

1998
NORTON SOUND DISTRICT
SALMON REPORT
to the
Alaska Board of Fisheries

By
Fred Bue
and
Charles Lean

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Alaska Department of Fish and Game
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1998 NORTON SOUND SALMON SEASON SUMMARY

Introduction

The Norton Sound Salmon District consists of all waters between Cape Douglas in the north and Point Romanof Light in the south. The District is divided into six subdistricts: Subdistrict 1, Nome; Subdistrict 2, Golovin; Subdistrict 3, Moses Point; Subdistrict 4, Norton Bay; Subdistrict 5, Shaktoolik; and Subdistrict 6, Unalakleet Subdistrict. Each of these subdistricts contains at least one major salmon-producing stream. Subdistrict boundaries were established to facilitate management of individual salmon stocks.

All commercial salmon fishing in the district is by set gillnets in marine waters; fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets chinook salmon. Emphasis switches to chum salmon around June 25 and the coho salmon fishery begins the third week of July. The season closes September 7. Pink salmon may be very abundant during even year returns when a pink directed fishery may replace or may be scheduled to alternate periods with the historical chum directed fishery.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the district. The Eastern subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have fairly healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently experienced poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a subsistence harvest within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Commercial Fishery Overview

The 1998 Norton Sound District commercial salmon fishing season began on June 15 and ended on September 5. Commercial fishing time and areas were set throughout the season by Emergency Order. The commercial salmon harvest totaled 641,396 fish, which was comprised of 7,429 chinook, 7 sockeye, 29,623 coho, 588,013 pink, and 16,324 chum salmon (Table 1). Eighty-two permit holders participated in the fishery and received \$358,982 for their catch (Table 2 and 3). This summary should be considered preliminary and will be updated with minor additions and corrections in subsequent reports.

Table 1 lists the Norton Sound salmon historical and current year commercial harvests relative to the recent 5 year (1993-1997) and the recent 10 year (1988-1997) averages. The total chinook salmon harvest for 1998 was considered average. The harvest was 9% below the recent 5 year

average and 6% above the recent 10 year average. The coho salmon harvest was the lowest since 1987, 50% below the recent 5-year average and 51% below the recent 10-year average catches. Although market was limited in some subdistricts, poor weather was the primary limiting factor for the low coho salmon harvest. Historically, Norton Sound has had very limited, but sporadic markets for pink salmon. Significant market interest began in 1994 that focused on the abundant even year return. The fishery went well so it was attempted on the weaker return in 1995 with such poor results that no directed pink fishery was attempted on the anticipated weak 1997 return. The commercial harvest of pink salmon was successful in 1996 and opened again in 1998. The 1998 harvest of pink salmon was larger than 1996, but less than 1994. The chum salmon commercial harvest was 49% below the 5 year average and 70% below the 10 year average catches for Norton Sound. This low chum salmon harvest can be attributed primarily to the combination of a low harvestable surplus and poor markets throughout the district.

A record low number of commercial permits (82) actually fished during the 1998 season (Table 2). The Norton Sound Salmon District has 201 CFEC salmon permits. The number of participating fishermen this season was 27% below the recent 5 year average and 31% below the recent 10 year average. There has been a significant drop in effort in recent years due primarily to poor market conditions

Two primary salmon buyers co-operated in Norton Sound during the 1998 season. One buyer operated during the chinook and coho salmon seasons while the other buyer was interested in pink salmon. Both buyers shared use of the tenders and incidental catches of other species during pink salmon openings were delivered to the other buyer. The chinook and coho salmon were delivered to a land-based facility at Unalakleet from other subdistricts using tenders and aircraft. Most fish were headed, gutted, iced and shipped airfreight to markets. Some salmon were frozen and shipped to Western Alaska villages as part of the State's disaster relief program. The other buyer, who purchased pink salmon, tendered fish throughout Norton Sound to their processing vessel located along the eastern coast. These salmon were filleted and frozen in blocks that were stored on-board the ship. In addition, a few individual fishermen sold their catch of fresh salmon locally and to wholesale distributors, as permitted under catcher-seller status.

The average price paid for chinook salmon was \$.74 per pound, \$.30/lb for sockeye, \$.29/lb for coho, \$.14/lb for pink, and \$.09/lb for chum salmon (Table 3). The total value of the raw fish reported on fish tickets in 1998 was \$358,982. This was 20% below the recent 5 year average and 23% below the recent 10 year average. The recent decline in traditional salmon markets has been offset in Norton Sound with the development of a pink salmon market on even year returns. The pink salmon harvest contributed 52% of the exvessel fishery value in 1998.

Subsistence Fishery Overview

Household subsistence surveys were partially funded by the Commercial Fisheries Division and implemented by the Division of Subsistence during the fall of 1998 in Norton Sound villages. This information will be available in The Annual Management Report and in a report by Subsistence Division to be completed this spring. Daily interviews of Unalakleet River and vicinity subsistence

fishermen were conducted at Unalakleet during the early portion of the fishing season in order to monitor the chinook salmon return. Total harvests by subsistence fishermen were not documented. Effort and catch information was used in combination with the Department's test net in the lower Unalakleet River and commercial catch results to evaluate the timing and magnitude of the chinook salmon return. This inseason assessment formed the basis for scheduling early commercial salmon fishing periods in the Unalakleet and Shaktoolik Subdistricts. Commercial fishing is typically only allowed after chinook salmon have been observed entering the Unalakleet River in increasing numbers for a week's time to assure the harvest is directed on an actively migrating stock rather than milling fish and to assure adequate quantities are available to subsistence users.

Subsistence fishing permits are required by regulation for each household that fishes in the Nome Subdistrict. These permits identify the body of water to be fished, the type of gear used, and the bag limit, which is specific to that body of water. In addition, the permit contains a catch calendar where the permit holder records catches in numbers of each species of fish for each day fished. If the subsistence fishers have filled their bag limits or would like to fish another location, they can be issued another permit for another area after the earlier one has been returned. These permits are important to management because they identify users and bag limits, but the actual catch information can not be compiled until well after the season when the permits are returned to the Department of Fish and Game. Therefore, this information will also be presented in a later report.

