GEORGE RIVER SALMON STUDIES, 1996 to 2002

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Regional Information Report[1] No. 3A03-17

Alaska Department of Fish and Game
Division of Commercial Fisheries
Anchorage, Alaska 99518

May 2003

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ACKNOWLEDGEMENTS

The salmon escapement monitoring program on the George River is a cooperative project operated jointly by the Kuskokwim Native Association (KNA) and the Commercial Fisheries Division of the Alaska Department of Fish and Game (ADF&G). Since inception of the project in 1996, operational funds have been provided to KNA from the U.S. Bureau of Indian Affairs through grants administered by the Bering Sea Fishermen's Association (BSFA) (#E004400039). In addition, other groups such as the Kuskokwim Corporation and the Sport Fish Division of ADF&G have provided in-kind support to the project in the form of free land-use for camp, facilities, weir fabrication, and welding services. General Fund support from ADF&G included assistance from staff biologists, fish and wildlife technicians who served as crew leaders or crewmembers, and some operational costs. Additional funding in support of this project was provided to ADF&G through a grant from the National Oceanic and Atmospheric Administration (NOAA) under the Western Alaska Fishery Disaster Relief Program (# NA 96FM0196).

Many individuals contributed to the development and operation of the George River weir. We give special thanks to Rob Stewart for directing the design and construction of the weir and his periodic technical assistance and to all who contributed to the design and construction of the weir. Angie Morgan, Samantha John and Elizabeth Ande of KNA assisted with administrative needs and a myriad of other tasks. Our greatest appreciation goes to the following crewmembers that did the bulk of the inseason work:

1996 crew: Stephen Blanchett, Bernard Vaska and Bryon Ward
1997 crew: Stephen Blanchett, Bryon Ward and Nick John.
1998 crew: Bryon Ward and Ronnie Vanderpool.
1999 crew: Bryon Ward, Ronnie Vanderpool and Spencer Rearden.
2000 crew: Ronnie Vanderpool, Andrew John Sr. and Spencer Rearden.
2001 crew: Ronnie Vanderpool, Andrew John Sr. and William Hoffman.
2002 crew: Ricky Ciletti, Dwayne Hoffman and Chad Latham.

The authors want to thank the numerous high school students from communities in the KNA Region who contributed to project operations through the KNA sponsored student Internship program. The U.S. Fish and Wildlife Service, Office of Subsistence Management, provided funding support for the internship program through the Fisheries Resource Monitoring Program.

Additionally, we would like to thank the Vanderpool family of Georgetown who annually provided winter storage facilities for equipment, assisted with and provided facilities for equipment repair and maintenance, and who provided weir crews with many hours of Alaskan hospitality. Finally, we would like to thank Larry Nicholson of Gull Cape Air for his long hours and invaluable expertise in conducting low-level aerial stream surveys.

FOREWORD

Part of the mission of this project is to promote local involvement and to develop the capacity of KNA to engage effectively in salmon resource management. Since inception, the project's crew consisted of two locally hired KNA technicians and one ADF&G technician. The project annually serves as a platform to host several student interns from surrounding communities to offer "hands-on" work experience at the weir.

Oversight of field operations is shared between KNA and ADF&G. Both organizations make use of the weir data during inseason salmon management deliberations. ADF&G takes the lead in data management, data analysis and reporting; although, more of this responsibility is expected to shift to KNA since the addition of their fishery biologist position sponsored through the U.S. Fish and Wildlife Service, Office of Subsistence Management, Partners Fisheries Program, funded under the Fishery Resource Monitoring Program.

George River weir has developed into a useful tool for salmon management. Ideally the project will continue to operate as a cooperative project, with active participation by KNA and ADF&G staff, but the outlook for future funding is unstable. Future funding from BSFA is tenuous because of instability in their grant program. Funding sources for ADF&G involvement have included state General Funds and the Western Alaska Disaster grant. The Western Alaska Disaster grant terminates following June 2003 field season. New funding sources need to be identified for both KNA and ADF&G if the George River weir is to continue beyond 2003.

Data presented in this report supercedes information found in previous reports. This report includes data and references to other research projects in the Kuskokwim Area. Complete documentation of these projects and results appear in separate reports.

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ABSTRACT

George River salmon escapements were annually monitored from 1996 through 2002 using two types of fish weirs. A fixed weir was used from 1996 to 1998; the project was transitioned to a resistance board weir from 1999 through 2002, with a number of modifications made each year. The total annual escapements of chinook salmon were 7,716, 7,823, 3,548, 2,960, 3,309, and 2,444 fish in 1996, 1997, 1999, 2000, 2001 and 2002 respectively. In 1998, the project ended prematurely on 7 July, 2,505 chinook salmon observed passing the weir. For chum salmon, the total annual escapements were 21,670, 5,907, 11,552, 9,656, 3,492, 11,601 and 6,543 fish in 1996, 1997, 1999, 2000, 2001 and 2002 respectively. In 1998, 6,391 chum salmon were observed passing the weir before the project ended. For coho salmon, the total annual escapements were 9,210, 8,914, 11,262, 14,398 and 6,759 fish in 1997, 1999, 2000, 2001 and 2002 respectively. Chinook and chum salmon escapements to the George River have been declining, and coho salmon escapements have remained relatively stable, since 1996;a contrast to chinook and chum salmon escapement trends seen elsewhere in the Kuskokwim River drainage. ASL composition estimates of the total annual chinook, chum and coho salmon escapements in most years, were generally consistent with ASL trends seen elsewhere in the Kuskokwim River drainage. Results from spaghetti tagged chum, sockeye and coho salmon recaptured at the George River weir as part of a mark-recapture project initiated in 2001,generated run timing, travel time and travel speed estimates from the tagging sites near Kalskag and Aniak for chum and coho salmon bound for the George River in 2002. Results of aerial surveys conducted on the George River in 2001 and 2002 gave indications of where chinook and chum salmon spawn within the drainage and its tributaries. Paired data sets between aerial survey counts and total annual salmon escapements were obtained in 2001 and 2002.

KEY WORDS: chinook salmon, *Oncorhynchus tshawytscha*, chum salmon, *O. keta*, coho salmon, *O. kisutch*, escapement, age-sex-length, George River, Kuskokwim River, resistance board weir, mark recapture, aerial surveys

INTRODUCTION

George River is located in the middle Kuskokwim River basin (Figure 1) and provides spawning and rearing habitat for chinook salmon *Oncorhynchus tshawytscha*, chum salmon *O. keta* and coho salmon *O. kisutch* that contribute to subsistence, commercial and sport fisheries of the Kuskokwim River (ADF&G 1998). Small numbers of sockeye salmon *O. nerka* and pink salmon *O. gorbuscha* also migrate in the river. In the Kuskokwim River downstream of its confluence with George River, the average annual subsistence harvest includes 78,564 chinook salmon, 51,417 chum salmon and 29,450 coho salmon (Burkey et al. 2002). The Kuskokwim River supports one of the largest subsistence salmon fisheries in the world, and for many local residents subsistence fishing is a fundamental component of their culture (Coffing 1991, 1997a, 1997b; Coffing et al. 2000). The lower Kuskokwim River supports commercial fisheries that average an annual harvest of 18,081 chinook salmon, 216,406 chum salmon and 453,755 coho salmon (Burkey et al. 2002). These commercial fisheries are an important component of the market economy of lower Kuskokwim River communities (Buklis 1999; Burkey et al. 2002). Salmon production from the George River contributes to the overall Kuskokwim River salmon harvests both in terms of numbers of fish and in adding to the diversity of salmon spawning populations that support these fisheries.

George River is a popular location for sport fishing and the river is an access route for recreational and subsistence hunters. Professional guide operations based both within and outside the Kuskokwim Area use George River as an angling and hunting destination for their clients. In 2000, the George River received some of the highest chinook salmon sport-fish angler effort in the middle Kuskokwim River region (Burr 2002). Escapement monitoring will help ensure continued wise management practices to provide for sustainable harvest opportunity for these various user groups.

