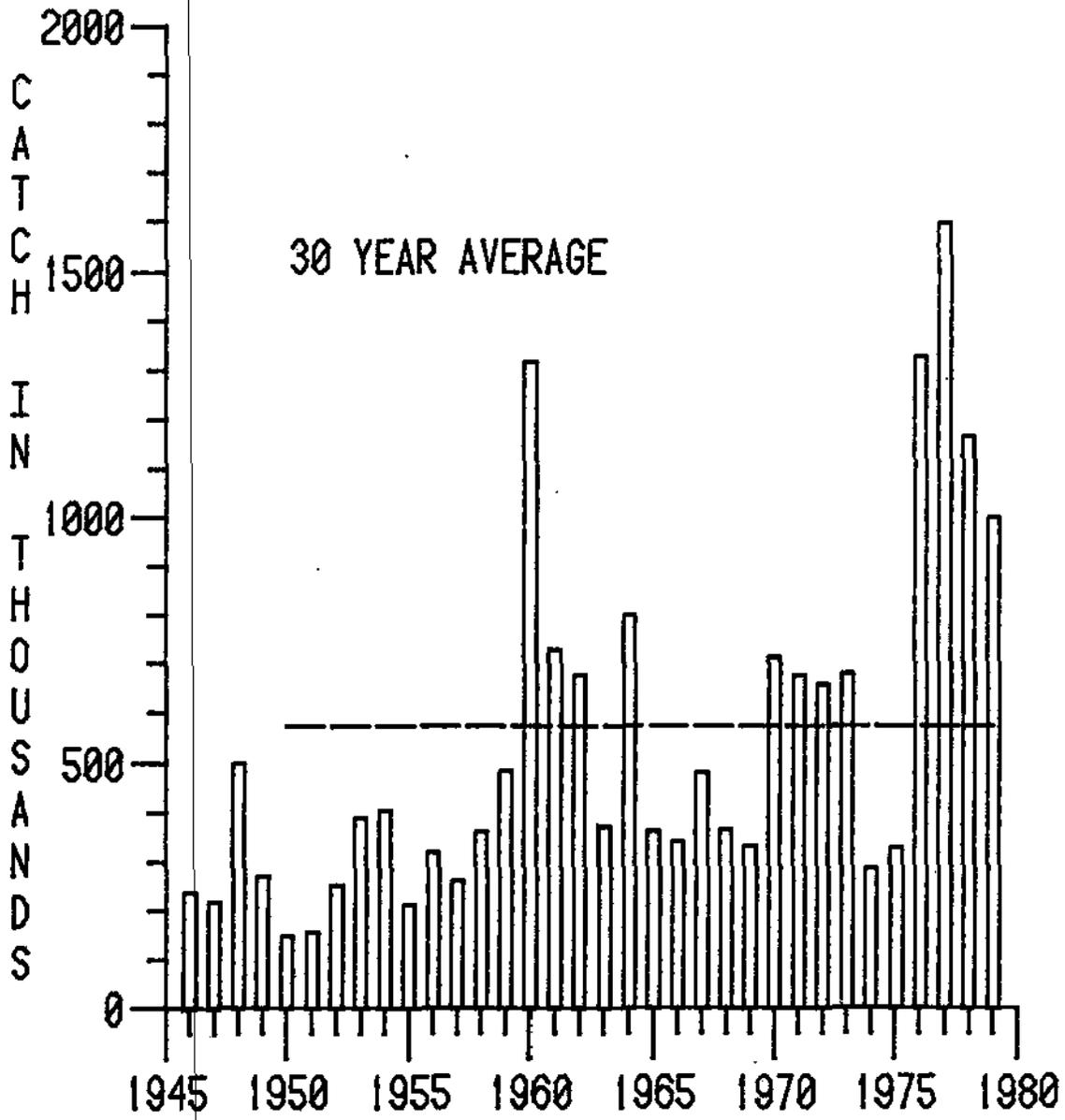
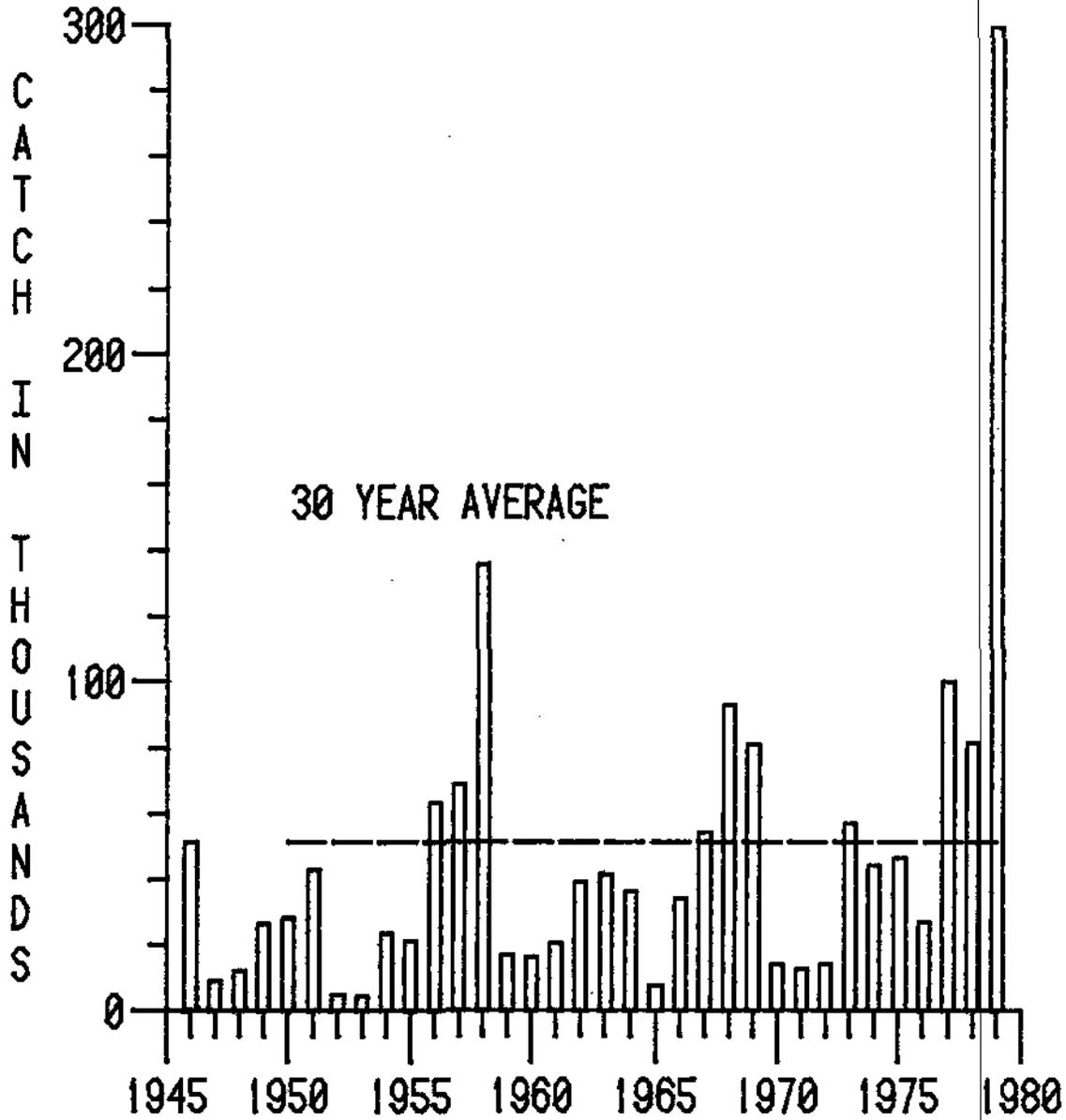
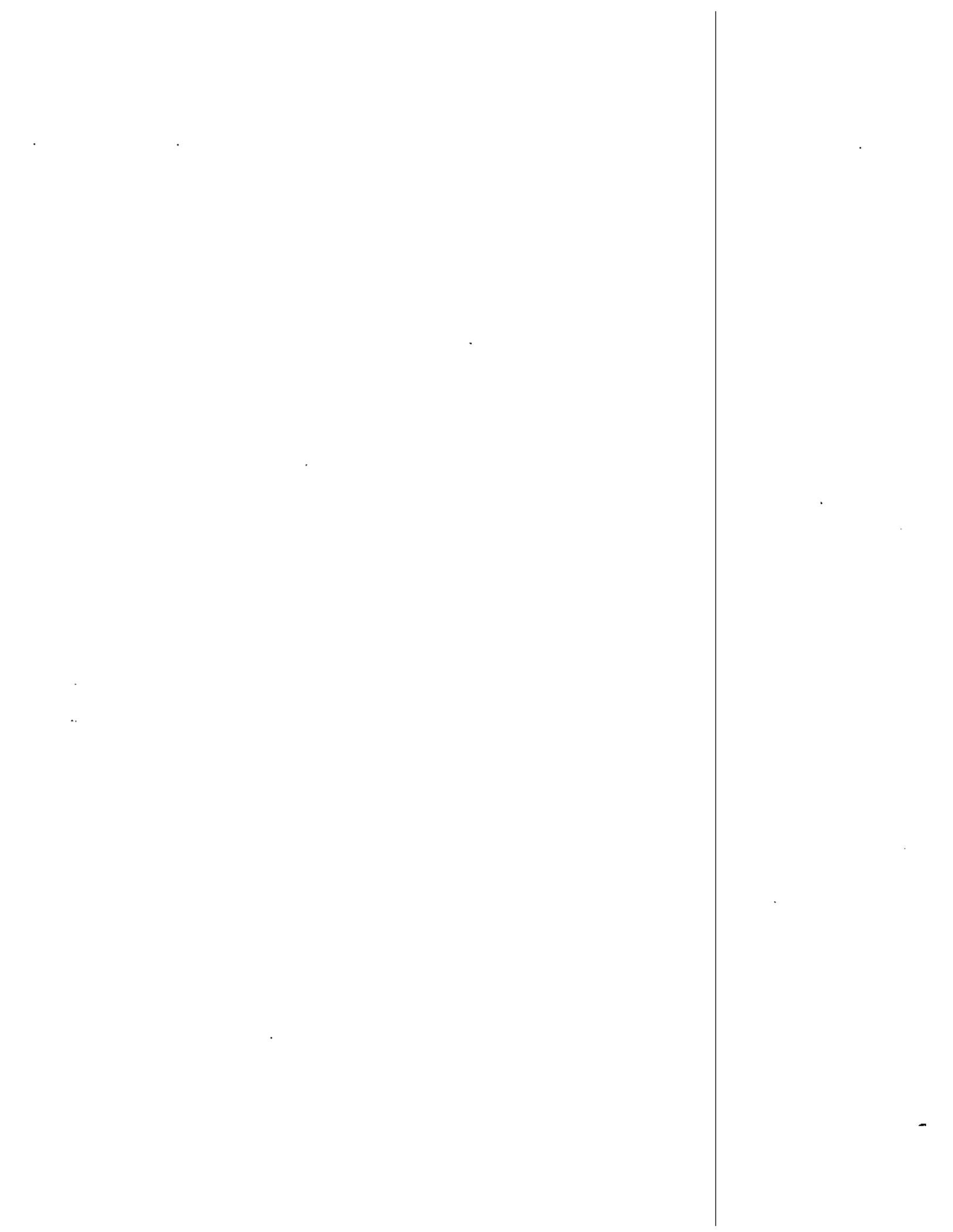


Figure 7.

### COHO SALMON CATCH BY YEAR, BRISTOL BAY



The orderly conduct of the coho fishery was disrupted this season when numerous public complaints of illegal closed area fishing were reported from the Togiak district. This has been a recurring problem here for over ten years and culminated in an apparent wholesale disregard of the upriver closure by a large number of local fishermen. Law enforcement coverage has been, and still remains, inadequate to handle the situation. Fortunately the coho run was strong this year and escapements were adequate however, some fish quality problems were reported by local buyers. The situation resolved itself in 1979 after local buyers terminated operations for the season. If this situation is allowed to continue uncontrolled in the future, and coincides with a weak coho run, the risk of overharvest exists.



## 1979 DISTRICT MANAGEMENT SUMMARIES

Naknek-Kvichak District

The pre-season outlook indicated the largest (14.7 million) non-peak run of sockeye salmon to this district since total run estimates were first available in 1956. The combined runs to this district's three major river systems were expected to produce about 7.7 million sockeye surplus to escapement requirements and would have been the second largest non-peak year harvest since 1948. This projected harvest amounted to over 58% of the entire sockeye harvest in Bristol Bay (Table 1). Kvichak River stocks were expected to dominate the run with the Naknek and Branch systems comprising only about 16% of the district total. Sockeye runs to this district exhibit wide fluctuations due to the cyclic production pattern of the Kvichak River which in recent years has been characterized by a single large peak year every five years. The 1979 run was a non-peak production year in the cycle, however a larger than average return to Kvichak was anticipated and is the result of a 10 year old change in the escapement management plan for this system. This plan requires increased escapements in the Kvichak River during the year immediately preceding the peak year with the objective of spreading production over several years in the cycle. The 1979 escapement goal for Kvichak River was increased to 6.0 million fish in accordance with the intentions of continuing this plan into the next cycle (Table 1).

Commercial harvests of all five species of salmon from this district have averaged about 3.2 million fish for non-peak years during the last two decades. Catches of salmon other than sockeye normally comprise a minor portion (5%) of the total in this district.

Early season fishing effort was higher than average and considerably above levels observed in recent years. A pre-season canvass of available fishing effort in this district indicated a minimum of 700 units of drift gear

and 190 units of set gear would participate this season. Some fishermen indicated their intentions to fish for king salmon and/or early season sockeye openings in the Nushagak and Egegik districts through the last week of June. Actual peak effort of 800 units of drift gear was observed on June 30 while a peak number of set nets wasn't on hand until July 2 (Table 12). The peak set net effort is difficult to determine inseason because of the number of fishermen who divide their legal unit of gear into two separate nets, however, there were probably over 200 individual units on hand near the peak. A peak count of 244 individual nets was made on July 2 (Table 12).

Unresolved price disputes between fishermen and major processors ultimately delayed participation by most fishermen until June 28. A provision in last year's AIFMA contract permitted fishing until the start of the regulatory period on June 23, and early season effort increased steadily until about 550 drift units and 100 set nets were actively fishing prior to this date (Table 12).

Available processing capacity was up from the previous season. Individual buyers numbered 45 in this district alone and included not only the established shore based canneries, but also a large number of floating processors and shore based fresh fish processors and exporters (Table 29). Only minor additional canning capacity was available, however a sizeable freezing facility was installed at the Nelbro Packing Company plant this season along with an enlargement of the existing freezing facility at New England's Pederson Point plant. A new freezer plant was also under construction at Bumble Bee Seafoods and an expansion of freezing capacity at the Red Salmon Company plant was underway, but neither were available for production this season. An expansion in the available airlift export capacity was also evident this season through either the diversification of existing shore based operations or through the efforts of a number of new buyers who have established themselves in the area (Table 29). As a result, a larger portion of the catch was airlifted out of the

area this season for processing elsewhere. Although there was an impressive increase in the fresh export capacity the most dramatic change in processing was provided by an assortment of large freezer ships that either furnished supplemental capacity for established shore based plants or were part of a large number of new buyers operating here for the first time. Companies with new or expanded shore based plants included Alaska Far East, Queen Fisheries, Salamatof Seafoods and Northern Peninsula Fisheries with still others making plans for future construction of permanent facilities. In addition to production through local canning, freezing, salting and fresh airlift export of fish, there were also a large number of fish transported outside of the district and canned or frozen at plants in the Nushagak district or hauled aboard brine tenders to canneries or freezers outside of Bristol Bay (Table 31).

Despite the increased production capacity that was mobilized this season the large run that ultimately materialized quickly exceeded the available capacity and resulted in frequent and prolonged catch restrictions being imposed on most fishermen for up to two weeks during the peak of the run. Additional discussion on the impact of limited processing capacity is included within the text that follows.

Fishermen managed a catch of 756,000 sockeye salmon during the full week of fishing prior to the start of the regulatory period on June 23 (Table 12). Fishing effort, catches and CPUE increased steadily throughout this week, however no indication of the eventual magnitude of the run was apparent by this date. Sockeye catches with only a moderate amount of effort were above average with almost 10% of the total projected season harvest already accounted for by the regulatory closure of the fishery on June 23.

Inside test fishing and aerial surveys of Kvichak River revealed only insignificant sockeye escapement into the river above the fishery during the same period (Table 23).

Test fishing offshore from Port Moller began on June 6 but indices fluctuated and remained at a low level until June 12 when catches increased sharply (Table 5). With the exception of two days, weather conditions permitted reasonably continuous fishing until June 16 when a stretch of inclement weather interrupted regular fishing for over four days. When fishing resumed here on June 21 indices were high and remained so for the next two days until a three day storm again precluded regular fishing (Table 5). The run entry pattern and magnitude looked encouraging and by the start of the regulatory period, inseason test fishing at Port Moller indicated almost 12 million fish had already passed that area and suggested an inshore run near that forecast. As it eventually turned out, the peak day of sampling at Port Moller occurred on June 22 which is several days earlier than normal.

In light of the preseason forecast, the generally favorable inshore catch and offshore test fishing trends that existed at that time, a 24 hour fishing period was announced for the entire district for June 24-25 (Table 11). Most fishermen remained on the beach due to the price dispute and less than 25 dirft units and 115 set units fished this opening. The total sockeye catch for the first half of the period on June 24 was approximately 80,000 fish and CPUE was very high for those few fishermen participating. Catches by all set nets along the west side of the Kvichak section were heavy and were equally strong in nets extending from Libbyville to Graveyard on the east side of the district. A survey of the district on the following day indicated the same trend.

The fish continued to move into the lower reaches of the rivers as quickly as they appeared in the fishing district. Inside test fishing indices on the Kvichak River increased dramatically on June 24 and continued the following day with the largest index for the season being reported on that date (Table 23).

The fish moved rapidly up the rivers and escapements above the counting stations picked up rapidly beginning on June 24 on Naknek River and in Kvichak River on the following day (Table 20). An aerial survey of Kvichak River on June 25 confirmed a large number of fish were continuing to escape the fishery. Over 2.7 million fish were estimated to be in the river below the counting station at Igiugig by that time (Table 23).

The situation remained virtually unchanged for the next three days. With only minimal fishing effort due to the price dispute, high CPUE in the district and rapidly escalating escapements in the rivers, fishing time was extended four times to permit the harvest of surplus fish (Table 11). Test fishing on Kvichak River and daily surveys below the counting towers indicated continued large sockeye escapements above the fishing district (Table 23).

The price dispute between fishermen and buyers remained unresolved until the afternoon of June 28, and while fishing time was extended repeatedly after June 24, very few fishermen participated. CPUE continued high during this time and by the afternoon of June 28 the total sockeye harvest stood at about 1.2 million (Table 12). By June 28 over 46% of the escapement goal had been accounted for on Kvichak River, while 61% of the goal had been secured on Naknek River (Table 20). An aerial survey of Kvichak River on the same day (June 28) revealed an additional 3.3 million fish remained in the river below the counting station (Table 23). With the lower end of the escapement management range assured on the Kvichak, and above normal escapement on the Naknek, a decision was made to extend fishing time in the district until further notice after 2 p.m. on June 28 (Table 11). The extension coincided with the official 3 p.m. settlement of price disputes on the same day, and while many were already fishing before this time, the entire fleet was finally participating by late afternoon. Catches were heavy throughout the district and the daily catch

for June 28 was estimated at over 1.3 million sockeye salmon and quickly advanced the season catch to over 2.5 million fish (Table 12).

CPUE remained about the same the following day but the large harvest quickly taxed the holding and processing capacity of most buyers. By June 29 two major companies announced they had suspended buying any additional fish until they could process the fish they were holding. By June 30 all but two major processors were forced to terminate buying for at least some period of time because of limited processing capacity.

Indications of fish moving offshore from Port Moller showed a declining trend there following a peak on June 22 (Table 5). Windy weather and rough seas continued to hamper operations, but intermittent fishing through the termination of the program on June 29 suggested an earlier than normal peak in run timing (Table 5). Commercial sockeye catches and escapement counts were far ahead of expectations and normal timing for this date. Mild spring conditions and warmer water temperatures also suggested the possibility of earlier than normal run timing. By June 30 the accumulative sockeye harvest in the Naknek-Kvichak district was 4.7 million and was already 61% of the total preseason projected harvest (Table 12).

Within 24 hours of the time the entire fleet resumed fishing on June 28, escapement counts on Naknek River began a rapid decline which continued through June 30 when the daily count dropped to less than 15,000 (Table 20). With continuous fishing in the district the proportionately less abundant Naknek sockeye stocks were unable to withstand this rate of interception. Only 69% of the desired escapement had been attained by that time, and when coupled with the possibility of earlier than normal run timing, the situation prompted a closure of the Naknek section pending a reversal of the escapement trend in this river (Table 11). Since Naknek section was to remain closed for an

indefinite period, the customary 48 hour waiting period for relocation of set nets was waived for set net fishermen wishing to transfer to an alternate site in the Kvichak section (Table 11).

The escapement trend on Naknek River showed an immediate benefit of the closure and the daily escapement count on July 1 increased to over 55,000 followed by an additional 89,000 on July 2 (Table 20). Based on the encouraging escapement trend, the Naknek section was reopened for a 12 hour test period to assess the duration of this improving trend (Table 11). Since the escapements continued to escalate and it was apparent that the lower end of the escapement range of 700,000 was attainable by the end of the day, the Naknek section was extended until further notice after 3 p.m. on July 2 (Table 11). The entire district remained open after this time until the resumption of the regular five day-per-week fishing schedule after July 17. All told, the Kvichak section had been open to uninterrupted fishing for almost 27 consecutive days between June 24 and July 21.

The total season harvest amounted to 15.4 million sockeye salmon from this district alone (Table 4). The large harvest was achieved despite the delayed start of the fishery due to the price dispute and the severe and lengthy restrictions placed on fishermen because of limited processing capacity. Fish buying was suspended or limited in some form or another for 19 consecutive days after June 29 and continued until the last restriction was lifted on July 17. By July 6 it was not only evident that the run had already exceeded preseason expectations, but also that there was no immediate end in sight to the frequent and lengthy suspensions by local processors. As a result, a limited waiver of the restriction against buying and processing of fish by foreigners was granted starting on July 6 (Table 11). This limited exception permitted foreign processors to purchase, process and transport sockeye salmon from the Naknek-Kvichak district under the conditions of a special permit. Kvichak Bay was

also designated as a constructive port to provide a local purchase and processing point for foreign vessels. This special waiver remained in effect for five days until it was rescinded on July 11 (Table 11). By this time the lengthy suspensions and strict fishing limits that had prompted the waiver were on the decline and the processing capacity was beginning to more closely match the catch capacity of the fleet. During the 13 day period from June 28 until the waiver against foreign processing was rescinded, the average daily harvest from the district was about 900,000 fish (Table 18). As it turned out, no applications for foreign buying or processing were received in the Naknek-Kvichak, however a permit was processed on July 6 allowing a vessel owned by a Canadian company to receive fish from a domestic tender in Egegik loaded with sockeye salmon from that district.