1998 SEASON SUMMARY BY SUBDISTRICT

Nome - Subdistrict 1

The commercial salmon season in the Nome Subdistrict is scheduled to take place by regulation between July 1 and August 31. However, there was no commercial salmon harvest due to inadequate abundance of chum, pink, and coho salmon (Table 2). Commercial fishing in the subdistrict is typically very limited because of the small local salmon stocks and the high subsistence demand. Sport fishing for chum salmon is closed by regulation in the subdistrict. The recent ten year average commercial harvest is 1 chinook, 1 sockeye, 202 coho, 50 pink, and 332 chum salmon. The ten year average subsistence salmon harvest in the subdistrict is 53 chinook, 164 sockeye, 1,162 coho, 2,687 pink, and 3,711 chum salmon. One hundred fifty two subsistence fishing permits were issued in 1998 for the Nome Subdistrict. Harvest results will be available in a future report.

Concerns for chum salmon escapement and subsistence harvest requirements have caused the management staff to allow no commercial openings in the Nome Subdistrict during June and July from 1989 to present. Only a few commercial openings were allowed in the chum and pink salmon season from 1984 to 1988. Since 1990, Chum salmon sport fishing and during odd years, pink salmon sport fishing has been eliminated during July as well. The sport fishing closures were in place with severe restrictions of subsistence salmon fishing.

Subsistence fishing was closed prior to the beginning of the chum salmon return for nearly the entire area except in marine waters East of Cape Nome. A strong pink salmon return developed

while chum salmon remained weak throughout most of the subdistrict. The management strategy used this season was to direct fishing effort as much as possible on the abundant pink salmon return while managing conservatively to assure chum salmon escapement. A series of Emergency Orders were issued that restricted fishing gear, times, and harvest areas to target pink salmon and protect chum salmon. Fishing gear restrictions, imposed alone or in combination, included gillnets with maximum mesh sizes of 4 ½ inches and beach seines that required releasing all chum salmon. In addition, the Board of Fisheries removed the Eldorado River from the “Rivers of Concern” list for chum salmon at their December 1997 meeting. This meant that management could be less restrictive than in the past eight years for that stream. In a practical sense, subsistence chum salmon fishing could be justified once management became confident that escapement goal would be achieved rather than requiring escapement be attained before fishing is allowed. The problem in the past was that by the time escapement goals had absolutely been achieved, the runs were largely through the fishing area which resulted in little opportunity to fish.

On June 29, the marine waters west of Cape Nome were opened to gillnets with a restricted mesh size of 4 ½ inches to target the abundant pink salmon while protecting chum salmon in coastal waters. The pink salmon return continued to build throughout the Nome area. On July 9, the marine waters of Safety Sound and Bonanza Channel were opened to gillnet fishing with the small mesh size restriction. Also, that day, seining was opened for Flambeau, Eldorado, Bonanza, Solomon, Nome, Cripple, and Sinuk Rivers with the condition that all chum salmon were to be released. Subsistence gillnet fishing was opened without mesh restrictions for the Snake River on July 22nd because both aerial surveys and tower counts indicated the chum salmon escapement goal had been attained. On July 30th, all rivers east of Cape Nome were opened to gillnets with unrestricted mesh size because the coho salmon return was developing and continued restrictions would do little to benefit chum salmon. On August 3rd, all remaining waters in the subdistrict, rivers west of Cape Nome, were opened to unrestricted mesh size gillnets.

The coho salmon return appeared slightly below average, but fall storms and unusually high water limited subsistence fishing efforts. Therefore, the standard subsistence fishing schedule of two 48 hour periods per week in freshwater and one 5 day period per week in marine waters was followed. It was assumed that the reduced effort and success due to weather would offset the weak coho salmon returns and should result in adequate coho salmon escapements.

Golovin Bay- Subdistrict 2

Over the past seven years, chum salmon stocks in the Golovin Bay Subdistrict have received little or no commercial exploitation. In recent years, escapement goals have been met, but the harvestable surplus has declined from the previous two decades. The 1998 Salmon Management Plan for the Golovin Bay Subdistrict limited commercial harvest to a maximum of 15,000 chum salmon before mid-July in an attempt to protect the chum salmon stocks and allow for a harvest while flesh quality is at its best. By that date, the chum salmon run would be assessed and fishing time could be adjusted accordingly.

No directed commercial chum salmon periods were opened during the 1998 season due to lack of market interest, although the chum salmon return appeared adequate to support a limited commercial harvest. The pink salmon return was strong, but initially there was also little market interest. Only a few permit holders had the equipment and resources to target pink salmon. Initially, the only pink salmon buyer in the area decided that it would not be profitable to send a tender to the Golovin Bay Subdistrict given the expected low volume of pink salmon available. However, later in the pink salmon run, some fishermen became interested in the Golovin Bay Subdistrict when the buyer began closing operations in the southern subdistricts and moved northward as the pink abundance diminished in the south.

The Golovin Bay Subdistrict began fishing on July 18 with gillnets restricted to pink salmon gear only (4 ½ inch mesh only). Continuous open fishing through July 31 was allowed. This was done because: (1) there was an obviously abundant pink salmon return; (2) catches with the same gear restrictions in other subdistricts landed few chum salmon; (3) there was a market for both chum and pink salmon; (4) and the buyer requested that he be able to direct fishing times to optimize his tender and processing operations. Two additional 24 hour periods were scheduled for one fisherman who hoped to acquire salmon to be used as crab bait, but no commercial harvests were reported from those periods. On August 17, the subdistrict was opened on a continuous schedule through August 31 in preparation for a potential coho salmon market. However, there were never long enough breaks in the severe weather conditions to allow successful fishing and tendering. The total season commercial harvest landed by 16 permit holders included 1 chinook, 0 sockeye, 3 coho, 723 chum, and 106,761 pink salmon. The coho and chum salmon catches were below average, but the pink salmon harvest was the highest on record for the subdistrict.