Objectives

1. Determine daily and total annual escapements of chinook, chum and coho salmon to George River during the target operation period of 15 June through 20 September;

2. Estimate age-sex-length (ASL) composition of the total annual chinook, chum and coho salmon escapements to George River from a minimum of three pulse samples, one collected from each third of the run, such that simultaneous 95% confidence intervals for the age composition in each pulse are no wider than 0.20 ($\alpha = 0.05$ and $d = 0.10$);

3. Profile habitat variables: daily water temperature, water level, and water chemistry (conductivity, pH, alkalinity, turbidity, color, calcium, magnesium and iron) of George River;

4. Establish chinook salmon aerial survey index areas in George River and collect paired data for aerial survey and weir counts in 2001 and 2002,

5. Recover tag numbers and associated information from chum, sockeye and coho salmon in support of a mark/recapture study conducted on the mainstem Kuskokwim River in 2001 and 2002; and

6. Serve as a monitoring site for chinook salmon equipped with radio telemetry transmitters deployed as part of a mark/recapture tagging study conducted on the mainstem Kuskokwim River in 2002;

Background

Kuskokwim River drains an area of approximately 50,000 square miles, 11 percent of the total area of Alaska (Brown 1983, Figure 2). Each year mature Pacific salmon *Oncorhynchus spp.* return to the river and support intensive subsistence and commercial fisheries that average an annual harvest of 1.7 million salmon (Burkey et al. 2002). 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, Coffing 1997a, Coffing 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. 2002). Salmon that contribute to these fisheries spawn and rear in nearly every tributary of the Kuskokwim River basin; however, few spawning streams receive any rigorous salmon escapement monitoring. Deficiency of escapement data limits the ability of management authorities and researches to assess the adequacy of escapements and the impacts of management decisions. Even information such as general inter- and intra-annual patterns in ASL composition have been lacking for Kuskokwim River salmon escapements. The need to address this escapement data gap became even more important in September 2000, when the Alaska Board of Fisheries (Board) classified both Kuskokwim River chinook salmon and chum salmon as "stocks of concern" (as defined in 5 AAC 39.222) because of the chronic inability of managers to maintain expected harvest levels (Burkey et al. 2000a, Burkey et al. 2000b).

Historically, several Kuskokwim River tributaries were sometimes surveyed for spawning salmon through the use of small fixed-wing aircraft (Burkey et al. 2002, Schwanke and Molyneaux 2002). Biologists from ADF&G conducted sporadic aerial surveys to document salmon escapements in George River since 1960 (Schneiderhan 1983, Burkey and Salomone 1999) (Appendix A). These aerial surveys are typically flown in late July when chinook salmon are believed to be at their peak spawning abundance. The surveys provide an index of escapement abundance and their utility for indexing chum salmon and coho salmon escapements are not generally considered reliable under the conditions found in the Kuskokwim River basin (Burkey et al. 2002).

The only long-term ground-based escapement monitoring projects in the Kuskokwim River basin have been in the Kogrukluk River (1976 to present; Clark and Molyneaux 2003a) and the Aniak River (1980 to present; Sandall 2003). These tributaries constitute a modest fraction of the total Kuskokwim River basin, and are incomplete in their representation of the diversity of salmon populations that contribute to harvests. In addition, the pattern of salmon ASL composition observed in Kogrukluk River has been shown to be an anomaly (DuBois and Molyneaux 2000), and the passage estimates generated by the sonar project on Aniak River are not apportioned to species. Other escapement monitoring projects were developed within the Kuskokwim River basin, but these initiatives were short-lived (Burkey et al. 2002). Inception of the George River weir in 1996, coupled with other initiatives begun in the late 1990s, provides some of the additional escapement monitoring required for sustainable salmon management (Mundy 1998, Holmes and Burkett 1996).

The goal of salmon management is to provide for sustainable long-term fisheries, and is achieved in part by ensuring adequate numbers of salmon escape the fisheries to spawn each year. Since 1960, management of the Kuskokwim River subsistence, commercial, and sport fisheries has been the responsibility of ADF&G. Management authority for the subsistence fishery was broadened in October 1999 to include the federal government under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA), the U.S. Fish and Wildlife Service (USFWS) is the federal agency most involved in the Kuskokwim Area. In addition, Tribal groups such as Kuskokwim Native Association (KNA) are charged by their constituency to actively promote a healthy and sustainable subsistence salmon fishery. These three groups combined their resources to develop several new projects, including the George River weir, to better achieve their common goal of providing for sustainable long-term salmon fisheries in Kuskokwim River.

Sustaining Kuskokwim River salmon fisheries through effective management requires more than just ensuring adequate escapement. Ground-based escapement projects, such as the George River weir, commonly serve as platforms for collecting other types of information useful for salmon management and research. Knowledge of the ASL compositions of salmon populations can provide insights into understanding fluctuations in salmon abundance and for developing spawner-recruit relationships used in formulating escapement goals (DuBois and Molyneaux 2000). Collection of ASL data is typically included in most escapement monitoring projects (e.g., Gates and Harper 2002, Roettiger et al. 2003, Estensen 2002, Clark and Molyneaux 2003a). Water temperature, water chemistry and stream discharge are all fundamental variables of the stream environment that directly and indirectly influence salmon productivity (Hauer and Lambert 1996). These variables can change by anthropogenic activities (mining, timber harvesting, man-made impoundments, etc.; NRC 1996), or climatic changes (e.g., El Nino and La Nina events) that can in turn have an effect on stream productivity and timing of events such as salmon migration and spawning (Kruse 1988). The operational plan for the George River weir included collecting ASL and habitat data that contributed towards long-term information needs.

Historically, the northern region of the Kuskokwim Mountains, including the George River drainage, supported a relatively high level of mining activity. Since the early 1900s, several small to moderate size mining camps operated intermittently in the middle and upper George River drainage (Brown 1983). A small tributary of George River named Julian Creek received intermittent mining activity since the early 1900s, and this activity continues at a recreational level today. Mining interest in the northern region of Kuskokwim Mountains expanded in recent years with proposed large-scale open-pit gold mining operations at Donlin Creek in the Crooked Creek drainage, which borders the George River drainage. Development of the Donlin Creek mine heightens the interest and need for continued monitoring of George River salmon populations. Impacts of this proposed mine will likely include increased recreational and subsistence activities in the George River area because of the resulting increase in human population associated with development of the Donlin Creek mine.

METHODS

Study Site

George River originates in the northern Kuskokwim Mountains within the middle Kuskokwim River basin and flows south for approximately 75 mi to its confluence with the Kuskokwim River at river mile (rm) 309 (river kilometer (rkm) 497) (Figure 1). George River drains an area of approximately 1,400 square miles of mostly upland spruce-hardwood forest. Major tributaries include the East, South and North Forks, and Michigan and Beaver Creeks. White spruce and scattered birch or aspen are common on south-facing slopes, but black spruce is more characteristic on northern exposures and poorly drained areas. The understory consists of spongy moss and low brush in poorly drained areas, grasses in well-drained areas, and willow and alder in the open forest near timberline.

The weir site is located in a poorly drained area at Latitude 61° 55' 260" and Longitude 157° 42' 000", and is approximately four river miles (seven river km) upstream of the river's confluence with the Kuskokwim River (Figure 1). At average flow, the low river gradient at this location produces a stream discharge of approximately 1,974 ft^3/s (55.9 m^3/s). The profile of the 360-ft channel is uniform, the central 300-ft measuring approximately three feet in depth during average water levels. The substrate is composed of medium sized gravel and coble.

Georgetown is the nearest settlement located on the mainstem of the Kuskokwim River approximately one half-mile upstream from the George River confluence. Georgetown is currently the homestead of Bob, Anne and Richard Vanderpool. The Vanderpool family does not have telephone service, but can be contacted by marine VHF radio. In support of the project, the Vanderpool family allowed KNA and ADF&G to use their facilities for winter storage of camp equipment. Historically, the formal community of Georgetown was an early 1900s mining settlement of approximately 200 residents until a fire destroyed most of the town in 1911 (Brown 1983).

Approximately 20 miles upstream from the George River is the community of Red Devil, population 44 (Williams 2000). The town does not have a grocery store, but gasoline can sometimes be purchased from a local vendor who operates Vanderpool Flying Service. Several air taxi carriers service Red Devil from Aniak six days a week.

Approximately 20 miles downstream from George River is the community of Crooked Creek, population 137 (Williams 2000). Crooked Creek has retail outlets for groceries and gasoline, but supplies can be limited. Several air taxi carriers service Crooked Creek from Aniak six days a week.

Weir Design and Maintenance

A fixed weir was installed in the George River from 1996 through 1998, but in 1999 most of the fixed weir was replaced with a resistance board weir. Fixed weir sections continued to be used along the river margins, but in successive years the fixed weir was replaced with additional resistance board weir sections. By 2001, lengths of fixed weir used were reduced to a 10-ft section at each bank. Design modifications as described in Stewart (2002) and Linderman et al. (2002) were implemented in 2001 to improve weir performance. An additional fish passage chute was added in 2002. The current weir design incorporates components to facilitate upstream and downstream fish passage, and upstream and downstream boat passage.

Fixed Weir

The fixed weir used from 1996 through 1998 consisted of aluminum panels and stringers supported by weighted wooden tripods as described in Molyneaux et al. (1997). Spacing between pickets was $1\frac{13}{16}$-in and allowed for a complete census of all but the smallest returning salmon. Small resident species were able to slip through the panels.

