

STOCK ASSESSMENT STUDIES OF CHILKAT RIVER

ADULT SALMON STOCKS IN 1999



by

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and
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ABSTRACT

Mark-recapture studies of adult Chilkat River sockeye *Oncorhynchus nerka* and chinook *O. tshawytscha*, salmon stocks were conducted by the Alaska Department of Fish and Game (ADF&G) and the Northern Southeastern Regional Aquaculture Association (NSRAA) in 1999. Detailed results for chinook salmon portions of the program are described in Ericksen (2000). The objective of the sockeye salmon study was to provide estimates of escapement of sockeye salmon stocks to Chilkat Lake and the Chilkat River. Salmon were captured, marked, and released using two fish wheels located on the lower Chilkat River. The total fish wheel catch by species was 7,735 sockeye, 320 chinook, 1,697 coho, 15,740 pink, and 4,250 chum salmon. Of the 7,735 sockeye salmon captured, 7,461 were marked with a primary adipose fin clip and a secondary mark that varied according to timing strata. A total of 19,124 sockeye salmon were examined for marks during recovery efforts in Chilkat Lake, of which 471 had been marked at the fish wheels. A total of 547 sockeye salmon were examined for marks during recovery efforts in mainstem spawning areas, of which 26 had been marked at the fish wheels. Tagging and recovery data were pooled to develop estimates of the total inriver abundance of sockeye salmon returning to the Chilkat River drainage. The drainage-wide sockeye salmon inriver abundance estimate at the time of tagging was 260,729 (SE 11,821, 95% confidence interval 237,559–283,899) fish. Abundance estimates by stock were determined by applying stock composition and fish wheel catch-per-unit data to the drainage-wide estimate. Escapements to Chilkat Lake and mainstem spawning areas were estimated to be 236,374 and 24,355 fish, respectively.

KEY WORDS: mark-recapture, stratified population estimations, escapement estimation, scale pattern analysis, Chilkat River, Chilkat Lake, salmon, fish wheel, age, length, and sex composition

INTRODUCTION

Mark-recapture studies have been conducted since 1994 to assess the productivity, run timing, and exploitation patterns of Chilkat River salmon stocks and to monitor trends and changes in river abundance (Bergander unpublished data, Beesley and Barto unpublished data, Kelley and Bachman 2000). The primary focus of this project is to provide fishery managers with an assessment of sockeye salmon escapement to the Chilkat River and Chilkat Lake (Figure 1) and allow for timely fishing time and area adjustments to the District 115 drift gillnet fishery (Figure 2). Sockeye salmon escapement studies had been conducted at Chilkat Lake from 1967 to 1995 and 1999 using an enumeration weir (Table 1). Due to the approximate 30-day delay in migratory timing between the marine commercial fishery and the weir, the Chilkat River fish wheel program was initiated to provide abundance information on a more timely inseason basis. In addition, the fish wheel program also provides valuable information about sockeye salmon spawning in mainstem areas in the Chilkat River. Chinook, coho, chum, and pink salmon spawning within the Chilkat River drainage can also be assessed using the fish wheels. The Chilkat River fish wheel program was conducted by the Alaska Department of Fish and Game (ADF&G) in 1977, 1978, 1982, and 1983 and again in 1990 to assess, primarily, chum but also coho salmon escapements in the Chilkat River (Table 2). In 1991 the fish wheel program was modified to assess chinook and sockeye salmon escapement in the Chilkat River, but the program was terminated early due to funding cuts. Since 1994 ADF&G and the Northern Southeastern Aquaculture Association (NSRAA) have worked cooperatively to assess Chilkat River sockeye salmon stocks using fish wheels in the lower river. In 1994 and 1995 the Chilkat Lake weir was operated in conjunction with the fish wheels. Sockeye salmon were captured at the weir and examined for marks applied at the fish wheels. Results of the 1994 and 1995 weir work revealed that Chilkat weir counts were not producing reliable estimates of the sockeye salmon escapement into Chilkat Lake, presumably due to increased openings of the weir boat gate, reversals in water flow in the fenced outlet stream, as well as a change in weir operation intended to capture fish in a trap for examination and biological sampling. This study also showed that a mark recovery program with marks applied at the lower river fish wheels could provide improved estimates of escapement. As a result, the operation of the weir for determining escapement at Chilkat Lake was discontinued in 1996 (Bergander unpublished data). During 1996 through 1998 recovery of marks was conducted by extensive beach seining at holding and spawning areas in the lake. Results of the 1998 program (Kelley and Bachman 2000) revealed that recovery efforts were biased because later returning fish were not available at spawning beaches during seining operations. Operation of the Chilkat Lake weir was re-established in 1999 to provide an improved mark-recovery platform.

The commercial sockeye salmon harvest in the Lynn Canal (District 115) fishery is comprised of a mixture of Chilkat Lake, Chilkat River, Chilkoot Lake, Berners Bay rivers, and other smaller local sockeye salmon stocks. Scale pattern analysis (SPA) is used to estimate the contribution of these stocks of sockeye salmon in this fishery each season (McPherson and Olsen McPherson et al. 1992, McPherson 1989, McPherson 1987, McPherson and Marshall 1986, McPherson et al. 1983, Marshall et al. 1982). Scale pattern analysis can be used inseason and post season to identify Chilkat Lake, Chilkoot Lake, and "other" (an amalgamation of Chilkat River mainstem, Berners Bay, and other local stocks) sockeye salmon stocks in the Lynn Canal fishery. Scale samples used for SPA standards for Chilkat Lake and mainstem area sockeye salmon stocks are collected by this project.

Sockeye salmon originating in Chilkat Lake and Chilkat River contribute significantly to the Lynn Canal (District 115) commercial drift gillnet fishery. Chilkat Lake has produced annual commercial sockeye salmon harvests as high as 168,361 in 1986, with mean harvests of 97,242 fish for the years 1976 through 1998 (Table 3). Annual harvests of "other" sockeye stocks, which includes Chilkat River mainstem spawning fish, have been as high as 33,429 in 1992 with a mean harvest of 13,558 fish for the years 1976 through 1998 (Table 3). In addition to the commercial harvest, sockeye salmon from Chilkat Lake and the Chilkat River are harvested in the Haines area subsistence fishery. Reported harvests for that fishery for the period 1990 through 1999 averaged approximately

2,750 sockeye salmon (ADF&G unpublished data). As in 1998, the 1999 preseason projection was for a strong return of Chilkat Lake sockeye salmon (Bachman et al. 1999). The Lynn Canal drift gillnet fishery was managed to target those fish while protecting other stocks present in lesser abundance. Lynn Canal drift gillnet fishery openings and catch by statistical week are summarized in Table 4.

Spawning escapement goals have been established for two separate stocks of sockeye salmon in Chilkat Lake (McPherson 1990). The escapement goal for the early run is 17,500 (range 14,000 to 28,000) fish and the goal for the late run is 47,500 (range 52,000 to 106,000) fish. The optimal total escapement goal is the sum of the individual stock goals. No formal escapement goals have been derived for sockeye salmon stocks that spawn in the Chilkat River mainstem. The escapement to mainstem areas is currently monitored through foot surveys. The desired peak foot survey count is 500 to 2,000 fish.

Sockeye salmon escapements to Chilkat Lake have averaged 110,339 annually for the period 1976 through 1998 with a range of 23,947 to 262,852 fish (Table 5). Escapement estimates of sockeye salmon to the Chilkat mainstem areas are available since 1994 and have averaged 29,046 fish from 1994 through 1998 with a high of 53,369 fish in 1996 (Table 6).

Mark-recapture methods were used in 1999 to estimate sockeye salmon escapements to the Chilkat River and Chilkat Lake. Two fish wheels were operated in the lower Chilkat River adjacent to the Haines Highway between 9 and 9.5 miles from downtown Haines, Alaska to capture fish for marking. Marking data and ratios of marked to unmarked fish collected in the mainstem and Chilkat Lake areas were used to develop escapement estimates for sockeye salmon. Trends in fish wheel catches were used inseason to provide a general idea of inriver abundance, which allowed managers to adjust commercial fishing effort accordingly. Daily fish wheel catches of all fish species were recorded, and age, length, and sex data were collected from sockeye salmon from fish caught in the Chilkat River fish wheels. Analysis of mark-recapture data for chinook salmon caught in the Chilkat River fish wheels during this study is reported elsewhere (Ericksen 2000).

OBJECTIVES

The primary goals of the Chilkat River fish wheel program in 1999 were to obtain information on sockeye salmon escapement to Chilkat Lake and Chilkat River mainstem spawning areas, general distribution of sockeye salmon to these areas, and age, sex, and size composition of sockeye salmon stocks in the Chilkat River drainage.

The specific objectives of this project are as follows:

1. Estimate, on a postseason basis, the number of adult sockeye salmon escaping into Chilkat Lake with a precision of $\pm 10\%$, 95% of the time.
2. Estimate the number of sockeye salmon escaping into the mainstem Chilkat River spawning areas with a precision of $\pm 20\%$, 90% of the time.
3. Estimate the age, sex, and length composition of sockeye salmon captured in the Chilkat River fish wheels on a weekly basis with a precision of $\pm 5\%$, 95% of the time.

4. Estimate the annual age, sex, and length composition of the sockeye salmon spawning escapement in Chilkat Lake and the Chilkat River with a precision of $\pm 5\%$, 95% of the time.
5. Estimate the number of Chilkat Lake, Chilkoot Lake, and “other” sockeye salmon harvested in the Lynn Canal drift gillnet fishery.

Additional objectives for estimating chinook salmon inriver abundance are presented in project operational plans and reports authored by Randy Ericksen of ADF&G, Sport Fish Division.

METHODS

Study Area Descriptions

The Chilkat River basin, at the head of Lynn Canal in northern southeast Alaska (Figure 1), is bordered by the Takhinsha Mountains and Glacier Bay National Park and Preserve to the south and by the Takshanuk Mountains to the east. The northern and western parts of the basin lie within British Columbia, Canada. The Chilkat River is a large glacial system that originates in Yukon, Canada, and has its terminus near Haines, Alaska. The mainstem and major tributaries (Tsirku, Klehini, Kelsall, and Tahini Rivers) comprise approximately 220 miles of river channel in a watershed covering about 1,000 square miles. The river system originates from many glaciers and flows through rugged mountainous terrain, converging to a turbid, braided river system. This turbidity precludes complete enumeration of salmon escapements in many areas by aerial or foot surveys. Chilkat River stream flow originates as runoff from rain, melting snow, ice, and as ground water discharge to the streams from springs and seeps along or in riverbeds. Runoff from melting glacier snow and ice augments stream flow during summer months.

Chilkat Lake (59°19'34" N, 135°53'33" W) is a relatively large, clear water lake with a surface area of $9.8 \times 10^6 \text{ m}^2$ (2,432 acres), mean depth of 32.5 m, a maximum depth of 57 m, and a volume of $319 \times 10^6 \text{ m}^3$. The outlet of the lake is located approximately 30 km northwest of the city of Haines, Alaska. Chilkat Lake drains into the Chilkat River by way of the Tsirku River. It is located approximately 27 river miles upstream from the town of Haines near the northern terminus of Lynn Canal (Figure 1). Average precipitation for this area is approximately 165 cm/yr. (Bugliosi 1988). Resident fish include sockeye (*O. nerka*), coho (*O. kisutch*), pink (*O. gorbuscha*), and chum (*O. keta*) salmon, Dolly Varden (*Salvelinus malma*), cutthroat trout (*Salmo clarki*), threespine stickleback (*Gasterosteus aculeatus*), and sculpin (*Cottus sp.*), with sockeye salmon being the most abundant (Anonymous 1987).

Fish Wheel Operation

Migrating adult salmon were captured with two three-basket fish wheels operated in the Chilkat River near mile 9 and 9.5 Haines Highway from June 7 through October 8 (Statistical Weeks 24–41, Appendix A). They were located approximately 18 miles downstream from Chilkat Lake. Each fish wheel consisted of two aluminum pontoons, measuring approximately 12 m in length and 6 m in width and filled with closed-cell Styrofoam for flotation. The pontoons supported a framework consisting of a vertically adjustable axle, three catch baskets, wooden slides, and chutes along with two live boxes per wheel designed to hold fish prior to sampling. The three catch baskets were rotated about the axle by the force of the water and were adjusted vertically in the water column by hoisting the axle up or down within tower support channels. As the fish wheel baskets rotated, migrating salmon were captured when they swam under the structure. V-shaped wooden slides bolted to the rib mid-section of each basket directed fish (by gravity through wooden guides) to aluminum live boxes bolted to the outer edges of each pontoon.

The aluminum baskets measured 3.1 m (width) by 3.7 m (depth), and were covered with nylon seine mesh (5.1 x 5.1 cm openings), and were bolted to a metal axle which spun in a pillow-block bearing assembly. The aluminum baskets fished to a maximum depth of approximately 3.45 m and were adjusted using a raised tower, which rested on the aluminum pontoons. Minimum fishing depth for the aluminum baskets was approximately 1 m but at this depth the baskets lacked the needed contact with the water current and did not spin properly. In past years, several designs for paddles were used to increase the surface area in contact with the water in an attempt to increase revolution speed. Although some improvements were noted, most of the attempts to increase wheel revolutions per minute (rpm) by attaching various paddles and buckets to the baskets decreased overall performance of the fish wheels. The depth at which the fish wheels operated in depended primarily upon water velocity. At the chosen sites, an average river depth of at least 1 meter is required to maintain revolutions adequate to capture migrating salmon (approximately 1.5–4 rpm).

The fish wheels were positioned between 9 and 9.5 mile Haines Highway on the east riverbank, approximately 200-m apart. The fish wheels were primarily secured in position by anchoring to the highway guardrail with 0.95-cm steel cable. One-inch diameter polyethylene rope bridle acted as a back-up system in the event that the steel cable failed. The fish wheels were held out from, and parallel to, the shoreline by an adjustable boom log system. This boom log system similar in design developed for the Taku fish wheel project was installed onto the Chilkat River fish wheels in 1998. The Chilkat River channel at this location is conducive for fish wheel operation, however, seasonal fluctuations in water flow velocities (particularly from late August through early October), required minor changes in fishing location to maintain fish wheel rpm at an acceptable rate. The fish wheels rotated between 0–3.85 rpm throughout the season, depending on the water velocity and depth in which the wheels fished. When water levels subsided, the fish wheels were moved farther out from shore into faster water currents or moved to an alternate location to maintain a speed of basket rotation adequate to catch fish.

Fish wheel deployment is accomplished by hoisting the fish wheels into the river with a crane and then drifting each wheel down stream into position at chosen sites. At the end of the season, each fish wheel is crane-hoisted onto flat bed trailers and then transported and stored near milepost 10, Haines Highway.

Marking, Tagging, and Sampling Procedures

Data collected and recorded at the fish wheels included daily catch and number of marked and tagged fish by species. In addition, fish wheel effort (hours fish wheels were operational during a 24-hour period), water level, temperature, and weather data were recorded on a daily basis.

All sockeye salmon captured in the fish wheels were sampled for sex and mid-eye to fork of tail (MEF) length. A sub-sample of 260 sockeye salmon per week was sampled for scales, length, and sex determination. The scale sample data was used for age determination, stock differentiation, and assignment of marked fish to Chilkat Lake and Chilkat River mark groups. All healthy chinook salmon equal to or greater than 440 mm MEF were tagged with uniquely numbered spaghetti tags and sampled for sex, scales, and MEF lengths (Ericksen 2000). Also, every tagged chinook salmon was given a upper left operculum punch used to verify tag loss during recovery. The total sampling goal for chum salmon was 634 fish. Assuming similar fish wheel catches of chum salmon as in 1997 and 1998, to meet that goal, every second chum salmon captured in the fish wheels was sampled for sex, scales, and MEF length. Every second coho salmon was sampled for scales, sex determination, and MEF length. For pink salmon, 25 fish were sampled daily for MEF length and sex determination only.

All uninjured sockeye salmon were marked with a primary adipose fin clip and a secondary fin mark based on timing strata. Marked fish less than or equal to 360 mm MEF (jacks) were subsequently removed from the mark-recapture analysis because fish in this size range are virtually unsusceptible to capture in recovery events at Chilkat Lake from which ratios of marked to unmarked fish are used to develop population estimates. Each release or timing strata was established to correspond to approximately 25% of the sockeye salmon run captured in the fish wheels. This was determined by identifying the weeks that 25%, 50%, 75%, and 100% of the historic (1994–1998) Chilkat sockeye salmon run were captured in the fish wheels. Strata marks for the 1999 season were as follows:

Dates	Statistical Weeks²	Mark (adipose fin clip+)
June 6 to July 24	24-30	Left axillary appendage
July 25 to August 21	31-34	Last 4 rays of dorsal fin
August 22 to September 11	35-37	Left ventral fin
September 12 to End	38-End	Right ventral fin

²Appendix A.

All salmon that had serious wounds (most often thought to be seal inflicted) or that were lethargic in behavior were immediately released and were not marked, tagged, or sampled.

Salmon were dip netted from the fish wheel live boxes and placed into a tagging/marking trough partially filled with river water. Fin clip marks were applied to sockeye salmon as follows: one person held the fish in the trough while a second person removed the adipose fin and applied a secondary mark according to what time strata the fish was captured in. Chinook salmon were tagged by insertion of a 15-cm applicator needle and attached spaghetti tag through the musculature immediately below the dorsal fin. The two ends of the tag were passed through a small metal sleeve, which secured the tag when crimped with pliers. Biological sampling was also conducted during application of the marks/tags. Date of sample, sex, and length measurements along with other information about each fish were recorded on mark-sense forms and scale samples were taken from the preferred area of all chinook, sub-samples of sockeye, chum, and coho salmon caught (ADF&G 1994). The tagging and sampling procedures took from 20 to 40 seconds per fish to complete. The fish were then immediately returned to the river.

Fish wheel catches were sampled in the morning (0800–1200 hrs) and late afternoon (1430–1630 hrs) with more frequent checks during periods of peak fish movement.

Mark Recovery

The ADF&G fish wheel crew performed all of the sockeye salmon mark recovery efforts in Chilkat River mainstem areas. Jet drive powered riverboats were used to transport the crew and sampling gear to capture sites. Beach seines and linen gillnets were used to capture fish. Because a relatively small number of fish were recovered at Chilkat River mainstem locations, every unmarked fish captured was sampled for scales, MEF length, and sex. Every captured sockeye salmon was physically handled to determine presence or absence of an adipose fin and if an adipose fin was absent the fish was examined for a secondary mark. Every fish handled for mark recovery was given a lower left opercle punch to allow it to be identified during subsequent sampling trips as previously sampled. All fish were released after sampling. Data was recorded on established data forms and field note books.

NSRAA crews conducted mark recovery activities at the weir site near the outlet of Chilkat Lake. During 1998, the Chilkat weir was not operated as a mark recovery site. In that year beach seines were used to capture fish on spawning grounds along its shores where sockeye salmon were examined in much the same manner as in mainstem areas. Operation of the weir was re-instituted in 1999 to provide a more representative sample of the entire migration of Chilkat Lake sockeye salmon (Kelley and Bachman 2000). Due to relatively large numbers of sockeye salmon captured by NSRAA recovery crews at Chilkat Lake, a sub-sample of 100 fish per week was sampled for scales, MEF length, and sex.

Recovery efforts were conducted once or twice per week beginning July 11 at Chilkat Lake and July 26 at Chilkat mainstem spawning areas. A trap was erected at the mid-section of the Chilkat Lake weir where fish swam through a small opening in the fence into a covered pen. NSRAA staff used dipnets to capture trapped fish for mark examination and sampling. Scheduling of recovery sampling efforts at mainstem areas varied based on the percentage of recaptures in a given area to avoid unnecessary over handling of fish on spawning grounds. Seine nets were deployed to corral schools of sockeye salmon on and near spawning grounds for mark inspection. Data was exchanged weekly between NSRAA and ADF&G offices in Haines.

Marking and mark recovery data were organized by ADF&G statistical week for analysis. Statistical weeks begin at 00:01 a.m. Sunday and end the following Saturday at midnight, with weeks being numbered sequentially beginning with the week encompassing the first Saturday in January. Inclusive dates for 1999 statistical weeks are shown in Appendix A.

Lynn Canal Drift Gillnet Harvest

Estimates of sockeye salmon stock contribution in the Lynn Canal drift gillnet fishery were derived from SPA with scale samples collected each week from the commercial catch. Catches are tabulated during and after each fishery opening using fish ticket information collected from processors and fishing vessels. Commercial catch was reported by fishing period and assigned to a statistical week. ADF&G employees collected sockeye salmon scales from fishing vessels and tenders on the grounds during open fishing periods and at the port of Excursion Inlet

during time of delivery. Scales were obtained from the preferred area of the left side of the fish as shown in ADF&G, 1994. Scale samples collected from each fishing period were sent to the ADF&G scale lab in the Region I, ADF&G office in Douglas, Alaska for analysis.

Using methods described in McPherson (1987), scale samples from the Lynn Canal commercial gillnet harvest of sockeye salmon were assigned to one of three different stock groupings. These groups were Chilkat Lake, Chilkoot Lake, and “others.” The “others” group is comprised primarily of Chilkat River mainstem and Berners Bay rivers sockeye salmon but also includes other smaller local stocks. Stock proportions were applied to the total weekly commercial harvest of sockeye salmon. Estimates of the total catch by stock group and age class were made by applying each age and stock proportion to the catch during each fishing period and summing the estimates across periods.

Statistical Methods

Mark–recapture data was compiled into a matrix summarized by marking and recapture periods. The mark–recapture matrices were then analyzed using a statistical program called “Stratified Population Analysis System” (SPAS; Arnason, A. N., C. W. Kirby, C. J. Swartz, and J. R. Irvine 1996). This program provides stratified population estimates using maximum likelihood techniques (Plante 1990) and associated variances for cases where s (the number of tagging stratum) and t (number of recovery stratum) are not equal. For cases in which $s=t$, the model provides stratified population estimates based on Chapman and Junge (1956) and Darroch (1961). Stratified methods were used because they allow the probabilities of capture in marking and recovery strata to vary across time. The program also provides results for two tests for appropriateness of pooling the data. If either of those tests (equal proportions and complete mixing) are not significant ($P>0.05$) then the data may be fully combined and a Pooled Petersen estimate (PPE) is appropriate.

Assumptions necessary to form consistent (i.e., approaching unbiased as sample size increases) stratified mark–recapture estimates in this study include:

1. All fish that pass the lower Chilkat River fish wheels during the period of interest have a non-zero probability of recovery at the spawning grounds and all fish caught during recovery efforts have a non-zero probability of being marked (i.e., the population is closed).
2. There is no mark loss, mark-induced mortality, mark mis-identification or non-reporting of marks. Should any of these occur, they are to be estimated and adjusted for.
3. All fish, marked or not, are independently caught with the same probability in any given recovery stratum.
4. All fish, marked or not, move from a given release stratum to the recovery strata independently with the same probability distribution.
5. There are no release strata or recovery strata where no marks are released or found respectively, and there are no rows or columns of the release-recovery matrix that are linear combinations of other rows or columns respectively (Arnason et al. 1996).

Mark and recovery data were organized in temporal strata and a drainage-wide sockeye salmon abundance estimate was determined for the time of marking. The estimate was derived for all mark and recovery data combined. Sockeye salmon that were less than or equal to 360 mm MEF (“jacks”) were subtracted from the number of marks applied each week and were also removed from the second event recovery data. Estimates of

weekly abundance were determined by multiplying the proportion of the fish wheel sockeye salmon CPUE for each weekly period by the total abundance estimate. The weekly estimates of Chilkat River mainstem and Chilkat Lake sockeye salmon were then determined by multiplying the weekly abundance estimate by the proportion of mainstem and lake fish as determined by SPA.

Sockeye, chinook, chum, and coho salmon scale samples were aged in the Region I aging Laboratory in Douglas, Alaska. Length, sex, and age results were recorded on mark-sense data forms (ADF&G 1994). When complete, the forms were then scanned and a computer file was generated and saved onto disk. That file was then analyzed using two (Olsen, unpublished data) computer programs. One program summarized age data by statistical week and sex. The other summarized length information by statistical week and sex.