The season harvest of 15.4 million sockeye salmon was almost double the preseason forecast and is the largest non-peak year harvest since 1938 (Table 1). The total run to the Naknek-Kvichak district was 27.9 million and is the third largest run since complete catch and escapement records became available in 1956 (Table 4). It actually surpassed three of the five peak years during the same period and was exceeded only by the large peak year runs in 1965 and 1970.

The Kvichak River escapement of 11.2 million was five million above the midpoint of the escapement goal and is the largest non-peak year escapement since accurate escapement records first became available in the mid-1950's.

The escapement of 925,000 in Naknek River was just above the upper end of the management escapement range of 900,000 for this system (Table 4). Management of these stocks was complicated again this season by the interception of Naknek River fish during uninterrupted fishing on the more numerous Kvichak River stocks. As Naknek River escapement lagged for a short period during the

peak of the fishery the Naknek section was closed for a short time in order to bolster the escapement. The closure of Naknek section simultaneous with the Kvichak opening was criticized by some set net fishermen on Naknek beaches but was deemed necessary at that time in order to reverse a rapid decline in the Naknek River escapement.

The orderly management and harvest of the run this season was complicated by a combination of factors including earlier than normal run timing, the delayed settlement of the price dispute between fishermen and processors, a larger than forecasted run, limited processing capacity and the rapid movement of fish through the fishery and into the rivers. The early arrival and rapid migration of fish through the fishery shifted and exaggerated the normally short duration and intensity of this fishery. Inclement weather normally disrupts fishing for varying periods during most years, but with the exception of a prevailing northwesterly wind, a generally moderate and stable weather pattern prevailed this season and didn't interfere with fishing.

Age composition of the sockeye run this season to Naknek-Kvichak district was dominated by five year old fish (67%) from Kvichak River (Table 3). These exceptional returns are due to the combined results of larger than usual brood year escapements at this stage of the Kvichak cycle and improved survival conditions during the past few years. Beginning in 1969 the escapement goal for the brood year immediately preceding the peak year was increased from 2.0 to 6.0 million fish in an effort to spread out the production more evenly over the five year Kvichak cycle. Extremely severe climatic conditions during the early 1970's reduced the returns from the larger escapement in 1969. A similar escapement management strategy was adopted in the next cycle and a 4.4 million sockeye escapement was secured in Kvichak River in 1974. The exceptional returns of five year old fish this season were in addition to 5.7 million four year

old fish that returned in 1978 from the same brood year and lends further support to this change in escapement management philosophy for the Kvichak system.

The combined harvests of the other species of salmon amounted to 186,000 fish (Table 19). This compares with a 20 year average harvest (1959-78) of 152,000 fish for king, chum and coho salmon only since no pink run occurs during odd numbered years and the harvest of this species in 1979 was minimal. This season's harvest of the other species was dominated by a catch of 178,000 chum salmon (Table 19). A larger than normal coho run also occurred, but late season fishing effort and processing capacity was minimal on this species and even though the catch was above average, it was not indicative of the strength of the run. The season catch of cohos totaled 3,400 compared to a long term average of about 1,800. This years catch of king salmon of 4,100 fell short of the long term average of 8,200 for this species.

#### Egegik District

The 1979 preseason forecast for the Egegik district was 2.2 million sockeye salmon, consisting of an estimated harvest of 1.6 million after escapement requirements of 600,000 were met (Table 1). The actual run to the district was 3.3 million with an escapement of 1.0 million and harvest of 2.3 million (Table 4).

Peak fishing effort occurred just before the emergency regulatory period when 169 drift and 153 set units were participating in the fishery (Table 13). Peak effort during the emergency regulatory period occurred during the June 29-30 fishing period when 136 drift and 154 set units were in operation (Table 13).

The commercial sockeye catch in the Egegik district prior to the emergency regulatory period on June 23 was 236,000, 15% of the total anticipated harvest

and one of the largest early season catches recorded since 1962 (Table 13). Aerial surveys of the Egegik lagoon indicated over 9,000 fish in the lagoon and tower counts were 12,000 through June 21 (Table 24). A 24 hour period for June 24 was announced based on indications of a strong and/or early run from the Port Moller test program, an escapement of over 17,000 past the counting tower, inside test fish indices which began climbing on June 23 and a forecasted harvest of 1.6 million fish (Table 24). The fishing effort during this period was reduced to 50 drift and 153 set units due to an unresolved price dispute between processors and fishermen (Table 13). The commercial catch for the June 24-25 period was 119,000 sockeye, bringing the total catch thus far to 354,000, or 23% of the forecasted harvest (Table 13).

An aerial survey of Egegik lagoon on the afternoon of June 25 revealed 15,000 sockeye in the lagoon and a fair showing of fish in the river below the lagoon, while the escapement past the Egegik counting station at the time of the aerial survey was over 35,000 (Table 24). With at least 8% of the escapement goal assured at this time (less than 1% is average), the Port Moller test fishery still showing strong catches, and the Egegik River inside test fish indices increasing, a 12 hour fishing period for June 26 was announced (Table 11).

Effects of the price dispute were still in evidence for the June 26 fishing period as only 69 units of drift gear fished, and set net units remained at 153 (Table 13). The sockeye catch for this 12 hour period was 140,000, bringing the total accumulative catch to 494,000 (Table 13). The escapement past the Egegik tower through June 26 was over 58,000 with another 18,000 fish in the lagoon (Table 24). By June 27, over 244,000 sockeye were estimated to have passed the inside test fish site, and with this strong early escapement, another 12 hour period was announced for June 28 (Table 11).

A price settlement still had not occurred and the drift net effort was still minimal. The June 28 period catch of 151,000 was about equal to the previous period indicating about the same strength in the district for the past three days. The total district accumulative catch had now risen to over 645,000 fish (Table 13).

The continued sockeye run strength in the commercial district, an escapement past the Egegik counting station through 3:00 p.m. on June 28 of 148,000, an aerial survey of the lagoon on June 28 of 194,000 and dramatic increases in the inside test fish indices on June 28 prompted an opening of 12 hours for June 29 (Table 24). The escapement past the tower at 2:00 p.m. on June 29 reached 282,000 and an aerial survey of the lagoon that afternoon indicated another 189,000 through the fishery, bringing the accumulative escapement to 471,000, 79% of the escapement goal (Table 24). The estimated sockeye catch for the June 29 12 hour period was about 100,000, and the fishing period was subsequently extended for 12 hours (Table 11). The total sockeye catch for the entire 24 hour period amounted to 210,000 bringing the accumulative catch to 855,000 (Table 13). The price settlement had occurred on June 28 and the full fleet of 136 drift units and 154 set net units participated in the June 29-30 period (Table 13).

By late June it was apparent that the Naknek-Kvichak sockeye run was going to be strong. The Kvichak River escapement had reached 4.8 million fish by the end of June, and continuous fishing was in effect in that district. Many drift units transferred from the Egegik area to the Naknek-Kvichak district and the 12 hour period announced at Egegik for July 2 showed a significant reduction in fishing effort (Table 13).

The sockeye escapement past the Egegik counting tower through July 1 reached 512,000, the lower end of the escapement range, while an aerial survey

of the lagoon on the same day indicated another 79,000 fish (Table 24). With the escapement goal assured, fishing was extended until further notice (Table 11).

The sockeye catch for the period July 2-7 was 904,000, and most of the major processors were suspended or on limits for the majority of this period (Table 13). Two major processors in the Egegik area were suspended a total of 103 hours and on limits 98 hours during the July 2-7 period, while peak effort consisted of 102 drift and 126 set units (Table 13).

The processing capability began to improve by the beginning of the next week. Foreign vessels had been allowed to process and receive fish from Egegik fishermen on July 6 by Commissioner's announcement (Table 11). Only one foreign vessel participated in the fishery and received and processed 268,000 pounds of fish from the Egegik district during the July 6-7 time period. The Commissioner rescinded the foreign processing exception at 6:00 p.m. on July 11 when the catch rate dropped to a point where the domestic industry could process the daily catch without assistance. Most processors in the district were in full production by the end of July 9. The period from July 8-14 produced an additional 373,000 catch and brought the accumulative sockeye catch to over 2.1 million, 95% of the final catch for the district (Table 13).

A total of 21 processors operated in the Egegik district at one time or another during 1979 (Table 29). Nine of these operators canned fish in Bristol Bay, while the remainder transported fish out of the Bay via tender for canning, air lifted them out fresh and frozen, or shipped them out frozen (Table 29).

The total run of 3.3 million sockeye was the third largest since 1956 and was 57% over the 20 year average of 2.1 million. The total sockeye run in 1979 was 51% over the preseason forecast of 2.2 million, while both the catch of 2.3 million and the escapement of 1.0 million were over the 20 year average.

The total catch of other salmon species in the Egegik district amounted to 49,000 (Table 19). The king salmon catch of 3,600 and the chum salmon catch of 33,000 were slightly above average for this district, while the coho salmon catch of 12,500 was nearly five times the 20 year average and was the largest catch in the last 20 years.

#### Ugashik District

A conservative management approach was adopted in the Ugashik district early in the season due to the uncertainty over the actual strength of the sockeye salmon run here. Returns have been weak at Ugashik in recent years and with the exception of 1976 no total run since 1971 has exceeded the minimum escapement requirements.

The forecasted sockeye run to the Ugashik district was 983,000 in 1979, and consisted of an escapement goal of 500,000 and an estimated harvest of 483,000 (Table 1). The anticipated commercial catch this season was only the second year since 1971 that any harvest was forecast for the district. The run was expected to be about evenly distributed between the  $4_2$  age class returning from an escapement in 1975 of 429,000 and the  $5_3$  age class from an escapement in 1974 of 62,000 (Table 2).

The commercial sockeye catch prior to the emergency order period on June 23 was 6,000 fish, and fishing effort consisted of 7 drift units and 6 set units (Table 14). A 12 hour period was announced for June 26-27 to help determine run strength and timing, as the inside Ugashik River test fish catch indices during the period June 21-25 were minimal (Table 25).

The sockeye catch for the June 26-27 period was 12,000 with 6 drift and 4 set nets operating, with only two processors available to handle fish (Table 14). An aerial survey of the Ugashik River lagoon on June 28 revealed about 7,000 fish. Inside river test fish catch indices and estimated escapement increased

on June 26 (29,000), and held up through June 28 (Table 15). The immediate increase in the sockeye catch indices and estimated escapement on June 29 (40,000), after the effect of the fishery indicated a fair amount of fish had moved through the district.

Sockeye returns to other districts in Bristol Bay by late June appeared to be earlier and stronger than forecast. With the increasing escapement trend in Ugashik River as shown by the inside test catches, a second 12 hour fishing period was announced for June 29-30, and an additional 15,000 sockeye were caught with minimal fishing effort (Table 11).

The inside sockeye test fish catch indices had been climbing steadily since June 26: June 28 - 847 index points; June 29 - 1,155; and June 30 - 2,289. Index catches dropped to 1,778 on July 1 as a result of the fishery, but increased to a season high of 4,704 on July 2. Meanwhile, scale samples from inside test fish catches from June 21-27 consisted of 75% age 4<sub>2</sub> and less than 25% age 5<sub>3</sub>. This analysis seemed to indicate that the number of 5<sub>3</sub> age class was much lower than forecast (45%) or that the number of 4<sub>2</sub> age class was much higher than forecast (47%) (Table 2). Because nearly half the run was forecast to be age 5<sub>3</sub>, a cautious approach would be necessary until a change occurred in the age composition or the actual escapement could be determined.

Aerial surveys of the Ugashik lagoon on July 1-3 showed a steady buildup of fish: July 1 - 23,000; July 2 - 65,000; and July 3 - 77,000 (Table 25). The sockeye escapement past the counting tower reached 43,000 through July 3, and although 1979 was the second operational year, the new inside test fishing program was unable to provide a reliable estimate of the actual numbers of fish that had escaped the fishery to date. Both flag tagging at the inside test fish site and aerial surveys of the lagoon were used to try and correlate lag time between the test fish site and the Ugashik lagoon, but the results were so variable that the information was practically useless. An outside test

fisherman was contracted to test fish in the district on July 2-3 to help indicate possible run strength in the district. The test boat fished in five widely scattered areas of the district on July 2 and caught fair numbers of fish in all areas, especially the inside river sites (Table 7). Test catches in the same areas on July 3 were slightly lower, but did indicate that there were still fresh fish entering the district in good numbers (Table 7).

A 12 hour period was announced for July 5 based on strong inside sockeye test fish indices on July 4, a continuous buildup of fish in the lagoon, an escapement of over 45,000 past the counting tower, outside test fish results which indicated new fish in the district and the continuing strong returns to the other districts in Bristol Bay. The eventual catch for the July 5 period was 38,000 sockeye and the CPUE for all gear combined increased from 1,000 per unit on 6/29-30 to over 1,700 per unit (Table 4).

An aerial survey of the Ugashik lagoon and upper river on July 5 showed 65,000, and strong daily tower counts which had increased to 70,000 and 67,000 on July 6 and July 7, respectively (Table 25). The Ugashik River tower showed a continued buildup on July 8 (53,000) and July 9 (128,000), bringing the accumulative sockeye escapement for the Ugashik River to 372,000 and 74% of the desired escapement (Table 25). Lagoon aerial surveys meanwhile indicated a dramatic increase to 130,000 sockeye on July 6 and up to 189,000 on July 7, with large numbers of fish in the upper river (Table 25). By this time it was clear that the return was strong, and another 12 hour period was announced for July 10 (Table 11).

An aerial survey of the Ugashik lagoon on July 10 showed 88,000 in the lagoon and 250,000 in the river below the lagoon (Table 25). The tower escapement meanwhile had surpassed the escapement goal of 500,000 and it was evident that the escapement range would be substantially exceeded; therefore, the 12 hour period for July 10 was extended through 9:00 a.m., July 21 (Table 11).

The sockeye catch for July 10-14 was 78,000 and the CPUE for all gear increased to 2,700 per unit (Table 14). The sockeye catch peaked from July 15-21 at 222,000 (Table 14). Sockeye were still available by the July 22-23 weekend, and since no coho salmon were showing in the catch as yet, the fishing period was extended through the weekend so that fish excess to escapement needs could be utilized (Table 11). The total sockeye catch of 393,000 was the largest catch since 1971 and the total escapement of 1.7 million was the second largest in history (Table 4).

Processor capability was extremely limited in this district, and during the majority of the sockeye run only two companies operated. One company had a maximum capacity of 7-10,000 fish per day and the second company took only 30-35,000 fish per day. Had not the other districts realized such large returns, some processors may have tendered fish from Ugashik. Most of the sockeye taken in the district were canned in Bristol Bay or flown out frozen to Anchorage. Six additional operators moved into the area during or after the week of July 15, and a total of nine companies operated in the district during 1979 (Table 29).

Large numbers of fish were available in the district earlier than normal, but timing of the peak of the run appeared to be only 2 to 3 days earlier than normal.

The king salmon catch of 8,000 in the Ugashik district was nearly 4 times the 20 year average and marks the second year in a row that effort and catch have increased. The chum salmon catch of 18,000 was just over the 20 year average of 16,000, while the coho catch of 18,000 was nearly 9 times the 20 year average.

### Nushagak District

The large preseason inshore sockeye salmon forecast indicated for Nushagak district of 4.4 million, dictated early and increased fishing time over that of previous years, and a probable harvest of 3.1 million fish after escapement requirements of 1.3 million were met (Table 1).

Commercially significant runs of king, chum, pink and coho salmon also return to Nushagak, and an important part of fisheries management effort in this district is directed toward monitoring the developing runs of these other species, and assuring that escapements are sufficient to sustain the stocks.

Nushagak has always been the mainstay of the Bay's important king salmon fishery, with over 70% of the commercial harvest originating in this district. Considerable early season fishing and management effort was directed towards what was expected to be a strong king run. Preseason expectations were for a total Bay harvest of 150,000 with about 105,000 anticipated to be produced by spawning systems in Nushagak district's extensive fresh water drainage.

Early season fishing effort directed toward king stocks was noticeably increased over previous effort levels. For many years early season effort approximated about 200-250 drift units, while 1979 effort was in the range of 400-430 units (Table 15). This increase in effort is due to several factors: (1) increased interest in marketing both fresh and frozen kings and resultant higher prices paid to fishermen; (2) generally increasing harvests (and total runs) due, in part, to curtailment of high seas interception of kings by the Japanese mothership fishery, and more important, adequate parent year escapements coupled with favorable survival conditions; and (3) earlier initiation of fishing efforts brought on by the emergence of the Bering Sea herring fishery. Many fishermen are extending their season (and earning power) by participating in the new and developing Togiak herring fishery, the Nushagak king salmon fishery, and finally the Bay sockeye fishery in that order.

Preseason effort surveys in this district indicated that approximately 490 drift units and 210 set net units would participate this year during the sockeye season. Actual peak effort of 459 drift units and 174 set units was recorded during the 6/27-7/4 period (Table 15).

Unresolved price disputes between fishermen and major processors had minimal effect in this district, as the local marketing association (WACMA) successfully concluded price negotiations by mid-June. Approximately 90,000 fish were lost to the harvest between June 23-28 by two small groups of local fishermen who were members of the AIFMA association, which did not settle prices until June 28.

As in most districts in Bristol Bay in 1979, available processing capacity was increased substantially, especially those involved in frozen production. In total, 26 different processors operated in Nushagak district, including the three long-established shore based canneries, 14 frozen floater operations (6 in 1978), nine fresh export (7 in 1978), and five processors who brine tendered salmon out of Nushagak district to be processed elsewhere (Table 29).

With the approach of the emergency regulatory period for Nushagak district on June 16, the king salmon harvest continued to climb rapidly, and although escapement indices (subsistence catches averaged: June 10 - 35 per net; June 11 - 13; June 12 - 4; and June 13 - 3) and commercial harvests both indicated a strong run, the regular 5 day weekly fishing period was shortened by one day when it appeared that the king catch would amount to 80-85,000 through June 15, well over the long term average catch of 25,000 by this date (Table 15).

Transfer of fishing effort out of Nushagak began in earnest the following week as over 240 fishermen took advantage of the long weekend closure to move to the district of their choice to begin the sockeye season. The king harvest

for Nushagak through June 15 was over 83,000, the highest ever recorded, but on par with the 79,000 fish caught through this date in 1978 (Table 15).

With indications of good king escapement occurring over the weekend of June 16-18 as far upriver as the village of Ekwok, another 24 hour fishing period was announced for June 19-20 with the sockeye salmon boundary line in effect (Table 11). Fishing effort was down to about 286 drift units, with many fishermen now using small mesh gill net gear. The total catch of 71,000 fish was comprised of 36,000 kings and 18,000 and 17,000 sockeye and chums, respectively (Table 15). Of special interest was the estimate that about 65% of the king catch were "small jack kings". From post season escapement summaries and catch analysis, it appears that a very significant proportion of the king escapement occurred during the 4 day closure between June 15-19.

Additional 12 hour fishing periods on June 21 and June 23, to test the incoming run strength, gave evidence of a slow and gradual buildup of the sockeye run, with the sockeye catch on June 23 of 67,000 becoming the largest early catch ever made in the district by this date (Table 15). It was becoming more apparent that the entire Bay sockeye run was early, although just how early was as yet undetermined.

The outside Nushagak test boat made its one and only trip on June 24 to test for incoming run strength. Significant sockeye test catches made on the inside of the district at Kanakanak Beach just south of Dillingham and on the upper Combine showed conclusively that a strong push of fish were moving rapidly through the district (Table 8). From the closure on June 23, when the entire district was essentially void of fish, only 18 hours was required for this body of fish to move from the outside line through the district. Past tagging studies and run timing data show that normally sockeye require 24-36 hours to move through this large district. In addition to the good test boat catches in

the upper district, a strong test net catch (4,700 index points) was made midway in the district on June 24 at Ekuk Bluff by a new experimental test set net project (Table 9). With the apparent strong show of fish, a 12 hour period was announced for June 25 (Table 11).

The fishing period began on June 25 was extended 12 hours for the Igushik section when it became apparent that, due to the location of the fishing fleet (virtually all of the mobile fishing effort were on Combine Flats in the upper 1/3 of the district) little effective effort would be placed on early arriving sockeye stocks to the Igushik River system, where sockeye escapement was already estimated at 58,000 fish (39% of the escapement goal) by the inside test fish site (Table 27). The sockeye catch amounted to 159,000 for the entire 24 hour period bringing the accumulative harvest to 257,000 (Table 15).

The sockeye escapement into Wood River began to increase dramatically on June 25 (June 25 - 55,000; June 26 - 246,000; June 27 - 160,000) and through June 27 had amounted to 462,000 or 58% of the escapement goal (Table 20). Just as dramatic as the sharp increase in the Wood River escapement rate, was the rapid drop-off to less than 10,000 on June 30 once the fishery was opened (Table 20). In retrospect, the sharp rise and fall in both the Wood and Nuyakuk River escapement rates (adjusted for migration time) allows an estimate of what proportion of this single surge of fish were caught and how many entered the escapement. The afternoon flood tide on June 24 brought into Nushagak about 750,000 sockeye bound for Wood and Nuyakuk Rivers. The fishery caught about 160,000 of these fish, with the balance going into the escapement (470,000 to Wood River and 120,000 to Nuyakuk River). If the fishery had been opened just one tide earlier, it's entirely conceivable that the catch:escapement ratio might have been reversed. The foregoing was included to dramatically demonstrate that one tide (or 12 hours) can make a significant difference in the balance between catch and escapement.

An aerial survey of Wood River on June 26, which produced an estimate of up to 330,000 assured sockeye escapement, prompted the decision for another fishing period on June 27, with a good possibility of extended fishing time based on the final outcome of the Wood River escapement (Table 26).

The opening on June 27 produced extremely heavy sockeye catches, especially near the outside line indicating significant continued run strength moving into the district. A 12 hour district period extension was announced based on: (1) Wood River had achieved over 57% (462,000) of the escapement goal; (2) the Igushik River inside test net project indicated that over 73% (110,000) of the sockeye escapement requirements had been met; and (3) the continuing strong show of fish in the district (Tables 26-27).

The entire Nushagak district was subsequently extended for two additional 24 hour periods for a combined period length of just over three days, June 27-29 (Table 11). The total period sockeye catch amounted to 1.1 million fish with 47% (516,000) occurring on June 27, 37% (406,000) on June 28, and 16% (176,000) on June 29-30 (Table 15). Throughout the entire three day period the rationale for the fishing extensions were: (1) continuing heavy show of sockeye in the fishery, indicating that the run was at forecast level (4.4 million; (2) extremely high proportion of the escapement achieved early in the season (55 to 60% at Wood River and 75-100% indicated at Igushik River); and (3) only about 40% of the forecast accounted for by June 28.