Resistance Board Weir

A resistance board weir was used from 1999 to present. The weir was based on a design developed by the USFWS (Tobin 1994). Improvements to the USFWS design as described in Stewart (2002) were implemented over subsequent years. Spacing between pickets was $1\frac{1}{4}$-in. The pickets had some flexibility, but the narrow spacing allowed for a complete census of all but the smallest returning salmon. Small resident species slipped through the panels.

Facilitating Upstream Fish Passage

The fixed weir incorporated fish gates into its design to facilitate upstream fish passage as described in Molyneaux et al. (1997). A holding pen installed in front of a fish gate aided in collection of biological samples. As fish passed through the fish gate, they entered the holding pen for passage through the pen and enumerated, or sampled for ASL data. The fixed weir used in the resistance board weir design also allowed for removal of fixed weir panels to facilitate upstream fish passage

The resistance board weir utilized four methods to facilitate upstream fish passage. The first two methods used two types of passage chutes that created openings in the weir, allowing fish passage. The first type of passage chute was used in combination with a fish trap. The trap acted as a holding pen for collecting fish used in biological sampling, and as a platform for enumerating fish passage. The passage chute and trap combination were identical to those used at Tatlawiksuk River weir (Linderman et al. 2002). The second type of passage chute was an enclosed design implemented in 2002, and was used exclusively for enumerating fish passage. Details of the enclosed passage chute are described below. A third method for facilitating fish passage used modified resistance board weir panels termed "counting panels". Several pickets in the counting panel design were not permanently affixed to the base cover of the panel. This design allowed a crewmember to slide the upriver portion of these pickets back from the front of the panel, creating an opening for fish to pass for enumeration. The fourth method for facilitating fish passage in the resistance board weir design consisted of removing a panel from the weir, creating a temporary breach for fish to pass for enumeration.

The enclosed passage chute consisted of a 3-in x $\frac{3}{16}$-in aluminum angle frame identical in length and width to a weir panel (Figure 3). The spaces on either side of the frame were filled with sealed 1-in schedule 40 PVC electrical conduit spaced 2 $\frac{5}{8}$-in apart (1 $\frac{5}{16}$-in between pickets). A ¾-in thick piece of plywood attached to the top of the frame at its upstream end acted as a counting platform. Vinyl coated wire mesh fencing material attached to the remainder of the frame's top prevented fish from jumping out of the chute. A resistance board and harness assembly (Stewart 2002) attached to the downstream end of chute provided lift. The assembly performed a similar function to the resistance board and harness assembly used on a weir panel. Two 10-in. by 27-in. boat bumpers tied into the frame in front of the resistance board provided additional buoyancy. The upstream opening included an exit gate constructed from a modified fixed weir panel. The exit gate was hinged and could be lowered to allow fish passage and enumeration. The enclosed passage chute, designed for installation like a weir panel, was moved to optimize fish passage locations as needed.

Facilitating Downstream Fish Passage

For various reasons, fish sometimes migrated downstream and required an avenue for safe passage over the weir. This behavior was especially common among longnose suckers *Catostomus catostomus* in late summer. Prevalence of this behavior was unknown in 1996; consequently, the original fixed weir design did not incorporate any means for fish to migrate downstream. Instead, the crew created a temporary breach by moving a weir panel, and then directed downstream migrating fish through the breach.

The resistance board weir installed in 1999 provided a more effective means of accommodating downstream fish passage through incorporation of downstream passage chutes. Each chute consisted of a single panel set to allow some water to flow over the distal end of the panel. Details of the downstream passage chutes are described in Linderman et al. (2002). Several of these chutes were incorporated along the length of the weir. Fish do not typically pass upstream over these chutes, and they are set only during periods of active downstream fish migration. Downstream passage chutes were not used during periods of strong upstream salmon passage.

Facilitating Boat Passage

Boats passed through the fixed panel weir at a designated location, typically in the channel thalweg. Each instance required a crewmember to wade out to the passage location to remove three or four of the fixed weir panels for boat passage. For additional details see Molyneaux et al. (1997).

Transition to the resistance board weir in 1999 made boat passage faster and easier without compromising integrity of the weir. Boats passed at a designated 'boat gate' located near the thalweg, and boat operators were able to pass with little or no involvement by the weir crew. The boat gate consisted of modified resistance board weir panels (Linderman et al. 2002). Weight of a passing boat submerged these modified panels, allowing boat passage over the weir. The panels would resurface once the boat cleared the weir. Boats with jet-drive engines were most common and could pass upstream and downstream over the boat gate by reducing their speed. However, operators of boats with propeller-drive engines had to use a towrope when passing upstream, and turn off their engines and tilt their motors when passing downstream (Linderman et al. 2002).

Weir Cleaning and Inspection

The weir was cleaned several times each day, typically at the beginning and end of counting shifts. Cleaning the fixed weir required a custom-made aluminum rake to push debris up and over the fixed weir panels. A technician cleaned the resistance board weir by walking across the weir to partially submerge each panel, thereby allowing the current to wash any debris downstream. A rake was used to push larger debris loads off the resistance board weir. Each time the weir was cleaned, a visual inspection was made of the weir panels, substrate rail, fish trap, and fixed weir sections to ensure no openings would allow fish to pass upstream. If conditions did not allow an adequate visual inspection, technicians used snorkel gear to ensure no breaches in the weir.

Total Annual Escapement

The target operational period for counting fish was 15 June through 20 September, which spans most of the salmon runs. The term "total annual escapement" used in this report refers to the cumulative escapement of a given species during the target operational period. Total annual escapement may consist of observed passage and estimated passage, the later being applied to days when the weir was inoperable. Inoperable periods may have been caused by interruptions in operations, a delayed start date or a premature end date.

Observed Fish Passage

All fish observed passing upstream through the weir were enumerated by species. Daily enumeration typically began by 0800 hours, and typically ended by 1200 hours depending on hourly abundance. The most commonly used counting procedures consisted of a crewmember positioned above the fish gate or exit gate to enumerate passage with a zeroed multiple tally counter. A crewmember positioned with the best view of fish passage used counting panels or removed a weir panel, to enumerate passage with a zeroed multiple tally counter. Counting continued for a minimum of one hour, or until passage waned to near zero, then the passage location was closed. The crewmember immediately recorded fish passage in a designated notebook and zeroed the tally counter for the next count. This procedure was repeated several times each day, even when passage numbers were low. At the end of each day, recorded counts were copied to the logbook form entitled *"Hourly Upstream Fish Passage"* (Appendix B.1). Daily counts were tallied and recorded on the logbook form entitled *"Daily and Cumulative Passage"* (Appendix B.2).

Estimated Fish Passage

Upstream salmon passage was estimated for days the weir was inoperable. Estimates were assumed to be zero if the inoperable period occurred when passage for the species in question was considered negligible. Otherwise, the passage estimate for a single day was calculated as the average of observed passage one or two days before and one or two days after the inoperable day, minus any observed passage from the inoperable day. Daily passage estimates for inoperable periods lasting two or more days were derived by one of two methods, the first being termed the "linear method" and the second being termed the "proportion method".

The linear method extrapolated daily passage estimates from the average observed passage two days before the inoperable period to the average observed passage two days after the inoperable period. This resulted in a linear increase or decrease in daily passage estimates over the duration of the inoperable period. Daily estimates from this method were calculated using the following formula:

$$\hat{n}_{d_i} = \alpha + \beta \cdot i - n'_{d_i} \tag{1}$$

$$\alpha = \frac{n_{d_1-1} + n_{d_1-2}}{2}$$

$$\beta = \frac{(n_{d_I+1} + n_{d_I+2}) - (n_{d_1-1} + n_{d_1-2})}{2(I+1)}$$

for (day-1, day-2,…, day-*i*,…*I*)

where:

$\hat{n}_{d_i}$ = passage estimate for the i^{th} day (day-1, day-2,.., day-*i*,...*I*) of a multiple day inoperable period;

n'_{d_i} = observed passage (if any) from a given day of the inoperable period;

n_{d_I+1} = observed passage the first day after the inoperable period (d_I);

n_{d_I+2} = observed passage the second day after the inoperable period;

n_{d_1-1} = observed passage one day before the inoperable period;

n_{d_1-2} = observed passage two days before the inoperable period;

I = number of days the inoperable period lasted

The proportion method was only used if evidence supporting similar fish passage characteristics existed between the data set being estimated and a model dataset. The model data set could be from a different year at George River, or from the same year at a neighboring project. In either case, daily estimated passage from this method was based on the model data set's daily passage proportions, and was calculated using the following formula:

$$n_{d_i} = \left(\frac{n_{2d_i} \times n_{1t_1}}{n_{2t_1}} \right) - n_{o_i} \quad (1)$$

where:

n_{d_i} = passage estimate for a given day (i) of the inoperable period;

n_{2d_i} = passage for the i^{th} day in the model data set 2;

n_{1t_1} = known cumulative passage for the operational time period (t_1) from the estimated dataset 1;

n_{2t_1} = known cumulative passage for the corresponding time period (t_1) from the model data set 2;

n_{o_i} = observed passage (if any) from the given day (i) being estimated.