Moses Point - Subdistrict 3

The Moses Point Subdistrict chum salmon return has also been experiencing below average returns despite conservative management actions. However, the situation has improved slightly as indicated by the Kwiniuk River tower counts which have been at or above the escapement goal in the last four years. As a result, the river has been removed from the "Rivers of Concern" list. The 1998 Salmon Management Plan stated that there was to be no chum salmon directed fishery. Fishing periods could be scheduled for other salmon species utilizing special restrictions to minimize the incidental chum salmon harvest. It was expected that this harvest would not significantly affect the subdistricts' chum salmon escapement.

A single 24 hour commercial chinook salmon fishing period was opened on June 18 in the Moses Point Subdistrict. The catch rate was low and the Kwiniuk River counting tower indicated the chinook salmon escapement was below average. Therefore, no additional chinook salmon directed periods were scheduled.

The pink salmon return was strong as expected. A pink directed fishery opened June 30 and was scheduled to run continuously through July 25. Moderate landings of pink salmon occurred over the first 15 days. Late in the run, there was a coordinated effort to take advantage of the large pink salmon surplus. On July 17, an Emergency Order was issued that extended the western subdistrict

boundary to improve fish quality. Harvest volume significantly increased as fishermen arrived from another subdistrict. This intensive fishing effort lasted three days and ended when these fishermen moved on to the Golovin Bay Subdistrict.

Several periods were scheduled to target coho salmon, but weather conditions made fishing and tendering difficult to coordinate. Finally, on July 17, the subdistrict was opened to continuous fishing until July 31, yet no additional deliveries were made due to poor weather.

The 1998 Moses Point Subdistrict total commercial season harvest taken by 23 permits included 105 chinook, 1,462 coho, 145,669 pink, and 2,311 chum salmon (Table 6). The chinook salmon harvest was well below average. The coho salmon harvest was 56% below the recent 5 year average. Even though the chum salmon harvest was 161% above the recent 5 year average, it still fell 17% below the recent 10 year average. Pink salmon harvests have been inconsistent in the Moses Point Subdistrict like the rest of Norton Sound, but the total harvest for the subdistrict in 1998 was the highest on record.

Norton Bay - Subdistrict 4

The Norton Bay Subdistrict typically has difficulty attracting a buyer due to its remoteness and its reputation for water-marked fish. Consequently, regulatory changes were implemented that moved the western boundary from Six Mile Point to Isaac's Point in 1995 and the eastern boundary out to Point Dexter in 1998 in an attempt to improve fish quality. Due to lack of timely salmon escapement information, the Norton Bay Subdistrict is typically managed similar to the Shaktoolik and Unalakleet Subdistricts because they reflect similar trends in salmon return strength and timing. In 1998, there was no interest in salmon until the late coho season. Twice weekly, 24-hour fishing periods were scheduled beginning August 3 and ending August 15 then on August 17, continuous fishing was opened until August 31. There was no reported commercial harvest in the Norton Bay Subdistrict during the coho salmon fishery due to weather and there was no harvest of other salmon species due to lack of interest. There has only been three seasons in the last ten years when salmon have been commercially harvested in the subdistrict.

Shaktoolik and Unalakleet - Subdistricts 5 and 6

Both the Shaktoolik and Unalakleet Subdistricts, which share a common boundary, consistently attract commercial markets due to larger volumes of fish and better transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle and the harvest in one subdistrict affects the movement of fish in the adjacent subdistrict. As stated earlier, the department's test net in the Unalakleet River and subsistence interviews at Unalakleet are used to set early fishing periods in both subdistricts. As the season progresses, the test net, commercial catch indices, the Shaktoolik River counting tower, and the North River counting tower operated in cooperation with Kawarak Corporation, are used to assess return strengths of each salmon species. Frequently, aerial surveys are not obtained in either subdistrict due to poor survey

conditions and are only useful for late season escapement assessment because of the long travel time between the fishery and the spawning grounds (Table 4).

Commercial fishing is typically only allowed after chinook salmon have been observed entering the Unalakleet River in increasing numbers for a week's time, to assure the harvest is directed on actively migrating salmon and not on milling fish. In 1998, the first fishing periods for chinook salmon in both subdistricts opened on June 15 and again on June 18 for 24 hours each (Table 8 and 9). They were directed at chinook salmon using a minimum mesh size restriction of 7.5 inches. The chinook salmon harvest was near average for early periods, but escapement lagged; therefore, subsequent periods were canceled. Both subdistricts reopened to chinook salmon fishing on June 25 for 24 hours. Assessment indices of the Unalakleet River run remained at desired levels: While the Shaktoolik River indicators did not improve. Consequently, the fishing time during that period was extended for the Unalakleet Subdistrict, but closed as planned in Shaktoolik. The Unalakleet Subdistrict fished one additional 48 hour period and one 24-hour period for chinook. There were no additional periods for chinook at Shaktoolik due to the low escapements as indicated by the counting tower. The salmon counting tower at Shaktoolik verified subsistence fishing reports helping to assure managers this unusual management action was appropriate.

Both the Unalakleet and Shaktoolik Subdistricts opened on June 28 for a 12-hour pink salmon period that allowed only gillnets with mesh sizes 4" to 4 1/2" to be used. This period was staggered between king openings to test the abundance of pink salmon and check the pink to chum salmon ratio. The economic viability of the pink salmon fishery depended on a large volume which meant that directed fishing would need to begin as soon as possible. However, there was only a small market for chum salmon. Consequently, it was very important that the incidental chum salmon harvest be minimized at a level that the market could absorb and not create a wastage problem.

A short "test" opening was allowed to assess chum/pink ratios. The results of the opening were favorable; therefore, both subdistricts were opened on June 29 to continuous pink salmon fishing through July 25. The justification for this liberal fishing time was the large surplus of pink salmon returning as anticipated, and the small incidental catch of other salmon species. A limited market existed for the low volumes of these species. This schedule also provided the fish buyer the flexibility needed to schedule tenders and processing operations to maximize efficiency. The buyer actually maintained radio contact with fishermen to set fishing periods.

