TAKOTNA RIVER SALMON STUDIES AND UPPER KUSKOKWIM RIVER AERIAL SURVEYS, 2001

By

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and

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REGIONAL INFORMATION REPORT[1] NO. 3A02-09

Alaska Department of Fish and Game
Division of Commercial Fisheries
Arctic-Yukon-Kuskokwim Region
333 Raspberry Road
Anchorage, Alaska 99518-1599

February 2002

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ACKNOWLEDGMENTS

Many individuals have contributed to the development and operation of the Takotna River weir. Nell Huffman, Helen Mwarey, Bart Mwarey, Jan Newton, Dick Newton and Lynn Goods assisted with administrative needs, staging, counts and a myriad of other tasks, and we thank them for their support and participation. We would also like to thank McGrath Native Village Council for providing assistance during the dismantling of the weir and for participating in the orientation with selected McGrath leaders to help promote a better understanding of the project. Our greatest appreciation goes to the following crewmembers that did the bulk of the inseason work: Clinton Goods (crew leader), Allen Mwarey (assistant crew leader), Tabatha Huffman, Misty Wachter and Jeremy Wilson.

Funding for this project was made possible by a grant from the U.S. Bureau of Indian Affairs, which was administered by the Bering Sea Fishermen's Association (grant # E004401023). Additional funding and support was provided by the National Oceanic and Atmospheric Administration through a grant to the Alaska Department of Fish and Game, Commercial Fisheries Division (grant # NA96FM0196). The continued support of these groups is greatly appreciated.

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ABSTRACT

For the second consecutive year, a resistance board weir was installed on the Takotna River to enumerate adult salmon escapement. The weir replaced a counting tower project that operated with limited success from 1995-1999. Fish enumeration through the weir began 23 June and ended 20 September 2001. The total annual escapement included 721 (0.42% estimated) chinook salmon *Oncorhynchus tshawytscha,* 5,420 (0.16% estimated) chum salmon *O. keta,* 2,606 (9.80% estimated) coho salmon *O. kisutch* and 1 sockeye salmon *O. nerka*. Scale samples, sex and length information were taken from a portion of the chinook, chum and coho salmon passage to characterize the total annual passage. Chinook salmon sample numbers were not adequate to characterize the total passage, but chum and coho samples were adequate. Females comprised 43.7% of the chinook samples, and age-1.4 was the most abundant age class (61.6%). Females were estimated to comprise 50.1% of the total chum salmon passage, and age-0.3 was the most abundant age class (75.1%). For coho salmon, females were estimated to comprise 42.4% of the total passage, and age-2.1 was the most abundant age class (87.9%).

Kuskokwim River chinook and chum salmon were classified as "stocks of concern" by the Alaska Board of Fisheries in early 2001. The consequent closure of the Kuskokwim River commercial fishery in June and July, and the institution of a weekly subsistence fishing schedule throughout the Kuskokwim River drainage, may have been beneficial to the escapement of chinook and chum salmon to the Takotna River. The total annual escapement of chinook and chum salmon were 200% and 400% (respectively) above the 2000 escapement levels in the Takotna River. In addition, the chinook salmon run experienced an increase in the proportion of females, older aged fish, and an increase in average length of most age-sex categories. This increase was possibly influenced by the fishing schedule imposed on subsistence fishers. Coho escapement decreased by 33% in 2001.

Efforts were made to determine the distribution of juvenile salmon in the Takotna River drainage. Fish were caught with minnow traps and seines deployed in the mainstem and tributary streams at various times throughout the summer. Captures included 185 chinook and 350 juvenile coho salmon. Most of the fish were found in Fourth-of-July Creek and Big Creek (lower), but juvenile coho salmon were also found at one location in Moore Creek. No juvenile salmon were found in Little Waldren Fork, Big Waldren Fork, Big Creek (upper), Minnie Creek, Bonnie Creek or Tatalina River.

The weir project served as a platform for conducting two sets of aerial stream surveys to document the distribution and relative abundance of spawning salmon in the Takotna River drainage and selected upper Kuskokwim River tributaries. The first set of surveys were conducted in late June and focused on chinook and chum salmon. The second set of surveys were done in late September and focused on coho and late spawning chum salmon. Within the Takotna River drainage, Fourth-of-July Creek continued to be the primary spawning location for chinook, chum and coho salmon. Elsewhere in the upper Kuskokwim drainages, chinook and chum salmon appeared more abundant in 2001 than in 2000, while coho salmon seemed less abundant. Spawning salmon were distributed throughout the upper Kuskokwim River drainages, but in relatively low densities, except in the Salmon River, where 1,033 chinook salmon were observed.

INTRODUCTION

The Kuskokwim River drains an area of approximately 50,000 square miles, which comprises 11% of the total area of Alaska (Brown 1983). Each year mature Pacific salmon *Oncorhynchus* return to the river and support intensive subsistence and commercial fisheries that produce an average annual harvest of over one million salmon (Burkey et al. 2001). The subsistence fishery is a vital cultural component for most Kuskokwim area residents, and the subsistence harvest of salmon contributes substantially to the regional food base (Coffing 1991, 1997a, 1997b; Coffing et al. 2000). The commercial salmon fishery, though modest in value compared to other areas of Alaska, has been an important component of the market economy of lower Kuskokwim River communities (Buklis 1999; Burkey et al. 2001). The salmon that contribute to these fisheries spawn and rear in nearly every corner of the Kuskokwim River basin; however, few spawning streams receive any rigorous salmon escapement monitoring. The scant escapement data limits the ability of management authorities to assess the adequacy of escapements and the effects of management decisions. The need to address this escapement data gap became even more critical in September 2000, when the Alaska Board of Fisheries (BOF) classified both Kuskokwim River chinook and chum salmon as "stocks of concern" because of the chronic inability of managers to maintain expected harvest levels (5 AAC 39.222; Burkey et al. 2000a, 2000b, 2001). The Takotna River weir is one of several initiatives started in the late 1990s to help address this data gap in the Kuskokwim River salmon management program.

The Commercial Fisheries Division of the Alaska Department of Fish and Game (ADF&G) is responsible for managing the subsistence and commercial salmon fisheries of the Kuskokwim River. In addition, Tribal groups such as Takotna Tribal Council (TTC) have begun to assume a more proactive role in the management of salmon fisheries. These two groups combined their resources to develop the Takotna River weir as one of several recent initiatives aimed at improving management capacity in the Kuskokwim Salmon Management Area. The common goal of both organizations is the maintenance of sustainable salmon fisheries.

The approach used to achieve this goal of a sustainable harvest is to ensure that adequate numbers of salmon escape the fisheries to spawn each year (Burkey et al. 2001). The ADF&G has lacked the tools necessary to adequately assess the abundance and distribution of salmon escapement in the Kuskokwim River basin. Also lacking is the data necessary for the development of escapement goals. Most limiting was information in the upper Kuskokwim River basin. Before 1995, the only thorough escapement-monitoring project in the upper basin was a weir on the South Fork Salmon River that operated in 1981 and 1982, which focused on chinook salmon (Schniederhan 1982a, 1982b). From 1983 to 1994, escapement monitoring in the upper Kuskokwim River basin was limited to, at most, one annual aerial survey flown over a portion of the Salmon River during the estimated peak of chinook spawning (Burkey and Salomone 1999). One objective of the escapement-monitoring project on the Takotna River was to help fill the information void in the upper Kuskokwim River basin by providing managers with a reliable monitoring project that may serve as an index for the upper basin, and promote better assessment of management decisions.

To meet this objective, the Takotna River salmon escapement-monitoring program was established in 1995 to monitor adult salmon returns on the Takotna River. A counting tower was used to enumerate fish from 1995 to 1999, but success was limited because of poor water clarity, periodic high water levels and organizational difficulties (Molyneaux et al. 2000). The escapement-monitoring program transitioned from a counting tower to a resistance board weir in 2000. The resistance board weir design performs better during high water events than tower or fixed-panel weir designs, as demonstrated at the following sites: Middle Fork Goodnews (Menard 1999), Tuluksak (Harper 1997), Kwethluk (Harper 1998; Chris and Cappiello 1999), Andreafsky (Tobin and Harper 1998), Gisasa Rivers (Wiswar 1998) and Beaver Creek (Collin and Kostohrys 1998). The resistance board weir performed well on the Takotna River in 2000; therefore, the same methodology was employed in 2001 (Schwanke et al. 2001).

Monitoring salmon escapement is vital to sustainable salmon management. In addition, knowledge of the age, sex and length (ASL) compositions of spawning populations can provide insights into understanding fluctuations in salmon abundance, and can be applied to the development of escapement goals (DuBois and Molyneaux 2000). Consequently, salmon escapement projects typically include the collection of ASL data.

Escapement projects also commonly serve as platforms for some level of habitat monitoring. Water temperature, water chemistry and stream discharge rate are all fundamental variables of the stream environment that directly and indirectly influence salmon productivity (Hauer and Lambert 1996). These variables can change because of anthropogenic activities (mining, timber harvesting, man-made impoundments, etc.) or climatic changes (e.g., El Nino and La Nina events). Changes in these variables can affect stream productivity and the timing of events such as salmon migration and spawning.

Preliminary investigations suggest that juvenile and adult salmon only use a small fraction of the available habitat in the Takotna River drainage (Schwanke et al. 2001). In addition, the relatively small salmon runs to the Takotna River contrast the levels that must have been required to support early indigenous settlements in the area (Molyneaux et al. 2000). Present and future investigations may provide some insight as to whether the available habitat is underutilized and why the salmon runs remain low. Multi-year investigations are required to more definitively assess whether the distribution and habitat utilization of juvenile salmon and spawning adults is a limiting factor to salmon abundance in the Takotna River drainage.

More broadly, investigations of the occurrence, distribution and abundance of salmon in the upper Kuskokwim River tributaries have been limited (Burkey and Salomone 1999; Schwanke et al. 2001), due in part to the logistical constraints of ADF&G fishery biologists being based in Bethel. The Takotna River weir project is intended to partially serve as a platform for extending aerial survey investigations in the upper Kuskokwim River basin.

Objectives

1. Determine the daily and total annual chinook, chum and coho salmon escapements to the Takotna River, upstream of the community of Takotna, from 24 June to 20 September.
2. Estimate the ASL composition of the total chinook, chum and coho salmon escapements to the Takotna River, upstream of the community of Takotna, from a minimum of three pulse samples, one collected from each third of the run, such that 95 percent simultaneous confidence intervals for the age composition in each pulse are no wider than 0.20 ($\alpha = 0.05$ and $d = 0.10$).
3. Monitor habitat variables including daily water temperature and daily water level.
4. Determine the distribution and habitat utilization of juvenile salmon upstream of the Takotna River weir.
5. Determine the distribution of spawning salmon upstream of the Takotna River weir.
6. Identify locations of spawning salmon aggregates in upper Kuskokwim River drainage tributaries.

Background

Takotna River salmon populations appear to be in a state of recovery, or restoration, following near extirpation earlier in the century (Stokes 1985; Molyneaux et al. 2000). Native Athabaskans, who lived in the upper Kuskokwim River basin before the early twentieth century, harvested salmon from the Takotna River, including residents of *Tagholjitdochak'* which was located near the mouth of Fourth-of-July Creek (Hosley 1966; Stokes 1985; Anderson 1977; BLM 1984). Hosley (1966) and Stokes (1983) reported that people from the Vinasale and Tatlawiksuk Athabaskan bands also fished in the Takotna River. The numbers of salmon that were harvested by these people is unknown, but interviews with Nikolai elders recall the existence of fairly strong chinook and chum runs in the Takotna River until the early 1900's (Stokes 1985).

Historically, these people commonly harvested salmon using weirs fitted with fish traps. At least four historical weir sites have been documented on the Takotna River (Stokes 1983). The last of these was abandoned no later than the mid-1920s according to oral history and first hand knowledge of Nikolai elders. One of these sites was located on the Nixon Fork of the Takotna River, near the confluence of the West Fork River. The other locations included a site on the main river a short distance above the community of Takotna, one near Big Creek (lower), and another near, or within, Fourth-of-July Creek. According to an elder who fished the Nixon Fork weir, these sights were abandoned because the areas' Athabaskan population coalesced around major village sites, and because of the effects of the booming mining industry. Several epidemics also ravaged the area's Native populations in the late nineteenth and early twentieth centuries. Between 1908 and 1910, a wave of epidemics, primarily diphtheria, forced the remnant population at *Tagholjitdochak*' to abandon the site (BLM 1984).

Gold was discovered in the Innoko mining district in 1906 and the Takotna River was transformed into a major access route to the gold fields (Brown 1983). The community of Takotna developed as a supply point and staging area for the miners. Dog teams were the primary means of winter transportation. The dried salmon they were fed were likely harvested from the Takotna River and other local streams. Steamboats loaded with tons of mining supplies navigated the Takotna River as far upstream as the current town of Takotna. In the early 1920s small temporary dams were built on the river to facilitate steamboat passage (Kusko Times 1921). At some point, salmon populations became depleted. The timing and cause of the decline are unclear (Stokes 1985), but was likely caused by a combination of over fishing and habitat alteration associated with mining development.

Area residents and local biologists described the Takotna River as being almost void of salmon during the 1960s and 70s (Molyneaux et al. 2000). However, by the 1980s, Takotna residents began to notice adult salmon in the river again. During an aerial survey in 1994 an experienced ADF&G fishery biologist observed several thousand chum and some chinook salmon in Fourth-of-July Creek, a clear water tributary of the Takotna River, but few salmon were observed elsewhere in the Takotna drainage (Burkey and Salomone 1999). In recent years, sport fishers have also begun to catch coho salmon while pike fishing (D. Newton, local resident, Takotna, personal communication). The perceived increase in salmon abundance is what prompted the establishment of the escapement-monitoring program on the Takotna River.

METHODS

Study Area

The Takotna River originates in the northern half of the mineral rich Kuskokwim Mountains. Formed by the confluence of Moore Creek and Little Waldren Fork, the river flows in a northeasterly direction passing the community of Takotna at river mile (rm) 50, before swinging southeasterly near the confluence of the Nixon Fork River at rm 15 (Brown 1983; Figure 1). The Tatalina River joins at rm 3, and then the Takotna River empties into the Kuskokwim River across from McGrath at rm 507.

The Takotna River is about 100 miles in length and drains an area of 2,180 square miles (Brown 1983). The river is shallow and winding from its head to the town of Takotna, but gradually becomes deeper downstream of that point, especially after the Nixon Fork confluence. The current is sluggish and the channel width in the lower reaches averages 400 to 500 ft. The river slope is about 4.7 feet per mile (Brown 1983).

At normal flow, the river has a nominal load of suspended matter, but the water has a high level of color because of organic leaching. The Nixon Fork and Tatalina Rivers drain extensive bog flats and swampy lowlands, but the remainder of the basin is mostly upland spruce-hardwood forest (Brown 1983, Selkregg *undated*). White spruce with scattered birch and aspen is common on moderate south-facing slopes, while black spruce is more characteristic on northern exposures and poorly drained flat areas. The understory consists of spongy moss and low brush on the cool moist slopes, grasses on dry slopes, and willow and alder in the higher open forest near timberline.

Weir Design and Operation

Site Selection

A weir site reconnaissance trip was conducted upstream of Takotna in 1999 (Molyneaux et al. 2000). A site was chosen directly upstream of a bridge located 2 rm upriver from the town of Takotna and 53 rm from the confluence with the Kuskokwim River. During the site survey on 7 July 1999, the discharge was estimated as 1,232 ft^3/s (Molyneaux at al. 2000). The weir was placed a hundred feet above this point in 2000, and it was moved upstream an additional 20 feet in 2001.

Weir Design

The basic design and materials used in the Takotna River weir in 2001 were the same as those used in 2000 (Schwanke et al. 2001), although some of the fixed-weir sections used in 2000 were replaced with additional floating weir panels in 2001. The weir spanned a 280-foot channel and consisted of 89 resistance board panels that covered the central 270 ft of the channel. Five-foot sections of fixed weir panels were placed along the weir margins to accommodate the slope of the bank.

Weir Maintenance

Cleaning debris from the weir was a daily task and consisted of walking across the weir to partially submerge each panel, thereby allowing the current to wash debris downstream. The carcasses of spent salmon (hereafter referred to as carcasses) that washed up on the weir were counted by species and sex, and then passed downstream.

Maintenance also included periodic inspections of the weir and substrate rail using snorkel gear. Snorkel gear inspections were done every few days depending on water conditions. Any holes or scoured areas were repaired immediately.

Fish Passage

All fish passing upstream through the passage gates were enumerated by species, with the exception of fish that were obviously small enough to pass freely through the panels. The counting schedule was variable, with adjustments being made depending on the migratory behavior of the fish. There were two or more counting episodes each day, each lasting from 20 minutes to a few hours depending upon fish passage.

When high water rendered the weir inoperable, daily fish passage was estimated as an average of the daily passage from two days before and two days after the washout period. To estimate missed passage when a day had a partial count, the same technique was used, but the observed number for that day was subtracted from the daily estimate. When weir operations ended before the desired ending date, passage was estimated using year 2000 percent passage data.

Salmon Age-Sex-Length Composition

The ASL composition of the chinook, chum and coho escapements were estimated by sampling a portion of the total salmon passage for scales, sex and length information using standard sampling procedures (DuBois and Molyneaux 2000). The samples for each species were collected in pulses whereby intensive sampling was done for a few days, followed by a few days with no sampling. The goal of each pulse was to collect samples from 210 chinook, 200 chum and 170 coho salmon from at least each third of the respective runs. These sample sizes were selected so that the simultaneous 95% confidence interval for the estimated age composition would be no wider than 0.20 (Bromaghin 1993). Sex composition was estimated based on all samples collected, whereas only fish that were successfully aged were used to estimate age and length composition of the escapement.

Scales used in age determination were removed from the preferred area of the fish (INPFC 1963). Three scales were taken from each fish and mounted on gum cards. Sex was determined by visually examining external morphology, keying on the development of the kype, roundness of the belly and the presence, or absence, of an ovipositor. Length was measured to the nearest millimeter from mid-eye to the fork-of-the-tail. Sex and length data were recorded with other pertinent information on computer mark-sense forms. After sampling, each fish was released upstream of the weir. The gum cards and data forms were sent to the Bethel ADF&G office for processing and analysis following procedures described by DuBois and Molyneaux (2000).

Climatological and Hydrological Monitoring

Water temperature, air temperature and water depth were monitored on a daily basis. Stream temperature is not uniform among all habitat types within a stream reach (Hauer and Hill 1996); therefore, temperature measurements were collected from a consistent, yet convenient, location each day. Measurements for the Takotna River were collected from a station on the north shore approximately five feet downstream from the weir. The temperature was taken once in the morning and once in the evening. A calibrated thermometer was submerged a few centimeters below the surface and allowed to stand undisturbed for a couple of minutes before being read. It was placed back into the water for an additional 30 seconds to check if the reading was stable. If the reading was stable, the water temperature was recorded. If it changed, the process was repeated until the temperature reading stabilized. Air temperature was measured at a shaded area near the weir site and recorded in the logbook. Precipitation was measured twice daily to the nearest millimeter using a standard rain gauge. The wind speed, wind direction, and amount of cloud cover was estimated and recorded by the observer.

Daily operations included monitoring river depth with a standardized staff gauge. The staff gauge consisted of a metal rod driven into the stream channel with a meter stick attached to it. The height of the water surface, as measured from the staff gauge, represented the "stage" of the river above an established datum plane. Three semi-permanent benchmarks were installed in 2000 to provide for consistency of stage measurements between years. Each benchmark consisted of a steel rod that was driven several feet into the ground near the shoreline, such that only a few inches showed above the surface. The tip of the rods corresponded to stage measurements of 58, 144 and 179.5 cm. These benchmarks were used to calibrate the meter stick at the start of the 2001 field season and to reset the meter stick whenever it was dislodged. The river stage was measured once in the morning and once in the evening.

Juvenile Salmon Investigations

Juvenile salmon were captured with beach seines and minnow traps to determine their distribution in the middle and upper reaches of the Takotna River basin. Effort focused on 13 geographic zones, or index areas, that included the mainstem of the Takotna River and major tributaries (Figure 2). Periodic seining and trapping took place throughout the field season on an opportunistic basis.

The beach seines measured 30 ft in length by 4 ft in depth, with a 3/16 inch mesh size. A typical sampling event included several seine hauls from a given segment of stream with each haul moving progressively downstream. Any juvenile salmon caught were identified and measured to the nearest millimeter (fork length). All other species were identified and their abundances were estimated. Records were kept of the number of fish by species, global positioning system (GPS) coordinates, bank designation and a brief habitat description.

The minnow traps had ¼ inch mesh and were baited with salmon roe placed in small-perforated plastic containers. Traps were fished overnight and information such as soak time, the number of fish caught by species, the fork length of juvenile salmon, GPS coordinates and a brief habitat description were recorded.

Spawning Salmon Distribution

The distribution and relative abundance of spawning adult salmon in the Takotna River and other upper Kuskokwim River tributaries was determined through aerial surveys conducted from a fixed-winged aircraft. Two sets of aerial surveys were flown: one in late July to target chinook and chum salmon, and a second set in late September to target coho and late spawning chum salmon. All surveys were done with a contracted pilot flying a Piper PA-12 Cub.

Each day the coordinates for the mouth of each river to be surveyed that day were entered into the pilot's GPS. The pilot would follow each river to the best of his ability as the observer looked for fish. The observer used a tally counter to keep track of the number of salmon observed by species in each stream or stream segment. Immediately after each survey, the observer would record information such as the survey time, wind, weather, water visibility, river substrate type, distance surveyed and an overall rating of the survey conditions based on all of these factors. The notes were later transferred to an *Escapement Observations-Kuskokwim Area* form, which were submitted for entry into the *Kuskokwim Area Salmon Escapement Observation Catalog* database (e.g., Burkey and Salomone 1999).

RESULTS

Weir Operations

The weir was assembled from 23 June through 14 September 2001. No holes were detected that adult salmon could pass through, but a few small holes were discovered early in the season as the substrate adjusted to the weir, and were immediately repaired. High water rendered the weir inoperable for a half-day on 20 August and two full days on 21 and 22 August. The weir was also disassembled six days before the objective ending date because of time constraints. Passage was estimated during these inoperable periods.

Fish Passage

Chinook Salmon

The total chinook salmon escapement in 2001 was 721 fish (Table 1), which includes 3 fish (0.42% of the total passage) that were estimated to have passed when the weir was inoperable. The first chinook salmon was observed on 24 June, the second day of operation. Peak daily passage of 110 fish occurred on 8 July. The median passage date was 13 July, and the central fifty-percent of the run occurred between 8 and 20 July. The last chinook salmon was observed on 4 September.

Chum Salmon

The total chum salmon escapement in 2001 was 5,420 fish (Table 1), which includes 9 fish (0.16% of the total passage) that were estimated to have passed the site when the weir was inoperable. Six fish passed the weir the first full day of operation. Peak daily passage of 372 fish occurred on 12 July and the median passage date was 17 July. The central fifty-percent of the passage occurred between 12 and 22 July. The last chum salmon was observed on 28 August. The daily passage pattern was bimodal with peaks occurring on 12 and 19 July.

Coho Salmon

The total coho salmon escapement in 2001 was 2,606 fish (Table 1), which includes 255 coho salmon (9.78% of the total passage) that were estimated to have passed the site when the weir was inoperable. The estimated passage includes 217 fish for the period 20 to 22 August and 38 fish from 16 to 20 September. The first coho salmon was observed on 30 July, the median passage date was 27 August, and the central fifty-percent of the passage occurred between 23 and 31 August. Passage was unimodal with the peak daily count of 275 fish occurring on 26 August.

Other Species

Of the other species of fish observed passing the weir in 2001, the most abundant was the longnose sucker *Catostomus catostomus* with a total passage of 13,458 fish (Table 1). Ninety percent of the total longnose sucker passage occurred by 3 July, the 11th day of operation. Other species passing the weir included 141 Arctic grayling *Thymallus arcticus*, 41 northern pike *Esox lucius*, 8 whitefish (broad whitefish *Coregonus nasus*, humpback whitefish *Coregonus pidschian* and round whitefish *Prosopium cylindraceum*), and a sockeye salmon.

Age-Sex-Length Data

Chinook Salmon

Scales, sex and length information were collected from 96 chinook salmon (13.3% of the total escapement). An insufficient number of samples were collected from the first third of the chinook run, so the samples were not used to estimate the ASL composition of the total escapement. Age was determined for 86 of the 96 chinook salmon sampled (89.6% of the sample). Age-1.4 was the most abundant age class (61.6%), followed by age-1.3 (25.6%), age-1.2 (10.5%) and age-1.5 (2.3%) (Table 2). Based on all fish sampled, females comprised 39.2% of the sample (Table 3). The average length of the fish sampled showed distinct partitioning by age class (Table 4). For males ages-1.2, -1.3, -1.4 and -1.5, the respective average lengths were 516, 671, 816 and 855 mm. Females only occurred as age-1.3 and -1.4 fish, with respective average lengths of 776 and 864 mm. Overall, male chinook salmon lengths ranged from 400 to 895 mm, while female lengths ranged from 705 to 860 mm.

Chum Salmon

Scales, sex and length information were collected from 621 chum salmon (11.5% of the total escapement). The samples were collected from six pulses, and sample sizes ranged from 54 to 153 fish per pulse. The chum passage was partitioned into six temporal strata based on the pulse sample dates.

Age was determined from 573 of the 621 chum salmon sampled (92.3% of the sample). As applied to total chum escapement, age-0.3 fish were the most abundant age class (75.1%), followed by age-0.4 (24.7%), age-0.5 (0.2%) and age-0.2 (0.1%) fish (Table 5). Older aged chum salmon tended to be more prominent early in the run, and their proportion diminished as the season advanced.

Based on all fish sampled, sex composition of the total chum salmon escapement was estimated to include 2,715 females (50.1% of the total escapement) (Table 3). The proportion of females generally increased as the run progressed (Figure 3).

The average lengths of the Takotna River chum salmon were partitioned well by age class. For males age-0.3 and -0.4, the respective average lengths were 581 and 590 mm, and females of the same age classes had respective average lengths of 548 and 566 mm (Table 6). Length composition changed little over time (Figure 4). Overall, males ranged from 490 to 665 mm, while females ranged from 465 to 615 mm.

Coho Salmon

Scales, sex and length information were collected from 399 coho salmon (15.3% of the total escapement). The samples were collected from three pulses and sample sizes ranged from 54 to 175 fish per pulse. The coho passage was partitioned into three temporal strata based on the dates when pulse samples were collected.

Age was determined for 303 of the 399 fish sampled (75.9%). As applied to the total coho escapement, age-2.1 fish comprised the majority of the run (87.9%), followed by age-3.1 (11.8%) and age-1.1 (0.3%) fish (Table 7).

Based on all fish sampled, sex composition of the total coho escapement was estimated to include 1,105 females (42.4% of the total escapement) (Table 3). The proportion of females generally increased as the run progressed.

The average length by age class for male coho salmon ages-1.1, -2.1 and -3.1 were 550 mm, 563 mm and 573 mm. For female's ages-2.1 and –3.1, the average lengths were 572 mm and 578 mm (Table 8). Overall, males ranged between 395 to 640 mm in length, while females ranged from 500 to 635 mm.

Climatological and Hydrological Conditions

Water level and water temperature were measured twice daily from 23 June to 14 September (Appendix A). Daily water levels ranged from 49 cm to 136 cm and included two high water events. The first high water event peaked on 21 July at 91 cm, and the second event peaked on 21 August at 136 cm. Daily water temperatures ranged from 6°C to 18°C.

Juvenile Investigations

During the course of the summer, 185 chinook salmon and 350 coho salmon were captured with seines and minnow traps (Appendix B). Sampling occurred in every juvenile sampling index area as illustrated in Figure 2. Catch data for each index area are listed in Table 9.

A total of 209 beach seine hauls were performed in eight of the index areas capturing 70 chinook salmon and 105 coho salmon (Table 9). All but one of the seine caught juvenile chinook salmon were from lower Big Creek (index area 3) and the mainstem of the Takotna River between the weir and Fourth-of-July Creek (index area 2). Over half the seine caught juvenile coho salmon were from Moore Creek (index area 11), all of which were sampled from one stream segment in lower Moore Creek. Seine catches also included approximately 900 juvenile Arctic grayling, 320 slimy sculpin *Cottus cagnatus,* 300 whitefish and 60 longnose suckers (Appendix B).

A total of 184 baited minnow traps were set overnight in 10 of the index areas capturing 115 chinook and 245 coho salmon (Table 9; Appendix B). Juvenile chinook and coho salmon were trapped in only two of the index areas: lower Big Creek (index area 3) and Fourth-of-July Creek (index area 4). In addition to salmon, approximately 230 slimy sculpin, 17 burbot *Lota lota*, one lamprey *Lamptera sp*. and one Dolly Varden *Salvelinus malma* were captured with minnow traps (Appendix B).

The lengths of juvenile chinook salmon ranged from 34 to 127 mm, and lengths of juvenile coho salmon ranged from 25 to 117 mm (Appendix B). No fish were aged, but length frequencies from specific capture sites suggest that two age classes (age-1 and age-0) of both species were captured.

Aerial Surveys

Aerial surveys were conducted during two time periods: 26 to 29 July and 22 to 23 September. A detailed summary of the surveys describing survey conditions such as wind, weather, cloud cover, watercolor, water depth, substrate color, time of day, spawn stage and overall fish visibility, can be seen in Appendix C. A reference map for aerial survey coverage can be sees as Figure 5.

Chinook and Chum Salmon

During the 26 July aerial survey of the Takotna River, all chinook salmon observed upstream of the weir were in Fourth-of-July Creek (106 live fish and 17 carcasses), and all but one chum salmon were observed in Fourth-of–July Creek (474 live fish and 23 carcasses) (Figure 6). The other chum salmon was observed in the mainstem Takotna River, approximately one mile upstream of the confluence of Big Waldren Fork (Figure 6). No salmon were observed in Big Waldren, Little Waldren, Moore, Bonnie or Big Creek (lower). In the Nixon Fork drainage, which was surveyed on 29 July (Figures 7 and 8), a total of 11 live chinook salmon and two chinook salmon carcasses were observed, all of which were in the upper mainstem. No salmon were observed in John Reek Creek, Ivy Creek or the West Fork River (Figure 7).

Only chinook salmon were observed during the 27 July survey of the Pitka Fork drainage (Figures 8 and 9). A total of 1,029 live chinook salmon and 4 chinook salmon carcasses were observed in the Salmon River (Figures 8 and 9). Observations in Bear, Sullivan and Sheep Creeks included 175, 22 and 4 live chinook salmon, respectively. No salmon were observed in the Pitka Fork mainstem upstream of the Sheep Creek confluence (Figure 9).

On 28 July three chinook salmon were observed during two East Fork Kuskokwim River tributary surveys. All three were observed in Jones Creek (Figure 8) and none were observed in Highpower Creek (Figures 10 and 11).