By June 28 heavy sustained daily catches and tender imports from other districts caused some district processors to suspend fishing operations for varying periods, a situation that was not to be alleviated until July 7 when daily catch/import rates dropped below the processing capacity level of 415,000 fish per day. Fishing suspensions alone were estimated to have resulted in lost harvest of approximately 740,000 fish in this district. Daily catch limits

(generally 12,000 lbs. per two-man drift vessel and 6,000 lbs. per drift skiff and set net) were imposed on most Nushagak district fishermen for virtually the entire season.

By June 29 the daily sockeye catch rate had dropped to less than half of the previous two days (176,000 on June 29 compared with 406,000 and 516,000 on June 28 and June 27, respectively). Along with the reduced commercial harvest, the Wood River daily sockeye escapement had fallen to between 9 and 18,000 per day from previous high levels (Table 20). Aerial survey coverage of Wood River was intensified, but surveys on June 27-29 failed to show any strength in the river (Table 26). With the Wood River daily sockeye escapement at about 62% of the desired goal, and the daily rate at a virtual standstill, along with a rapidly declining catch rate, the fishery was allowed to close at 3 a.m. on June 30.

With the Nushagak sockeye run now indicating about 2.4 million total return through June 30, the ultimate strength of the run was still not apparent and a halt in fishing was indicated. However, based on extremely strong sockeye catches on Igushik beach (over 36,000 through June 30), lack of fishing effort on the west side of Nushagak district, and with the inside Igushik River test fishing project indicating that 110,000 fish (or 73% of the escapement goal) had entered the river through June 29, a decision was reached to open the Igushik section only in the hopes that the drift fleet would help to curtail the apparent rapid movement of fish into the river (Tables 16 and 27). It was also becoming evident that the Igushik River system return was very strong, and that if the mobile fishing fleet were not put onto these fish right away that the escapement would quickly accelerate beyond the upper management range of 200,000 (Table 1). Therefore, after only a 14 hour closure, the Igushik section was reopened to fishing for a 24 hour period from June 30 to July 1 (Table 11). The major company which operates in the Igushik section and

accounts for the majority of the fish caught were suspended and the effective length of the closure for the section was 47 hours.

In the meantime, arrangements were made for the outside test boat to depart the evening of June 30 to determine if additional fish were moving into the district. However, prior to the test boats departure, three separate reliable reports from fishermen/processors were received indicating significant fish activity from midway down on Flounder Flats to as far north as lower Combine Flats. With this information and with the foreknowledge of the rapid movement of fish into the district on June 24-25, the outside test boat trip was cancelled and a decision was reached immediately to reopen Nushagak district the following day (July 1) for a 12 hour period (Table 11). The announcement was made with the realization that the Wood River daily sockeye escapement had fallen to less than 10,000 fish per day (Table 20). If the indicated strength in the district did not materialize, then the fishery would close until the additional escapement was secured; on the other hand, if the "fishermen" reports were correct, and there was no reason to think otherwise, the escapement goal and more was probably insured. Later in the evening of June 30, after the fishing period announcement, another strong push of fish was indicated from the new experimental Ekuk Bluff test set net site (Table 9).

An aerial survey of Wood River on July 1 indicated "at least" 250,000 in the river, and that the escapement goal was assured (Table 26). In addition, aerial survey observations on July 1 and inside test fishing results through June 30 in the Igushik River both indicated that the sockeye escapement goal in this system was also assured (Table 27). Fishing time in the Nushagak district was subsequently extended from July 1 until July 21 (Table 11).

During the following two weeks of continuous fishing (July 1-15) over 1.8 million sockeye salmon were caught (Table 15). The peak of the Wood River escapement occurred on July 1-2 (793,000 fish in two days), with another peak

on July 6-7 (283,000) when most major processors suspending buying operations on July 4-5 due to heavy catches (Table 18).

Effective July 6, Nushagak district (along with Naknek-Kvichak and Egegik districts) was designated as a constructive port by Commissioner's announcement where foreign processing could take place (Table 11). However, no direct foreign processing took place in Nushagak, and the announcement was rescinded on July 10 when the local domestic industry was again able to adequately process the daily harvest (Table 11).

The early run timing (run peaked on June 27-29) in 1979 into Nushagak, as well as the continuing strong sockeye run into the district, created significant industry processing problems. Most, if not all, operators were at one time on suspension and/or had severely limited their fishermen by placing them on restrictive limits.

Escapement goals were exceeded in all Nushagak district river systems except for the Snake River and the Igushik River sockeye escapement of 860,000 broke the previous largest of 644,000 in 1959. Many factors contributed to actual escapements exceeding preseason set goals: early run timing and the Department's inability to determine run strength prior to the arrival of the run; the unusually strong return (6.5 million) which was 2½ times the long term average to Nushagak; the fishermen/industry price dispute which affected two major processors in this district; and the heavy run of sockeye to the Naknek-Kvichak district, which plugged processors all over Bristol Bay, as fish were tendered to other districts for canning.

Sockeye salmon escapements by river system were: Wood - 1,706,000 escapement with a goal of 800,000 and 20 year average of 971,000; Igushik - 860,000 with a goal of 150,000 and average of 258,000; Nuyakuk - 360,000 with a goal of 250,000 and average of 196,000; Nushagak-Mulchatna - 139,000 with a goal of 40,000 and average of 57,000; and Snake - 8,000 with a goal of 30,000 and

average of 18,000 (Table 4). Overall, the Nushagak escapement of 3.1 million sockeye in 1979 was 107% larger than the 20 year average of 1.5 million (Table 4).

The total sockeye salmon harvest of 3.4 million was 209% higher than the 20 year average of 1.1 million and the largest since 3.5 million were caught in 1944. The total sockeye run to all systems of Nushagak totaled 6.5 million compared with the preseason inshore forecast of 4.4 million and the 20 year average run of 2.5 million (Table 1).

The sockeye salmon return to Nushagak in 1979 of 6.5 million was the second consecutive year that this district's run exceeded 6.0 million fish (6.7 million returned in 1978). In 1979 there were above average sockeye returns of all age groups to the Wood River lakes and an exceptionally large run to the Igushik River system (Table 4). The large runs of sockeye salmon to the Nushagak in 1978-79 coincided with large runs of sockeye to other lake systems in Bristol Bay, and the largest run of pink salmon ever recorded for the Nushagak district in 1978, and exceptionally large catches of king and coho salmon in 1978-79.

The large runs of salmon in recent years correspond to warm weather and warm surface temperatures in the Bering Sea and Northern Gulf of Alaska. The decline in air and water temperatures during the 1940's corresponds to the decline in the runs of many stocks of Alaskan salmon including the Nushagak stock of sockeye. The warm temperatures in 1957-58 coincided with an exceptional run of pink salmon to the Nushagak in 1958 and a large run of sockeye in 1959; whereas the very cold years in the early 1970's coincided with very small runs of all species in 1972 and 1973.

It has been generally felt that environmental conditions during the early marine life (smolt migration) are critical for total marine survival and that very cold winters may adversely affect freshwater survival. In addition to favorable environmental conditions, other factors which have substantially

increased salmon production in Nushagak district are (1) reduced fishing effort by the high seas Japanese gill net fishery on Bristol Bay sockeye, and in particular, on larger .3 ocean age fish, which dominate production in Nushagak in most years, and (2) the generally large, well distributed sockeye escapement in the parent years of 1974 and 1975.

The commercial harvest of king salmon in 1979 of 155,000 was the largest Nushagak catch in the history of the fishery, well above the previous high of 128,000 in 1929 and the 20 year long term average of 69,000 (Table 19). The district king escapement of 95,000 was the third largest ever recorded, well above the long term average of 63,000 for this district. The total king return of 250,000 fish, catch and escapement combined, exceeded the long term average total run of 129,000.

Nushagak chum salmon production was reduced over the previous three years, but the commercial catch of 479,000 was well above the long term average of 358,000, and with the chum escapement of 166,000, equaled a total run of 645,000 which was on par with the long term average of 611,000 (Table 19).

The coho salmon return to Nushagak was exceptionally strong, and increased late season fishing effort was directed at Nushagak cohos in 1979. The season commercial catch of 142,000 fish was well above the long term average of 21,000, and was the largest since 1922 when 160,000 cohos were caught in Nushagak (Table 19). Assessment of the district coho escapement was not undertaken in 1979, but the new sonar program in lower Nushagak River shows much promise as a means to document coho escapements in the future.

#### Togiak District

Togiak district is not managed under the same concept as the other Bristol Bay salmon districts. Open fishing periods at Togiak are established in advance and then adjusted via emergency regulation inseason, as needed, to achieve the desired balance between catch and escapement.

The 1979 preseason forecasted sockeye salmon return was 467,000 while the actual run totaled 704,000, 1½ times larger than predicted (Table 1). The fishery began the week of June 4 and the peak of the harvest occurred July 9-14 when over 125,000 sockeye were caught in a five day period (Table 17). By July 2 the sockeye escapement, although still under 5,000, was approximately one week ahead of schedule (Table 20). The sockeye catch was building in both Kulukak and Togiak sections, but did not give evidence of a really strong run at any time during the season.

The effort levels were higher this season than ever before and approximately 120 drift units and 35 to 40 set net units operated in Togiak district in 1979. The increased fishing effort and the fact that at least 4 or 5 companies operated at all times served to reduce the CPUE and gave the impression of a run magnitude of average proportion early in the season. An aerial survey of Togiak River on July 9 showed a strong increase of fish in the river and this was reflected by the tower counts during the next five day period when the escapement climbed from 33% to 70% of the goal (Table 28).

On July 20 an emergency regulation was issued to extend Togiak section for 36 hours in addition to the regular 4 day-per-week period as the escapement goal of 100,000 had been reached (Table 11). A second emergency regulation issued July 27 extended Togiak section for another 36 hours the following week to harvest fish in excess of escapement needs (Table 11).

Two of the seven companies that operated in Togiak this season were forced to suspend buying for 48 hours each because of fish in excess of their capacity, however, the suspensions did not serve to reduce the harvest because other buyers present were able to handle the overflow (Table 29).

In the final tally, the 1979 sockeye catch reached 479,000 and bested both the previous record of 453,000 set in 1978, and the long term average catch of 177,000 (Table 4).

Even with the two weekly period adjustments in fishing time, the Togiak River escapement rose to 171,000 by the end of the season, above the upper management range of 120,000 fish (Table 1). An additional 54,000 sockeye were enumerated during aerial surveys of numerous tributary streams to bring the district total escapement to 225,000 compared with the long term average of 151,000 fish (Table 4).

The total sockeye run into the Togiak area amounted to 704,000 fish compared with the long term average return of 327,000 (Table 4).

Commercial catches of other species were all above the long term averages, except for coho salmon, which was a record harvest: kings - 31,000 harvest in 1979 compared with the previous high of 57,000 in 1978 and 17,000 long term average; chums - 222,000 harvest compared with the previous high of 275,000 in 1978 and 139,000 long term average; and cohos - 124,000 harvest compared with the previous high of 45,000 in 1977 and 15,000 long term average (Table 19).

Extensive aerial surveys are conducted on an annual basis in the Togiak area to estimate escapement of king and chum salmon. In 1979, the district king salmon escapement was estimated to total 20,000 fish, just above the average escapement of 16,000 since 1967, and the total run, catch and escapement combined, amounted to 51,000 kings compared with the average of 39,000 since total run records have been available. The chum salmon escapement of 293,000 was also above the 248,000 average escapement, and the total run of 515,000 chums was well above the long term average of 390,000 fish.

The Togiak salmon fishery is relatively straight forward and generally not plagued with serious management difficulties, however, there has been a reoccurring enforcement problem that has been documented there since 1968. Various circumstances have precluded an intensive protection effort by Department of Public Safety. As a result, there has been an ever increasing number of reports of upriver commercial fishing (roundhauling with gill nets)

on the escapement. This illegal activity has historically been on the coho salmon run in the fall, but in 1979 it was reported that a significant number of heavily watermarked sockeye were also present in the commercial catch.

A total of 16 different individual complaints of illegal upriver commercial fishing were reported during the 1979 season. These complaints came from fishermen, pilots, processors, guides and concerned citizens and were far more numerous than in any previous year.

Wholesale disregard of the upriver closure continued, and on August 30 due consideration was given to closure of the entire fishery by emergency regulation, as Public Safety was unable to control and enforce the closure because of manpower and budget limitations. Prior to any closure decision, a meeting was arranged with the Togiak fishermen to discuss the problem.

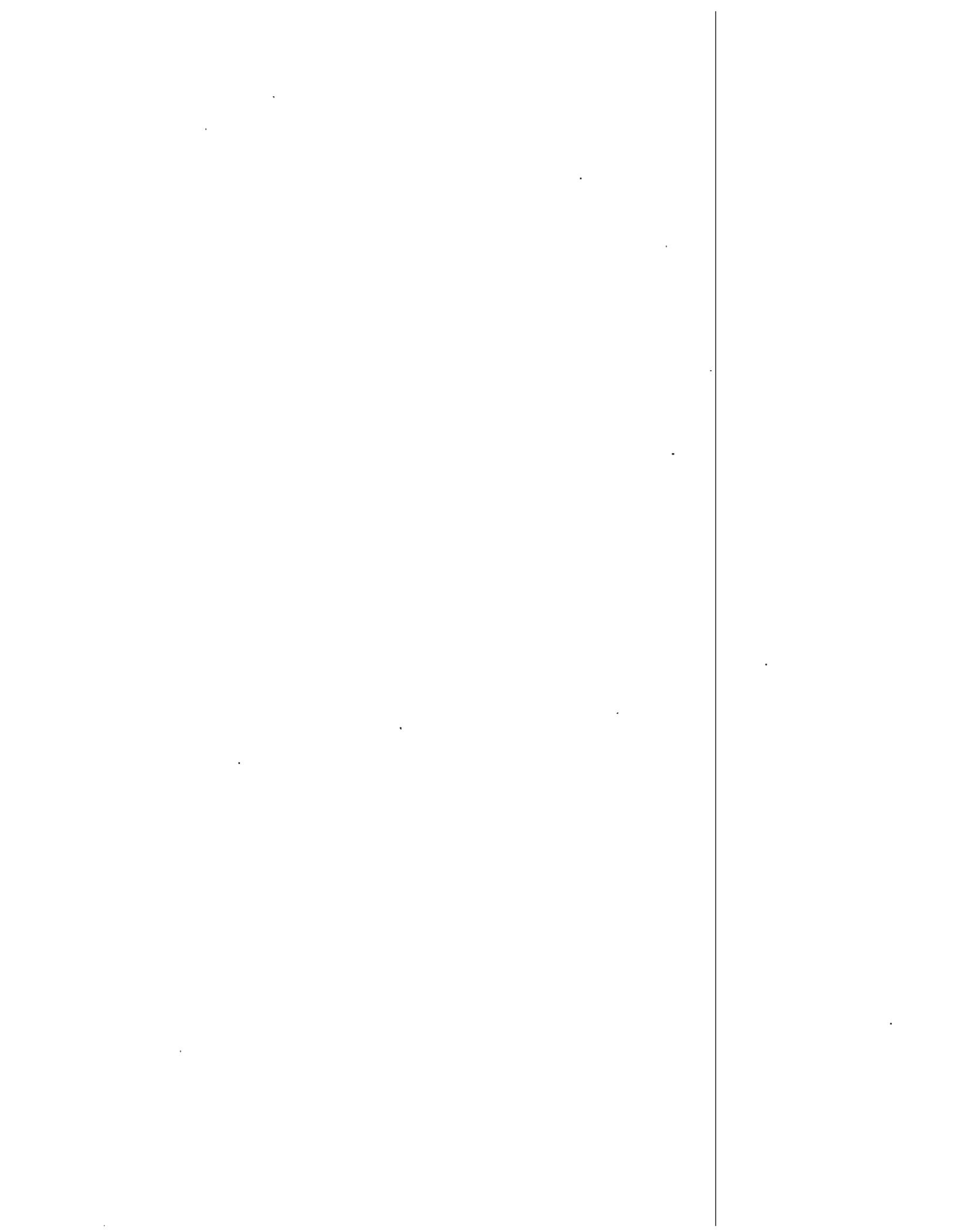
Department representatives discussed the nature of the problem and the long term detrimental effects on the resource, and fishermen were told that the entire fishery would be closed unless the illegal fishing activities ceased. The results of the meeting had some positive effect as there was only one more incident documenting a party fishing upriver. Ironically, the situation solved itself because the two remaining processors terminated their operations at this time. The spawning escapement of coho salmon in Togiak River could have been seriously affected by the illegal fishing this season had it not been for the magnitude of the run. In the future, an aggressive and intensive on-the-ground enforcement program in the lower river will be required. The Department of Fish and Game will also need to pursue additional funding for aerial assessment of the coho salmon escapement in this area.

## 1979 SUBSISTENCE SALMON FISHERY

Records of subsistence salmon harvests in Bristol Bay are monitored through a permit system first instituted during the early 1960's. During the intervening years, the advent of the snow machine has seen the dog sled replaced as the primary means of winter travel and this has resulted in a substantial reduction in the amount of fish required to feed dogs. On the other hand, the growth in local population, improved access to the area by subsistence users from outside urban communities and better documentation of subsistence harvests has resulted in an overall increase in the number of fish harvested for personal use.

Despite wide fluctuations in the size of the salmon runs and a 27% increase in the number of subsistence permit holders, the total catch of all salmon has remained quite stable during the past five years. Salmon subsistence catches of all species in Bristol Bay normally ranges somewhere between 100 and 200,000 fish and since 1963 has averaged 140,000.

Analysis of 1979 permit returns indicates a total subsistence harvest of 142,000 fish by 829 permit holders (Table 33). Participation and cooperation in the catch monitoring system was generally good this season with the exception of the Togiak district where the number of permits issued and the reported catches are not indicative of actual subsistence use patterns in that area. Although the resident population of the Togiak area is over 450, only 25 permits were issued there in 1979 and of these, only five permits have been returned.



## 1979 COMMERCIAL HERRING FISHERY

Introduction

The domestic herring fishery in eastern Bering Sea has developed in response to favorable market conditions and prices created by a worldwide herring shortage. Additional stimulus has been provided through incentives given American fishermen under the Fisheries Conservation and Management Act of 1976. Barring major changes in resource status or market conditions, expansion of the domestic fishery should result in the elimination of the foreign fishery apart from incidental harvests.

The high prices paid for sac roe herring in 1979 has made herring fishing one of the most lucrative fisheries in the world. This attractiveness has coincided with recent increases in herring abundance in the eastern Bering Sea and together have resulted in rapid domestic fishery expansion and higher herring harvests along western Alaska. Herring catches by domestic fishermen peaked in 1979 with an estimated exvessel value for the season in excess of \$8.2 million. In addition, the value of roe-on-kelp fisheries was estimated at \$264,000 resulting in a total value of the 1979 eastern Bering Sea herring resource to domestic fishermen of nearly \$8.5 million.

Commercial exploitation of herring first occurred in Bristol Bay during the late 1960's when fledgling sac roe and roe-on-kelp fisheries developed in the Togiak district. Early years of the fishery were characterized by variable and fluctuating production due to limited fishing and processing capacity along with annual variations in fish abundance and the general logistical difficulties of operating in the area. Steady and rapid growth in the catch and production capacity during the past three years has contributed to rapidly increasing harvests in both the sac roe and roe-on-kelp fisheries.

### Herring Sac Roe Fishery

The first domestic commercial herring sac roe fishery in Bristol Bay occurred in 1967 when a single operator purchased 122 metric tons (m.t.) of fish. These first catches were taken exclusively with gill nets; a gear type that has been used successfully each year the fishery has operated. During the eleven year history of this fishery, purse seines have also been employed and since they were first introduced in 1968 have taken an average of 74% of the catch. No herring harvests were reported in Bristol Bay in 1971 and 1976. Annual catches during other years remained under 100 m.t. until 1977-79 when the number of operators and amount of fishing effort increased dramatically and resulted in record catches of 2,500, 7,000 and 10,100 m.t., respectively.

During 1979 a total of 32 operators purchased 9,300 m.t. of sac roe herring and two companies purchased 800 m.t. of food/bait herring in Bristol Bay (Table 29). Approximately 77% of the harvest was taken from the Nunavachak and Togiak sections with lesser amounts coming from the remainder of the Togiak district (Table 35). There was a significant shift in percentage of the herring catch taken by the gill net fleet in 1979, which landed 40% of the harvest, compared to 8% in 1978 and 11% in 1977 (Table 35). The high gill net success is attributed to the large vessel fleet present "breaking up" herring schools into smaller units, thus making them less vulnerable to purse seines, and frequent spring storms which hampered purse seine operations. Still a third factor and perhaps the most significant was that early run timing resulted in only one company on the fishing ground and prepared to receive fish by the opening date of May 1. A severe storm during the last week of April delayed the arrival of the majority of the fleet until after peak spawning had occurred during the first week of May. As the herring run progressed into late May, fishing favored gill nets as marketable herring became less and less abundant.

Effort levels for the 1979 Togiak herring fishery were greatly increased over previous years and analysis of fish tickets indicate that 208 purse seiners and 437 gill net vessels participated in the fishery. However, these effort levels are considered inflated since many fishermen participating in the fishery were not operating their own vessel. Nonetheless, as crewmembers they were making deliveries and using their own permit cards, which prints on the fish tickets the names of their own vessels (even though the boats were not present on the grounds). That this was done for a reason is obvious - such action documents participation in the fishery for possible future limited entry. Actual participation, based on inseason aerial assessment, is estimated nearer to 175 purse seine and 350 gill net units.

The peak daily harvest occurred on May 11 when over 1,000 m.t. were delivered (Table 35). Most of the herring taken this past season were primary processed on the fishing grounds and subsequently transferred aboard foreign vessels anchored in designated constructive ports within Kulukak Bay and near Summit Island. Seventy percent of the sac roe herring harvest was salted for later stripping and reduction while 30% was frozen. The mean roe recovery in Bristol Bay was 8.6% and, although there was a wide range of prices paid for the fish, an average of \$637 per ton placed the exvessel value of the sac roe fishery in excess of \$6.5 million.

Two companies also purchased over 800 m.t. of bait herring at \$200 per ton resulting in a value of \$180,000. The overall exvessel value of the domestic herring harvest in Bristol Bay in 1979 exceeded \$6.7 million.

Some problems were encountered by the Department getting compliance with required onground registration by the processors and inseason catch reporting. These issues have been addressed in the 1980 regulation proposals and will hopefully minimize problems next season. For the most part, the industry was very cooperative.

### Herring Roe-on-Kelp Fishery

The commercial roe-on-kelp fishery originated in Bristol Bay in 1968 and has operated annually since that time. For the first six seasons one processor was involved and only limited harvests averaging less than 40,000 pounds resulted. Since 1974 there has been a steady increase in production. Although only 100 fishermen participated in the 1979 fishery in comparison to 160 in 1978, the number of processors increased 50%; from 11 in 1978 to 16 in 1979 (Table 29). A record harvest of 415,000 pounds (188 m.t.) was made with a value to fishermen of nearly \$250,000 (Table 36).