Catches of pink salmon were significantly better nearer Shaktoolik than Unalakleet. The Unalakleet return was smaller than expected, but there were also chinook salmon fishing periods in the Unalakleet Subdistrict that overlapped pink salmon fishing which may have attracted some of the effort. During these periods, both chinook and pink salmon gear were allowed in combination, but not to exceed 100 fathoms in aggregate. Most fishermen appeared to comply and targeted chinook salmon when they had the choice. These combination periods occurred near the peak of the pink salmon return. Pink salmon fishing essentially ended in both subdistricts on July 19 because the fishery had reached the end of the run and buying efforts had shifted to the northern subdistricts which have a slightly later run timing.

Chum salmon returns to eastern Norton Sound have been well below average in recent years. On July 27, a single 24-hour fishing period was opened in both the Unalakleet and Shaktoolik Subdistricts to test the abundance of coho salmon in relation to chum salmon. Early results showed that the coho salmon were predominate over chum in the catch. It was felt that continued protection of chum salmon late in the season would do little to improve escapement. Therefore, since the market would still accept incidental chum salmon, the period was extended and both subdistricts were placed on the standard fishing schedule of two 48 hour periods each week. The coho return to both subdistricts appeared below average. Weather conditions were extremely poor for fishing and escapement assessment; frequent rain caused high, turbid water conditions in rivers. The Unalakleet Subdistrict remained on the standard fishing schedule through the remainder of the season because effort was low and coho salmon were presumably escaping in adequate numbers although water conditions precluded reliable counting. The Shaktoolik Subdistrict was opened to continuous fishing from August 17 through August 31 to provide fishing flexibility during the persistent inclement weather.

The 1998 commercial catches in the Shaktoolik Subdistrict included 910 chinook, 3,624 coho, 236,171 pink and 7,080 chum salmon harvested by 28 permits holders (Table 2 and 8). The chinook salmon harvest was 48% below the recent 5 year average and 42% below the recent 10 year average. The coho salmon harvest was 71% below the recent 5 year average and 66% below the recent 10 year average. There was a very limited chum salmon market with most fish being purchased as an incidental catch of the chinook, pink, and coho salmon directed fisheries in both subdistricts. The total chum salmon harvest in the Shaktoolik Subdistrict was 29% below the recent 5 year average and 59% below the recent 10 year average harvest. The pink salmon harvest was less than the last two even year returns, 1994 and 1996, but was 24% above the recent 5 year average and 147 % above the recent 10 year average.

The Unalakleet Subdistrict commercial catch harvested by 52 permit holders included 6,413 chinook, 7 sockeye, 24,534 coho, 99,412 pink, and 6,210 chum salmon (Table 2 and 9). The chinook salmon catch was 5% above the recent 5 year average and 25% above the recent 10 year average. The coho salmon harvest in the subdistrict was 41% below the recent 5 year average and 46% below the recent 10 year average. The total chum salmon catch was 65% below the recent 5 year average and 75% below the recent 10 year average. The pink salmon harvest at Unalakleet for 1998 was also less than the 1994 and 1996 totals. This years catch was 26% below the recent 5 year average and 41% above the recent 10 year average for pink salmon.

ESCAPEMENT

Table 4 summarizes escapement assessments for the major index river systems of the Norton Sound and Port Clarence Districts. Most of the chum salmon assessments are compared to more formalized biological escapement goals (BEG's) for index areas. These BEG's are not historic averages in all cases, but reflect a specific desired level of escapement. BEG's are usually an index of return strength based on peak aerial surveys or counting tower passage estimates.

Department escapement projects in the Norton Sound District include counting towers on the Kwiniuk, Niukluk, and Shaktoolik Rivers, a test net operated on the Unalakleet River, and a weir on the Nome River. Both the Unalakleet test net and the Kwiniuk tower projects have been in operation for many years. They provide comparable and timely information that is used as a basis for inseason salmon management decisions. The Nome River weir first began as a counting tower project late in 1993 and was operational as a tower in 1994 and 1995 before switching to an operational weir in 1996. The Niukluk tower became operational in 1995. Both the Nome and Niukluk River projects have limited years of data that can be used when making comparisons, but have proven to be reliable and will become more valuable the longer they operate. This was the third season the Shaktoolik tower was operated. Project modifications were made that provided better data early in the season, but the tower flooded out again on August 14, 1998 when the river overflowed its banks for the third year in a row.

Four additional counting tower projects were also operated in the management area this season. The Snake, Eldorado, Pilgrim, and North River projects were setup and operated by Kawarak Incorporated. These projects operated as cooperative projects with the Department of Fish and Game, which supplied technical advice and purchased some equipment. The projects supplied important daily escapement information to the Department that was very useful for management of the local salmon resource. The importance of these projects increases the longer they run as changes and trends in the fishery are evaluated in relation to historic data.

Assessment conditions were fair to good for most of the district in 1998 for chinook, chum, and pink salmon, but poor to unacceptable for coho salmon throughout the district. The Nome Subdistrict streams received the most intensive assessment efforts because salmon stocks local to the Nome area are strictly regulated, easily accessed by road system, and are exposed to intensive subsistence and sport fishing pressure.

Chinook Salmon

The Unalakleet and Shaktoolik Subdistricts are the primary chinook salmon producers in Norton Sound. The Norton Bay, Moses Point and Golovin Bay Subdistricts have also experienced a gradual increasing trend of chinook salmon returns in recent years. Overall, the 1998 Norton Sound District chinook salmon return was about average. Eastern Norton Sound streams generally produce larger runs and therefore, support larger harvests. Some drainages had strong returns of chinook salmon compared to recent years while lower than average returns were observed in neighboring streams. For example, escapement to the Shaktoolik River was below average even though the Shaktoolik Subdistrict experienced one of it's most restricted commercial chinook salmon seasons. Conversely, the adjacent Unalakleet Subdistrict, had an average commercial harvest with slightly above average escapements.

Chum Salmon

Chum salmon escapements were variable throughout the management area in 1998. Streams in the northwestern portion of the area which include the Pilgrim, Sinuk, and Nome area drainages, had below average or below goal chum salmon escapements. An exception was the Snake River, which doubled its aerial survey goal. This aerial survey observation was supported by a tower count that also nearly doubled the recent high count. Spawning escapement indices for the middle subdistricts, Golovin Bay, Moses Point, and Norton Bay were above average or above goal for chum salmon. Escapement indices for both of the southern subdistricts, Shaktoolik and Unalakleet were below escapement goals.