No salmon were observed in the middle and lower portions of the Selatna River on 28 July (Figure 12).

Waters of the Windy Fork, Middle Fork, South Fork and Big Rivers were generally occluded due to suspended glacier flour; however, aerial surveys were conducted in various unnamed clear water tributaries to these rivers on 27 and 28 July. One tributary of the Windy Fork River was surveyed and 25 live chinook salmon were observed (Figure 9). One tributary of the Middle Fork Kuskokwim River was surveyed and 55 live chinook salmon were observed (Figure 9). Two tributaries of the South Fork Kuskokwim River were surveyed and a combined total of 46 chinook salmon were observed. Of these, 35 were in one tributary flowing directly into the South Fork near Farewell Lake, and 11 were in an unnamed tributary of Jones River (Figure 13). Three tributaries of the Big River were surveyed and 3, 16 and 21 chinook salmon were observed (Figures 9 and 14).

A total of 38 chinook salmon were observed during 28 July survey of an unnamed tributary of the Little Tonzona River (Figure 8).

Coho Salmon and Late Spawning Chum

Only coho salmon were observed during the 22 September survey of the Takotna River drainage. Most coho salmon were in Fourth-of-July Creek (107 live fish and 30 carcasses), and a few were observed in the mainstem below Moore Creek (7 fish), in Moore Creek (4 fish) and in lower Big Creek (3 fish) (Figure 6). No fish were seen in Big Waldren Fork or Little Waldren Fork. Within the Nixon Fork River drainage, no salmon were observed in John Reek Creek, Ivy Creek or the West Fork (Figure 7), but six live coho salmon and one coho salmon carcass were observed in the upper Nixon Fork mainstem (Figure 8).

Only coho salmon were observed during the 23 September survey of the Pitka Fork River drainage. Nine coho salmon were observed in Bear Creek, two in Sullivan Creek, and 28 in Sheep Creek (Figure 9). No salmon were observed during a partial survey of the Salmon River (Figures 8 and 9).

Coho and late spawning chum salmon were observed during surveys of various unnamed clear water tributaries in the Windy Fork, Middle Fork, South Fork and Big River drainages. One tributary of the Middle Fork River and one tributary of the Big River were flown, but no salmon were observed (Figure 9). A portion of the mainstem Windy Fork was surveyed and no salmon were observed, but one tributary of the Windy Fork River was surveyed and 114 coho salmon were observed (Figure 9). Two tributaries of the South Fork Kuskokwim River were flown and a combined total of 510 late spawning chum salmon and 180 coho salmon were observed (Figures 8 and 9). Jones River, an upper South Fork Kuskokwim River tributary, was partially surveyed and 165 coho salmon were observed (Figure 13).

A total of 208 coho salmon were observed in an unnamed tributary on the lower Little Tonzona River on 23 September (Figure 8).

DISCUSSION

Fish Passage

Chinook Salmon

The escapement of 721 chinook salmon for the period 23 June through 20 September 2001 is believed to accurately represent the annual chinook escapement upstream of the weir site. This conclusion is supported by the facts that no chinook salmon were observed on the first day of operation, and only 1.0% of the total passage occurred during the first five days of operation (Table 1). The influence of the two and a half days when the weir was inoperable in August was negligible because the chinook migration was nearly complete by that date. Furthermore, the inoperable period in September was well beyond the last date any chinook salmon were observed passing upstream of the weir.

The chinook salmon escapement of 721 in 2001 was more than most other years in which escapement data exists for the Takotna River (Schwanke et al. 2001; Figure 15; Appendix D). The 2001 escapement was more than twice the 345 fish observed in 2000, and almost twice the 1996 counting tower estimation of 401 fish; however, the 2001 passage was less than the 1,176 chinook salmon estimated to have passed the counting tower in 1997. It should be noted that in 1996 and 1997, counting tower operations ended before the chinook passage was complete. Based on the run timing in 2000 and 2001, the counting tower operations missed approximately 20% of the chinook run in 1996, and 10% of the run in 1997 (Appendix D).

The run timing for Takotna River chinook salmon in 2001 was earlier and more compact than in 2000 (Figure 16). The 2001 median passage date was five days earlier than in 2000, and the central fifty percent of the 2001 run occurred in 12 days, while it spanned 20 days in 2000 (Appendix D).

In addition to the upstream passage, records were kept regarding the chinook salmon carcasses that washed downstream onto the weir (Figure 17). A total of 24 chinook salmon carcasses were found on the weir, seven were female. All of the carcasses appeared to be in post-spawning condition. The first carcass was observed on 25 July, and the last carcass was seen on 26 August. Fifty-percent of the carcasses washed up on the weir by 1 August, while fifty-percent of the upstream passage occurred on 13 July. Based on this measure of central tendency, from the time these fish passed the weir, it took approximately 18 days for them to complete their life cycle and drift back downstream to the weir. In 2000 it took 22 days (Schwanke et al. 2001). In the future, this information should be insightful when determining optimal aerial survey timing.

The 2001 chinook salmon escapement to the Takotna River probably benefited from two conservation measures taken in response to the BOF designating Kuskokwim River chinook salmon as a stock of concern (Burkey et al. 2000a). One of these measures was the closure of the Kuskokwim River commercial salmon fishery in June and July. Consequently, the total commercial harvest of chinook salmon in 2001 was only 90 fish. The ten-year average annual harvest of chinook salmon is 23,387 fish (Burkey et al. 2001).

The second measure established, for the first time in history, a fishing schedule that was imposed on all Kuskokwim River subsistence fishers. Under this schedule, subsistence fishers were required to remove all salmon gillnets from the Kuskokwim River for at least three consecutive days each week, which included nets fished near the mouth of the Takotna River. This measure likely improved chinook salmon passage into the Takotna River. At the time of this writing, the 2001 annual subsistence information has not been compiled, but managers believe escapement of chinook salmon benefited from this regulation.

Chum Salmon

The 2001 escapement of 5,420 chum salmon at the Takotna River weir for the period 23 June through 20 September is believed to accurately represent the annual escapement upstream of the weir site. Some chum salmon likely passed the site before weir installation, as evidenced by the fact that chum salmon were observed from the very start of operations on 23 June (Table 1). Still, the pre-23 June passage is probably negligible considering that only 0.9% of the total annual run passed the weir during the first week of operation. The bulk of the chum passage occurred in July when operations were uninterrupted. The completeness of the data set is also supported by the fact that weir operations continued well past the date when the last chum salmon was observed (Table 1). The influence of the two and a half days in August when the weir was inoperable, and the early ending date of the project, were negligible.

The chum salmon escapement of 5,420 in 2001 was higher than all other years in which escapement data exists for the Takotna River (Schwanke et al. 2001; Figure 15; Appendix E). The 2001 chum escapement was more than four times the 2000 escapement of 1,254, more than three times the 1997 counting tower estimate of 1,794, and almost twice the 1996 counting tower estimate of 2,794 (Appendix E). It should be noted that in 1996 and 1997, counting tower operations ended before the chum passage was complete. Based on the 2000 and 2001 run timing, the counting tower passage estimates missed approximately 15% of the chum run in 1996, and about 5% of the run in 1997.

The 2001 run timing of chum salmon in the Takotna River appeared to be a little later and more compact than was observed in 2000 (Figure 16). The median passage date in 2001 was 17 July and the central fifty-percent of the passage occurred between 12 and 22 July (Appendix E). The median passage in 2001 was three days later than in 2000, and the central fifty percent of the 2001 run passed the weir in 11 days compared to 15 days in 2000.

In addition to the upstream passage, records were also kept regarding the occurrence of chum salmon carcasses washing downstream to the weir (Figure 17). A total of 150 chum carcasses were found on the weir. All of the carcasses appeared to be in post-spawning condition. Females comprised 21.0% of the carcass count, compared to 50.1% of the upstream migrants. The first carcass appeared on 9 July and the last on 30 August. Fifty-percent of the carcasses were observed by 1 August, while the mid-point of the upstream passage was 17 July. Based on this measure, it took approximately 15 days for chum salmon to complete their life cycle and drift back to the weir. In 2000 this lag time was 18 days (Schwanke et al. 2001). In the future, this information should be insightful when determining optimal aerial survey timing.

As with chinook salmon, Kuskokwim River chum salmon were also identified as a stock of concern by the BOF in 2001 (Burkey et al. 2000a), and escapements probably benefited from the consequent closure of the commercial fishery in June and July, and the fishing schedule imposed on the subsistence fishers. The total commercial harvest of chum salmon in the 2001 Kuskokwim River fishery was 1,272 fish, compared to the average annual harvest of 261,412 chum salmon (Burkey et al. 2001). Catch data from the subsistence fishery has not been compiled for 2001 at the time of this writing; however, it is believed that chum salmon escapement benefited from this schedule. In 2001 subsistence pressure at the mouth of the Takotna River appeared to be reduced.

Coho Salmon

The 2001 escapement of 2,606 coho salmon through the Takotna River weir from 23 June through 20 September is believed to accurately represent the annual escapement upstream of the weir site. The weir was operational well before the first coho salmon passed the weir, and passage for the final week of operation only accounted for 1.5% of the total escapement. Although a portion of the passage was estimated to account for brief inoperable periods, the estimates accounted for less than ten percent of the total escapement.

This was only the second year Takotna River coho salmon have been enumerated. The 2001 weir passage was 66% of the 2000 passage (3,957) (Figure 15; Appendix F).

Run timing of coho salmon in the Takotna River appeared to be a little later in 2001 than in 2000 (Figure 16). Percent passage data for 2001 was two to three days behind 2000 data for most of the run (Appendix F). Other than timing, the overall pattern of daily passage was markedly similar between the two years.

Kuskokwim River coho salmon have not been identified as a stock of concern. There was a commercial fishery in the river targeting coho salmon in August, but the harvest of 192,998 fish was modest compared to the average annual take of 468,650 coho salmon (Burkey et al. 2001). The low harvest was caused in part by a conservative fishing strategy that was used to accommodate the limited fish processing capacity of the fish buyers, but the overall abundance of coho salmon also appeared to be relatively low. No conservation measures were taken for coho salmon in the 2001 subsistence fishery.

Other Species

Longnose suckers dominated the resident species passage at the weir in both 2000 and 2001. The 2001 passage was over three times the 2000 passage, and the run appeared to be earlier in 2001 when over 2,000 suckers passed the weir the first day of operation (Appendix G). This suggests a significant number of suckers probably passed the weir site before the weir was installed. Passage rates remained high the entire first week of operation with almost 80% of the total escapement passing the weir by 29 June in 2001. Only 11% of the run passed the weir by the same date in 2000.

Salmon Age-Sex-Length Composition

The sample size of most of the ASL pulses collected in 2001 generally fell below the objectives, as was the case in 2000. The need for achieving these objectives for each pulse sample had to be weighed against the need for collecting the samples over a brief period of time, the abundance of the species at the time the samples were collected, and the need to avoid undue delay to the salmon migration. The challenge was especially problematic with chinook salmon because of their low abundance relative to the other species present, and the hesitancy chinook salmon demonstrated entering the trap. Still, the chinook salmon samples collected in 2001 did illustrate many of the patterns characteristic of ASL dynamics. The sample data collected for chum and coho salmon were applied to the total passage.

Chinook Salmon

Few ASL samples were collected from chinook salmon during the first third of the run, so the resulting data were not applied to the total escapement. The samples were, however, comparable to samples collected during the same general time period in 2000 (Table 2).

The age composition of chinook salmon sampled in 2001 had a higher proportion of older-aged fish than the samples from 2000 (Table 2). In 2001 age-1.2, -1.3, -1.4 and –1.5 fish comprised 10.5, 25.6, 61.6 and 2.3% of the total sample. In 2000 the same respective age classes represented 28.2, 33.3, 35.9 and 1.3% of the total sample (Table 2). Although speculative, the higher incidence of older-aged chinook salmon could be attributed to the influence of the subsistence fishing schedule, which required gillnets to be removed from the water for at least three consecutive days each week. This fishing schedule allowed segments of the run to pass upriver with little fishing pressure, possibly resulting in a larger proportion of bigger fish escaping to the spawning grounds. The influence of the periodic removal of the nets is compounded by the fact that nets fished near the mouth of the Takotna River are often "king nets" equipped with 8 inch or larger mesh sizes. These nets are selective for harvesting the older-aged fish (DuBois and Molyneaux 2000), so their removal would have a particular benefit for enhancing the escapement for that segment of the run. The alternative is that older-aged fish simply had better returns in 2001, but the increased abundance seen in the Takotna River appears to be across all age-classes.

The chinook salmon sampled from the Takotna River in 2001 also had a higher proportion of females than was observed in 2000 (Table 3). Female composition from fish sampled in 2001 was 43.7%, compared to 19.1% in 2000 (Schwanke et al. 2001). These finding are not surprising when considered in context with the higher proportion of older-aged fish seen in 2001, because the older age classes of chinook salmon tend to have a higher incidence of females than younger age classes (DuBois and Molyneaux 2000). Again, the higher proportion of females seen in the 2001 escapement could be attributed at least in part to the subsistence fishing schedule.

The length composition data collected at the Takotna River weir supports the argument that the subsistence fishing schedule improved the quality of the chinook salmon escapement. Sample sizes were small, but the average length of the chinook salmon from the same age-sex category showed that chinook salmon were generally larger in 2001 than in 2000 (Table 4). For male chinook salmon ages-1.2, -1.3, and –1.4, average length increases from 2000 to 2001 were 12, 7 and 38 mm, respectively. For females age-1.3 and 1.4, the average length increases were 9 and 37 mm, respectively. The increases in average lengths could be attributed to the fishing schedule; however, the difference in lengths could also have been influenced by a change made in the technique used to measure fish. In 2000 salmon were measured out of the water with a straight edge meter stick, while in 2001 fish were measured in the water with a fish cradle. The fish cradle did, however, incorporate a comparable straight edged meter stick for measuring the length of the fish. Alternatively, the total chinook run may have simply been composed of bigger fish in 2001.

Chum Salmon

The ASL samples collected for chum salmon at the Takotna River weir applied to the total escapement, so the discussion will focus on the ASL composition of the escapement as opposed to the samples. In addition, the subsistence fishing schedule likely had less influence on the ASL composition of chum salmon than was discussed for the chinook salmon, because of the tendency of subsistence fishers to use "king gear," which most chum salmon slip through.

Older-aged chum salmon were more prominent early in the run, and their proportion diminished as the season advanced (Table 5). This trend was also observed in 2000, which is the only other year in which ASL data were available for Takotna River chum salmon (Schwanke et al. 2001). This same pattern has been commonly observed at other escapement monitoring projects as well (DuBois and Molyneaux 2000).

The proportion of female chum salmon in 2000 and 2001 were similar. The percentage of females decreased from 56.6% in 2000 to 50.1% in 2001 (Table 3). The proportion of females generally increased over time in 2001, whereas there was no pattern in 2000 (Figure 3). An increasing trend in female composition over time is what normally occurs at other Kuskokwim River escapement projects (DuBois and Molyneaux 2000).

The average lengths of chum salmon by sex and age class sampled in 2001 were generally higher than fish sampled in 2000 (Table 6; Figure 3). Once again, this could have been a result of the change in measuring technique, or perhaps the total run consisted of larger fish.

Coho Salmon

The ASL samples collected for coho salmon at the Takotna River weir were applied to the total escapement, so the discussion will focus on the ASL composition of the escapement as opposed to the samples.

The age composition of coho salmon in the Takotna River included age-1.1, -2.1 and -3.1 fish (Table 7). The run, however, was dominated by the age-2.1 fish, which accounted for 87.9% of the total escapement. In 2000 the same age class was dominate when it accounted for 97.7% of the escapement (Table 7). The dominance of age-2.1 coho salmon is typical in the Kuskokwim Area (DuBois and Molyneaux 2000). Another feature to note regarding the age composition is that the proportion of age-3.1 fish increased from 2.0% in 2000 to 11.8% in 2001. The increase could be due in part to a carryover effect from the relative large coho run that occurred in the Takotna River in 2000.

The proportion of female coho salmon decreased from 50.9% in 2000 to 42.4% in 2001 (Table 3). Both years experienced a slight increase in the proportion of females as the run progressed.

The seasonal average length of age-2.1 coho salmon increased for both males and females from 2000 to 2001. The average length of age-2.1 males increased by 23 mm and the average length of the same age females increased by 25 mm (Table 8).

Climatological and Hydrological Monitoring

Local residents characterized climatic conditions during the 2001 project operations as being average. The weir was challenged by two high water events (Figure 18; Appendix A). The first event peaked on 21 July when the stage measurement reached 91 cm. The weir remained operational throughout the entire event. The second high water event peaked on 21 August when the water level reached a stage of 136 cm. The weir became inoperable when the stage measurement exceeded 125 cm on 20, 21 and 22 August. For comparison, in 2000 the maximum recorded stage measurement was 103 cm on 5 August, and the weir remained operational (Figure 18).

Fluctuations in daily water level did not seem to affect chum or coho salmon passage, but did seem to affect chinook passage (Figure 19). Daily chinook passage rates seemed erratic during low water periods, which contributed to the difficulties in collecting ASL samples for chinook salmon. Crewmembers observed chinook salmon congregating in a shaded pool under a bridge downstream of the weir during relatively low water levels. The fish in these congregations would periodically move upstream en masse, usually at night, contributing to the erratic daily passage numbers prior to 11 July. The daily counts became less erratic when the water level began to increase after 11 July, and the milling behavior became less apparent (Figure 19).

The reported water temperature of the Takotna River ranged from 6°C to 18°C during the 2001 project operations (Appendix A), which was less variable than the 2000 range of 2°C to 20°C (Schwanke et al. 2001). Water temperatures in 2001 were consistently cooler during the first three weeks of operation than was observed in 2000 (Figure 20). The cooler water temperatures observed in 2001, coupled with associated climatic conditions, appeared to help moderate the growth of filamentous algae in the river compared to what was observed in 2000. In 2000 the algae accumulated en masse on the weir pickets, which added to the burden of keeping the weir clean.

In 2001 the fluctuations observed in daily water temperatures did not appear to affect salmon passage (Figure 21).

Juvenile Salmon Investigations

This was the second year in which juvenile salmon investigations were conducted in the Takotna River basin. Efforts in 2001 included expanded coverage of tributaries in the upper basin, which is defined here as waters of the Takotna River drainage upstream of the Fourth-of-July Creek confluence. Sampling efforts occurred in all of the index areas illustrated in Figure 2.

Juvenile Chinook Salmon

Of the 185 juvenile chinook salmon caught in 2001, one fish was sampled downstream of Moore Creek (index area 9) in the upper basin of the Takotna River. The remaining 184 fish were all sampled in Fourth-of-July Creek, or locations downstream of Fourth-of-July Creek. Rearing and spawning habitat in the upper basin appeared to be excellent. The habitat was pristine with plenty of clean gravel, abundant riffles and back eddies, and plenty of cover in the form of overhanging banks and snags of large woody debris. Food appeared to be abundant in the form of benthic invertebrates and forage fish, while no barriers prevented the movement of fish into the upper basin. In addition, juvenile resident species were abundant in the upper basin (Appendix B), which suggests that water quality was probably adequate for juvenile salmon as well.

In the upper Takotna River basin, low juvenile chinook salmon abundance probably reflects the lack of spawners in that portion of the basin, possibly a result of the localized extirpation of the spawning population speculated to have occurred in association with mining related activities early in the 1900's. An alternate explanation could be the seasonal emigration of juvenile chinook salmon from the upper basin. As described by Thomas et al. (1969), following emergence, juvenile chinook salmon tend to drift downstream for a number of days before establishing a territory. This emigration behavior could result in considerable downstream displacement before the juvenile fish take up residency. In the upper Takotna River basin, 27 June was the earliest sampling date and was probably several weeks after emergence. This means that there was probably adequate time for juvenile chinook to emigrate from the upper basin before sampling took place. Sampling efforts should be initiated in the upper basin earlier in the season to address this alternative explanation.

This study also included the collection of length data for the juvenile salmon captured as part of this investigation. Juvenile chinook salmon were sampled from the weir site (index area 2) on two occasions: 25 June and 16 August. The length distribution of the sampled fish changed substantially between these to two events (Figure 22). The average length increased by 33 mm between sample dates, and the length ranges increased from 37-43 mm to 66-80 mm. Given the size of the fish and the unimodal length distribution of each sampling event, all the juvenile chinook salmon sampled from the weir site were presumed to be age-0.

Juvenile chinook salmon were captured in Big Creek (lower) (index area 3) on three occasions: 26 June, 27 July and 9 September. The length distributions of the fish suggest the occurrence of two age groups (Figure 22). Twenty-seven of the 28 juvenile chinook salmon sampled on 26 June ranged in length from 34 to 46 mm, and were assumed to be age-0 fish. The one exception was a juvenile that measured 98 mm that was believed to be age-1. The 7 juveniles caught on 27 July were all relatively large, ranging from 110 to 124 mm, and believed to be age-1. The 10 juvenile chinook salmon sampled on 9 September all ranged from 62 to 89 mm, and were believed to be age-0. The average length of presumed age-0 fish from 9 September was 39 mm greater than the presumed age-0 fish captured on 26 June.

Juvenile chinook salmon were captured from Fourth-of-July Creek (index area 4) on 26 July and 27 September (Figure 22). The length frequency distributions of the fish captured on these dates overlap, but they do display an increase in size. The 18 fish caught on 26 July ranged in length from 60 to 100 mm, and had two apparent age classes. Sixteen of the fish that ranged from 60 to 81 mm in length, and averaged 67.2 mm in length, were believed to be age-0. Two of the fish, 96 and 100 mm in length were believed to be age-1. Seventy-nine of the 80 juvenile chinook salmon sampled on 27 September were believed to be age-0. These fish ranged in length from 65 to 98 mm and averaged 85 mm. The one exception among the September-caught fish was a juvenile that measured 128 mm, which was believed to be an age-1 chinook salmon.

Juvenile Coho Salmon

In 2001 the increased trapping and seining effort in the upper Takotna River basin yielded some rewards in the search for juvenile coho salmon (Appendix B). Of the 350 juvenile coho salmon caught in 2001, 86 were found in Moore Creek (index area 11). The fish were found during two sampling events, both of which occurred in July. The fish from each sampling event were caught from the exact same location in Moore Creek, and they were small in size ranging from 25 to 46 mm in length. The other 264 juveniles were caught in Fourth-of-July Creek (129 fish) (index area 4), lower Big Creek (133 fish) (index area 3), and near the weir in the mainstem Takotna River (2 fish) (index area 2).

According to Lister and Genoe (1970), coho fry rear in the following habitats ordered from most preferred to least preferred: back eddies, log jams, cut banks or open bank areas, and fast water. Sampling effort the past two years included all of these habitats. Beaver ponds and oxbow lakes are described as important rearing sites for coho salmon (Nickelson et al. 1992; AFS 2001), and these habitats are abundant in the Takotna River drainage, including the upper basin. Still, sampling efforts in these habitats in 2001 yielded no coho salmon.

Juvenile coho salmon were caught in Big Creek (lower) (index area 3) on three occasions: 26 June, 27 July and 9 September (Figure 23; Appendix B). The 15 juveniles captured on 26 June ranged in length from 45 to 67 mm and were believed to be age-1 fish, as were the juveniles captured on 27 July that ranged between 59 and 98 mm in length. The juvenile coho salmon caught on 9 September are thought to have included both age-0 and age-1 fish because of the occurrence of two distinct groupings in their length frequency distribution. The juveniles presumed to be age-0 ranged from 48 to 76 mm, while the fish presumed to be age-1 ranged between 90 and 112 mm. The age-0 fish either entered the tributary at some point between the 27 July and 9 September sampling periods, or the fish were too small during the 27 July sampling to be captured in ¼ in mesh minnow traps.

Few adult coho salmon have been observed in Big Creek (lower) (index area 3), which supports the hypothesis that age-0 coho salmon immigrated to Big Creek (lower) from other locations. Still, Big Creek (lower) appears to be one of two or three primary rearing areas in the Takotna River drainage. One of the other rearing areas, Fourth-of-July Creek (index area 4), is also a major spawning area for adult coho salmon. Big Creek (lower) is located approximately five miles downstream of Fourth-of-July Creek (Figure 2), so fish emerging from Fourth-of-July Creek may get displaced and take up residency in Big Creek (lower).

An alternate explanation is that juvenile coho salmon may have been in Big Creek (lower) during the first two sampling events, but they had not emerged, or were too small to be captured in minnow traps. This explanation is supported by an observation made in 2000 when ten juvenile coho salmon were captured in the area with a seine on 3 August. These fish ranged in length from 28 to 38 mm, and belly slits were still visible were the yolk sac had been absorbed, so they were thought to have just recently emerged from the gravel (Schwanke et al. 2001). If emergence times were similar in 2001, then age-0 coho salmon would have not yet emerged by the 26 June sampling event, and by the 27 July event the fish would probably have still been too small to be captured in the minnow traps. Fish smaller than 45 mm tend to escape through the sides of ¼ inch mesh traps. This tendency could explain why no age-0 fish were sampled before 9 September.

Spawning Salmon Distribution

Many upper Kuskokwim River drainage tributary streams were difficult to survey because of water color, meandering stream channels and, at times, dense overhanging riparian vegetation (Appendix C). Most aerial surveys were limited to clear spring-fed streams, or the upper reaches of streams where the clarity was better. Overall, chinook and chum salmon appeared to be in greater abundance in 2001 than in 2000, which improved the success of identifying spawning aggregates of these species in a greater number of streams. The opposite was true for coho salmon, which appeared to be in lower abundance in 2001 than in 2000. Still, for all species, much of the available spawning habitat seemed to be underutilized in 2001, as well as in 2000.

Takotna River

Chinook and Chum Salmon. The aerial surveys in the Takotna River drainage were generally challenging because of the dark brown color of the water. The water stage height at the weir site was 60 cm on the day the surveys were conducted, and the water level had been dropping for over a week, so water clarity was relatively good. By the day the Takotna River aerial survey was flown, 91% of the total chinook and 87% of the total chum salmon escapements had passed the weir site. Most of the fish observed were spawning, plus small numbers of carcasses were seen. Still, only 17% of the total annual chinook salmon escapement, and 9% of the total annual seasonal chum salmon escapement were observed during the aerial surveys.

The distribution of fish in 2001 was comparable to what was observed in 2000, and reinforces the importance of Fourth-of-July Creek to the overall salmon production in the Takotna River basin. All of the chinook and chum salmon observed during the 2001 aerial surveys were in Fourth-of-July Creek, except one chum salmon that was seen in the mainstem just above the confluence of Big Waldren Fork. Similar results were found in 1996 when 100% of the chinook salmon and 99% of the chum salmon were observed in Fourth-of-July Creek, and in 2000 when 100% of both species were observed in Fourth-of-July Creek (Schwanke et al. 2001).

The increased total annual escapement in 2001 of both chinook and chum salmon was reflected in the increased abundance observed from the aerial survey of Fourth-of-July Creek, but the proportion of increase was markedly different from that observed at the weir. The total annual escapement of chinook salmon in the Takotna River was over 200% higher than the 2000 escapement, but the abundance observed in Fourth-of-July Creek in 2001 was 420% higher than was observed in 2000. For chum salmon, the total annual escapement was 400% higher than in 2000, but the abundance observed in Fourth-of-July Creek was 4,140% higher than was observed in 2000 (Schwanke et al. 2001).

Coho Salmon. Survey conditions were good for the Takotna River survey flown on 22 September 2001. It had not rained for two weeks prior to the survey and the water stage height at the weir site was relatively low (50 cm). Timing for the survey appeared to be late though. The weir had already been disassembled for a week before the surveys were flown. Over 25% of the coho observed were carcasses, and only 6% of the total weir passage was observed. Despite good survey conditions in Moore Creek, Little Waldren Fork and the upper mainstem, few coho salmon were observed in the upper basin. Similar to chinook and chum salmon, coho salmon do not seem to be utilizing the upper basin. Over 92% of all coho salmon observed were in Fourth-of-July Creek, which appears to be the primary spawning area for coho salmon. In 2000, the only other year the Takotna River was flown during the coho run, 100% of all observed coho salmon were in Fourth-of-July Creek (272) (Schwanke et al. 2001).

The decreased total annual escapement of coho salmon in 2001 was reflected in the aerial survey of Fourth-of-July Creek, and the proportion of increase was similar from that observed at the weir. The total annual escapement of coho salmon in the Takotna River was 66% of the 2000 escapement, and the abundance observed in Fourth-of-July Creek in 2001 was 50% of the 2000 escapement.

Other Upper Kuskokwim River Tributaries

Chinook and Chum Salmon. The other rivers surveyed in July had varied water conditions. The Nixon Fork, Selatna and Jones Rivers all had less than optimal survey conditions because of recent rains. These three rivers were partially surveyed and less than ten chinook salmon were seen among them (Appendix C). Most other tributaries surveyed were not affected by recent rains, and had optimal survey conditions.

Some of the rivers surveyed in 2001 with optimal conditions were also surveyed in 2000 (Schwanke et al. 2001). A tributary of the Little Tonzona was flown both years and the number of chinook salmon observed in 2001 (38) increased by 270% from 2000 (14). The number of salmon observed in the Salmon River of the Pitka Fork in 2001 (1,033) increased by 275% from 2000 (374).

The Salmon River had been surveyed 20 different times between 1975 and 2000, all focusing on chinook salmon (Burkey and Salomone 1999). Previous counts ranged from 272 to 2,555 salmon. The 2001 count of 1,033 fell short of the escapement goal of 1,300 chinook salmon.

Many areas flown in 2001 had never been documented as being surveyed. These included several tributaries in the South Fork, Windy Fork, Middle Fork and Big Rivers. The abundances of chinook salmon in these tributaries never appeared high (3 to 55 fish), but chinook salmon were present in most tributaries with suitable spawning habitat. Chum salmon appeared to be absent in these clear water tributaries in late July.

Coho and Late Spawning Chum Salmon. Conditions were poor for aerial surveys in the Nixon Fork drainage in 2001. Seven coho salmon were observed in 2001, which was 15% of 48 fish seen in 2000 (Schwanke et al. 2001).

A tributary of the Little Tonzona was surveyed in 2000 and 2001, both with excellent survey conditions. The 208 coho salmon observed in 2001 was 23% of the 900 fish seen in 2000 (Schwanke et al. 2001).

This was the first year the Pitka Fork drainage was surveyed for coho salmon since 1980. About 170 coho salmon were observed in the Salmon River on 25 September 1980. The 2001 data suggest coho salmon do not spawn in abundance in the Pitka Fork drainage. No coho salmon were observed in a partial survey of the Salmon River, and less than 50 coho salmon were seen in the adjacent tributaries of Bear, Sullivan and Sheep Creeks. The timing of the surveys did not appear to be late because no empty redds or carcasses were observed.