The product being harvested in the Togiak fishery is almost exclusively rockweed kelp (Fucus sp.) and although ribbon kelp (Laminaria sp.) is present in the Togiak area, it does not appear to be an important substrate. The prospects for the roe-on-kelp fishery in Bristol Bay indicate expansion in effort and processing capacity, but the market for rockweed kelp may be a limiting factor.

Several important beach areas in the Metervik-Kulukak Bay areas were closed by field announcement this season in order to protect the kelp resource from over harvest and to disperse effort to adjacent, less exploited beds. Metervik Bay was closed to kelping on May 11 when over 33% of the available kelp biomass was harvested in only three low tides. The western shoreline of Kulukak Bay was also closed to kelping on May 18 when the kelp harvest reached over 44% of the available kelp biomass on these beaches.

A total of 22.6 linear miles of milt (spawn) was recorded on 15 survey days, with peak of spawning based on these observations occurring between May 2-4. The roe-on-kelp commercial harvest was reported to be of high quality in 1979 and beach surveys by Department personnel confirmed that egg density and coverage was excellent.

### Entry Timing

Climatological conditions continued to influence herring entry timing patterns at Togiak in 1979. The 1978-79 winter was mild and warmer water temperatures are known to induce earlier run timing and spawning. Peak herring spawning activities commenced in late April in 1979, and peak spawning occurred in early May.

This early run timing and severe spring weather inhibited fleet movement to Togiak this year. The sac roe fishery opened on May 1 with only one company established and ready to receive fish. A severe storm the last week of April delayed the arrival of the majority of the fleet. The "normal" peak of the fishery has historically occurred between May 15-26, however, in 1979 the peak of the harvest was from May 4-13, with the peak aerial biomass estimate observed on May 10 (Tables 34-35). This early run was probably related to the unusually warm air and water temperatures experienced this spring.

The unusual run timing and storm activity had a significant effect on the quantity of the harvest. By the time the majority of the fleet was in operation, a large amount of spawning had already occurred and a major percentage of the total available biomass was no longer economically attractive. The early run timing and two additional major storms inseason kept the harvest from reaching the guideline harvest level of 12,000 m.t.

### Aerial Biomass Surveys

Fifteen surveys were flown in the Togiak district from April 30 through May 26 (Table 34). A total of 1,782 herring schools were observed in six major index areas and each school was categorized by size. A total of 22.6 linear miles of milt (spawn) was also recorded on nine days. Peak of spawning based upon these observations occurred during the first week of May when more than 20 linear miles of milt was recorded. This peak in spawning, based on

aerial surveys, was nearly two weeks earlier than Togiak district peak spawning in 1978. In contrast to peak spawning, herring abundance in the Togiak district was estimated to have been greatest on May 10, while the corresponding peak abundance in 1978 was observed on May 13 (Table 34).

Utilizing the same biomass conversion techniques developed in 1978 (relative abundance index (R.A.I.) times the tonnage conversion factor), herring biomass estimates were generated on a daily basis by index area (Table 34). The problems of (1) variable tonnage factors by area, (2) mixing of pre-spawners, spawners, and post-spawners, (3) double counting of herring schools on subsequent aerial surveys, and (4) specie identification by aerial surveyors, still exist and will continue to impact biomass estimation procedures.

The post-season herring biomass estimate in 1979 was reduced by 25% for each index area to account for species other than herring (Table 34). These adjustments result in a peak herring abundance on May 10 of 212 to 558,000 m.t. (Table 34). This post-season abundance complements the inseason estimate of 150 to 250,000 m.t. of herring made during the course of the season surveys.

#### Stock Status

The present status of herring stocks in eastern Bering Sea is not fully understood. Available data indicates that stocks declined in abundance in the early 1970's. This decline was evidently due to a combination of overfishing and the occurrence of a series of weak year classes. Herring catch and CPUE of Japanese trawlers had been the primary indicator of abundance, but are no longer useful as trawl catches are now largely incidental to other fisheries. This is a result of a combination of factors including decreased herring abundance, an increase in pollock abundance, and the low total allowable catches of herring in recent years.

The Japanese stern trawler data revealed that both catch and CPUE dropped from the peak years in the late 1960's. The CPUE for the Japanese eastern Bering Sea gill net fishery does not reveal any consistent downward trend. This may be due to ice conditions and the gill net fishery targeting on spawning concentrations which may not reflect total herring abundance.

Estimates of absolute abundance are scant and even relative abundance data are limited. Attempts have been made to estimate herring biomass by: (1) a Soviet hydroacoustical trawl survey; (2) ecosystem modeling; and (3) aerial surveys of spawning biomass. Although each method has its limitations, at present the best currently available estimates are those developed from inseason aerial assessment of spawning stocks.

Aerial surveys have been flown for the past several years along the eastern Bering Sea coast during the spawning period and number of fish schools recorded by surface area. In short, biomass estimates of total fish abundance are made by converting school surface area estimates on peak days, using density factors obtained from purse seine catches in the Togiak district. Final estimates of herring abundance include a 25% error to compensate for the presence of other fish species based on data of incidental species captured in commercial and test nets.

All biomass estimates previous to 1979 have been revised using new procedures and data interpretation. Despite weaknesses associated with aerial survey assessment, results have indicated an increasing trend in herring abundance. The relative abundance of eastern Bering Sea herring spawning stocks in 1979 was the highest observed in recent years, with a 45% increase in biomass from 1978 to 1979 in Bristol Bay. However, recent increases in herring abundance, as evidenced from strong recruitment from 1972-1976 and aerial survey

data, cannot be quantifiably related to the unexploited herring biomass which existed in the early 1960's.

The past two years (1978-1979) have been mild winters, 1979 especially so, and it is speculated that persisting marine conditions were not only conducive to herring growth and survival but also directly related to the earlier than average arrival of herring stocks to their spawning grounds.

Table 1. Inshore run of sockeye salmon by river system and district compared with the preseason inshore forecast, escapement goals and forecasted inshore commercial catch, Bristol Bay, 1979. <sup>1/</sup>

District and River System	Inshore Forecast			Goal	Escapement			Inshore Catch			
	Forecast <sup>2/</sup>	Actual	Run/Fore.		Range	Actual <sup>3/</sup>	Esc/Goal	Forecast	Actual <sup>2/</sup>	Catch/Fore.	
<b>NAKNEK-KVICHAK DISTRICT</b>											
Kvichak River	12,349	24,921	2.02	6,000	5,000-	7,000	11,218	1.87	6,349	13,703	2.16
Branch River <sup>4/</sup>	579	582	1.01	185	150-	220	294	1.59	394	287	0.73
Naknek River	1,744	2,384	1.37	800	700-	900	925	1.16	944	1,459	1.55
Total	14,672	27,887	1.90	6,985	5,850-	8,120	12,438	1.78	7,687	15,449	2.01
<b>EGEGIK DISTRICT</b>											
	2,171	3,286	1.51	600	500-	700	1,032	1.72	1,571	2,254	1.43
<b>UGASHIK DISTRICT<sup>5/</sup></b>											
	983	2,100 <sup>5/</sup>	2.14	500	400-	600	1,707 <sup>5/</sup>	3.41	483	393 <sup>5/</sup>	0.81
<b>NUSHAGAK DISTRICT</b>											
Wood River	2,579	3,489	1.35	800	600-	1,000	1,706	2.13	1,779	1,783	1.00
Igushik River	857	1,925	2.25	150	100-	200	860	5.73	707	1,065	1.51
Nuyakuk River <sup>4/</sup>	786	736	0.94	250	200-	300	360	1.44	536	375	0.70
Nushagak-Mu] Sys. <sup>4/</sup>	115	288	2.50	40	20-	60	139	3.46	75	149	1.99
Snake River <sup>4/</sup>	20	19	0.95	30	10-	50	8	0.27	0	10	-
Total	4,357	6,456	1.48	1,270	930-	1,610	3,074	2.42	3,097	3,383	1.09
<b>TOGIK DISTRICT</b>											
	467	704 <sup>6/</sup>	1.51	100	80-	120	225 <sup>6/</sup>	2.25	367	479 <sup>6/</sup>	1.31
<b>TOTAL BRISTOL BAY</b>											
	22,650	40,433	1.79	9,455	7,760-	11,150	18,475	1.95	13,205	21,958	1.66

1/ Number fish in thousands.

2/ Final Bristol Bay sockeye salmon forecast of inshore run for 1979.

3/ Escapement data is final, while catch data is preliminary.

4/ These systems cannot be managed separately from the major system in the district. Consequently, the exploitation rates are merely the harvest rates anticipated for the major system in the district; the corresponding escapement goals do not necessarily coincide with the escapement levels which would be achieved if these systems could be managed independently.

5/ Including Mother Goose system sockeye salmon run.

6/ Including all Togiak district sockeye systems.

Table 2. Inshore forecast of sockeye salmon age class return by river system and district, Bristol Bay, 1979.<sup>1/</sup>

District/System	Number of Fish in 1,000's				Total
	2-Ocean Age Class (Brood Year)		3-Ocean Age Class (Brood Year)		
	4 <sub>2</sub> (1975)	5 <sub>3</sub> (1974)	5 <sub>2</sub> (1974)	6 <sub>3</sub> (1973)	
<u>NAKNEK-KVICHAK DISTRICT</u>					
Kvichak River	4,318	6,613	1,272	146	12,349
Branch River	67	300	192	20	579
Naknek River	307	684	441	312	1,744
Total	4,692	7,597	1,905	478	14,672
<u>EGEGIK DISTRICT</u>					
	91	1,458	224	398	2,171
<u>UGASHIK DISTRICT</u>					
	459	447	67	10	983
<u>NUSHAGAK DISTRICT</u>					
Wood River	1,078	427	1,036	38	2,579
Igushik River	100	52	654	51	857
Nuyakuk River	348	54	354	30	786
Nush.-Mulch. Sys.	36	4	53	22	115
Snake River	9	2	8	1	20
Total	1,571	539	2,105	142	4,357
<u>TOGIAK DISTRICT</u>					
	95	49	288	35	467
TOTAL BRISTOL BAY <sup>2/</sup>	6,908	10,090	4,589	1,063	22,650

<sup>1/</sup> The 1977 Japanese high seas catch of 243,000 2-ocean immature Bristol Bay sockeye salmon has been deducted from the 3-ocean forecast return.

<sup>2/</sup> Sockeye salmon of several minor age classes would be expected to contribute an additional 1-2 percent to the total return.

Table 3. Inshore run of sockeye salmon by age class, river system and district, Bristol Bay, 1979.<sup>1/</sup>

District and River System	Age Class						Total	
	4 <sub>2</sub>	5 <sub>3</sub>	2-Ocean	5 <sub>2</sub>	6 <sub>3</sub>	3-Ocean		
<b>NAKNEK-KVICHAK DISTRICT</b>								
<u>Kvichak River</u>								
Number	5,581	16,548	22,129	1,942	516	2,458	24,587	
Percent	22.7	67.3	90.0	7.9	2.1	10.0	100.0	
<u>Branch River</u>								
Number	409	127	536	18	2	20	556	
Percent	73.5	22.9	96.4	3.2	0.4	3.6	100.0	
<u>Naknek River</u>								
Number	443	1,078	1,521	234	613	847	2,368	
Percent	18.7	45.5	64.2	9.9	25.9	35.8	100.0	
Total	Number	6,433	17,753	24,186	2,194	1,131	3,325	27,511
	Percent	23.4	64.5	87.9	8.0	4.1	12.1	100.0
<b>EGEGIK DISTRICT</b>								
<u>Number</u>								
	145	2,172	2,317	93	812	905	3,222	
<u>Percent</u>								
	4.5	67.4	71.9	2.9	25.2	28.1	100.0	
<b>UGASHIK DISTRICT</b>								
<u>Number</u>								
	1,436	587	2,023	15	44	59	2,082	
<u>Percent</u>								
	69.0	28.2	97.2	0.7	2.1	2.8	100.0	
<b>NUSHAGAK DISTRICT</b>								
<u>Wood River</u>								
Number	1,492	398	1,890	1,510	31	1,541	3,431	
Percent	43.5	11.6	55.1	44.0	0.9	44.9	100.0	
<u>Igushik River</u>								
Number	791	348	1,139	729	25	754	1,893	
Percent	41.8	18.4	60.2	38.5	1.3	39.8	100.0	
<u>Nuyakuk River</u>								
Number	492	6	498	224	1	225	723	
Percent	68.0	0.9	68.9	31.0	0.1	31.1	100.0	
<u>Nushagak-Mulchatna</u>								
Number	31	11	42	172	28	200	242	
Percent	12.8	4.5	17.3	71.1	11.6	82.7	100.0	
<u>Snake River</u>								
Number	10	1	11	7	+	7	18	
Percent	56.5	3.7	60.2	37.6	2.2	39.8	100.0	
Total	Number	2,816	764	3,580	2,642	85	2,727	6,307
	Percent	44.7	12.1	56.8	41.9	1.3	43.2	100.0
<b>TOGIK DISTRICT</b>								
<u>Number</u>								
	294	26	320	359	16	375	695	
<u>Percent</u>								
	42.3	3.8	46.1	51.6	2.3	53.9	100.0	
<b>TOTAL BRISTOL BAY</b>								
<u>Number</u>								
	11,124	21,302	32,426	5,303	2,088	7,391	39,817 <sup>2/</sup>	
<u>Percent</u>								
	27.9	53.5	81.4	13.4	5.2	18.6	100.0	

<sup>1/</sup> Number fish in thousands; the inshore run data does not include the 1979 Japanese high seas catch of maturing Bristol Bay sockeye or the 1978 Japanese catch of immatures.

<sup>2/</sup> Approximately 616,000 additional sockeye salmon of several minor age classes returning in 1979 are not included in this total.

Table 4. Sockeye salmon catch and escapement, Bristol Bay, 1979.<sup>1/</sup>

District and River System	Number of Fish		Total Run
	Catch	Escapement	
<u>NAKNEK-KVICHAK DISTRICT</u>			
Kvichak River	13,702,808	11,218,434	24,921,242
Branch River	287,466	294,200	581,666
Naknek River	1,458,925	925,362	2,384,287
Total	15,449,199	12,437,996	27,887,195
<u>EGEGIK DISTRICT</u>	2,254,067	1,032,042	3,286,109
<u>UGASHIK DISTRICT</u>			
Ugashik River		1,700,904	
Mother Goose System		6,000	
Total	392,833	1,706,904	2,099,737
<u>NUSHAGAK DISTRICT</u>			
Wood River	1,782,597	1,706,352	3,488,949
Igushik River	1,065,499	859,560	1,925,059
Nuyakuk River	375,462	360,120	735,582
Nushagak-Mulchatna	148,832	139,100	287,932
Snake River	10,148	8,439	18,587
Total	3,382,538	3,073,571	6,456,109
<u>TOGIK DISTRICT</u>			
Togiak Lake		171,138	
Togiak River		14,200	
Togiak Tributaries		9,500	
Kulukak System		26,600	
Other Systems		3,400	
Total	479,382	224,838	704,220
TOTAL BRISTOL BAY	21,958,019	18,475,351	40,433,370

<sup>1/</sup> Final escapement data, however the inshore catch and apportionment by river system to the Naknek-Kvichak and Nushagak districts are preliminary.

Table 5. Offshore test fishing catch indices and estimated inshore daily passage rate of sockeye salmon, Port Moller, Bristol Bay, 1979.

Date	No. of Stations Fished	Sockeye Salmon						
		Catch	Weight (lbs.)	Length (mm)	Index <sup>1/</sup>		Passage Rate <sup>2/</sup>	
					Daily	Accum.	Daily	Accum.
6/ 6	6	2	6.1	555	1.03	1.03	26	26
7	5	2	6.5	555	0.96	1.99	24	50
8					( 1.39)	3.38	35	85
9	4	4	4.8	501	1.80	5.18	45	130
10	1	1	7.5	558	2.01	7.19	51	181
11	5	5	7.3	560	2.22	9.41	56	237
12	6	60	6.3	552	30.98	40.39	604	841
13	5	48	6.2	547	24.10	64.49	584	1,425
14	5	90	6.1	550	42.73	107.22	917	2,342
15	5	45	6.3	562	19.22	126.44	246	2,588
16	4	130	5.9	548	85.41	211.85	1,945	4,533
17					(85.40)	297.25	2,100	6,633
18	2	20	5.8	532	(85.40)	382.65	3,068	9,701
19	3	66	6.2	553	(37.38)	420.03	701	10,402
20	3	86	6.0	550	(56.66)	476.69	1,200	11,602
21	6	152	6.1	550	65.18	541.87	1,373	12,975
22	5	311	5.9	546	124.90	666.77	3,204	16,179
23	4	120	5.9	545	85.14	751.91	2,097	18,276
24					(74.00)	825.91	1,829	20,105
25	3	97	5.7	542	58.34	884.25	1,669	21,774
26					(46.33)	930.58	1,309	23,083
27	4	59	5.8	545	34.31	964.89	895	23,978
28	6	95	5.7	547	52.58	1,017.47	1,277	25,255
29	4	29	5.5	535	16.98	1,034.44	572	25,827
Total	85	1,422	5.9	547		1,034.44		25,827

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

2/ Estimated daily passage rate (in numbers of fish) is the sum of the estimates for individual stations for that day which are calculated by multiplying the station index by a passage rate adjusted by the mean weight of the fish.

Table 6. Offshore test fishing catch indices and estimated inshore daily passage rate of chum salmon, Port Moller, Bristol Bay, 1979.

Date	No. of Stations Fished	Catch	Chum Salmon				
			Index <sup>1/</sup>		Passage Rate <sup>2/</sup>		
			Daily	Accum.	Daily	Accum.	
6/ 6	6						
7	5						
8			(0.45)	0.45	4		4
9	4	2	1.13	1.58	10		14
10	1		0.45	2.03	4		18
11	5	1	0.47	2.50	4		22
12	6	5	2.18	4.68	19		41
13	5	2	0.81	5.49	7		48
14	5	4	1.58	7.07	14		62
15	5	7	3.03	10.10	26		88
16	4	2	0.84	10.94	7		95
17			(1.24)	12.18	11		106
18	2	1	(0.75)	12.93	7		113
19	3	2	(1.21)	14.14	11		124
20	3		(0.22)	14.36	2		126
21	6	4	1.66	16.02	14		140
22	5	6	2.40	18.42	21		161
23	4	1	0.73	19.15	6		167
24			(1.88)	21.03	16		183
25	3	2	1.01	22.04	9		192
26			(2.20)	24.24	19		211
27	4	1	0.81	25.05	7		218
28	6	10	5.88	30.93	51		269
29	4		0.70	31.62	6		275
Total	85	50		31.62			275

<sup>1/</sup> Indices expressed in fish/100 fathom hours and includes interpolations for missed days (in brackets) and stations.

<sup>2/</sup> Estimated passage rate is expressed in thousands of fish, and is based on the historic average (1968-77) of 8,730 fish per adjusted index point.

Table 7. Summary of outside sockeye salmon drift net test fishing indices in the Ugashik district by index area and date, Bristol Bay, 1979.<sup>1/</sup>

Index Area	Date	
	7/2	7/3
Inside	1,440	624 <sup>2/</sup>
Pilot Point	450	519 <sup>2/</sup>
Dago Creek		137
Smokey Point	415	
Outer North	549	464
Outer Middle		
Outer South	923	326

<sup>1/</sup> All indices expressed in number of fish/100 fathom hours to the nearest full index point.

<sup>2/</sup> Average of two separate drifts in the same index area.

Table 8. Summary of outside sockeye salmon drift net test fishing indices in the Nushagak district by index area and date, Bristol Bay, 1979.<sup>1/</sup>

Index Area	Date 6/24
Nushagak River	
Wood River	
Kanakanak Beach	868
Grassy Island	0
Nushagak Point	1,025
Coffee Point	
Combine Flats	
Clarks Point	
Ekuk Bluff	
Schooner Channel, N. W.	
Schooner Channel, S. E.	
Ships Channel, N. W.	
Ships Channel, S. E.	
Middle Channel, N. W.	
Middle Channel, S. E.	
West Channel, N. W.	
West Channel, S. E.	
Dead Man's Spit	
Nichols Spit	

<sup>1/</sup> All indices expressed in number of fish/100 fathom hours to the nearest full index point.

Table 9. Summary of outside sockeye salmon set net test fishing indices in the Nushagak district by fishing site and date, Bristol Bay, 1979.<sup>1/</sup>

Date	Index Fishing Site		
	Etolin Point	Ekuk Bluff	Igushik Beach
6/19			
20	0		
21	5		2
22	0	116	11
23			9
24		4,652	29
25	25	296	9
26	124	242	1
27			18
28	48		2
29	4		111
30		3,480	92
7/ 1	293		162
2	30		3
3			9
4			50
5			364
6			
7			
8			21
9			42
10			19
11			320
12			12
13			7
14			2
15			8

<sup>1/</sup> All indices expressed in numbers of fish/100 fathom hours to the nearest full index point.

Table 10. Fishing effort registration by district, gear type and residency, Bristol Bay, 1979.<sup>1/2/</sup>

District	Type of Gear			(Percent)
	Drift	Set	Total	
<u>NAKNEK-KVICHAK</u>				
Resident	282	310	592	(53)
Non-Resident	475	57	532	(47)
Total	757	367	1,124	
<u>EGEGIK</u>				
Resident	108	97	205	(50)
Non-Resident	136	71	207	(50)
Total	244	168	412	
<u>UGASHIK</u>				
Resident	37	35	72	(87)
Non-Resident	8	3	11	(13)
Total	45	38	83	
<u>NUSHAGAK</u>				
Resident	495	276	771	(84)
Non-Resident	122	29	151	(16)
Total	617	305	922	
<u>TOGIAK</u>				
Resident	115	34	149	(99)
Non-Resident	1	0	1	(1)
Total	116	34	150	
<u>BRISTOL BAY</u>				
Resident	1,037	752	1,789	(66)
Non-Resident	742	160	902	(34)
Total	1,779	912	2,691	

1/ Does not incorporate district transfers.

2/ District registration based upon 1973 through 1977 average percentages.