Coho Salmon

Coho salmon are found in nearly all of the chum salmon producing streams throughout Norton Sound with the primary commercial contributors being the Unalakleet and Shaktoolik Rivers. Because inclement weather is normally experienced in this area during August and September, escapement data for all subdistricts is often limited. Streams in the northern subdistricts of Norton Sound are typically surveyed and the Unalakleet River test net has the best data set to compare coho salmon escapement in southern Norton Sound. The newer assessment projects are intended to monitor coho as well as chum salmon, but still lack an adequate data base. Nearly all escapement monitoring projects had gaps in operations of varying degrees due to high water in 1998. Overall, coho salmon escapements were average in the Nome and Norton Bay Subdistricts and below average in the rest of the district.

Pink Salmon

During recent years, pink salmon returns to Norton Sound have followed an odd/even year cycle with the even year returns typically much larger in size than the odd years. The 1998 return was down slightly from the record levels of the recent two even year seasons 1994 and 1996, but was substantially above current odd year levels. The relative abundance of pink salmon returning was greater in the northern subdistricts than in the south.

MANAGEMENT CONCERNS

Chum salmon stocks have been depressed throughout Norton Sound over the past eight to ten years with escapements in the northern subdistricts continuing to be a major concern. Chum salmon escapement goals are generally being met, but the cost has been a drastic reduction in all forms of harvest in many instances. The Nome Subdistrict was closed again in 1998 during the entire chum salmon run to sport and commercial fishing. Subsistence fishery management actions included intense management on a stream-by-stream basis. Most streams in the Nome Subdistrict were closed to directed chum salmon subsistence fishing for the majority of the season. The Golovin Bay, Moses Point, and Norton Bay Subdistricts attained their escapement goals with minimal

commercial harvests. Both the Shaktoolik and Unalakleet Subdistricts had chum salmon escapements below their goals with each having very small incidental commercial harvests.

The term, Rivers of Concern, was established at the Board of Fisheries meeting prior to the 1990 season. Rivers with chum escapements that had failed to attain the escapement goal for consecutive years, one generation were to be managed more conservatively. Subsistence fishing would not be allowed until the escapement goal was attained. In the past, staff had allowed a regular schedule of fishing until it the strength of the return was apparent, often the mid-point of the return. Both the Eldorado and Kwiniuk Rivers were removed from the "Rivers of Concern" list prior to the 1998 season because they attained their escapement goals in each of the last four years. However both streams continue to have depressed total returns which can support only small harvests. Even though escapement goals are generally being attained for most index streams in Norton Sound, chum salmon harvests will continue to be managed conservatively to assure future returns.

The renewed interest in Norton Sound pink salmon commercial fishing has proven feasible and manageable on strong year classes, but is questionable during weak return years. Management plans should be developed that set exploitation levels and escapement needs, gear and harvest requirements, and considers incidental weak stock impacts.

Salmon marketing conditions have become significant factors for consideration when scheduling fishing periods. Market conditions have caused more restrictive limitations than biological factors in recent years for many species. Fish buyers frequently notify the Department of Fish and Game that they can only handle a limited quantity with a high quality standard and at a specific rate to optimize their operations. The fishery manager must not only monitor the salmon returns and harvest rates, but also must coordinate schedules with the salmon buyers to protect the limited markets available for Norton Sound salmon.

The Board of Fisheries is looking into formulating a management plan to deal with the subsistence salmon fishing issue in the Nome area. The problem is that the chronic shortage of salmon does not satisfy all subsistence users needs. At the March 1998 meeting in Nome, the Board directed Nome area residents to create a Subsistence Salmon Working Group, which would gather together, reach consensus on options for how to deal with the issue, and consider the possibility of Tier-II management. These suggestions would be presented to the Board at a March 1999 meeting in Nome. It is the intention of the Board to put into regulation a management framework that it feels would adequately resolve the subsistence salmon requirements. The outcome is not clear, but it is possible management of the Nome area salmon fishery may change significantly.

1999 OUTLOOK

Salmon outlooks and harvest projections for the 1999 commercial salmon season are based on qualitative assessments of brood year returns, subjective determinations of freshwater overwintering and ocean survival, and projections of local market conditions. Salmon buyers will probably operate in only some of the Norton Sound subdistricts during 1999. The chinook return is expected to be average with a commercial harvest ranging from 6,000 to 8,000 fish. A pink

salmon market is unlikely in 1999. The pink salmon escapements during recent odd years have declined somewhat from stronger escapements in 1991. The 1999 chum salmon return is expected to be below average, while the market for Norton Sound chum will likely be minimal. The commercial harvest of chum salmon will be managed conservatively to provide a potential harvest between 20,000 and 40,000. The 1995 coho salmon commercial harvest and escapements indicate that the 1999 coho return will be average and the commercial harvest is expected to range from 50,000 to 70,000 fish.