RESULTS

Fish Wheel Operation

In 1999, fish wheels were operated on the Chilkat River from June 7 through October 8 (Table 2). The fish wheel located furthest downstream (FWII), was installed in a three-aluminum basket configuration on June 7 and fished until October 8. The fish wheel located furthest upstream (FWI), was fished in a three-aluminum basket configuration from June 8 through October 8. Fish wheel II was inoperable on August 25 through 27 due to low water flows. It was relocated into swifter current and was operable through the end of the season. Fish wheel I stopped fishing on September 22 through 24 due to very high winds and woody debris entanglements between the pontoons and basket structure. On October 8, water levels were below that necessary to operate the fish wheels and attempts to locate a suitable alternate area to operate both fish wheels was unsuccessful. Fish wheel effort (hours of operation per day), rpm, and physical river parameters are summarized in Appendix B. In 1999, the daily water level measurements were near the 1994–1998 average through the first half of the season. From August 23 to September 15, water levels were below the 1994–1998 average (Figure 3). It was during this time frame where fish wheel II had to be relocated to an alternate area due to low water levels and velocity.

Fish Wheel Catches

Dates of operation, daily and cumulative catches, total effort and catch per unit of fish wheel effort (CPUE) of chinook, sockeye, coho, pink, and chum salmon and Dolly Varden charr *Salvelinus malma* in the Chilkat River fish wheels are listed in Appendices C.1. to C.6. Dates of operation and the total fish wheel catch by species for the 1977, 1978, 1982, 1983, 1990, 1991, and 1994 to 1999 seasons are presented in Table 2. Graphs of the fish wheel CPUE for sockeye, coho, chinook, pink, and chum salmon are provided in Figure 4.

The total catch of 320 chinook salmon in 1999 was the highest on record for the period of 1994 to 1999 (Table 2). Catch dates were from June 16 to August 9. The 1999 fish wheel catch of chinook salmon is just over two times the historic 1994–1998 average of 148 fish. The daily catch peaked on July 8, 9, and 10, when 16, 35, and 23 fish were captured respectively. The highest CPUE of 2.409 was observed on July 9 (Appendix C.1).

The total fish wheel catch of sockeye salmon in 1999 was 7,735 fish (Appendix C.2). This catch is 1.8 times higher than the 1994 to 1998 average of 4,191 fish and is the highest catch on record. Catches occurred from June 9 through October 8. In 1999, as in past years, the daily catches fluctuated dramatically. The effects of the drift gillnet commercial fishery in Lynn Canal were observable in the fish wheel catch where net marks and dramatic weekly fluctuations of abundance were noted. Fish wheel catches declined to their lowest weekly levels between Thursday and Saturday indicating an average travel time of three to four days between Lynn Canal and the lower Chilkat fish wheel sites. Catches of sockeye salmon continued through the very end of the season with 118 fish captured in the last seven days of fish wheel operations.

The total 1999 coho salmon catch in the Chilkat River fish wheels was 1,697 fish. The 1990, 1997–1998 average coho salmon catch was 1,938 fish; 1990, 1997, and 1998 were the only other recent years of comparison due to removal of the fish wheels prior to the completion of coho salmon migration (Table 2). The coho salmon catch peaked on September 25 when 183 fish were caught, while CPUE was 22.706 on September 22 (Appendix C.3).

The 1999 pink salmon fish wheel catch was 15,740 fish (highest on record, Appendix C.4). This catch was well above the 1994 to 1998 average of 1,006 fish. The highest fish wheel catch rates for this species occurred between July 23 and August 20 and peaked on July 31.

The fish wheel catch of chum salmon was 4,250 fish (highest on record, Appendix C.5). This catch was 3.3 times the 1994–1998 average of 1,235 fish. The peak daily catch of 206 fish occurred on September 25. High catches of chum salmon continued through the end of the fish wheel program. The fish wheels captured 123 chum salmon on the last day (Appendix C.5).

In 1999 the total Dolly Varden catch in the fish wheels at Chilkat River was 4,523. Currently, fish wheel catch information is the only information collected for this species (Appendix C.6).

Sockeye Salmon Inriver Abundance

A total of 7,735 sockeye salmon were captured in the Chilkat River fish wheels between June 8 and October 13, 1999, of which 7,461 were marked and released (Appendix C.2; Table 7). After removal of 184 marked fish less than 360 mm MEF in length (jacks), a total of 7,277 marked sockeye salmon were included in the mark–recapture analyses (Table 6). During marked salmon recovery efforts 19,124 sockeye salmon were examined for marks at Chilkat Lake and 547 fish at mainstem spawning areas for a total of 19,671 fish examined (Table 7). After removal of 26 jack sockeye salmon from the recovery strata, a total of 19,645 fish were used in the analysis. Marked fish recoveries totaled 497, of which 471 (95%) were found at Chilkat Lake and 26 (5%) at mainstem spawning areas (Table 8).

A necessary assumption of the population estimation technique we used is that all fish in a particular recovery stratum, whether marked or unmarked, have the same capture probability. One factor that could violate this assumption is if marking and recapture gear are selective for different sized fish. Cumulative distribution

functions (CDF) of length for fish marked at the fish wheels and fish sampled on the spawning grounds (combined strata) were significantly different (Figure 5). Inspection of the CDFs clearly shows that small fish were relatively more prevalent in fish wheel samples than in the pooled spawning ground samples and indicates that probabilities of capture were not equal for fish of all sizes during marking and/or recovery events. Further analysis of the length data shows that the CDFs of fish sampled at Chilkat Lake and mainstem spawning areas were also significantly different (Figure 6).

Mark-recovery data was pooled for analysis. Recovery strata were reduced from sixteen to fifteen by combining the last two weeks of recovery data in order to increase the number of tag recoveries in the final strata. Because an initial analysis of the data resulted in negative probabilities of capture, four tagging strata were reduced to three by combining the last two tagging strata. This pooled data set is displayed in Table 6. Analysis of the data resulted in an escapement estimate of 260,729 (SE=11,821, 95% C.I. 237,559–283,899) sockeye salmon for the entire Chilkat River drainage (Appendix D). Scales collected from sockeye salmon marked at the fish wheels were assigned to stock of origin through scale analysis and weekly proportions by stock of the fish wheel catch were developed. The total abundance estimate was then multiplied by the weekly stock proportions to generate the weekly passage of sockeye salmon by stock group through the lower Chilkat River. The estimated abundance of Chilkat Lake sockeye salmon is 236,374 fish, 2.1 times the historical 1976–1998 average of 110,339 fish (Table 5). The estimated abundance of Chilkat River mainstem fish is 24,355 fish, 84% of the 1994–1998 average of 29,046 fish (Table 6).

Sockeye Salmon Stock Timing

Stock-specific sockeye salmon run timing was analyzed by applying scale-pattern based stock and age composition estimates to the weekly abundance estimates at the fish wheels (Table 9). The Chilkat Lake sockeye salmon return was very protracted; fish bound for Chilkat Lake were the most common stock group passing the fish wheel site each week of the season (Figure 7). The passage of early run Chilkat Lake fish peaked through the lower river in early July (Statistical Week 28). A second peak of abundance of Chilkat Lake fish passed through the lower river in August (Statistical Week 33–35). Fish with one freshwater check (age-1.X) dominated the early season catches while age-2.X fish dominated later in the season (Figure 8); these age composition trends are similar to those noted from historical data for early and late run Chilkat Lake returns (McPherson 1990). The run of Chilkat mainstem fish was much smaller and considerably less protracted than the return to Chilkat Lake. Mainstem fish peaked in the lower river in early to mid-July (Statistical Weeks 28 and 30), and the run was essentially over by the end of August.

Age, Length, and Sex Composition

Historical age composition and length-at-age data for Chilkat River salmon stocks along with size and sex ratios of pink salmon sampled in the Chilkat River fish wheels is summarized by species in Tables 10 through 22.

Historical age composition data for sockeye salmon captured in the Chilkat River fish wheels is presented in Table 10. In 1999, age-2.3 fish were most prevalent (41.6%), followed by age 1.3 (25.5%), age 2.2 (21.4%), age 0.2 (3.5%), and small contributions of numerous other age groups. Historical length-at-age data for Chilkat

River fish wheel catches of sockeye salmon is presented in Table 11. Average length-at-age for the most prevalent age classes were smaller than historical averages.

Historical age and length-at-age data for Chilkat Lake sockeye salmon escapements is summarized in Tables 12 and 13, respectively. Age-2.3 fish dominated the samples (52.0%), followed by age-1.3 (31.6%), age-2.2 (14.3%), and small contributions of numerous other age groups. Relative to historic averages, the percentage of age-2.3 fish was above average, the percentage of age-1.3 fish was average, and the percentage age-2.2 fish was below average. The low estimated contributions of age-2.X fish in the Chilkat Lake escapement during 1996 through 1998 is believed to be at least partially due to the fact that the weir was not operated in those years and late run fish were not well represented because in-lake sampling was terminated before many late run fish reached the spawning grounds. It is also interesting to note that during these years the proportions of small age-1.2 fish were very high. This may be an indication that small fish pass through the picket weir unsampled and uncounted, although it can not be definitively determined without weir and spawning ground samples from the same years. Average lengths from fish sampled at the weir for the major age classes at Chilkat Lake in 1999 were close to historical averages.

Historical age and length-at-age data for Chilkat River mainstem sockeye salmon is summarized in Tables 14 and 15, respectively. In 1999 the contributions of age-0.X sockeye salmon were much higher than historical averages, while contributions of age-1.X were much lower than average. The percentages of age-0.2 and age-0.1 sockeye salmon were the highest on record (65.8% and 7.2%), well above the historical averages of 18.0% and 0.3%, respectively. No age-1.3 fish were found in 1999, compared to an average of 32.1%. No trends across age classes were apparent between average lengths-at-age in 1999 relative to historical averages.

For chinook salmon, age-1.1 fish were most prevalent in fish wheel catches (a record 43.7%), followed by age-1.4 (28.0%), age-1.2 (16.8%), age-1.3 (8.6%), and age-1.5 (2.9%) (Table 16). Historical length-at-age data for chinook salmon captured in the Chilkat fish wheels is summarized in Table 17.

Three full seasons of age and length data have been collected from adult migrations of coho salmon in the Chilkat River with fish wheels. In 1999, age-1.1 fish were most abundant (64.2%), followed by age-2.1 (32.1%), and age-2.0 (3.5%) (Table 18). The only other years data was collected from coho salmon were 1990 and 1998. Length-at-age data for 1990 and 1998–1999 Chilkat River coho salmon is summarized in Table 19.

Fish wheel catches of chum salmon were comprised mostly of age-0.3 (80.2%) and age-0.4 (12.9%) fish, with age-0.2 fish contributing 6.7% and age-0.5 fish 0.2% (Table 20). The contributions of age-0.3 and age-0.2 fish were higher than during the other three years samples have been taken at the fish wheels (1990, 1997, and 1998). Length-at age data for chum salmon is presented in Table 21.

Pink salmon length and sex ratio data were first collected from the Chilkat River fish wheels in 1998. Pink salmon sex ratios were collected and tabulated weekly to provide insight to the status and timing of the return (Table 22). The pink salmon return in 1999 peaked in Statistical Week 33. The percent males in the weekly fish wheel samples in 1999 varied considerably throughout the season and did not exhibit a seasonal trend as it did in 1998 (Kelley and Bachman 2000).

Lynn Canal Drift Gillnet Harvest

The Lynn Canal drift gillnet fishery targets stocks of sockeye, chum, and coho salmon. Chinook and pink salmon are harvested incidentally in the fishery. In general, sockeye and summer chum salmon are harvested in the early to late summer periods of the fishery and coho and chum salmon are harvested in the late summer and fall periods (Figure 9).

The annual total Lynn Canal commercial gillnet harvests of sockeye salmon between 1976 and 1998 have ranged between 53,987 and 471,914 fish and averaged 230,574 (Table 3). Annual harvests during the most recent five-year period prior to 1999 (1994–1998) averaged 134,504 fish (Figure 10). The 1999 harvest of 163,530 ranked sixteenth highest since 1960. The 1999 harvest of sockeye salmon in Lynn Canal occurred over a 17-week period (Table 4). Strategies to manage harvest selectively to protect stocks of sockeye, chinook, coho, and/or chum salmon, while targeting abundant Chilkat Lake sockeye salmon stocks, resulted in substantial variation in the time and locations open to fishing each week (Table 4).

In 1999, sockeye salmon age 2.3 dominated the catch (50.1%), followed by fish age 1.3 (35.5%), and age 2.2 (10.5%). Fish of all other age classes accounted for <4% of the catch (Table 23). Average length-at-age for sockeye salmon harvested in the fishery is summarized in Table 24.

The stock composition of the 163,530 harvested sockeye salmon was estimated to be 149,619 Chilkat Lake fish (91.5%), 4,269 Chilkoot Lake fish (2.6%), and 9,570 fish (5.9%) from “other” stocks (Appendix E). Contributions from Chilkat Lake were greater than 60% in all weeks during the commercial fishing season (Appendix E). Weekly contributions from Chilkoot Lake sockeye salmon were not higher than 5% the entire season. “Other” sockeye stocks fish were present in sizable numbers only during the first five weeks of the season and contributed an average of 12% of the catch in those weeks. Historical harvests by week of Chilkat Lake and “Other” sockeye salmon in the Lynn Canal drift gillnet fishery are presented in Tables 25 and 26.

The 1999 catch of 149,691 Chilkat Lake sockeye salmon was 1.5 times the 1976 through 1998 average catch of 97,242 fish (Table 3). The 1999 harvest of 9,574 “other” sockeye salmon was 70.6% of the 1976 through 1998 average of 13,558 fish.

The Chilkat Lake sockeye salmon run was exploited by the Lynn Canal drift gillnet fishery at an estimated rate of 39%, compared to a 1976–1998 average of 49%. The estimated total run (escapement + harvest) of Chilkat Lake sockeye salmon in 1999 was estimated to be 386,368 fish, almost 1.9 times the 1976 through 1998 average of 207,581 fish (Table 3, Figure 10). Total return and exploitation rate information for the Chilkat mainstem sockeye salmon stock could not be determined as it is not possible to differentiate Chilkat River mainstem sockeye salmon from Berners Bay rivers fish in the commercial drift gillnet harvests.

DISCUSSION

The accuracy of mark–recapture studies in providing estimates of abundance is dependent on the degree to which the underlying assumptions of the analytical methods used are satisfied. In estimating the abundance of adult sockeye salmon in the Chilkat River drainage we assumed: (a) marking of adult sockeye salmon was in

proportion to their numbers immigrating over time; (b) no sockeye salmon entered or left the system between the marking and recovery events or sockeye salmon that made up the population of the capture strata have a non-zero probability of recapture during the recovery event; (c) no mark non-identification and no mark-induced mortality occurred; (d) the probability of recovering sockeye salmon is independent of its marked/unmarked status.

With respect to assumption (a), marking efforts at the Chilkat River fish wheels and recovery efforts at the Chilkat Lake weir and at mainstem spawning areas were conducted on a frequent basis through the season. Both of the fish wheels were strictly maintained and adjusted throughout the bulk of the sockeye salmon run. The wheels operated 24-hours per day except during equipment breakdowns, however it is known that river conditions affect the fishing efficiencies of both wheels. Recovery efforts were conducted a minimum of once per week throughout the season at the Chilkat Lake weir and at mainstem spawning areas, but water conditions can also affect the efficiency of sampling methods used at these locations. We are able to work around these variations in gear efficiency by using the Darroch stratified estimator for generating abundance estimates; this allows the probabilities of capture in tagging and recovery strata to vary across time but not within these strata.

It was likely that assumption (b) was violated in recent years of the Chilkat mark-recapture program because mark-recovery efforts conducted on spawning beaches at Chilkat Lake terminated before substantial portions of the run were available to recapture efforts. During the 1995–1998 programs, recovery rates at Chilkat Lake of fish marked at the fish wheels declined significantly as the season progressed. It is much more likely that assumption (b) was satisfied in 1999 with re-institution of the Chilkat Lake weir as a primary mark recovery site. Recovery rates of late run fish were markedly improved in 1999. Of the 2,163 fish that were marked in the lower river between August 22 and October 9, 213 fish (9.7%) were recovered in subsequent sampling events. Recovery ceased on October 23, 1999; historical data indicates an average of approximately 99% of the Chilkat Lake sockeye salmon run passes the weir by October 31 (Figure 11). We therefore conclude that the second event sampling at the Chilkat Lake weir site covered a high percentage of the sockeye salmon run to the lake.

That said, there were significant differences in the cumulative distribution function of length between fish sampled at the fish wheels and on the spawning grounds (Figure 5). Smaller fish were more prevalent in fish wheel samples than among the recovery samples. It is possible that a portion of small fish returning to Chilkat Lake passed through the weir uncounted and unsampled. Large differences in estimated contributions of small-sized fish in the Chilkat Lake spawning population between years when age composition samples were collected at the Chilkat Lake weir and years when samples were taken at Chilkat Lake spawning beaches also tends to support the likelihood that small fish are passing through the weir unsampled (Table 12). Stratification of mark-recapture data by size would remove possible bias in population estimates caused by differences in capture probabilities due to fish size (Bernard and Hansen 1992), but we could not structure our analysis accordingly because marked fish examined during recovery efforts were not routinely measured for length. We were able to make some correction for this possible bias by completely removing smaller “jack” salmon (less than or equal to 360 mm MEF length) from mark and recovery data.

We believe that non-recognition and mis-identification of marks (assumption c) were negligible. All marked fish had primary (adipose fin clip) and secondary marks (additional fin clips). Since no physical tags were applied and fish examined during recovery efforts were alive and not in advanced stages of decomposition, marks were not likely to be missed. Sampling crews were trained and aware of all specific marks. Marks were easily recognizable at the Chilkat Lake weir and mainstem spawning grounds.

We assume that mortality of marked fish (assumption c) was negligible. Holding studies of sockeye salmon captured with fish wheels in a similar study to this on the Taku River indicated negligible short-term mortality due to tagging and handling (unpublished data). The primary difference between the Taku River and Chilkat River sockeye salmon mark-recapture programs is physical tags are applied at the Taku and fin marks are

applied at the Chilkat. Tagging/marking of sockeye salmon at both rivers takes only 20–40 seconds. Standard protocol for mark–recapture projects on both rivers is to not mark or tag salmon that exhibit serious wounds or that are lethargic in behavior. While it is not possible to definitively conclude mortality of marked fish differs from unmarked fish, we have no information suggesting mark-induced mortality is an important factor in this ongoing study.

Kelley et al. (1997) concluded that tagging and handling procedures could effect fish behavior (assumption d). Their study conducted on the Taku River found that effects can be species–specific. It was found that tagged chinook salmon recaptured in the fish wheels had been delayed for a much longer period (mean 12.3 days) than either sockeye (mean 3.6 days) or coho (mean 4.3 days) salmon; these results are similar to those seen in 1988 (McGregor and Clark 1989). It is assumed that these fish dropped back or held in the vicinity of the capture site before resuming their upstream migration. The effects of the length of holding time, the time that fish are held in fish wheel live boxes before being tagged or marked, was examined at the Taku River in 1996. No significant differences in elapsed days from fish wheel release to recovery in the inriver commercial fishery were apparent between the long holding time groups and short holding time groups for chinook, sockeye, and coho salmon. There were also no substantial differences in tag recovery rate for a given species for the two holding times, similar to observations of McGregor and Clark (1989) for chinook salmon in 1988.

A removal of an unknown quantity of sockeye salmon between mark and recovery sites occurred in a subsistence gillnet fishery located between the fish wheels and spawning sites. Catches in this fishery are not well documented but are small relative to run size. Sampling of the subsistence fishery for marks is not conducted. We believe it is unlikely that removal rates in this fishery affected population estimates but cannot rule out the possibility that behavioral differences could cause differential susceptibility of marked and unmarked fish to this fishery.

In this study, abundance estimates for the Chilkat Lake and Chilkat River mainstem components of the escapement were developed by applying weekly fish wheel CPUE and stock composition data to the drainage-wide abundance estimate. It is known that fish wheel efficiency can change as river levels fluctuate. It is also known that the stock composition of sockeye salmon migrating past the fish wheels changes through time. These factors may induce bias in the total and weekly estimates of abundance for different components of the return. Any such bias could be minimized if we had the ability to generate separate estimates of abundance directly from the mark–recapture experiment. The current scale analysis methodology, however, is not capable of assigning stock of origin without error, a necessary element of such an estimation program.

The Chilkat River mark–recapture program has become an integral part of the department’s stock assessment and management program for salmon in upper Lynn Canal. ADF&G commercial fishery managers use abundance and stock composition data from this program together with fishery performance data from the drift gillnet fishery in Lynn Canal to adjust fishing times, catches, and escapements in order to meet escapement goal requirements (Bachman et al. 1999). Information from this project is used to determine if escapement goals are being attained, to assess the effects of various management decisions on the escapement levels, and to provide data needed to reconstruct the run size of Chilkat Lake and mainstem sockeye salmon stocks. Over time and as the information base increases, daily fish wheel catch may be used as a relative inseason index of abundance by comparing weekly catches with historical averages. Age and sex compositions of the escapements are monitored for any changes over the years that would give insight into the status of these stocks and would allow assessment of management strategies pertaining to these stocks. Run reconstruction conducted over a number of years provides a time series of data useful in the development of spawner–recruit relationships for the estimation of maximum sustainable yield, optimum escapement, and forecasting of future returns.

RECOMMENDATIONS

- 1) Operate the weir at the outlet of Chilkat Lake as a mark-recovery platform in 2000 and into the foreseeable future.
- 2) Discontinue marking sockeye salmon less than 360 mm MEF in the fish wheels and do not include fish of this size class in recovery data.
- 3) Record fish length of marked and unmarked fish during recapture efforts.
- 4) Continue making necessary safety and fish handling modifications to the fish wheels.
- 5) If additional monies become available, extend the length of the fish wheel program to employ mark-recapture techniques to include Chilkat and Klehini River chum salmon and Chilkat River coho salmon.

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Table 1. Chilkat Lake weir dates of operation and visual counts of sockeye, coho, pink, and chum salmon, 1967 to 1995 and 1999.

Year	Dates of Operation	Sockeye	Coho	Pink	Chum
1967	6/13-9/02	20,111	n/a	n/a	n/a
1968	6/08-9/12	41,246	168 ^a	4 ^a	n/a
1969	6/04-9/16	44,555	n/a	n/a	n/a
1970	5/29-9/17	41,085	n/a	n/a	n/a
1971	5/31-10/28	49,342	1,063 ^a	n/a	n/a
1972	6/03-10/12	51,850	518 ^a	n/a	n/a
1973	6/11-10/15	50,527	167 ^a	n/a	n/a
1974	5/30-9/28	82,811	161 ^a	n/a	n/a
1975	6/04-11/06	41,520	644 ^a	n/a	n/a
1976	6/03-10/21	69,723	204 ^a	n/a	n/a
1977	6/03-9/27	41,044	n/a	n/a	n/a
1978	6/05-11/05	67,520	390 ^a	n/a	n/a
1979	6/09-11/11	80,589	965 ^a	n/a	n/a
1980	6/15-10/8	87,847	n/a	n/a	n/a
1981	6/11-10/22	82,597	n/a	n/a	n/a
1982	6/24-10/06	80,208	n/a	n/a	n/a
1983	6/22-11/12	134,022	n/a	n/a	n/a
1984	6/09-10/07	115,269	n/a	n/a	n/a
1985	6/23-10/22	57,724	n/a	n/a	n/a
1986	6/16-11/14	23,947	n/a	n/a	n/a
1987	6/19-11/20	48,593	n/a	n/a	n/a
1988	6/18-11/14	27,575	n/a	n/a	n/a
1989	6/05-10/28	140,475	n/a	n/a	n/a
1990	6/06-11/13	53,780	n/a	n/a	n/a
1991	7/10-10/24	47,436	n/a	n/a	n/a
1992	6/08-10/15	94,278	1,052	2	41
1993	6/13-10/14	210,257	595	0	5
1994	5/20-10/05	80,788	797	0	0
1995	6/08-10/09	59,698	797	0	0
1999	6/30-10/23	129,533	2,785	17	10

All counts acquired from Alaska Department of Fish and Game Alexander database.

^a Weir counts do not reflect total escapement as weir was not operated through entire course of coho salmon returns and pickets are spaced such that smaller pink salmon can pass unobserved.

Table 2. Chilkat fish wheels dates of operation and catches of chinook, sockeye, coho, pink, and chum salmon, 1977, 1978, 1982, 1983, 1990, 1991, and 1994 to 1999.