Carcass Counts

Spawned out salmon and carcasses of dead salmon (both hereafter referred to as carcasses) washed up on the weir were counted by species and sexed, and passed downstream. Carcass count was recorded in the passage notebook and transferred to the "*Hourly Fish Carcass Count*" forms in the logbook at the end of each counting day (Appendix B.3). Final carcass counts for the day were tallied by species and sex and recorded on the "*Weir Carcass Counts*" form in the logbook (Appendix B.4).

ASL Composition of Escapement

The ASL composition of the total annual chinook, chum and coho salmon escapements were estimated by sampling a fraction of the fish passage and applying the ASL composition of those samples to the total escapement as described in DuBois and Molyneaux (2000).

Sample Collection

A pulse sampling design was used, in which intensive sampling was conducted for one to three days followed by a few days without sampling. The goal for each sampling pulse was to collect samples from 210 chinook salmon, 200 chum salmon and 170 coho salmon. These sample sizes were selected for simultaneous 95% confidence interval estimates of age composition proportions no wider than 0.20 (Bromaghin 1993). The minimum acceptable number of pulse samples was three per species – one pulse sample from each third of the run.

Salmon were sampled from the fish trap installed in the weir. The general practice was to open the entrance gate while leaving the exit gate closed, which allowed fish to accumulate inside the holding pen. The holding pen was typically allowed to fill with fish and sampling was done during scheduled counting periods.

Standard sampling procedures consisted of two or three technicians conducting specific duties. One or two crewmembers worked inside the holding pen. Whenever two crewmembers worked inside the holding pen, one netted fish and placed them in the sampling cradle while the other focused on determining sex, measuring length, and removing scales. A single crewmember could conduct all these tasks after receiving adequate training and experience. Another crewmember was positioned on the platform and recorded the species, sex, length and other pertinent data in field notebooks and on "ASL Sampling Field Forms" (Appendix B.5). Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of three scales were taken from each fish and mounted on numbered and labeled 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 tail fork. After each fish was sampled, it was released into a recovery area upstream of the weir. After sampling was completed, relevant information such as sex, length, date, and location was copied from the field notebooks or ASL field forms to computer mark-sense forms. Further details of sampling procedures can be found in DuBois and Molyneaux (2000). The completed gum cards and data forms were sent to the Bethel and Anchorage ADF&G offices for processing.

In 2001 and 2002, weir crews conducted active sampling on chinook salmon to increase chinook salmon sample sizes. Active sampling consisted of capturing and sampling chinook salmon while actively passing and enumerating fish. Further details of the active sampling procedures are described in Linderman et al. (2002).

Estimating ASL Composition of Escapement

ADF&G staff in Bethel and Anchorage aged scales, processed the ASL data, and generated data summaries. DuBois and Molyneaux (2000) describe details of processing and summarizing procedures. These procedures generated two types of data summary tables for each species, one described the age and sex composition and the other described length statistics. These summaries accounted for changes in the ASL composition throughout the season by first partitioning the season into temporal strata based on pulse sample dates, applying ASL composition of individual pulse samples to corresponding temporal strata, and finally summing the strata to generate the estimated ASL composition for the season. This procedure ensured ASL composition of the total annual escapement was weighted by abundance of fish in the escapement rather than by abundance of fish in the samples. For example, if samples of chum salmon were collected in six pulses, the season would be partitioned into six temporal strata with one pulse sample occurring in each stratum. If one of these six pulse samples consisted of 190 chum salmon collected on 27 and 28 June, then the ASL composition of this pulse sample was used to estimate the ASL composition of the 543 chum salmon escapement during the temporal stratum of 23 to 29 June. This procedure was repeated for each of the five remaining strata and the estimated age and sex composition for the total annual escapement was calculated as the sum of chum salmon in each stratum. Likewise, the estimated mean length composition for the total annual escapement was calculated by weighting the mean lengths in each stratum by the escapement of chum salmon that passed the weir during that stratum.

Ages were reported in the tables using European notation, with total age reported in parenthesis. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent by the juvenile fish in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals, plus one to account for the winter when the egg was incubating in the gravel. For example, a chinook salmon described as an age-1.4 fish under European notation has a total age of 6 years.

The original ASL gum cards, acetates and mark-sense forms were archived at the ADF&G office in Anchorage. The computer files were archived by ADF&G in the Anchorage and Bethel offices.

Chinook Salmon ASL Data Revision

The authors suspected many smaller chinook salmon sampled from the George River in 1996 and 1997 were erroneously identified as females. The basis of this suspicion was the inherent difficulties involved when sexing smaller chinook salmon combined with the percentage of age-1.2 fish identified as females and the percentage of fish under 700 mm identified as females. DuBois and Molyneaux (2000) demonstrated the 1996 and 1997 George River chinook salmon percentages were high compared to percentages seen in subsequent years at George River, and elsewhere in the Kuskokwim River. In an effort to produce a more accurate estimated ASL composition of the 1996 and 1997 George River chinook salmon escapement, chinook salmon ASL data from the 1997, 1998 and 1999 Kuskokwim River, District W1 commercial catch were analyzed. Commercial catch ASL sampling procedures in these years were similar to ASL sampling procedures at Kuskokwim River escapement projects. The only exceptions were the commercial catch samples were sex confirmed by visual identification of internal gonads. The sex confirmed ASL data was pooled over all years and a minimum length for female chinook salmon was calculated by:

$$L_{min} = \bar{l} - z_{0.025} s_l \quad (1)$$

where:

L_{min} = minimum length for female chinook salmon

$\bar{l}$ = mean length of female chinook salmon from the sex confirmed samples

S_l = sample standard deviation of female chinook salmon length from the sex confirmed samples

(In which 97.5 % of the female chinook salmon are above the minimum length (L_{min}).)

All female chinook salmon within the original 1996 and 1997 George River data set that measured less than L_{min} were considered to be males. The original data set was revised accordingly, and then re-analyzed to estimate the ASL composition of the chinook salmon escapement. The results of this analysis represent the revised estimated ASL composition of the chinook salmon escapement.

Mark/Recapture Tag Recovery

The George River weir was integrated into two mark/recapture tagging studies conducted in the mainstem Kuskokwim River. In one study, spaghetti tags were inserted into coho salmon in 2001, and chum salmon, sockeye salmon and coho salmon in 2002 (Kerkvliet and Hamazaki 2002 and *in progress*). In both years, fish were tagged near Kalskag and Aniak, and the George River weir served as one of the tag recovery locations. The weir crew gathered three sets of data in association with this study. The first data set was a list of tag recoveries in which the crew recaptured tagged fish in the fish trap, and recorded the date of capture, species, tag number, tag color, presence of secondary marks, and the general condition of the fish. Tagged fish were captured in a manner comparable to the active sampling technique described for ASL sampling of chinook salmon. Recaptured tagged fish were released upstream of the weir with the tag attached. Recaptured tagged fish data were recorded on the form entitled "*Tag Recovery Data Entry Form*" (Appendix B.6).

The second dataset was a daily summary of observed tagged salmon and observed fish passage. This data set was inclusive of the tag recoveries described above, but also included information for tagged fish that could not be captured as they passed upstream through weir. This data was recorded on the form entitled "*Tagged and Untagged Salmon Counted Past Weir*" (Appendix B.7).

The third dataset focused on determining any incidence of tag loss by examining fish for a secondary mark. Fish that received spaghetti tags also had their adipose fin clipped as a secondary mark. The weir crew examined fish caught in the fish trap for these secondary marks. In 2001, the secondary mark sample population was based on the ASL sample. In 2002, the secondary mark sample population was expanded to include a daily goal of 80 fish depending on abundance, and inclusive of any ASL sampled fish. Secondary mark sampling data was recorded on the form entitled "*Salmon Examined for Adipose Hole Punches*" (Appendix B.8).

The second tagging study involving the George River weir was a radio telemetry project intended to estimate the total abundance of chinook salmon in the Kuskokwim River in 2002 (Stuby *in draft*). Radio transmitters were inserted into chinook salmon caught near Aniak and one of several radio receiver stations was placed in the mouth of the George River to monitor the movement of tagged chinook salmon. The known chinook salmon passage at the weir, coupled with data collected from the receiver station, was used with similar data collected at other weir projects to develop estimates of the total chinook salmon abundance upstream from the tagging site.

Habitat Profiling

Stream Temperature

Temperature was measured with a thermometer scaled to 0.1°C increments and calibrated against a precision thermometer certified by the National Institute of Standards and Technology. Stream temperature measurements for the George River were collected from a station on the south shore, approximately 75-yds downstream from the weir. Measurements were made at least once each day at 0730 or 1030 hours. The thermometer was submerged a few centimeters below the water surface at least an arm's length off shore and allowed to stand undisturbed for one or two minutes until the temperature reading had stabilized. The reading was recorded on the "*Weather and Stream Observations*" form in the camp logbook (Appendix B.9).