Waters of the South Fork, Big River and Windy Fork were occluded because of glacier flour; however, these rivers are fed by clear water tributaries, which were the focus of the aerial surveys. Many of the same tributaries were flown in 1996, 2000 and 2001. Some documented spawning sites in the 1996 survey had all but disappeared (Schwanke et al. 2001), and in others the salmon abundances have been erratic. One tributary dropped from 300 late spawning chum salmon in 1996 to zero in 2001. Another site had 375 late spawning chum salmon and no coho salmon in 1996, 50 late spawning chum salmon and 300 coho salmon in 2000, and 480 late spawning chum salmon and 46 coho salmon in 2001 (Schwanke et al 2001; Appendix C). A small tributary of the Middle Fork was surveyed in 1996, and 550 coho salmon were observed; the same tributary was surveyed in 2001, and 114 coho salmon were observed. Two sites along the Windy Fork had over 350 and 50 late spawning chum salmon observed in them in 1996. No fish were observed in either site in 2001.

The influence of the silt laden glacier water of the South Fork, Big River and Windy Fork Rivers may be the cause of the erratic salmon abundance in the clear water tributaries. These clear water streams nearly all originate from groundwater springs in close proximity to occluded rivers they flow into. During high water, silt laden glacial water backs into the clear water tributaries, or in a few cases flows directly into them, and appears to dramatically alter the habitat in these small tributaries. Still, regardless of the changing habitat and wide fluctuations in abundance, spawning populations of salmon seem to persist in these areas.

Observations from aerial surveys from 2000 and 2001 suggest that coho salmon spawning in the tributaries of the South Fork, Middle Fork and Big Rivers spawn later than coho salmon in the Takotna River. A high proportion of carcasses (25% of total count) and numerous empty redds were observed in the Takotna River on 22 September 2001. No carcasses and only a few empty redds were observed outside of the Takotna River drainage. Similar results were found in 2000 (Schwanke et al. 2001).

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Table 1. Daily, cumulative, and percent passage data for chinook salmon, chum salmon, coho salmon and longnose suckers at the Takotna River weir, 2001.

	Chinook Salmon			Chum Salmon			Coho Salmon			Longnose Sucker		
Date	Daily	Cumulative	Percent Passage	Daily	Cumulative	Percent Passag	Daily	Cumulative	Percent Passage	Daily	Cumulative	Percent Passage
23-Jun	0	0	0	6	6	0	0	0	0	2,186	2,186	16
24-Jun	1	1	0	3	9	0	0	0	0	571	2,757	20
25-Jun	3	4	1	9	18	0	0	0	0	2,746	5,503	41
26-Jun	1	5	1	10	28	1	0	0	0	2,076	7,579	56
27-Jun	4	9	1	12	40	1	0	0	0	1,748	9,327	69
28-Jun	1	10	1	4	44	1	0	0	0	113	9,440	70
29-Jun	1	11	2	19	63	1	0	0	0	1,095	10,535	78
30-Jun	13	24	3	20	83	2	0	0	0	641	11,176	83
1-Jul	17	41	6	42	125	2	0	0	0	633	11,809	88
2-Jul	4	45	6	24	149	3	0	0	0	207	12,016	89
3-Jul	23	68	9	47	196	4	0	0	0	94	12,110	90
4-Jul	10	78	11	40	236	4	0	0	0	30	12,140	90
5-Jul	1	79	11	21	257	5	0	0	0	23	12,163	90
6-Jul	3	82	11	60	317	6	0	0	0	5	12,168	90
7-Jul	15	97	13	106	423	8	0	0	0	0	12,168	90
8-Jul	110	207	29	188	611	11	0	0	0	93	12,261	91
9-Jul	17	224	31	78	689	13	0	0	0	38	12,299	91
10-Jul	69	293	41	204	893	16	0	0	0	117	12,416	92
11-Jul	9	302	42	198	1,091	20	0	0	0	1	12,417	92
12-Jul	30	332	46	372	1,463	27	0	0	0	20	12,437	92
13-Jul	45	377	52	275	1,738	32	0	0	0	110	12,547	93
14-Jul	29	406	56	309	2,047	38	0	0	0	140	12,687	94
15-Jul	41	447	62	265	2,312	43	0	0	0	107	12,794	95
16-Jul	28	475	66	257	2,569	47	0	0	0	58	12,852	95
17-Jul	17	492	68	206	2,775	51	0	0	0	9	12,861	96
18-Jul	14	506	70	264	3,039	56	0	0	0	95	12,956	96
19-Jul	31	537	74	352	3,391	63	0	0	0	203	13,159	98
20-Jul	26	563	78	301	3,692	68	0	0	0	39	13,198	98
21-Jul	23	586	81	212	3,904	72	0	0	0	38	13,236	98
22-Jul	21	607	84	215	4,119	76	0	0	0	9	13,245	98
23-Jul	13	620	86	165	4,284	79	0	0	0	19	13,264	99
24-Jul	17	637	88	168	4,452	82	0	0	0	39	13,303	99
25-Jul	10	647	90	145	4,597	85	0	0	0	19	13,322	99
26-Jul	11	658	91	93	4,690	87	0	0	0	1	13,323	99
27-Jul	6	664	92	117	4,807	89	0	0	0	6	13,329	99
28-Jul	11	675	94	135	4,942	91	0	0	0	1	13,330	99
29-Jul	3	678	94	58	5,000	92	0	0	0	34	13,364	99
30-Jul	2	680	94	64	5,064	93	1	1	0	0	13,364	99
31-Jul	4	684	95	68	5,132	95	0	1	0	7	13,371	99
1-Aug	1	685	95	38	5,170	95	0	1	0	9	13,380	99
2-Aug	3	688	95	30	5,200	96	0	1	0	22	13,402	100
3-Aug	0	688	95	34	5,234	97	1	2	0	0	13,402	100
4-Aug	2	690	96	30	5,264	97	0	2	0	0	13,402	100
5-Aug	1	691	96	38	5,302	98	0	2	0	0	13,402	100
6-Aug	4	695	96	25	5,327	98	3	5	0	0	13,402	100
7-Aug	1	696	97	16	5,343	99	1	6	0	0	13,402	100
8-Aug	3	699	97	11	5,354	99	1	7	0	0	13,402	100
9-Aug	1	700	97	13	5,367	99	2	9	0	0	13,402	100
10-Aug	2	702	97	8	5,375	99	3	12	0	0	13,402	100
11-Aug	1	703	98	8	5,383	99	12	24	1	0	13,402	100
12-Aug	2	705	98	5	5,388	99	19	43	2	0	13,402	100
13-Aug	1	706	98	2	5,390	99	20	63	2	0	13,402	100
14-Aug	1	707	98	3	5,393	100	29	92	4	0	13,402	100
15-Aug	0	707	98	2	5,395	100	31	123	5	0	13,402	100
16-Aug	1	708	98	1	5,396	100	51	174	7	0	13,402	100
17-Aug	0	708	98	0	5,396	100	44	218	8	0	13,402	100

-Continued-

Table 1. (page 2 of 2)

	Chinook Salmon			Chum Salmon			Coho Salmon			Longnose sucker		
Date	Daily	Cumulative	Percent Passage	Daily	Cumulative	Percent Passag	Daily	Cumulative	Percent Passage	Daily	Cumulative	Percent Passage
18-Aug	1	709	98	7	5,403	100	77	295	11	0	13,402	100
19-Aug	0	709	98	4	5,407	100	66	361	14	0	13,402	100
20-Aug	1	710	98	3 a	5,410	100	91 a	452	17	c	13,402	100
21-Aug	1	711	99	3 b	5,413	100	91 b	543	21	c	13,402	100
22-Aug	1	712	99	3 b	5,416	100	91 b	634	24	c	13,402	100
23-Aug	1	713	99	0	5,416	100	74	708	27	0	13,402	100
24-Aug	0	713	99	1	5,417	100	145	853	33	0	13,402	100
25-Aug	0	713	99	2	5,419	100	156	1,009	39	0	13,402	100
26-Aug	1	714	99	0	5,419	100	275	1,284	49	0	13,402	100
27-Aug	1	715	99	0	5,419	100	175	1,459	56	0	13,402	100
28-Aug	1	716	99	1	5,420	100	151	1,610	62	0	13,402	100
29-Aug	1	717	99	0	5,420	100	164	1,774	68	0	13,402	100
30-Aug	1	718	100	0	5,420	100	104	1,878	72	0	13,402	100
31-Aug	1	719	100	0	5,420	100	137	2,015	77	0	13,402	100
1-Sep	0	719	100	0	5,420	100	105	2,120	81	4	13,406	100
2-Sep	0	719	100	0	5,420	100	92	2,212	85	23	13,429	100
3-Sep	1	720	100	0	5,420	100	71	2,283	88	16	13,445	100
4-Sep	1	721	100	0	5,420	100	73	2,356	90	5	13,450	100
5-Sep	0	721	100	0	5,420	100	68	2,424	93	1	13,451	100
6-Sep	0	721	100	0	5,420	100	26	2,450	94	1	13,452	100
7-Sep	0	721	100	0	5,420	100	13	2,463	95	1	13,453	100
8-Sep	0	721	100	0	5,420	100	14	2,477	95	0	13,453	100
9-Sep	0	721	100	0	5,420	100	14	2,491	96	1	13,454	100
10-Sep	0	721	100	0	5,420	100	15	2,506	96	1	13,455	100
11-Sep	0	721	100	0	5,420	100	11	2,517	97	0	13,455	100
12-Sep	0	721	100	0	5,420	100	24	2,541	98	1	13,456	100
13-Sep	0	721	100	0	5,420	100	12	2,553	98	0	13,456	100
14-Sep	0	721	100	0	5,420	100	15	2,568	99	2	13,458	100
15-Sep	0	721	100	0 b	5,420	100	6 b	2,574	99	c	13,458	100
16-Sep	0	721	100	0 b	5,420	100	11 b	2,585	99	c	13,458	100
17-Sep	0	721	100	0 b	5,420	100	3 b	2,588	99	c	13,458	100
18-Sep	0	721	100	0 b	5,420	100	5 b	2,593	100	c	13,458	100
19-Sep	0	721	100	0 b	5,420	100	6 b	2,599	100	c	13,458	100
20-Sep	0	721	100	0 b	5,420	100	7 b	2,606	100	c	13,458	100

a= estimated salmon passage (partial day)
b= estimated salmon passage (whole day)
c= no estimation for missed longnose sucker counts

Table 2. Age and sex composition of chinook salmon sampled at the Takotna River weir, 2000 and 2001.

Year	Sample Dates	Sample Size	Sex	Age Class (%) 1.1	1.2	1.3	1.4	1.5	Total
2001	7/05 - 7/06	45	M	0.0	6.7	26.7	33.3	0.0	66.7
	7/10 - 7/13		F	0.0	0.0	4.4	28.9	0.0	33.3
			Subtotal	0.0	6.7	31.1	62.2	0.0	100.0
	7/17 - 7/18	41	M	0.0	14.6	14.6	19.5	4.9	53.7
	7/21 - 7/23		F	0.0	0.0	4.9	41.5	0.0	46.3
	7/28 - 7/30		Subtotal	0.0	14.6	19.5	61.0	4.9	100.0
	8/05 - 8/07								
	Total Sample	86	M	0.0	10.5	20.9	26.7	2.3	60.5
			F	0.0	0.0	4.7	34.9	0.0	39.5
			Total	0.0	10.5	25.6	61.6	2.3	100.0
2000	7/05 - 7/07	48	M	2.1	25.0	35.4	18.7	2.1	83.3
	7/12 - 7/14		F	0.0	0.0	2.1	14.6	0.0	16.7
			Subtotal	2.1	25.0	37.5	33.3	2.1	100.0
	7/19 - 7/21	30	M	0	33.3	23.3	13.4	0.0	70.0
	7/28 - 7/30		F	0	0.0	3.3	26.7	0.0	30.0
	8/02, 8/14		Subtotal	0	33.3	26.7	40.0	0.0	100.0
	Total Sample	78	M	1.3	28.2	30.7	16.7	1.3	78.2
			F	0.0	0.0	2.6	19.2	0.0	21.8
			Total	1.3	28.2	33.3	35.9	1.3	100.0

Table 3. Female composition, based on all fish sampled, of the chinook, chum and coho salmon escapements at the Takotna River weir, 2000 and 2001.

Species	Year	Sample Size	Sample Dates (Stratum Dates)	Total Escapement	% Female
Chinook[a]	2001	51	7/05 - 7/14		39.2
		45	7/17 - 8/07		48.9
		96	**Seasonal**		**43.7**
	2000	55	7/05 - 7/14		14.5
		34	7/19 - 8/27		26.4
		89	**Seasonal**		**19.1**
Chum	2001	81	7/05 - 7/06 (6-23 - 7/08)	611	34.6
		167	7/10 - 7/14 (7/09 - 7/15)	1,701	48.5
		90	7/17 - 7/19 (7/16 - 7/19)	1,079	47.8
		110	7/21 - 7/23 (7/20 - 7/25)	1,206	52.7
		116	7/28 - 7/30 (7/26 - 8/02)	603	61.2
		57	8/05 - 8/07 (8/03 - 8/28)	220	71.9
		621	**Seasonal**	**5,420**	**50.1**
	2000	96	7/05 - 7/07 (6/24 - 7/09)	415	53.1
		126	7/12 - 7/14 (7/10 - 7/16)	281	64.3
		152	7/19 - 7/21 (7/17 - 7/24)	346	50.7
		25	7/28 - 7/29 (7/25 - 8/29)	212	68
		399	**Seasonal**	**1,254**	**56.6**

-Continued-

Table 3. (page 2 of 2)

Species	Year	Sample Size	Sample Dates (Stratum Dates)	Total Escapement	% Female
Coho	2001	175	8/19 - 8/20, 8/24 (7/30 - 8/25)	1,009	30.9
		170	8/28 - 8/29 (8/26 - 9/01)	1,111	51.2
		54	9/05 - 9/20 (9/02 - 9/20)	487	46.3
		399	**Seasonal**	**2,606**	**42.4**
	2000	40	8/14 (8/04 - 8/19)	891	47.5
		170	8/25 - 8/27 (8/20 - 8/29)	2,175	48.8
		170	9/01 - 9/03 (8/30 - 9/07)	630	58.8
		96	9/11 - 9/13 (9/08 - 9/20)	261	60.4
		476	**Seasonal**	**3,957**	**50.9**

[a] samples not applied to total escapement

Table 4. Length composition of chinook salmon sampled at the Takotna River weir, 2000 and 2001.

Year	Sample Dates	Sex		Age Class 1.1	1.2	1.3	1.4	1.5
2001	7/05 - 7/06	M	Mean Length		552	663	810	
	7/10 - 7/13		Std. Error		6	14	15	
			Range		540-560	595-735	710-895	
			Sample Size	0	3	12	15	0
		F	Mean Length			783	867	
			Std. Error			78	8	
			Range			705-860	810-910	
			Sample Size	0	0	2	13	0
	7/17 - 7/18	M	Mean Length		498	688	828	855
	7/21 - 7/23		Std. Error		25	33	29	5
	7/28 - 7/30		Range		400-555	590-825	640-895	850-860
	8/05 - 8/07		Sample Size	0	6	6	8	2
		F	Mean Length			770	861	
			Std. Error			30	15	
			Range			740-800	780-985	
			Sample Size	0	0	2	17	0
	Total Sample	M	Mean Length		516	671	816	855
			Std. Error		16	14	14	5
			Range		400-560	590-825	640-895	850-860
			Sample Size	0	9	18	23	2
		F	Mean Length			776	864	
			Std. Error			42	9	
			Range			705-860	780-795	
			Sample Size	0	0	4	30	0
2000	7/05 - 7/07	M	Mean Length	451	516	659	782	895
	7/12 - 7/14		Std. Error		17	12	20	
			Range	451- 451	418- 623	557- 754	728- 911	895- 895
			Sample Size	1	12	17	9	1
		F	Mean Length			722	856	
			Std. Error			0	22	
			Range			722- 722	780- 950	
			Sample Size	0	0	1	7	0
	7/19-7/21	M	Mean Length		490	676	770	
	7/28-7/30, 8/14, 8/27		Std. Error		15	21	45	
			Range		430- 585	595- 755	673- 880	
			Sample Size	0	10	7	4	0
		F	Mean Length			812	801	
			Std. Error				26	
			Range			812- 812	697- 898	
			Sample Size	0	0	1	8	0
	Total Sample	M	Mean Length	451	504	664	778	895
			Std. Error		11	11	20	
			Range	451- 451	418- 623	557- 755	673- 911	895- 895
			Sample Size	1	22	24	13	1
		F	Mean Length			767	827	
			Std. Error				17	
			Range			722- 812	697- 950	
			Sample Size	0	0	2	15	0

Table 5. Estimated age and sex composition of the chum salmon escapement at the Takotna River weir, 2000 and 2001.

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 Esc.	0.2 %	0.3 Esc.	0.3 %	0.4 Esc.	0.4 %	0.5 Esc.	0.5 %	Total Esc.	Total %
2001	7/05 - 7/06	74	M	0	0.0	223	36.5	190	31.1	0	0.0	413	67.6
	(6/20 - 70/8)		F	0	0.0	74	12.1	124	20.3	0	0.0	198	32.4
			Subtotal	0	0.0	297	48.6	314	51.4	0	0.0	611	100.0
	7/10 - 7/14	153	M	0	0.0	567	33.3	289	17.0	11	0.7	867	51.0
	(7/09 - 7/15)		F	0	0.0	589	34.7	245	14.4	0	0.0	834	49.0
			Subtotal	0	0.0	1,156	68.0	534	31.4	11	0.7	1,701	100.0
	7/17 - 7/18	83	M	0	0.0	429	39.7	130	12.1	0	0.0	559	51.8
	(7/16 - 7/19)		F	0	0.0	468	43.4	52	4.8	0	0.0	520	48.2
			Subtotal	0	0.0	897	83.1	182	16.9	0	0.0	1,079	100.0
	7/21 - 7/23	103	M	0	0.0	421	34.9	141	11.7	0	0.0	562	46.6
	(7/20 - 7/25)		F	0	0.0	527	43.7	117	9.7	0	0.0	644	53.4
			Subtotal	0	0.0	948	78.6	258	21.4	0	0.0	1,206	100.0
	7/28 - 7/30	106	M	0	0.0	222	36.8	12	1.9	0	0.0	233	38.7
	(7/26 - 8/02)		F	0	0.0	335	55.7	34	5.6	0	0.0	370	61.3
			Subtotal	0	0.0	557	92.5	46	7.5	0	0.0	603	100.0
	8/05 - 8/07	54	M	0	0.0	57	25.9	4	1.9	0	0.0	61	27.8
	(8/03 - 8/28)		F	4	0.9	155	70.4	0	0.0	0	0.0	159	72.2
			Subtotal	4	0.9	212	96.3	4	1.9	0	0.0	220	100.0
	Season	573	M	0	0.0	1,919	35.4	765	14.1	11	0.2	2,695	49.7
			F	4	0.1	2,149	39.7	572	10.6	0	0.0	2,725	50.3
			Total	4	0.1	4,068	75.1	1,337	24.7	11	0.2	5,420	100.0
2000	7/05 - 7/07	85	M	0	0.0	73	17.6	117	28.2	5	1.2	195	47.1
	(6/24 - 7/09)		F	0	0.0	132	31.8	88	21.2	0	0.0	220	52.9
			Subtotal	0	0.0	205	49.4	205	49.4	5	1.2	415	100.0
	7/12 - 7/14	117	M	0	0.0	58	20.5	41	14.6	0	0.0	98	35.0
	(7/10 - 7/16)		F	0	0.0	120	42.7	62	22.2	0	0.0	183	65.0
			Subtotal	0	0.0	178	63.2	103	36.8	0	0.0	281	100.0
	7/19 - 7/21	140	M	8	2.2	104	30.0	52	15.0	0	0.0	163	47.1
	(7/17 - 7/24)		F	7	2.1	131	37.9	44	12.9	0	0.0	183	52.9
			Subtotal	15	4.3	235	67.9	96	27.9	0	0.0	346	100.0
	7/28 - 7/29	23	M	0	0.0	55	26.1	19	8.7	0	0.0	74	34.8
	(7/25 - 8/29)		F	18	8.7	102	47.8	18	8.7	0	0.0	138	65.2
			Subtotal	18	8.7	157	73.9	37	17.4	0	0.0	212	100.0
	Season	365	M	7	0.6	290	23.1	229	18.2	5	0.4	531	42.3
			F	26	2.1	484	38.6	213	17.0	0	0.0	723	57.7
			Total	33	2.7	774	61.7	442	35.2	5	0.4	1,254	100.0

Table 6. Length composition of the chum salmon escapement at the Takotna River weir, 2000 and 2001.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2001	7/05 - 7/06 (6/23 - 7/08)	M	Mean Length		603	587	
			Std. Error		6	7	
			Range		540- 645	505- 640	
			Sample Size	0	27	23	0
		F	Mean Length		572	563	
			Std. Error		4	7	
			Range		545- 585	500- 600	
			Sample Size	0	9	15	0
	7/10 - 7/14 (7/09 - 7/15)	M	Mean Length		585	591	540
			Std. Error		4	7	-
			Range		535- 650	500- 645	540- 540
			Sample Size	0	51	26	1
		F	Mean Length		551	565	
			Std. Error		3	5	
			Range		495- 600	530- 615	
			Sample Size	0	53	22	0
	7/17 - 7/18 (7/16 - 7/19)	M	Mean Length		578	600	
			Std. Error		4	5	
			Range		540- 620	570- 620	
			Sample Size	0	33	10	0
		F	Mean Length		549	569	
			Std. Error		4	12	
			Range		515- 590	540- 590	
			Sample Size	0	36	4	0
	7/21 - 7/23 (7/20 - 7/25)	M	Mean Length		574	584	
			Std. Error		5	7	
			Range		520- 665	540- 625	
			Sample Size	0	36	12	0
		F	Mean Length		546	576	
			Std. Error		4	7	
			Range		475- 600	540- 615	
			Sample Size	0	45	10	0
	7/28 - 7/30 (7/26 - 8/02)	M	Mean Length		578	585	
			Std. Error		5	10	
			Range		510- 630	575- 595	
			Sample Size	0	39	2	0
		F	Mean Length		552	543	
			Std. Error		3	8	
			Range		500- 600	510- 565	
			Sample Size	0	59	6	0
	8/05 - 8/07 (8/03 - 8/28)	M	Mean Length		559	620	
			Std. Error		10	-	
			Range		490- 610	620- 620	
			Sample Size	0	14	1	0
		F	Mean Length	500	519		
			Std. Error	-	4		
			Range	500- 500	465- 610		
			Sample Size	1	38	0	0
	Seasonal	M	Mean Length		581	590	540
			Range		490- 665	500- 645	540- 540
			Sample Size	0	200	74	1

-Continued-

Table 6. (page 2 of 2)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
2001 (con't)	Seasonal (con't)	F	Mean Length	500	548	566	
			Range	500- 500	465- 610	500- 615	
			Sample Size	1	240	57	0
2000							
	7/05 - 7/07 (6/24 - 7/9)	M	Mean Length		554	606	648
			Std. Error		6	7	
			Range		507-580	540-658	648
			Sample Size	0	15	24	1
		F	Mean Length		542	576	
			Std. Error		4	9	
			Range		490-583	514-667	
			Sample Size	0	27	18	0
	7/12 - 7/14 (7/10 - 7/16)	M	Mean Length		561	577	
			Std. Error		3	4	
			Range		537-587	548-602	
			Sample Size	0	24	17	0
		F	Mean Length		540	558	
			Std. Error		3	6	
			Range		500-583	485-614	
			Sample Size	0	50	26	0
	7/19 - 7/20 (7/17 - 7/24)	M	Mean Length	547	562	590	
			Std. Error	29	4	8	
			Range	496-596	502-610	530-698	
			Sample Size	3	42	21	0
		F	Mean Length	546	542	551	
			Std. Error	23	3	7	
			Range	516-591	407-591	515-618	
			Sample Size	3	53	18	0
	7/28 - 7/29 (7/25 - 8/29)	M	Mean Length		564	620	
			Std. Error		6		
			Range		548-588	620	
			Sample Size	0	6	2	0
		F	Mean Length	525	542	519	
			Std. Error	15	10	5	
			Range	510-540	485-587	514-523	
			Sample Size	2	11	2	0
	Seasonal	M	Mean Length	547	560	598	648
			Std. Error	29	2	4	
			Range	496-596	502-610	530-698	648
			Sample Size	3	87	64	1
		F	Mean Length	531	542	560	
			Std. Error	13	3	4	
			Range	510-591	477-591	485-667	
			Sample Size	5	141	64	0

Table 7. Estimated age and sex composition of the coho salmon escapement at Takotna River weir, 2000 and 2001.

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1 Esc.	1.1 %	2.1 Esc.	2.1 %	3.1 Esc.	3.1 %	Total Esc.	Total %
2001	8/19, 8/20, 8/24	142	M	7	0.7	589	58.4	197	10.6	703	69.7
	(7/30 - 8/25)		F	0	0.0	277	27.5	28	2.8	305	30.3
			Subtotal	7	0.7	866	85.9	135	13.4	1008	100.0
	8/28, 8/29	117	M	0	0.0	522	47.0	38	3.4	560	50.4
	(8/26 - 9/01)		F	0	0.0	494	44.5	57	5.1	551	49.6
			Subtotal	0	0.0	1016	91.5	95	8.5	1111	100.0
	9/05, 9/06	44	M	0	0.0	199	40.9	66	13.6	265	54.5
	(9/02 - 9/20)		F	0	0.0	210	43.2	11	2.3	221	45.5
			Subtotal	0	0.0	409	84.1	77	15.9	486	100.0
	Seasonal	303	M	7	0.3	1310	50.3	211	8.1	1528	58.7
			F	0	0.0	981	37.6	96	3.7	1078	41.3
			Total	7	0.3	2291	87.9	307	11.8	2606	100.0
2000	8/14	36	M	0	0.0	421	47.2	25	2.8	446	50.0
	(8/4 - 8/19)		F	0	0.0	445	50.0	0	0.0	445	50.0
			Subtotal	0	0.0	866	97.2	25	2.8	891	100.0
	8/25 - 8/27	152	M	0	0.0	1059	48.7	15	0.7	1073	49.3
	(8/20 - 8/29)		F	0	0.0	1087	50.0	14	0.6	1102	50.7
			Subtotal	0	0.0	2146	98.7	29	1.3	2175	100.0
	9/01 - 9/03	136	M	0	0.0	273	43.4	0	0.0	273	43.4
	(8/30 - 9/07)		F	0	0.0	334	52.9	23	3.7	357	56.6
			Subtotal	0	0.0	607	96.3	23	3.7	630	100.0
	9/11 - 9/13	71	M	4	1.4	106	40.9	0	0.0	110	42.3
	(9/08 - 9/20)		F	7	2.8	140	53.5	4	1.4	151	57.7
			Subtotal	11	4.2	246	94.4	4	1.4	261	100.0
	Seasonal	395	M	4	0.1	1860	47.0	39	1.0	1902	48.1
			F	7	0.2	2006	50.7	41	1.0	2055	51.9
			Total	11	0.3	3866	97.7	80	2.0	3957	100.0

Table 8. Length composition of the coho salmon escapement at the Takotna River weir, 2000 and 2001.

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
2001	8/19, 8/20, 8/24	M	Mean Length	550	566	560
	(7/30 - 8/25)		Std. Error		5	13
			Range	550- 550	475- 635	430- 620
			Sample Size	1	83	15
		F	Mean Length		568	551
			Std. Error		4	7
			Range		505- 620	535- 570
			Sample Size	0	39	4
	8/28, 8/29	M	Mean Length		561	600
	(8/26 - 9/01)		Std. Error		8	17
			Range		395- 640	555- 630
			Sample Size	0	55	4
		F	Mean Length		577	588
			Std. Error		4	14
			Range		500- 635	550- 620
			Sample Size	0	52	6
	9/05, 9/06	M	Mean Length		561	577
	(9/02 - 9/20)		Std. Error		13	15
			Range		440- 640	515- 615
			Sample Size		18	6
		F	Mean Length		566	595
			Std. Error		6	
			Range		515- 605	595- 595
			Sample Size		19	1
	Seasonal	M	Mean Length	550	563	573
			Std. Error		4	9
			Range	550- 550	395- 640	430- 630
			Sample Size	1	156	25
		F	Mean Length		572	578
			Std. Error		3	9
			Range		500- 635	535- 620
			Sample Size	0	110	11
2000	8/14	M	Mean Length		541	650
	(8/4 - 8/19)		Std. Error		9	
			Range		476- 614	650- 650
			Sample Size	0	17	1

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Table 8. (page 2 of 2)

Year	Sample Dates (Stratum Dates)	Sex		Age Class		
				1.1	2.1	3.1
2000 (con't)		F	Mean Length		535	
			Std. Error		11	
			Range		425- 610	
			Sample Size	0	18	0
	8/25 - 8/27 (8/20 - 8/29)	M	Mean Length		537	506
			Std. Error		5	
			Range		412- 611	506- 506
			Sample Size	0	74	1
		F	Mean Length		552	543
			Std. Error		3	
			Range		488- 600	543- 543
			Sample Size	0	76	1
	9/01 - 9/03 (8/30 - 9/07)	M	Mean Length		547	
			Std. Error		6	
			Range		420- 640	
			Sample Size	0	59	0
		F	Mean Length		544	563
			Std. Error		4	13
			Range		435- 594	523- 597
			Sample Size	0	72	5
	9/11 - 9/13 (9/08 - 9/20)	M	Mean Length	573	551	
			Std. Error		8	
			Range	573- 573	444- 611	
			Sample Size	1	29	0
		F	Mean Length	571	558	575
			Std. Error	21	5	
			Range	550- 591	477- 614	575- 575
			Sample Size	2	38	1
	Seasonal	M	Mean Length	573	540	597
			Std. Error		4	
			Range	573- 573	412- 640	506- 650
			Sample Size	1	179	2
		F	Mean Length	571	547	557
			Std. Error	21	3	13
			Range	550- 591	425- 614	523- 597
			Sample Size	2	204	7

Table 9. Juvenile chinook and coho salmon data collected in the Takotna River, 2001.