Year	Dates of Operation	Chinook	Sockeye	Coho	Pink	Chum	Wheel Type and Number of Baskets
1977	8/21-10/21	0	108	729	0	604	N/A
1978	8/14-11/9	0	119	369	14	1,586	N/A
1982	10/5-26	0	10	78	0	254	1 wooden 4-basket wheel
1983	8/9-10/3	0	299	190	67	176	1 wooden 4-basket wheel
1990	8/14-10/25	0	2,984	3,686	1,140	3,025	2 wooden 4-basket wheels
1991	6/10-7/20	382	1,385	0	578	8	2 wooden 4-basket wheels
1994	6/18-9/11	214	3,865	140	532	196	2 wooden 4-basket wheels
1995	6/16-9/16	139	3,231	1,353	609	2,288	2 wooden 4-basket wheels
1996	6/22-9/16	68	3,118	546	494	430	2 wooden 4-basket wheels
1997	6/11-10/9	179	5,016	1,057	1,657	1,315	2 aluminum 3-basket wheels
1998	6/8-10/13	138	5,747	1,071	1,738	1,947	2 aluminum 3-basket wheels
1999	6/7-10/8	320	7,735	1,697	15,740	4,250	2 aluminum 3-basket wheels
Average Catch ^a		148	4,191	1,938 ^b	1,006	1,235	

^a Average catch taken from the 1994–1998 catch years where dates of operation are comparable.

^b Average calculated from 1990, and 1997–1998.

Table 3. Catch, escapement, annual total run and exploitation rates of Lynn Canal (District 115) sockeye salmon stocks, 1960–1999.

Year	Sockeye Stock												
	Chilkat Lake					Chilkoot Lake					Total "Others"		Total Lynn Canal Catch
	Catch	Esc.	Total Run	% Total Lynn Canal Catch	Expl. Rate	Catch	Esc.	Total Run	% Total Lynn Canal Catch	Expl. Rate	Catch ^a	Esc. ^d	
1960													59,604
1961													67,860
1962													103,696
1963													57,518
1964													68,200
1965													89,046
1966													108,086
1967		20,111	20,111										66,621
1968		41,246	41,246										80,004
1969		44,555	44,555										127,869
1970		41,085	41,085										79,115
1971		49,342	49,342										75,147
1972		51,850	51,850										81,010
1973		50,527	50,527										193,701
1974		82,811	82,811										152,014
1975		41,520	41,520										18,338
1976	59,328	69,729	129,057	46.9	0.46	62,452	71,297	133,749	49.3	0.47	4,842		126,622
1977	41,389	41,044	82,433	25.9	0.50	113,313	97,051	210,364	70.8	0.54	5,377		160,079
1978	89,558	67,528	157,086	82.6	0.57	14,264	35,454	49,718	13.1	0.29	4,658		108,480
1979	115,994	80,589	196,583	60.1	0.59	69,864	95,946	165,810	36.2	0.42	7,116		192,974
1980	30,681	95,347	126,028	57.8	0.24	20,846	96,512	117,358	39.3	0.18	1,558		53,085
1981	48,460	84,089	132,549	51.9	0.37	43,792	83,372	127,164	46.9	0.34	1,071 ^b		93,323
1982	127,036	80,221	207,257	46.4	0.61	144,592	102,973	247,565	52.9	0.58	1,908 ^b		273,536
1983	123,888	134,207	258,095	33.5	0.48	241,469	80,343	321,812	65.4	0.75	3,955 ^b		369,312
1984	98,231	115,269	213,500	29.4	0.46	231,792	100,417	332,209	69.3	0.70	4,350 ^b		334,373
1985	135,503	57,724	193,227	44.6	0.70	152,325	69,026	221,351	50.1	0.69	16,178		304,006
1986	168,361	23,947	192,308	58.0	0.88	110,430	88,024	198,454	38.1	0.56	11,414		290,205
1987	70,069	48,593	118,662	16.9	0.59	334,995	95,185	430,180	80.6	0.78	10,751		415,815
1988	76,473	27,593	104,066	21.8	0.73	253,968	81,274	335,242	72.2	0.76	21,110		351,551
1989	159,446	140,475	299,921	33.8	0.53	291,863	54,900	346,763	61.8	0.84	20,625		471,934
1990	147,056	60,231	207,287	41.2	0.71	178,864	73,324	252,188	50.1	0.71	31,044		356,964
1991	59,806	52,889	112,695	19.4	0.53	224,041	90,638	314,679	72.8	0.71	23,964		307,811
1992	111,887	97,740	209,627	39.1	0.53	140,719	67,071	207,790	49.2	0.68	33,429		286,035
1993	100,717	209,730	310,447	58.9	0.32	51,424	51,827	103,251	30.1	0.50	18,985		171,126
1994	122,212	153,540 ^d	275,752	73.2	0.44	25,414	37,416	62,830	15.2	0.40	19,252	26,186 ^c	166,878
1995	63,396	184,541 ^d	247,937	79.5	0.26	7,946	7,209	15,155	10.0	0.52	8,430	26,080 ^c	79,772
1996	96,380	262,852 ^d	359,232	66.9	0.27	18,861	50,739	69,600	13.1	0.27	28,893	53,369 ^c	144,134
1997	70,056	238,803 ^d	308,859	63.3	0.23	28,913	44,254	73,167	26.1	0.40	11,642	14,699 ^c	110,611
1998	120,644	211,114 ^d	331,758	89.6	0.36	2,217	12,335	14,541	1.6	0.15	11,715	24,959 ^c	134,576
1999	149,691	236,374 ^d	386,065	91.5	0.39	4,270	19,284	23,554	2.6	0.18	9,570	24,386 ^c	163,560
1976-1998													
Mean	97,242	110,339	207,581	49.6	0.49	120,190	68,982	189,171	44.1	0.53	13,558	29,059	230,574
Min	30,681	23,947	20,111	16.9	0.23	2,206	7,209	14,541	1.6	0.15	1,071	14,234	53,987
Max	168,361	262,852	392,209	91.5	0.88	334,995	102,973	430,180	80.7	0.84	33,429	53,369	471,914

^a Catch is a mixture of Chilkat mainstem, Berners Bay and other non-Chilkoot or Chilkat Lake sockeye salmon.

^b Catch broken out for age-0 fish only.

^c Escapement derived from mark-recapture estimates for Chilkat mainstem fish only.

^d Estimates of escapement is for Chilkat Mainstem sockeye only, mark-recapture estimates.

Table 4. Fishery openings, effort and harvest of salmon in Lynn Canal (District 115) by statistical week, 1999.

Week	Catch					Exvessel Value	Boats	Hours Open	No. Landings
	Chinook	Sockeye	Coho	Pink	Chum				
26 ^a	222	6,570	2	1	3,187	\$58,431	51	48	91
27 ^b	160	7,379	96	167	11,863	\$78,394	60	72	143
28 ^c	47	16,979	65	10,971	50,962	\$220,195	58	96	265
29 ^d	29	20,724	21	12,975	99,072	\$353,699	63	96	339
30 ^e	48	16,192	40	11,056	81,016	\$259,565	73	96	307
31 ^f	11	13,325	12	10,591	44,225	\$154,153	80	96	252
32 ^g	29	18,536	74	3,402	6,705	\$147,195	58	120	208
33 ^h	4	12,467	81	4,562	3,645	\$105,682	48	120	159
34 ⁱ	2	15,087	194	4,746	4,200	\$139,743	51	96	142
35 ^j	0	15,757	899	4,001	5,541	\$145,160	49	72	121
36 ^k	1	9,963	2,733	261	7,782	\$105,622	50	48	96
37 ^l	0	6,204	4,441	0	9,916	\$91,053	72	48	112
38 ^m	0	3,281	5,587	0	10,542	\$84,864	69	48	95
39 ⁿ	0	427	5,368	4	3,311	\$45,397	38	72	46
40 ^o	0	505	10,445	0	5,744	\$62,271	38	96	74
41 ^p	3	128	4,955	0	3,404	\$31,325	29	72	45
42 ^q	0	6	337	0	136	\$3,183	8	72	8
Total	556	163,530	35,350	62,737	351,251	\$1,134,964	895	1,368	2,503

Notes to openings:

^a Week 26: Section 15-A open from 12:01 p.m., Sunday, June 20 through 12:00 noon, Tuesday, June 22, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island, to Seduction Point, with the following restriction:

Chilkat Inlet: will be closed north of the latitude of Seduction Point.

Section 15-C: open from Section 15-C: (Boat Harbor area): will be open from 12:01 p.m., Sunday, June 20 through 12:00 noon, Tuesday, June 22, in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey. Section 15-C: (except for Boat Harbor area): open from 12:01 p.m., Sunday, June 20 through 12:00 noon, Tuesday, June 22, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches.

^b Week 27: Section 15-A: open from 12:01 p.m., Sunday June 27 through 12:00 noon Wednesday, June 30, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be closed north of the latitude of Seduction Point. Section 15-C: (Boat Harbor area): open from 12:01 p.m., Sunday, June 27 through 12:00 noon, Wednesday, June 30, in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey.

Section 15-C: (except for Boat Harbor area): open from 12:01 p.m., Sunday, June 27 through 12:00 noon, Tuesday, June 29, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnet Mesh Restriction in Section 15-C (except the Boat Harbor area): gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches.

- ^c Week 28: Section 15-A: open from 12:01 p.m., Sunday, July 4 through 12:00 noon Thursday, July 8, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be closed north of the latitude of Glacier Point.

Section 15-C: (Boat Harbor area): open from 12:01 p.m., Sunday, July 4 through 12:00 noon, Thursday, July 8, in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey. *Extension* Section 15-C: (Boat Harbor Area): open until further notice only in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point to a point 2.4 miles north of Point Whidbey. Section 15-C: (except for Boat Harbor area): open from 12:01 p.m., Sunday, July 4 through 12:00 noon, Tuesday, July 6, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnet Mesh Restriction in Section 15-C (except the Boat Harbor area): gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches. *Extension* Section 15-C open for an additional 24 hours in those waters within two nautical miles of the eastern shoreline of Lynn Canal from the latitude of Vanderbilt Reef Light to the latitude of Little Island Light and will close at 12:00 noon, Wednesday, July 7.

- ^d Week 29: Section 15-A: open from 12:01 p.m., Sunday July 11 through 12:00 noon Thursday, July 15, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be closed north of the latitude of the northernmost tip of Kochu Island.

Section 15-C: (Boat Harbor area): open until further notice in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey with no mesh size restriction. Section 15-C: (except for Boat Harbor area): open from 12:01 p.m., Sunday, July 11 through 12:00 noon, Tuesday, July 13, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnet Mesh Restriction in Section 15-C (except the Boat Harbor area): gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches. *Extension* Section 15-C open for an additional 24 hours in those waters within two nautical miles of the eastern shoreline of Lynn Canal from the latitude of Vanderbilt Reef Light to the latitude of Little Island Light and will close at 12:00 noon, Wednesday, July 14.

- ^e Week 30: Section 15-A: open from 12:01 p.m., Sunday July 18 through 12:00 noon Thursday, July 22, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light,

to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be closed north of the latitude of the northernmost tip of Kochu Island.

Section 15-C: (Boat Harbor area): open until further notice in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey with no mesh size restriction. Section 15-C: (except for Boat Harbor area): open from 12:01 p.m., Sunday, July 18 through 12:00 noon, Tuesday, July 20, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnet Mesh Restriction in Section 15-C (except the Boat Harbor area): gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches. *Extension* Section 15-C open for an additional 24 hours in those waters within two nautical miles of the eastern shoreline of Lynn Canal from the latitude of Vanderbilt Reef Light to the latitude of Little Island Light and will close at 12:00 noon, Wednesday, July 21.

- ^f Week 31: Section 15-A: open from 12:01 p.m., Sunday, July 25 through 12:00 noon Thursday, July 29, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be open to the mouth of the Chilkat River.

Section 15-C: (Boat Harbor area): open until further notice in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey. Section 15-C: (except for Boat Harbor area): will be open from 12:01 p.m., Sunday, July 25 through 12:00 noon, Tuesday, July 27, in those waters within two nautical miles of the western shoreline of Lynn Canal south of the latitude of Lance Point and in all remaining waters of Section 15-C south of the latitude of Point Bridget, with the following restriction: Gillnet Mesh Restriction in Section 15-C (except the Boat Harbor area): gillnets fished in Section 15-C (with the exception of the Boat Harbor area) must have a minimum mesh size of six inches. *Extension* Section 15-C open for an additional 24 hours in those waters within two nautical miles of the eastern shoreline of Lynn Canal from the latitude of Vanderbilt Reef Light to the latitude of Little Island Light and will close at 12:00 noon, Wednesday, July 28.

- ^g Week 32: Section 15-A: open from 12:01 p.m., Sunday, August 1 through 12:00 noon Thursday, August 5, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: open to the mouth of the Chilkat River. *Extension* This area is extended one more day and closed 12:00 noon, Friday, August 6.

Section 15-C: (Boat Harbor area): open until further notice only in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey. The remaining waters of Section 15-C are closed.

- ^h Week 33: Section 15-A: open from 12:01 p.m., Sunday, August 8 through 12:00 noon, Friday, August 13, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred

Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: will be open to the mouth of the Chilkat River.

Section 15-C: (Boat Harbor area): open until further notice only in those waters within two nautical miles of the western shoreline of Lynn Canal from the latitude of Lance Point south to a point 2.4 miles north of Point Whidbey. The remaining waters of Section 15-C are closed.

- ⁱ Week 34: Section 15-A: open from 12:01 p.m., Sunday, August 15 through 12:00 noon, Thursday, August 19, in the waters of Lynn Canal west of a line beginning at a point within two nautical miles of the western shoreline of Lynn Canal at the latitude of Point Sherman, to Sullivan Rock Light, to Eldred Rock Light, to the southernmost tip of Talsani Island, to the northernmost tip of Talsani Island to Seduction Point, with the following restriction: Chilkat Inlet: open to the mouth of the Chilkat River.

Section 15-C: closed, this includes all waters of the Boat Harbor Area.

- ^j Week 35: Section 15-A: open from 12:01 p.m., Monday, August 23 through 12:00 noon, Wednesday, August 25, in the waters of Lynn Canal from the latitude of Seduction Point to the mouth of the Chilkat River with the following restriction: Section 15-A: closed south of Seduction Point. *Extension* Section 15-A: open for an additional 24 hours in those waters within Chilkat Inlet north of the latitude of Seduction Point and will now close at 12:00 noon, Thursday, August 26.

Section 15-C: open 12:01 p.m., Monday, August 23 through 12:00 noon, Wednesday, August 25.

- ^k Week 36: Section 15-A: open from 12:01 p.m., Sunday, August 29 through 12:00 noon Tuesday, August 31, in the waters of Lynn Canal from the latitude of Seduction Point to the mouth of the Chilkat River with the following restriction: Section 15-A: closed south and east of Seduction Point.

Section 15-C: open from 12:01 p.m., Sunday, August 29 through 12:00 noon Tuesday, August 31.

- ^l Week 37: Section 15-A: open from 12:01 p.m., Sunday, September 5 through 12:00 noon Tuesday, September 7, in the waters of Lynn Canal south of the latitude of the northernmost tip of Sullivan Island and from 12:01 p.m., Sunday, September 5 through 12:00 noon, Monday, September 6, from the northernmost tip of Kochu Island to the mouth of the Chilkat River.

Section 15-C: open 12:01 p.m., Sunday, September 5 through 12:00 noon Tuesday, September 7.

- ^m Week 38: Section 15-A: open from 12:01 p.m., Sunday, September 12 through 12:00 noon Tuesday, September 14, in the waters of Lynn Canal south of the latitude of the northernmost tip of Sullivan Island.

Section 15-C: open 12:01 p.m., Sunday, September 12 through 12:00 noon Tuesday, September 14.

- ⁿ Week 39: Section 15-A: closed. Section 15-C: open 12:01 p.m., Sunday, September 19 through 12:00 noon, Tuesday, September 21.

- ^o Week 40: Section 15-A: open from 12:01 p.m., Sunday, September 26 through 12:00 noon, Tuesday, September 28, in the waters of Lynn Canal south of the latitude of the northernmost tip of Sullivan Island.

Section 15-C: open 12:01 p.m., Sunday, September 26 through 12:00 noon, Thursday, September 30.

^p Week 41: Section 15-A: closed for the season. Section 15-C: open 12:01 p.m., Sunday, October 3 through 12:00 noon, Wednesday, October 6.

^q Week 42: Section 15-C: open 12:01 p.m., Sunday, October 10 through 12:00 noon, Wednesday, October 13.

Table 5. Historical estimated escapements of Chilkat Lake sockeye salmon by week, 1976 to 1999^a.

Mid-Week Date	Stat. Week	Year												
		1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
3-Jun	23	0	0	0	0	0	0	0	0	0	0	0	0	0
10-Jun	24	1	0	22	6	0	0	0	0	0	0	0	0	0
17-Jun	25	0	214	476	44	72	3	0	0	302	0	0	0	0
24-Jun	26	433	305	1,302	698	887	0	31	368	1,441	7	4	88	59
1-Jul	27	944	572	8,622	6,930	1,152	5	532	1,248	5,436	98	2	1,777	2,015
8-Jul	28	2,437	773	2,751	2,081	3,560	141	605	11,144	623	1,317	602	2,197	496
15-Jul	29	1,140	207	11,816	8,576	4,355	549	461	15,284	3,280	1,141	139	5,601	9
22-Jul	30	2,055	542	1,310	4,068	4,575	1,071	2,515	8,935	6,011	334	20	2,542	722
29-Jul	31	2,816	711	1,814	1,413	2,100	1,002	1,743	10,750	929	812	24	1	1,969
5-Aug	32	310	1,184	40	2,056	2,100	266	3,496	6,865	141	2,029	1	123	1,965
12-Aug	33	2,740	725	1,078	5,895	2,100	729	509	4,254	2,971	157	3	1,776	200
19-Aug	34	9,810	968	1,634	7,288	5,666	1,450	4,073	5,589	1,417	1,555	138	1,875	566
26-Aug	35	4,283	1,269	1,246	11,212	6,910	767	5,151	1,433	14,899	4,434	736	6,193	280
2-Sep	36	6,799	18,711	5,670	3,639	10,351	4,967	1,575	5,475	18,015	3,271	1,006	1,618	469
9-Sep	37	17,483	8,664	6,106	19,464	29,613	18,652	6,091	10,526	18,512	3,372	5,364	27	7,973
16-Sep	38	9,655	144	7,747	12	10,739	1,113	20,378	21,097	21,106	12,639	6,943	259	2,254
23-Sep	39	5,584	5,821	9,469	2,353	7,015	6,134	25,516	9,455	17,510	17,688	3,796	18,033	2,747
30-Sep	40	0	234	6,334	1,413	3,374	32,516	7,467	9,398	2,252	5,258	3,762	6,165	4,551
7-Oct	41	3,001	0	91	2,125	778	10,222	78	7,305	424	2,009	831	0	655
14-Oct	42	238			1,316		4,502		5,081		1,603	576	318	663
Yearly Total		69,729	41,044	67,528	80,589	95,347	84,089	80,221	134,207	115,269	57,724	23,947	48,593	27,593
Weekly Mean		3,486	2,160	3,554	4,029	5,609	4,672	5,014	7,895	6,067	3,396	1,330	2,700	1,533
Early Stock		17,582	9,437	17,924	30,433	10,253	10,617	9,640	47,885	28,193	7,449	2,536	13,345	7,512
Late Stock		52,147	31,607	49,604	50,156	85,094	73,472	70,581	86,322	87,076	50,275	21,411	35,248	20,081

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Table 5. Page 2 of 2.

Mid-Week Date	Stat. Week	Year											76-98
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean
3-Jun	23	62	0	1	0	0	0	0	0	0	0	0	3
10-Jun	24	689	202	44	10	0	0	57	0	476	395	270	83
17-Jun	25	5,802	639	305	53	75	0	2,232	0	1,857	2,562	1,142	636
24-Jun	26	10,690	3,615	901	1,016	1,745	1,510	5,323	2,720	3,618	6,382	5,744	1,876
1-Jul	27	7,845	1,660	1,600	1,653	3,557	3,456	8,471	11,051	11,759	12,307	12,675	4,030
8-Jul	28	2,295	4,353	1,971	1,762	4,240	8,223	9,674	32,814	5,951	10,495	26,890	4,805
15-Jul	29	8,126	9,566	503	6,529	3,552	5,125	9,387	28,393	5,713	12,343	16,463	6,165
22-Jul	30	15,810	2,380	2,812	5,034	7,615	8,025	18,775	28,308	13,187	9,500	20,846	6,354
29-Jul	31	3,161	1,449	2,234	2,263	5,336	8,184	17,172	26,778	16,044	10,900	14,872	5,200
5-Aug	32	4,340	1,925	3,724	3,579	6,490	9,375	17,973	42,335	22,138	15,897	17,929	6,450
12-Aug	33	11	380	1,821	1,197	14,537	34,085	15,054	22,358	11,283	17,350	21,224	6,140
19-Aug	34	3,207	2,948	4,295	5,768	6,643	17,559	25,643	17,767	9,617	16,221	20,989	6,596
26-Aug	35	7,582	7,167	10,732	10,357	23,593	16,367	21,007	21,848	14,521	19,738	20,061	9,205
2-Sep	36	8,379	9,647	5,380	13,172	19,677	19,346	13,394	13,942	18,044	12,723	9,575	9,360
9-Sep	37	15,019	259	2,260	6,014	1,251	18,274	20,377	14,112	27,518	19,149	10,193	12,003
16-Sep	38	34,155	664	3,264	8,779	61,222	4,012		425	42,800	12,857	13,806	12,830
23-Sep	39	2,713	4,465	1,873	22,150	32,323				9,474	18,121	10,395	11,112
30-Sep	40	2,936	3,552	1,091	6,171	297				21,328	10,598	10,699	6,435
7-Oct	41	3,053	4,456	1,427	1,891	2,947				3,475	3,163	2,903	2,397
14-Oct	42	4,600	904	6,651	342	14,630				0	411	0	2,789
Yearly Total		140,475	60,231	52,889	97,740	209,730	153,540	184,541	262,852	238,803	211,114	236,374	110,339
Weekly Mean		7,024	3,170	2,644	5,144	10,487	9,596	13,182	16,428	11,940	11,111	11,834	5,957
Early Stock		54,090	25,792	15,916	23,096	47,147	43,897	89,065	172,401	80,744	80,782	116,832	34,771
Late Stock		86,385	34,439	36,973	74,644	162,583	109,643	95,476	90,451	158,059	130,331	119,845	70,988

^aEscapement estimates based on weir counts in 1976 to 1993 and on mark-recapture estimates from fish wheel programs in 1994 to 1999.

Table 6. Weekly and yearly escapement of Chilkat River mainstem sockeye salmon from 1994 to 1999^a.

Mid-Week Date	Stat Week	Year						1994-1998		
		1994	1995	1996	1997	1998	1999	Mean	Minimum	Maximum
2-Jun	23									
9-Jun	24		27		69	65	0	54	27	69
16-Jun	25		1,410		270	1,153	39	944	40	1,410
23-Jun	26	137	2,867	585	162	3,820	431	1,514	137	3,820
30-Jun	27	1,061	3,700	4,428	1,189	2,842	1,565	2,644	1,061	4,428
7-Jul	28	3,427	3,529	12,508	1,059	2,893	5,571	4,683	1,059	12,508
14-Jul	29	1,434	3,116	10,239	1,433	3,312	2,671	3,907	1,433	10,239
21-Jul	30	2,242	4,283	11,416	3,277	3,335	5,001	4,911	2,242	11,416
28-Jul	31	2,720	3,140	6,615	2,845	4,271	2,607	3,918	2,590	6,615
4-Aug	32	3,170	1,588	5,207	2,222	1,252	2,891	2,688	1,252	5,207
11-Aug	33	8,431	1,229	1,036	613	1,201	1,724	2,502	613	8,431
18-Aug	34	1,882	449	661	371	243	1,083	721	243	1,882
25-Aug	35	886	740	398	430	481	257	587	255	886
1-Sep	36	691		217	140		381	349	140	691
8-Sep	37	105		59	377	90		158	59	377
15-Sep	38				180		133	180	131	180
Yearly Total		26,186	26,080	53,369	14,638	24,959	24,355	29,046	14,638	53,369
Weekly Mean		2,182	2,173	4,447	976	1,920	1,353			

^a Based on mark-recapture estimates from apportionment of fish wheel captured sockeye salmon by stock through scale pattern analysis (SPA).

Table 7. Tagging and recovery data from the 1999 Chilkat River sockeye salmon mark–recapture program.