River Stage and Stream Discharge

Daily operations included monitoring fluctuations in water level with a standardized staff gage. The staff gage consisted of a metal rod incremented in centimeters and secured to a stake driven into the stream channel near camp. Height of the water surface as measured against the staff gage represented the "stage" of the water level above an arbitrary datum plane. The stage of the water level was measured at least once each morning and recorded on the "*Weather and Stream Observations*" form in the camp logbook (Appendix B.9). Measurements were recorded more frequently when water levels were changing rapidly.

The staff gage was calibrated against semi-permanent benchmarks intended to allow for consistency of the stage measurements between years (Appendix C). These benchmarks consisted of sections of pipe driven into the gravel with only a few inches showing above the gravel surface. This procedure was done to reduce the likelihood of the pipe being washed out or damaged by ice flows during break-up.

Discharge of the George River was periodically determined using methods described by the U. S. Geological Survey (Rantz 1982). Velocities were measured using a Price AA current-meter with a top-setting wading rod. Stream discharge was calculated using the conventional current-meter method. Information collected for calculating discharge was recorded on the *"Stream Discharge"* form in the camp logbook (Appendix B.10).

Water Chemistry

Water samples were collected at low, intermediate and high water levels to provide a profile of water chemistry in different flow regimes. Water samples were collected from approximately mid-channel, upstream of the weir and just under the surface using a 500-ml polyethylene bottle. The bottle was thoroughly pre-rinsed with water from the same general location as the sample to be collected. The sample bottle was capped under water to avoid any air space. An external label affixed to the bottle to identified the date and time the sample was collected, stream name, general location, collectors name, ADF&G contact name and phone number. The sample was stored in a cool and dark location until transport to the ADF&G Limnology laboratory in Soldotna. Sampling was done early in the week and timed for transport within 24-hours of sample collection. The limnology laboratory was notified once the sample was in transit to ensure preparation time to receive the sample.

Water sample tests were conducted at the ADF&G Limnology Laboratory, by Analytical Resources, Inc., and by Elemental Research, Inc, in Vancouver, British Columbia. Details of the tests conducted and testing procedures are outlined in Linderman et al. (2002).

Aerial Surveys

Aerial survey techniques were used in 2001 and 2002 to determine the distribution and relative abundance of spawning salmon in the George River drainage. These surveys were flown to establish a standardized aerial survey index area for the tributary and to develop a paired data set for comparison with weir counts. Surveys were conducted with a contracted pilot flying a Piper PA-18 Super Cub and timed to target the peak of chinook salmon spawning. Aerial survey index areas were defined for the mainstem, East Fork, South Fork and North Fork of George River. After each survey, the observer tallied and recorded the fish count by index area on the form entitled *"Escapement Observations – Kuskokwim Area"* (Appendix B.11). Other pertinent information was recorded on this form such as survey time, wind, weather, water visibility, river substrate type, distance surveyed, the occurrence of redds and spawning activity, and overall rating of the survey. Completed forms were submitted for entry into the *Kuskokwim Area Salmon Escapement Observation Catalog* (Burkey and Salomone 1999)

RESULTS

1996

Operations

A fixed weir was operated from 21 June through 26 July in 1996. Further details of weir operations in 1996 are described in Molyneaux et al. (1997).

Fish Passage

Results from the 1996 season are described in Molyneaux et al. (1997); however, they are repeated here in a revised form that accounts for revisions to the total annual escapement data and the ASL composition estimates.

Chinook Salmon. Total annual escapement in 1996 was 7,716 fish, including an estimated passage of 965 fish (12.5%) during the inoperable periods (Table 1). Estimated passage for the inoperable periods of 15 through 20 June, and 27 July through 20 September was derived by the proportion method; chinook salmon passage data at the George River weir in 1997 were used as the model dataset. Estimated passage for the inoperable periods on 29 June and 2 July was derived from the average of the observed passage that occurred one day before and one day after 29 June and 2 July.

The first chinook salmon was observed on 21 June, the first day of operation, and the peak daily passage of 1,034 fish occurred on 1 July. The last chinook salmon was observed on 26 July, the last day of weir operations. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, the median passage date was 3 July and central fifty-percent of the run occurred between 1 and 9 July.

Chum Salmon. Total annual escapement in 1996 was 19,393 fish, including an estimated passage of 2,712 fish (14.0%) during the inoperable periods (Table 2). The estimated passage for the inoperable periods of 15 through 20 June, and 27 July through 20 September was derived by the proportion method, with chum salmon passage at the George River weir in 2002 used as the model dataset. Estimated passage for inoperable periods on 29 June and 2 July was derived from the average of the observed passage that occurred one day before and one day after 29 June and 2 July respectively.

The first chum salmon was observed on 21 June, the first day of operation, and the peak daily passage of 1,314 fish occurred on 23 June. The last chum salmon was observed on 26 July, the last day of weir operations. Based on the 15 June through 20 September operational period and inclusive of the estimated passage, the median passage date was 8 July and central fifty-percent of the run occurred between 2 and 19 July.

Coho Salmon. A total of 173 coho salmon were observed passing upstream through the weir before 27 July when project operations ended (Table 3). Total annual escapement was not determined for coho salmon in 1996 because of the premature termination of the project. The first coho salmon was observed on 16 July, the twenty-sixth day of operation.

Other Species. Additional upstream fish passage at the weir in 1996 is described in Molyneaux et al. (1997) and in Appendix D.1 and D.2.

Carcass Counts. Details of carcass counts in 1996 are described in Molyneaux et al. (1997) and in Appendix E.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 211 chinook salmon in 1996. Samples were collected from four pulses ranging in size from 32 to 97 fish per pulse. Age was determined for 191 of the 211 fish sampled (90.5%). Aged samples accounted for 2.5% of the chinook salmon escapement and were adequate for estimating ASL composition of the escapement. Chinook salmon escapement was partitioned into three temporal strata based on dates when samples were collected.

Because of suspected errors in sex determination of chinook salmon during ASL sampling in 1996, the original data set was revised based on the minimum length determined for female chinook salmon (Figure 4). For 1996, estimated ASL composition of the chinook salmon escapement results are presented in two configurations, the first shows the estimate based on the original data set and the second shows the estimate based on the revised data set.

Original Chinook Salmon Estimate. Based on the original ASL data set, and as applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (39.8%), followed by age-1.5 (29.4%), age-1.3 (23.2%), age-1.2 (7.1%), and age-2.2 (0.4%) (Appendix F.1). The sex composition of the total annual chinook salmon escapement was estimated to include 3,615 males (46.8%) and 4,102 females (53.2%). The mean length for age-1.2, -1.3, -1.4, and -1.5 male chinook salmon was 598 mm, 714 mm, 861 mm, and 941 mm, respectively (Appendix F.2). One age-2.2 male fish in the sample had a length of 600 mm. Average length for age-1.2, -1.3, -1.4, and -1.5 female chinook salmon was 558 mm, 743 mm, 856 mm, and 902 mm, respectively. No age-2.2 female fish were in the sample. Overall, male chinook salmon lengths ranged from 505 to 1010 mm, and female lengths ranged from 500 to 1000 mm.

Revised Chinook Salmon Estimate. Based on the revised ASL data set, and as applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (39.8%), followed by age-1.5 (29.4%) age-1.3 (23.2%), age-1.2 (7.1%) and age-2.2 (0.4%) (Table 4). Sex composition of the total annual chinook salmon escapement was estimated at 4,298 males (55.7%) and 3,419 females (44.3%). Average length for age-1.2, -1.3, -1.4 and -1.5 male chinook salmon was 587 mm, 708 mm, 855 mm and 907 mm, respectively (Table 5). The only age-2.2 male fish in the sample had a length of 600 mm. Average length for age-1.3, -1.4 and -

1.5 female chinook salmon was 806 mm, 861 mm, and 911 mm, respectively. No age-1.2 and -2.2 female fish were in the revised data set. Overall, male chinook salmon lengths ranged from 500 to 1010 mm, and female lengths ranged from 742 to 1000 mm.

Chum Salmon. Scale samples, sex and length were collected from 912 chum salmon in 1996. The samples were collected from six pulses ranging in size from 100 to 200 fish per pulse. Age was determined for 765 of the 912 fish sampled (83.8%). Aged samples accounted for 3.5% of chum salmon escapement and were adequate for estimating the ASL composition of the escapement (Table 6 and 7). Chum salmon escapement was partitioned into six temporal strata based on dates when samples were collected.