	Chinook							Coho						
	# seine	seined		# trap	Avg hrs	trapped		# seine	seined		# trap	Avg hrs	trapped	
Area[c]	sets	fish	CPUE[a]	sets	set	fish	CPUE[b]	sets	fish	CPUE[a]	sets	set	fish	CPUE[b]
1	0	na	na	27	20	0	0.00	0	na	na	27	20	0	0.00
2	32	34	1.06	18	20	0	0.00	32	2	0.06	18	20	0	0.00
3	31	35	1.13	23	18.4	17	0.57	31	17	0.55	23	18.4	116	3.87
4	4	0	0.00	49	21.3	98	1.78	4	0	0.00	49	21.3	129	2.34
5	11	0	0.00	0	na	na	na	11	0	0.00	0	na	na	na
6	0	na	na	16	18	0	0.00	0	na	na	16	18	0	0.00
7	0	na	na	8	17	0	0.00	0	na	na	8	17	0	0.00
8	8	0	0.00	0	na	na	na	8	0	0.00	0	na	na	na
9	61	1	0.02	4	14	0	0.00	61	0	0.00	4	14	0	0.00
10	10	0	0.00	18	17	0	0.00	10	0	0.00	18	17	0	0.00
11	52	0	0.00	0	na	na	na	52	86	1.65	0	na	na	na
12	0	na	na	6	17	0	0.00	0	na	na	6	17	0	0.00
13	0	na	na	15	24	0	0.00	0	na	na	15	24	0	0.00
	209	70	0.33	184		115	0.63	209	105	0.50	184		245	1.33

[a] CPUE is defined as the number of salmon captured per seine attempt

[b] CPUE is defined as the number of salmon captured per trap per 24-hr period

[c] Area

1 below weir
2 above weir to 4th of July Creek
3 Big Creek (lower)
4 4th of July Creek
5 Fourth of July Creek to Big Waldren Fork
6 Bonnie Creek
7 Minnie Creek
8 Big Waldren Fork
9 Big Waldren Fork to Moore Creek/Little Waldren Confluence
10 Little Waldren Fork
11 Moore Creek
12 Big Creek (upper)
13 Tatalina Creek

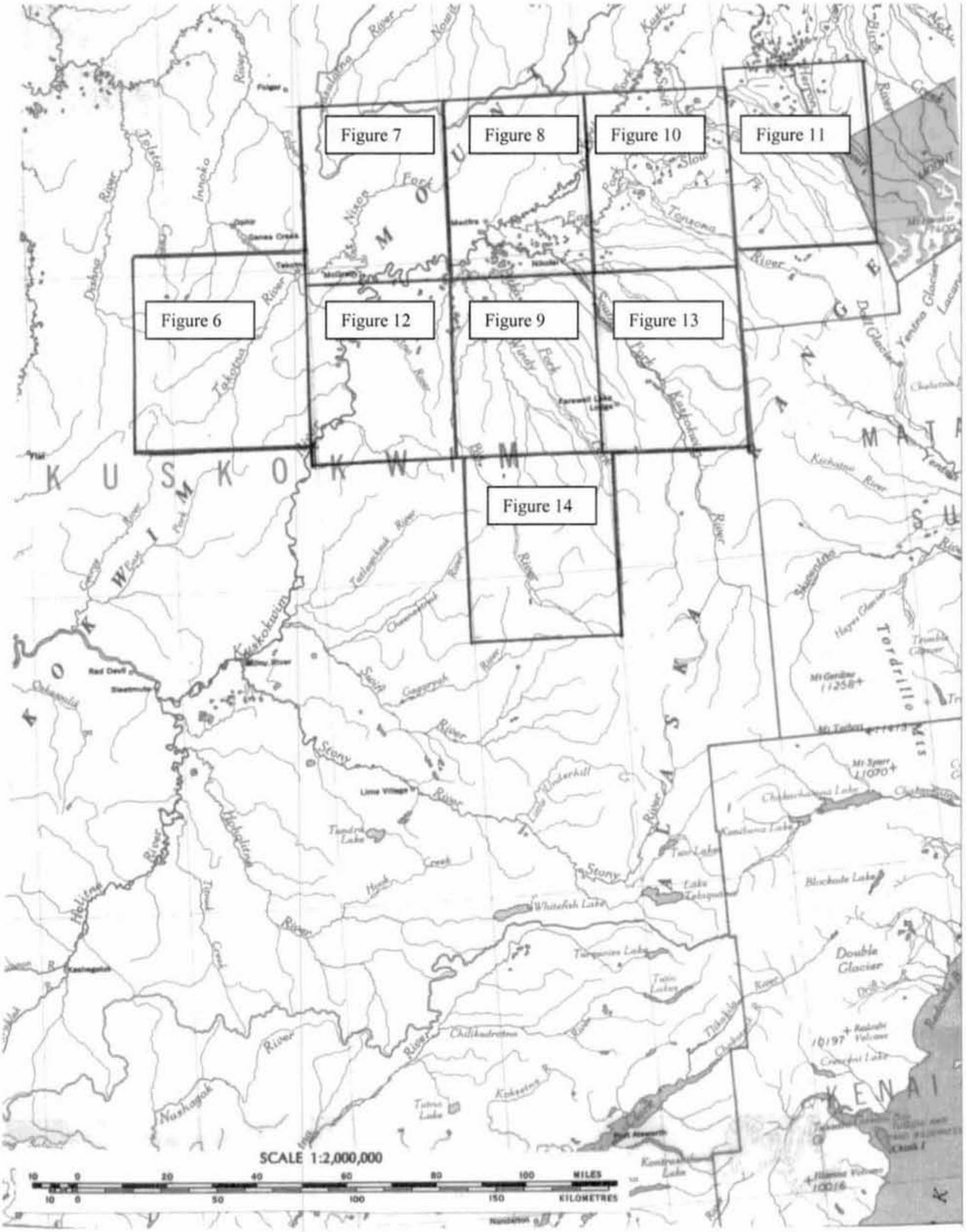

Figure 5. Reference map of upper Kuskokwim River for figures 6 to 14.

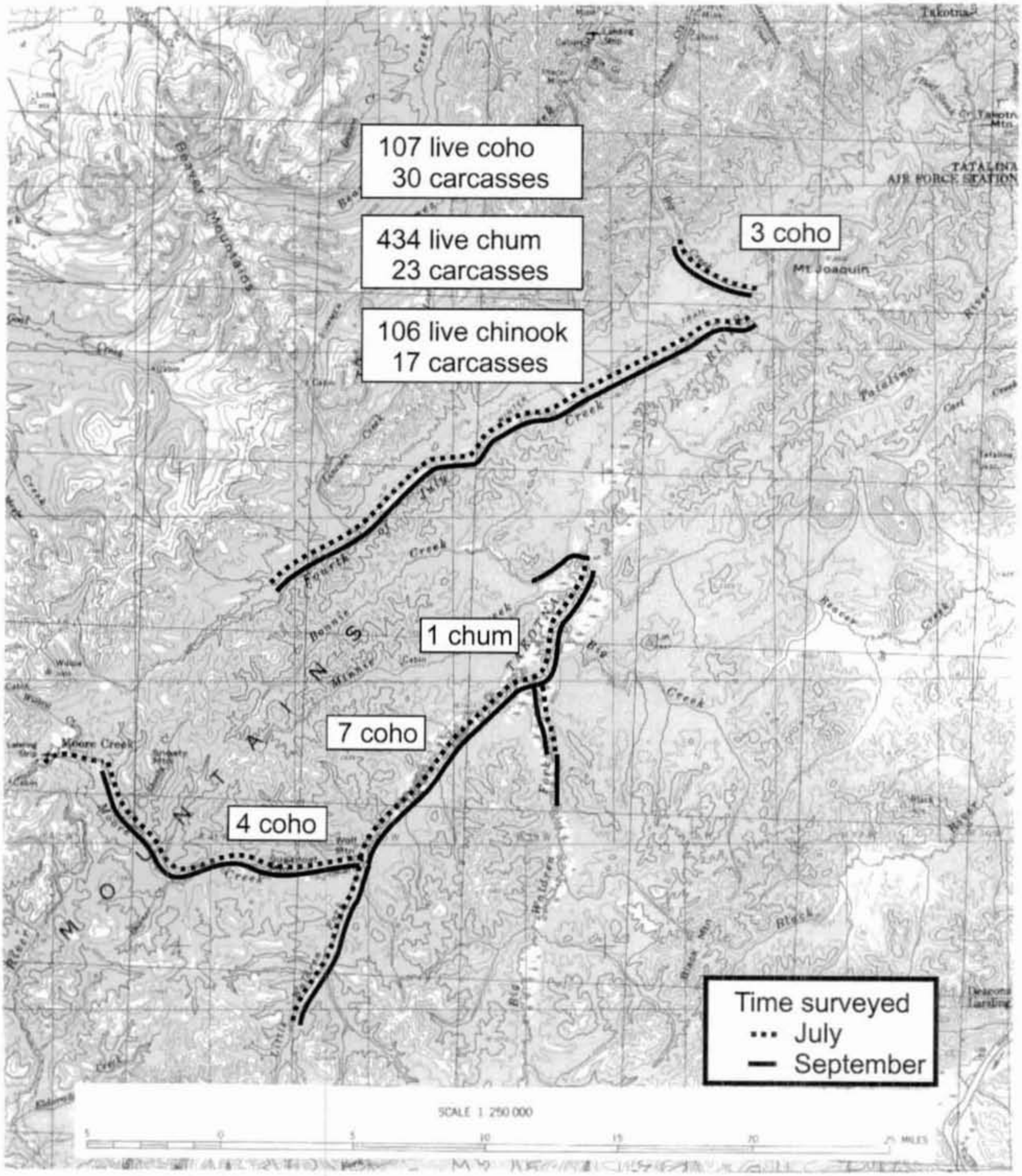

Figure 6. Aerial survey streams: Takotna River drainage.

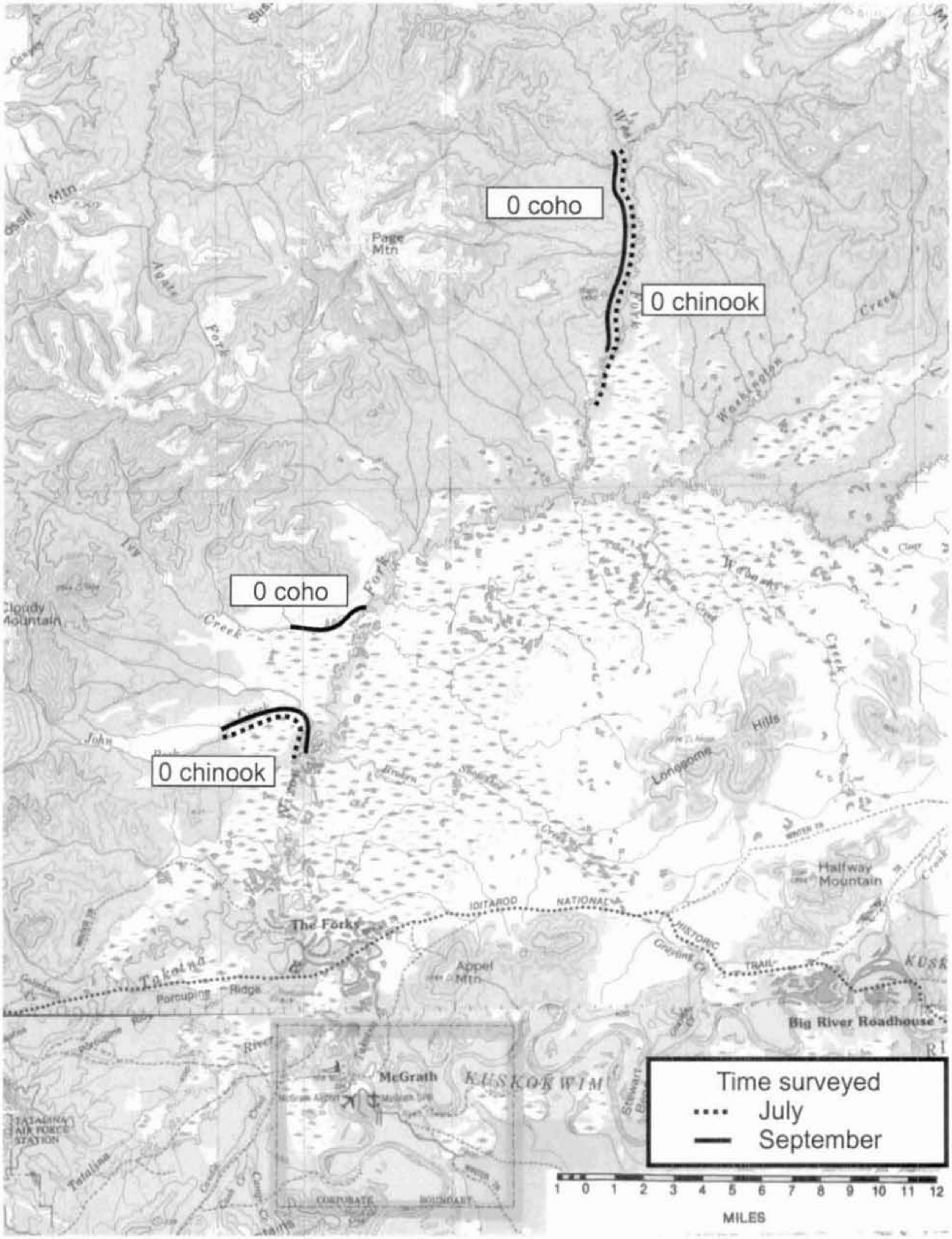

Figure 7. Aerial survey streams: Nixon Fork drainage.

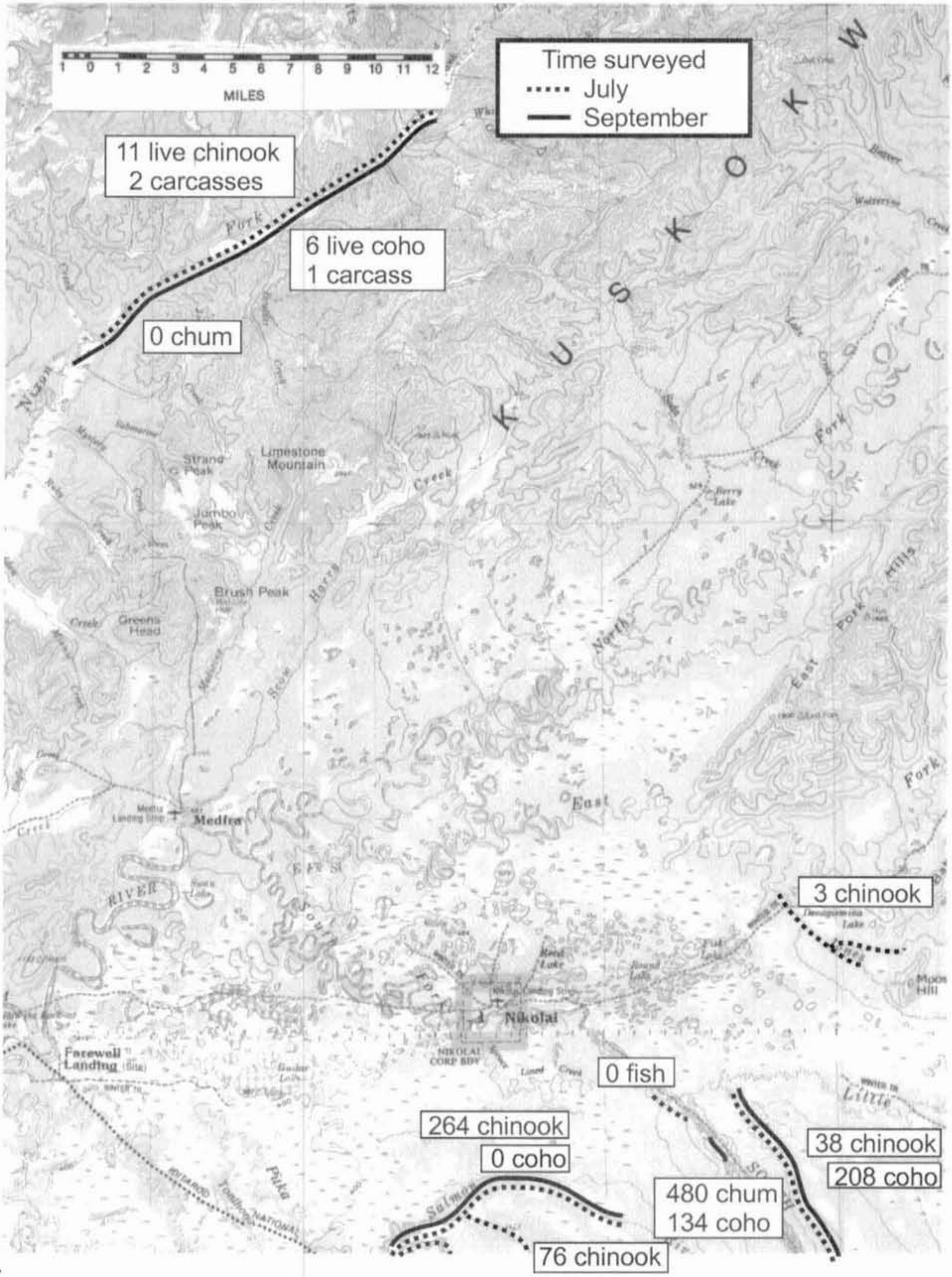

Figure 8. Aerial survey streams: lower Pitka Fork and lower South Fork Kuskokwim drainages.

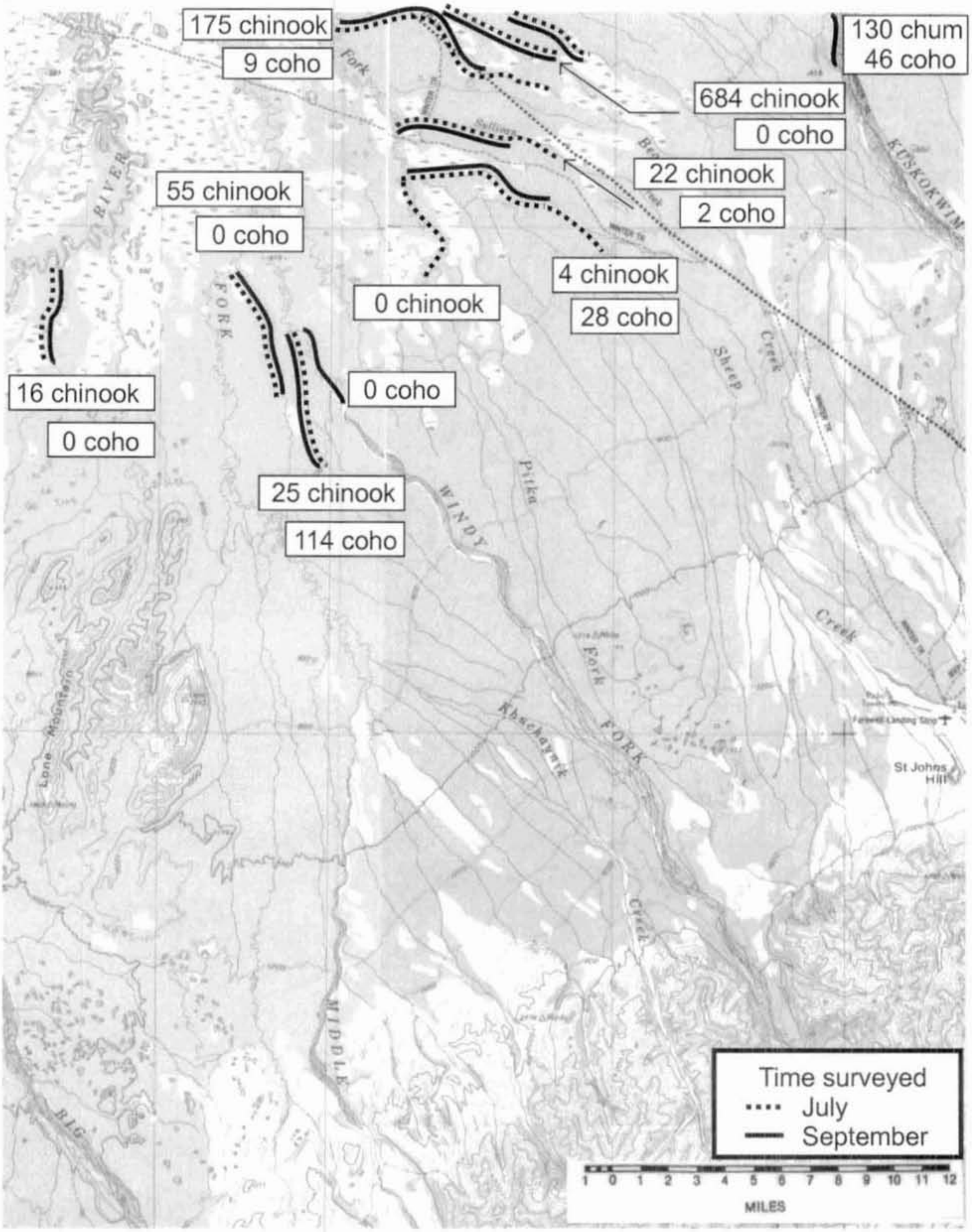

Figure 9. Aerial survey streams: upper Pitka Fork, Windy River, South Fork and Middle Fork Kuskokwim drainages.

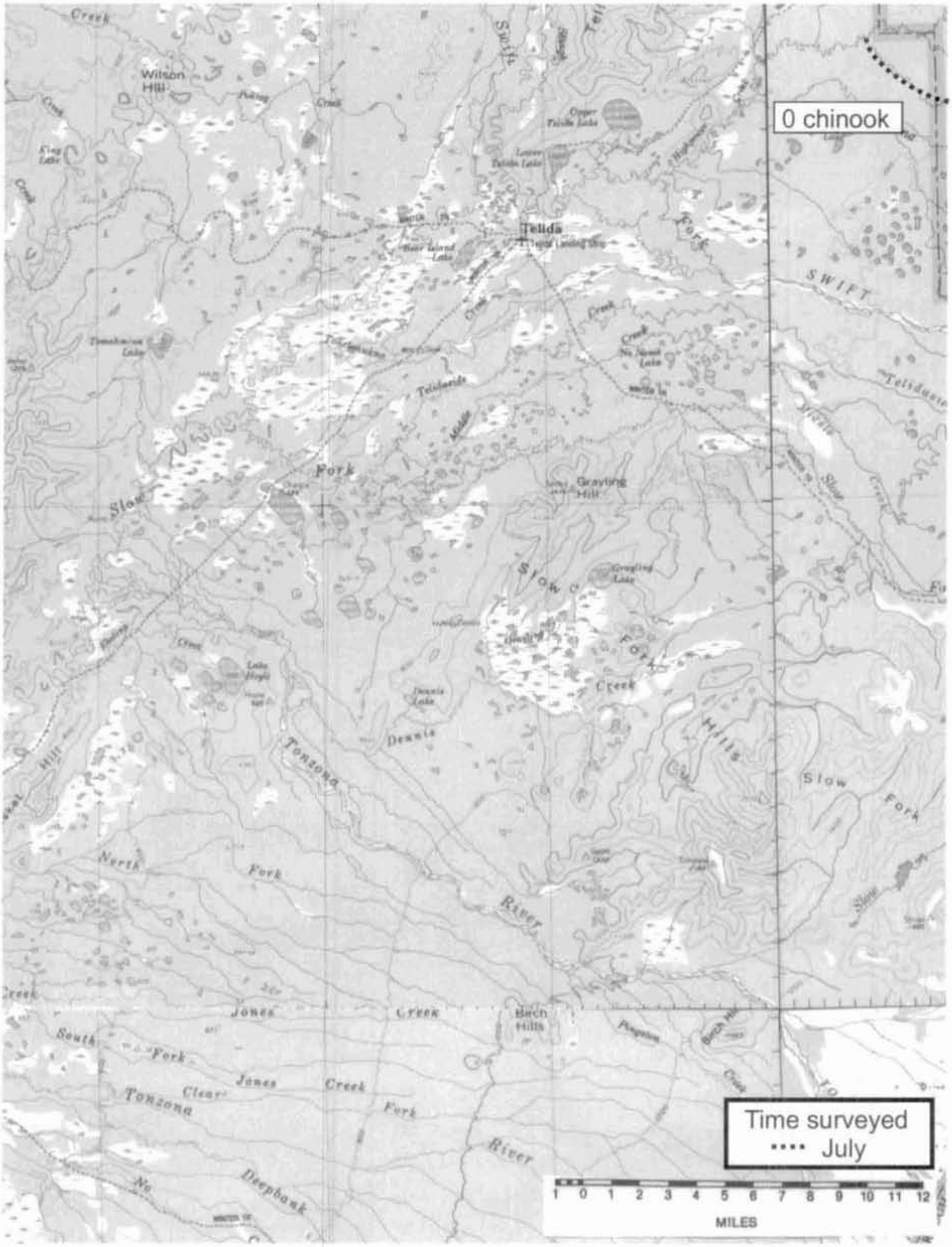

Figure 10. Aerial survey streams: lower Highpower Creek drainage.

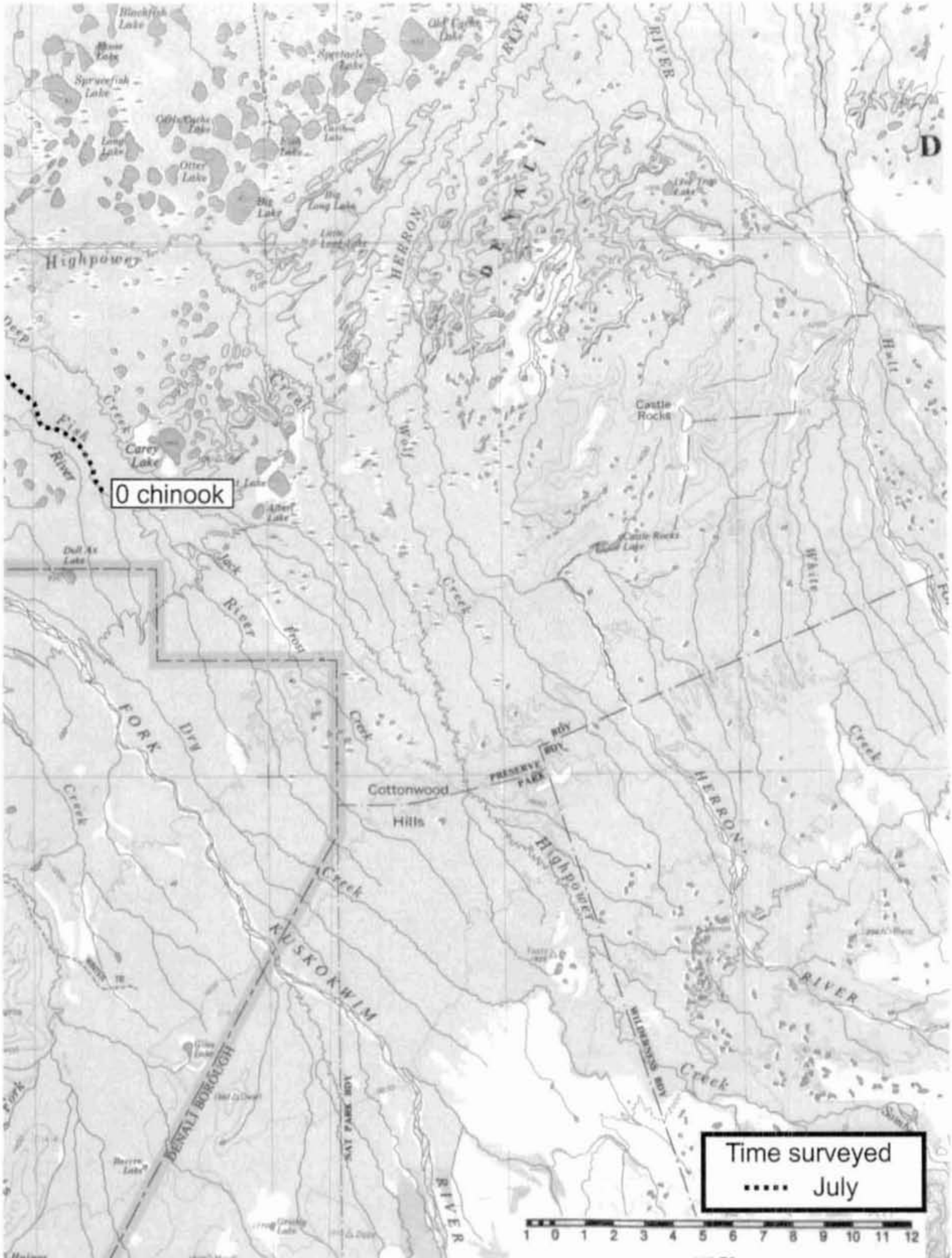

Figure 11. Aerial survey streams: upper Highpower Creek drainage.

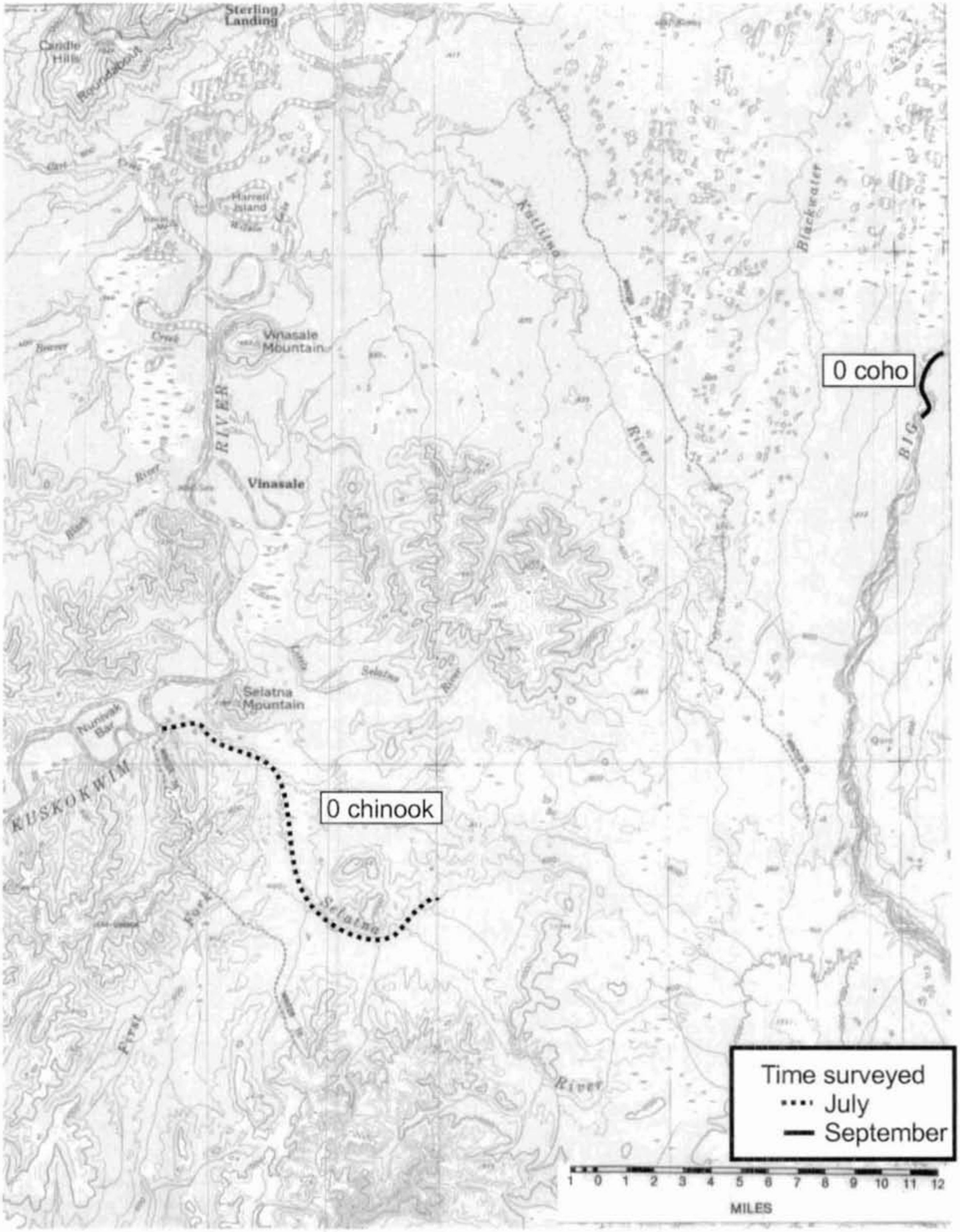

Figure 12. Aerial survey streams: lower Big River and Selatna River drainages.