Tagging Dates	Mark Applied ^a	Statistical Week of Recovery																Marks Recovered	Marks Released	Percent Recovered
		Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36	Week 37	Week 38	Week 39	Week 40	Week 41	Week 42	Week 43	Week 44			
6/9-7/24	LA	25	20	50	13	10	10	2	1	0	1	1	0	0	0	0	0	133	2,910	4.6%
7/25-8/21	DC	0	0	0	17	13	33	27	18	5	17	5	5	5	3	3	0	151	2,388	6.3%
8/22-9/11	LV	0	0	0	0	0	0	0	8	9	39	6	14	10	5	2	0	93	1,158	8.0%
9/12-10/9	RV	0	0	0	0	0	0	0	0	0	0	3	34	38	27	17	1	120	1,005	11.9%
Total		25	20	50	30	23	43	29	27	14	57	15	53	53	35	22	1	497	7,461	6.7%
Total		851	690	1,351	1,125	573	736	577	565	494	2,671	1,013	2,427	3,163	1,916	1,309	191	19,671		

^a All sockeye marked had the adipose fin removed as a primary mark. Secondary marks were left axillary appendage clip (LA), dorsal fin last four rays clip (DC), left ventral fin clip (LV), and right ventral fin clip (RV).

Table 8. Pooled-strata tagging and recovery data used to calculate the mark–recapture estimate of sockeye salmon to the Chilkat River drainage, 1999.

Statistical Week of Marking	Chilkat Lake and Mainstem combined																Total Marks Recovered ^a	Total Marks Applied ^b
	Statistical Week of Recovery																	
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43,44			
24-30	25	20	50	13	10	10	2	1	0	1	1	0	0	0	0	133	2,858	
31-34	0	0	0	17	13	33	27	18	5	17	5	5	5	3	3	151	2,284	
35-41	0	0	0	0	0	0	0	8	9	39	9	48	48	32	20	213	2,135	
Total	25	20	50	30	23	43	29	27	14	57	15	53	53	35	23	497	7,277	
Examined	851	690	1,351	1,125	573	736	570	565	494	2,671	1,013	2,427	3,163	1,916	1,500	19,645		

^a Number of fish examined reduced by removal of marked and unmarked jack salmon from the analysis.

^b Number of marks out reduced by removal jacks from the analysis.

Table 9. Weekly estimated abundance, fresh water age class, and stock group for sockeye salmon captured in the Chilkat River fish wheels, 1999.

Stat Week	Mid-Week Date	Weekly Proportion	Weekly Abundance	Chilkat Lake	Chilkat Mainstem	Lake ^a			Mainstem ^a		Total
						Age 1.	Age 2.	Age 3.	Age 0.	Age 1.	
24	9-Jun	0.0010	270	270	0	0.86	0.14	0.00	0.00	0.00	1.00
25	16-Jun	0.0045	1,180	1,140	39	0.80	0.17	0.00	0.03	0.00	1.00
26	23-Jun	0.0237	6,169	5,737	431	0.62	0.31	0.00	0.06	0.01	1.00
27	30-Jun	0.0546	14,225	12,659	1,565	0.52	0.37	0.00	0.06	0.05	1.00
28	7-Jul	0.1244	32,427	26,856	5,571	0.46	0.37	0.00	0.10	0.07	1.00
29	14-Jul	0.0733	19,112	16,442	2,671	0.55	0.31	0.00	0.12	0.02	1.00
30	21-Jul	0.0990	25,820	20,819	5,001	0.48	0.33	0.00	0.17	0.03	1.00
31	28-Jul	0.0670	17,461	14,853	2,607	0.49	0.36	0.00	0.11	0.04	1.00
32	4-Aug	0.0798	20,798	17,906	2,891	0.32	0.54	0.00	0.11	0.03	1.00
33	11-Aug	0.0879	22,921	21,197	1,724	0.26	0.67	0.00	0.06	0.01	1.00
34	18-Aug	0.0846	22,045	20,962	1,083	0.14	0.80	0.00	0.05	0.00	1.00
35	25-Aug	0.0778	20,292	20,035	257	0.07	0.92	0.00	0.01	0.00	1.00
36	1-Sep	0.0381	9,944	9,563	381	0.11	0.85	0.00	0.03	0.00	1.00
37	8-Sep	0.0390	10,180	10,180	0	0.03	0.97	0.01	0.00	0.00	1.00
38	15-Sep	0.0534	13,921	13,788	133	0.03	0.96	0.00	0.01	0.00	1.00
39	22-Sep	0.0398	10,382	10,382	0	0.05	0.95	0.00	0.00	0.00	1.00
40	29-Sep	0.0410	10,685	10,685	0	0.08	0.91	0.00	0.00	0.00	1.00
41	6-Oct	0.0111	2,899	2,899	0	0.11	0.89	0.00	0.00	0.00	1.00
Total			260,729	236,374	24,355						

^a Fraction of weekly fish wheel catch.

Table 10. Historical age compositions for sockeye salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Percent By Age Class														
		0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.2	3.3	4.2
1989	30	0.0	0.0	0.0	0.0	3.3	3.3	3.3	0.0	0.0	66.7	23.3	0.0	0.0	0.0	0.0
1990	755	0.0	0.7	2.6	0.0	0.7	2.3	4.5	0.0	3.0	62.4	23.0	0.0	0.8	0.0	0.0
1991	111	0.0	3.6	17.1	0.0	0.0	20.7	46.8	0.0	0.0	3.6	8.1	0.0	0.0	0.0	0.0
1994	1,963	0.2	2.4	6.1	0.0	1.9	4.2	32.1	0.1	1.7	26.4	23.2	0.1	0.1	1.4	0.1
1995	1,971	0.1	4.8	6.7	0.2	1.8	8.5	18.0	0.1	3.9	29.6	26.1	0.1	0.1	0.0	0.0
1996	1,910	0.0	3.9	14.9	0.0	0.0	4.6	26.2	0.0	0.5	27.7	22.1	0.0	0.1	0.0	0.0
1997	2,573	0.1	2.2	8.5	0.0	1.2	8.7	14.0	0.0	2.8	24.6	37.5	0.1	0.1	0.0	0.0
1998	3,534	0.3	2.4	2.2	0.0	1.0	3.9	25.5	0.0	1.6	35.8	26.8	0.1	0.3	0.2	0.0
1999	3,246	0.5	3.5	2.0	0.0	1.2	3.1	25.5	0.2	0.7	21.4	41.6	0.1	0.1	0.1	0.0
Ave. (89-91, 94-98)	1,606	0.1	2.5	7.3	0.0	1.2	7.0	21.3	0.0	1.7	34.6	23.8	0.1	0.2	0.2	0.0
SD (89-91, 94-98)		0.28	1.77	6.24	0.24	1.26	6.17	14.70	0.21	1.63	20.89	8.21	0.22	0.43	0.66	0.20
CV (89-91, 94-98)		319.9%	70.9%	86.0%	952.2%	102.1%	87.8%	69.0%	854.5%	96.6%	60.4%	34.5%	441.6%	230.2%	328.6%	1,621.5%

Table 11. Historical length-at-age data for sockeye salmon captured in the Chilkat River fish wheels.

Year	Average Length at Age in MEF														
	0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.2	3.3	
1989	-	-	-	-	370	-	580	-	-	526	600	-	-	-	
1990	-	444	566	-	312	486	577	-	352	517	589	-	506	-	
1991	-	468	531	-	-	440	552	-	-	490	532	-	-	-	
1996	-	476	587	-	-	509	587	-	377	530	589	-	480	-	
1997	336	466	582	-	340	486	580	530	358	518	575	582	538	545	
1998	320	450	563	570	326	474	558	540	350	504	568	537	536	555	
1999	318	441	563	-	327	482	562	557	337	503	562	528	525	530	
Ave.(89-91,94-98)	328	461	566	-	337	479	572	535	359	514	576	560	515	550	
SD(89-91,94-98)	11.3	13.3	22.0	0.0	24.8	25.2	14.0	7.1	12.3	14.8	24.1	31.8	27.5	7.1	
CV(89-91,94-98)	3.4%	2.9%	3.9%	0.0%	7.4%	5.3%	2.4%	1.3%	3.4%	2.9%	4.2%	5.7%	5.3%	1.3%	

Table 12. Historical age compositions for sockeye salmon escapements to Chilkat Lake.

Year	Sample Size	Percent by Age Class														
		0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	4.2
1982	1,630	0.1	0.1	0.4	2.3	12.9	0.0	2.6	45.3	34.8	0.0	0.0	0.0	1.3	0.1	0.0
1983	2,848	0.0	0.0	0.7	3.2	38.0	0.0	2.7	27.9	27.1	0.0	0.0	0.0	0.1	0.0	0.0
1984	2,728	0.0	0.0	0.1	1.5	22.8	0.0	1.5	53.6	20.2	0.0	0.0	0.0	0.2	0.0	0.0
1985	1,333	0.0	0.0	0.6	0.7	9.2	0.2	3.3	39.7	45.7	0.0	0.0	0.2	0.5	0.0	0.0
1986	940	0.0	0.0	0.0	1.7	1.6	0.0	0.5	20.6	73.1	0.0	0.0	0.0	1.9	0.5	0.0
1987	1,461	0.0	0.0	0.9	1.8	24.5	0.0	2.7	34.2	35.0	0.1	0.0	0.0	0.5	0.2	0.0
1988	1,918	0.0	0.1	0.0	0.8	47.3	0.2	0.0	7.9	43.4	0.1	0.0	0.0	0.1	0.1	0.0
1989	3,874	0.0	0.0	0.0	0.7	42.8	0.1	0.0	28.9	27.3	0.0	0.0	0.0	0.0	0.1	0.0
1990	2,635	0.0	0.1	0.0	1.8	14.0	0.5	0.0	24.8	58.0	0.1	0.0	0.0	0.8	0.0	0.0
1991	1,602	0.0	0.0	0.0	2.1	36.1	0.1	0.0	21.8	39.5	0.2	0.0	0.0	0.0	0.2	0.0
1992	2,505	0.0	0.1	0.0	1.1	40.8	0.2	0.0	16.9	40.7	0.0	0.0	0.0	0.0	0.1	0.0
1993	2,367	0.0	0.1	0.0	6.4	15.0	0.0	0.0	36.2	38.7	0.0	0.0	0.0	3.6	0.0	0.1
1994	2,187	0.0	0.0	0.0	2.6	58.6	0.1	0.0	11.4	26.6	0.0	0.0	0.0	0.1	0.6	0.0
1995	2,691	0.0	0.0	0.0	5.5	27.1	0.9	0.0	17.7	48.6	0.0	0.0	0.0	0.1	0.0	0.0
1996 ^a	308	0.0	0.0	0.0	10.4	67.5	0.0	0.0	8.8	13.3	0.0	0.0	0.0	0.0	0.0	0.0
1997 ^a	750	0.0	0.0	0.4	38.8	19.9	0.0	1.3	14.0	25.6	0.0	0.0	0.0	0.0	0.0	0.0
1998 ^a	1,198	0.0	0.0	0.1	4.9	69.4	0.0	0.3	19.0	6.0	0.2	0.0	0.0	0.0	0.0	0.0
1999	2,548	0.0	0.0	0.0	1.7	31.6	0.1	0.0	14.3	52.0	0.2	0.0	0.0	0.0	0.0	0.0
Ave.(82-98)	1,940	0.0	0.0	0.2	5.1	32.2	0.1	0.9	25.2	35.5	0.0	0.0	0.0	0.5	0.1	0.0
SD(82-98)		0.0	0.0	0.3	9.1	20.3	0.2	1.2	13.0	16.2	0.1	0.0	0.0	1.0	0.2	0.0
CV(82-98)		0.0%	159.7%	157.0%	178.4%	63.0%	175.2%	138.1%	51.7%	45.8%	173.0%	0.0%	0.0%	175.9%	160.9%	0.0%

^a Scale samples collected from beach seine captures at Chilkat Lake spawning grounds all other samples collected from fish captured at the Chilkat Lake weir.

Table 13. Historical length-at-age for escapements of Chilkat Lake sockeye salmon.

Year	Average Length by Age Class in MEF															
	0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	4.2	4.3
1982	-	555	356	518	607		365	540	616	-	-	-	565	637	-	-
1983	-	-	330	503	596	615	357	541	601	630	-	-	562	601	-	-
1984	-	560	332	513	595	630	355	521	594	600	-	-	552	610	-	-
1985	-	-	357	504	597	633	372	518	596	-	-	405	515	-	-	-
1986	-	-	-	490	602	-	363	547	612	-	-	-	563	619	-	-
1987	-	-	338	508	598	-	346	534	599	565	-	-	526	616	-	-
1988	-	600	-	540	620	620	-	563	625	580	-	-	572	670	-	-
1989	-	-	-	536	598	570	-	543	590	-	-	-	480	575	-	600
1990	-	580	-	512	581	590	-	530	579	640	-	-	534	605	-	-
1991	-	-	-	519	584	600	-	528	583	565	-	-	-	581	-	-
1992	450	533	-	514	584	575	-	526	585	600	645	-	510	617	-	-
1993	-	557	-	508	574	-	-	521	574	-	-	-	525	-	540	-
1994	-	-	-	544	575	575	-	538	575	-	-	-	518	560	-	-
1995	-	510	-	513	573	582	-	521	572	605	-	-	560	605	-	-
1996	-	-	-	526	587	-	-	514	577	-	-	-	-	-	-	-
1997	-	-	400	479	575	-	367	519	572	-	-	-	-	-	-	-
1998	-	-	385	477	543	-	406	475	542	512	-	-	-	-	-	-
1999	-	-	-	544	592	578	-	533	582	593	-	-	500	-	-	-
Ave. (82-98)	-	556	357	512	588	599	366	528	588	589	-	-	537	608	-	-
SD (82-98)	0.0	29.4	26.9	18.8	17.4	24.0	17.9	18.7	19.9	38.6	0.0	0.0	27.6	28.8	0.0	0.0
CV (82-98)	0.0%	5.3%	7.5%	3.7%	3.0%	4.0%	4.9%	3.5%	3.4%	6.6%	0.0%	0.0%	5.1%	4.7%	0.0%	0.0%

Table 14. Historical age compositions for sockeye salmon escapements to the Chilkat River (Bear Flats).

Year	Sample Size	Percent by Age Class										
		0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.2	2.3	2.4
1984	135	0.0	6.7	28.1	0.0	0.7	1.5	63.0	0.0	0.0	0.0	0.0
1985	136	0.0	14.7	42.6	0.0	0.0	0.0	39.7	0.7	1.5	0.7	0.0
1986	114	0.0	6.1	49.1	0.9	0.0	14.9	26.3	0.9	0.0	0.9	0.9
1987	51	0.0	9.8	9.8	0.0	0.0	3.9	74.5	0.0	0.0	2.0	0.0
1988	93	1.1	36.6	32.3	0.0	1.1	23.7	5.4	0.0	0.0	0.0	0.0
1989	88	0.0	8.0	56.8	0.0	0.0	2.3	31.8	0.0	0.0	1.1	0.0
1990	22	0.0	36.4	31.8	0.0	0.0	4.5	27.3	0.0	0.0	0.0	0.0
1991	297	0.7	21.5	54.2	0.0	1.0	9.1	13.5	0.0	0.0	0.0	0.0
1992	399	0.5	18.8	26.1	0.5	2.3	3.0	48.9	0.0	0.0	0.0	0.0
1996	585	0.0	11.6	62.4	0.0	0.2	5.6	20.2	0.0	0.0	0.0	0.0
1997	437	0.2	18.3	62.9	0.0	0.0	3.2	15.3	0.0	0.0	0.0	0.0
1998	429	1.2	28.0	42.0	0.0	1.9	7.5	19.6	0.0	0.0	0.0	0.0
1999	237	7.2	65.8	20.3	0.0	2.1	4.2	0.0	0.0	0.4	0.0	0.0
Average(84-92, 96-98)	232	0.3	18.0	41.5	0.1	0.6	6.6	32.1	0.1	0.1	0.4	0.1
SD(84-92, 96-98)		0.5	10.8	16.4	0.3	0.8	6.7	20.9	0.3	0.4	0.7	0.3
CV(84-92, 96-98)		148.0%	59.9%	39.5%	244.7%	136.0%	101.5%	64.9%	235.7%	346.4%	166.3%	346.4%

Table 15. Historical length-at-age data for sockeye salmon escapements to the Chilkat River (Bear Flats).

Year	Average Length by Age in MEF										
	0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.2	2.3	2.4
1984	-	435	560	-	325	445	568	-	-	-	-
1985	-	448	559	-	-	-	567	-	520	560	-
1986	-	466	579	600	-	449	570	600	-	585	605
1987	-	441	583	-	-	437	580	-	-	585	-
1988	390	427	553	-	385	452	549	-	-	-	-
1989	-	442	566	-	-	420	582	-	-	-	-
1990	-	433	577	-	-	400	590	-	-	-	-
1991	342	436	563	-	328	429	568	-	-	-	-
1992	295	429	572	613	342	446	581	-	-	-	-
1996	-	460	596	-	350	464	596	-	-	-	-
1997	410	468	586	-	-	464	586	-	-	-	-
1998	307	444	570	-	341	448	567	-	-	-	-
1999	328	460	586	-	322	454	-	-	480	-	-
Avg. (84-92, 96-98)	349	444	572	607	345	441	575	-	520	577	-
SD (84-92, 96-98)	111.2	74.8	73.6	70.1	82.5	79.9	73.8	0.0	0.0	75.3	0.0
CV (84-92, 96-98)	31.9%	16.8%	12.9%	11.6%	23.9%	18.1%	12.8%	0.0%	0.0%	13.1%	0.0%

Table 16. Historical age composition for chinook salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Percent by Age Class							
		0.1	1.1	1.2	1.3	1.4	1.5	2.1	2.3
1991	383	0.5	36.3	11.7	27.2	21.7	1.0	1.6	0.0
1994	74	0.0	2.7	1.4	41.9	54.1	0.0	0.0	0.0
1995	77	0.0	2.6	42.9	9.1	44.2	0.0	0.0	1.3
1996	61	0.0	8.2	16.4	67.2	8.2	0.0	0.0	0.0
1997	139	0.0	10.8	11.5	18.7	59.0	0.0	0.0	0.0
1998	109	0.0	39.4	13.8	17.4	23.9	5.5	0.0	0.0
1999	279	0.0	43.7	16.8	8.6	28.0	2.9	0.0	0.0
Avg. (91,94-98)	141	0.1	16.7	16.3	30.3	35.2	1.1	0.3	0.2
SD (91,94-98)		0.2	16.7	14.0	21.2	20.2	2.2	0.7	0.5
CV (91,94-98)		244.9%	100.4%	86.0%	70.2%	57.5%	203.1%	244.9%	244.9%

Table 17. Historical length-at-age composition for chinook salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Average Length at Age in MEF							
		0.1	1.1	1.2	1.3	1.4	1.5	2.1	2.3
1991	381	425	346	545	743	870	901	404	-
1994	74	-	405	550	765	872	-	-	-
1995	77	-	420	582	695	913	-	-	630
1996	61	-	348	547	778	890	-	-	-
1997	139	-	332	542	762	850	-	-	-
1998	109	-	388	539	759	885	885	-	-
1999	278	-	349	587	754	863	918	-	-
Average (91,94-98)	140	-	373	550	750	880	893	-	-
SD (91,94-98)		0.0	36.0	15.7	29.4	21.3	11.3	0.0	0.0
CV (91,94-98)		0.0%	9.7%	2.9%	3.9%	2.4%	1.3%	0.0%	0.0%

Table 18. Historical age composition for coho salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Percent by Age Class						
		1.0	1.1	2.0	2.1	3.0	3.1	4.1
1990	1,025	0.0	45.8	0.1	48.3	0.2	5.6	0.1
1998	485	1.9	61.9	12.8	23.5	0.0	0.0	0.0
1999	579	0.0	64.2	3.5	32.1	0.2	0.0	0.0
Average(90,98)	755	1.0	53.9	6.5	35.9	0.1	2.8	0.1
SD(90,98)		0.0	12.7	10.3	18.8	0.0	0.0	0.0
CV(90,98)		0.0%	23.6%	159.4%	52.5%	0.0%	0.0%	0.0%

Table 19. Historical length-at-age composition for coho salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Average Length at Age in MEF						
		1.0	1.1	2.0	2.1	3.0	3.1	4.1
1990	1,023	-	573	360	605	350	611	640
1998	484	317	615	339	633	-	-	-
1999	575	-	558	320	600	301	-	-
Average(90,98)		-	594	349	619	-	-	-
SD(90,98)		0.0	31.0	16.1	21.1	0.0	0.0	0.0
CV(90,98)		0.0%	5.2%	4.6%	3.4%	0.0%	0.0%	0.0%

Table 20. Historical age composition of chum salmon captured in the Chilkat River fish wheels.

Year	Sample Size	Percent Age Class			
		0.2	0.3	0.4	0.5
1990	1,801	0.4	72.9	26.4	0.3
1997	105	5.7	65.7	28.6	0.0
1998	606	5.3	64.5	29.2	1.0
1999	582	6.7	80.2	12.9	0.2
Average(90,97-98)	837	3.8	67.7	28.1	0.4
SD(90,97-98)		3.0	4.5	1.5	0.5
CV(90,97-98)		77.7%	6.7%	5.3%	118.4%

Table 21. Historical average length-at-age for chum salmon captured in the Chilkat River fish wheels.

Year	Average Length at Age in MEF			
	0.2	0.3	0.4	0.5
1990	554	630	669	653
1997	634	660	669	-
1998	608	629	663	660
1999	603	635	667	661
Average(90,97-98)	599	640	667	657
SD(90,97-98)	40.8	17.6	3.5	4.9
CV(90,97-98)	6.8%	2.8%	0.5%	0.8%

Table 22. Sex ratios (by statistical week) and average lengths of pink salmon captured in the Chilkat River fish wheels, 1999.

Statistical Week	Total Weekly Catch	Males	Females	Percent Males	Cumulative Catch	Cumulative Proportion
27	4	2	2	50.0%	4	0.000
28	32	26	6	81.8%	36	0.002
29	209	111	98	52.9%	245	0.016
30	1,242	845	397	68.0%	1,487	0.094
31	3,278	1967	1311	60.0%	4,765	0.303
32	2,550	1139	1411	44.7%	7,315	0.465
33	3,736	1729	2007	46.3%	11,051	0.702
34	2,399	1892	507	78.9%	13,450	0.855
35	908	643	265	70.9%	14,358	0.912
36	821	623	198	75.9%	15,179	0.964
37	381	209	172	54.9%	15,560	0.989
38	104	83	21	80.0%	15,664	0.995
39	63	54	9	85.1%	15,727	0.999
40	13	4	9	27.3%	15,740	1.000
Total	15,740	9,326	6,414	59.2%		
Ave. Length (mm)	441	438	444			
SE (length)	0.79	1.36	0.88			

Table 23. Historical age composition for sockeye salmon captured in the commercial Lynn Canal drift gillnet fishery.