Applied to the total annual escapement, age-0.3 chum salmon was the most abundant age class (59.8%), followed by age-0.4 (36.8%), age-0.5 (1.9%), and age-0.2 (1.5%). The sex composition of the total annual chum salmon escapement was estimated at 10,571 males (54.5%) and 8,822 females (45.5%). Mean length for age-0.2, -0.3, -0.4, and -0.5 male chum salmon was 592 mm, 595 mm, 614 mm, and 626 mm, respectively. Average length for age-0.2, -0.3, and -0.4 female chum salmon was 560 mm, 552 mm, and 570 mm, respectively. No age-0.5 female fish were in the sample. Overall, male chum salmon lengths ranged from 442 to 703 mm, and female lengths ranged from 443 to 657 mm.

Coho Salmon. No coho salmon ASL samples were collected in 1996 because project operations were terminated prematurely..

Habitat Profiling

Water temperature ranged from 9°C to 17°C and air temperature ranged 9°C to 26°C from 22 June through 26 July. Stage measurements ranged from 30 cm to 110 cm from 23 June through 29 July. Further details of habitat profiling in 1996 are described in Molyneaux et al. (1997) and in Appendix G.1.

1997

Operations

A fixed weir was operated from 9 June through 15 September in 1997. Low water levels throughout most of the operational period contributed to uninterrupted operations. A 50-ft section of the weir was removed for approximately six hours on 16 June to install larger tripods and steel substrate grates for scouring control. Passage was estimated on this date to account for any fish that may have passed through the open weir sections. Minor breaches in the weir occurred during the remainder of the operational period, but no passage estimates were made. Weir operations were discontinued at 2400 hours on 15 September and project closure began the following day.

Fish Passage

Chinook Salmon. Total annual escapement in 1997 was 7,823 fish, including an estimated passage of 13 fish (0.2 %) during the inoperable periods (Table 1). The estimated passage for the inoperable period on 16 June was derived from the average of observed passage two days before and two days after 16 June. Estimated passage for the inoperable period of 16 through 20 September was assumed to be zero because any chinook salmon passage during this time was considered negligible.

The first chinook salmon was observed on 9 June, the first day of operation, and the peak daily passage of 907 fish occurred on 25 June. The last chinook salmon was observed on 22 August. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, the median passage date was 30 June and the central fifty-percent of the run occurred between 26 June and 4 July.

Chum Salmon. Total annual escapement in 1997 was 5,907 fish, including an estimated passage of one fish (0.0%) during the inoperable periods (Table 2). The estimated passage for the inoperable period on 16 June was derived from the average of the observed passage two days before and two days after 16 June. Estimated passage for the remaining inoperable period of 16 through 20 September was assumed to be zero because any chum salmon passage during this time was considered to be negligible.

The first chum salmon was observed on 16 June, the eighth day of operation, and the peak daily passage of 575 fish occurred on 19 July. The last chum salmon was observed on 10 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, the median passage date was 19 July and the central fifty-percent of the run occurred between 6 and 24 July. Passage for the remaining inoperable period of 16 through 20 September was assumed to be zero because any chum salmon passage during this time was considered to be negligible.

Coho Salmon. Total annual escapement in 1997 was 9,210 fish, including an estimated passage of 241 fish (2.6%) during the inoperable periods (Table 3). Estimated passage for the inoperable period of 16 through 20 September was derived by the proportion method, with coho salmon passage at the Kogrukluk River weir in 1997 used as the model dataset. No coho salmon passage estimate was necessary for the inoperable period on 16 June.

The first coho salmon was observed on 20 July, the forty-first day of operation, and the peak daily passage of 1,471 fish occurred on 30 August. Coho salmon were still passing the weir in small numbers when the weir was dismantled on 16 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, the median passage date was 30 August and the central fifty-percent of the run occurred between 22 August and 4 September.

Other Species. Upstream passage at the weir in 1997 also included 445 sockeye salmon, 17 pink salmon, 1 Arctic grayling *Thymallus arcticus*, 1 whitefish *Coregonus spp.*, and 6,404 longnose suckers (Appendix D.1 and D.2). Ninety percent of the total longnose suckers passed upstream by 9 July, the nineteenth day of operation. Small numbers of suckers migrated back downstream throughout the summer, most of their downstream passage occurring in late July and early August.

Carcass Counts. Carcass counts in 1997 included 58 chinook salmon, 531 chum salmon and 12 coho salmon (Appendix E). The first chinook salmon carcass was observed on 30 June the twenty-first day of operations, and the median chinook salmon carcass passage date was 27 July. The first chum salmon carcass was observed on 2 July the twenty-third day of operations, and the median chum salmon carcass passage date was 29 July. The first coho salmon carcass was observed on 7 August the fifty-ninth day of operations, and coho salmon carcasses were still passing the weir when it was dismantled on 15 September.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 282 chinook salmon in 1997. Samples were collected from four pulses and sample sizes ranged from 52 to 90 fish per pulse. Age was determined for 269 of the 282 fish sampled (95.4%). Aged samples accounted for 3.4% of the chinook salmon escapement and were adequate for estimating the ASL composition of the total annual escapement. Chinook salmon escapement was partitioned into four temporal strata based on dates when samples were collected.

Because of suspected errors in sex determination of chinook salmon during ASL sampling in 1997, the original data set was revised based on the minimum length determined for female chinook salmon (Figure 4). For 1997, the estimated ASL composition of the chinook salmon escapement results are presented in two configurations, the first shows the estimate based on the original data set and the second shows the estimate based on the revised data set.

Original Chinook Salmon Estimate. Based on the original ASL data set and as applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (53.7%), followed by age-1.2 (34.6%), and age-1.3 (11.7%) (Appendix F.1). No age-2.2 or age-1.5 fish were in the sample. Sex composition of the total annual chinook salmon escapement was estimated to include 3,610 males (46.1%) and 4,213 females (53.9%). Average length for age-1.2, -1.3, and -1.4 male chinook salmon was 583 mm, 747 mm, and 843 mm, respectively (Appendix F.2). Average length for age-1.2, -1.3, and -1.4 female chinook salmon was 545 mm, 706 mm, and 845 mm, respectively. Overall, male chinook salmon lengths ranged from 457 to 998 mm, and female lengths ranged from 425 to 967 mm.

Revised Chinook Salmon Estimate. Based on the revised ASL data set and as applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (53.7%), followed by age-1.2 (34.6%) and age-1.3 (11.7%) (Table 4). Sex composition of the total annual chinook salmon escapement was estimated as 4,897 males (62.6%) and 2,926 females (37.4%). Average length for age-1.2, -1.3, and -1.4 male chinook salmon was 568 mm, 731 mm and 835 mm, respectively (Table 5). Average length for age-1.3 and -1.4 female chinook salmon was 750 mm and 849 mm, respectively. No age-1.2 female chinook salmon were in the revised data set. Overall, male chinook salmon lengths ranged from 425 to 998 mm, and female lengths ranged from 729 to 967 mm.

Chum Salmon. Scale samples, sex and length were collected from 727 chum salmon in 1997. The samples were collected from six pulses ranging in size from 32 to 211 fish per pulse. Age was determined for 641 of the 727 fish sampled (88.1%). The aged samples accounted for 10.9% of the chum salmon escapement and were adequate for estimating ASL composition of the total annual escapement (Table 6 and 7). Chum salmon escapement was partitioned into six temporal strata based on dates when samples were collected.

As applied to the total annual escapement, age-0.3 chum salmon was the most abundant age class (51.4%), followed by age-0.4 (46.3%), age-0.5 (1.6%), and age-0.2 (0.7%). The sex composition of the total annual chum salmon escapement was estimated to include 3,376 males (57.2%) and 2,531 females (42.8%). Average length for age-0.2, -0.3, -0.4, and -0.5 male chum salmon was 514 mm, 561 mm, 591 mm, and 621 mm, respectively. Average length for age-0.2, -0.3, -0.4, and -0.5 female chum salmon was 504 mm, 535 mm, 558 mm, and 576 mm, respectively. Overall, male chum salmon lengths ranged from 465 to 678 mm, and female lengths ranged from 372 to 625 mm.

Coho Salmon. Scale samples, sex and length were collected from 258 coho salmon in 1997. Samples were collected from three pulses ranging in size from 71 to 99 fish per pulse. Age was determined for 204 of the 258 fish sampled (79.5%). Aged samples accounted for 2.2% of the coho salmon escapement and were adequate for estimating ASL composition of the total annual escapement (Table 8 and 9). Escapement was partitioned into three temporal strata based on dates when samples were collected.

As applied to the total annual escapement, age-2.1 coho salmon was the most abundant age class (95.9%), followed by age-1.1 (2.3%), and age-3.1 (1.9%). Sex composition of the total annual coho salmon escapement was estimated to include 5,343 males (58.0%) and 3,867 females (42.0%). Average length for age-1.1, -2.1, and -3.1 male coho salmon was 569 mm, 551 mm and 569 mm, respectively. Average length for age-2.1 and -3.1 female coho salmon was 564 mm and 581 mm, respectively. No age-1.1 female coho salmon were in the sample. Overall, male coho salmon lengths ranged from 383 to 653 mm, and female lengths ranged from 456 to 651 mm.