Table 1. Commercial salmon catches by species, Norton Sound District, 1961-1998.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,300	35	13,807	34,327	48,332	101,801
1962	7,286	18	9,156	33,187	182,784	232,431
1963	6,613	71	16,765	55,625	154,789	233,863
1964	2,018	126	98	13,567	148,862	164,671
1965	1,449	30	2,030	220	36,795	40,524
1966	1,553	14	5,755	12,778	80,245	100,345
1967	1,804	-	2,379	28,879	41,756	74,818
1968	1,045	-	6,885	71,179	45,300	124,409
1969	2,392	-	6,836	86,949	82,795	178,972
1970	1,853	-	4,423	64,908	107,034	178,218
1971	2,593	-	3,127	4,895	131,362	141,977
1972	2,938	-	454	45,182	100,920	149,494
1973	1,918	-	9,282	46,499	119,098	176,797
1974	2,951	-	2,092	148,519	162,267	315,829
1975	2,393	2	4,593	32,388	212,485	251,861
1976	2,243	11	6,934	87,916	95,956	193,060
1977	4,500	5	3,690	48,675	200,455	257,325
1978	9,819	12	7,335	325,503	189,279	531,948
1979	10,706	57	31,438	167,411	140,789	350,401
1980	6,311	40	29,842	227,352	180,792	444,337
1981	7,929	56	31,562	232,479	169,708	441,734
1982	5,892	10	91,690	230,281	183,335	511,208
1983	10,308	27	49,735	76,913	319,437	456,420
1984	8,455	6	67,875	119,381	146,442	342,159
1985	19,491	166	21,968	3,647	134,928	180,200
1986	6,395	233	35,600	41,260	146,912	230,400
1987	7,080	207	24,279	2,260	102,457	136,283
1988	4,096	1,252	37,214	74,604	107,966	225,132
1989	5,707	265	44,091	123	42,625	92,811
1990	8,895	434	56,712	501	65,123	131,665
1991	6,068	203	63,647	-	86,871	156,789
1992	4,541	296	105,418	6,284	83,394	199,933
1993	8,972	279	43,283	157,574	53,562	263,670
1994	5,285	80	102,140	982,389	18,290	1,108,184
1995	8,860	128	47,862	81,644	42,898	181,392
1996	4,984	1	68,206	487,441	10,609	571,241
1997	12,573	161	32,284	20	34,103	79,141
1998	7,429	7	29,623	588,013	16,324	641,396
Previous 5-Yr Avg ^a	8,135	130	58,755	341,814	31,892	440,726
Previous 10-Yr Avg ^b	6,998	310	60,086	179,058	54,544	300,996

^a 1993-1997

^b 1988-1997

Table 2. Norton Sound commercial salmon harvest summary by subdistrict, 1998.

	Subdistricts						Total Number
	1	2	3	4	5	6	
Number of Fishermen	0	16	23	0	28	52	82 ^a
Chinook							
Number	0	1	105	0	910	6,413	7,429
Weight(lbs.)		3	1,847		15,894	110,087	127,831
Sockeye							
Number	0	0	0	0	0	7	7
Weight(lbs.)						43	43
Coho							
Number	0	3	1,462	0	3,624	24,534	29,623
Weight(lbs.)		20	12,154		29,258	191,273	232,705
Pink							
Number	0	106,761	145,669	0	236,171	99,412	588,013
Weight(lbs.)		246,444	324,068		539,608	220,504	1,330,624
Chum							
Number	0	723	2,311	0	7,080	6,210	16,324
Weight(lbs.)		4,937	13,651		46,197	41,902	106,687
Totals ^b							
Number		107,488	149,547	0	247,785	136,576	641,396
Weight(lbs.)		251,404	351,720	0	630,957	563,809	1,797,890

^a Some fishermen fished more than one subdistrict.

^b Totals do not include Salmon Roe sold.

Table 3. Norton Sound salmon dollar value and average price paid to the fisherman, by species, 1998.

Species	Dollar value	Average price per pound
Chinook	\$94,595	\$0.74
Sockeye	\$13	\$0.30
Coho	\$67,485	\$0.29
Pink	\$187,287	\$0.14
Chum	\$9,602	\$0.09
Total Value	\$358,982	

Table 4. Salmon survey counts of Norton Sound streams and associated chum salmon escapement goals, 1998.

Stream Name	Chinook	Coho	Sockeye	Pink	Chum	Chum Goal
Salmon L.			5,210			
Grand Central R.			1,977			
Pilgrim R.	97	415	64	70,935	2,845	
Glacial L.			975			
Sinuk R.		322	3	372,850	630	4,500
Cripple R.			2	46,030	212	
Penny R.				11,300	43	
Snake R.		344		21,470	2,057	1,000
Nome R.	3	515		179,680	335	2,000
Flambeau R.	1			7,180	2,828	3,250
Eldorado R.	8	71		123,950	3,000	5,250
Bonanza R.		448	10	167,130	295	1,500
Solomon R.		358		45,175	90	550
Fish R.	96			663,050	28,010	17,500
Boston Cr.	255			175,330	418	2,500
Niukluk R.	51	593		205,110	2,556	8,000
Ophir Cr.		116				
Kwiniuk R.	296 ^d	610		655,933 ^d	24,248 ^d	19,500 ^e
Tubutulik R.	894			112,480	10,180	12,000
Inglutalik R.	2,015	100		29,630	9,235	8,500
Ungalik R.	402	1,070		259,550	2,965	2,500
Shaktoolik R.	197	1,404		89,010	1,557	11,000
Unalakeet R.	739	772		23,730	1,050	
North R.	591	233		153,150	50	2,000
Old Woman R.	312	210		14,410	180	100

Note: A multitude of factors affect escapement survey counts. The escapement survey counts here are instantaneous counts which do not represent total escapement. Chum goals pertain to aerial surveys in all cases except for Kwiniuk River which has a counting tower goal. Refer to text for an evaluation of the return.

^a Counts should be considered minimums due to counting conditions.

^b Early count.

^c Late count.

^d Preliminary expanded tower counts.

^e Chum goal for tower count.

^f Pink abundance obscured chum recognition.

Table 5. Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 1998.

Period	Period Catch and Catch Per Unit Effort										Cumulative Catch and Catch Per Unit Effort								
	Pink Period	Hrs. Fished Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
	1	24 7/18	4	0	0.00	23	0.24	2,818	29.35	0		0		23	0.24	2,818	29.35	0	
	2	24 7/19	14	1	0.00	188	0.56	32,220	95.89	0		1		211	0.49	35,038	81.11	0	
	3	24 7/20	13	0	0.00	183	0.59	26,026	83.42	0		1		394	0.53	61,064	82.08	0	
	4	24 7/21	12	0	0.00	127	0.44	20,529	71.28	1		1		521	0.50	81,593	79.06	1	
	5	24 7/22	11	0	0.00	111	0.42	18,429	69.81	1		1		632	0.49	100,022	77.18	2	
	6	24 7/23	6	0	0.00	91	0.63	6,739	46.80	1		1		723	0.50	106,761	74.14	3	
	7	12 7/24	0 No Deliveries									1		723		106,761		3	
Coho 1		24 8/1-8/2	0 No fishermen... Poor weather									1		723		106,761		3	
Coho 2		24 8/3-8/4	1	0	0.00	0	0.00	0		0		1		723		106,761		3	0.13

Total hours fished = 204

Total number of permits used = 18

Table 7. Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 1998.