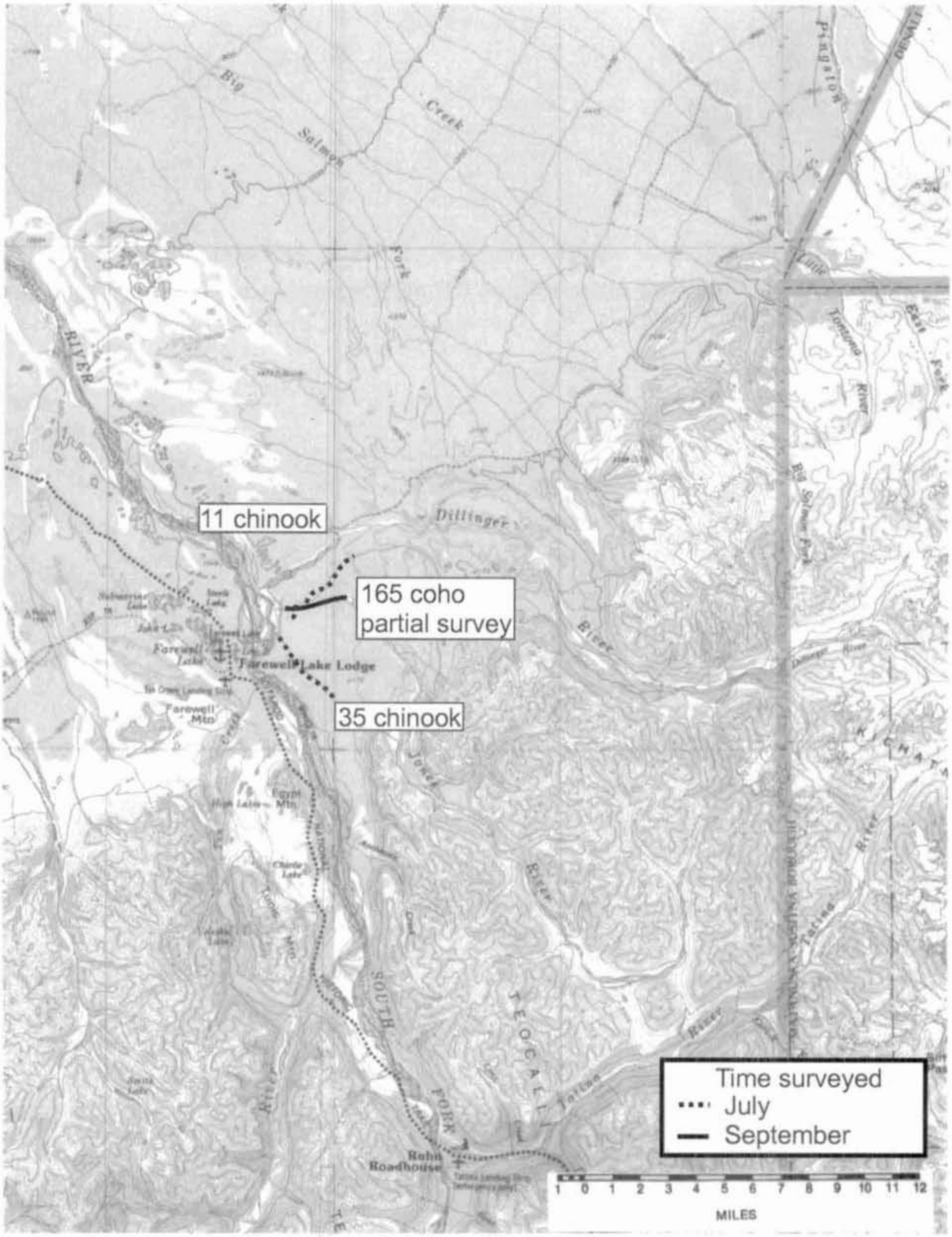

Figure 13. Aerial survey streams: upper South Fork Kuskokwim drainage.

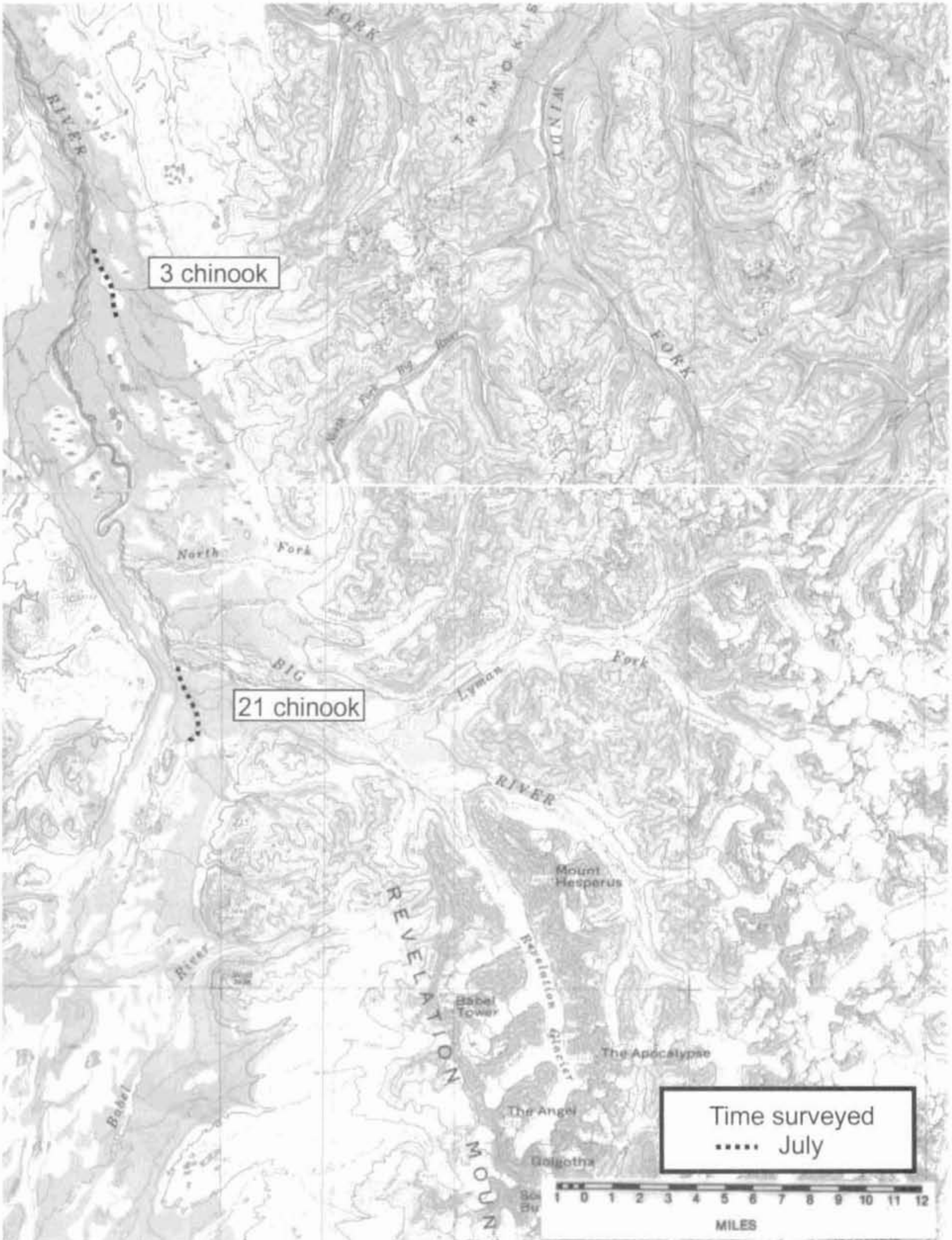

Figure 14. Aerial survey streams: upper Big River drainage.

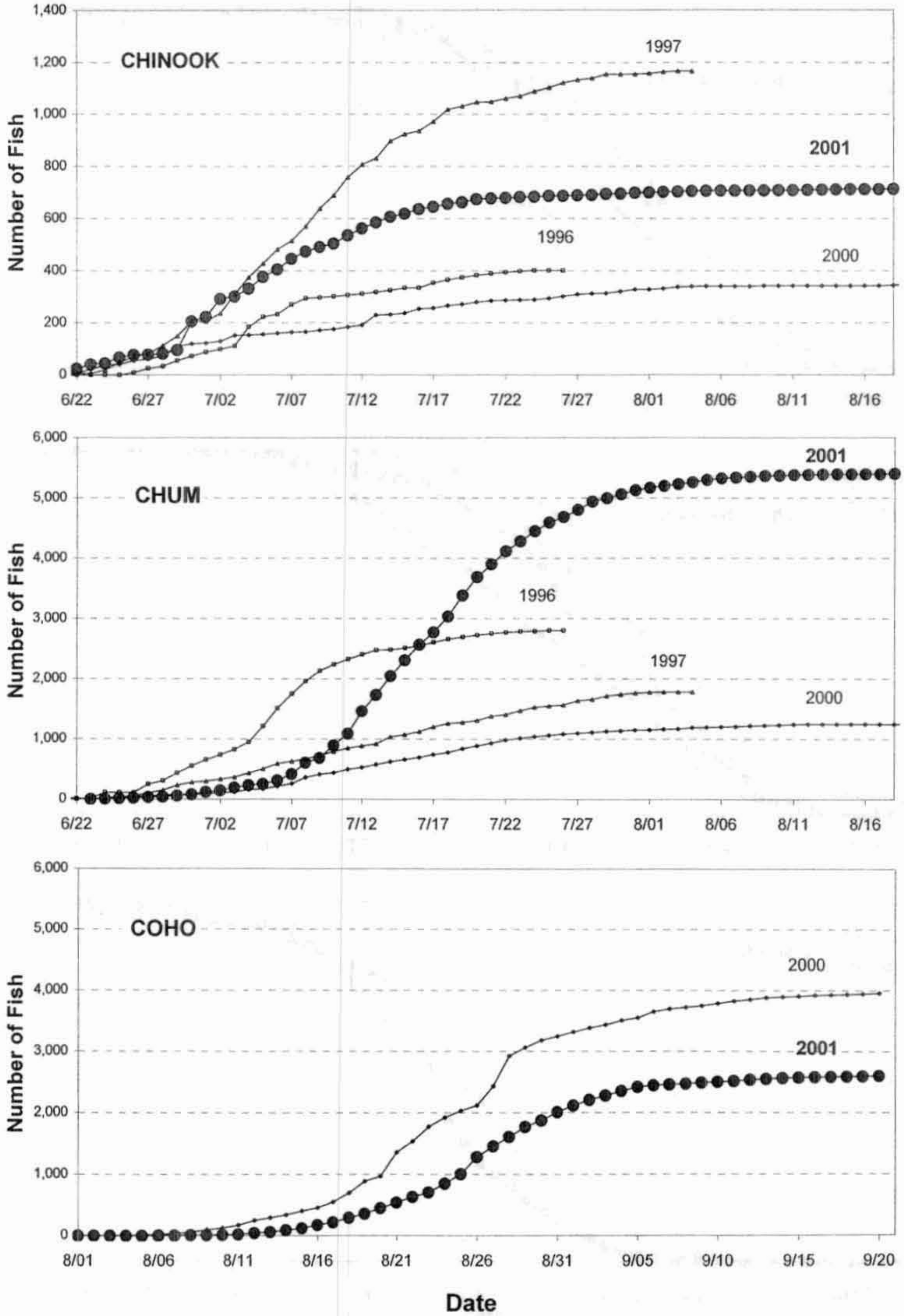

Figure 15. Cumulative passage of chinook, chum and coho salmon past the Takotna River tower (1996 and 1997) and weir (2000 and 2001).

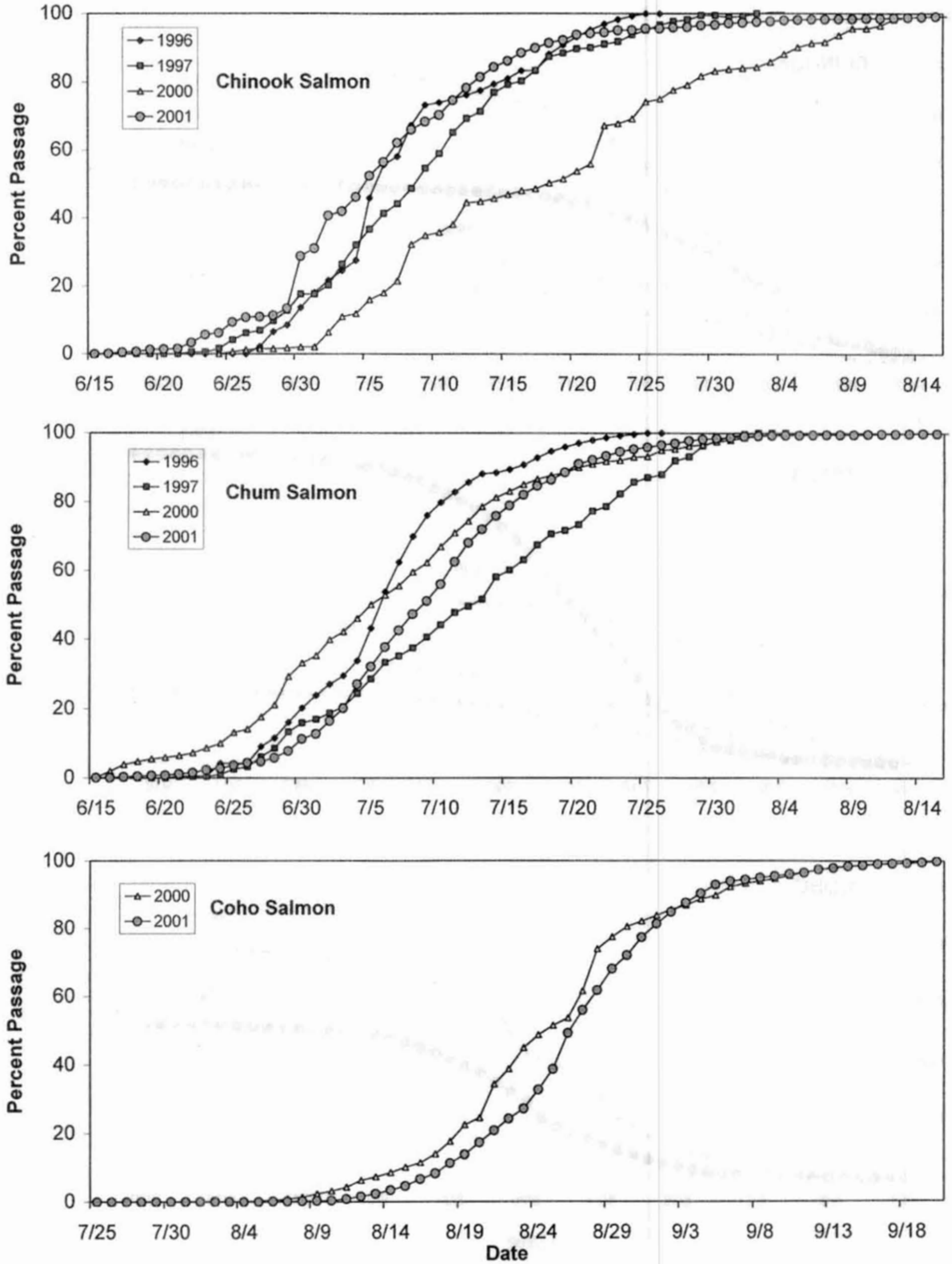

Figure 16. Cumulative percent passage of chinook, chum and coho salmon past the Takotna River tower (1996 and 1997) and weir (2000 and 2001).

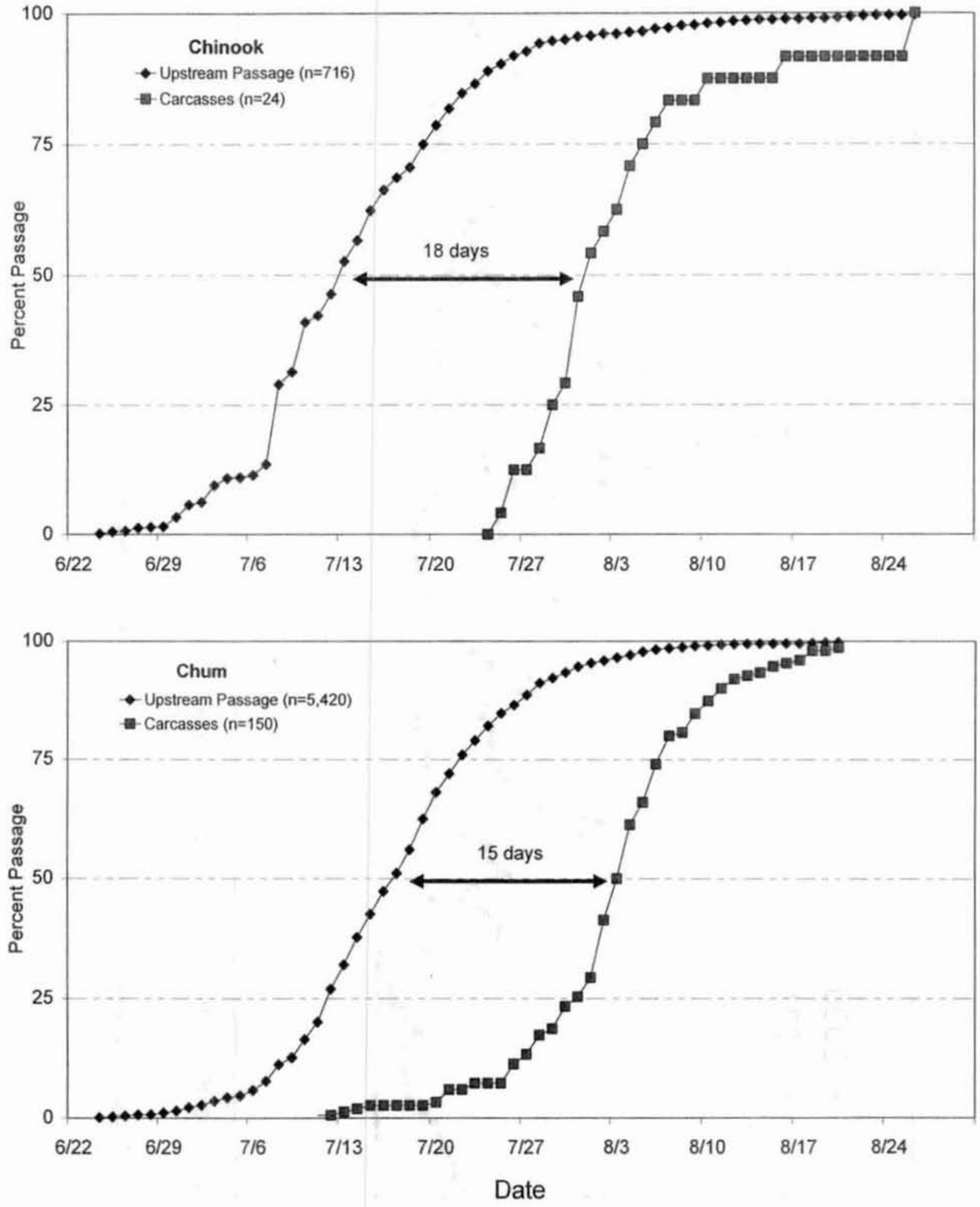

Figure 17. Cumulative percent upstream (live) and downstream (carcass) passage of chinook and chum salmon at the Takotna River weir, 2001.

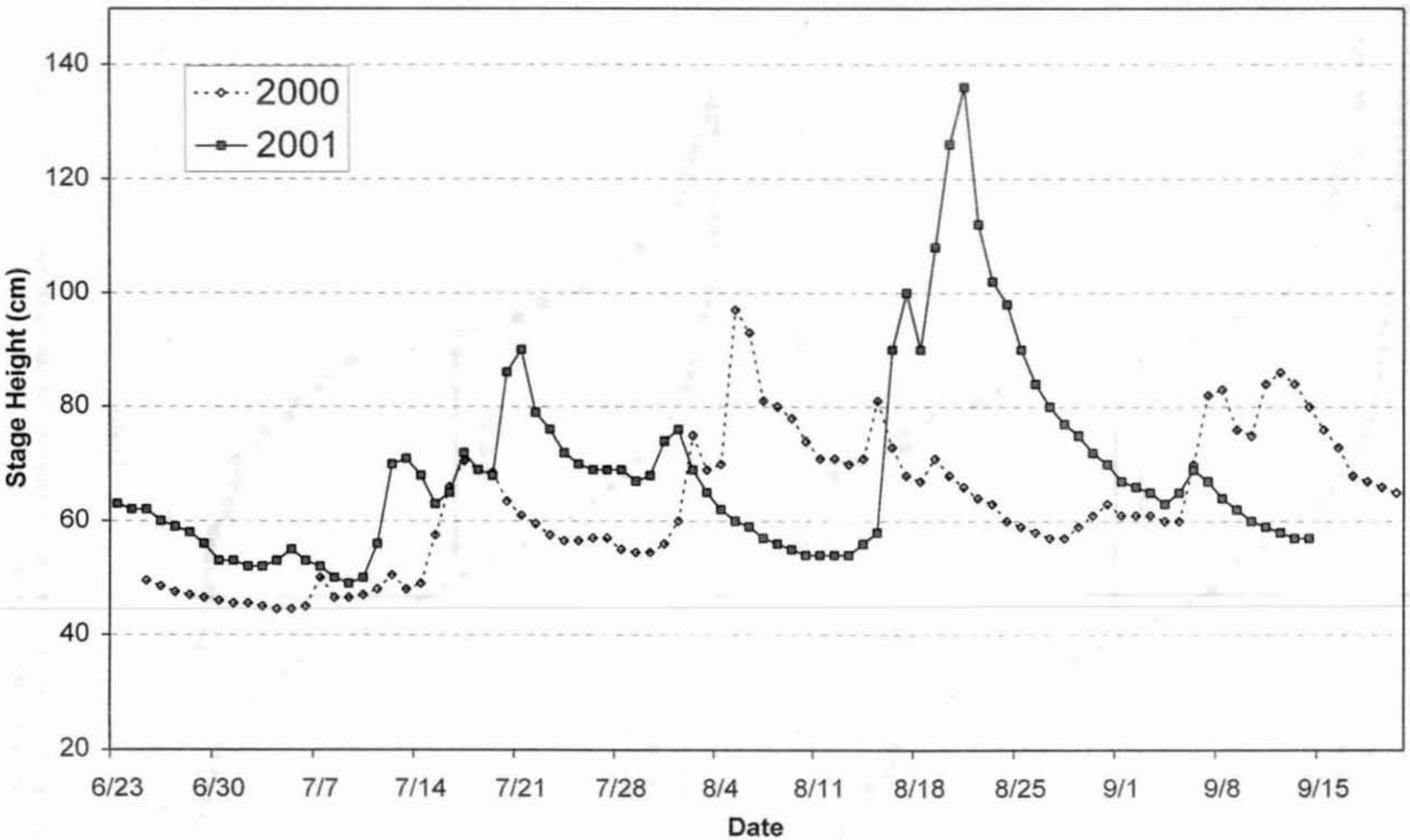

Figure 18. Daily river stage height at the Takotna River weir site, 2000 and 2001.

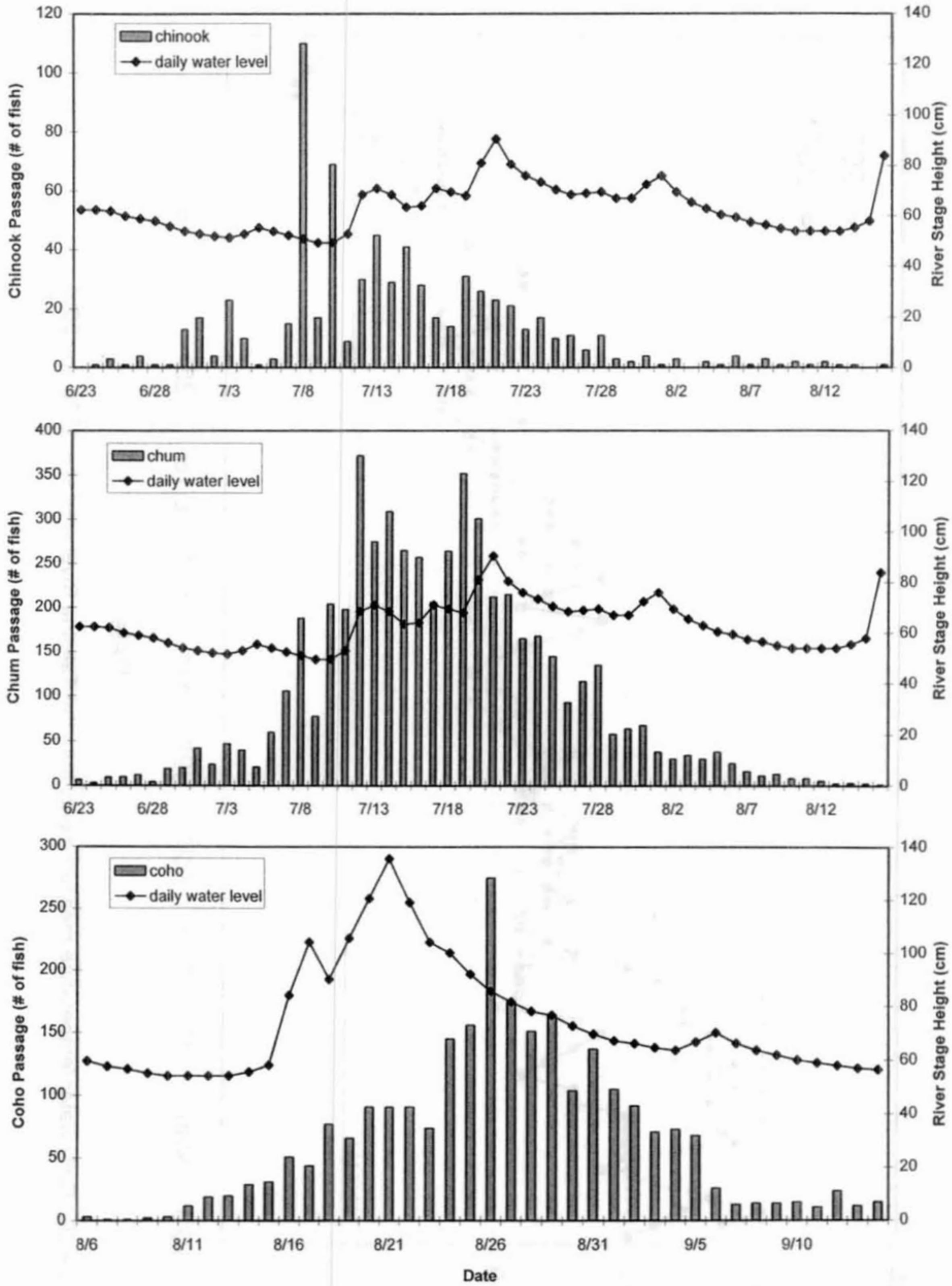

Figure 19. Daily chinook, chum and coho salmon passage at the Takotna river weir relative to river stage height, 2001.

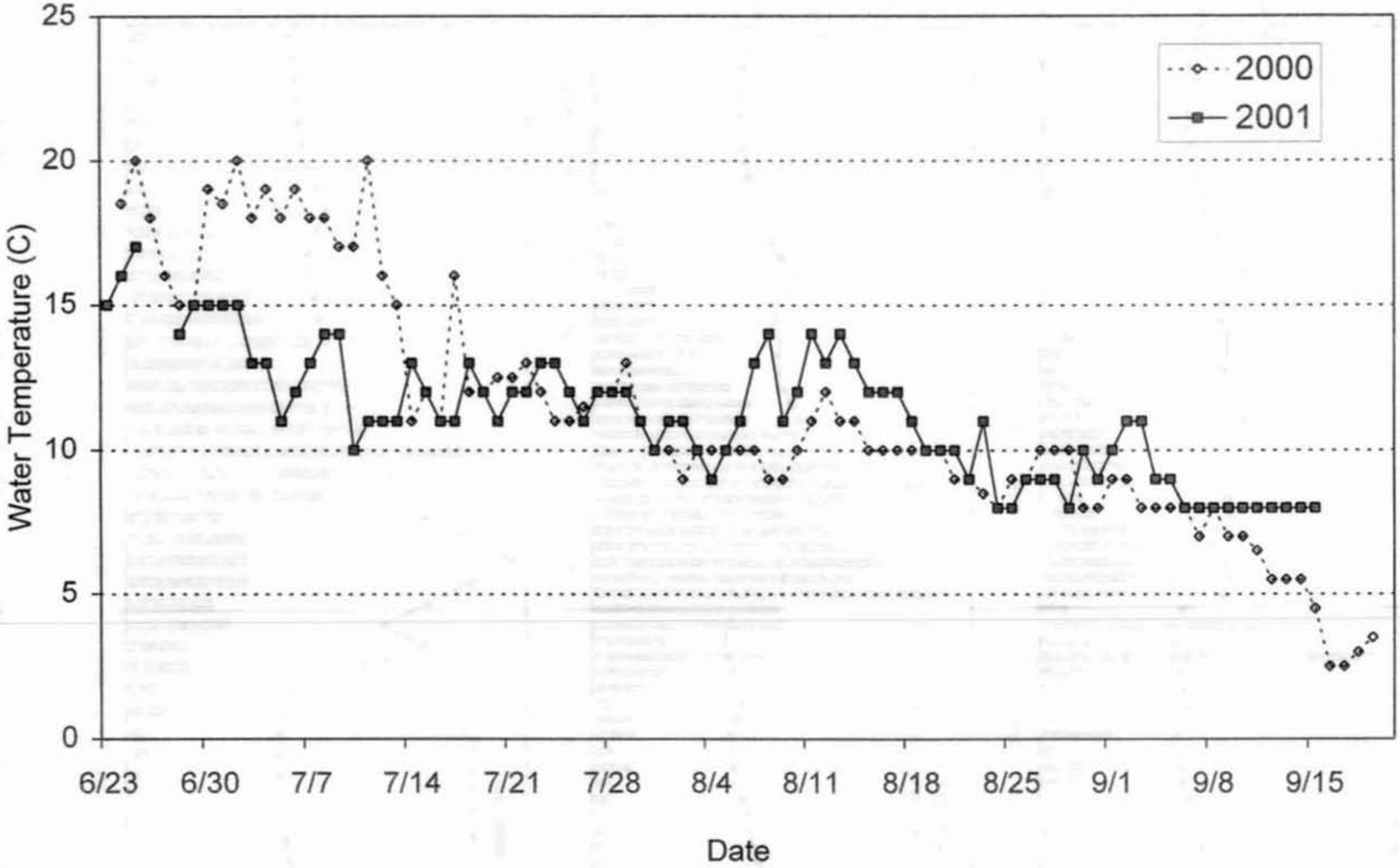

Figure 20. Daily water temperature measurements from the Takotna River weir site, 2000 and 2001.