Year	Sample Size	Percent by Age Class													
		0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.2	3.3
1982	5,350	0.0	0.0	0.5	0.1	0.0	3.9	55.3	0.1	0.0	12.4	27.1	0.0	0.3	0.2
1983	10,620	0.0	0.0	1.1	0.0	0.0	2.2	55.0	0.3	0.0	7.4	33.7	0.0	0.1	0.0
1984	11,867	0.0	0.0	1.7	0.0	0.0	1.5	68.3	0.2	0.0	9.8	18.4	0.1	0.0	0.0
1985	10,616	0.0	0.2	1.4	0.0	0.0	2.4	53.3	1.2	0.0	6.9	34.2	0.1	0.1	0.0
1986	10,549	0.0	0.3	4.7	0.0	0.0	4.7	35.4	0.2	0.0	16.8	36.5	0.1	1.0	0.2
1987	11,500	0.0	0.0	2.3	0.0	0.0	4.2	58.9	0.1	0.0	6.3	27.8	0.1	0.1	0.2
1988	11,061	0.0	0.0	1.6	0.0	0.0	5.2	62.7	0.3	0.0	6.9	22.9	0.1	0.1	0.1
1989	6,734	0.0	0.0	1.5	0.0	0.0	2.2	45.0	0.2	0.0	15.5	35.2	0.0	0.0	0.4
1990	7,820	0.0	0.1	4.5	0.0	0.0	3.0	31.5	0.4	0.0	15.9	43.9	0.3	0.3	0.1
1991	7,477	0.0	0.3	5.8	0.0	0.0	5.3	53.0	0.2	0.0	4.2	30.8	0.1	0.0	0.1
1992	7,854	0.0	0.2	4.0	0.0	0.0	1.8	48.5	0.4	0.0	9.1	35.7	0.1	0.1	0.1
1993	7,948	0.0	0.1	6.0	0.0	0.0	2.0	27.8	0.2	0.0	12.1	50.2	0.1	1.4	0.1
1994	8,330	0.0	0.0	3.0	0.0	0.1	1.3	51.3	0.1	0.0	8.7	34.1	0.1	0.1	1.2
1995	6,051	0.0	1.3	7.9	0.1	0.0	9.6	32.1	0.4	0.0	11.8	36.4	0.1	0.0	0.1
1996	6,996	0.0	0.4	7.8	0.0	0.0	3.9	51.7	0.1	0.0	11.8	24.2	0.0	0.1	0.0
1997	5,488	0.0	0.6	5.8	0.0	0.0	4.1	43.2	0.1	0.0	9.7	36.5	0.0	0.0	0.1
1998	4,874	0.0	0.2	1.8	0.0	0.0	1.9	49.2	0.1	0.0	15.4	31.1	0.0	0.1	0.1
1999	4,736	0.0	0.3	1.8	0.0	0.0	1.7	35.5	0.1	0.0	10.5	50.1	0.0	0.0	0.1
Average(82-98)	8,104	0.0	0.2	3.6	0.0	0.0	3.5	48.4	0.3	0.0	10.6	32.9	0.1	0.2	0.2
SD(82-98)		0.0	0.3	2.4	0.0	0.0	2.1	11.3	0.3	0.0	3.8	7.6	0.1	0.4	0.3
CV(82-98)		0.0%	150.8%	66.3%	282.3%	412.3%	58.9%	23.4%	97.6%	0.0%	35.4%	23.2%	98.4%	172.2%	159.7%

Table 24. Historical length-at-age composition for sockeye salmon captured in the commercial Lynn Canal drift gillnet fishery.

Year	Sample Size	Average Length by Age in MEF												
		0.2	0.3	0.4	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.2	3.3
1982	5,347	-	584	582	-	513	585	614	-	565	612	-	579	617
1983	10,586	-	581	645	346	520	586	597	-	559	597	606	559	633
1984	11,790	550	578	-	-	509	581	609	-	546	598	604	551	609
1985	10,511	490	571	574	308	506	577	605	370	540	594	605	555	585
1986	3,244	498	577	632	-	514	586	609	-	562	604	605	557	598
1987	2,867	545	595	600	-	507	591	607	-	557	596	-	566	628
1988	4,167	-	584	612	-	518	588	605	-	548	607	586	576	590
1989	2,084	-	582	655	370	497	590	625	350	544	588	648	-	571
1990	2,428	-	574	-	-	505	582	606	-	550	589	596	582	608
1991	1,898	521	566	629	-	511	575	579	-	530	581	569	439	599
1992	2,171	496	571	623	329	516	574	589	-	539	585	-	555	604
1993	2,399	-	572	-	-	524	579	554	-	548	586	585	556	582
1994	2,376	-	580	-	383	522	580	592	-	542	588	640	531	584
1995	923	481	573	607	-	524	580	589	-	538	581	-	-	556
1996	1,230	502	599	-	-	535	597	529	-	557	600	-	-	592
1997	698	522	602	-	-	547	602	615	-	551	607	-	-	634
1998	697	455	575	-	-	536	584	-	-	538	589	-	545	-
1999	640	547	592	-	-	543	590	-	-	542	589	-	-	560
Average(82-98)	3,848	506	580	616	347	518	585	595	360	548	594	604	550	599
SD(82-98)		58.2	39.3	55.2	59.4	41.8	36.6	53.5	43.2	38.8	38.6	53.2	65.3	51.0
CV(82-98)		11.5%	6.8%	9.0%	17.1%	8.1%	6.3%	9.0%	12.0%	7.1%	6.5%	8.8%	11.9%	8.5%

Table 25. Annual commercial harvests of Chilkat Lake sockeye salmon by week, 1976 to 1999.

Mid-Week Date	Statistical Week	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
17-Jun	25	384	0	4,385	1,512	603	1,539	469	0	2,248	408	88	0
24-Jun	26	4,605	5,041	1,343	3,243	166	1,960	2,139	1,084	4,907	1,725	357	1,880
1-Jul	27	4,624	9,089	0	25	0	1,821	3,529	1,868	5,696	1,633	1,302	3,530
8-Jul	28	4,146	1,577	1,048	4,936	0	1,494	2,919	5,603	4,790	5,139	625	1,516
15-Jul	29	897	2,205	1,832	5,512	0	2,504	2,626	4,457	9,051	4,318	1,858	6,810
22-Jul	30	1,740	1,044	3,218	13,220	2,110	5,100	1,103	7,382	8,136	3,137	2,209	5,038
29-Jul	31	1,459	1,130	20,294	18,107	1,301	2,121	11,392	8,243	8,366	9,150	2,242	6,072
5-Aug	32	9,420	3,318	18,939	28,212	3,450	5,668	27,126	17,604	12,062	9,676	10,774	15,278
12-Aug	33	11,682	4,625	22,490	15,870	8,237	1,017	30,199	18,777	18,396	11,336	30,803	9,454
19-Aug	34	11,496	5,217	11,334	16,101	6,844	1,980	14,475	11,718	6,390	26,250	45,502	8,166
26-Aug	35	7,997	6,123	3,138	6,339	6,889	18,720	16,202	20,923	6,528	35,316	14,617	6,456
2-Sep	36	497	1,482	1,233	1,471	681	3,130	10,675	19,799	4,898	16,834	44,362	2,494
9-Sep	37	257	318	256	685	207	1,000	1,913	5,148	3,997	7,808	7,719	1,825
16-Sep	38-42	124	220	48	761	193	406	2,269	1,282	2,766	2,773	5,903	1,550
Yearly Total		59,328	41,389	89,558	115,994	30,681	48,460	127,036	123,888	98,231	135,503	168,361	70,069
Weekly Mean		4,238	3,184	6,889	8,285	2,789	3,461	9,074	9,530	7,017	9,679	12,026	5,390
Early Stock Catch		9,514	13,064	8,023	29,065	1,984	12,885	26,257	32,908	43,208	23,540	15,333	24,571
Late Stock Catch		49,814	28,325	81,535	86,929	28,697	35,575	100,779	90,980	55,023	111,963	153,028	45,498

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Table 25 (page 2 of 2)

Mid-Week Date	Statistical Week	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	76-98 Mean
17-Jun	25	0	7,596	1,719	1,211	0	2,283	-	2,283	987	3,146	0	0	2,403
24-Jun	26	2,379	8,490	2,406	1,826	2,436	1,141	4,752	1,698	3,234	2,950	2,841	4,398	3,110
1-Jul	27	3,482	10,439	6,306	1,557	4,627	2,563	6,768	2,002	929	3,398	7,888	6,643	4,626
8-Jul	28	4,920	11,161	4,405	1,931	3,548	5,547	7,677	4,884	1,597	2,387	14,463	15,656	6,130
15-Jul	29	7,598	12,833	3,688	2,389	5,687	5,865	11,756	1,971	2,512	2,756	16,274	17,622	7,520
22-Jul	30	3,405	9,805	10,257	2,116	5,647	2,926	6,452	2,082	2,869	2,588	14,006	14,618	6,293
29-Jul	31	8,507	12,833	9,923	4,060	5,562	3,981	9,597	2,611	8,008	7,596	13,211	11,894	7,989
5-Aug	32	6,497	30,913	25,025	6,478	11,688	7,123	11,775	4,543	16,233	9,590	18,128	16,818	13,853
12-Aug	33	13,369	18,492	35,214	6,049	24,426	11,967	12,141	5,764	17,426	6,066	12,852	11,762	14,229
19-Aug	34	6,771	18,034	0	10,037	9,648	26,518	11,760	18,943	19,743	11,031	9,738	14,708	13,758
26-Aug	35	6,728	13,465	29,780	8,691	26,558	14,515	18,913	7,195	9,872	11,544	4,875	15,698	13,407
2-Sep	36	6,637	3,833	14,282	6,056	9,517	10,273	12,759	4,375	6,742	4,627	2,687	9,654	7,226
9-Sep	37	3,518	1,231	3,761	5,466	2,220	4,650	7,863	2,996	3,977	2,378	2,197	5,969	3,696
16-Sep	38-42	2,662	321	290	1,939	323	1,365	0	2,048	2,251	0	1,485	4,249	1,422
Yearly Total		76,473	159,446	147,056	59,806	111,887	100,717	122,212	63,396	96,380	70,056	120,644	149,691	97,242
Weekly Mean		5,883	11,389	11,312	4,272	8,607	7,194	8,729	4,528	6,884	5,004	9,280	11,515	7,158
Early Stock Catch		25,500	60,963	2,972	11,030	21,945	20,325	37,404	14,920	12,129	17,225	55,472	58,938	22,619
Late Stock Catch		50,973	98,483	144,084	48,776	89,942	80,392	84,808	48,476	84,251	52,831	65,172	90,759	74,623

Table 26. Annual harvests of “other”^a sockeye salmon in the Lynn Canal drift gillnet fishery by week, 1976 to 1999.

Mid-Week Date	Stat. Week	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
17-Jun	25	60	0	548	504	381	143	44	0	355	134	16	0	0
24-Jun	26	694	2,653	1,759	1,328	56	101	210	49	514	1,688	599	734	968
1-Jul	27	963	1,330	207	0	725	145	145	255	491	5,173	1,233	6,958	6,611
8-Jul	28	1,194	332	386	494	158	150	155	294	383	6,691	4,365	983	4,889
15-Jul	29	375	848	316	501	73	181	175	105	309	273	738	872	5,100
22-Jul	30	735	116	577	1,414	0	116	172	268	561	522	897	263	1,057
29-Jul	31	204	0	486	1,942	76	154	549	1,204	706	746	597	330	1,316
5-Aug	32	227	0	0	0	75	67	128	740	536	448	903	350	442
12-Aug	33	151	0	269	165	8	0	329	663	244	377	948	111	348
19-Aug	34	132	98	74	492	3	14	0	256	73	68	825	121	101
26-Aug	35	76	0	29	195	3	0	0	78	130	48	206	22	100
2-Sep	36	8	0	6	35		0	0	42	48	0	87	0	122
9-Sep	37	0	0	1	14		0	0	1	0	10	0	7	23
16-Sep	38-42	23	0		32		0	1	0	0	0	0	0	33
Yearly Total		4,842	5,377	4,658	7,116	1,558	1,071	1,908	3,955	4,350	16,178	11,414	10,751	21,110
Weekly Mean		346	384	333	508	111	77	136	283	311	1,156	815	768	1,508

^aIncludes Berners Bay River systems and other local stocks.

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Table 26. (page 2 of 2)

Mid-Week Date	Stat. Week	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	76-98 Mean
17-Jun	25	3,214	1,823	2,213	-	-	-	1,282	1,828	1,466	-	-	667
24-Jun	26	3,381	1,783	6,782	4,926	2,321	1,178	1,165	3,309	1,441	1,309	1,818	1,699
1-Jul	27	2,440	6,998	4,097	8,241	4,258	2,418	976	1,245	2,070	820	535	2,431
8-Jul	28	1,742	2,221	2,470	5,650	3,296	2,135	1,696	1,743	1,046	1,050	937	1,853
15-Jul	29	2,030	1,054	3,451	4,275	3,012	2,619	744	2,311	1,133	4,122	2,444	1,544
22-Jul	30	1,725	4,601	1,012	3,327	2,757	1,323	799	2,660	1,447	1,509	1,124	1,208
29-Jul	31	2,922	4,669	1,729	2,488	1,738	2,400	457	5,535	1,495	1,520	1,091	1,432
5-Aug	32	1,956	4,251	1,138	2,356	879	2,236	385	5,695	769	921	949	1,060
12-Aug	33	366	3,088	224	1,422	433	2,291	250	2,916	168	293	417	645
19-Aug	34	494	-	151	280	246	1,623	396	1,051	278	102	108	291
26-Aug	35	233	297	635	280	33	723	100	333	210	31	59	159
2-Sep	36	98	216	-	184	12	263	90	145	95	6	85	67
9-Sep	37	19	40	38	-	-	32	61	87	24	21	-	16
16-Sep	38-42	5	3	24	-	-	11	29	34	-	-	3	9
Yearly Total		20,625	31,044	23,964	33,429	18,985	19,252	8,430	28,893	11,642	11,715	9,570	12,993
Weekly Mean		1,473	2,217	1,712	2,388	1,356	1,481	602	2,064	832	900	737	937

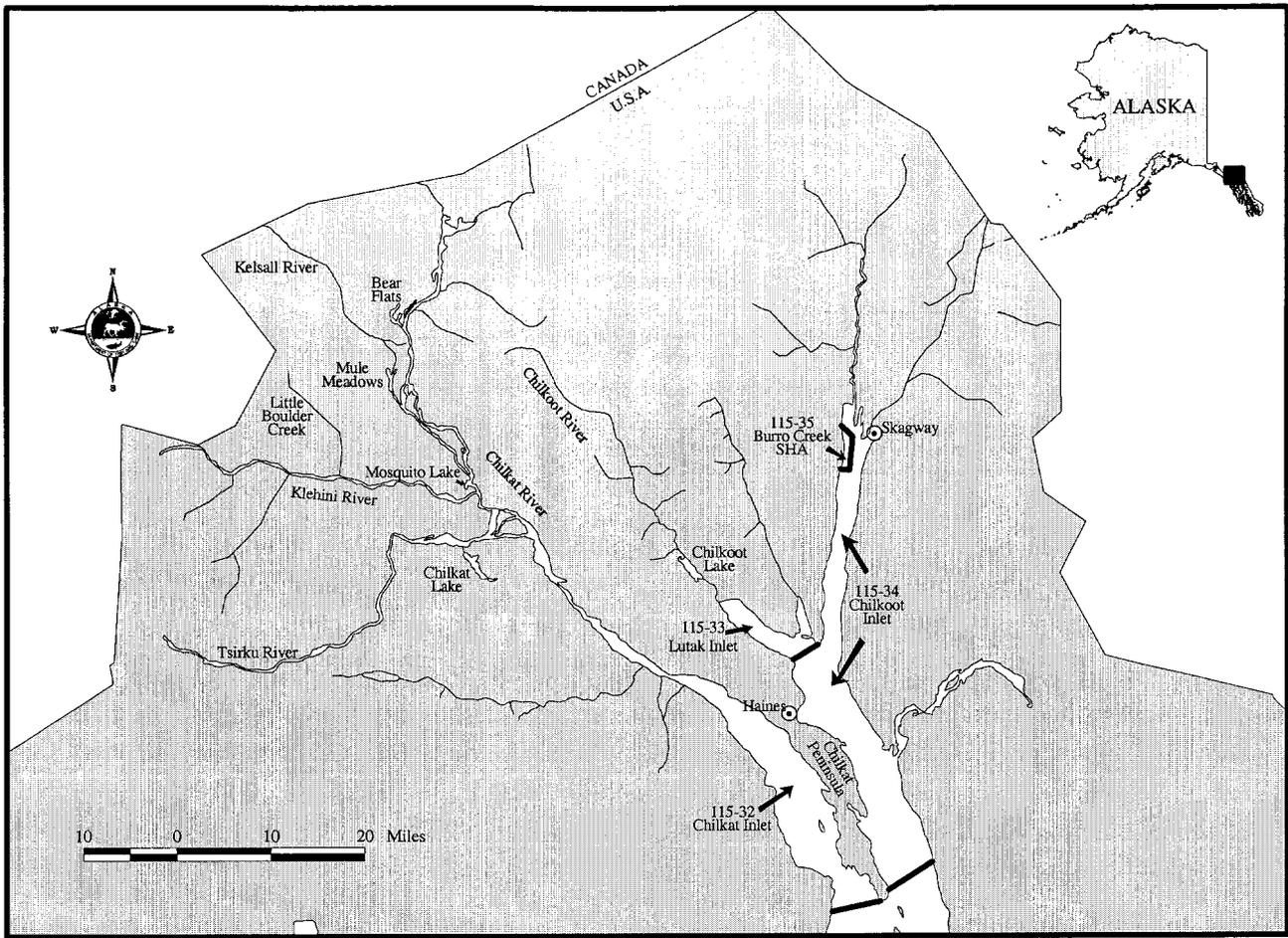


Figure 1. Chilkat Lake and adjacent marine areas.

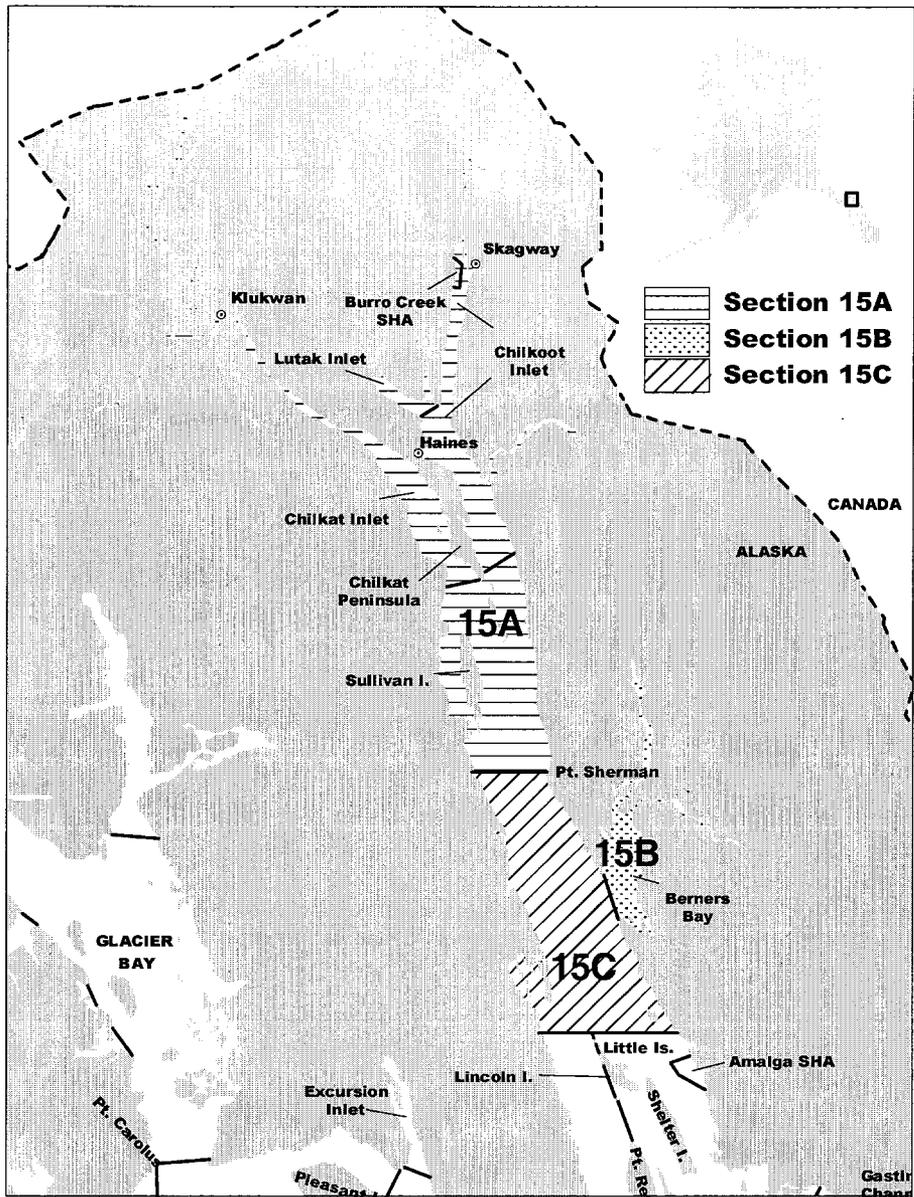


Figure 2. Lynn Canal with primary fishing areas.

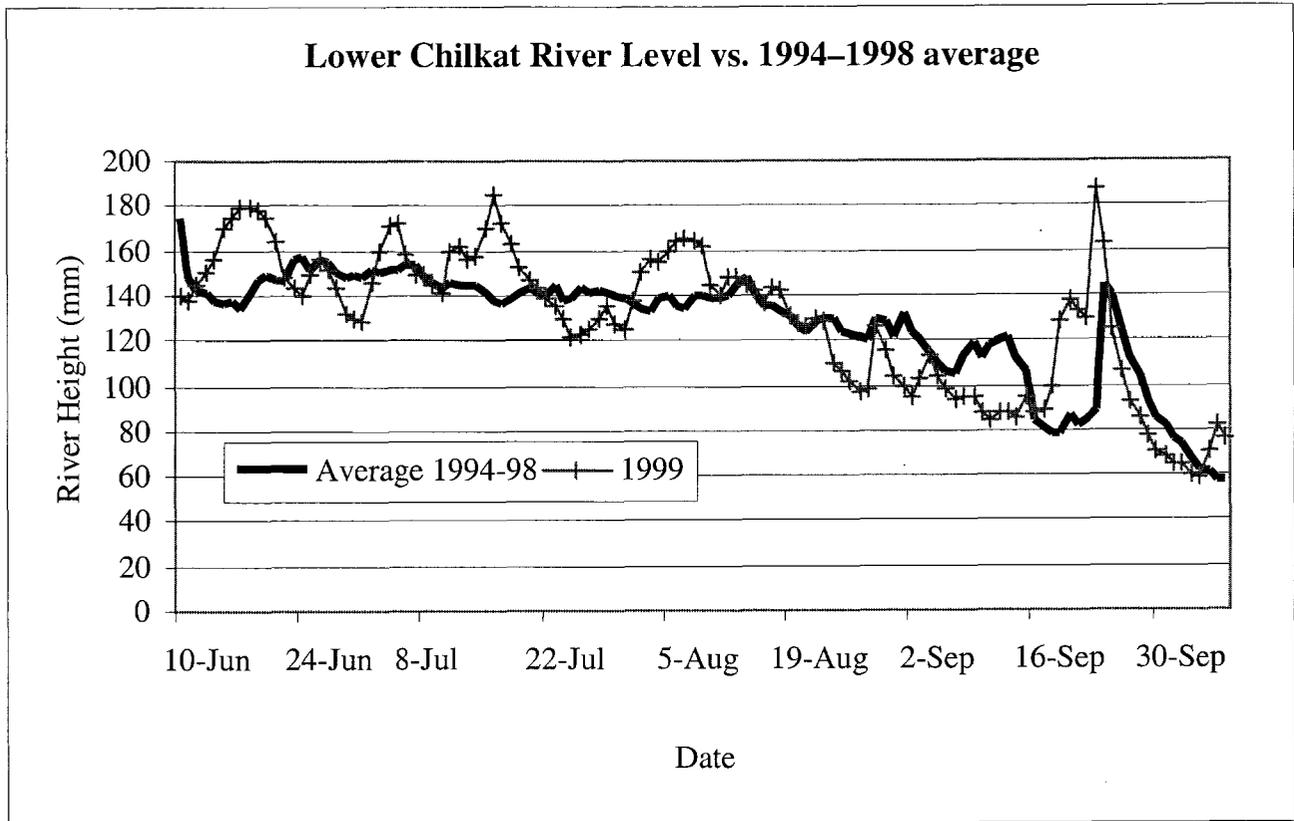


Figure 3. Water levels for the Chilkat River, 1999.