TABLE 11. Bristol Bay emergency order fishing periods, commissioner's announcements, and general announcements by district, 1979. <sup>1/</sup>

Emergency Order Number	Date and Time	Hours Open
<u>SALMON</u>		
<u>NAKNEK-KVICHAK DISTRICT</u>		
K 01	June 24 11 am - June 25 11 am	24
K 02	June 25 11 am - June 25 11 pm	12
K 03	June 25 11 pm - June 26 12 N	13
K 05	June 26 12 N - June 27 1 pm	25
K 06	June 27 1 pm - June 28 2 pm	25
K 08	June 28 2 pm - July 17 9 am	18 days, 19 hrs. <sup>2/</sup>
Naknek Section only		
K 11	July 1 2 am - July 2 3 am	25 <sup>3/</sup>
K 13	July 2 3 am - July 2 3 pm	12
K 14	July 2 3 pm - July 17 9 am	14 days, 18 hrs.
<u>EGEGIK DISTRICT</u>		
K 01	June 24 10 am - June 25 10 am	24
K 04	June 26 12 N - June 26 12 MN	12
K 07	June 28 1 am - June 28 1 pm	12
K 09	June 29 1 pm - June 30 1 am	12
K 10	June 30 1 am - June 30 1 pm	12
K 12	July 2 3 am - July 2 3 pm	12
K 14	July 2 3 pm - July 17 9 am	14 days, 18 hrs.
<u>UGASHIK DISTRICT</u>		
K 04	June 26 2 pm - June 27 2 am	12
K 09	June 29 4 pm - June 30 4 am	12
K 15	July 5 6 am - July 5 6 pm	12
K 16	July 10 11:30 pm - July 11 11:30 pm	24
K 17	July 11 11:30 pm - July 17 9 am	5 days <sup>4/</sup> 9 <sup>1/2</sup> hrs.
K 18	July 21 9 am - July 23 9 am	48 <sup>5/</sup>
<u>NUSHAGAK DISTRICT</u>		
D 04	June 15 9 am - June 16 9 am	24 <sup>3/</sup>
D 05	June 19 6 am - June 20 6 am	24
D 06	June 19 6 am - June 21 12 MN	54 <sup>5/</sup>
D 07	June 21 9 am - June 21 9 pm	12
D 08	June 23 11 am - June 23 11 pm	12
D 09	June 25 1 pm - June 26 1 am	12
D 11	June 27 3 am - June 27 3 pm	12
D 12	June 27 3 pm - June 28 3 am	12
D 13	June 28 3 am - June 29 3 am	24
D 14	June 29 3 am - June 30 3 am	24
D 16	July 1 6 am - July 1 6 pm	12
D 17	July 1 6 pm - July 21 9 am	19 days, 15 hrs.

(Continued)

TABLE 11. (Continued)

Emergency Order Number	Date and Time		Hours Open
Igushik Section only			
D 10	June 26	1 am - June 26	1 pm 12
D 15	June 30	5 pm - July 1	5 pm 24
<u>TOGIK DISTRICT</u>			
Togiak Section only			
D 18	July 20	9 am - July 21	9 pm 36
D 19	July 27	9 am - July 28	9 pm 36
<u>HERRING</u>			
<u>BRISTOL BAY AREA</u>			
D 1	May 2	12 MN - June 30	12 MN 60 days 6/
D 2	May 11	12 MN - June 30	12 MN 51 days 6/
D 3	May 18	12 MN - June 30	12 MN 44 days 6/
<u>Commissioner's Announcements</u>			
Number	Date	Description	
KS-1	July 1	Permitted a waiver of the 48-hour waiting period prior to relocation of set net gear in the Naknek-Kvichak district.	
1-79	July 6	Granted a limited exception to 5 AAC 39.198 and permitted foreign processors to receive, process and transport sockeye salmon from the Naknek-Kvichak, Egegik and Nushagak districts under the conditions of a special waiver. It also designated constructive ports in these three Bays.	
2-79	July 10	Amended Commissioner's Announcement No. 1-79 by deleting Nushagak Bay as a constructive port and terminated any possible foreign fish processing waivers for the Nushagak district.	
3-79	July 11	Amended Commissioners Announcement No. 1-79 by deleting Kvichak Bay and Egegik Bay as constructive ports and terminated any foreign fish processing waivers for the Naknek-Kvichak and Egegik districts.	
<u>General Announcements</u>			
Number	Date	Description	
1	July 6	This is Steve Pennoyer, Acting Director of the Commercial Fisheries Division of the Alaska Department of Fish and Game with an announcement affecting the Bristol Bay	

(Continued)

TABLE 11. (Continued)

General Announcements

Number	Date	Description
		<p>Salmon fishery. There is currently a Board of Fisheries regulation, 5 AAC 39.198 which governs certain activities by aliens not lawfully admitted to the United States. Among other things, this regulation prohibits foreign vessels or aliens, or both from processing fish resources. The regulation also specifies that the Commissioner can grant a limited exception to this regulation to allow foreign vessels to process fish resources in places by him if certain conditions exist.</p> <p>In regards to the Bristol Bay fishery, the Commissioner has determined that the run is apparently exceeding pre-season forecast levels and harvest rates are holding up longer than anticipated. The Department is now estimating that some 24 million sockeye have entered Bristol Bay compared to a preseason forecast of 22.6 million. The run is still continuing.</p> <p>In the Nushagak, Naknek-Kvichak and Egegik districts of the Bristol Bay area the sockeye salmon escapement requirements have now been met or exceeded in many of the contributing systems. Escapements satisfy subsistence needs of the area and all sockeye salmon in or entering the commercial fishery are now available for commercial harvest. It is anticipated that additional areas will be open to commercial fishing as required escapements are obtained. The volume of fish available for harvest has exceeded the processing capacity of facilities operated by United States processors causing numerous and lengthy suspensions of operation, imposition of fishing limits and resultant loss of harvest opportunity to domestic fishermen. There is no opportunity for United States processors to make emergency arrangements to handle the total excess volume available. There is a likelihood of substantial wastage of fish resources to the fishery if foreign processing or transportation capacity is not utilized. There is no significant likelihood of clandestine foreign fishing operations if the exception is granted.</p> <p>Therefore, effective immediately the Commissioner grants a limited exception to the regulation 5 AAC 39.198 allowing foreign vessels to receive fish resources from fishermen licensed under the laws and regulations of the State, process those resources at designated areas and transport those resources through the waters of Alaska. These activities would be carried out under the terms of a permit issued by the Commissioner through the King Salmon,</p>

(Continued)

TABLE 11. (Continued)

General Announcements		
Number	Date	Description
		<p>Dillingham, or Juneau offices of the Department. It should be emphasized that there are numerous other licensing and permitting procedures required by various State and Federal agencies and further information on those requirements are also available through the Department offices.</p> <p>The areas open to foreign processing will be Nushagak Bay, Kvichak Bay and Egegik Bay.</p> <p>This announcement will remain in effect until rescinded by subsequent announcement which will occur when it is apparent that domestic facilities are able to take the fish that are surplus to escapement needs. At this time we have no way of determining how long the run will continue at the present level, but reiterate that when the surplus conditions ceases to exist, we will rescind the exception, allowing sufficient notice for all parties to be aware of the change.</p>
<u>1/</u>		Emergency order period: Naknek-Kvichak, Egegik and Ugashik districts from 9:00 am, June 23 until 9:00 am July 17; Nushagak district from 9:00 am June 16 until 9:00 am July 17.
<u>2/</u>		Naknek section subsequently closed for 25 hours of the period by emergency order No. K11.
<u>3/</u>		Closed to fishing.
<u>4/</u>		Fishing time extended through the usual weekend closure.
<u>5/</u>		Restricts fishing south of the red salmon boundary line.
<u>6/</u>		Closes various beach area to the commercial harvest of herring roe-on-kelp.

Table 12. Commercial catch by period and species, Naknek-Kvichak district, Bristol Bay, 1979.

Period	Time	Effort <sup>1/</sup>		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/ 1-6/9	-				2				2
6/11-16	5 days			1,308	1,131				2,439
6/18-23	5 days	550	100	755,579	1,118	5,326			762,023
6/24-27	3½ days	60	50	432,988	54	1,303			434,345
6/28-30	3 days	800	244	3,503,269	435	10,541			3,514,245
7/ 1- 3	3 days <sup>2/</sup>			2,882,458	110	11,576	2		2,894,146
7/ 4- 6	3 days			2,754,349	105	11,062	5		2,765,521
7/ 7- 9	3 days			1,916,339	125	19,383	7		1,935,854
7/10-12	3 days			1,925,147	162	27,335	4		1,952,648
7/13-15	3 days			925,799	328	30,223	5		956,355
7/16-21	5½ days			308,523	286	22,155	4		330,968
7/23-28	5 days			37,057	133	16,262	34	120	53,606
7/30-8/4	5 days			5,926	43	19,400	26	1,021	26,416
8/ 6-11	5 days			281	20	2,737	4	1,719	4,761
8/13-18	5 days			165	5	608	4	543	1,325
8/20-8/30	-			11		7		45	63
Total				15,449,199	4,057	177,918	95	3,448	15,634,717
Percent of District	Catch			98.8	+	1.1	+	+	100.0

<sup>1/</sup> Estimated actual effort based on aerial surveys during fishing periods.

<sup>2/</sup> Naknek section subsequently closed to fishing for 25 hours from 2 a.m. July 1 until 3 a.m. July 2.

Table 13. Commercial catch by period and species, Egegik district, Bristol Bay, 1979.

Period	Time	Effort <sup>1/</sup>		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/28-6/2	5 days			11	111	3			125
6/ 4- 9	5 days			101	545				646
6/11-16	5 days			5,950	1,000				6,950
6/18-23	5 days	169	153	229,677	886	3,226			233,790
6/24-25	24 hours	50	153	118,689	311	524			119,524
6/26	12 hours	69	153	139,816	162	781			140,759
6/28	12 hours	67	154	150,944	106	757			151,807
6/29-30	24 hours <sup>2/</sup>	136	154	209,656	154	1,634			211,444
7/ 2- 7	141 hours <sup>3/</sup>	102	126	903,582	196	7,205			910,983
7/ 8-14	7 days			372,937	98	7,917			380,952
7/15-21	153 hours			118,378	29	7,732			126,139
7/23-28	5 days			3,915	7	1,422		1,477	6,821
7/30-8/4	5 days			411		1,543		2,645	4,599
8/ 6-11	5 days				2	559		3,305	3,867
8/13-18	5 days							230	230
8/20-25	5 days					3		3,276	3,279
8/27-9/1	5 days							1,300	1,300
9/ 3- 8	5 days							303	303
Total				2,254,067	3,607	33,306	0	12,538	2,303,518
Percent of District Catch				97.9	0.2	1.4	-	0.5	100.0

<sup>1/</sup> Estimated actual effort based on aerial surveys during fishing periods.

<sup>2/</sup> A 12 hour period followed by a 12 hour extension.

<sup>3/</sup> A 12 hour period followed by an announcement for continuous fishing until 9 a.m. July 17.

Table 14. Commercial catch by period and species, Ugashik district, Bristol Bay, 1979.

Period	Time	Effort <sup>1/</sup>		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/28-6/2	5 days				867				867
6/ 4- 9	5 days				2,729				2,729
6/11-16	5 days			265	2,845				3,110
6/18-23	5 days	7	6	5,539	1,566	21			7,126
6/26-27	12 hours	6	4	11,978	30	41			12,049
6/29-30	12 hours	6	9	14,715	12	50			14,777
7/ 5	12 hours	15	7	37,962	8	122			38,092
7/10-14	96½ hours <sup>2/</sup>	20	9	77,969	21	8,375			86,365
7/15-21	7 days			221,504	35	7,966			229,505
7/22-28	153 hours			19,375	1	957			20,333
7/30-8/4	5 days			3,240	1	25	3	439	3,708
8/ 6-11	5 days			219	1	17	1	444	682
8/13-18	5 days			60	1	8	3	4,099	4,171
8/20-25	5 days			7		1		6,419	6,427
8/27-9/1	5 days							3,685	3,685
9/ 3- 8	5 days							2,368	2,368
9/10-15	5 days							870	870
Total				392,833	8,117	17,583	7	18,324	436,864
Percent of District	Catch			89.9	1.9	4.0	+	4.2	100.0

<sup>1/</sup> Estimated actual effort based on aerial surveys during fishing periods.

<sup>2/</sup> A 12 hour period followed by an announcement for continuous fishing until 9 a.m. July 21.

Table 15. Commercial catch by period and species, Nushagak district, Bristol Bay, 1979.

Period	Time	Effort <sup>1/</sup>		Number of Fish					Total	
		Drift	Set	Sockeye	King	Chum	Pink	Coho		
5/28-6/2	5 days			1	11,495					11,496
6/ 4- 9	5 days			5	14,259	4				14,268
6/11-15	4 days	430		437	57,466	418				58,321
6/19-20	24 hours	286	125	18,416	35,545	16,767		3		70,731
6/21	12 hours	340	136	11,876	3,156	3,827	6			18,865
6/23	12 hours	330	136	67,083	13,289	22,425	9			102,806
6/25-26	24 hours <sup>2/</sup>	364	174	159,139	4,267	24,156	3			187,565
6/27-30	3 days	459	174	1,097,523	6,271	63,929	17	3		1,167,743
7/ 1- 4	4 days	459	174	713,645	4,976	86,080	27			804,728
7/ 5- 7	3 days			354,685	678	44,344	20	1		399,728
7/ 8-10	3 days			392,260	620	48,662	78	14		441,634
7/11-15	5 days			387,582	1,012	76,112	66	105		464,877
7/16-21	5½ days			161,022	2,041	68,976	212	2,460		234,711
7/23-28	5 days			15,493	246	14,907	12	36,653		67,311
7/30-8/4	5 days			2,909	104	7,452	17	31,418		41,900
8/ 6-11	5 days			383	34	1,088	1	61,440		62,946
8/13-18	5 days			79	14	70		10,154		10,317
Total				3,382,538	155,473	479,217	468	142,251		4,159,947
Percent of District Catch				81.3	3.7	11.5	+	3.4		100.0

<sup>1/</sup> Estimated actual effort based on aerial surveys during fishing periods.

Second 12 hours of this period was open to Igushik section only.

Table 16. Commercial sockeye salmon catch by period from Clarks Point, Ekuk and Igushik beaches, Nushagak district, Bristol Bay, 1979.

Period	Time	Number of Fish		
		Clarks Point Beach <sup>1/</sup>	Ekuk Beach <sup>2/</sup>	Igushik Beach <sup>3/</sup>
5/28-6/2	5 days			
6/ 4- 9	5 days			
6/11-15	4 days		181	
6/19-20	24 hours		973	1,702
6/21	12 hours	3	182	301
6/23	12 hours	76	1,391	2,643
6/25-26	24 hours <sup>4/</sup>	36	3,783	13,343
6/27-30	3 days	6,126	68,327	18,682
7/ 1- 4	4 days	3,657	40,691	36,136
7/ 5- 7	3 days	10,683	53,790	24,669
7/ 8-10	3 days	1,186	29,198	26,206
7/11-15	5 days	11,564	57,006	25,148
7/16-21	5½ days	6,204	31,978	4,190
7/23-28	5 days	483	3,841	
7/30-8/4	5 days		345	
8/ 6-11	5 days			
8/13-18	5 days			
<b>Total</b>		<b>40,018</b>	<b>291,686</b>	<b>153,020</b>

1/ Approximate fishing effort was 22 set nets. Sockeye salmon accounted for 94.6% of the total beach catch; catch of other species included 184 kings, 1,388 chums, 99 pinks and 617 cohos.

2/ Approximate fishing effort was 90 set nets. Sockeye salmon accounted for 95.5% of the total beach catch; catch of other species included 2,040 kings 9,167 chums, 285 pinks and 2,335 cohos.

3/ Approximate fishing effort was 24 skiffs and 60 set nets. Sockeye salmon accounted for 99.1% of the total beach catch; catch of other species included 1,069 kings, 252 chums, 44 pinks and 2 cohos.

4/ Second 12 hours of this period was open to Igushik section only.

Table 17. Commercial catch by period and species, Togiak district, Bristol Bay, 1979.

Period	Time <sup>1/</sup>	Number of Fish					Total
		Sockeye	King	Chum	Pink	Coho	
6/ 4- 9	5 days	26	510	1			537
6/11-16	5 days	992	3,353	131			4,476
6/18-23	5 days	14,425	8,640	1,657	54		24,776
6/25-30	5 days	74,064	8,246	11,953	355		94,618
7/ 2- 7	5 days	86,016	5,699	29,319	695		121,729
7/ 9-14	5 days	125,458	2,644	59,134	423		187,659
7/16-21	5 days <sup>2/</sup>	88,453	999	65,678	85	7	155,222
7/23-28	5 days <sup>2/</sup>	53,940	323	30,802	73	20	85,158
7/30-8/4	5 days	27,230	83	17,086	47	280	44,726
8/ 6-11	5 days	6,644	31	4,083	29	2,943	13,730
8/13-18	5 days	1,573	32	2,048	35	24,167	27,855
8/20-25	5 days	561	13	261	17	38,276	39,128
8/27-9/1	5 days		6	58	3	46,592	46,659
9/ 3- 8	5 days		2	13		11,569	11,584
<b>Total</b>		<b>479,382</b>	<b>30,581</b>	<b>222,224</b>	<b>1,816</b>	<b>123,854</b>	<b>857,857</b>
<b>Percent of District Catch</b>		<b>55.9</b>	<b>3.6</b>	<b>25.9</b>	<b>0.2</b>	<b>14.4</b>	<b>100.0</b>

## Summary Catch by Section

Section	Number of Fish					Total
	Sockeye	King	Chum	Pink	Coho	
Togiak	411,644	28,463	209,693	1,692	84,419	735,911
Kulukak	66,629	2,106	10,848	88	32,272	111,943
Osviak	778	10	906	24	6,671	8,389
Matogak	331	2	777	12	492	1,614
<b>Total</b>	<b>479,382</b>	<b>30,581</b>	<b>222,224</b>	<b>1,816</b>	<b>123,854</b>	<b>857,857</b>

<sup>1/</sup> Togiak River section open 4 days-per-week, while other sections open 5 days-per-week.

<sup>2/</sup> Fishing time in Togiak River section extended 36 hours.

Table 18. Total commercial salmon catch by day and district, Bristol Bay, 1979.

Date	Number of Fish in Thousands					Daily
	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	
> 6/18	2	7	7	84	5	105
18	45	15	1		4	65
19	122	24	1	60	4	211
20	99	57	1	11	4	172
21	122	51	1	19	5	198
22	146	43	2		5	196
23	228	44	1	103	3	379
24	79	57				136
25	79	63		154	18	314
26	118	141	6	34	17	316
27	157		6	549	17	729
28	1,344	152		432	17	1,945
29	1,265	100	7	187	17	1,576
30	908	111	8		9	1,036
7/ 1	772			209		981
2	1,093	93		81	24	1,291
3	1,029	241		201	21	1,492
4	1,350	173		314	21	1,858
5	644	117	38	144	21	964
6	772	154		152	21	1,099
7	771	133		104	13	1,021
8	676	68		62		806
9	488	45		181	38	752
10	563	51	2	199	33	848
11	714	77	11	116	33	951
12	675	45	11	153	33	917
13	413	39	33	88	33	606
14	225	56	29	51	18	379
15	319	43	34	56		452
16	136	32	34	73	31	306
17	98	21	34	66	24	243
18	32	11	36	35	23	137
19	39	11	24	19	23	116
20	13	5	34	26	23	101
21	13	3	34	16	31	97
22 >	86	21	42	182	269	600
Total	15,635	2,304	437	4,160	858	23,393

Table 19. Commercial salmon catch by district and species, Bristol Bay, 1979.<sup>1/</sup>

District and River System	Number of Fish					Total
	Sockeye	King	Chum	Pink	Coho	
<u>NAKNEK-KVICHAK DISTRICT</u>						
Kvichak River	13,702,808					
Branch River	287,466					
Naknek River	1,458,925					
Total	15,449,199	4,057	177,918	95	3,448	15,634,717
<u>EGEGIK DISTRICT</u>	2,254,067	3,607	33,306		12,538	2,303,518
<u>UGASHIK DISTRICT</u>	392,833	8,117	17,583	7	18,324	436,864
<u>NUSHAGAK DISTRICT</u>						
Wood River	1,782,597					
Igushik River	1,065,499					
Nuyakuk River	375,462					
Nushagak-Mulchatna	148,832					
Snake River	10,148					
Total	3,382,538	155,473	479,217	468	142,251	4,159,947
<u>TOGIAK DISTRICT</u>						
Togiak Section	411,644	28,463	209,693	1,692	84,419	735,911
Kulukak Section	66,629	2,106	10,848	88	32,272	111,943
Osviak Section	778	10	906	24	6,671	8,389
Matogak Section	331	2	777	12	492	1,614
Total	479,382	30,581	222,224	1,816	123,854	857,857
TOTAL BRISTOL BAY	21,958,019	201,835	930,248	2,386	300,415	23,392,903
SPECIES PERCENT	93.8	0.9	4.0	+	1.3	100.0

<sup>1/</sup> Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak districts is preliminary.

Table 20. Daily sockeye salmon escapement counts by river system, Bristol Bay, 1979.