Period	Period Catch and Catch Per Unit Effort											Cumulative Catch and Catch Per Unit Effort								
	Pink Period	Hrs. Fished	Date	# FM	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE
King 1		24	6/15-6/16	14	222	0.66	3	0.01	-		0		222	0.66	3		0		0	
King 2		24	6/18-6/19	17	244	0.60	0	0.00	-		0		466	0.63	3		0		0	
King 3		24	6/25-6/26	18	319	0.74	8	0.02	-		0		785	0.67	11		0		0	
	1	12	6/28	9	1		41	0.38	4,651	43.06	0		786		52		4,651	43.06	0	
	2	6	6/29	11	9		100	1.52	5,115	77.50	0		795		152	2.30	9,766	56.13	0	
	3	24	6/30	18	19		334	0.77	17,617	40.78	0		814		486	0.98	27,383	45.19	0	
	4	24	7/1	17	5		755	1.85	17,523	42.95	0		819		1,241	1.37	44,906	44.29	0	
	5	24	7/2	11	14		898	3.40	19,137	72.49	0		833		2,139	1.83	64,043	50.11	0	
	6	24	7/3	14	2		120	0.36	7,523	22.39	0		835		2,259	1.50	71,566	44.34	0	
	7	24	7/4	15	12		329	0.91	12,418	34.49	0		847		2,586	1.39	83,984	42.55	0	
	8	24	7/5	14	9		633	1.88	16,102	47.92	0		856		3,221	1.46	100,086	43.33	0	
	9	24	7/6	16	3		720	1.88	16,312	42.48	1		859		3,941	1.52	116,398	43.21	1	
	10	24	7/7	18	6		272	0.63	11,321	26.21	0		865		4,213	1.40	127,719	40.86	1	
	11	24	7/8	15	2		139	0.39	9,722	27.01	0		867		4,352	1.29	137,441	39.43	1	
	12	24	7/9	17	3		285	0.70	22,868	56.05	0		870		4,637	1.22	160,309	41.17	1	
	13	24	7/10	15	23		196	0.54	12,758	35.44	0		893		4,833	1.17	173,067	40.68	1	
	14	24	7/11	15	5		323	0.90	16,984	47.18	0		898		5,156	1.14	190,051	41.19	1	
	15	24	7/12	3	1		90	1.25	4,112	57.11	0		899		5,246	1.15	194,163	41.43	1	
	16	24	7/13	14	2		140	0.42	8,286	24.66	1		901		5,386	1.10	202,449	40.31	2	
	17	24	7/14	18	2		485	1.12	21,654	50.13	2		903		5,871	1.10	224,103	41.09	4	
	18	24	7/15	3	1		147	2.04	5,038	69.97	0		904		6,018	1.11	229,141	41.47	4	
	19	24	7/16	4	0		130	1.35	3,104	32.33	0		904		6,148	1.11	232,245	41.91	4	
	20	24	7/17	5	0		230	1.92	3,123	26.03	1		904		6,378	1.13	235,368	40.99	5	
	21	24	7/18	2	0		0	0.00	570	11.88	0		904		6,378	1.12	235,938	40.75	5	
	22	24	7/19	2	0		42	0.88	233	4.85	0		904		6,420	1.12	236,171	40.45	5	
	23	24	7/20	0									904		6,420	1.12			5	
	24	24	7/21	0									904		6,420	1.12			5	
	25	24	7/22	0									904		6,420	1.12			5	
	26	24	7/23	0									904		6,420	1.12			5	
	27	12	7/24	0									904		6,420	1.12			5	
Coho 4		24	7/27-7/28	7	1		139	0.83			355	2.11	905		8,559	1.11			360	2.14
Coho 5		48	7/30-8/1	3			49	0.34			136	0.94	905		8,608	1.09			496	1.59
Coho 6		48	8/3-8/5	0	Poor weather								905		8,608	1.09			496	1.59
Coho 7		48	8/6-8/8	13	4		425	0.68			2654	4.25	909		7,033	1.06			3,150	3.37
Coho 8		48	8/10-8/12	1	0		1	0.02			18	0.38	909		7,034	1.05			3,168	3.22
Coho 9		48	8/13-8/15	0	Poor weather								909		7,034	1.05			3,168	3.22
Coho 10		30	8/17-8/18	0	Poor weather								909		7,034	1.05			3,168	3.22
Coho 11		24	8/19	0	Poor weather								909		7,034	1.05			3,168	3.22
Coho 12		24	8/20	0	Poor weather								909		7,034	1.05			3,168	3.22
Coho 13		24	8/21	6	0		22	0.15			135	0.94	909		7,056	1.03			3,303	2.93
Coho 14		24	8/22	0	Poor weather								909		7,056	1.03			3,303	2.93
Coho 15		24	8/23	1	0		1	0.04			56	2.33	909		7,057	1.03			3,359	2.92
Coho 16		24	8/24	1	0		7	0.29			62	2.58	909		7,064	1.02			3,421	2.91
Coho 17		24	8/25	3	1		6	0.08			70	0.97	910		7,070	1.01			3,491	2.80
Coho 18		24	8/26	4	0		10	0.10			133	1.39	910		7,080	1.00			3,624	2.70
Coho 19		24	8/27	0	Poor weather															
Coho 20		24	8/28	0	Poor weather															
Coho 21		24	8/29	0	Poor weather															
Coho 22		24	8/30	0	Poor weather															
Coho 23		24	8/31	0	Poor weather															

Total hours fished = 1272

Total number of permits used = 28

Table 8. Commercial salmon set gillnet catches from Unalakleet, Subdistrict 6, Norton Sound, 1998.