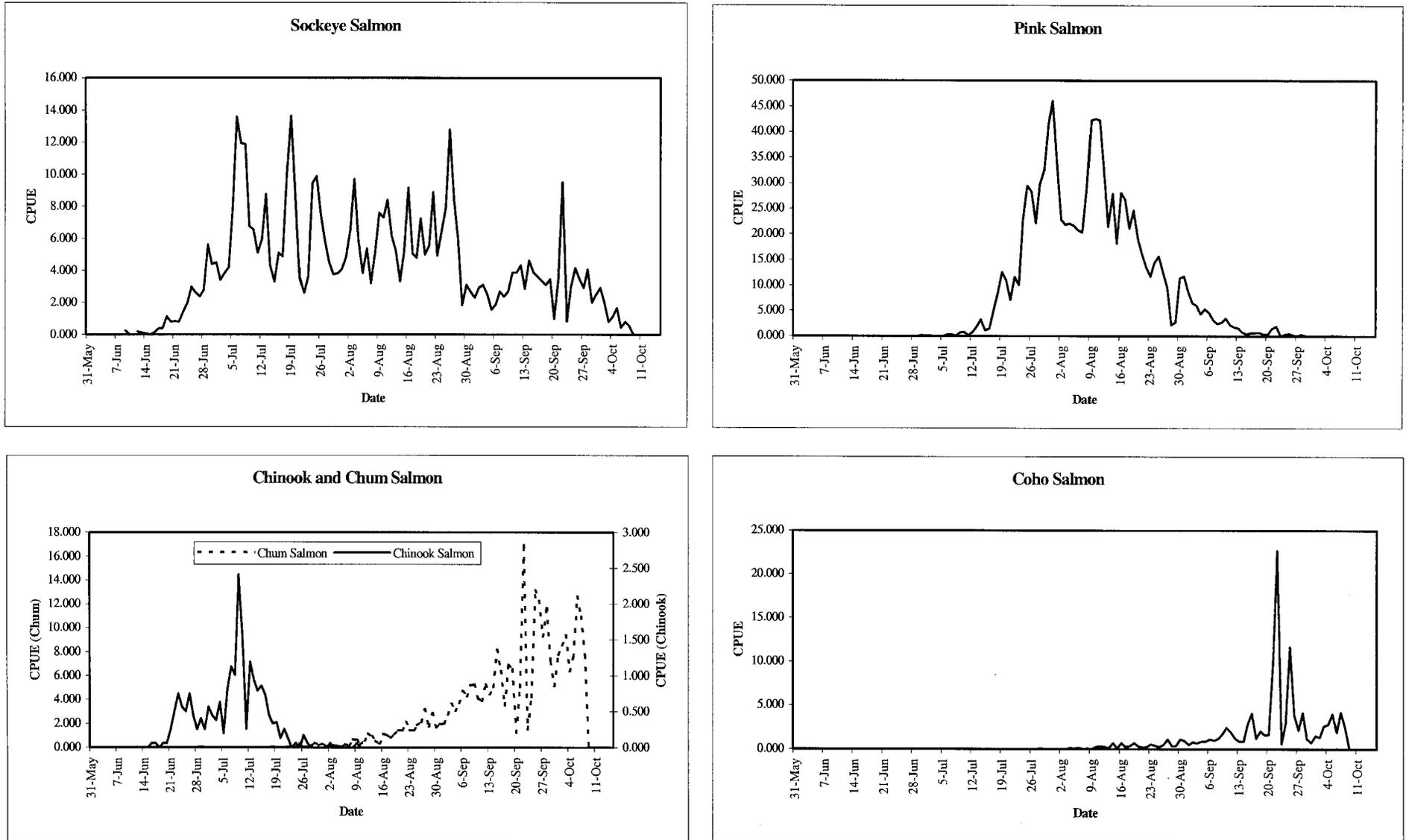


Figure 4. Fish wheel CPUE for five Pacific salmon species in the Chilkat River, 1999.

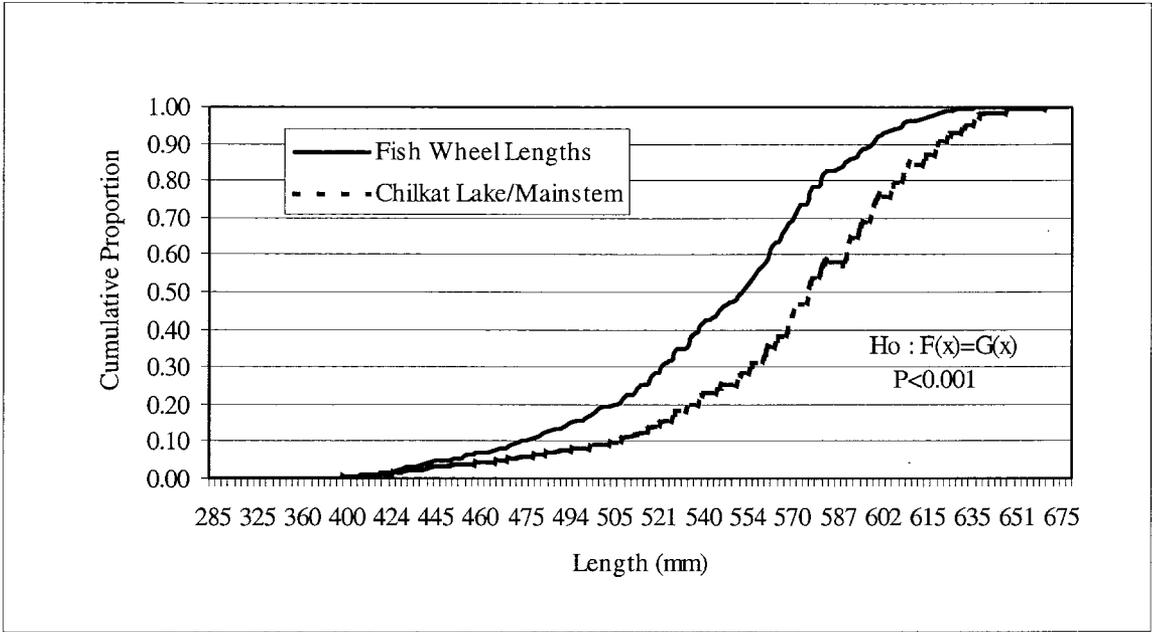


Figure 5. Cumulative distribution functions (CDF) of MEF lengths of sockeye salmon captured in the Chilkat River fish wheels versus lengths of fish examined on spawning grounds at Chilkat Lake and Bear Flats (Chilkat Mainstem) during 1999.

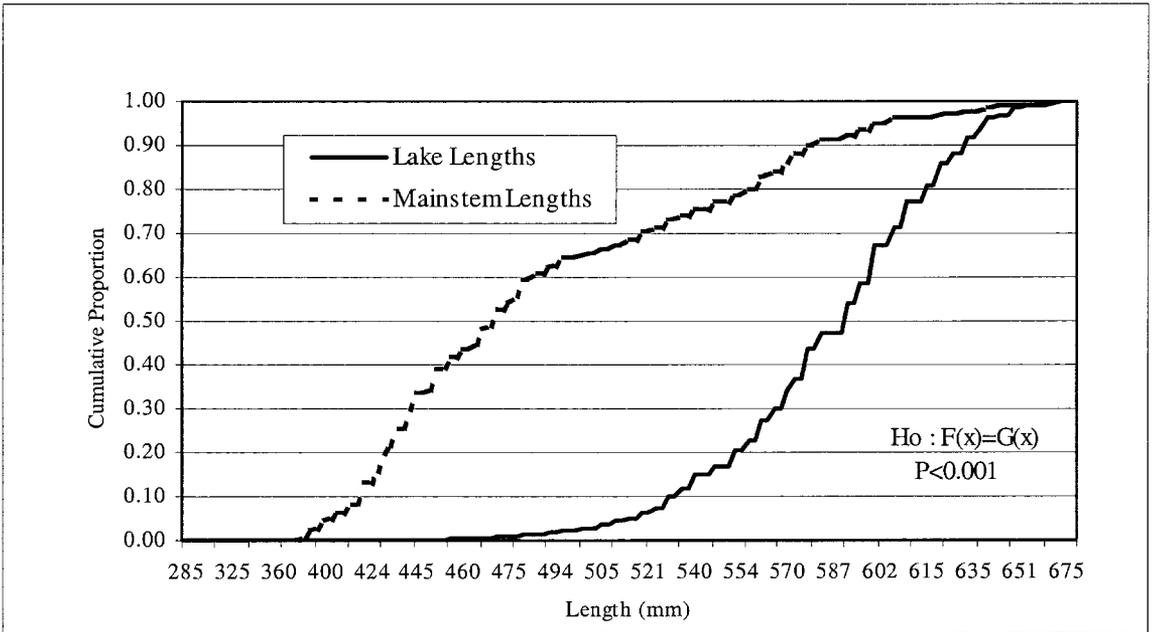


Figure 6. Cumulative distribution functions (CDF) of MEF lengths of sockeye salmon captured in recovery events at the Chilkat Lake and at Bear Flats (Chilkat Mainstem) during 1999.

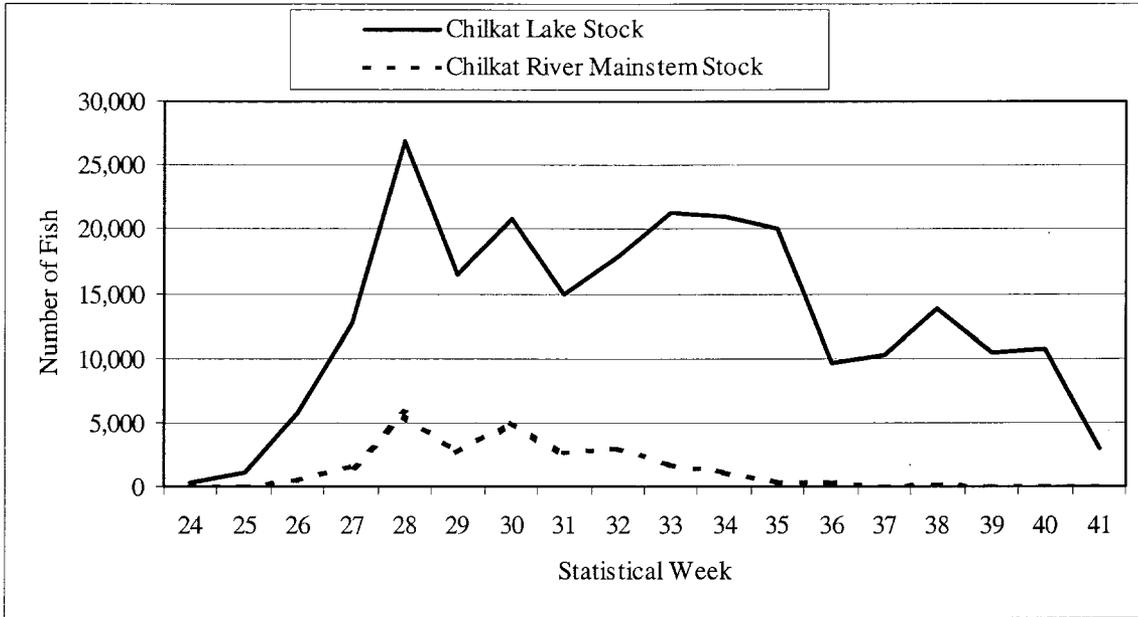


Figure 7. Weekly estimated passage of sockeye salmon by stock group through the lower Chilkat River, 1999.

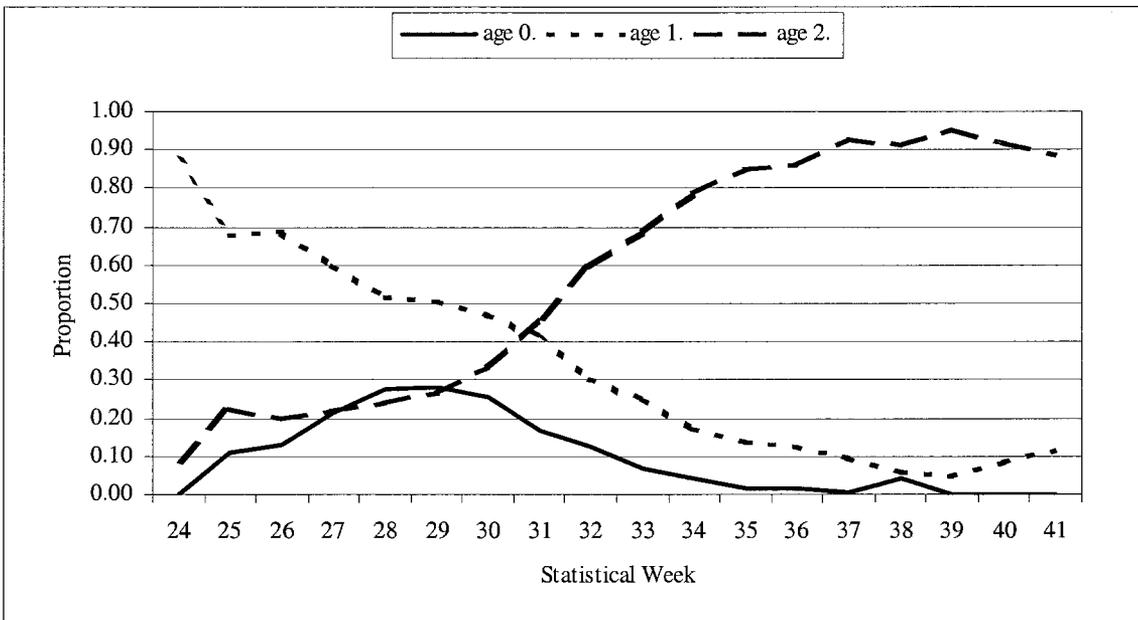


Figure 8. Average weekly freshwater age composition of the sockeye salmon fish wheel catches, 1994-1999.

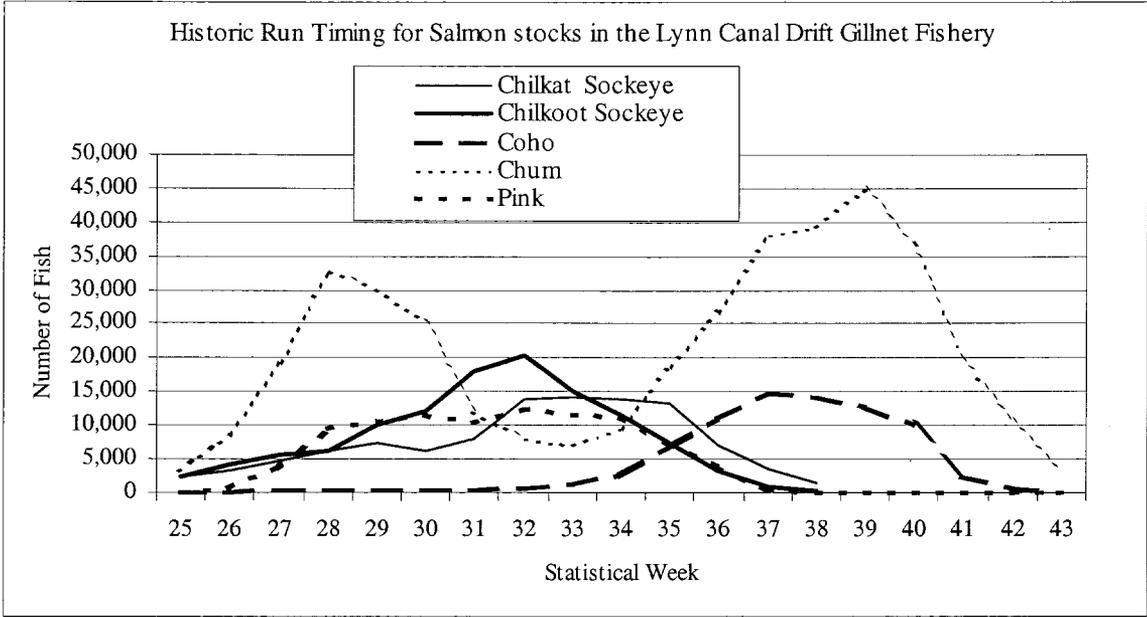


Figure 9. Historic run timing for salmon stocks in the Lynn Canal drift gillnet fishery 1976–1999 average.

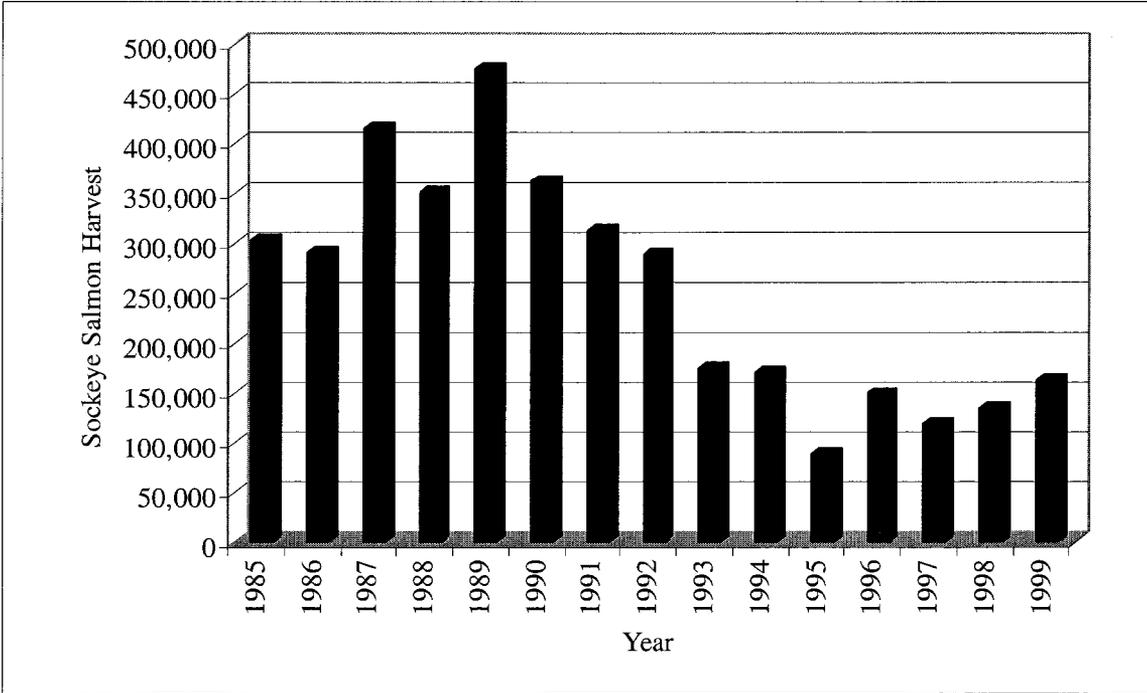
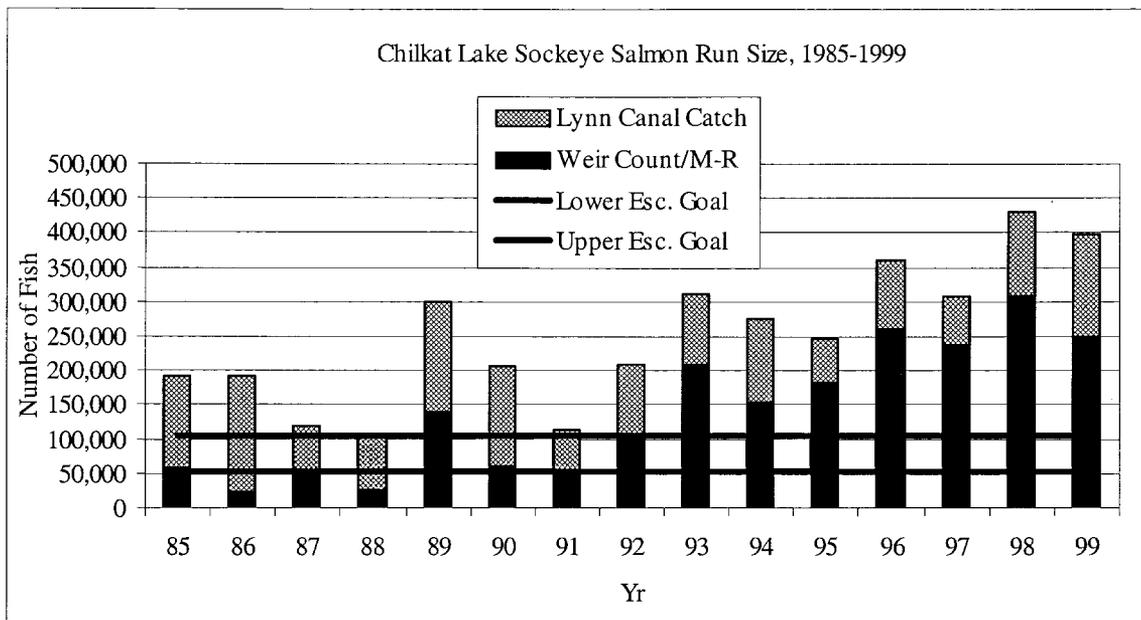


Figure 10. Total sockeye salmon harvest in District 15 drift gillnet fishery, 1985–1999.



Note: 1994-1999 escapement estimates based on Mark-recapture estimates.

Figure 11. Historical escapement, harvest and total run of Chilkat Lake sockeye salmon, 1984-1999.

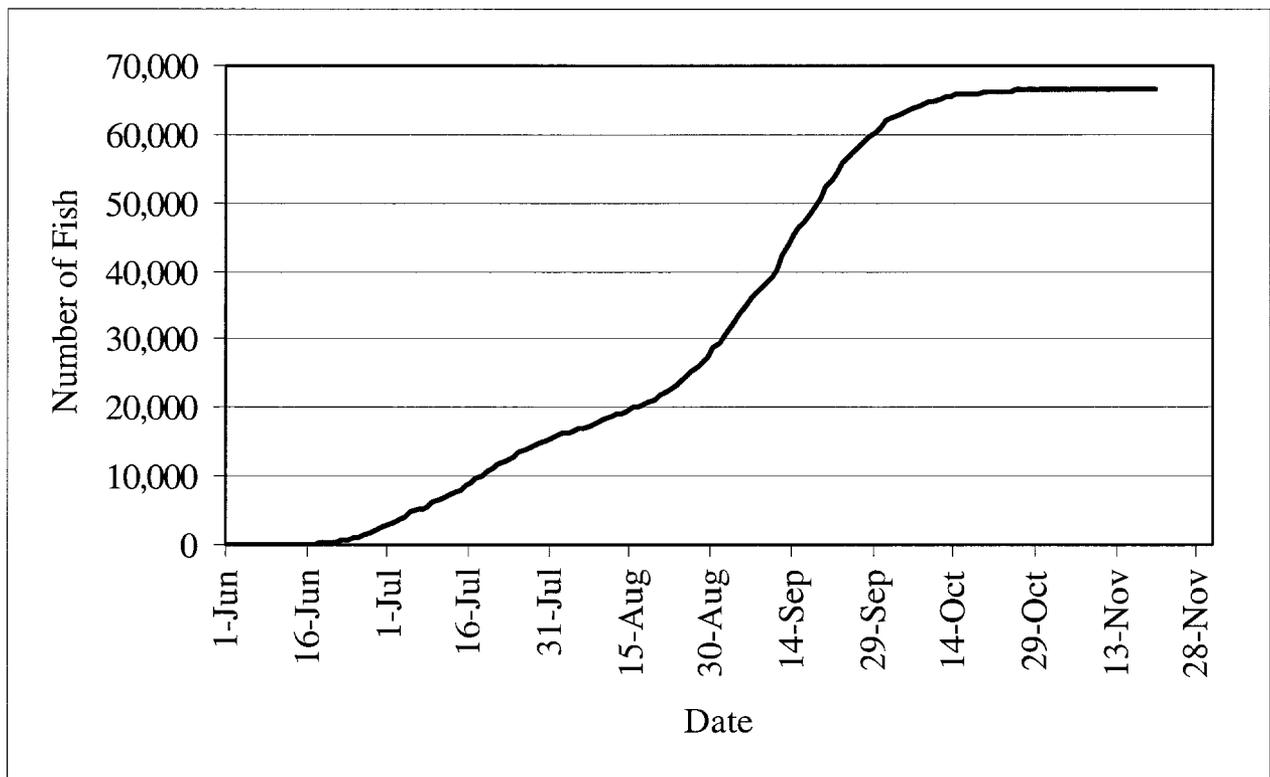


Figure 12. Average Chilkat Lake daily cumulative sockeye salmon weir counts, 1970 to 1995, 1999.

APPENDICES

Appendix A. Calendar dates for statistical weeks in 1999.

Week #	From	Through	Week #	From	Through
1	1-Jan	2-Jan	28	4-Jul	10-Jul
2	3-Jan	9-Jan	29	11-Jul	17-Jul
3	10-Jan	16-Jan	30	18-Jul	24-Jul
4	17-Jan	23-Jan	31	25-Jul	31-Jul
5	24-Jan	30-Jan	32	1-Aug	7-Aug
6	31-Jan	6-Feb	33	8-Aug	14-Aug
7	7-Feb	13-Feb	34	15-Aug	21-Aug
8	14-Feb	20-Feb	35	22-Aug	28-Aug
9	21-Feb	27-Feb	36	29-Aug	4-Sep
10	28-Feb	6-Mar	37	5-Sep	11-Sep
11	7-Mar	13-Mar	38	12-Sep	18-Sep
12	14-Mar	20-Mar	39	19-Sep	25-Sep
13	21-Mar	27-Mar	40	26-Sep	2-Oct
14	28-Mar	3-Apr	41	3-Oct	9-Oct
15	4-Apr	10-Apr	42	10-Oct	16-Oct
16	11-Apr	17-Apr	43	17-Oct	23-Oct
17	18-Apr	24-Apr	44	24-Oct	30-Oct
18	25-Apr	1-May	45	31-Oct	6-Nov
19	2-May	8-May	46	7-Nov	13-Nov
20	9-May	15-May	47	14-Nov	20-Nov
21	16-May	22-May	48	21-Nov	27-Nov
22	23-May	29-May	49	28-Nov	4-Dec
23	30-May	5-Jun	50	5-Dec	11-Dec
24	6-Jun	12-Jun	51	12-Dec	18-Dec
25	13-Jun	19-Jun	52	19-Dec	25-Dec
26	20-Jun	26-Jun	53	26-Dec	31-Dec
27	27-Jun	3-Jul			

Appendix B. Chilkat River daily water level, temperature, fish wheel rpm, and fish wheel effort data, 1999.