Date	Kvichak River		Naknek River		Egegik River		Ugashik River	
	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.
6/18			0	0	840	840		
19			48	48	432	1,272		
20	696	696	1,338	1,386	1,074	2,346		
21	498	1,194	0	1,386	9,828	12,174		
22	612	1,806	48	1,434	5,256	17,430		
23	396	2,202	138	1,572	6,732	24,162		
24	222	2,424	16,338	17,910	8,784	32,946		
25	356,430	358,854	133,716	151,626	2,100	35,046		
26	686,868	1,045,722	98,424	250,050	23,310	58,356		
27	850,170	1,895,892	106,122	356,172	65,802	124,158		
28	887,382	2,783,274	133,692	489,864	65,556	189,714		
29	1,015,074	3,798,348	45,894	535,758	169,158	358,872		
30	975,168	4,773,516	14,550	550,308	82,296	441,168		
7/ 1	557,016	5,330,532	55,596	605,904	70,548	511,716	1,800	1,800
2	585,012	5,915,544	89,046	694,950	100,554	612,270	10,884	12,684
3	925,692	6,841,236	17,088	712,038	99,828	712,098	30,702	43,386
4	640,218	7,481,454	30,624	742,662	64,254	776,352	1,716	45,102
5	492,762	7,974,216	33,972	776,634	22,392	798,744	8,832	53,934
6	486,090	8,460,306	56,202	832,836	56,178	854,922	69,810	123,744
7	667,410	9,127,716	40,512	837,348	25,860	880,782	66,792	190,536
8	573,660	9,701,376	12,330	885,678	21,498	902,280	53,382	243,918
9	446,460	10,147,836	6,870	892,548	46,914	949,194	127,776	371,694
10	294,828	10,442,664	3,648	896,196	29,886	979,080	172,950	544,644
11	220,122	10,662,786	8,838	905,034	19,062	998,142	167,856	712,500
12	107,712	10,770,498	7,092	912,126	15,114	1,013,256	116,874	829,374
13	90,576	10,861,074	5,244	917,370	6,270	1,019,526	247,602	1,076,976
14	68,160	10,929,234	4,050	921,420	4,590	1,024,116	202,416	1,279,392
15	76,992	11,006,226	2,244	923,664	3,270	1,027,386	90,672	1,370,064
16	57,696	11,063,922	1,698	925,362	3,474	1,030,860	43,176	1,413,240
17	48,888	11,112,810			1,182	1,032,042	34,524	1,447,764
18	38,922	11,151,732					20,592	1,468,356
19	25,614	11,177,346					59,046	1,527,402
20	23,220	11,200,566					74,862	1,602,264
21	10,050	11,210,616					37,578	1,639,842
22	6,468	11,217,084					22,506	1,662,348
23	1,350	11,218,434					11,514	1,673,862
24							13,536	1,687,398
25							6,372	1,693,770
26							7,134	1,700,904
System Total		11,218,434		925,362		1,032,042		1,700,904

(continued)

Table 20. (continued)

Date	Wood River		Igushik River		Nuyakuk River		Snake River		Logiak River	
	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.
6/19	180	180								
20	570	750					1	1		
21	330	1,080	324	324				1		
22	228	1,308	1,068	1,392				1		
23	78	1,386	912	2,304				1		
24	276	1,662	1,596	3,900				1		
25	55,026	56,688	1,752	5,652				1		
26	245,730	302,418	5,352	11,004			4	5		
27	159,702	462,120	18,816	29,820			17	22		
28	18,462	480,582	27,600	57,420			292	314	66	66
29	12,480	493,062	30,456	87,876			282	596	708	774
30	9,348	502,410	29,706	117,582	168	168	80	676	498	1,272
7/ 1	263,688	766,098	27,678	145,260	3,510	3,678	212	888	2,484	3,756
2	529,596	1,295,694	64,020	209,280	24,492	28,170	636	1,524	804	4,560
3	39,468	1,335,162	88,686	297,966	46,746	74,916	2,119	3,643	2,904	7,464
4	8,502	1,343,664	63,852	361,818	26,124	101,040	1,076	4,719	2,700	10,164
5	18,960	1,362,624	72,126	433,944	12,006	113,046	606	5,325	6,942	17,106
6	166,998	1,529,622	56,952	490,896	49,326	162,372	326	5,651	5,952	23,058
7	115,812	1,645,434	46,140	537,036	55,206	217,578	430	6,081	2,454	25,512
8	18,036	1,663,470	60,294	597,330	38,208	255,786	852	6,933	3,522	29,034
9	5,952	1,669,422	53,148	650,478	17,340	273,126	496	7,429	3,576	32,610
10	5,046	1,674,468	40,116	690,594	11,448	284,574	277	7,706	5,688	38,298
11	3,900	1,678,368	25,050	715,644	33,198	317,772	143	7,849	9,312	47,610
12	7,704	1,686,072	23,442	739,086	21,660	339,432	110	7,959	11,556	59,166
13	5,406	1,691,478	20,742	759,828	9,486	348,918	87	8,046	6,624	65,790
14	4,320	1,695,798	12,522	772,350	3,084	352,002	85	8,131	4,242	70,032
15	5,190	1,700,988	15,192	787,542	2,334	354,336	56	8,187	3,852	73,884
16	4,992	1,705,980	12,090	799,632	2,316	356,652	19	8,206	3,330	77,214
17	372	1,706,352	7,986	807,618	2,400	359,052	37	8,243	9,000	86,214
18			5,598	813,216	1,068	360,120	91	8,334	11,376	97,590
19			5,286	818,502			61	8,395	13,350	110,940
20			3,882	822,384			44	8,439	9,294	120,234
21			4,116	826,500					4,860	125,094
22			4,686	831,186					3,978	129,072
23			7,914	839,100					2,796	131,868
24			5,760	844,860					2,088	133,956
25			5,472	850,332					2,706	136,662
26			7,218	857,550					4,566	141,228
27			2,010	859,560					5,658	146,886
28									5,322	152,208
29									3,720	155,928
30									3,072	159,000
31									3,870	162,870
8/ 1									3,168	166,038
2									4,416	170,454
3									684	171,138
System Total		1,706,352		859,560		360,120		8,439		171,138

Table 21. Daily salmon escapement sonar counts by species, Nushagak River, Bristol Bay, 1979.

Date	Sockeye		King		Chum		Total	
	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.
6/24	24	24	73	73	73	73	170	170
25	35,229	35,253	17,614	17,687	17,614	17,687	70,457	70,627
26	3,079	38,332	713	18,400	1,614	19,301	5,406	76,033
27	16,572	54,904		18,400	4,660	23,961	21,232	97,265
28	114,031	168,935		18,400	5,444	29,405	119,475	216,740
29	226,492	395,427		18,400	46,014	75,419	272,506	489,246
30	37,122	432,549		18,400	28,715	104,134	65,837	555,083
7/ 1	5,684	438,233	4,906	23,306	19,468	123,602	30,058	585,141
2	12,333	450,566	1,898	25,204	11,058	134,660	25,289	610,430
3	5,133	455,699		25,204	753	135,413	5,886	616,316
4	578	456,277		25,204	290	135,703	868	617,184
5	128	456,405	64	25,268	1,129	136,832	1,321	618,505
6	491	456,896	294	25,562	295	137,127	1,080	619,585
7	6,410	463,306		25,562	1,007	138,134	7,417	627,002
8	2,180	465,486		25,562	329	138,463	2,509	629,511
9	2,066	467,552		25,562	1,750	140,213	3,816	633,327
10	992	468,544	503	26,065	985	141,198	2,480	635,807
11	16	468,560		26,065	299	141,497	315	636,122
12	471	469,031		26,065	1,503	143,000	1,974	638,096
13	676	469,707	705	26,770	3,483	146,483	4,864	642,960
14	1,526	471,233		26,770	1,138	147,621	2,664	645,624
15	2,003	473,236		26,770	1,983	149,604	3,986	649,610
16	5,264	478,500	2,809	29,579	8,428	158,032	16,501	666,111
17	4,992	483,492	927	30,506	927	158,959	6,846	672,957
18	14,524	498,016	683	31,189	3,588	162,547	18,795	691,752
19	3,209	501,225	1,612	32,801	3,241	165,788	8,062	699,814
Total		501,225		32,801		165,788		699,814

Table 22. Summary of salmon aerial survey escapement estimates by species, district and river system, Bristol Bay, 1979.<sup>1/</sup>

District and River System	Number of Fish <sup>2/</sup>							
	Sockeye Salmon		King Salmon		Chum Salmon		Coho Salmon	
	Index	Total	Index	Total	Index	Total	Index	Total
<b>NAKNEK-KVICHAK DISTRICT</b>								
Kvichak River	-	-	-	-	-	-	-	-
Branch River	-	294,200	-	-	-	-	-	-
Naknek River	-	-	-	7,150	-	-	-	-
Total	-	294,200	-	7,150	-	-	-	-
<b>EGEGIK DISTRICT</b>								
Egegik River	-	-	-	-	-	-	-	-
<b>UGASHIK DISTRICT</b>								
Ugashik River	-	-	-	-	-	-	-	-
Mother Goose	3,000	6,000	400	800	-	-	80	-
Total	3,000	6,000	400	800	-	-	80	-
<b>NUSHAGAK DISTRICT</b>								
Wood River <sup>3/</sup>	-	-	20	-	-	-	-	-
Muklung River	6,300	9,500	950	-	100	-	-	-
Igushik River	0	0	100	-	0	-	-	-
Nuyakuk River <sup>4/</sup>	1,300	2,600	240	-	0	-	-	-
Nushagak River <sup>5/</sup>	37,400	70,600	14,220	-	8,300	-	-	-
Mulchatna River <sup>6/</sup>	28,200	54,400	13,710	-	6,860	-	-	-
Snake River	0	0	20	-	0	-	-	-
Total	73,200	139,100	29,260	95,000	15,260	100,000	-	-
<b>TOGIAK DISTRICT</b>								
Togiak River <sup>7/</sup>	11,170	23,700	4,560	-	13,900	87,800	-	-
Ungalikthluk River <sup>8/</sup>	1,300	2,600	980	-	10,500	21,000	-	-
Kulukak River <sup>9/</sup>	15,400	26,600	2,260	-	16,400	32,800	-	-
Quigmy River	0	0	20	-	11,000	22,000	-	-
Matogak River	200	400	100	-	13,400	26,800	-	-
Osviak River	200	400	210	-	36,200	72,400	-	-
Slug River <sup>10/</sup>	0	0	0	-	9,000	30,000	-	-
Total	28,270	53,700	8,130	20,000	140,400	292,800	-	-
<b>TOTAL BAY</b>	<b>104,470</b>	<b>493,000</b>	<b>37,790</b>	<b>122,950</b>	<b>155,660</b>	<b>392,800</b>	<b>80</b>	<b>0</b>

1/ Detailed information on aerial survey derived escapements are published in annual summary reports.

2/ Aerial survey escapement estimates are categorized as: index - indices of total escapement; generally data is incomplete which will not allow determination of total escapement; total - aerial survey data is complete and does allow estimate of total escapement.

3/ Includes Ice and Sunshine Creeks and Peace and Wind Rivers.

4/ Below the counting tower.

5/ Includes Iowithla, Kokwok, Klutispaw, King Salmon and Chichitnok Rivers and Klutuk Creek.

6/ Includes Stuyahok, Koktuli and Chilikadrotna Rivers and Mosquito Creek.

7/ Includes Gechiak and Pungokebuk Creeks and Kashaiaik, Narogurum and Ongivinuck Rivers.

8/ Includes Kukayachagak and Kurtluk River.

9/ Includes Kulukak Lake and Tithe Creek ponds.

10/ Includes Pierce Creek and South/North Creeks on Hagemester Island.

Table 23. Summary of Kvichak River daily sockeye salmon escapement counts, aerial survey and river test fishing estimates, Naknek-Kvichak district, Bristol Bay, 1979.

Date	Tower Count Daily    Accum.		Enumeration Method <sup>1/</sup>							
			Aerial Survey				River Test Fishing			
			Nakeen to Index	Index to Index	Index to Tower	Total	Fish Per Index Pt. <sup>2/</sup>	Index Point	Accumulative Escapement	
6/17									0	
18								322	11	4
19								"	41	13
20	1	1						"	41	13
21	+	1						"	41	13
22	1	2						"	42	14
23	+	2	-	0	0	0		"	50	16
24	+	2						"	3,784	1,218
25	356	359	810	1,505	438	2,753		8,516	11,713	9,975
26	687	1,046	981	1,909	486	3,376		21,003	12,944	27,186
27	850	1,896	801	1,896	510	3,207		501	16,561	8,297
28	887	2,783	594	1,959	726	3,279		238	21,361	5,084
29	1,015	3,798						293	21,780	6,382
30	975	4,774							<u>3/</u>	
7/ 1	557	5,331	693	1,387	426	2,506				
2	585	5,916								
3	926	6,841								
4	640	7,481	180	477	348	1,005				
5	493	7,974								
6	486	8,460	603	938	168	1,709				
7	667	9,128								
8	574	9,701	14	411	300	725				
9	446	10,148								
10	295	10,443								
11	220	10,663								
12	108	10,770								
13	91	10,861								
14	68	10,929								
15	77	11,006								
16	58	11,064								
17	49	11,113								
18	39	11,152								
19	26	11,177								
20	23	11,201								
21	10	11,211								
22	6	11,217								
23	1	11,218								
Total		11,218								6,382

1/ In thousands of fish.

2/ Fish per index from 6/18-24 based on catchability and from 6/25-29 based on 3-day lag time from tower escapement.

3/ Project terminated early.

Table 24. Summary of Egegik River daily sockeye salmon escapement counts, aerial survey and river test fishing estimates, Egegik district, Bristol Bay, 1979.

Date	Enumeration Method <sup>1/</sup>					Comments
	Tower Count		Aerial <sup>2/</sup> Survey	Inside Test Fishing <sup>3/</sup>		
	Daily	Accum.		Daily	Accum.	
6/16				2	2	
17				9	11	
18	1	1		7	18	
19	+	1	1	2	20	Good visibility.
20	1	2		2	22	
21	10	12	9	2	23	Excellent visibility.
22	5	17		0	23	
23	7	24		2	25	
24	9	33		8	32	
25	2	35	15	17	49	Fair visibility.
26	23	58	18	98	147	Poor visibility.
27	66	124	179	97	244	Fair visibility.
28	66	190	194	266	510	Good visibility.
29	169	359	189	271	782	Poor visibility.
30	82	441		13	794	
7/ 1	71	512	79	166	960	Excellent visibility.
2	101	612		76	1,036	
3	100	712		27	1,063	
4	64	776		85	1,148	
5	22	799		52	1,200	
6	56	855		33	1,233	
7	26	881		126	1,359	
8	21	902		74	1,433	
9	47	949		11	1,444	
10	30	979		7	1,450	
11	19	998				
12	15	1,013				
13	6	1,020				
14	5	1,024				
15	3	1,027				
16	3	1,031				
17	1	1,032				
Total		1,032			1,450	

1/ In thousands of fish.

2/ Includes estimate of fish in clearwater immediately below the lagoon index areas.

3/ Estimates based on average of escapement/index for previous years (79.8 fish/index point).

Table 25. Summary of Ugashik River daily sockeye salmon escapement counts, aerial survey and river test fishing estimates, Ugashik district, Bristol Bay, 1979.

Date	Enumeration Method <sup>1/</sup>				Comments	
	Tower Count		Aerial <sup>2/</sup> Survey	Inside Test Fishing <sup>3/</sup>		
	Daily	Accum.		Daily		Accum.
6/21				3	3	
22				2	5	
23				+	5	
24				1	6	
25				6	12	
26			+	29	40	Poor visibility.
27				27	67	
28			7	29	96	Fair visibility.
29				40	135	
30				78	214	
7/ 1	2	2	23	61	274	Good visibility.
2	11	13	65	167	435	Good visibility.
3	31	43	77	84	519	Poor visibility.
4	2	45		120	639	
5	9	54	65	99	738	Poor visibility.
6	70	124	130	88	825	Poor visibility.
7	67	191	189	110	935	Fair visibility.
8	53	244		94	1,029	
9	128	372	103	65	1,094	Good visibility.
10	173	545	338	52	1,146	Fair visibility.
11	168	713		39	1,184	
12	117	829		24	1,209	
13	248	1,077		28	1,236	
14	202	1,279				
15	91	1,370				
16	43	1,413				
17	35	1,448				
18	21	1,468				
19	59	1,527				
20	75	1,602				
21	38	1,640				
22	23	1,662				
23	12	1,674				
24	14	1,687				
25	6	1,694				
26	7	1,701				
Total		1,701			1,236	

1/ In thousands of fish.

2/ Includes total estimates for lagoon index areas and river below lagoon.

3/ Estimates based on average of escapement/index for previous years (34.2 fish/index point).

Table 26. Summary of Wood River daily sockeye salmon escapement counts and aerial survey estimates, Nushagak district, Bristol Bay, 1979.

Date	Enumeration Method <sup>1/</sup>		Aerial Surveys <sup>2/</sup>	Comments
	Tower Count Daily	Accum.		
6/19	+	+		
20	1	1		
21	+	1		
22	+	1		
23	+	1		
24	+	2		
25	55	57	51	Heavy in lower river; poor vis.
26	246	302	136	Estimate total river at 300,000.
27	160	462	75	Heavy in upper river, light below.
28	18	481	3	Average of two surveys; exc. vis.
29	12	493	5	No fish in lower river; exc. vis.
30	9	502		No survey due to poor weather.
7/ 1	264	766	150	Estimate total river at 250,000.
2	530	1,296	211	Heavy in upper river.
3	39	1,335		
4	9	1,344		
5	19	1,363		
6	167	1,530	140	Good visibility.
7	116	1,645	11	Partial river count.
8	18	1,663		
9	6	1,669		
10	5	1,674		
11	4	1,678		
12	8	1,686		
13	5	1,691		
14	4	1,696		
15	5	1,701		
16	5	1,706		
17	+	1,706		
Total		1,706		

<sup>1/</sup> In thousands of fish.

<sup>2/</sup> Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 27. Summary of Igushik River daily sockeye salmon escapement counts, aerial survey and river test fishing estimates, Nushagak district, Bristol Bay, 1979.

Date	Enumeration Method <sup>1/</sup>							
	Tower Count		Aerial Survey <sup>2/</sup>			River Test Fishing		
	Daily	Accum.	Lagoon	River	Total	Fish/ Index Pt. <sup>3/</sup>	Accumulative Index Pt.	Escapement
6/21	+	+				22.0	338	7
22	1	1				"	404	9
23	1	2	+	+	+	"	456	10
24	2	4				"	671	15
25	2	6	1	+	1	"	2,621	58
26	5	11	+	1	1	"	4,987	110
27	19	30	2	3	4	"	6,359	140
28	28	57	8	5	14	12.0	7,832	94
29	30	88	3	3	6	"	9,129	110
30	30	118				"	11,910	143
7/ 1	28	145	1	2	3	18.8	16,268	306
2	64	209	3	2	5	19.8	23,240	460
3	89	298				"	26,003	515
4	64	362				"	27,153	538
5	72	434				"	28,459	564
6	57	491				"	30,619	606
7	46	537				"	35,599	705
8	60	597				20.1	37,733	758
9	53	650				"	39,208	788
10	40	691				"	40,240	809
11	25	716				"	41,603	836
12	23	739				"	42,956	863
13	21	760				"	45,476	914
14	13	772						
15	15	788						
16	12	800						
17	8	808						
18	6	813						
19	5	819						
20	4	822						
21	4	827						
22	5	831						
23	8	839						
24	6	845						
25	5	850						
26	7	858						
27	2	860						
Total		860					45,476	914

1/ In thousands of fish.

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

3/ Fish per index point was originally based on the historic relationship between escapements and test fishing indices, and was adjusted periodically during the season based on catchability and lag timing factors.

Table 28. Summary of Togiak River daily sockeye salmon escapement counts and aerial survey estimates, Togiak district, Bristol Bay, 1979.

Date	Tower Count		Enumeration Method <sup>1/</sup>				Comments
	Daily	Accum.	Aerial Survey <sup>2/</sup>			Total	
			Togiak to Pung.	Pungokepuk to Ongi.	Ongivinuck to Tower		
6/28	+	+					
29	1	1	0	+	1	1	Poor visibility.
30	+	1					
7/ 1	2	4					
2	1	5					
3	3	7					
4	3	10					
5	7	17					
6	6	23					
7	2	26	+	2	2	4	Fair to good vis.; poor
8	4	29					vis. l. river, good above.
9	4	33	+	2	4	6	Good visibility.
10	6	38					
11	9	48					
12	12	59					
13	7	66					
14	4	70					
15	4	74					
16	3	77					
17	9	86					
18	11	98					
19	13	111					
20	9	120					
21	5	125					
22	4	129					
23	3	132					
24	2	134					
25	3	137					
26	5	141					
27	6	147					
28	5	152					
29	4	156					
30	3	159					
31	4	163					
8/ 1	3	166					
2	4	170					
3	1	171					
Total		171					

1/ In thousands of fish.

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

Table 29. Commercial processors and buyers operating by district, Bristol Bay, 1979.<sup>1/</sup>

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
<u>NAKNEK-KVICHAK DISTRICT</u>							
(A) <u>SALMON</u>							
1. Alaska Far East Corp.	King Salmon					Air	
2. Alaskan Fisheries Co.	M/V Alaskan I		Floater				
3. Alaska Internat. Traders	M/V Bobbie					Air	
4. Alaska Marine Processors	M/V Kathi R		Floater				
5. Alaska Marine Products	M/V Francis Lee		Floater				
6. Alaska Packers Ass'n.	S. Naknek	2-½ lb. 2-1 lb.					Installed new ½ lb. line.
7. Alaska Trading Co.	King Salmon					Air	
8. Al-Aska Trading Co.	Naknek-Kvichak		Floater	Floater			
9. All Alaskan Seafoods	M/V All Alaskan		Floater			Sea	
10. Arrowac	King Salmon					Air	
11. Associated Earthmovers	King Salmon					Air	
12. Ball Brothers	Dillingham					Air	
13. Beason, Joseph	Naknek					Air	
14. Big Creek Fishing & Packing	Big Creek					Air	
15. Bumble Bee Seafoods	S. Naknek	2-½ lb. 3-1 lb.	Shore plant				Sea
16. Crusader Fisheries	M/V Crusader & Eagle			Floater			
17. Gina Karen Fishing	M/V Gina Karen		Floater				
18. Icicle Seafoods	Dillingham		Floater			Air	Frozen on "Star" vessels.
19. Ikari Alaska Fisheries	M/V Tyee & Princess		Floater				
20. Kenai Packers	S. Naknek					Air	Sea
21. Kemp Fisheries	Naknek		Floater				Sea M/V Courageous & Baranof.
22. Lockers, 10th and M	King Salmon					Air	
23. Morpac	Dillingham		Floater			Air	M/V Denali.
24. Mystic Way	M/V Trident		Floater				
25. Nelbro Packing Co.	Naknek	3-½ lb. 2-1 lb.	Shore plant			Air	Installed new 1 lb. line.
26. New England Fish Co.	Pederson Pt.		Shore plant			Air	
27. North Coast Seafood Proc.	M/V Polar Bear		Floater				
28. North Peninsula Fisheries	King Salmon					Air	
29. Northern Aurora Fisheries	M/V Northern Aurora		Floater	Floater			
30. Northland Seafood Prod.	M/V Northland		Floater				
31. Nuka Point Fisheries	Marin I			Floater			
32. Osmar's Ocean Specialties	Naknek					Air	
33. Peter Pan Seafoods	Nornak					Air	Sea
34. Putman Fish Co.	Naknek					Air	
35. Queen Fisheries	Naknek					Air	
36. Red Salmon Co.	Naknek	2-½ lb. 2-1 lb.	Shore plant				Sea Installed new ½ lb. line.
37. Salamatof Seafoods	Naknek					Air	
38. Sea Alaska	M/V Obsession		Floater				
39. Sea Products Export Co.	Dillingham					Air	
40. Skagit Fisheries	M/V Early & Golden Dawn		Floater				
41. Sunflne Seafoods	S. Naknek			Shore plant		Air	
42. Trans-Pacific Seafoods	M/V Penguin & Pavlof		Floater				
43. Trident Seafoods	M/V Bountiful		Floater				
44. Western Alaska Fisheries	M/V Pacific Har.			Floater	Floater		
45. Whitney-Fidalgo Seafoods	Naknek M/V Yardarm Knot	1-½ lb. 1-1 lb.	Floater			Air	Sea
Total Naknek-Kvichak District:		5	23	6	23	7	

(continued)