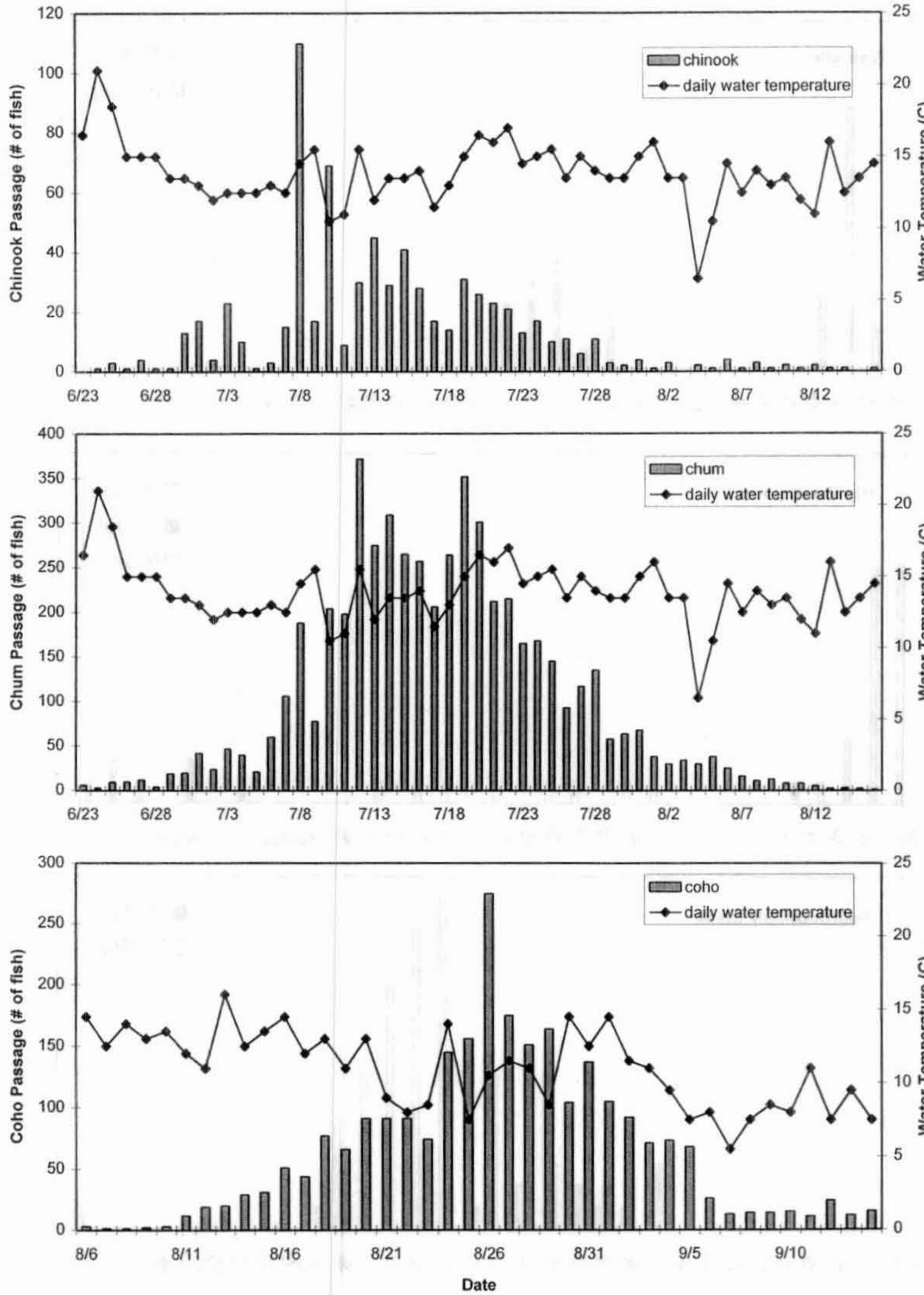

Figure 21. Daily chinook, chum and coho passage at the Takotna River weir relative to daily water temperature, 2001.

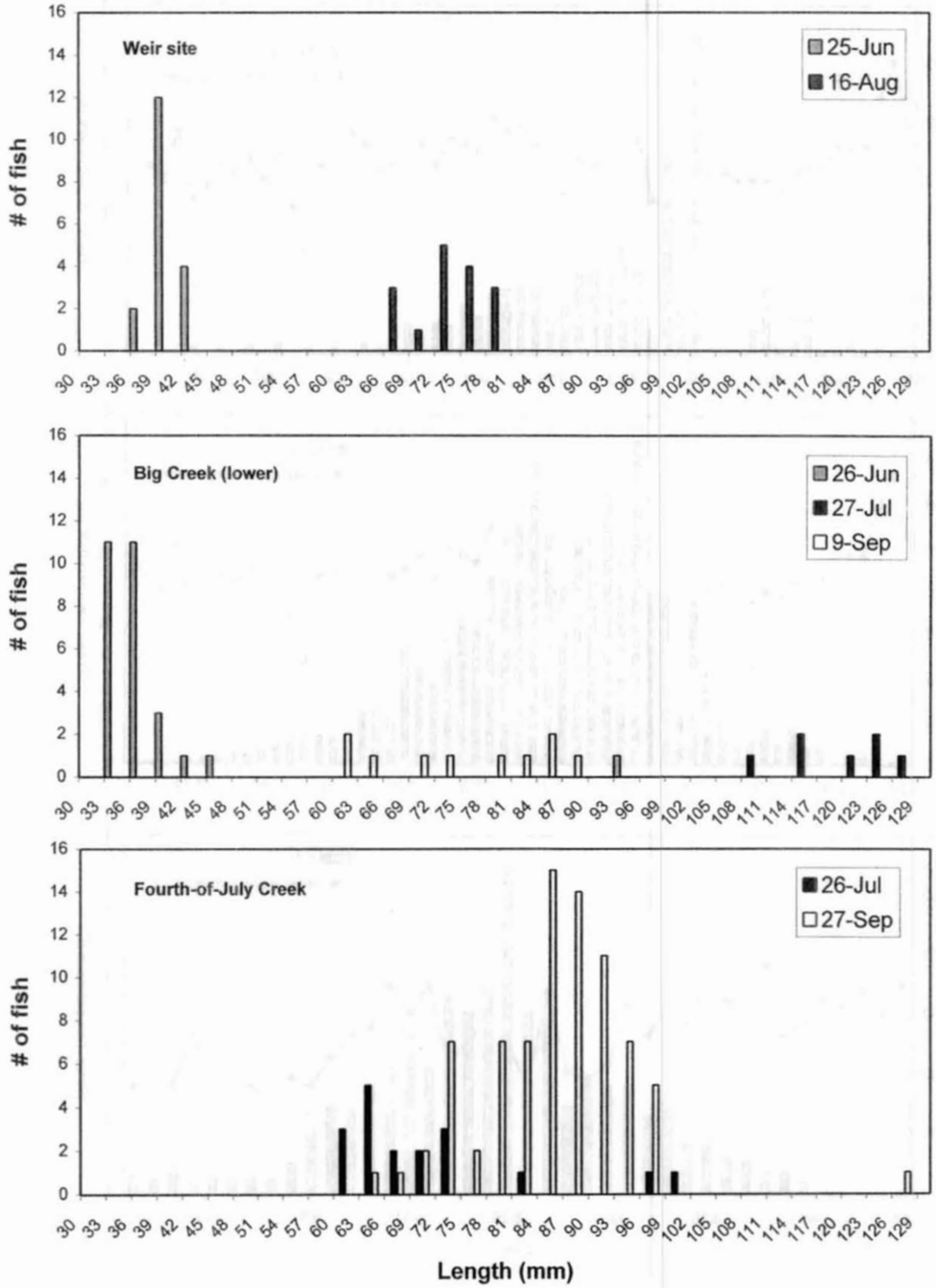

Figure 22. Juvenile chinook salmon lengths sampled from three sites on the Takotna River, 2001.

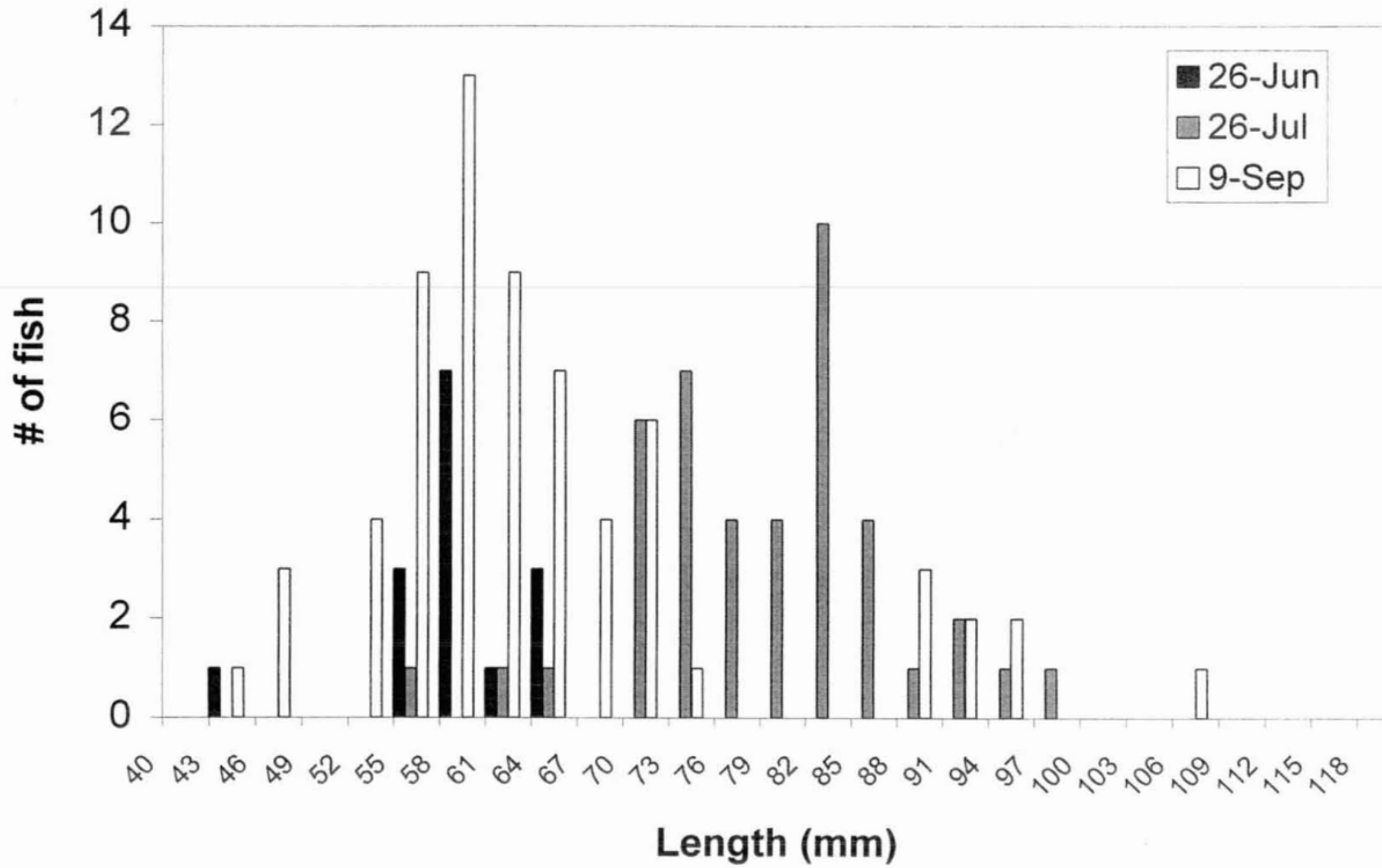

Figure 23. Juvenile coho salmon lengths sampled from Big Creek (lower), Takotna River drainage, 2001.

APPENDIX

Appendix A. Daily climate and water information collected at the Takotna River weir site, 2001.

Date	Time	sky[a]	Precip	wind	Temperature (°C) air	water	River Stage Height (cm)
23-Jun	1030	1	-	E/5	13.0	15.0	63
23-Jun	1800	1	-	E/5	20.0	17.0	62
24-Jun	1000	3	-	E/10	14.0	15.0	62
24-Jun	1900	3	-	E/15	28.0	16.0	63
25-Jun	1000	2	-	W/5	10.0	12.0	62
25-Jun	1700	1	-	W/5	27.0	17.0	62
26-Jun	900	4	-	W/5	15.0	12.0	60
26-Jun	1900	4	-	W/10	-	-	60
27-Jun	900	4	-	-	-	-	59
28-Jun	900	1	-	W/15	14.0	12.0	58
28-Jun	2300	1	-	W/5	16.0	16.0	58
29-Jun	700	1	-	-	10.0	14.0	56
29-Jun	1900	2	-	W/15	17.0	15.0	56
30-Jun	700	4	-	W/5	10.0	15.0	55
30-Jun	1900	4	-	NW/5	17.0	18.0	53
1-Jul	900	4	-	-	11.0	15.0	53
1-Jul	1700	4	-	W/5	15.0	17.0	53
2-Jul	800	4	-	-	11.0	15.0	52
2-Jul	1300	4	-	-	13.0	15.0	52
3-Jul	800	4	-	-	12.0	15.0	51
3-Jul	1900	4	2.5 mm	W/10	13.0	15.0	52
4-Jul	800	4	-	-	9.0	13.0	53
4-Jul	2000	4	-	W/5	16.0	15.0	53
5-Jul	800	4	-	-	10.0	13.0	56
5-Jul	1800	4	-	NW/5	15.0	14.0	55
6-Jul	800	4	-	-	9.0	11.0	55
6-Jul	1800	3	-	NW/5	17.0	14.0	53
7-Jul	800	3	-	-	10.0	12.0	53
7-Jul	1800	3	-	W/5	15.0	14.0	52
8-Jul	800	3	-	-	10.0	13.0	52
8-Jul	1800	3	-	-	19.0	15.0	50
9-Jul	800	1	-	SW/5	10.0	14.0	50
9-Jul	1700	3	-	SW/5	21.0	15.0	49
10-Jul	800	4	2.5 mm	-	11.0	14.0	49
10-Jul	2000	4	3.4 mm	SW/5	10.0	14.0	50
11-Jul	800	4	-	-	12.0	10.0	50
11-Jul	2000	4	3.6 mm	SW/10	10.0	12.0	56
12-Jul	800	4	4.4mm	SW/5	19.0	11.0	67
12-Jul	2000	4	-	-	12.0	12.0	70
13-Jul	800	5	-	-	12.0	11.0	71
13-Jul	1900	4	-	-	12.0	12.0	71
14-Jul	900	4	-	-	13.0	11.0	69
14-Jul	1900	2	-	-	14.0	14.0	68
15-Jul	900	4	-	SW/10	14.0	13.0	64
15-Jul	1900	4	2.5 mm	SW/5	13.0	12.0	63
16-Jul	800	4	2.4 mm	-	14.0	12.0	63
16-Jul	1900	4	4 mm	-	14.0	13.0	65
17-Jul	800	4	.5 mm	-	10.0	11.0	70
17-Jul	2000	4	-	-	13.0	12.0	72
18-Jul	800	1	.2 mm	-	12.0	11.0	70
18-Jul	1900	4	-	-	14.0	14.0	69
19-Jul	800	4	6 mm	-	15.0	13.0	68
19-Jul	1900	4	1.5 mm	SW/5	15.0	13.0	68
20-Jul	800	4	5 mm	-	15.0	12.0	76
20-Jul	1900	4	2.2 mm	S/5	18.0	13.0	86
21-Jul	800	3	-	S/5	14.0	11.0	91
21-Jul	1900	3	-	S/5	18.0	13.0	90
22-Jul	800	4	-	-	15.0	12.0	82
22-Jul	1900	4	-	-	19.0	14.0	79
23-Jul	800	4	-	S/5	15.0	12.0	76
23-Jul	1900	4	-	SW/10	14.0	14.0	76
24-Jul	800	3	-	S/5	15.0	13.0	75

-Continued-

Appendix A. (page 2 of 3)

Date	Time	sky[a]	Precip	wind	Temperature (°C) air	water	River Stage Height (cm)
24-Jul	1900	3	-	-	15.0	14.0	72
25-Jul	800	3	-	SW/5	14.0	13.0	71
25-Jul	1900	4	-	-	17.0	15.0	70
26-Jul	800	4	-	-	13.0	12.0	68
26-Jul	1900	4	8 mm	-	14.0	14.0	69
27-Jul	800	1	-	-	14.0	11.0	69
27-Jul	1900	1	-	-	16.0	14.0	69
28-Jul	800	4	-	-	11.0	12.0	70
28-Jul	1900	3	-	-	17.0	14.0	69
29-Jul	800	4	-	SW/5	12.0	12.0	67
29-Jul	1900	4	-	-	15.0	13.0	67
30-Jul	800	4	6.5 mm	-	13.0	12.0	66
30-Jul	1900	4	10 mm	-	14.0	12.0	68
31-Jul	800	2	-	-	13.0	11.0	71
31-Jul	1900	2	-	SW/5	17.0	13.0	74
1-Aug	800	3	-	SW/10	13.0	10.0	76
1-Aug	1900	2	-	W/5	19.0	14.0	76
2-Aug	800	4	-	W/5	13.0	11.0	70
2-Aug	1900	4	-	S/5	14.0	13.0	69
3-Aug	800	1	-	SW/5	10.0	11.0	66
3-Aug	1900	1	-	SW/5	17.0	12.0	65
4-Aug	800	3	-	SW/5	5.0	10.0	64
4-Aug	1900	1	-	-	8.0	12.0	62
5-Aug	800	1	-	W/5	5.0	9.0	61
5-Aug	1900	1	-	-	16.0	13.0	60
6-Aug	800	1	-	SW/5	11.0	10.0	60
6-Aug	1900	1	-	SW/5	18.0	14.0	59
7-Aug	800	1	-	SW/5	10.0	11.0	58
7-Aug	1900	1	-	-	15.0	14.0	57
8-Aug	800	3	-	SW/10	13.0	13.0	57
8-Aug	1900	3	-	SW/15	15.0	15.0	56
9-Aug	800	4	-	SW/10	12.0	14.0	55
9-Aug	1900	3	-	SW/5	14.0	15.0	55
10-Aug	800	4	-	SW/10	13.0	11.0	54
10-Aug	1900	4	-	S/5	14.0	14.0	54
11-Aug	800	4	-	-	12.0	12.0	54
11-Aug	1900	4	-	SW/5	12.0	13.0	54
12-Aug	800	4	2.5	SW/5	10.0	14.0	54
12-Aug	1900	3	-	SW/5	12.0	12.0	54
13-Aug	800	3	-	-	13.0	13.0	54
13-Aug	1900	4	8.0	-	19.0	15.0	54
14-Aug	800	3	-	SW/10	11.0	14.0	55
14-Aug	1900	4	-	SW/5	14.0	14.0	56
15-Aug	800	4	4.0	S/5	12.0	13.0	58
15-Aug	1900	4	25.0	S/5	15.0	13.0	58
16-Aug	800	3	-	-	11.0	12.0	78
16-Aug	1900	3	-	-	18.0	13.0	90
17-Aug	800	4	-	-	11.0	12.0	108
17-Aug	1900	4	3.5	-	13.0	12.0	100
18-Aug	900	4	7.0	SW/5	12.0	12.0	90
18-Aug	1900	4	0.5	SW/5	14.0	11.0	90
19-Aug	900	4	12.5	SW/5	12.0	11.0	103
19-Aug	1900	4	18.5	W/5	10.0	10.0	108
20-Aug	1000	4	1.5	W/5	14.0	10.0	115
20-Aug	1900	4	-	-	12.0	11.0	126
21-Aug	1000	3	-	NE/15	8.0	10.0	135
21-Aug	1900	3	-	N/10	10.0	10.0	136
22-Aug	900	3	-	-	3.0	10.0	126
22-Aug	2000	3	-	N/5	13.0	10.0	112
23-Aug	900	2	-	-	6.0	9.0	106
23-Aug	2000	1	-	-	11.0	10.0	102
24-Aug	900	1	5.0	-	15.0	11.0	102

-Continued-

Appendix A. (page 3 of 3)

Date	Time	sky[a]	Precip	wind	Temperature (°C) air	water	River Stage Height (cm)
24-Aug	2000	2	-	-	13.0	10.0	98
25-Aug	900	1	-	-	5.0	8.0	94
25-Aug	2000	1	-	-	10.0	10.0	90
26-Aug	900	2	-	-	8.0	8.0	87
26-Aug	2000	3	3.5	S/5	13.0	10.0	84
27-Aug	900	3	-	SW/5	7.0	9.0	83
27-Aug	2000	3	-	-	16.0	11.0	80
28-Aug	900	3	-	-	9.0	9.0	79
28-Aug	2100	4	-	E/5	13.0	9.0	77
29-Aug	1000	1	-	-	8.0	9.0	78
29-Aug	1800	1	-	-	9.0	9.0	75
30-Aug	900	4	-	-	8.0	8.0	73
30-Aug	1630	3	-	-	21.0	10.0	72
30-Aug	2030	2	-	-	9.0	10.0	70
31-Aug	800	1	-	W/3	10.0	9.0	70
31-Aug	1800	2	-	-	15.0	9.0	69
1-Sep	900	5	-	-	8.0	9.0	67
1-Sep	1800	2	-	-	21.0	10.0	67
2-Sep	900	2	-	-	11.0	9.0	66
2-Sep	1800	2	-	W/5	12.0	11.0	66
3-Sep	800	3	-	-	10.0	9.0	65
3-Sep	1800	3	-	-	12.0	11.0	64
4-Sep	800	4	5.0	S/3	9.0	9.0	63
4-Sep	1800	3	-	S/8	10.0	9.0	64
5-Sep	900	4	0.7	S/5	7.0	8.0	65
5-Sep	1800	4	-	SW/10	8.0	9.0	68
6-Sep	900	4	0.7	W/5	8.0	9.0	69
6-Sep	1600	4	-	-	8.0	8.0	71
7-Sep	1000	3	-	W/5	3.0	7.0	67
7-Sep	1700	3	-	-	8.0	8.0	65
8-Sep	1000	4	5.0	var 0-5	7.0	7.0	64
8-Sep	1700	4	-	-	8.0	8.0	63
9-Sep	1000	5	-	-	2.0	6.0	62
9-Sep	1700	1	-	-	15.0	8.0	62
10-Sep	900	1	-	-	2.0	6.0	60
10-Sep	1600	3	-	-	14.0	8.0	60
11-Sep	1100	1	-	S/5	10.0	7.0	59
11-Sep	2000	1	-	SE/5	12.0	8.0	59
12-Sep	900	1	-	-	7.0	6.0	58
12-Sep	2000	1	-	-	8.0	8.0	58
13-Sep	1000	1	-	-	5.0	6.0	57
13-Sep	1700	1	-	-	14.0	8.0	57
14-Sep	1000	4	-	W/5	5.0	7.0	57
14-Sep	1700	4	-	-	10.0	8.0	56

[a] sky condition codes

1 = < 10% cloud cover
2 = < 50% cloud cover
3 = >50% cloud cover
4 = complete overcast
5 = thick fog

Appendix B. Juvenile fish catch data from the Takotna River drainage, 2001.

AREA	DESCRIPTION
1	below weir
2	above weir to 4th of July Creek
3	Big Creek (lower)
4	4th of July Creek
5	Fourth of July Creek to Big Waldren Fork
6	Bonnie Creek
7	Minnie Creek
8	Big Waldren Fork
9	Big Waldren Fork to Moore Creek/Little Waldren Confluence
10	Little Waldren Fork
11	Moore Creek
12	Big Creek (upper)

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
25-Jun	Takotna River	2	seine-5	gravel bar below cut bank	N	62 58.12	156 05.69		chinook	18	38
											42
											39
											40
											40
											40
											39
											41
											43
											42
											37
											39
											40
											39
											40
											41
											42
											39
25-Jun	Takotna River	2	seine-8	gravel bar	S	62 58.12	156 05.69		NA		
25-Jun	Takotna River	2	seine-6	island/gravel bar	S	62 57.94	156 07.14		NA		
25-Jun	Takotna River	2	seine-2	by small creek outlet	N	62 58.01	156 06.95		NA		
26-Jun	Big Creek (lower)	3	seine-17	all within 100 yards of mouth	N	62 50.72	156 19.74		chinook	28	95
											43
											46
											39
											35
											36
											38
											35
											37
											34
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											37
											37
											35
											38
											34
											34
											35
											36
											38
											34
									coho	15	55
											60
											66
											66
											56

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
26-Jun	Big Creek (lower)	3							coho		44
	(con't)								(con't)		66
											58
											61
											60
											58
											55
											59
											58
											59
27-Jun	Takotna River	9	seine-2	gravel bar	N	62 37.88	156 38.00		grayling	~25	
27-Jun	Takotna River	9	seine-1	gravel bar under cut bank	N	62 37.95	156 37.95		whitefish	2	
27-Jun	Takotna River	9	seine-1	gravel bar	S	62 37.90	156 37.49				
27-Jun	Takotna River	9	seine-1	riffle	N	62 38.00	156 36.96		grayling	4	
									sculpin	1	
27-Jun	Takotna River	9	seine-5	gravel bar	N	62 38.20	156 37.11		grayling	~50	
27-Jun	Big Waldren Fork	8	seine-8	gravel bar/backwater	N	62 38.25	156 35.30		grayling	~100	
	(mouth)								sculpin	5	
27-Jun	Takotna River	9	seine-3	gravel bar	S	62 38.38	156 35.06				
27-Jun	Takotna River	5	seine-2	gravel bar/riffle	N	62 38.64	156 34.06		whitefish	~100	
									grayling	12	
27-Jun	Takotna River	5	seine-4	gravel bar	N	62 38.95	156 34.25		grayling	~50	
27-Jun	Takotna River	5	seine-5	gravel bar	S	62 42.25	156 31.07		sculpin	15	
									grayling	12	
27-Jun	Fourth-of-July Creek	4	seine-4	gravel bar under cutbank	S				grayling	~50	
	(mouth)								whitefish	10	
27-Jun	Takotna River	2	seine-3	gravel bar	N	62 49.93	156 20.47		grayling	~50	
27-Jun	Takotna River	2	seine-3	riffle	N	62 50.06	156 20.13		coho	2	65
	(old Takotna)										59
									grayling	~50	
27-Jun	Big Creek (lower)	3	seine-7	gravel bar	N	62 50.72	156 19.74		chinook	3	36
	(mouth)										38
											37
									coho	2	65
											59
2-Jul	Moore Creek	11	seine-5	gravel bar/riffle	N	62 32.25	156 48.82		grayling	~25	
									sculpin	~20	
2-Jul	Moore Creek	11	seine-4	gravel bar/riffle	S	62 32.25	156 48.82		grayling	~10	
									sculpin	~10	
2-Jul	Moore Creek	11	seine-3	straight slow moving stretch	N	62 32.42	156 48.12		sucker	1	
2-Jul	Moore Creek	11	seine-3	gravel bar	N	62 32.48	156 38.48		grayling	~20	
									sculpin	~15	
2-Jul	Moore Creek	11	seine-4	gravel bar under cut bank	S	62 32.37	156 47.88		sculpin	~15	
									grayling	~10	
2-Jul	Little Waldren Fork	10	seine-2	gravel bar/riffle	S	62 32.00	156 47.82		sculpin	~10	
									grayling	1	
2-Jul	Little Waldren Fork	10	seine-2	gravel bar under cut bank	N	62 32.02	156 47.77		sculpin	~50	
2-Jul	Little Waldren Fork	10	seine-3	riffle	N	62 32.10	156 47.65		sculpin	~15	
2-Jul	Little Waldren Fork	10	seine-3	riffle	N	62 32.15	156 47.60		sculpin	~10	
3-Jul	Takotna River	9	seine-6	gravel bar	N	62 32.42	156 47.05		grayling	20	
									sucker	20	
									sculpin	10	
									whitefish	10	
3-Jul	Moore Creek	11	seine-3	gravel bar/riffle	S	62 32.42	156 47.67		coho	50	35
											35
											32
											34
											37
											36
											36
											33
											37
											32
										did not measure 40	
3-Jul	Moore Creek	11	seine-1	backside of gravel bar	N	62 32.45	156 47.75				
3-Jul	Takotna River	9	seine-3	gravel bar	S	62 32.40	156 47.40		sculpin	~20	
									grayling	~15	
3-Jul	Takotna River	9	seine-3	riffle	N	62 32.40	156 47.40		grayling	~30	
									sculpin	~10	