Period	Pink Period	Hrs. Fished	Date	# FM	Period Catch and Catch Per Unit Effort						Cumulative Catch and Catch Per Unit Effort								
					Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho	Coho CPUE	Kings	King CPUE	Chum	Chum CPUE	Pinks	Pink CPUE	Coho
King 1		24	6/15-6/16	29	641	0.92	1	0.00	0	0	0	641	0.92	1	-	0	0	0	
King 2		24	6/18-6/19	32	734	0.98	8	0.01	0	0	0	1,395	0.95	9	-	0	0	0	
King 3		48	6/25-6/27	42	2,831	1.40	184	0.09	0	0	0	4,226	1.21	193	0.10	0	0	0	
	1	12	6/28/98	5	39		68	1.13	4,756	79.27	0	4,265		261	0.13	4,756	79.27	0	
	2	6	6/29/98	3	2		9	0.50	1,040	57.78	0	4,267		270	0.13	5,796	74.31	0	
	3	24	6/30/98	6	0		0		2,728	18.94	0	4,267		270	0.12	8,524	38.40	0	
	4	24	7/1/98	5	9		23	0.19	8,237	68.64	0	4,276		293	0.12	16,761	49.01	0	
King 4		48	6/29-7/1	38	1,375	0.75	287	0.16	0	0	0	5,651	1.07	580	0.14	16,761	49.01	0	
King 5		24	7/2-7/3	26	488	0.78	127	0.20	0	0	0	6,139	1.04	707	0.15	16,761	49.01	0	
	5	24	7/2/98	6	8		26	0.18	3,211	22.30	0	6,147		733	0.15	19,972	41.09	0	
	6	24	7/3/98	5	2		38	0.32	3,429	28.58	0	6,149		771	0.15	23,401	38.62	0	
	7	24	7/4/98	3	33		41	0.57	2,064	28.67	0	6,182		812	0.16	25,465	37.56	0	
	8	24	7/5/98	2	12		0		1,672	34.83	0	6,194		812	0.16	27,137	37.38	0	
	9	24	7/6/98	2	6		56	1.17	731	15.23	0	6,200		868	0.17	27,868	36.01	0	
	10	24	7/7/98	6	32		41	0.28	8,418	58.46	0	6,232		909	0.17	36,286	39.53	0	
	11	24	7/8/98	0	No fishermen...	Poor weather					0	6,232		909	0.17	36,286	39.53	0	
	12	24	7/9/98	9	8		37	0.17	4,425	20.49	0	6,240		946	0.17	40,711	35.90	0	
	13	24	7/10/98	15	20		97	0.27	9,318	25.88	2	6,260		1,043	0.18	50,029	33.49	2	
	14	24	7/11/98	5	9		29	0.24	2,740	22.83	0	6,269		1,072	0.18	52,769	32.69	2	
	15	24	7/12/98	8	8		52	0.27	6,097	31.76	0	6,277		1,124	0.18	58,866	32.59	2	
	16	24	7/13/98	14	16		29	0.09	10,164	30.25	6	6,293		1,153	0.17	69,030	32.23	8	
	17	24	7/14/98	18	17		158	0.37	8,703	20.15	9	6,310		1,311	0.19	77,733	30.20	17	
	18	24	7/15/98	13	21		261	0.84	6,594	21.13	23	6,331		1,572	0.21	84,327	29.22	40	
	19	24	7/16/98	13	8		78	0.25	4,484	14.37	23	6,339		1,650	0.22	88,811	27.77	63	
	20	24	7/17/98	7	5		94	0.56	3,750	22.32	11	6,344		1,744	0.22	92,561	27.50	74	
	21	24	7/18/98	8	13		134	0.70	4,821	25.11	25	6,357		1,878	0.23	97,382	27.37	99	
	22	24	7/19/98	2	4		70	1.46	916	19.08	2	6,361		1,948	0.24	98,298	27.26	101	
	23	24	7/20/98	0	No fishermen...	Poor weather					0	6,361		1,948	0.24	98,298	27.26	101	
	24	24	7/21/98	3	0		0		1,114	15.47	1	6,361		1,948	0.24	99,412	27.03	102	
	25	24	7/22/98	0	No fishermen...	Poor weather					0	6,361		1,948	0.24	99,412	27.03	102	
	26	24	7/23/98	0	No fishermen...	Poor weather					0	6,361		1,948	0.24	99,412	27.03	102	
	27	12	7/24/98	0	No fishermen...	Poor weather					0	6,361		1,948	0.24	99,412	27.03	102	
Coho 6		24	7/27-7/28	28	12		998	1.60			1,193	1.91	6,373		2,940	0.34	99,412	1,295	2.08
Coho 7		48	7/30-8/1	28	15		956	0.71			3,867	2.88	6,388		3,902	0.39	99,412	5,152	2.62
Coho 8		48	8/3-8/5	20	7		601	0.63			2,378	2.48	6,395		4,503	0.41	99,412	7,540	2.38
Coho 9		48	8/6-8/8	19	6		565	0.62			4,588	5.03	6,401		5,088	0.42	99,412	12,128	3.16
Coho 10		48	8/10-8/12	21	1		366	0.36			3,741	3.71	6,402		5,434	0.42	99,412	15,869	3.27
Coho 11		48	8/13-8/15	11	1		115	0.22			950	1.80	6,403		5,549	0.41	99,412	16,819	3.13
Coho 12		48	8/17-8/19	5	1		66	0.28			583	2.43	6,404		5,615	0.41	99,412	17,402	3.10
Coho 13		48	8/20-8/22	7	0		83	0.25			643	1.91	6,404		5,698	0.40	99,412	18,045	3.03
Coho 14		48	8/24-8/26	17	0		112	0.14			1,778	2.18	6,404		5,810	0.39	99,412	19,823	2.93
Coho 15		48	8/27-8/29	17	3		184	0.23			2,553	3.13	6,407		5,994	0.38	99,412	22,376	2.95
Coho 16		48	8/31-9/2	13	6		124	0.20			1,664	2.67	6,413		6,118	0.37	99,412	24,040	2.93
Coho 17		48	9/3-9/5	3	0		92	0.64			494	3.43	6,413		6,210	0.38	99,412	24,534	2.94

Total hours = 738
 Total number of permits used = 52
 Additionally, sockeye commercially harvested.

Figure 1. Norton Sound commercial salmon fishing subdistricts.