Table 29. (continued)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
<u>EGEGIK DISTRICT</u>							
(A) <u>SALMON</u>							
1. Alaskan Fisheries Co.	M/V Alaskan I		Floater				
2. Alaska Trading Co.	King Salmon				Air		
3. All Alaskan Seafoods	M/V All Alaskan		Floater				
4. Associated Earthmovers	King Salmon				Air		
5. Big Creek Fishing & Packing	Big Creek		Floater		Air		M/V Express.
6. Columbia-Wards Fisheries	N. Egegik						Fish camp.
7. Dressel-Pacific	M/V Kayak	1-1 lb.			Air		Canning floater.
8. Egegik Resources Development	S. Egegik	2-½ lb.	Shore				dba Diamond E.
		1-1 lb.	plant				
9. Favco	S. Egegik				Air		
10. Icicle Seafoods	M/V Alaska Star		Floater				
11. Kenai Packers	S. Naknek				Air		
12. Morpac	Dillingham		Floater				M/V Denali.
13. Nelbro Packing Co.	Naknek					Sea	Tender to N/K
						Sea	for canning.
14. New England Fish Co.	S. Egegik		Floater				M/V Alaskan
							Enterprise.
15. North Peninsula Fisheries	King Salmon				Air		
16. Northern Aurora Fisheries	M/V Northern Aurora		Floater				
17. Oregon-Alaska Fisheries	S. Egegik				Air		
18. Sea Alaska	M/V Obsession		Floater				
19. Trans-Pacific Seafoods	M/V Penguin & Pavlof		Floater				
20. Trident Seafoods	M/V Bountiful		Floater				
21. Whitney-Fidalgo Seafoods	Naknek		Floater				M/V Mokuhana.
Total Egegik District:		2	12	0	8	2	
<u>UGASHIK DISTRICT</u>							
(A) <u>SALMON</u>							
1. All Alaskan Seafoods	M/V All Alaskan		Floater				
2. Egegik Resources Development	S. Egegik					Sea	Tender to Egegik
							for canning.
3. Griechen Fish Co.	Pilot Point		Shore plant				
4. Icicle Seafoods	M/V Alaska Star		Floater				
5. Northern Aurora Fisheries	M/V Northern Aurora		Floater				
6. Northland Seafood Products	M/V Northland		Floater				
7. Salamatof Seafoods	Naknek				Air		
8. Trans-Pacific Seafoods	M/V Penguin & Pavlof		Floater				
9. Whitney-Fidalgo Seafoods	Naknek					Sea	Tender to N/K
							for canning.
Total Ugashik District:		0	6	0	1	2	
<u>NUSHAGAK DISTRICT</u>							
(A) <u>SALMON</u>							
1. Alaska Far East Corp.	King Salmon				Air		M/V Salvage King.
2. Alaska Marine Processors	M/V Kathi R & Speedwell		Floater				
3. Alaska Marine Products	Francis Lee		Floater				Additional vessels.
4. Alaska Packers Ass'n.	Clarks Point		Floater				M/V Sea Alaska & Sea Producer.
5. All Alaskan Seafoods	M/V All Alaskan		Floater				
6. Ball Brothers	Dillingham				Air		

(continued)

Table 29. (continued)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
<u>NUSHAGAK DISTRICT (continued)</u>							
<b>(A) SALMON (continued)</b>							
7. Columbia-Wards Fisheries	Ekuk	1-½ lb. 3-1 lb.	Shore plant & floater			Sea	M/V Double Star.
8. Crusader Fisheries	M/V Crusader & Eagle					Floater	
9. Dolphin Partnership	M/V Dolphin		Floater				
10. Eastern Shellfish						Sea	Tender to Kodiak for canning.
11. Egegik Resources Development	S. Egegik					Sea	Tender to Egegik for canning.
12. Engstrom Brothers	Dillingham		Shore plant				
13. Icicle Seafoods	Dillingham		Floater				Frozen on "Star" vessels.
14. Midgulf Seafoods	M/V Northern King		Floater				
15. Morpac	Dillingham		Floater			Air	M/V Denali.
16. N & N Market	Dillingham		Shore plant floater				Frozen for retail market.
17. North Coast Seafood Proc.	M/V Polar Bear						
18. North Peninsula Fisheries	King Salmon					Air	M/V Bobbi.
19. Nuka Point Fisheries	Marin I					Floater	
20. Olympic Seafoods	M/V Teddy		Floater				
21. Peter Pan Seafoods	Dillingham	1-½ lb. 2-1 lb.				Air	Sea
22. Queen Fisheries	Nushagak	1-½ lb. 2-½ lb. 1-1 lb.				Air	Sea
23. Sea Products Export Co.	Dillingham					Air	
24. Sea Run Seafoods	Dillingham					Air	
25. Trident Seafoods	M/V Bountiful		Floater				
26. Whitney-Fidalgo Seafoods	Naknek					Air	
Total Nushagak District:		3	14	2	9	5	
<u>TOGIK DISTRICT</u>							
<b>(A) SALMON</b>							
1. Alaska Marine Products	M/V Aleska		Floater				
2. Ball Brothers	Dillingham					Air	
3. Dolphin Partnership	M/V Dolphin		Floater				
4. Kachemak Seafoods	Togiak					Shore plant	Air
5. Northland Seafood Prod.	M/V Northland		Floater			Floater	
6. Olympic Seafoods	M/V Teddy		Floater				
7. Togiak Fisheries	Togiak	1-½ lb. 1-1 lb.	Shore plant				
Total Togiak District:		1	5	2	2	0	
<b>(B) HERRING</b>							
1. Alaska Marine Processors	M/V Speedwell					Floater	
2. Alaska Packers Ass'n.	Ultra Processor		Floater				
3. Alaska Shore Fisheries	M/V Gina Karen					Floater	
4. All Alaskan Seafoods	M/V All Alaskan		Floater				
5. Atco Seafoods	M/V Priscilla Ann					Floater	
6. Ball Brothers	M/V Julie B					Floater	
7. Columbia-Wards Fisheries	Ekuk		Shore plant			Floater	
8. Deep Sea	M/V Deep Sea					Floater	
9. Denali Seafoods	M/V Denali		Floater				
10. Fairbanks Forest & Farm	Goodnews Bay					Air	

(continued)

Table 29. (continued)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
<u>TOGIAC DISTRICT (continued)</u>							
(B) <u>HERRING (continued)</u>							
11. Icicle Seafoods	Star vessels		Floater				
12. Kemp Fisheries	M/V Frieda K.			Floater			
13. Kenai Packers				Floater			
14. Kodiak King Crab			Floater	Floater			Tender fish to Kodiak.
15. North Coast Seafood Prod.	M/V Polar Bear		Floater				
16. New England Fish Co.	Pederson Pt.			Floater			
17. Northern Aurora Fisheries	M/V Northern Aurora		Floater				
18. Nuka Point Fisheries	Marin I			Floater			
19. Pacific Pearl Seafoods	M/V Akutan		Floater	Floater			
20. Pisces	M/V Golden Pices			Floater			
21. Queen Fisheries	Nushagak			Floater			
22. Seapac Fisheries	M/V Oakland Seapac			Floater			
23. Seward Fisheries	Homer			Floater			Tender fish to Homer.
24. Seward Marine Services	M/V Odyssey			Floater			
25. Skagit Fisheries	M/V Golden Dawn			Floater			
26. Sorensen Lighterage	M/V Starling/Snooks			Floater			
27. Togiak Fisheries	Togiak		Shore plant				
28. Tormala, Irving	M/V Crusader/Eagle			Floater			
29. Trident Seafoods	M/V Bountiful		Floater	Floater			
30. Wesley Brand Shrimp/Prawns	M/V Obsession			Floater			
31. Western Alaska Fisheries	M/V Pacific Harvest/Kaliakh			Floater			
32. Whitney-Fidalgo Seafoods	M/V Yardarm Knot		Floater	Floater			
Total Togiak District:		0	12	24	1	0	
(C) <u>HERRING ROE-ON-KELP</u>							
1. All Alaskan Seafoods	M/V All Alaskan			Floater			
2. Anderson, Emil A.	Metervik Bay			Floater			
3. Aspelund, Allan	Togiak			Floater			
4. Brown, Lois	Togiak			Floater			
5. Columbia-Wards Fisheries	Ekuk			Floater			
6. Gould, Robert J.	Togiak			Floater			
7. Hansen, Paul J.	F/V Cutbank Queen			Floater			
8. Herrmann, Helen M.	Togiak			Floater			
9. Ivanoff, Alfred	Togiak			Floater			
10. Newby, Richard A.	M/V Grampus			Floater			
11. Nuka Point Fisheries	Marin I			Floater			
12. O'Neill, Raymond P.	F/V Gloria Rae			Floater			
13. Skagit Fisheries	M/V Golden Dawn			Floater			
14. Sorensen Lighterage	M/V Starling/Snooks			Floater			
15. Togiak Fisheries	Togiak			Shore plant			
16. Whitney-Fidalgo Seafoods	M/V Mokuhana			Floater			
Total Togiak District:		0	0	16	0	0	

(continued)

Table 29. (continued)

FISHERY OPERATOR SUMMARY

District	Number of Operators						Number of Canning Lines <sup>2/</sup>		
	(Total)	Canned	Frozen	Cured	Export Fresh Brine		1 lb.	½ lb.	¼ lb.
<b>(A) SALMON</b>									
Naknek-Kvichak	(45)	5	23	6	23	7	10	10	-
Egegik	(21)	2	12	-	8	2	2	2	-
Ugashik	(9)	-	6	-	1	2	-	-	-
East Side	(51)	(7)	(26)	(6)	(26)	(10)	12	12	-
Nushagak	(26)	3	14	2	9	5	6	4	1
Togiak	(7)	1	5	2	2	-	1	1	-
West Side	(28)	(4)	(15)	(4)	(10)	(5)	7	5	1
Total Bay	(60)	11	34	8	28	13	19	17	1
<b>(B) HERRING</b>									
Togiak	(32)	-	12	24	1	-	-	-	-
<b>(C) HERRING ROE-ON-KELP</b>									
Togiak	(16)	-	-	16	-	-	-	-	-

<sup>1/</sup> Indicates operators with either a physical plant or processing facility in a district or those operators from other areas buying fish and/or providing tender service for fishermen in districts away from the facility.

<sup>2/</sup> Number of canning lines available for operation.

Table 30. Salmon case pack and commercial production of frozen and cured salmon by species, Bristol Bay, 1979. <sup>1/</sup>

Category	No. Operators	Pack and Production <sup>2/</sup>					Total
		Sockeye	King	Chum	Pink	Coho	
<b>(A) CASE PACK (in 48 - 1 lb. talls)</b>							
East Side	7	456,751	276	5,034		3	462,074
West Side	4	232,131	2,782	29,483		1,233	265,619
Total	11	688,882	3,058	34,517		1,236	727,693
<b>(B) FROZEN (in pounds)</b>							
East Side	26	30,311,452	224,867	313,248	2,342	147,905	30,999,814
West Side	18	7,720,420	2,066,511	918,086	109	1,202,395	11,907,521
Total	35	38,031,872	2,291,378	1,231,334	2,451	1,350,300	42,907,335
<b>(C) CURED (in pounds)</b>							
East Side	6	3,055,574	3,122	96,072	400		3,155,168
West Side	4	595,572	13,702	40,513	3	1,000	650,790
Total	8	3,651,146	16,824	136,585	403	1,000	3,805,958
<b>(D) TOTAL FROZEN AND CURED (in pounds)</b>							
East Side	30	33,367,026	227,989	409,320	2,742	147,905	34,154,982
West Side	22	8,315,992	2,080,213	958,599	112	1,203,395	12,558,311
Total	39	41,683,018	2,308,202	1,367,919	2,854	1,351,300	46,713,293

<sup>1/</sup> Includes only fish processed in Bristol Bay; east side includes Naknek-Kvichak, Egegik and Ugashik districts, while west side includes Nushagak and Togiak districts.

<sup>2/</sup> Pack and production data extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

Table 31. Salmon transported out of the area for processing, by species, Bristol Bay, 1979.<sup>1/</sup>

Category	No. Operators	Fresh/Brine Export					Total
		Sockeye	King	Chum	Pink	Coho	
<b>(A) FRESH EXPORT BY AIR<sup>2/</sup> (in pounds)</b>							
East Side	25	18,164,284	68,119	37,830	337	68,704	18,339,274
West Side	9	4,674,370	1,584,785	1,138,719	3,485	864,835	8,266,194
Total	27	22,838,654	1,652,904	1,176,549	3,822	933,539	26,605,468
<b>(B) BRINE EXPORT BY SEA<sup>2/3/</sup> (in number of fish and pounds)</b>							
<b>East Side: 8</b>							
No. Tenders <sup>4/</sup>							57
No. Fish Pounds							2,854,476
							16,736,724
<b>West Side: 4</b>							
No. Tenders <sup>4/</sup>							4
No. Fish Pounds							132,980
							820,630
<b>Total: 11</b>							
No. Tenders <sup>4/</sup>							61
No. Fish Pounds							2,987,456
							17,557,354

- <sup>1/</sup> Includes all fish exported from Bristol Bay in either brine or chilled sea water by sea-going tenders, or by air transportation; east side includes Naknek-Kvichak, Egegik and Ugashik districts, while west side includes Nushagak and Togiak districts.
- <sup>2/</sup> Export information extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form; some processors reported mixed reds and chums.
- <sup>3/</sup> Specie breakdown generally not available until fish are final processed.
- <sup>4/</sup> Number of tenders are estimated.

Table 32. Average round weight and value of the commercial salmon catch, by species and district, Bristol Bay, 1979.

I. WEIGHT

District	Average Round Weight in Pounds <sup>1/</sup>					Total
	Sockeye	King	Chum	Pink	Coho	
Naknek-Kvichak	5.76	21.75	6.81	-	5.15	
Egegik	5.98	21.16	7.20	-	7.27	
Ugashik	5.97	22.72	7.52	-	8.41	
Nushagak	6.12	21.06	6.24	3.73	6.71	
Togiak	7.15	22.20	7.79	3.90	9.04	
Weighted Average	5.87	21.32	6.78	3.70	7.78	
Total Weight of Catch, All Districts <sup>2/</sup>	128,894	4,303	6,307	9	2,337	141,850

II. VALUE

Category	Estimated Value					Total
	Sockeye	King	Chum	Pink	Coho	
Average Price Per Pound <sup>3/</sup>	\$ 1.025	\$ 1.00	\$ .41	\$ .33	\$ 1.05	
Average Price Per Fish	\$ 6.02	\$21.32	\$ 2.78	\$1.22	\$ 8.17	
Ex-Vessel Value to Fishermen <sup>2/</sup>	\$132,116	\$4,303	\$2,586	\$3	\$2,454	\$141,462

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

2/ Total weight and ex-vessel value shown in thousands of pounds and dollars, respectively; catches in pounds are preliminary.

3/ Average price per pound derived from AIFMA and WACMA price schedules: Sockeye - average of canned and fresh/frozen; King - WACMA fresh/frozen value; Chum - WACMA canned value; Pink - AIFMA value; and Coho - WACMA fresh/frozen value.

Table 33. Subsistence salmon catch by species, district and village area, Bristol Bay, 1979.

Area	Permits Issued	Number of Fish <sup>1/</sup>					Total
		Sockeye	King	Chum	Pink	Coho	
<b>NAKNEK-KVICHAK DISTRICT:</b>							
Naknek system <sup>2/</sup>	243	9,500	1,000	200	+	900	11,700
<b>Kvichak system:</b>							
Levelock	21	4,400	100	+	+	+	4,500
Igiugig	25	6,600	+	300		300	7,200
Kokhanok	18	16,200		+	+		16,200
Pedro Bay	11	3,500					3,500
Port Alsworth	24	4,200					4,200
Nondalton	22	14,700					14,700
Newhalen	8	4,200					4,200
Iliamna	52	11,700					11,700
District Total	424	75,000	1,200	600	+	1,200	78,000
<b>EGEGIK DISTRICT</b>							
Egegik system <sup>3/</sup>	8	300	+			100	400
<b>UGASHIK DISTRICT</b>							
Ugashik system <sup>4/</sup>	8	200	+	+		100	300
<b>NUSHAGAK DISTRICT</b>							
Nushagak Bay <sup>5/</sup>	254	11,800	2,200	900	100	3,400	18,300
Wood system <sup>6/</sup>	12	1,000	+	+		+	1,000
<b>Igushik system:</b>							
Manokotak	30	6,600	200	100	+	500	7,400
<b>Nushagak system:</b>							
Portage Creek	7	1,400	300	400	+	200	2,300
Ekwok	13	3,700	1,000	2,100	+	400	7,200
New Stuyahok	36	10,600	3,600	1,900	400	600	17,200
Koliganek	12	5,100	1,600	1,500		+	8,200
District Total	364	40,200	8,900	6,800	500	5,200	61,600
<b>TOGIK DISTRICT</b>							
Togiak system <sup>7/</sup>	25	800	200	300	+	700	2,000
<b>TOTAL BRISTOL BAY</b>	<b>829</b>	<b>116,500</b>	<b>10,300</b>	<b>7,700</b>	<b>500</b>	<b>7,300</b>	<b>142,300</b>

1/ Catches rounded to nearest 100 fish.

2/ Includes the communities of Naknek, South Naknek and King Salmon.

3/ Includes the villages of Egegik and North Egegik.

4/ Includes the villages of Pilot Point and Ugashik.

5/ Includes the communities of Dillingham, Kakanak, Clarks Point, Clarks Slough (Queen), Ekwok, Igushik beach and the Lewis Point fish camps.

6/ Includes the village of Aleknagik.

7/ Includes the villages of Togiak and Twin Hills.

Table 34. Summary of herring aerial survey biomass estimates in the Togiak district of Bristol Bay, 1979.

Date	Adjusted School Count (RAI) by Index Area						Biomass Estimates <sup>2/</sup>				
	Tonnage <sup>1/</sup> 2.0-6.7 Nushagak	6.7-11.0 Kulukak	6.7-11.0 Nunavachak	2.4-6.7 Ungalikthluk	1.0-2.0 Togiak	5.0-11.0 Matogak	W/O 25% Error		W/25% Error		
						low	high	low	high		
4/30		0	42	752				2,086	5,500	1,564	4,125
5/ 1											
2	0	0	900	1,004	71			8,510	16,768	6,382	12,576
3	61	0	5	317				916	2,587	687	1,940
4	17,355	563	71	280	1,460			41,089	128,048	30,816	96,036
5	18,724	29,918	326	159	486			240,950	460,172	180,712	345,129
6											
7	981	24,389	91	58	65,602	932		236,379	417,697	177,284	313,272
8											
9	0	0	46	743				2,091	5,484	1,568	4,113
10	76,783	12,312	21	+	46,956			283,153	744,021	212,364	558,015
11											
12	0	0	79	+	13,066	+		13,595	27,001	10,196	20,250
13											
14	340	+	31	29	2,522	699		6,974	15,546	5,230	11,659
15											
16	0	0	6	0	474			514	1,014	385	760
17	337	2	62	0	+	0		1,102	2,961	826	2,220
18											
19											
20											
21	0	0	0	0							
22											
23											
24	0	6	10	56	2,768	0		3,009	6,087	2,256	4,565
25											
26	0	0	34	7	2,767			3,011	5,954	2,258	4,465

1/ Range of tonnage factors used to convert RAI's to biomass for various index areas.

2/ In metric tons.

Table 35. Inshore commercial herring catch by day and gear type, Togiak district, Bristol Bay, 1979.

Date	Catch in Pounds						Metric Tons	
	Gill Net		Purse Seine		Total		Daily	Accum. <sup>1/</sup>
	Daily	Accum.	Daily	Accum.	Daily	Accum.		
5/ 1			11,500	11,500	11,500	11,500	5	5
2	3,332	3,332	360,850	372,350	364,182	375,682	165	170
3	6,710	10,042	226,166	598,516	232,876	608,558	106	276
4	66,215	76,257	1,004,274	1,602,790	1,070,489	1,679,047	485	761
5	84,281	160,538	762,174	2,364,964	846,455	2,525,502	384	1,145
6	186,403	346,941	1,293,250	3,658,214	1,479,653	4,005,155	671	1,816
7	119,850	466,791	759,322	4,417,536	879,172	4,884,325	399	2,215
8	223,990	690,781	578,419	4,995,955	802,409	5,686,736	364	2,579
9	107,916	798,697	935,817	5,931,772	1,043,733	6,730,469	473	3,052
10	375,516	1,174,213	1,067,318	6,999,090	1,442,834	8,173,303	654	3,706
11	477,567	1,651,780	1,781,313	8,780,403	2,258,880	10,432,183	1,024	4,730
12	472,585	2,124,365	344,799	9,125,202	817,384	11,249,567	371	5,101
13	767,312	2,891,677	1,036,320	10,161,522	1,803,632	13,053,199	818	5,919
14	631,385	3,523,062	199,082	10,360,604	830,467	13,883,666	377	6,296
15	507,761	4,030,823	136,000	10,496,604	643,761	14,527,427	292	6,588
16	322,302	4,353,125	239,340	10,735,944	561,642	15,089,069	255	6,843
17	678,401	5,031,526	207,294	10,943,238	885,695	15,974,764	402	7,245
18	837,577	5,869,103	387,658	11,330,896	1,225,235	17,199,999	556	7,801
19	556,389	6,425,492	101,735	11,432,631	658,124	17,858,123	298	8,099
20	58,514	6,484,006	34,650	11,467,281	93,164	17,951,287	42	8,141
21	252,466	6,736,472	43,218	11,510,499	295,684	18,246,971	134	8,275
22	263,247	6,999,719	122,781	11,633,280	386,028	18,632,999	175	8,450
23	622,322	7,622,041	197,969	11,831,249	820,291	19,453,290	372	8,822
24	595,531	8,217,572	406,175	12,237,424	1,001,706	20,454,996	454	9,276
25	367,900	8,585,472	372,297	12,609,721	740,197	21,195,193	336	9,612
26	125,352	8,710,824	418,666	13,028,387	544,018	21,739,211	247	9,859
27	83,452	8,794,276	306,255	13,334,642	389,707	22,128,918	177	10,036
28	43,622	8,837,898	15,700	13,350,342	59,322	22,188,240	27	10,063
29	91,018	8,928,916	13,760	13,364,102	104,778	22,293,018	48	10,111
30	600	8,929,516		13,364,102	600	22,293,618		10,111
31		8,929,516		13,364,102		22,293,618		10,111
6/ 1	10,012	8,939,528		13,364,102	10,012	22,303,630	5	10,116
Total		8,939,528		13,364,102		22,303,630		10,115
Percent of Catch		40.1		59.9		100.0		

## Summary of Herring Catch by Section

Section	Metric Tons and Percent of Total				
	Gill Net (Percent)		Purse Seine (Percent)		Total
Kulukak	1,251	(66.3)	637	(33.7)	
Nunavachak	1,081	(28.0)	2,784	(72.0)	3,865
Togiak	1,718	(43.1)	2,267	(56.9)	3,985
Hagemeister	4	(1.1)	373	(98.9)	377
Total	4,054	(40.1)	6,061	(59.9)	10,115

<sup>1/</sup> Due to rounding of daily catches the total catch may not equal the sum of the daily catches.

Table 36. Commercial herring roe-on-kelp harvest by day, Togiak district, Bristol Bay, 1979.