Statistical Week	Date	Daily Water Level	Daily Water Temp.(C)	Fish Wheel I rpm	Fish Wheel II rpm	Fish Wheel I Effort	Fish Wheel II Effort
24	8-Jun	141	6.6	2.90	2.87	21.00	22.00
24	9-Jun	145	7.1	2.90	2.67	24.00	24.00
24	10-Jun	140	5.5	2.70	2.55	24.00	24.00
24	11-Jun	137	5.8	2.60	2.60	24.00	24.00
24	12-Jun	145	6.6	2.95	3.00	24.00	24.00
25	13-Jun	150	7.4	2.70	2.85	24.00	24.00
25	14-Jun	156	6.3	2.93	2.85	24.00	22.75
25	15-Jun	170	6.8	2.95	2.95	24.00	24.00
25	16-Jun	175	6.8	3.10	2.70	24.00	24.00
25	17-Jun	179	5.8	3.80	2.50	24.00	24.00
25	18-Jun	179	5.9	3.85	2.40	24.00	23.95
25	19-Jun	178	7.1	3.72	2.40	23.95	24.00
26	20-Jun	175	5.4	3.60	2.45	24.00	24.00
26	21-Jun	164	6.6	3.25	2.40	23.58	23.50
26	22-Jun	148	7.0	3.40	2.30	24.00	24.00
26	23-Jun	143	7.0	3.35	2.15	24.00	24.00
26	24-Jun	140	6.5	3.30	2.40	24.00	24.00
26	25-Jun	149	7.8	3.80	2.75	23.95	24.00
26	26-Jun	156	8.3	3.65	2.85	24.00	24.00
27	27-Jun	151	7.0	3.40	2.60	23.93	24.00
27	28-Jun	143	6.6	3.05	2.50	23.00	24.00
27	29-Jun	132	7.0	2.60	2.50	22.67	22.25
27	30-Jun	130	7.0	2.80	2.40	23.50	23.67
27	1-Jul	128	7.6	2.85	2.40	24.00	24.00
27	2-Jul	146	8.3	3.75	2.60	23.85	23.65
27	3-Jul	160	8.3	3.60	3.00	23.90	23.67
28	4-Jul	171	8.5	3.65	3.00	24.00	24.00
28	5-Jul	172	8.0	3.65	2.65	22.20	22.84
28	6-Jul	158	8.1	3.55	2.50	22.00	22.17
28	7-Jul	149	6.9	3.25	2.50	24.00	24.00
28	8-Jul	149	8.2	3.25	2.30	23.63	23.83
28	9-Jul	144	6.6	2.75	2.15	21.17	22.42
28	10-Jul	141	6.9	2.80	2.10	22.20	23.00
29	11-Jul	159	7.1	3.50	2.40	22.65	23.15
29	12-Jul	162	6.9	3.30	2.20	22.84	22.50
29	13-Jul	156	7.4	2.85	2.20	22.25	22.30
29	14-Jul	157	8.2	3.20	2.25	22.35	23.06

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Appendix B. (page 2 of 4)

Statistical Week	Date	Daily Water Level	Daily Water Temp.(C)	Fish Wheel I rpm	Fish Wheel II rpm	Fish Wheel I Effort	Fish Wheel II Effort
29	15-Jul	170	8.1	3.50	2.35	22.08	23.25
29	16-Jul	185	8.6	3.65	2.65	22.40	22.88
29	17-Jul	172	9.0	3.45	2.55	23.96	23.33
30	18-Jul	163	8.2	2.80	2.50	22.08	22.84
30	19-Jul	153	8.6	2.70	2.25	21.00	21.92
30	20-Jul	147	7.4	3.20	2.05	22.48	22.42
30	21-Jul	143	7.8	3.20	1.90	23.08	23.42
30	22-Jul	139	6.5	3.00	1.55	19.50	22.92
30	23-Jul	135	7.9	2.85	1.30	21.65	23.65
30	24-Jul	130	7.8	2.65	0.97	22.05	23.38
31	25-Jul	121	6.8	2.10	0.50	22.33	5.00
31	26-Jul	122	7.0	2.30	1.45	22.46	12.00
31	27-Jul	125	6.6	2.50	1.70	23.00	22.50
31	28-Jul	130	6.8	2.65	1.80	24.00	24.00
31	29-Jul	135	6.9	2.55	1.30	21.65	23.83
31	30-Jul	127	7.5	2.60	1.10	22.30	24.00
31	31-Jul	125	7.3	2.10	0.75	23.95	24.00
32	1-Aug	137	8.3	3.35	2.25	22.98	23.82
32	2-Aug	150	8.2	3.15	2.70	22.84	23.92
32	3-Aug	156	8.0	3.65	2.65	24.00	24.00
32	4-Aug	155	8.2	3.55	2.65	24.00	24.00
32	5-Aug	160	8.0	3.75	2.90	22.15	23.89
32	6-Aug	164	8.1	3.60	2.70	22.04	23.25
32	7-Aug	165	8.2	3.60	2.75	23.65	23.83
33	8-Aug	164	7.4	3.20	2.65	24.00	24.00
33	9-Aug	162	7.0	2.70	2.50	23.84	24.00
33	10-Aug	145	7.3	2.70	1.70	24.00	24.00
33	11-Aug	140	7.4	2.65	1.80	22.50	24.00
33	12-Aug	148	7.6	3.50	2.10	24.00	24.00
33	13-Aug	148	8.1	3.50	2.20	24.00	24.00
33	14-Aug	144	6.4	3.00	1.75	20.00	24.00
34	15-Aug	142	6.8	2.90	1.85	13.76	24.00
34	16-Aug	136	7.0	2.65	1.70	23.82	24.00
34	17-Aug	143	7.0	2.95	2.15	24.00	24.00
34	18-Aug	140	6.9	2.65	2.15	24.00	24.00
34	19-Aug	131	6.9	2.85	1.90	24.00	24.00

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Appendix B. (page 3 of 4)

Statistical Week	Date	Daily Water Level	Daily Water Temp.(C)	Fish Wheel I rpm	Fish Wheel II rpm	Fish Wheel I Effort	Fish Wheel II Effort
34	20-Aug	127	7.0	2.65	1.55	24.00	24.00
34	21-Aug	126	6.4	2.55	1.45	24.00	24.00
35	22-Aug	130	6.4	3.15	2.60	24.00	24.00
35	23-Aug	128	5.9	2.55	1.40	24.00	24.00
35	24-Aug	110	5.8	2.15	N/A	24.00	13.00
35	25-Aug	106	6.1	2.25	N/A	24.00	N/A
35	26-Aug	102	6.6	2.50	N/A	23.98	N/A
35	27-Aug	97	6.5	2.60	N/A	23.56	N/A
35	28-Aug	98	7.3	3.00	2.75	24.00	12.00
36	29-Aug	126	6.1	3.20	3.30	23.17	24.00
36	30-Aug	116	5.9	3.35	3.25	24.00	24.00
36	31-Aug	104	5.9	2.80	2.95	24.00	24.00
36	1-Sep	99	6.3	2.80	3.05	24.00	24.00
36	2-Sep	95	7.0	2.65	3.05	24.00	24.00
36	3-Sep	103	7.3	3.00	3.20	24.00	24.00
36	4-Sep	113	6.3	3.50	3.30	24.00	22.84
37	5-Sep	104	5.9	3.15	3.00	24.00	24.00
37	6-Sep	98	6.3	2.80	2.95	24.00	24.00
37	7-Sep	94	5.6	2.60	2.75	23.92	23.92
37	8-Sep	95	5.5	2.75	3.15	24.00	24.00
37	9-Sep	94.5	5.8	2.50	2.80	23.83	24.00
37	10-Sep	87.5	6.4	2.40	2.80	23.73	23.67
37	11-Sep	84	6.9	2.20	2.70	24.00	24.00
38	12-Sep	88	6.4	2.40	3.10	24.00	24.00
38	13-Sep	88	6.0	2.60	3.05	24.00	24.00
38	14-Sep	85	6.0	2.50	3.05	24.00	24.00
38	15-Sep	95	5.8	3.00	3.30	24.00	24.00
38	16-Sep	88	5.8	3.10	3.25	24.00	24.00
38	17-Sep	89	6.1	3.00	3.20	24.00	24.00
38	18-Sep	99	6.1	3.05	3.10	24.00	24.00
39	19-Sep	128	6.9	3.50	3.10	22.00	24.00
39	20-Sep	137	6.0	3.60	3.00	24.00	24.00
39	21-Sep	133	5.1	2.25	2.95	24.00	24.00
39	22-Sep	129	5.4	N/A	2.90	10.30	11.50
39	23-Sep	187	5.6	3.95	2.95	15.10	24.00
39	24-Sep	164	5.4	3.85	2.95	15.10	24.00
39	25-Sep	125	5.1	3.10	2.90	23.00	24.00

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Appendix B. (page 4 of 4)

Statistical Week	Date	Daily Water Level	Daily Water Temp.(C)	Fish Wheel I rpm	Fish Wheel II rpm	Fish Wheel I Effort	Fish Wheel II Effort
40	26-Sep	106	5.0	2.70	2.90	23.00	24.00
40	27-Sep	93	4.5	2.80	2.80	24.00	24.00
40	28-Sep	85	4.6	2.25	2.95	24.00	24.00
40	29-Sep	77	3.9	2.35	2.75	24.00	24.00
40	30-Sep	71	5.4	2.30	2.90	23.92	24.00
40	1-Oct	68	6.3	1.90	3.25	23.00	24.00
40	2-Oct	65	5.9	2.00	3.30	24.00	24.00
41	3-Oct	64.5	6.0	2.00	3.30	24.00	24.00
41	4-Oct	60	5.9	1.80	3.00	24.00	24.00
41	5-Oct	59	6.1	2.00	2.90	23.00	24.00
41	6-Oct	70	5.9	2.90	2.80	21.84	24.00
41	7-Oct	82	6.1	1.75	2.90	24.00	24.00
41	8-Oct	76	5.9	2.00	3.20	24.00	24.00

Appendix C.1. Daily catch, number tagged, and CPUE of chinook salmon captured in the Chilkat River fish wheels, 1999.

Date	Daily Chinook Catch	Cumul. Chinook Catch	Daily Chinook Tagged	Cumul. Chinook Tagged	Daily CPUE	Cumul. Proport. CPUE
16-Jun	1	1	1	1	0.063	0.003
17-Jun	1	2	1	2	0.063	0.006
18-Jun	0	2	0	2	0.000	0.006
19-Jun	1	3	0	2	0.063	0.009
20-Jun	1	4	0	2	0.063	0.012
21-Jun	4	8	1	3	0.255	0.024
22-Jun	8	16	2	5	0.500	0.048
23-Jun	12	28	4	9	0.750	0.084
24-Jun	9	37	2	11	0.563	0.111
25-Jun	8	45	0	11	0.501	0.135
26-Jun	12	57	8	19	0.750	0.171
27-Jun	7	64	4	23	0.438	0.192
28-Jun	4	68	1	24	0.255	0.204
29-Jun	6	74	5	29	0.401	0.223
30-Jun	4	78	3	32	0.254	0.235
1-Jul	9	87	7	39	0.563	0.262
2-Jul	7	94	5	44	0.442	0.284
3-Jul	6	100	5	49	0.378	0.302
4-Jul	10	110	6	55	0.625	0.332
5-Jul	3	113	2	57	0.200	0.341
6-Jul	12	125	5	62	0.815	0.380
7-Jul	18	143	9	71	1.125	0.434
8-Jul	16	159	7	78	1.011	0.483
9-Jul	35	194	15	93	2.409	0.598
10-Jul	23	217	12	105	1.527	0.671
11-Jul	4	221	3	108	0.262	0.684
12-Jul	18	239	13	121	1.191	0.741
13-Jul	14	253	7	128	0.943	0.786
14-Jul	12	265	6	134	0.793	0.824
15-Jul	13	278	10	144	0.860	0.865
16-Jul	11	289	8	152	0.729	0.900
17-Jul	7	296	6	158	0.444	0.921
18-Jul	5	301	4	162	0.334	0.937
19-Jul	5	306	3	165	0.349	0.954
20-Jul	2	308	2	167	0.134	0.960
21-Jul	4	312	3	170	0.258	0.972
22-Jul	2	314	2	172	0.141	0.979
23-Jul	0	314	0	172	0.000	0.979
24-Jul	1	315	0	172	0.066	0.982
25-Jul	0	315	0	172	0.000	0.982
26-Jul	2	317	2	174	0.174	0.991
27-Jul	1	318	1	175	0.066	0.994

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Date	Daily Chinook Catch	Cumul. Chinook Catch	Daily Chinook Tagged	Cumul. Chinook Tagged	Daily CPUE	Cumul. Proport. CPUE
28-Jul	0	318	0	175	0.000	0.994
29-Jul	0	318	0	175	0.000	0.994
30-Jul	0	318	0	175	0.000	0.994
31-Jul	0	318	0	175	0.000	0.994
1-Aug	0	318	0	175	0.000	0.994
2-Aug	1	319	1	176	0.064	0.997
3-Aug	0	319	0	176	0.000	0.997
4-Aug	0	319	0	176	0.000	0.997
5-Aug	0	319	0	176	0.000	0.997
6-Aug	0	319	0	176	0.000	0.997
7-Aug	0	319	0	176	0.000	0.997
8-Aug	0	319	0	176	0.000	0.997
9-Aug	1	320	1	177	0.063	1.000

Appendix C.2. Daily catch, number marked, and CPUE of sockeye salmon captured in the Chilkat River fish wheels, 1999.

Date	Daily Sockeye Catch	Cumul. Sockeye Catch	Daily Sockeye Marked	Cumul. Sockeye Marked	Daily CPUE	Cumul. Proport. CPUE
9-Jun	4	4	4	4	0.250	0.000
10-Jun	0	4	0	4	0.000	0.000
11-Jun	1	5	1	5	0.063	0.001
12-Jun	3	8	3	8	0.188	0.001
13-Jun	2	10	2	10	0.125	0.001
14-Jun	1	11	1	11	0.064	0.001
15-Jun	0	11	0	11	0.000	0.001
16-Jun	2	13	2	13	0.125	0.002
17-Jun	6	19	6	19	0.375	0.002
18-Jun	6	25	6	25	0.375	0.003
19-Jun	18	43	18	43	1.126	0.005
20-Jun	13	56	13	56	0.813	0.007
21-Jun	13	69	13	69	0.828	0.008
22-Jun	13	82	13	82	0.813	0.010
23-Jun	23	105	23	105	1.438	0.013
24-Jun	31	136	31	136	1.938	0.016
25-Jun	48	184	46	182	3.003	0.022
26-Jun	42	226	41	223	2.625	0.027
27-Jun	38	264	37	260	2.378	0.031
28-Jun	44	308	44	304	2.809	0.037
29-Jun	84	392	84	388	5.610	0.047
30-Jun	69	461	69	457	4.388	0.056
1-Jul	72	533	72	529	4.500	0.064
2-Jul	54	587	52	581	3.411	0.071
3-Jul	61	648	61	642	3.847	0.078
4-Jul	67	715	66	708	4.188	0.086
5-Jul	119	834	119	827	7.926	0.101
6-Jul	200	1,034	193	1,020	13.584	0.127
7-Jul	191	1,225	188	1,208	11.938	0.150
8-Jul	188	1,413	186	1,394	11.884	0.172
9-Jul	98	1,511	97	1,491	6.745	0.185
10-Jul	99	1,610	98	1,589	6.571	0.198
11-Jul	78	1,688	78	1,667	5.109	0.207
12-Jul	90	1,778	89	1,756	5.955	0.219
13-Jul	130	1,908	130	1,886	8.754	0.235
14-Jul	65	1,973	65	1,951	4.294	0.243
15-Jul	50	2,023	50	2,001	3.309	0.250
16-Jul	77	2,100	77	2,078	5.102	0.259
17-Jul	77	2,177	75	2,153	4.885	0.269
18-Jul	151	2,328	148	2,301	10.085	0.288
19-Jul	195	2,523	192	2,493	13.630	0.314
20-Jul	130	2,653	127	2,620	8.686	0.330
21-Jul	55	2,708	55	2,675	3.548	0.337
22-Jul	37	2,745	37	2,712	2.617	0.342

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Date	Daily Sockeye Catch	Cumul. Sockeye Catch	Daily Sockeye Marked	Cumul. Sockeye Marked	Daily CPUE	Cumul. Proport. CPUE
23-Jul	55	2,800	55	2,767	3.642	0.349
24-Jul	143	2,943	143	2,910	9.443	0.367
25-Jul	90	3,033	87	2,997	9.879	0.386
26-Jul	86	3,119	84	3,081	7.487	0.400
27-Jul	89	3,208	85	3,166	5.868	0.411
28-Jul	72	3,280	71	3,237	4.500	0.420
29-Jul	57	3,337	55	3,292	3.760	0.427
30-Jul	59	3,396	59	3,351	3.823	0.434
31-Jul	65	3,461	63	3,414	4.067	0.442
1-Aug	75	3,536	73	3,487	4.808	0.451
2-Aug	101	3,637	97	3,584	6.480	0.463
3-Aug	155	3,792	147	3,731	9.688	0.482
4-Aug	95	3,887	91	3,822	5.938	0.493
5-Aug	59	3,946	58	3,880	3.844	0.500
6-Aug	81	4,027	81	3,961	5.365	0.510
7-Aug	51	4,078	49	4,010	3.222	0.517
8-Aug	81	4,159	75	4,085	5.063	0.526
9-Aug	121	4,280	118	4,203	7.588	0.541
10-Aug	117	4,397	113	4,316	7.313	0.555
11-Aug	130	4,527	125	4,441	8.387	0.570
12-Aug	98	4,625	94	4,535	6.125	0.582
13-Aug	84	4,709	82	4,617	5.250	0.592
14-Aug	49	4,758	49	4,666	3.341	0.598
15-Aug	65	4,823	60	4,726	5.164	0.608
16-Aug	146	4,969	140	4,866	9.159	0.626
17-Aug	81	5,050	80	4,946	5.063	0.635
18-Aug	77	5,127	74	5,020	4.813	0.644
19-Aug	116	5,243	114	5,134	7.250	0.658
20-Aug	80	5,323	74	5,208	5.000	0.668
21-Aug	89	5,412	86	5,294	5.563	0.678
22-Aug	142	5,554	138	5,432	8.875	0.695
23-Aug	79	5,633	75	5,507	4.938	0.705
24-Aug	79	5,712	78	5,585	6.405	0.717
25-Aug	63	5,775	58	5,643	7.875	0.732
26-Aug	102	5,877	101	5,744	12.761	0.756
27-Aug	66	5,943	65	5,809	8.404	0.772
28-Aug	71	6,014	70	5,879	5.917	0.783
29-Aug	29	6,043	28	5,907	1.844	0.787
30-Aug	50	6,093	49	5,956	3.125	0.793
31-Aug	43	6,136	42	5,998	2.688	0.798
1-Sep	37	6,173	35	6,033	2.313	0.802
2-Sep	47	6,220	47	6,080	2.938	0.808

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Date	Daily Sockeye Catch	Cumul. Sockeye Catch	Daily Sockeye Marked	Cumul. Sockeye Marked	Daily CPUE	Cumul. Proport. CPUE
3-Sep	50	6,270	50	6,130	3.125	0.814
4-Sep	39	6,309	39	6,169	2.498	0.818
5-Sep	25	6,334	25	6,194	1.563	0.821
6-Sep	30	6,364	26	6,220	1.875	0.825
7-Sep	43	6,407	40	6,260	2.696	0.830
8-Sep	38	6,445	36	6,296	2.375	0.835
9-Sep	43	6,488	43	6,339	2.697	0.840
10-Sep	61	6,549	53	6,392	3.861	0.847
11-Sep	62	6,611	60	6,452	3.875	0.854
12-Sep	69	6,680	68	6,520	4.313	0.863
13-Sep	46	6,726	45	6,565	2.875	0.868
14-Sep	74	6,800	72	6,637	4.625	0.877
15-Sep	62	6,862	61	6,698	3.875	0.884
16-Sep	58	6,920	56	6,754	3.625	0.891
17-Sep	54	6,974	48	6,802	3.375	0.898
18-Sep	50	7,024	47	6,849	3.125	0.904
19-Sep	53	7,077	50	6,899	3.457	0.910
20-Sep	16	7,093	13	6,912	1.000	0.912
21-Sep	55	7,148	54	6,966	3.438	0.919
22-Sep	69	7,217	21	6,987	9.495	0.937
23-Sep	11	7,228	10	6,997	0.844	0.938
24-Sep	39	7,267	38	7,035	2.992	0.944
25-Sep	65	7,332	60	7,095	4.149	0.952
26-Sep	55	7,387	48	7,143	3.511	0.958
27-Sep	47	7,434	42	7,185	2.938	0.964
28-Sep	65	7,499	56	7,241	4.063	0.972
29-Sep	32	7,531	31	7,272	2.000	0.976
30-Sep	40	7,571	38	7,310	2.504	0.980
1-Oct	46	7,617	43	7,353	2.936	0.986
2-Oct	32	7,649	32	7,385	2.000	0.990
3-Oct	13	7,662	11	7,396	0.813	0.991
4-Oct	18	7,680	17	7,413	1.125	0.993
5-Oct	26	7,706	22	7,435	1.660	0.997
6-Oct	7	7,713	6	7,441	0.458	0.997
7-Oct	13	7,726	11	7,452	0.813	0.999
8-Oct	9	7,735	9	7,461	0.563	1.000

Appendix C.3. Daily catch and CPUE of coho salmon captured in the Chilkat River fish wheels, 1999.

Date	Daily Coho Catch	Cumul. Coho Catch	Daily CPUE	Cumul. Proport. CPUE
28-Jul	1	1	0.063	0.001
29-Jul	0	1	0.000	0.001
30-Jul	0	1	0.000	0.001
31-Jul	0	1	0.000	0.001
1-Aug	0	1	0.000	0.001
2-Aug	0	1	0.000	0.001
3-Aug	0	1	0.000	0.001
4-Aug	2	3	0.125	0.002
5-Aug	1	4	0.065	0.002
6-Aug	2	6	0.132	0.003
7-Aug	0	6	0.000	0.003
8-Aug	1	7	0.063	0.004
9-Aug	0	7	0.000	0.004
10-Aug	4	11	0.250	0.006
11-Aug	5	16	0.323	0.008
12-Aug	4	20	0.250	0.010
13-Aug	2	22	0.125	0.012
14-Aug	10	32	0.682	0.017
15-Aug	1	33	0.079	0.018
16-Aug	11	44	0.690	0.024
17-Aug	4	48	0.250	0.026
18-Aug	6	54	0.375	0.029
19-Aug	11	65	0.688	0.034
20-Aug	5	70	0.313	0.037
21-Aug	3	73	0.188	0.039
22-Aug	4	77	0.250	0.041
23-Aug	9	86	0.563	0.045
24-Aug	5	91	0.405	0.049
25-Aug	2	93	0.250	0.051
26-Aug	4	97	0.500	0.055
27-Aug	9	106	1.146	0.064
28-Aug	4	110	0.333	0.067
29-Aug	6	116	0.382	0.070
30-Aug	18	134	1.125	0.079
31-Aug	15	149	0.938	0.087
1-Sep	8	157	0.500	0.091
2-Sep	13	170	0.813	0.098
3-Sep	11	181	0.688	0.104
4-Sep	14	195	0.897	0.111
5-Sep	14	209	0.875	0.118
6-Sep	18	227	1.125	0.128

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Date	Daily Coho Catch	Cumul. Coho Catch	Daily CPUE	Cumul. Proport. CPUE
7-Sep	16	243	1.003	0.136
8-Sep	19	262	1.188	0.146
9-Sep	28	290	1.756	0.160
10-Sep	39	329	2.468	0.181
11-Sep	31	360	1.938	0.197
12-Sep	20	380	1.250	0.207
13-Sep	14	394	0.875	0.214
14-Sep	14	408	0.875	0.221
15-Sep	47	455	2.938	0.246
16-Sep	65	520	4.063	0.279
17-Sep	20	540	1.250	0.290
18-Sep	33	573	2.063	0.307
19-Sep	25	598	1.630	0.320
20-Sep	27	625	1.688	0.334
21-Sep	153	778	9.563	0.413
22-Sep	165	943	22.706	0.601
23-Sep	8	951	0.614	0.606
24-Sep	38	989	2.916	0.630
25-Sep	183	1,172	11.681	0.726
26-Sep	61	1,233	3.894	0.759
27-Sep	35	1,268	2.188	0.777
28-Sep	66	1,334	4.125	0.811
29-Sep	19	1,353	1.188	0.821
30-Sep	12	1,365	0.751	0.827
1-Oct	24	1,389	1.532	0.840
2-Oct	22	1,411	1.375	0.851
3-Oct	42	1,453	2.625	0.873
4-Oct	45	1,498	2.813	0.896
5-Oct	63	1,561	4.021	0.929
6-Oct	29	1,590	1.898	0.945
7-Oct	67	1,657	4.188	0.979
8-Oct	40	1,697	2.500	1.000

Appendix C.4. Daily catches and CPUE of pink salmon captured in the Chilkat River fish wheels, 1999.