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Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Lengt.
3-Jul	Takotna River	9	seine-5	straight brushy stretch	N	62 32.71	156 46.77		grayling	~20	
									sculpin	~10	
3-Jul	Takotna River	9	seine-3	gravel bar	N	62 33.23	156 46.65		chinook	1	87
									whitefish	~10	
3-Jul	Takotna River	9							grayling	5	
									sucker	5	
3-Jul	Takotna River	9	seine-4	straight stretch with debri	S	62 33.25	156 46.52		sculpin	~20	
									grayling	~10	
3-Jul	Takotna River	9	seine-2	gravel bar	N	62 33.25	156 46.52		sculpin	~20	
									grayling	~10	
3-Jul	Takotna River	9	seine-2	gravel bar/riffle	N	62 33.16	156 46.39		grayling	~25	
									sculpin	~25	
3-Jul	Takotna River	9	seine-2	gravel bar	S	62 33.01	156 46.18		grayling	~15	
									sculpin	~10	
14-Jul	Takotna River	9	traps-4	slow current, gravel bottom	S	62 32.42	156 47.05	14 hrs	sculpin	5	
									burbot	1	140
14-Jul	Little Waldren Fork	10	trap-1	slow current, gravel bottom	S	62 32.39	156 47.58	17 hrs	burbot	1	145
14-Jul	Little Waldren Fork	10	trap-1	slow current, under debri	N	62 32.36	156 47.62	17 hrs	sucker	1	
									sculpin	1	
14-Jul	Little Waldren Fork	10	trap-1	deep, slow current, gravel	N	62 31.81	156 48.12	17 hrs			
14-Jul	Little Waldren Fork	10	trap-1	slow current, under log jam	N	62 31.68	156 48.07	17 hrs			
14-Jul	Little Waldren Fork	10	trap-1	slow current, under log jam	S	62 31.70	156 48.02	17 hrs	sculpin	2	
14-Jul	Little Waldren Fork	10	trap-1	eddy, mud bottom,	S	62 31.76	156 48.12	17 hrs			
14-Jul	Little Waldren Fork	10	trap-1	eddy, mud bottom,	S	62 31.79	156 48.11	17 hrs	sculpin	1	
14-Jul	Little Waldren Fork	10	trap-1	shallow, muddy bottom	S	62 31.87	156 48.02	17 hrs	sculpin	3	
14-Jul	Little Waldren Fork	10	trap-1	8 ft deep, under fallen tree	N	62 31.92	156 48.05	17 hrs			
14-Jul	Little Waldren Fork	10	trap-1	8 ft deep, under fallen tree	N	62 31.92	156 48.03	17 hrs	sculpin	1	
14-Jul	Little Waldren Fork	10	trap-1	log jam	N	62 32.02	156 47.83	17 hrs			
14-Jul	Little Waldren Fork	10	trap-1	fast current, behind riffle	S	62 32.06	156 47.32	17 hrs	sculpin	1	
14-Jul	Little Waldren Fork	10	trap-1	along grassy bank	N	62 32.13	156 47.61	17 hrs	sculpin	2	
14-Jul	Little Waldren Fork	10	trap-1	log jam	N	62 32.16	156 47.72	17 hrs	burbot	1	187
14-Jul	Little Waldren Fork	10	trap-1	log jam	S	62 32.17	156 47.73	17 hrs	burbot	1	143
14-Jul	Little Waldren Fork	10	trap-1	slow current, under a log	S	62 32.17	156 47.73	17 hrs	burbot	1	195
14-Jul	Little Waldren Fork	10	trap-1	under log, below riffle	N	62 32.17	156 47.70	17 hrs	sculpin	3	
									burbot	1	123
14-Jul	Little Waldren Fork	10	trap-1	under wilows, below riffle	N	62 32.22	156.47.60	17 hrs	sculpin	2	
14-Jul	Moore Creek	11	seine-3	slow current, gravel	S	62 32.29	156 52.67		sculpin	~10	
									whitefish	~20	
14-Jul	Moore Creek	11	seine-2	swift water, above riffle	N	62 32.27	156 52.51		whitefish	~20	
									grayling	~10	
14-Jul	Moore Creek	11	seine-4	swift water, below riffle	S	62 32.22	156 52.32		grayling	8	
14-Jul	Moore Creek	11	seine-2	swift water, on riffle	N	62 32.26	156 52.30		sculpin	2	
									grayling	2	
14-Jul	Moore Creek	11	seine-2	swift water, on riffle	S	62 32.26	156 51.91		grayling	2	
14-Jul	Moore Creek	11	seine-2	swift water, above riffle	N	62 32.35	156 51.70		grayling	3	
									sculpin	2	
14-Jul	Moore Creek	11	seine-3	swift water, below riffle	N	62 32.34	156 51.46		grayling	3	
									sculpin	2	
14-Jul	Moore Creek	11	seine-3	swift water, below riffle	N	62 32.34	156 51.46		whitefish	~30	
									grayling	6	
14-Jul	Moore Creek	11	seine-3	calm water, gravel bottom	N	62 32.13	156 50.93		grayling	6	
									sculpin	2	
									sucker	1	
14-Jul	Moore Creek	11	seine-4	calm water, muddy bottom	N	62 32.15	156 50.71		sucker	~50	
									sculpin	~20	
14-Jul	Moore Creek	11	seine-1	swift water along willow bank	S	62 32.40	156 47.68		coho	36	35
											32
											31
											35
											36
											33
											35
											40
											25
											38
											37
											37
											35
											36

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
14-Jul	Moore Creek	11							coho		32
	(con't)								(con't)		30
											32
											31
											34
											35
											35
											46
											33
											30
											37
											35
											35
											36
											33
											30
											45
											32
											38
											38
											31
15-Jul	Takotna River	9	trap-1	gravel bar	N	62 32.42	156 47.04	14 hrs	sculpin	4	
15-Jul	Takotna River	9	trap-1	slow current, grassy bank	N	62 32.48	156 47.25	14 hrs	sculpin	2	
15-Jul	Takotna River	9	trap-1	shallow water, under willows	S	62 32.48	156 47.25	14 hrs	sculpin	4	
15-Jul	Takotna River	9	trap-3	cut bank, under fallen trees	N	62 32.66	156 47.03	14 hrs	sculpin	10	
									burbot	1	125
15-Jul	Takotna River	9	trap-1	cut bank, under a log	S	62 32.64	156 46.87	14 hrs			
15-Jul	Takotna River	9	trap-1	slow current, under willows	S	62 32.56	156 46.82	14 hrs	sculpin	1	
15-Jul	Takotna River	9	trap-2	swift current, under spruce	S	62 32.71	156 46.75	14 hrs	sculpin	1	
15-Jul	Takotna River	9	trap-2	slow water, under log	N	62 32.82	156 46.92	14 hrs	sculpin	1	
15-Jul	Takotna River	9	trap-1	swift water along cut bank	S	62 32.92	156 46.72	14 hrs	sculpin	1	
15-Jul	Takotna River	9	trap-2	grassy bank under willows	N	62 32.93	156 46.92	14 hrs	sculpin	1	
15-Jul	Takotna River	9	trap-2	swift water under log jam	S	62 33.04	156 46.94	14 hrs			
15-Jul	Takotna River	9	trap-1	slow moving 6 ft of water	S	62 33.04	156 46.61	14 hrs			
18-Jul	Big Creek (lower)	3	seine-7	gravel bar above and below	N	62 50.72	156 19.74		chinook	4	85
				the confluence							82
											46
											48
									grayling	~180	
									whitefish	23	
									sculpin	14	
20-Jul	Tatalina Creek	13	trap-2	along grassy bank	S	62 53.04	156 46.61	24 hrs			
20-Jul	Tatalina Creek	13	trap-1	under tree along cut bank	S	62 52.98	156 56.65	24 hrs			
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	N	62 52.97	155 56.63	24 hrs			
20-Jul	Tatalina Creek	13	trap-1	along grassy bank	S	62 52.93	155 56.50	24 hrs	sculpin	1	
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	S	62 52.96	155 56.47	24 hrs			
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	S	62 52.97	155 56.48	24 hrs	sculpin	1	
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	N	62 52.99	155 56.52	24 hrs	sculpin	1	
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	S	62.52.99	155 56.57	24 hrs	sculpin	1	
20-Jul	Tatalina Creek	13	trap-1	eddy under willows	N	62 53.01	155 56.62	24 hrs			
20-Jul	Tatalina Creek	13	trap-2	under bridge	N	62 53.07	155 56.59	24 hrs	sculpin	1	
20-Jul	Tatalina Creek	13	trap-1	under willows along cut bank	S	62 53.07	155 56.57	24 hrs			
20-Jul	Tatalina Creek	13	trap-2	under fallen spruce tree	S	62 53.06	155 56.49	24 hrs			
26-Jul	Fourth-of-July Creek	4	trap-5	log jam on west fork	S	62 49.42	156 21.42	16 hrs	chinook	3	96
											64
											64
									sculpin	13	
26-Jul	Fourth-of-July Creek	4	trap-1	beaver slough	N	62 49.35	156 21.42	16 hrs			
26-Jul	Fourth-of-July Creek	4	trap-2	narrow shallow riffle	S	62 49.35	156 21.03	16 hrs	sculpin	1	
26-Jul	Fourth-of-July Creek	4	trap-4	under fallen trees	S	62 49.37	156 20.82	16 hrs	chinook	3	81
											69
											63
									sculpin	12	
26-Jul	Fourth-of-July Creek	4	trap-9	around large log jam	both	62 49.92	156 21.58	16 hrs	chinook	8	64
											68
											64
											72
											73
											60

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
26-Jul	Fourth-of-July Creek	4							chinook		100
	(con't)								(con't)		60
									sculpin	33	
26-Jul	Fourth-of-July Creek	4	trap-2	side channel below log jam	N	62 49.87	156 21.64	16 hrs	chinook	4	73
											62
									sculpin	11	
26-Jul	Big Creek (lower)	3	trap-8	above log jam	both	62 51.78	156 18.47	20 hrs	coho	43	85
											78
											86
											70
											57
											82
											72
											73
											86
											72
											62
											82
											75
											92
											80
											95
											92
											75
											70
											73
											98
											78
											80
											82
											83
											72
											83
											82
											77
											82
											73
											82
											64
											82
											90
											86
											84
											80
											75
											74
											77
											80
											72
									sculpin	29	
									burbot	1	142
									Dolly Varden	1	153
27-Jul	Big Creek (lower)	3	trap-9	under logs/debri	both	62 50.72	156 19.74	20 hrs	chinook	7	124
											110
											127
											122
											115
											124
											115
									coho	3	84
											85
											82
									sculpin	25	
13-Aug	Big Creek (upper)	12	trap-1	under spruce logs	S	62 40.14	156 32.55	17 hrs	sculpin	1	
13-Aug	Big Creek (upper)	12	trap-2	eddy under willows	N	62 40.15	156 32.55	17 hrs			
13-Aug	Big Creek (upper)	12	trap-1	slow moving water over gravel	S	62 40.16	156 32.54	17 hrs			
13-Aug	Big Creek (upper)	12	trap-1	under a log	N	62 40.16	156 32.52	17 hrs			

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
13-Aug	Big Creek (upper)	12	trap-1	calm water under a cut bank	N	62 40.16	156 32.50	17 hrs	sculpin	2	
13-Aug	Minnie Creek	7	trap-2	under a brush jam	S	62 41.14	156 32.25	17 hrs	burbot	1	125
13-Aug	Minnie Creek	7	trap-1	under willows	N	62 41.13	156 32.23	17 hrs			
13-Aug	Minnie Creek	7	trap-1	under log, sandy bottom	S	62 41.12	156 32.22	17 hrs	sculpin	1	
13-Aug	Minnie Creek	7	trap-1	under overhanging willows	S	62 41.12	156 32.31	17 hrs	sculpin	1	
13-Aug	Minnie Creek	7	trap-1	slow water, muddy bottom	N	62 41.11	156 32.38	17 hrs			
13-Aug	Minnie Creek	7	trap-1	under logs	S	62 41.11	156 32.19	17 hrs			
13-Aug	Minnie Creek	7	trap-1	by grassy bank, gravel	S	62 41.11	156 32.13	17 hrs			
13-Aug	Bonnie Creek	6	trap-2	along grassy bank, mud	N	62 42.44	156 31.64	18 hrs			
13-Aug	Bonnie Creek	6	trap-2	side slough	N	62 42.13	156 32.35	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	log jam	N	62 42.14	156 32.26	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	under fallen spruce tree	N	62 42.13	156 32.39	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	under overhanging trees	N	62 42.11	156 32.32	18 hrs			
13-Aug	Bonnie Creek	6	trap-2	under fallen logs	S	62 42.11	156 32.34	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	under overhanging willows	S	62 42.13	156 32.38	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	under fallen trees	N	62 42.13	156 32.41	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	under log	S	62 42.12	156 32.42	18 hrs	burbot	1	157
13-Aug	Bonnie Creek	6	trap-2	under log	N	62 42.25	156 32.50	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	open stretch, muddy bottom	N	62 42.25	156 32.50	18 hrs			
13-Aug	Bonnie Creek	6	trap-1	below brush jam	N	62 42.12	156 32.52	18 hrs			
16-Aug	Takotna River	2	seine-6	off of small island	N	62 57.94	156 07.14		chinook	16	73
											66
											73
											76
											76
											68
											66
											77
											70
											79
											75
											73
											74
											80
											78
											73
									grayling	~60	
									whitefish	~60	
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.13	155 59.65	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.26	155 59.06	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.37	155 59.17	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.46	155 59.02	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.49	155 59.01	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.46	155 58.99	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.57	155 58.58	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.84	155 58.61	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	S	62 58.85	155 58.56	20 hrs	burbot	1	63
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.84	155 57.90	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.70	155 57.70	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.47	155 57.96	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.18	155 58.13	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.17	155 58.18	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.19	155 58.30	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.09	155 58.56	20 hrs			
26-Aug	Takotna River	1	trap-1	5-mile long beaver slough	N	62 58.07	155 58.47	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	S	62 59.51	155 55.86	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	S	62 59.48	155 55.84	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	S	62 59.45	155 55.83	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	S	62 59.42	155 55.67	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	N	62 59.53	155 55.59	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	N	62 59.50	155 55.53	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	N	62 59.40	155 55.71	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	N	62 59.40	155 55.76	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	N	62 59.41	155 55.81	20 hrs			
26-Aug	Takotna River	1	trap-1	beaver pond/lake next to river	S	62 59.51	155 55.90	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.61	156 11.28	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.56	156 11.27	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.52	156 11.23	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.49	156 11.20	20 hrs			

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.41	156 11.08	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.35	156 11.15	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.36	156 11.22	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.34	156 11.27	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.36	156 11.37	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.40	156 11.43	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62.54.46	156 11.40	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.62	156 11.79	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.63	156 11.79	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.65	156 12.00	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	S	62 54.78	156 12.16	20 hrs			
7-Sep	Takotna River	2	trap-1	oxbow lake connected to river	N	62 54.82	156 12.28	20 hrs			
7-Sep	Takotna River	2	trap-2	oxbow lake connected to river	S	62 54.91	156 12.31	20 hrs			
9-Sep	Big Creek (lower)	3	trap-6	below log jam	N	62 50.72	156 19.74	14 hrs	coho	70	92
											95
											72
											59
											70
											60
											64
											54
											89
											89
											56
											68
											62
											93
											60
											59
											59
											88
											62
											58
											66
											74
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											62
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											108
											68
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											71
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											62
											64
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											68
											65
											56
											64
											72
											52
											62
											58
											60
											45
											59
											53
											57
											66

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
9-Sep	Big Creek (lower) (con't)	3							coho (con't)		63
											55
											57
											58
											96
											72
											63
											67
											62
											56
											47
											47
											60
											72
											55
									chinook	10	65
											72
											89
											85
											62
											71
											78
											62
											85
											82
									burbot	4	175
											177
											132
											115
27-Sep	Fourth-of-July Creek (all traps set within a quarter mile of the log jam at 62 49.92N and 156 21.58W)	4	trap-26	all habitat types with a concentration in and around cover such as logs and debri	both	62 49.92	156 21.58	26 hrs	coho	129	74
											82
											92
											79
											82
											66
											82
											74
											84
											90
											83
											78
											98
											67
											72
											78
											72
											89
											70
											64
											86
											89
											82
											85
											76
											80
											117
											75
											98
											87
											88
											81
											74
											73
											68
											68
											72
											64
											80
											65

-Continued-

Date	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
27-Sep	Fourth-of-July Creek	4							coho		73
	(all traps set within								(con't)		71
	a quarter mile of the										65
	log jam at 62 49.92N										74
	and 156 21.58W)										63
	(con't)										68
											68
											92
											80
											69
											75
											72
											72
											58
											85
											52
											87
											113
											68
											95
											88
											64
											72
											93
											82
											92
											89
											83
											85
											78
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											55
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											80
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											98
											87
											109
											82
											82
											92
											70
											67
											77
											73
											75
											82
											80
											94
											83
											120
											115
											74

-Continued-

ate	Sample Site	Area	Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
27-Sep	Fourth-of-July Creek	4							coho		86
	(all traps set within								(con't)		124
	a quarter mile of the										57
	log jam at 62 49.92N										93
	and 156 21.58W)										86
	(con't)										68
											77
											73
											65
											56
											90
											75
											82
											87
											86
											87
											87
											88
											70
											78
									chinook	80	88
											94
											92
											96
											85
											94
											88
											97
											93
											127
											84
											72
											93
											89
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											98
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											70
											81
											68
											90
											84
											85
											76
											88
											89
											91
											86

-Continued-

Date	Sample Site	Area Seine/Trap (#)	Habitat Description	Bank	Latitude	Longitude	Soak Time	Species	# Caught	Length
27-Sep	Fourth-of-July Creek (all traps set within a quarter mile of the log jam at 62 49.92N and 156 21.58W) (con't)	4						chinook (con't)		89
										86
										90
										88
										79
										65
										78
										92
										88
										85
										80
										88
										90
										90
										82
										95
										83
										82
										96
										94
										84
										70
										73
										86
										81
										84
										78
										89
										88
										72
										80
								burbot	2	146
										182
								sculpin	15	

~ estimation

Appendix C. Aerial survey notes, Takotna River drainage and selected upper Kuskokwim River tributary streams, 2001.

Chum and Chinook

Corey Schwanke (ADF&G)-observer
Jim Ellis (Enterprise Flying)-pilot
PA-12 (180 hp) Piper Cub

Each river survey was assigned a number representing the overall effectiveness of the survey. The rating was based on wind, weather, watercolor, water visibility, bottom color, time of day and spawn stage. The scale is from 1-3, with 1 representing "good", 2 representing "fair" and 3 representing "poor".

July 26. We left Takotna at 10:00 am with 100% overcast skies and calm winds. We arrived at the confluence of Big Waldren/Takotna River (63° 30 N, 156° 35 W) at 10:30 am. We surveyed upstream approximately 10 nautical miles (nm) to where the stream width became too small to see in. No salmon were seen from the air. The water was brownish in color and difficult to see in throughout the drainage. Spawning habitat was present throughout this section, but little was concluded on the presence of salmon because of unfavorable water conditions. The survey was rated a 3.

Next we surveyed from the confluence of Moore Creek/Little Waldren (62° 32.30 N, 156° 47.50 W) up Moore Creek. We surveyed a 17 nm mile portion of Moore Creek. Spawning habitat seemed abundant and looked good throughout most of the tributary. Old mining activity at the headwaters of Moore Creek changed the anatomy of the upper river (airstrip at mine-62° 36.21 N, 157° 08.35) (17 nautical miles from mouth). For about a two mile stretch the river was basically a series man made gravel pits. It is the observer's opinion that if fish were present, some would have been seen. The survey was rated a 2.

We then flew the Little Waldren Fork from its confluence with Moore Creek (62° 32.30 N, 156° 47.50 N) to its headwaters (6 nm). We started this survey at 11:15 am and surveyed till 11:30 am. The water had a slight brown stain but the bottom was visible in most stretches. No fish were seen and it is our opinion that if salmon were present, a few would have been spotted. This survey was rated a 2.

We then flew back to the confluence of Little Waldren/Moore Creek on down the mainstem of the Takotna River to Minnie Creek (about 12 nm). This stretch was marginal for spotting fish because of watercolor and depth. Decent looks were limited to shallow areas. One chum was observed swimming through a riffle approximately one mile above the confluence of Big Waldren Fork. This survey started at 12:05 pm and took 20 minutes to fly. An overall rating of 2 was given to this survey.

Minnie Creek was too small to survey (62° 41.25 N, 156° 32.00 W). It was narrow and had tall trees obscuring the bottom. We then flew to Bonnie Creek (62° 42.50 N, 156° 31.00 W). This creek was slightly larger but visibility was limited to glimpses. No fish were seen in it.

We then flew to the mouth of Fourth-of-July Creek (62° 49.71 N, 156° 19.88 W). We started this survey at 12:55 pm. This river had clear water but had marginal visibility because of channel meandering and bank cover. From the mouth upstream to GPS coordinates 62° 43 N and 156° 45 W, 106 live chinook salmon, 17 chinook carcasses, 474 live chum and 23 chum carcasses were observed. All fish were observed from a stretch starting about four miles above the mouth to a point about three miles downstream of Lincoln Creek. It is believed many more fish were in the river but survey conditions and river anatomy made it difficult to observe fish, especially with chum salmon. Most fish observed appeared to be actively spawning or swimming downstream. One group of chum salmon numbered over 100 fish. Approximately a five nm stretch was surveyed above where the last fish was observed but no more were observed. The survey ended at 1:52 pm and covered about a 20 nm stretch. A rating of 2 was assigned to this survey.

Last, we flew lower Big Creek (62° 50.72 N, 156° 19.74 W). This creek was small and difficult to see in. The water was clear but bank cover was unfavorable. We flew this river three times from different angles looking for fish, but yet no fish were seen. It is our opinion that if there were fish present, we would have been able to see some of them. About 3 nm were flown and the survey was rated a 3.

We then flew to Takotna. Arrived at 3:00 pm with a total of five hours of flying time logged for the day.

July 27. We departed Takotna at 10:05 am headed for the Nixon Fork drainage with 90% clear skies and no wind. We flew straight to the west bank tributary of John Reek Creek (63° 08 N, 155° 46 W). This river was about 10 miles long. The lower five miles had a muddy bottom with high banks and a lot of trees obscuring our view. About half way up the river conditions improved and a little gravel became visible. The upper third of the river had fair spawning habitat and was fair to survey. No fish were seen and the survey was rated a 3.

We then flew about five nm up the Nixon Fork to the tributary Ivy Creek. The water here was stained brown from recent rains and it was not surveyed.

Next we flew a straight line to the mouth of the West Fork (63° 15 N, 155° 22 W). The water here was also stained from recent rains so we flew a straight line up it looking for some favorable water conditions. Conditions never improved so we flew to the headwaters of the Nixon Fork. This was also muddy from recent rains so we changed our plan and headed to the Pitka Fork tributaries, which are not influenced by rain. We departed at 11:45 am and arrived at the Salmon River at 12:10 pm.

Conditions on the Salmon River (62° 53.30 N, 154° 34.20 W) were good for surveying. The sky was almost entirely clear and the wind was calm. All branches of the Salmon River started out with a muddy weedy bottom but opened up to wide sections full of gravel with minimal bank cover, excellent survey conditions. The following is what was observed:

- Section 101- 0 salmon
- Section 102- 264 live chinook salmon
- Section 103- 76 live chinook salmon, 1 chinook salmon carcass
- Section 104- 689 live chinook salmon, 3 chinook salmon carcasses, 3 grizzly bear
- Total- 1,029 live chinook, 4 chinook carcasses

Survey timing appeared good as most fish were in small spawning aggregates, few were observed traveling in the main channel and few carcasses were observed. The survey was assigned a 1, the best rating possible.

We flew to Bear Creek (62° 50.93 N, 154° 33.47 W) next. We flew upstream to 62° 46.77 N and 154° 09.05 W, about 10 nm. Conditions were similar to that of the Salmon River in that it started out muddy with weeds and then opening up to wide open gravel areas with minimal bank cover. We observed 175 live chinook. This survey ended at 2:25 and was rated a 1. We then flew to McGrath to refuel.

After refueling we flew back to the Pitka Fork drainage to Sullivan Creek (62° 48.02 N, 154° 30.28 W). We started the survey at 4:30 pm. This river had similar anatomy to the Salmon River and Bear Creek, but more logs were in the lower half of the river. We observed 22 chinook salmon, all in the upper half where gravel was abundant. We surveyed about 10 nm and the survey was rated a 1.

Next, we continued up to the next tributary of the Pitka Fork, Sheep Creek (62° 46.28 N, 154° 28.38 W). Once again, river anatomy was similar to that of Bear Creek, but only 4 live chinook salmon were observed. We surveyed about 10 nm and the survey was rated a 1.

The water conditions in the Pitka River mainstem improved above the confluence of Sheep Creek so this stretch of river was surveyed next. It was similar to Sheep Creek in anatomy but no fish were observed. Ended the mainstem Pitka Fork survey at 5:30 pm. This survey was also rated a 1.

The weather remained clear and calm so we continued the surveys. Next we flew to an unnamed west bank tributary of the Windy Fork located at 62° 41.58 N and 154° 36.27 W. Some logs/trees obscured the view in the lower half of this clear water stream, but it opened up nicely with lots of gravel and minimal bank cover. A total of 25 live chinook salmon were observed, mostly in the upper half of the tributary. Approximately 8 nm were surveyed and the overall rating was a 1.

Next we flew to the Middle Fork Kuskokwim River and surveyed a west bank clear tributary at 62° 43.68 N and 154° 40.21 W. This river was same as the others flown that day in that they started out with a muddy log strewn bottom and opened up to a wide gravel filled bottom. A total of 55 chinook salmon and two bears were observed, all in the upper stretches. About 7 nm were flown and the overall rating was a 1.

We then surveyed a clear water tributary of the Big River. This was an east bank tributary located at 62° 43.29 N and 154° 51.79 W. This was surveyed to 62° 37.85 N and 154° 54.65 W, a distance of about 11 nm. A total of 16 chinook salmon were observed here, all in the second half of the creek where gravel became abundant. The overall rating for this tributary was determined to be a 1.

On our way to McGrath we flew over Blackwater Creek, which was too stained to see in. We arrived in Takotna at 7:30 pm. We logged 8.5 hours of flying this day.

July 28. Today the skies were mostly cloudy and the winds were calm. We departed Takotna at 10:10 am headed for the Little Tonzona drainage. We arrived at an unnamed clear water tributary of the Little Tonzona (62° 57.74 N, 154° 06.60 W) that had been surveyed the year before. About 12 nm were surveyed and 38 live chinook salmon were observed. Survey conditions were good and an overall rating of 1 was assigned for this survey.

Next we flew up the Little Tonzona to the Big Salmon Fork. This river was glacial but we continued up it looking for some sizeable clear water tributaries to survey but found none.

Next we looked for Clear Creek, a tributary of the Little Tonzona. This stream was very small and difficult to see in.

Next, we flew to a west bank clear water tributary of the South Fork that enters the river about a mile downstream of the confluence of Little Tonzona River. This creek was about 5 nm in length with lots of gravel in the upper half but no fish were seen. An overall survey rating of 1 was given to this survey. We departed this creek at 11:45 am and flew to Jones River (63° 04.25 N, 154° 03.50 W) on the East Fork of the Kuskokwim.

Jones River was difficult to see in, but was surveyed because some parts of the river could be seen in. About 15 nm were flown and 3 chinook salmon were observed, all on one redd below the major fork in the river. We ended the survey at 12:30 pm, and an overall rating of 3 was given to this survey.

We flew back to the South Fork Kuskokwim and flew up it looking for clear water tributaries to survey. We flew to one located at 62° 54.37 N and 154° 05.81 W that was flown during coho season the year before. The South Fork Kuskokwim was running high and had backed into this tributary making surveying it impossible.

We continued upriver to another small tributary that had also been surveyed in 2000 located at 62° 51.28 N and 153° 59.93 W. The South Fork Kuskokwim was also backed into this tributary making it impossible to survey.

We landed in Farewell at 1:10 pm to refuel, and then departed to Jones Creek of the South Fork Kuskokwim. Despite being clear in September of 2000, it was completely glacial. A small tributary about a mile above the confluence was clear and a 2 nm stretch was surveyed. Survey conditions were excellent and 11 chinook salmon were observed. This survey was rated a 1.

Just upriver from the confluence of Jones Creek a couple miles, a clear water east bank stream entered the South Fork Kuskokwim. A 5 nm mile stretch of this tributary was surveyed and 35 chinook salmon were observed. Survey conditions were excellent and the survey was assigned a rating of 1. Survey ended at 2:15 pm so we flew to the Big River.

The first place we went on the Big River was rumored to have chinook salmon in it by a homesteader in the area. This place was an unnamed west bank tributary (61° 55.01 N, 154° 33.72 W) high in the Big River drainage. The water was clear and the survey was assigned a rating of 1. We flew approximately 7 miles and observed 21 chinook salmon, all in the lower half of the tributary.

We continued on down the Big River looking for some water to survey. An east bank tributary at 62° 07.18 N and 154° 39.45 W was flown and 3 chinook were seen in it. It was a short tributary, about 3 miles long, but conditions were excellent for surveying and it was assigned a rating of 1. This survey started at 3:15 and ended at 3:22 pm.

We continued down Big River and did not find any other places to survey. We flew to the Selatna River next. We intersected this river about 30 nm from its mouth. Water conditions were not good for surveying so we flew a straight line down the river looking for a clear tributary. None were found. The habitat in the Selatna River looked good for salmon with lots of gravel, riffles and bank cover.

We departed the Selatna River at 4:30 and headed for Takotna. We intersected Tatalina Creek but the water was too dark to see in. We arrived in Takotna at 5:00 pm. Total flight time for the day was 6.3 hours.

July 29. Today the sky was overcast and it was raining lightly. The winds were calm when we left Takotna at 2:30 pm headed for the West Fork Nixon Fork. We arrived at the confluence of the West Fork and Nixon Fork at 2:45 pm. The water was still dark from recent rains so we flew about the 50% of the bends heading upriver till the conditions became more conducive for surveying. Conditions did improve but never became optimal. No salmon were observed. A rating of 3 was assigned.

From the headwaters of the West Fork, we flew to the headwaters of the Nixon mainstem at 63° 26 N and 154° 30.63 W. We surveyed this downstream 15 nm to 63° 14.47 N and 155° 01.63. The survey conditions of this stretch started out excellent but deterioated as we flew downstream. By the end we could hardly see in the water at all. A total of 11 live chinook and 2 carcasses were observed. Most of these fish were larger fish in shallow water, and/or had lots of fungus on them making them visible. Many more salmon were probably present in this stretch, and below where water conditions were poor for surveying. This survey ended at 4:15 pm and the survey was rated a 3.

Next we flew to Highpower Creek. We arrived here at 4:50 and flew directly to Fish Creek (63° 55.00 N, 153° 40.25 W). River conditions were marginal at the start of the survey but improved to good about half way through the survey. About 10 nm were surveyed and no salmon were observed. A rating of 2 was assigned to this survey.

Next, we flew over a section of the mainstem of Highpower Creek that was surveyed in 2000. The water was dark and difficult to see in so it was not surveyed. We headed back for Takotna with a 15 mph headwind at 5:30 pm. We arrived in Takotna at 6:40 pm for a total flight time of 4.5 hours.

Coho and Late Spawning Chum

Corey Schwanke (ADF&G)-observer
Jim Ellis (Enterprise Flying)-pilot
PA-18 (180 hp) Piper Cub

September 22. Left Takotna at 11:10 am under clear skies and calm winds. Arrived at the confluence of Big Waldren Fork (on the Takotna River) at 11:30 am. Despite it not raining for two weeks, and the Takotna River being relatively low, water conditions were poor and no fish were seen. The water was just too dark to see in, especially in the middle to lower stretches. We ended survey at 11:05 am and it was rated a 3.