Habitat Profiling

Water temperature, air temperature and stage measurement were measured nearly every morning from 6 June through 15 September (Appendix G.2). Water temperatures ranged from 9°C to 19°C, and air temperatures ranged from 4°C to 24°C. Stage measurements ranged from 16 cm to 59 cm.

Five discharge measurements were taken in three locations on the George River in 1997. Measurements were taken at the weir site, at a site on the mainstem George River 200-ft upstream of its confluence with the East Fork, and at a site in the East Fork 100-ft upstream from its confluence with mainstem George River. From measurements taken on 6 August, the discharge of the George River at the weir site was estimated to be 15.9 m^3/s at a stage measurement of 17.2 cm (Appendix G.3, G.4, G.5, G.6 and G.7). From measurements taken on 1 September, the discharge of the George River at the weir site was estimated to be 21.7 m^3/s at a stage measurement of 24.6 cm. From measurements taken on 1 September, the discharge of the mainstem George River 200-ft upstream of its confluence with the East fork was estimated as 9.1 m^3/s with a stage measurement at the weir site of 24.6 cm. From measurements taken on 2 August, discharge of the East Fork 100-ft upstream of its confluence with mainstem George River was estimated to be 7.1 m^3/s with a stage measurement at the weir site of 17.5 cm. From measurements taken on 1 September, the discharge of the East Fork 100-ft upstream of its confluence with mainstem George River was estimated to be 10.9 m^3/s with a stage measurement at the weir site of 24.6 cm.

Five water samples were collected from George River drainage in 1997. One sample was collected from the East Fork of George River on 23 June for trace metal analysis. Another sample was collected on 23 June from the mainstem George River upstream of its confluence with the East Fork for trace metal analysis. Three samples were collected at or near the weir site on 23 June, 26 June, and 17 September. The 23 June sample was submitted for trace metal analysis, the 26 June sample was submitted for general chemical analysis, and the 17 September sample was submitted for general chemical and trace metal analysis. The ADF&G limnology laboratory processed samples for general chemical analysis and Analytical Resources, Inc. processed samples for trace metal analysis. Results are described in Appendix G.8.

1998

Operations

A fixed weir was operated in 1998 from 22 June through 7 July, and from 30 July through 2 August. High water in early June delayed installation of the weir. This weir maintained consistent operations until rapidly rising water levels caused the holding pen to partially collapse, and forced the suspension of weir operations in the late afternoon of 7 July. The weir washed out on 8 July because of high water and heavy debris load. The weir crew relocated to Georgetown because the water level was threatening to breach the bank at camp. Weir components were salvaged over the next two weeks as water levels receded. Water levels allowed for re-installation of the weir in late July. Unfortunately, continuous rain after re-installation caused water levels to rise again and the weir was removed from the river on 3 August. The camp was closed down for the season and several crew members were sent to the Andreafsky and the Goodnews River weirs for training on resistance board weirs.

Fish Passage

Chinook, Chum and Coho Salmon. A total of 2,505 chinook salmon; 6,391chum salmon and 52 coho salmon were observed passing upstream through the weir in 1998 (Table 1-3).

However, total annual escapement for any of these salmon species was not determined because the project terminated prematurely. The first chinook and chum salmon were observed on 22 June and they continued to pass upstream after 7 July when the weir first became inoperable, and after 2 August when operations ended. The first coho salmon was observed on 30 July and continued to pass upstream after 2 August when operations ended.

Other Species. Upstream passage at the weir in 1998 included 9 sockeye salmon, 300 pink salmon, 1 northern pike *Esox lucius*, 16 Arctic grayling and 6,632 longnose suckers (Appendix D.1 and D.2).

Carcass Counts. Carcass counts in 1998 included 29 chinook salmon and 134 chum salmon (Appendix E). The first chinook salmon carcass was observed on 30 July the thirty-eighth day of operations. The first chum salmon carcass was observed on 30 June the ninth day of operations.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 82 chinook salmon in 1998, but ASL composition of the total annual chinook salmon escapement was not determined because of lack of escapement and sample data. Age was determined for 75 of the 87 fish sampled and included 23 age-1.2 fish (30.7%), 38 age-1.3 fish (50.7%) and 14 age-1.4 fish (18.7%) (Table 4). Sex composition included 55 males (73.3%) and 20 females (26.7%). Male chinook salmon lengths ranged from 420 mm to 837 mm, and female lengths ranged from 612 mm to 905 mm (Table 5).

Chum Salmon. Scale samples, sex and length, were collected from 345 chum salmon in 1998, but the ASL composition of the total annual chum salmon escapement was not determined because of lack of escapement and sample data. Age was determined for 322 of the 355 fish sampled (Table 6). Age composition included 266 age-0.3 fish, 55 age-0.4 fish and 1 age-0.5 fish. No age-0.2 fish were in the sample. Sex composition included 200 males, and 122 females. Male chum salmon lengths ranged from 511 to 706 mm and female lengths ranged from 503 to 624 mm (Table 7).

Coho Salmon. No coho salmon ASL samples were collected in 1998 because of the premature termination of the project.

Habitat Profiling

Water temperature, air temperature and stage measurement were measured nearly every morning from 9 June through 6 August (Appendix G.9). Water temperatures ranged from 5°C to 14°C, and air temperatures ranged from 5°C to 20°C. Stage measurements ranged from 47.5 cm to 118 cm. The highest stage measurement occurred on 4 August, when the weir became inoperable for the remainder of the season. No discharge measurements were taken on George River in 1998.

Water samples were collected from George River near the weir site on 23 June and 8 August.

Samples were submitted for general chemical analysis at the ADF&G limnology laboratory, and results are described in Appendix G.8.

1999

Operations

A new resistance board weir was operated from 14 July through 25 September in 1999. Initial plans in 1999 were to install and operate the fixed weir, and then assemble, install and transition to the resistance board weir; but high water in June and early July prevented installation of the fixed weir. New resistance board weir materials arrived by barge into Georgetown on 21 June, and the materials were transported to the weir site by skiff. Assembly of weir components occurred over the next two weeks and weir installation began on 8 July. The weir was operational in the late evening of 13 July, and included a remnant 70-ft of fixed weir at the river margins. The resistance board weir remained operational at water levels that would have caused a fixed weir to fail. Scouring occurred at the fixed weir sections, but kept to a minimum through maintenance and cleaning. Weir operations were discontinued at 1700 hours on 25 September and camp closure began the following day. The weir substrate rail was left in the river after the remaining weir components were dismantled and removed.

Fish Passage

Chinook Salmon. Total annual chinook salmon escapement in 1999 was 3,548 fish, including an estimated passage of 1,109 fish (31.3%) during the inoperable period (Table 1). Estimated passage for the 15 June through 13 July inoperable period was derived by the proportion method; the chinook salmon passage at the Tatlawiksuk River weir in 1999 was used as the model dataset.

The first chinook salmon was observed on 14 July the first day of operations, and the highest observed passage of 456 fish occurred on 20 July. The last chinook salmon was observed on 12 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 19 July and central fifty-percent of the run occurred between 12 and 23 July.

Chum Salmon. Total annual escapement in 1999 was 11,552 fish, including an estimated passage of 3,508 fish (30.4%) during the inoperable period (Table 2). Estimated passage for the inoperable period of 15 June through 13 July was derived by the proportion method, the chum salmon passage at the Tatlawiksuk River weir in 1999 used as the model dataset.

The first chum salmon was observed on 14 July the first day of operations, and the highest observed passage of 768 fish occurred on 19 July. The last chum salmon was observed on 25 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 20 July and central fifty-percent of the run occurred between 12 and 26 July.

Coho Salmon. Total annual coho salmon escapement was 8,914 fish in 1999 (Table 3). No estimates of coho salmon passage were necessary in 1999.

The first coho salmon was observed on 28 July, the fifteenth day of operation, and the peak daily passage of 1,296 fish occurred on 1 September. The last coho salmon was observed on 24 September, and coho salmon still passed the weir in small numbers when dismantled on 26 September. Based on the operational period of 15 June through 20 September, median passage date was 4 September and central fifty-percent of the run occurred between 30 August and 13 September.

Other Species. Passage in 1999 included 39 sockeye salmon, 97 pink salmon, 2 northern pike, 2 Arctic grayling, and 278 longnose suckers (Appendix D.1 and D.2).