Date	Daily Pink Catch	Cumul. Pink Catch	Daily CPUE	Cumul. Proport. CPUE
30-Jun	2	2	0.127	0.0001
1-Jul	1	3	0.063	0.0002
2-Jul	1	4	0.063	0.0002
3-Jul	0	4	0.000	0.0002
4-Jul	0	4	0.000	0.0002
5-Jul	0	4	0.000	0.0002
6-Jul	4	8	0.272	0.0005
7-Jul	5	13	0.313	0.0008
8-Jul	1	14	0.063	0.0009
9-Jul	10	24	0.688	0.0015
10-Jul	12	36	0.796	0.0023
11-Jul	2	38	0.131	0.0024
12-Jul	11	49	0.728	0.0031
13-Jul	28	77	1.886	0.0049
14-Jul	49	126	3.237	0.0080
15-Jul	17	143	1.125	0.0090
16-Jul	22	165	1.458	0.0104
17-Jul	80	245	5.075	0.0152
18-Jul	125	370	8.348	0.0232
19-Jul	179	549	12.512	0.0351
20-Jul	165	714	11.024	0.0456
21-Jul	110	824	7.097	0.0523
22-Jul	164	988	11.598	0.0634
23-Jul	152	1,140	10.066	0.0729
24-Jul	347	1,487	22.914	0.0947
25-Jul	268	1,755	29.418	0.1227
26-Jul	325	2,080	28.294	0.1497
27-Jul	336	2,416	22.154	0.1707
28-Jul	477	2,893	29.813	0.1991
29-Jul	493	3,386	32.520	0.2300
30-Jul	642	4,028	41.598	0.2696
31-Jul	737	4,765	46.111	0.3135
1-Aug	527	5,292	33.782	0.3456
2-Aug	355	5,647	22.776	0.3673
3-Aug	349	5,996	21.813	0.3880
4-Aug	353	6,349	22.063	0.4090
5-Aug	332	6,681	21.633	0.4296
6-Aug	313	6,994	20.733	0.4493
7-Aug	321	7,315	20.282	0.4686
8-Aug	465	7,780	29.063	0.4963
9-Aug	673	8,453	42.203	0.5364

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Date	Daily Pink Catch	Cumul. Pink Catch	Daily CPUE	Cumul. Proport. CPUE
10-Aug	681	9,134	42.563	0.5769
11-Aug	654	9,788	42.194	0.6171
12-Aug	511	10,299	31.938	0.6475
13-Aug	343	10,642	21.438	0.6679
14-Aug	409	11,051	27.886	0.6944
15-Aug	229	11,280	18.194	0.7117
16-Aug	447	11,727	28.043	0.7384
17-Aug	428	12,155	26.750	0.7638
18-Aug	338	12,493	21.125	0.7839
19-Aug	394	12,887	24.625	0.8073
20-Aug	305	13,192	19.063	0.8255
21-Aug	258	13,450	16.125	0.8408
22-Aug	216	13,666	13.500	0.8537
23-Aug	187	13,853	11.688	0.8648
24-Aug	178	14,031	14.432	0.8785
25-Aug	125	14,156	15.625	0.8934
26-Aug	100	14,256	12.510	0.9053
27-Aug	75	14,331	9.550	0.9144
28-Aug	27	14,358	2.250	0.9165
29-Aug	43	14,401	2.735	0.9191
30-Aug	182	14,583	11.375	0.9299
31-Aug	188	14,771	11.750	0.9411
1-Sep	141	14,912	8.813	0.9495
2-Sep	104	15,016	6.500	0.9557
3-Sep	95	15,111	5.938	0.9613
4-Sep	68	15,179	4.355	0.9655
5-Sep	85	15,264	5.313	0.9705
6-Sep	73	15,337	4.563	0.9749
7-Sep	50	15,387	3.135	0.9779
8-Sep	39	15,426	2.438	0.9802
9-Sep	44	15,470	2.760	0.9828
10-Sep	55	15,525	3.481	0.9861
11-Sep	35	15,560	2.188	0.9882
12-Sep	29	15,589	1.813	0.9899
13-Sep	25	15,614	1.563	0.9914
14-Sep	12	15,626	0.750	0.9921
15-Sep	7	15,633	0.438	0.9925
16-Sep	10	15,643	0.625	0.9931
17-Sep	10	15,653	0.625	0.9937
18-Sep	11	15,664	0.688	0.9944
19-Sep	6	15,670	0.391	0.9948

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Date	Daily Pink Catch	Cumul. Pink Catch	Daily CPUE	Cumul. Proport. CPUE
20-Sep	6	15,676	0.375	0.9951
21-Sep	24	15,700	1.500	0.9965
22-Sep	14	15,714	1.927	0.9984
23-Sep	1	15,715	0.077	0.9984
24-Sep	4	15,719	0.307	0.9987
25-Sep	8	15,727	0.511	0.9992
26-Sep	3	15,730	0.191	0.9994
27-Sep	2	15,732	0.125	0.9995
28-Sep	5	15,737	0.313	0.9998
29-Sep	1	15,738	0.063	0.9999
30-Sep	0	15,738	0.000	0.9999
1-Oct	0	15,738	0.000	0.9999
2-Oct	0	15,738	0.000	0.9999
3-Oct	0	15,738	0.000	0.9999
4-Oct	0	15,738	0.000	0.9999
5-Oct	1	15,739	0.064	0.9999
6-Oct	1	15,740	0.065	1.0000

Appendix C.5. Daily catch and CPUE of chum salmon captured in the Chilkat River fish wheels, 1999.

Date	Daily Chum Catch	Cumul. Chum Catch	Daily CPUE	Cumul. Proport. CPUE
29-Jun	1	1	0.067	0.000
30-Jun	0	1	0.000	0.000
1-Jul	0	1	0.000	0.000
2-Jul	0	1	0.000	0.000
3-Jul	0	1	0.000	0.000
4-Jul	0	1	0.000	0.000
5-Jul	0	1	0.000	0.000
6-Jul	0	1	0.000	0.000
7-Jul	0	1	0.000	0.000
8-Jul	0	1	0.000	0.000
9-Jul	0	1	0.000	0.000
10-Jul	0	1	0.000	0.000
11-Jul	0	1	0.000	0.000
12-Jul	0	1	0.000	0.000
13-Jul	0	1	0.000	0.000
14-Jul	0	1	0.000	0.000
15-Jul	0	1	0.000	0.000
16-Jul	0	1	0.000	0.000
17-Jul	0	1	0.000	0.000
18-Jul	1	2	0.067	0.000
19-Jul	0	2	0.000	0.000
20-Jul	0	2	0.000	0.000
21-Jul	0	2	0.000	0.000
22-Jul	1	3	0.071	0.001
23-Jul	1	4	0.066	0.001
24-Jul	0	4	0.000	0.001
25-Jul	3	7	0.329	0.002
26-Jul	1	8	0.087	0.002
27-Jul	1	9	0.066	0.003
28-Jul	2	11	0.125	0.003
29-Jul	6	17	0.396	0.005
30-Jul	3	20	0.194	0.005
31-Jul	5	25	0.313	0.006
1-Aug	2	27	0.128	0.007
2-Aug	1	28	0.064	0.007
3-Aug	3	31	0.188	0.008
4-Aug	2	33	0.125	0.008
5-Aug	1	34	0.065	0.008
6-Aug	4	38	0.265	0.009
7-Aug	3	41	0.190	0.010
8-Aug	11	52	0.688	0.012

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Date	Daily Chum Catch	Cumul. Chum Catch	Daily CPUE	Cumul. Proport. CPUE
9-Aug	10	62	0.627	0.015
10-Aug	4	66	0.250	0.015
11-Aug	9	75	0.581	0.018
12-Aug	19	94	1.188	0.022
13-Aug	15	109	0.938	0.025
14-Aug	8	117	0.545	0.027
15-Aug	4	121	0.318	0.028
16-Aug	18	139	1.129	0.032
17-Aug	17	156	1.063	0.036
18-Aug	13	169	0.813	0.039
19-Aug	18	187	1.125	0.043
20-Aug	23	210	1.438	0.048
21-Aug	23	233	1.438	0.053
22-Aug	34	267	2.125	0.060
23-Aug	23	290	1.438	0.065
24-Aug	18	308	1.459	0.071
25-Aug	15	323	1.875	0.077
26-Aug	17	340	2.127	0.085
27-Aug	25	365	3.183	0.096
28-Aug	21	386	1.750	0.102
29-Aug	45	431	2.862	0.112
30-Aug	27	458	1.688	0.118
31-Aug	31	489	1.938	0.125
1-Sep	32	521	2.000	0.132
2-Sep	44	565	2.750	0.142
3-Sep	58	623	3.625	0.155
4-Sep	48	671	3.074	0.166
5-Sep	59	730	3.688	0.179
6-Sep	75	805	4.688	0.195
7-Sep	68	873	4.264	0.210
8-Sep	83	956	5.188	0.229
9-Sep	84	1,040	5.269	0.247
10-Sep	65	1,105	4.114	0.262
11-Sep	62	1,167	3.875	0.276
12-Sep	84	1,251	5.250	0.294
13-Sep	71	1,322	4.438	0.310
14-Sep	81	1,403	5.063	0.328
15-Sep	131	1,534	8.188	0.357
16-Sep	102	1,636	6.375	0.379
17-Sep	56	1,692	3.500	0.392
18-Sep	110	1,802	6.875	0.416

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Date	Daily Chum Catch	Cumul. Chum Catch	Daily CPUE	Cumul. Proport. CPUE
19-Sep	100	1,902	6.5217	0.439
20-Sep	20	1,922	1.2500	0.444
21-Sep	81	2,003	5.0625	0.462
22-Sep	123	2,126	16.9266	0.521
23-Sep	20	2,146	1.5345	0.527
24-Sep	55	2,201	4.2199	0.542
25-Sep	206	2,407	13.1489	0.588
26-Sep	192	2,599	12.2553	0.632
27-Sep	148	2,747	9.2500	0.664
28-Sep	186	2,933	11.6250	0.706
29-Sep	114	3,047	7.1250	0.731
30-Sep	82	3,129	5.1336	0.749
1-Oct	122	3,251	7.7872	0.776
2-Oct	137	3,388	8.5625	0.807
3-Oct	150	3,538	9.3750	0.840
4-Oct	102	3,640	6.3750	0.863
5-Oct	119	3,759	7.5957	0.889
6-Oct	193	3,952	12.6309	0.934
7-Oct	175	4,127	10.9375	0.973
8-Oct	123	4,250	7.6875	1.000

Appendix C.6. Daily and cumulative catch of Dolly Varden char in the Chilkat River fish wheels, 1999.

Date	Daily Dolly Varden Catch	Cumul. Dolly Varden Catch
8-Jun	3	3
9-Jun	3	6
10-Jun	0	6
11-Jun	1	7
12-Jun	2	9
13-Jun	2	11
14-Jun	2	13
15-Jun	2	15
16-Jun	3	18
17-Jun	0	18
18-Jun	3	21
19-Jun	1	22
20-Jun	2	24
21-Jun	2	26
22-Jun	4	30
23-Jun	4	34
24-Jun	7	41
25-Jun	1	42
26-Jun	3	45
27-Jun	3	48
28-Jun	6	54
29-Jun	6	60
30-Jun	5	65
1-Jul	9	74
2-Jul	5	79
3-Jul	1	80
4-Jul	3	83
5-Jul	6	89
6-Jul	16	105
7-Jul	18	123
8-Jul	34	157
9-Jul	32	189
10-Jul	37	226
11-Jul	56	282
12-Jul	70	352
13-Jul	59	411
14-Jul	110	521
15-Jul	119	640
16-Jul	102	742
17-Jul	197	939
18-Jul	291	1,230
19-Jul	186	1,416

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Date	Daily Dolly Varden Catch	Cumul. Dolly Varden Catch
20-Jul	81	1,497
21-Jul	182	1,679
22-Jul	122	1,801
23-Jul	62	1,863
24-Jul	133	1,996
25-Jul	53	2,049
26-Jul	117	2,166
27-Jul	99	2,265
28-Jul	149	2,414
29-Jul	92	2,506
30-Jul	197	2,703
31-Jul	75	2,778
1-Aug	139	2,917
2-Aug	90	3,007
3-Aug	127	3,134
4-Aug	67	3,201
5-Aug	58	3,259
6-Aug	88	3,347
7-Aug	45	3,392
8-Aug	25	3,417
9-Aug	60	3,477
10-Aug	30	3,507
11-Aug	67	3,574
12-Aug	104	3,678
13-Aug	51	3,729
14-Aug	30	3,759
15-Aug	11	3,770
16-Aug	38	3,808
17-Aug	44	3,852
18-Aug	30	3,882
19-Aug	81	3,963
20-Aug	42	4,005
21-Aug	54	4,059
22-Aug	91	4,150
23-Aug	43	4,193
24-Aug	26	4,219
25-Aug	19	4,238
26-Aug	25	4,263
27-Aug	11	4,274
28-Aug	6	4,280
29-Aug	1	4,281

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Date	Daily Dolly Varden Catch	Cumul. Dolly Varden Catch
30-Aug	23	4,304
31-Aug	12	4,316
1-Sep	17	4,333
2-Sep	12	4,345
3-Sep	11	4,356
4-Sep	0	4,356
5-Sep	2	4,358
6-Sep	1	4,359
7-Sep	2	4,361
8-Sep	4	4,365
9-Sep	6	4,371
10-Sep	14	4,385
11-Sep	20	4,405
12-Sep	14	4,419
13-Sep	5	4,424
14-Sep	4	4,428
15-Sep	7	4,435
16-Sep	0	4,435
17-Sep	1	4,436
18-Sep	2	4,438
19-Sep	2	4,440
20-Sep	6	4,446
21-Sep	30	4,476
22-Sep	21	4,497
23-Sep	6	4,503
24-Sep	3	4,506
25-Sep	6	4,512
26-Sep	1	4,513
27-Sep	0	4,513
28-Sep	4	4,517
29-Sep	0	4,517
30-Sep	0	4,517
1-Oct	0	4,517
2-Oct	1	4,518
3-Oct	1	4,519
4-Oct	1	4,520
5-Oct	0	4,520
6-Oct	0	4,520
7-Oct	1	4,521
8-Oct	2	4,523

Appendix D. Stratified Population Analysis System (S.P.A.S.) mark-recovery output for the Chilkat River drainage sockeye salmon abundance estimate, 1999 (Arnason et al. 1996).

1999 Chilkat Sockeye ALL M-R data — Chi-square Test Statistics

Complete Mixing : 54.67 (2 df)
 Significance... 0.00
 Equal Proportions: 99.96 (14 df)
 Significance... 0.00
 End of Pooling Tests

>> ML Darroch Estimate

Total Number of iterations is 7 (Max iterations is 25)
 Estimate (std. Err) : 260,728.64 (11,821.37)
 Log likelihood : 122,468.23
 95 % normal C I 237,558.76, 283,898.52)
 G-square : 18.78 (12 df)
 Significance : 0.09
 Chi-square : 18.31 (12 df)
 Significance... 0.11

Table of Stratum Estimates & Predicted counts N(cap), m(cap, rec), u(rec)

	Stratum Si	S.E.(Size)	P(Capture)	W29	W30	W31	W32	W33	W34	W35	W36
LA	95,196.02	1,955.91	0.03	25.25	20.72	40.56	22.75	10.46	7.63	2.33	0.72
DC	38,615.09	5,889.51	0.06	0.00	0.00	0.00	21.72	13.29	28.50	29.11	15.12
LVRV	126,917.53	8,827.63	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80
Unmarked				825.44	669.28	1,310.42	1,080.57	549.25	699.87	538.51	544.40

	Stratum Si	S.E.(Size)	P(Capture)	W37	W38	W39	W40	W41	W42	W4344
LA	95,196.02	1,955.91	0.03	0.00	1.01	1.27	0.00	0.00	0.00	0.00
DC	38,615.09	5,889.51	0.06	4.63	17.06	5.60	4.72	5.10	2.98	3.16
LVRV	126,917.53	8,827.63	0.02	6.99	39.51	14.73	39.48	51.76	31.38	24.34
Unmarked				482.38	2,613.42	991.39	2,382.79	3,106.14	1,881.63	1,472.51

End of Table

Appendix E. Weekly commercial catch contributions of sockeye salmon by stock group and age class in the Lynn Canal (District 115) drift gillnet fishery, 1999.

Week	Stock	Age Class									Total Fish	Prop.
		0.3	1.2	1.3	2.2	2.3	1.4	3.2	3.3	2.4		
26	Chilkoot	0	21	254	21	42	0	0	0	0	338	0.05
	Chilkat	0	698	3,024	106	571	0	0	0	0	4,398	0.67
	Other	317	190	1,226	85	0	0	0	0	0	1,818	0.28
	Total	317	909	4,504	211	613	0	0	0	0	6,555	
27	Chilkoot	0	45	89	0	67	0	0	0	0	201	0.03
	Chilkat	0	22	3,634	981	2,006	0	0	0	0	6,643	0.90
	Other	156	67	290	22	0	0	0	0	0	535	0.07
	Total	156	134	4,013	1,003	2,073	0	0	0	0	7,379	
28	Chilkoot	0	0	276	55	55	0	0	0	0	386	0.02
	Chilkat	0	221	9,923	386	5,127	0	0	0	0	15,656	0.92
	Other	331	0	551	0	0	55	0	0	0	937	0.06
	Total	331	221	10,750	441	5,182	55	0	0	0	16,979	
29	Chilkoot	0	188	423	0	47	0	0	0	0	658	0.03
	Chilkat	0	376	10,479	752	6,015	0	0	0	0	17,622	0.85
	Other	752	235	1,410	0	47	0	0	0	0	2,444	0.12
	Total	752	799	12,312	752	6,109	0	0	0	0	20,724	
30	Chilkoot	0	75	225	0	150	0	0	0	0	450	0.03
	Chilkat	0	0	9,220	600	4,798	0	0	0	0	14,618	0.90
	Other	525	0	525	75	0	0	0	0	0	1,124	0.07
	Total	525	75	9,970	675	4,948	0	0	0	0	16,192	
31	Chilkoot	0	102	136	34	68	0	0	0	0	341	0.03
	Chilkat	0	68	7,054	545	4,192	0	0	34	0	11,894	0.89
	Other	477	34	579	0	0	0	0	0	0	1,091	0.08
	Total	477	204	7,770	579	4,260	0	0	34	0	13,325	
32	Chilkoot	0	136	362	90	181	0	0	0	0	769	0.04
	Chilkat	0	136	6,329	1,402	8,952	0	0	0	0	16,818	0.91
	Other	588	90	226	0	45	0	0	0	0	949	0.05
	Total	588	362	6,917	1,492	9,178	0	0	0	0	18,536	
33	Chilkoot	0	32	128	64	64	0	0	0	0	288	0.02
	Chilkat	0	128	1,795	1,859	7,948	0	0	0	32	11,762	0.94
	Other	160	0	256	0	0	0	0	0	0	417	0.03
	Total	160	160	2,179	1,923	8,012	0	0	0	32	12,467	
34	Chilkoot	0	0	108	54	108	0	0	0	0	270	0.02
	Chilkat	0	162	1,190	2,542	10,761	54	0	0	0	14,708	0.97
	Other	108	0	0	0	0	0	0	0	0	108	0.01
	Total	108	162	1,298	2,596	10,869	54	0	0	0	15,087	

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Week	Stock	Age Class									Total	
		0.3	1.2	1.3	2.2	2.3	1.4	3.2	3.3	2.4	Fish	Prop.
35	Chilkoot	0	0	0	0	0	0	0	0	0	0	0.00
	Chilkat	0	0	820	2,284	12,594	0	0	0	0	15,698	1.00
	Other	59	0	0	0	0	0	0	0	0	59	0.00
	Total	59	0	820	2,284	12,594	0	0	0	0	15,757	
36	Chilkoot	0	42	169	0	42	0	0	0	0	254	0.03
	Chilkat	0	42	635	1,313	7,622	0	0	42	0	9,654	0.97
	Other	42	42	0	0	0	0	0	0	0	85	0.01
	Total	42	127	805	1,313	7,664	0	0	42	0	9,993	
37	Chilkoot	0	0	128	43	64	0	0	0	0	235	0.04
	Chilkat	0	0	384	789	4,754	0	0	21	21	5,969	0.96
	Other	0	0	0	0	0	0	0	0	0	0	0.00
	Total	0	0	512	831	4,818	0	0	21	21	6,204	
38	Chilkoot	0	15	15	0	23	8	0	0	0	61	0.02
	Chilkat	0	23	122	601	2,474	0	0	0	0	3,220	0.98
	Other	0	0	0	0	0	0	0	0	0	0	0.00
	Total	0	38	137	601	2,497	8	0	0	0	3,281	
39	Chilkoot	0	0	3	0	0	0	0	0	0	3	0.01
	Chilkat	0	0	29	61	326	0	0	0	0	416	0.98
	Other	0	0	3	0	0	0	0	0	0	3	0.01
	Total	0	0	35	61	326	0	0	0	0	422	
40	Chilkoot	0	0	0	6	0	6	0	0	0	13	0.03
	Chilkat	0	0	13	169	306	0	0	0	0	488	0.98
	Other	0	0	0	0	0	0	0	0	0	0	0.00
	Total	0	0	13	175	306	6	0	0	0	500	
41	Chilkoot	0	0	0	2	0	2	0	0	0	3	0.03
	Chilkat	0	0	3	42	75	0	0	0	0	120	0.98
	Other	0	0	0	0	0	0	0	0	0	0	0.00
	Total	0	0	3	43	75	2	0	0	0	123	
42	Chilkoot	0	0	0	0	0	0	0	0	0	0	0.03
	Chilkat	0	0	0	2	4	0	0	0	0	6	0.98
	Other	0	0	0	0	0	0	0	0	0	0	0.00
	Total	0	0	0	2	4	0	0	0	0	6	

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<u>Total Sample Size by Stock Group and Age Class</u>										
System	0.3	1.2	1.3	2.2	2.3	1.4	3.2	3.3	2.4	Total
Chilkoot	0	18	64	13	26	4	0	0	0	125
Chilkat	0	62	1,335	518	2,362	1	0	3	2	4,283
Other	87	21	149	6	2	1	0	0	0	266
Total	87	101	1,548	537	2,390	6	0	3	2	4,674

<u>Total Proportion by Stock Group and Age Class</u>										
System	0.3	1.2	1.3	2.2	2.3	1.4	3.2	3.3	2.4	Total
Chilkoot	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.03
Chilkat	0.00	0.01	0.29	0.11	0.51	0.00	0.00	0.00	0.00	0.92
Other	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Total	0.02	0.02	0.33	0.11	0.51	0.00	0.00	0.00	0.00	1.00

<u>Total Commercial Catch by Stock Group and Age Class</u>										
System	0.3	1.2	1.3	2.2	2.3	1.4	3.2	3.3	2.4	Total
Chilkoot	0	656	2,316	369	912	15	0	0	0	4,269
Chilkat	0	1,876	54,654	14,432	78,525	54	0	98	53	149,691
Other	3,515	659	5,067	182	92	55	0	0	0	9,570
Total	3,515	3,191	62,037	14,983	79,528	125	0	98	53	163,530

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