We then surveyed from the confluence of Big Waldren up to Moore Creek. Distance surveyed was approximately 12 miles and conditions were good, with an overall rating of 2 assigned. Seven coho salmon were observed, all on one redd about ¼ mile below the confluence of Moore Creek and Little Waldren Fork. Survey conditions were believed to be optimal for this stretch of river.

We surveyed up Moore Creek from the confluence of Moore Creek and Little Waldren next. Conditions were very good for surveying, except for in the shade, which covered about 10% of the river. Four coho salmon were observed, all on one redd, within a mile of the confluence of Little Waldren Fork. About 10 nm were surveyed and an overall rating of 2 was assigned.

We surveyed the Little Waldren Fork next. About eight nm were flown and a rating of 3 was assigned, mostly because bank cover and associated shade, along with a brown stain in the water. No salmon were observed.

We then surveyed the mainstem from the confluence of Big Waldren Fork down to the confluence of Minnie Creek. Conditions were marginal, no fish were observed, and the survey was rated a 2.

Bonnie and Minnie Creeks had too many shadows on them to survey.

Fourth-of-July Creek was surveyed next. This survey started at 1:00 pm and ended at 2:00 pm. Conditions were excellent in the sunlight, but the shaded areas were difficult to see in; shade covered about 20% of the water. A total of 107 live coho and 30 carcasses were observed. The survey was rated a 2. It appeared the survey was a little late based on the proportion of carcasses, downstream movement and empty redds. Overall, fish were observed in the same sections the chinook and chum salmon were observed, but a higher proportion of the coho salmon were observed higher in the drainage than chinook and chum salmon.

Next we surveyed Big Creek (lower). Lots of shade covered this small creek, but at least 50% of it was visible from the air with excellent visibility. Still, only 3 coho salmon were observed. Because of all the shade, a rating of 3 was assigned to the river.

After the Big Creek survey, we flew to McGrath to refuel.

From McGrath, we flew to Big River to look in some of the side sloughs and small clear water tributaries. We flew to the east bank tributary located at 62° 43.29 N and 154° 51.79 W. We arrived at 3:30 pm. No coho salmon were observed but one chinook salmon was observed full of fungus. About five nm were flown and a rating of 1 was assigned.

Next we flew to a west bank tributary of Big River located at 62° 40.71 N and 154° 57.69 where 300 chum salmon were observed in 1996. About a five nm stretch was surveyed and despite excellent survey conditions, no salmon were observed. A rating of 1 was assigned to the survey.

We then flew over to the Middle Fork and surveyed an unnamed tributary at 62° 43.68 N and 154° 40.21 W. About 3 nm were surveyed and no fish were observed. The creek started out with lots of logs in it obscuring the view, but opened up nicely the second half. A rating of 1 was given to the survey.

Then we flew to the Windy Fork and surveyed a tributary located at 62° 41.28 N and 154° 36.27 W. Approximately nine nm were surveyed and 114 coho salmon were observed. Fifty were in one school milling around a small fork in the river and 30 were in a school in a deep bend. A rating of 1 was assigned to this survey.

From this point, we flew about a 10 nm mile stretch of the Windy Fork upstream of the above-mentioned tributary looking for salmon. The bottom was visible in most side channels but no salmon were observed. We decided to fly over to the Pitka Fork next.

We arrived at the mouth of Bear Creek at 4:55 pm. Despite excellent conditions, only nine coho salmon were observed in an eight nm stretch that covered all suitable salmon habitat. An overall rating of 1was assigned to this stretch.

From Bear Creek we flew up the Pitka Fork to Sullivan Creek. This survey started at 5:15 pm and ended at 5:25 pm. Two coho salmon were observed under good conditions. Shadows were longer at this time and covered about 20% of the water in the lower stretches, but hardly any shadows were in the upper stretches where spawning habitat was most abundant. A rating of 1 was assigned to the survey.

We flew to Sheep Creek next but the shadows were getting bad so we ended the surveys and flew to Takotna. Arrived at Takotna at 6:10 pm. Total flight time for the day was 6.5 hours.

September 23. The sky was 90% clear and the wind was blowing from the southwest at 10 mph. The first place we went to was John Reek Creek of the Nixon Fork. No salmon were observed in a three nm stretch and the survey was rated a 3.

Next we flew up the Nixon Fork about 5 miles to Ivy Creek. About 3 miles were surveyed and no salmon were seen. Water conditions were poor and a rating of 3 was assigned.

From there we flew to the mouth of the West Fork. We arrived at 12:30 pm and the survey conditions were bad (water color and shade) so we flew a straight line up it looking for better conditions. Conditions improved a little as we went further upstream but no salmon were observed. Overall rating was a 3.

From the West Fork headwaters we flew over to the Nixon Fork headwaters. We arrived by Von Frank Creek at 1:15 pm, which appears to be the upper limit of salmon habitat. The water conditions were excellent in the upper stretches but deterioated as we flew downstream. We surveyed a distance of 20 nm until conditions were not conducive for surveying. Six live coho, four of which were on one redd, and one carcass was observed. No salmon were observed for the first seven nm, and when the first salmon was observed, conditions were already poor for spotting fish. An overall rating of 3 was assigned to this survey.

We then flew to McGrath to refuel. We departed McGrath at 2:00 pm heading for the Salmon River. We arrived here at 2:30 pm and started to survey section 101. The wind was blowing from the west at 30 mph making it difficult to survey. Because of the wind, we only surveyed sections 101, 102 and 104. Approximately 75% of these sections were flown to the best of the pilot's ability. Despite excellent water conditions, no coho salmon were observed. We ended this survey at 3:15 and a rating of 1 was assigned to the portions that were surveyed.

Next we flew to the Little Tonzona and surveyed an unnamed tributary at (62° 57.74 N, 154° 06.60 W). Approximately an eight nm stretch was surveyed and 208 coho salmon were observed, most of which were in schools of 10-30 fish. Conditions were excellent and a rating of 1 was assigned to the survey.

From the Little Tonzona we flew up the South Fork Kuskokwim to an unnamed west bank tributary at 62° 54.37 N and 154° 05.81 W. This tributary was about 3 nm long and 480 chum and 134 coho salmon were observed. This place is a popular bear hunting spot and some bear hunters had just shot a grizzly bear here. Conditions were excellent and the survey was rated a 1.

We continued up the South Fork Kuskokwim to an unnamed east bank tributary at 62° 51.28 N and 153° 59.93 W. Conditions were excellent and 130 chum and 46 coho salmon were observed in a two nm stretch. A rating of 1 was assigned to the survey.

We continued up the South Fork Kuskokwim to Jones Creek. The wind was blowing over 30 mph up here and surveying was difficult. We made an attempt and flew a few miles up it before turning around. A total of 165 coho salmon were observed before turning around.

We decided to head away from the mountains to get out of the wind and flew towards Sheep Creek. We arrived here at 4:45 pm and surveyed the lower 6 nm stretch of it. A total of 28 coho salmon were observed. A rating of 1 was assigned to the survey.

The wind was picking up so we decided to end the surveys. We flew to McGrath, then on to Takotna. We arrived in Takotna at 5:45 pm. Total flight time for the day was 5 hours.

Appendix D. Daily and cumulative passage of chinook salmon at the Takotna River counting tower, 1995-1998[a] and the Takotna River weir, 2000-2001.

Date	Daily						Cumulative						Percent Passage					
	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001
15-Jun		0	0					0	0					0	0			
16-Jun		0	0					0	0					0	0			
17-Jun		0	0					0	0					0	0			
18-Jun		0	0					0	0					0	0			
19-Jun		0	0					0	0					0	0			
20-Jun		0	0	0				0	0	0				0	0			
21-Jun		0	0	0				0	0	0				0	0			
22-Jun		0	6	0				0	6	0				0	1			
23-Jun		0	0	0		0		0	6	0		0		0	1			0
24-Jun		0	12	0	0	1		0	18	0	0	1		0	2		0	0
25-Jun		0	30	0	2	3		0	48	0	2	4		0	4		1	1
26-Jun		0	24		2	1		0	72	0	4	5		0	6		1	1
27-Jun		9	9	0	1	4		9	81	0	5	9		2	7		1	1
28-Jun		17	33	0	0	1		26	114	0	5	10		7	10		1	1
29-Jun		8	36	0	1	1		34	150	0	6	11		9	13		2	2
30-Jun		21	57	0	1	13		55	207	0	7	24		14	18		2	3
1-Jul		18	0	0	0	17		72	207	0	7	41		18	18		2	6
2-Jul		15	30	3	15	4		87	237	3	22	45		22	20		6	6
3-Jul		12	72	3	16	23		98	309	6	38	68		25	26		11	9
4-Jul		12	66	3	3	10		110	375	9	41	78		28	32		12	11
5-Jul		73	54	0	14	1		183	429	9	55	79		46	37		16	11
6-Jul		39	54	6	7	3		223	483	15	62	82		56	41		18	11
7-Jul	4	10	33		12	15	4	233	516		74	97		58	44		22	13
8-Jul	7	37	54		37	110	11	270	570		111	207		67	49		32	29
9-Jul	2	24	69		9	17	13	294	639		120	224		73	55		35	31
10-Jul	8	3	51		3	69	21	297	690		123	293		74	59		36	41
11-Jul	41	4	74		8	9	62	301	764		131	302		75	65		38	42
12-Jul	8	5	48		22	30	70	305	812		153	332		76	69		44	46
13-Jul	12	5	24		1	45	82	311	836		154	377		78	71		45	52
14-Jul	17	7	66		3	29	99	318	902		157	406		79	77		46	56
15-Jul	9	7	27		4	41	108	325	929		161	447		81	79		47	62
16-Jul	6	9	12		4	28	114	334	941		165	475		83	80		48	66
17-Jul	0	0	36		2	17	114	334	977		167	492		83	83		49	68
18-Jul	12	20	48		6	14	126	353	1,025		173	506		88	87		50	70
19-Jul	12	11	12		4	31	138	364	1,037		177	537		91	88		51	75
20-Jul	6	9	15		8	26	144	374	1,052		185	563		93	90		54	78
21-Jul	0	8	3		7	23	144	382	1,055		192	586		95	90		56	82
22-Jul	9	7	12		39	21	153	389	1,067		231	607		97	91		67	84
23-Jul	0	5	9		2	13	153	394	1,076		233	620		98	92		68	86
24-Jul	0	4	24		5	17	153	398	1,100		238	637		99	94		69	89
25-Jul	0	3	15		17	10	153	401	1,115		255	647		100	95		74	90
26-Jul	0	0	18		3	11	153	401	1,133		258	658		100	97		75	92
27-Jul	0		12		9	6			1,145		267	664			98		78	92
28-Jul	0		6		5	11			1,151		272	675			98		79	94
29-Jul	0		15		9	3			1,166		281	678			99		82	94
30-Jul	3		0		5	2			1,166		286	680			99		83	95
31-Jul	0		-6		2	4			1,160		288	684			99		84	95
1-Aug	0		3		1	1			1,163		289	685			99		84	95
2-Aug	0		9		1	3			1,172		290	688			100		84	96
3-Aug	0		5		5	0			1,176		295	688			100		86	96
4-Aug	0		0		8	2			1,176		303	690			100		88	96
5-Aug					7	1					310	691					90	96
6-Aug					4	4					314	695					91	97
7-Aug	0				1	1					315	696					92	97
8-Aug					7	3					322	699					94	97
9-Aug					7	1					329	700					96	97
10-Aug	0				0	2					329	702					96	98
11-Aug					3	1					332	703					97	98
12-Aug	0				6	2					338	705					98	98
13-Aug					2	1					340	706					99	98
14-Aug					1	1					341	707					99	98
15-Aug	0				0	0					341	707					99	98

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Appendix D. (page 2 of 2)

Date	Daily						Cumulative						Percent Passage					
	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001
16-Aug					0	1					341	708					99	98
17-Aug					0	0					341	708					99	98
18-Aug					2	1					343	709					100	99
19-Aug					0	0					343	709					100	99
20-Aug					0	1					343	710					100	99
21-Aug	0				0	1 c					343	711					100	99
22-Aug					0	1 c					343	712					100	99
23-Aug	0				0	1					343	713					100	99
24-Aug					0	0					343	713					100	99
25-Aug	0				0	0					343	713					100	99
26-Aug					0	1					343	714					100	99
27-Aug					1	1					344	715					100	99
28-Aug	0				0	1					344	716					100	100
29-Aug	0				0	1					344	717					100	100
30-Aug	0				0	1					344	718					100	100
31-Aug	0				0	1					344	719					100	100
1-Sep	0				0	0					344	719					100	100
2-Sep					0	0					344	719					100	100
3-Sep					0	1					344	720					100	100
4-Sep					0	1					344	721					100	100
5-Sep					0	0					344	721					100	100
6-Sep					0	0					344	721					100	100
7-Sep					0	0					344	721					100	100
8-Sep					0	0					344	721					100	100
9-Sep					1	0					345	721					100	100
10-Sep					0	0					345	721					100	100
11-Sep					0	0					345	721					100	100
12-Sep					0	0					345	721					100	100
13-Sep					0	0					345	721					100	100
14-Sep					0	0 c					345	721					100	100
15-Sep					0	0 c					345	721					100	100
16-Sep					0	0 c					345	721					100	100
17-Sep					0	0 c					345	721					100	100
18-Sep					0	0 c					345	721					100	100
19-Sep					0	0 c					345	721					100	100
20-Sep					0	0 c					345	721					100	100

[a]= expanded daily and cumulative numbers from 1995-1998 do not include estimates for missed counts.

b= estimated salmon passage (partial day)

c= estimated salmon passage (whole day)

Appendix E. Daily and cumulative passage of chum salmon at the Takotna River counting tower, 1995-1998[a] and the Takotna River weir, 2000-2001.

Date	Daily						Cumulative						Percent Passage					
	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001
15-Jun		0	0					0	0					0	0			
16-Jun		0	0					0	0					0	0			
17-Jun		0	0					0	0					0	0			
18-Jun		0	0					0	0					0	0			
19-Jun		0	0					0	0	0				0	0			
20-Jun		0	0	0				0	0	0				0	0			
21-Jun		14	6	0				14	6	0				0	0			
22-Jun		0	0	0				14	6	0				0	0			
23-Jun		0	0	0		6		14	6	0		6		0	0			0
24-Jun		102	12	0	1	3		115	18	0	1	9		4	1		0	0
25-Jun		0	27	0	24	9		115	45	0	25	18		4	3		2	0
26-Jun		0	12		23	10		115	57	0	48	28		4	3		4	1
27-Jun		137	51	0	11	12		252	108	0	59	40		9	6		5	1
28-Jun		68	45	0	9	4		320	153	0	68	44		11	9		5	1
29-Jun		127	84	0	6	19		448	237	0	74	63		16	13		6	1
30-Jun		117	48	9	6	20		565	285	9	80	83		20	16		6	2
1-Jul		101	18	0	10	42		666	303	9	90	125		24	17		7	2
2-Jul		85	33	15	18	24		752	336	24	108	149		27	19		9	3
3-Jul		69	33	6	17	47		821	369	30	125	196		29	21		10	4
4-Jul		123	69	3	39	40		944	438	33	164	236		34	24		13	4
5-Jul		264	72	12	12	21		1,207	510	45	176	257		43	28		14	5
6-Jul		295	87	6	45	60		1,502	597	51	221	317		54	33		18	6
7-Jul	0	242	33		44	106	0	1,744	630		265	423		62	35		21	8
8-Jul	53	209	42		101	188	53	1,953	672		366	611		70	37		29	11
9-Jul	82	172	57		49	78	135	2,126	729		415	689		76	41		33	13
10-Jul	222	105	63		27	204	357	2,231	792		442	893		80	44		35	16
11-Jul	63	86	65		58	198	420	2,317	857		500	1,091		83	48		40	20
12-Jul	42	78	33		29	372	462	2,395	890		529	1,463		86	50		42	27
13-Jul	98	70	36		49	275	560	2,464	926		578	1,738		88	52		46	32
14-Jul	117	11	117		50	309	677	2,475	1,043		628	2,047		89	58		50	38
15-Jul	82	26	36		35	265	759	2,502	1,079		663	2,312		90	60		53	43
16-Jul	126	37	54		33	257	885	2,539	1,133		696	2,569		91	63		56	47
17-Jul	11	56	78		51	206	896	2,595	1,211		747	2,775		93	67		60	51
18-Jul	150	53	57		34	264	1,046	2,648	1,268		781	3,039		95	71		62	56
19-Jul	129	35	18		59	352	1,175	2,682	1,286		840	3,391		96	72		67	63
20-Jul	42	29	30		50	301	1,217	2,712	1,316		890	3,692		97	73		71	68
21-Jul	129	26	72		43	212	1,346	2,737	1,388		933	3,904		98	77		74	72
22-Jul	72	21	24		53	215	1,418	2,758	1,412		986	4,119		99	79		79	76
23-Jul	79	16	66		33	165	1,497	2,774	1,478		1,019	4,284		99	82		81	79
24-Jul	8	8	62		23	168	1,505	2,783	1,539		1,042	4,452		100	86		83	82
25-Jul	18	11	24		25	145	1,523	2,794	1,563		1,067	4,597		100	87		85	85
26-Jul	11	0	15		20	93	1,534	2,794	1,578		1,087	4,690		100	88		87	87
27-Jul	33		72		14	117	1,567		1,650		1,101	4,807			92		88	89
28-Jul	21		21		11	135	1,588		1,671		1,112	4,942			93		89	91
29-Jul	29		57		18	58	1,617		1,728		1,130	5,000			96		90	92
30-Jul	66		27		12	64	1,683		1,755		1,142	5,064			98		91	93
31-Jul	6		21		10	68	1,689		1,776		1,152	5,132			99		92	95
1-Aug	0		12		3	38	1,689		1,788		1,155	5,170			100		92	95
2-Aug	0		6		12	30	1,689		1,794		1,167	5,200			100		93	96
3-Aug	0		0		2	34	1,689		1,794		1,169	5,234			100		93	97
4-Aug	0		0		22	30	1,689		1,794		1,191	5,264			100		95	97
5-Aug					5	38	1,689				1,196	5,302					95	98
6-Aug					11	25	1,689				1,207	5,327					96	98
7-Aug	0				5	16	1,689				1,212	5,343					97	99
8-Aug					11	11	1,689				1,223	5,354					98	99
9-Aug					5	13	1,689				1,228	5,367					98	99
10-Aug	0				10	8	1,689				1,238	5,375					99	99
11-Aug					6	8	1,689				1,244	5,383					99	99
12-Aug	0				6	5	1,689				1,250	5,388					100	99
13-Aug					2	2	1,689				1,252	5,390					100	99
14-Aug					0	3	1,689				1,252	5,393					100	100
15-Aug	0				0	2	1,689				1,252	5,395					100	100
16-Aug					0	1	1,689				1,252	5,396					100	100
17-Aug					0	0	1,689				1,252	5,396					100	100
18-Aug					0	7	1,689				1,252	5,403					100	100
19-Aug					0	4	1,689				1,252	5,407					100	100
20-Aug					1	3 b	1,689				1,253	5,410					100	100

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Appendix E. (page 2 of 2)

Date	Daily						Cumulative						Percent Passage					
	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001	1995	1996	1997	1998	2000	2001
21-Aug	0				0	3 c	1,689				1,253	5,413					100	100
22-Aug					0	3 c	1,689				1,253	5,416					100	100
23-Aug	0				0	0	1,689				1,253	5,416					100	100
24-Aug					0	1	1,689				1,253	5,417					100	100
25-Aug	0				0	2	1,689				1,253	5,419					100	100
26-Aug					0	0	1,689				1,253	5,419					100	100
27-Aug					0	0	1,689				1,253	5,419					100	100
28-Aug	0				0	1	1,689				1,253	5,420					100	100
29-Aug	0				1	0	1,689				1,254	5,420					100	100
30-Aug	0				0	0	1,689				1,254	5,420					100	100
31-Aug	0				0	0	1,689				1,254	5,420					100	100
1-Sep	0				0	0	1,689				1,254	5,420					100	100
2-Sep					0	0					1,254	5,420					100	100
3-Sep					0	0					1,254	5,420					100	100
4-Sep					0	0					1,254	5,420					100	100
5-Sep					0	0					1,254	5,420					100	100
6-Sep					0	0					1,254	5,420					100	100
7-Sep					0	0					1,254	5,420					100	100
8-Sep					0	0					1,254	5,420					100	100
9-Sep					0	0					1,254	5,420					100	100
10-Sep					0	0					1,254	5,420					100	100
11-Sep					0	0					1,254	5,420					100	100
12-Sep					0	0					1,254	5,420					100	100
13-Sep					0	0					1,254	5,420					100	100
14-Sep					0	0					1,254	5,420					100	100
15-Sep					0	0 c					1,254	5,420					100	100
16-Sep					0	0 c					1,254	5,420					100	100
17-Sep					0	0 c					1,254	5,420					100	100
18-Sep					0	0 c					1,254	5,420					100	100
19-Sep					0	0 c					1,254	5,420					100	100
20-Sep					0	0 c					1,254	5,420					100	100

[a]= expanded daily and cumulative numbers for 1995 and 1998 do not include estimates for missed counts.
b= estimated salmon passage (partial day)
c= estimated salmon passage (whole day)

Appendix F. Daily and cumulative passage of coho salmon at the Takotna River weir, 2000-2001.

Date	Daily		Cumulative		Percent Passage	
	2000	2001	2000	2001	2000	2001
23-Jun		0		0		0
24-Jun	0	0	0	0	0	0
25-Jun	0	0	0	0	0	0
26-Jun	0	0	0	0	0	0
27-Jun	0	0	0	0	0	0
28-Jun	0	0	0	0	0	0
29-Jun	0	0	0	0	0	0
30-Jun	0	0	0	0	0	0
1-Jul	0	0	0	0	0	0
2-Jul	0	0	0	0	0	0
3-Jul	0	0	0	0	0	0
4-Jul	0	0	0	0	0	0
5-Jul	0	0	0	0	0	0
6-Jul	0	0	0	0	0	0
7-Jul	0	0	0	0	0	0
8-Jul	0	0	0	0	0	0
9-Jul	0	0	0	0	0	0
10-Jul	0	0	0	0	0	0
11-Jul	0	0	0	0	0	0
12-Jul	0	0	0	0	0	0
13-Jul	0	0	0	0	0	0
14-Jul	0	0	0	0	0	0
15-Jul	0	0	0	0	0	0
16-Jul	0	0	0	0	0	0
17-Jul	0	0	0	0	0	0
18-Jul	0	0	0	0	0	0
19-Jul	0	0	0	0	0	0
20-Jul	0	0	0	0	0	0
21-Jul	0	0	0	0	0	0
22-Jul	0	0	0	0	0	0
23-Jul	0	0	0	0	0	0
24-Jul	0	0	0	0	0	0
25-Jul	0	0	0	0	0	0
26-Jul	0	0	0	0	0	0
27-Jul	0	0	0	0	0	0
28-Jul	0	0	0	0	0	0
29-Jul	0	0	0	0	0	0
30-Jul	0	1	0	1	0	0
31-Jul	0	0	0	1	0	0
1-Aug	0	0	0	1	0	0
2-Aug	0	0	0	1	0	0
3-Aug	0	1	0	2	0	0
4-Aug	3	0	3	2	0	0
5-Aug	11	0	14	2	0	0
6-Aug	8	3	22	5	1	0
7-Aug	14	1	36	6	1	0

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Appendix F. (page 2 of 2)

Date	Daily Passage		umulative Passage		Percent Passage	
	2000	2001	2000	2001	2000	2001
8-Aug	19	1	55	7	1	0
9-Aug	40	2	95	9	2	0
10-Aug	31	3	126	12	3	0
11-Aug	44	12	170	24	4	1
12-Aug	80	19	250	43	6	2
13-Aug	42	20	292	63	7	2
14-Aug	51	29	343	92	9	4
15-Aug	58	31	401	123	10	5
16-Aug	54	51	455	174	11	7
17-Aug	98	44	553	218	14	8
18-Aug	146	77	699	295	18	11
19-Aug	192	66	891	361	23	14
20-Aug	80	91 a	971	452	25	17
21-Aug	387	91 b	1,358	543	34	21
22-Aug	178	91 b	1,536	634	39	24
23-Aug	241	74	1,777	708	45	27
24-Aug	152	145	1,929	853	49	33
25-Aug	107	156	2,036	1,009	51	39
26-Aug	86	275	2,122	1,284	54	49
27-Aug	314	175	2,436	1,459	62	56
28-Aug	490	151	2,926	1,610	74	62
29-Aug	140	164	3,066	1,774	77	68
30-Aug	120	104	3,186	1,878	81	72
31-Aug	62	137	3,248	2,015	82	77
1-Sep	70	105	3,318	2,120	84	81
2-Sep	66	92	3,384	2,212	86	85
3-Sep	54	71	3,438	2,283	87	88
4-Sep	70	73	3,508	2,356	89	90
5-Sep	46	68	3,554	2,424	90	93
6-Sep	100	26	3,654	2,450	92	94
7-Sep	42	13	3,696	2,463	93	95
8-Sep	25	14	3,721	2,477	94	95
9-Sep	30	14	3,751	2,491	95	96
10-Sep	36	15	3,787	2,506	96	96
11-Sep	40	11	3,827	2,517	97	97
12-Sep	27	24	3,854	2,541	97	98
13-Sep	29	12	3,883	2,553	98	98
14-Sep	16	15	3,899	2,568	99	99
15-Sep	9	6 b	3,908	2,574	99	99
16-Sep	15	11 b	3,923	2,585	99	99
17-Sep	5	3 b	3,928	2,588	99	99
18-Sep	8	5 b	3,936	2,593	99	100
19-Sep	10	6 b	3,946	2,599	100	100
20-Sep	11	7 b	3,957	2,606	100	100

a= estimated salmon passage (partial day)
b= estimated salmon passage (whole day)

Appendix G. Daily and cumulative upstream passage of longnose suckers at the Takotna River weir, 2000-2001[a].

Date	Daily Passage		Cumulative Passage		Percent Passage	
	2000	2001	2000	2001	2000	2001
23-Jun		2,186		2,186		16
24-Jun	2	571	2	2,757	0	20
25-Jun	67	2,746	69	5,503	2	41
26-Jun	82	2,076	151	7,579	4	56
27-Jun	63	1,748	214	9,327	6	69
28-Jun	101	113	315	9,440	8	70
29-Jun	100	1,095	415	10,535	11	78
30-Jun	220	641	635	11,176	17	83
1-Jul	406	633	1,041	11,809	27	88
2-Jul	641	207	1,682	12,016	44	89
3-Jul	489	94	2,171	12,110	57	90
4-Jul	264	30	2,435	12,140	64	90
5-Jul	134	23	2,569	12,163	68	90
6-Jul	107	5	2,676	12,168	70	90
7-Jul	158	0	2,834	12,168	75	90
8-Jul	229	93	3,063	12,261	81	91
9-Jul	118	38	3,181	12,299	84	91
10-Jul	112	117	3,293	12,416	87	92
11-Jul	94	1	3,387	12,417	89	92
12-Jul	56	20	3,443	12,437	91	92
13-Jul	112	110	3,555	12,547	94	93
14-Jul	60	140	3,615	12,687	95	94
15-Jul	63	107	3,678	12,794	97	95
16-Jul	22	58	3,700	12,852	97	95
17-Jul	9	9	3,709	12,861	98	96
18-Jul	7	95	3,716	12,956	98	96
19-Jul	0	203	3,716	13,159	98	98
20-Jul	3	39	3,719	13,198	98	98
21-Jul	9	38	3,728	13,236	98	98
22-Jul	4	9	3,732	13,245	98	98
23-Jul	0	19	3,732	13,264	98	99
24-Jul	0	39	3,732	13,303	98	99
25-Jul	1	19	3,733	13,322	98	99
26-Jul	4	1	3,737	13,323	98	99
27-Jul	4	6	3,741	13,329	98	99
28-Jul	1	1	3,742	13,330	99	99
29-Jul	7	34	3,749	13,364	99	99
30-Jul	0	0	3,749	13,364	99	99
31-Jul	2	7	3,751	13,371	99	99
1-Aug	2	9	3,753	13,380	99	99
2-Aug	7	22	3,760	13,402	99	100
3-Aug	3	0	3,763	13,402	99	100
4-Aug	1	0	3,764	13,402	99	100
5-Aug	8	0	3,772	13,402	99	100
6-Aug	4	0	3,776	13,402	99	100

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Appendix G. (page 2 of 2)

Date	Daily Passage		Cumulative Passage		Percent Passage	
	2000	2001	2000	2001	2000	2001
7-Aug	3	0	3,779	13,402	99	100
8-Aug	3	0	3,782	13,402	100	100
9-Aug	0	0	3,782	13,402	100	100
10-Aug	1	0	3,783	13,402	100	100
11-Aug	0	0	3,783	13,402	100	100
12-Aug	7	0	3,790	13,402	100	100
13-Aug	0	0	3,790	13,402	100	100
14-Aug	0	0	3,790	13,402	100	100
15-Aug	0	0	3,790	13,402	100	100
16-Aug	0	0	3,790	13,402	100	100
17-Aug	0	0	3,790	13,402	100	100
18-Aug	0	0	3,790	13,402	100	100
19-Aug	0	0	3,790	13,402	100	100
20-Aug	0		3,790	13,402	100	100
21-Aug	0		3,790	13,402	100	100
22-Aug	2		3,792	13,402	100	100
23-Aug	4	0	3,796	13,402	100	100
24-Aug	1	0	3,797	13,402	100	100
25-Aug	0	0	3,797	13,402	100	100
26-Aug	1	0	3,798	13,402	100	100
27-Aug	0	0	3,798	13,402	100	100
28-Aug	0	0	3,798	13,402	100	100
29-Aug	0	0	3,798	13,402	100	100
30-Aug	0	0	3,798	13,402	100	100
31-Aug	0	0	3,798	13,402	100	100
1-Sep	0	4	3,798	13,406	100	100
2-Sep	0	23	3,798	13,429	100	100
3-Sep	0	16	3,798	13,445	100	100
4-Sep	0	5	3,798	13,450	100	100
5-Sep	0	1	3,798	13,451	100	100
6-Sep	0	1	3,798	13,452	100	100
7-Sep	0	1	3,798	13,453	100	100
8-Sep	0	0	3,798	13,453	100	100
9-Sep	0	1	3,798	13,454	100	100
10-Sep	0	1	3,798	13,455	100	100
11-Sep	0	0	3,798	13,455	100	100
12-Sep	0	1	3,798	13,456	100	100
13-Sep	0	0	3,798	13,456	100	100
14-Sep	0	2	3,798	13,458	100	100
15-Sep	0		3,798	13,458	100	100
16-Sep	0		3,798	13,458	100	100
17-Sep	0		3,798	13,458	100	100
18-Sep	0		3,798	13,458	100	100
19-Sep	0		3,798	13,458	100	100
20-Sep	0		3,798	13,458	100	100

[a] expanded daily and cumulative numbers do not include estimates for missed counts.