Date	Harvest in Pounds		Metric Tons	
	Daily	Accum.	Daily	Accum. <sup>1/</sup>
5/ 4	2,624	2,624	1	1
5	10,892	13,516	5	6
6		13,516		6
7	14,717	28,233	7	13
8	66,606	94,839	30	43
5/ 9	49,569	144,408	22	65
10	128,215	272,623	58	123
11	31,876	304,499	14	137
12	7,207	311,706	3	140
13	41,060	352,766	19	159
5/14	48,901	401,667	22	181
15	3,363	405,030	2	183
16		405,030		183
17	6,885	411,915	3	186
18	312	412,227		186
5/19	1,000	413,227		186
20		413,227		186
21		413,227		186
22		413,227		186
23	1,500	414,727	1	187
Total		414,727		188

<sup>1/</sup> Due to rounding of daily harvests, the total harvest may not equal the sum of the daily harvests.

## APPENDIX A

FISHING PROSPECTS FOR THE 1979  
BRISTOL BAY COMMERCIAL SALMON/HERRING FISHERY

SALMON

For the 1979 fishing season, the Alaska Department of Fish and Game, Division of Commercial Fisheries, has prepared a formal preseason total inshore forecast for sockeye salmon, and expected harvest levels of other species based on long-term catch trends.

The total inshore sockeye run is expected to total about 22.7 million fish, with escapement requirements amounting to 9.5 million. Escapement goals are similar to previous years with the exception of Kvichak River, where the pre-peak year escapement requirement is 6.0 million fish. The forecast run, harvest and escapement requirements vary by management district as shown on Table 1.

The projected sockeye harvest would amount to 13.2 million fish, with all districts showing a surplus over escapement requirements. Over 81% of the total sockeye harvest would be in Naknek-Kvichak and Nushagak districts, providing these systems produce as expected. The 1979 expected harvest would be three times larger than the average "pre-peak" catch since 1959.

As always, the primary management objective will be to obtain escapement goals, and allow excess fish over escapement requirements to enter the commercial catch. Available fishing effort will concentrate in those districts with large expected returns, and ultimate fishing time permitted will be a function of run strength by system and available effort.

Run strength indications from early season commercial catches, both offshore (Port Moller) and inshore test fishing and indications from aerial surveys and tower escapement counts will all provide advance information on which to regulate fishing time.

Fishing prospects by district vary with the size of the expected return. In Naknek-Kvichak and Nushagak districts, large expected sockeye returns dictate early and increased fishing time over that of previous years. All river system returns of these two districts are in rough parity with each other, and providing the various river systems produce as expected, it should not be necessary to conduct partial district fishing periods. Both Egegik and Togiak districts have forecasted sockeye runs at or larger than recent average returns, which in turn, dictate early season test fishing with the commercial fleet, with additional fishing time dependent upon available fishing effort, run timing and indicated inseason magnitude of the run. Ugashik district's forecast will allow "limited" careful testing of run strength. Fishing time will be entirely dependent upon apparent inseason run strength and available effort. Extreme care will be needed in this district to insure escapement goals are met, as the relationship of actual return to forecast return for this system is poor.

Management goals will also be directed at achieving adequate escapements of other species of salmon in several districts. King salmon harvests in Nushagak and Togiak districts are expected to total about 120,000 fish, which will surpass the long-term average catch of 90,000. King escapements (and total runs) in recent years have been increasing significantly, and 1979 is expected to be another good

"king year." Average escapements of chum salmon in 1975 should produce a catch in 1979 that is on par with the long-term average of 600,000 fish. Depending upon the amount of late season processing capacity and fishing effort, the coho salmon harvest should approach 100,000 fish, which is over twice the long-term average.

### HERRING

Commercial herring fishing in the Togiak district of Bristol Bay was initiated in 1967 and continued on a limited and sporadic basis until 1977 when 2,500 metric ton (m.t.) were taken. In 1978, a record harvest of 7,000 m.t. was made, and the 1979 season prospects are for a continued rapid increasing catch trend.

The fishery in Bristol Bay has been of less intensity and longer duration in comparison to sac roe fisheries elsewhere in the State. In years when weather and ice conditions allow, spawning herring are usually available for harvest by early May and are still present into the early part of June.

Prior to 1978 regulations affecting Bristol Bay's commercial herring fishing were minimal. In the face of a rapidly developing commercial fishery with increased fishing effort and harvest potential, additional regulatory measures are beginning to evolve. The current fishery is managed primarily by fishing seasons, specification of type and quantity of gear, fishing area restrictions and guideline harvest levels.

The guideline harvest level concept represents conservative preseason estimated levels of allowable harvests which will not jeopardize the viability of herring stocks. The Togiak district herring fishery may close to commercial herring fishing before or after the guideline harvest level has been reached if principles of management and conservation dictate such action, based on inseason biological assessment of stock condition as the season progresses.

The guideline harvest level for the Togiak herring fishery in 1979 is 12,000 m.t. Inseason biomass estimates will also be made, and the harvest rates held to within 10 to 20% of estimated tonnage available for the commercial harvest.

Similar to the 1978 Bristol Bay fishery, actual domestic harvests will be allowed to exceed guideline harvest levels if inseason assessments of abundance indicate the conservation of herring stocks are not jeopardized.

Inseason closures of the sac roe fishery may be implemented if the harvest accelerates at a pace which makes it difficult or impossible to construct meaningful accumulative harvest estimates, and especially if the total harvest is nearing the guideline harvest level of 12,000 m.t., and stock strength has yet to be entirely defined.

The recent production history for the herring roe-on-kelp fishery also indicates an increasing harvest trend, although not as rapid as the trend for the sac roe fishery. The roe-on-kelp fishery as yet does not have a harvest limit or quota, however, this fishery will be closely monitored and controlled. Several kelp control areas will be closed to commercial harvesting to allow comparisons with adjacent heavily picked kelp beds. If heavy kelping effort is localized, and kelp resources in these areas are being adversely affected, closures of affected beach areas may be required to shift effort to other kelp beds. Possible damaging effects to spawning substrate may be limiting factors to the continued development of this fishery.

## APPENDIX B (May, 1979)

## BRISTOL BAY PROCESSING CAPACITY, 1979

INTRODUCTION

In 1978 the Alaska Department of Fish and Game, in response to concerns over the adequacy of Alaskan processing capacities and growing interest in cooperative ventures involving foreign processors, published an "Evaluation of Alaskan Salmon Processing Capacity and Policy for Accessing Foreign Supplemental Processing Capacity" as provided by Commercial Fisheries Regulation 5 AAC 39.198. The 1979 Alaskan Salmon Processing Capacity Evaluation is intended to serve as the first annual update of that original document and to further explain the policy governing utilization of foreign processing to supplement domestic processing capacities.

To assess and evaluate this year's capacities of Alaskan salmon processors the Commercial Fisheries staff of the Alaska Department of Fish and Game has conducted a survey of planned domestic processing operations in seven major salmon harvest areas in the State. Results of this survey have been evaluated in terms of actual inseason processing levels observed during the 1978 salmon season and compared to Department projections of 1979 salmon harvest levels. Where possible actual processing capacity estimates from the companies themselves are used in the analysis and related to observed performances. In a few instances this approach was not possible and capacities were estimated from past production levels. The central objective of this effort is to identify anticipated shortfalls in existing domestic processing capacity and thereby a basis for operational planning in advance of the season by fishermen and industry.

REVIEW OF 1978 PROCESSING PROBLEMS

Despite preseason planning efforts the 1978 Bristol Bay salmon harvest did not occur without domestic processing difficulties. In the Nushagak district of Bristol Bay a phenomenal 13.7 million pink salmon return totally surprised everyone in view of the 3.2 million return projected for that fishery. The final Nushagak district pink salmon catch of 4.3 million set a new record, although local processors were forced to impose substantial suspensions and harvest limits. During the later stages of the record run foreign processing was solicited by the Commissioner of Fish and Game with no positive results. The foreign companies contacted felt it was too late in the run to field a viable processing effort.

SUMMARY OF 1979 PROCESSING CAPACITY

Although not identified as a problem area, Bristol Bay will command much attention in 1979 with a 14.0 million salmon harvest projected for the season. Sockeye salmon will dominate the Bay's harvest in this off-cycle year for pink salmon returns. Bristol Bay processing operations were largely successful during the 1978 sockeye run when 9.9 million were harvested. This year shore based canning and freezing operations will remain similar to last year and should be capable of handling the anticipated peak short term harvest rate of 3.0 million fish provided: 1) the run exhibits normal timing, 2) the run does not exceed forecast level, 3) there is an even distribution of fishing periods, and 4) there is no delay in beginning of fishing operations due to price disputes. An additional processing capacity will be available from floating processors although that capacity data has not been made available and documented in this analysis.

## BRISTOL BAY

EXISTING PROCESSING CAPABILITIES

The analysis of existing processing capabilities for Bristol Bay has been approached by computing separately the capacities for the east (Naknek-Kvichak, Egegik and Ugashik districts) and west sides (Nushagak and Togiak districts). Although there is substantial exchange of fish between districts for processing, the yearly interchange varies and is roughly proportional to the forecast magnitude. In recent years the exchange of fish between east and west side processing plants has been roughly equal. In those years with a strong sockeye salmon forecast and run for east side systems (such as 1979) most, if not all, fish transported within Bristol Bay are transferred to processing plants in Nushagak district on the west side. Overall, west side plants commonly operate slightly longer than their counterparts on the east side because of a significant early season king salmon run, and late runs of pink and coho salmon. For these reasons the processing capacities have been computed separately for east and west sides.

WEST SIDE (Nushagak and Togiak Districts)

Canning Capacity. An inventory of canning lines on the west side of Bristol Bay indicates a total of 13 lines, consisting of seven 1 lb. lines, five 1/2 lb. lines, and one 1/4 lb. line (Appendix Table I). Actual plant capacities by individual operators indicate a daily sustained canning capacity estimate of 280,000 fish per day (Appendix Table I). The canning capacity can also be estimated by multiplying the average capacity of a single 1 lb. line by the total number of 1 lb. lines available. This approach assumes that the smaller can size lines would be shut down in favor of the higher efficiency one pound lines during the peak harvest period. Using this technique, the west side capacity is estimated at 273,000 fish per day using a 13 fish per case conversion factor. The two different methods of computing daily capacities compliment each other and lend a degree of confidence to these estimates. Canning is not limited to the 1 lb. lines throughout the season. When harvest rates permit, processors commonly switch operations to the smaller can size lines with less daily capacity. Therefore, to estimate the total season maximum potential canning capacity for 1979 the normal processing period (mid-June through late July) was divided into three periods (early, middle, and late) with 30% of maximum efficiency applied to the early and late periods and 70% maximum efficiency applied to the middle period. Using this technique an estimated 5.3 million salmon could be canned during the season from June 19 to July 21. This analysis assumes that canning operations continue on a daily basis throughout the season. The characteristics of the fishery are such that continuous operations are not commonly possible as district openings occur at intervals and fish are not available on a continuous basis. The estimate of short term canning capacity for west side facilities has been derived by applying a 90% efficiency factor to the maximum capacity for three days. Three days is the maximum time period commonly required to process fish caught in a 12-24 hour period during the peak of the season. The capacity estimated for short term operation is 756,000 salmon. This estimate is in part dependent on plant and tender brine holding capacity to protect the surplus from spoilage. The west side shore-based brine capacity is estimated at 275,000 salmon, with additional brine capacity available from east side operations as well as numerous floating brine tenders on an as-needed or on-call basis.

Export and Fresh/Frozen Capacity. West side seasonal export capacity in fresh/frozen products is estimated at 142,000 salmon per day or 2.7 million fish over the season (Appendix Table 1). This estimate is based on a preseason survey of major operators and their expected fresh/frozen and export capacities, and the anticipated continued expansion of the fresh/frozen market. In 1978, export of fresh/frozen fish out of Bristol Bay was in excess of 5 million fish.

Combined Capacity. The combined capacity for west side operations is best estimated by considering the short term canning rate rather than the unrealistically high estimate of the seasonal potential canning capacity. By using short term capacity of 756,000 at a rate of one per week for 7 weeks, a total of 5.3 million fish could more realistically be canned through the season. With the addition of 2.7 million export capacity, an estimated 8.0 million salmon appear to be the seasonal capacity for the west side of Bristol Bay. In 1978, 9.3 million salmon were caught by west side fishermen during a 10-week season. Fish imports and exports into and out of west side plants were roughly equal, indicating a 930,000 fish per week capacity.

#### EAST SIDE (Naknek-Kvichak, Egegik and Ugashik Districts)

Canning Capacity. The east side facilities possess a total of 25 operational canning lines consisting of 13 1-lb. lines and 12 ½-lb. lines (Appendix Table 1). The maximum daily capacity, estimated from the capacity of the 13 1-lb. lines, projects a daily potential of 507,000 salmon; however, an updated estimate of daily capacity based on actual plant capacities for 1979 is 610,000 fish per day on a sustained basis.

By following the same technique used earlier for separating the normal canning season into three periods and applying 70% efficiency factor for the middle period and 30% efficiency factor to the early and late periods, an estimated 9.2 million salmon could be processed between June 19 and July 21.

The short term canning capacity for east side operations is estimated at 1.6 million salmon per three day period. This estimate is derived by applying a 90% efficiency factor to the maximum potential capacity of all 1 lb. lines for the three day period. As noted before the short term capacity is partially dependent on the availability of plant and tender brine holding capacity to protect the surplus from spoilage. The east side brine capacity, estimated at over 1.5 million salmon, is adequate to cover the short term canning capacity of 1.6 million salmon. A large segment of a period's catch is usually canned fresh, which substantially reduces the required brine holding capacity.

Export and Fresh/Frozen Capacity. Most large processors have the potential for exporting fish out of the Bristol Bay area for processing, however, relatively few processors commonly export large numbers of fish out of Bristol Bay. The trend to export of fish for the fresh/frozen market is on a sharp and rapid increase with the estimate for season export at 2.7 million fish for east side operations.

The total fresh/frozen capacity of east side operators is estimated at 2.7 million salmon and is equal to west side operations. This estimate is derived from the expected capacity of eight shore-based operations and does not include an estimate of floating operations.

Combined Processing Capacity. The combined east side processing capacity of 14.6 million salmon has been derived by adding the estimated total season canning capacity of 9.2 million to the 2.7 million export capacity and the 2.7 million fresh/frozen capacity.

#### TOTAL BRISTOL BAY

Processing Capacity. The seasonal total canning capacity of all Bay operations is estimated at 14.5 million with west side operations capable of 5.3 million and east side operations capable of 9.2 million fish. The export and fresh/frozen capacity totals 8.1 million salmon. Therefore, the estimated combined processing capacity of Bristol Bay is 22.6 million salmon per commercial fishing season. In 1978, the total Bay canning potential was estimated at 14.6 million fish compared with 14.5 million for 1979. The increase in production potential is entirely due to significantly higher estimates of export and fresh/frozen production capacities.

Short Term Production Limits. The short term processing capacity of all Bristol Bay facilities is estimated at 3.4 million salmon per three day period. This estimate is derived from the 2.4 million short term canning capacity plus a 1.0 million salmon estimate of export and fresh/frozen capacity. The short term export and fresh/frozen capacity would drop significantly if heavy fishing continued on an uninterrupted basis. Likewise, continued heavy uninterrupted fishing would reduce the short term canning capacity, but not as drastically as export operations.

Harvest Projections and Anticipated Peak Harvest Rate. A total of 14.0 million salmon are anticipated to be harvested in Bristol Bay in 1979 (Appendix Table 1). This estimate consists of 13.2 million sockeye salmon, 150,000 king salmon, 550,000 chum salmon, and 100,000 coho salmon. If the 1979 salmon run in Bristol Bay exhibits normal entry patterns and harvest is normally distributed, a potential maximum peak short term harvest rate of 3.0 million could occur anytime during the first two weeks in July.

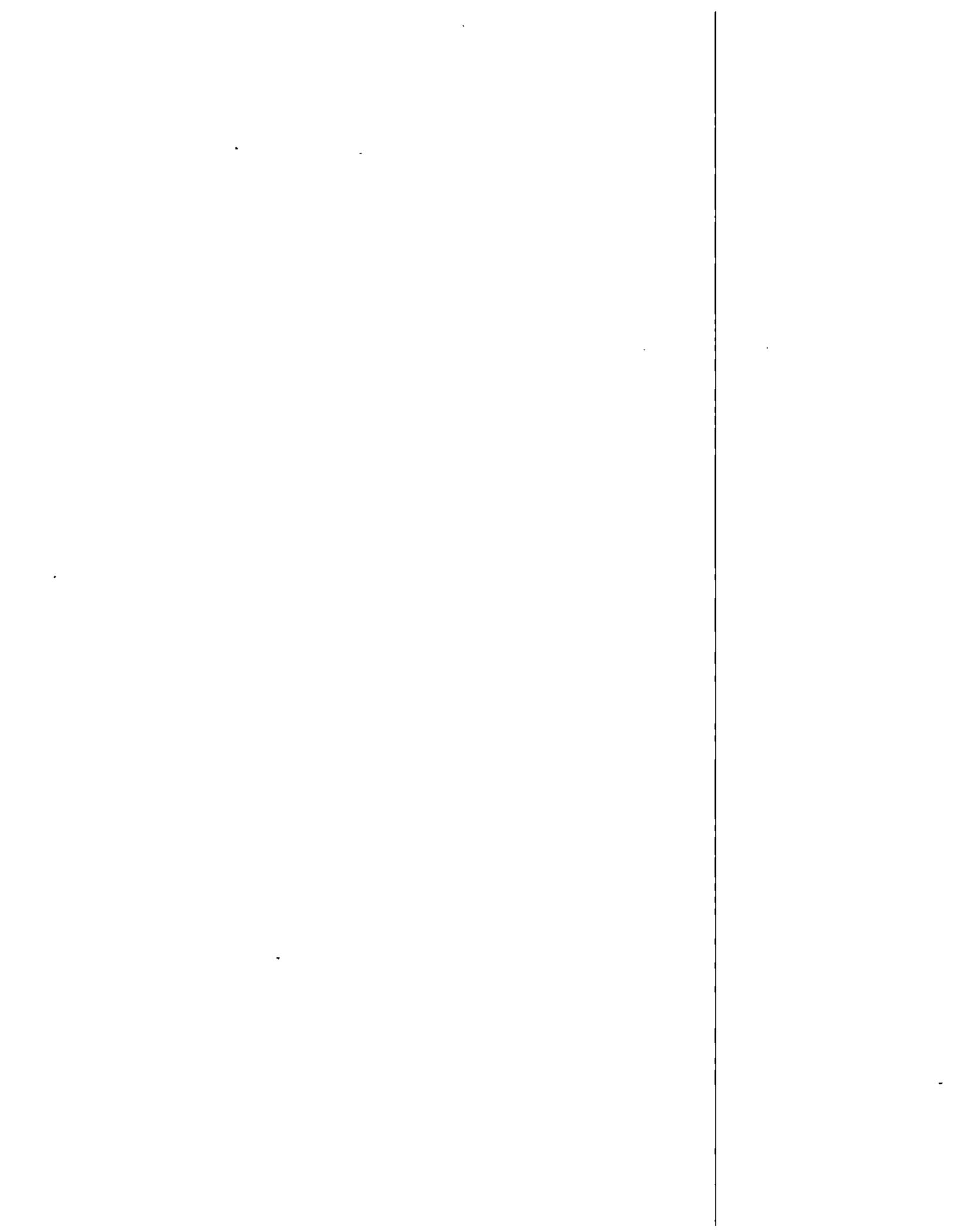
#### SUMMARY

Based on data presented it appears that the existing processing capacities anticipated in Bristol Bay for 1979 is potentially capable of handling a 22.6 million salmon harvest if distributed normally through the commercial fishing season. The data also indicates that the short term maximum capacity of 3.4 million salmon should handle the potential maximum harvest rate of 3.0 million salmon. The key elements in the fishing industry's ability to adequately handle the expected Bristol Bay harvest in 1979 are: (1) normal run timing and entry patterns; (2) run strength close to that forecast or expected; (3) evenly distributed fishing periods (a function of (1) and (2) ); and (4) no delay in beginning of fishing operations due to fishermen-industry price dispute(s).

As previously discussed, the largest potential for supplemental capacity exists in the export operations. The majority of aircraft export operations are directed through the Anchorage area. The potential for this is difficult to estimate as many of the operators that may use exporting as a means to increase their capacity, may not make commitments until the season gets underway.

The tendering capacity of Bristol Bay appears adequate to meet the needs associated with the projected harvest. The availability of additional tender capacity would largely depend on salmon fisheries in other areas.

The rapid increase in frozen production from freezer ships in recent years and the frozen potential for 1979 is difficult to measure as many operators make last minute commitments. As of March 14, 1979, 25 operators have filed "Intent to Operate" forms indicating Bristol Bay as the primary area or one of the areas of intended operations. These 25 operators have indicated as many as 31 freezer ships might be available for the 1979 salmon season in Bristol Bay. Individual freezer ship daily capacities vary greatly; however, 31 freezer ships could be expected to handle from 300 to 500,000 fish per day. The actual freezer ship operations always total less than preseason expectations.



Appendix Table 1. Summary of 1978 salmon harvest and 1979 harvest projection, daily and seasonal processing capacity, and operational canning lines available, Bristol Bay, 1979.<sup>1/</sup>

I. Comparison of the 1978 Commercial Salmon Harvest with 1979 Projections: (in thousands of fish)					
<u>Area</u>	<u>1978 Harvest</u>	<u>1979 Projection</u>	<u>Percent Change Projected</u>		
Bristol Bay	16.505	14.005	-15%		
II. Projected Daily and Seasonal Processing Capacity Estimates for the 1979 Salmon Fishery: (in thousands of fish)					
<u>Area</u>	<u>Daily Processing Capacity</u>			<u>Combined Seasonal Capacity</u>	
	<u>Canning</u>	<u>Fresh/Frozen</u>	<u>Combined</u>		
Bristol Bay:					
East Side	610	142	752	14,600	
West Side	<u>280</u>	<u>142</u>	<u>422</u>	<u>8,000</u>	
Total	890	284	1,174 <sup>2/</sup>	22,600	
III. Plants and Operational Canning Lines Available for the 1979 Salmon Season:					
<u>Area</u>	<u>Number Plants</u>	<u>Operational Canning Lines Available</u>			
		<u>1/4 lb.</u>	<u>1/2 lb.</u>	<u>1 lb.</u>	<u>Total</u>
Bristol Bay:					
East Side	9		12	13	25
West Side	<u>4</u>	<u>1</u>	<u>5</u>	<u>7</u>	<u>13</u>
Total	13	1	17	20	38

<sup>1/</sup> All data in this table extracted from appendix tables in "1979 Alaskan Salmon Processing Capacity Report", May, 1979 (1978 harvest is up-dated and 1979 catch projection is corrected).

<sup>2/</sup> The combined daily capacity estimate excludes a projected 4,150,000 fish seasonal export capacity anticipated for the 1979 season.