Carcass Counts. Carcass counts in 1999 included 280 chinook salmon, 824 chum salmon and 4 coho salmon (Appendix E). The first chinook salmon carcass was observed on 15 July the second day of operations, and the median chinook salmon carcass passage date was 9 August. The first chum salmon carcass was observed on 14 July the first day of operations, and the median chum salmon carcass passage date was 4 August. The first coho salmon carcass was observed on 18 September the sixty-sixth day of operations, and coho salmon carcasses still passed the weir when dismantled on 26 September.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 60 chinook salmon in 1999, but the sample was not adequate for estimating ASL composition of the total annual chinook salmon escapement. Age was determined for 54 of the 60 fish sampled and included 5 age-1.2 fish (9.3%), 8 age-1.3 fish (14.8%) and 41 age-1.4 fish (75.9%) (Table 4). Sex composition of the sample included 25 males (46.3%) and 29 females (53.7%). Male chinook salmon ranged in length from 415 to 990 mm, and females ranged from 655 to 955 mm (Table 5).

Chum Salmon. Scale samples, sex and length were collected from 637 chum salmon in 1999, but the sample was not adequate for estimating ASL composition of the total annual chum salmon escapement. Age was determined for 611 of the 637 fish sampled and included 393 age-0.3 fish, 215 age-0.4 fish and 3 age-0.5 fish (Table 6). No age-0.2 fish were in the sample. Sex composition of the sample included 319 males and 292 females. Male chum salmon lengths ranged from 485 to 660 mm and female lengths ranged from 480 to 665 mm (Table 7).

Coho Salmon. Scale samples, sex and length were collected from 390 coho salmon in 1999. Samples were collected from 3 pulses ranging in size from 120 to 150 fish per pulse. Age was determined for 338 of the 390 fish sampled (86.7%). Aged samples accounted for 3.8% of the coho salmon escapement and were adequate for estimating the ASL composition of the total annual escapement (Table 8 and 9). Coho salmon escapement was partitioned into 3 temporal strata based on dates when samples were collected.

As applied to the total annual escapement, age-2.1 coho salmon was the most abundant age class (69.8%), followed by age-3.1 (27.4%), and age-1.1 (2.7%). Sex composition of this escapement was estimated to include 5,271 males (59.1%) and 3,643 females (40.9%). Average length of male age-1.1, -2.1, and -3.1 coho salmon was 496 mm, 547 mm, and 564 mm, respectively. Average length of female age-1.1, -2.1, and -3.1 coho salmon was 538 mm, 541 mm, and 551 mm, respectively. Overall, male coho salmon lengths ranged from 405 mm to 645, and female lengths ranged from 445 to 635 mm.

Habitat Profiling

Water temperature, air temperature and stage measurement were generally measured every morning from 6 June through 25 September (Appendix G.10). Water temperatures ranged from 4°C to 16°C, and air temperatures ranged from 0°C to 24°C. Stage measurements ranged from 49 cm to 139 cm. From measurements taken on 8 June, discharge of George River near the weir site was estimated to be 127.7 m^3/s at a stage measurement of 85.0 cm (Appendix G.11). No water samples were collected for chemical analysis in 1999.

2000

Operations

A resistance board weir was operated from 17 June to 16 September in 2000. Project operations were interrupted on 1 through 2 August, and 5 August because of high and turbid water. The weir resumed operation after each of these dates once the water level receded to an operable level. A cabin was constructed to serve as crew quarters and a camp office. Weir operations were discontinued at 2100 hours on 16 September and camp closure began the following day. The weir substrate rail was left in the river after the remaining weir components were dismantled and removed.

Fish Passage

Chinook Salmon. Total annual escapement in 2000 was 2,960 fish, including an estimated passage of 30 fish (1.0%) for the inoperable periods (Table 1). Estimated passage for the inoperable period of 1 through 2 August was derived by the linear method. Estimated passage for the inoperable period on 5 August was derived from an average of the observed passage that occurred two days before and two days after 5 August. Estimated passage for the inoperable periods of 15 through 17 June, and 17 through 20 September was assumed zero because any chinook salmon passage during these periods was considered negligible.

The first chinook salmon was observed on 22 June, the sixth day of operation, and the peak daily passage of 495 fish occurred on 11 July. The last chinook salmon was observed on 14 August. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 11 July and central fifty-percent of the run occurred between 3 and 17 July.

Chum Salmon. Total annual escapement in 2000 was 3,492 fish, including an estimated passage of 62 fish (1.8%) for the inoperable periods of 1, 2 August, and 5 August (Table 2). Estimated passage for inoperable period of 1 through 2 August was derived by the linear method. Passage estimate for inoperable period on 5 August was derived from the average of the observed passage that occurred two days before and two days after 5 August. Estimated passage for inoperable periods of 15 through 17 June, and 17 through 20 September was assumed to be zero because any chum salmon passage during these times was considered to be negligible.

The first chum salmon was observed on 21 June, the fifth day of operation and the peak daily passage of 436 fish occurred on 11 July. The last chum salmon was observed on 5 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 11 July and central fifty-percent of the run occurred between 6 and 21 July.

Coho Salmon. Total annual escapement in 2000 was 11,262 fish, including an estimated passage of 34 fish (0.2 %) for inoperable periods (Table 3). Estimated passage for the inoperable period of 1 through 2 August was derived by the linear method. Estimated passage for the inoperable period of 5 August was derived from the average of the observed passage that occurred two days before and two days after 5 August. Estimated passage for the inoperable period of 17 through 20 September was derived by the linear method, with the passage for the two days following 20 September assumed to be zero. No coho salmon estimates were necessary for the inoperable period of 15 through 17 June.

The first coho salmon was observed on 22 July, the thirty-sixth day of operation, and the peak daily passage of 1,451 fish occurred on 21 August. The last coho salmon was observed on 16 September, and they were still passing the weir in small numbers when the weir was dismantled on 17 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 21 August and central fifty-percent of the run occurred between 18 and 27 August.

Other Species. Passage in 2000 also included 22 sockeye salmon, 61 pink salmon, 2 whitefish, 74 Arctic grayling, and 7,688 longnose suckers (Appendix D.1 and D.2). Ninety percent of the total longnose suckers passed upstream by 12 July, the twenty-sixth day of operation. Small numbers of suckers migrated back downstream throughout the summer, most of the downstream passage occurring in late July and August.

Carcass Counts. Carcass counts in 2000 included 73 chinook salmon and 140 chum salmon (Appendix E). The first chinook salmon carcass was observed on 22 July the thirty-fifth day of operations, and the median chinook salmon carcass passage date was 8 August. The first chum salmon carcass was observed on 1 July the sixteenth day of operations, and the median chum salmon carcass passage date was 28 July. No coho salmon carcasses were observed in 2000.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 80 chinook salmon in 2000, but the sample was not adequate for estimating ASL composition of the total annual chinook salmon escapement. Age was determined for 72 of the 80 fish sampled and included 7 age-1.2 fish (9.7%), 15 age-1.3 fish (20.8%), 49 age-1.4 fish (68.1%) and 1 age-1.5 fish (1.4%) (Table 4). Sex composition of the sample included 34 males (47.2%) and 38 females (52.8%). Male chinook salmon ranged in length from 490 to 965 mm, and females ranged from 580 to 980 mm (Table 5).

Chum Salmon. Scale samples, sex and length were collected from 245 chum salmon in 2000. Samples were collected from four pulses ranging in size from 28 to 89 fish per pulse. Age was determined for 235 of the 245 fish sampled (95.9%). Aged samples accounted for 6.7% of the chum salmon escapement and were adequate for estimating ASL composition of the total annual escapement (Table 6 and 7). Chum salmon escapement was partitioned into four temporal strata based on the dates when the samples were taken.

As applied to the total annual escapement, age-0.4 chum salmon was the most abundant age class (50.4%), followed by age-0.3 (46.7%), age-0.5 (1.6%), and age-0.2 (1.4%). Sex composition of the chum salmon escapement was estimated to include 1,972 males (56.5%) and 1,520 females (43.5%). Average length for age-0.3, -0.4, and -0.5 male chum salmon was 579 mm, 605 mm, and 562 mm, respectively. Two age-0.2 male chum salmon were in the sample, each having a length of 570 mm. Average length for age-0.3 and -0.4 female chum salmon was 558 mm and 572 mm. One age-0.2 and one age-0.5 female chum salmon were in the sample, each having lengths of 555 mm and 580 mm. Overall, male chum salmon lengths ranged from 520 to 675 mm while female lengths ranged from 490 to 665 mm.

Coho Salmon. Scale samples, sex and length were collected from 418 coho salmon in 2000. Samples were collected from 3 pulses ranging in size from 118 to 170 fish per pulse. Age was determined for 365 of the 418 fish sampled (87.3%). Aged samples accounted for 3.2% of the coho salmon escapement and were adequate for estimating the ASL composition of the total annual escapement (Table 8 and 9). Coho salmon escapement was partitioned into 3 temporal strata based the dates when the samples were collected.

As applied to the total annual escapement, age-2.1 coho salmon was the most abundant age class (97.6%), followed by age-1.1 (1.3%), and age-3.1 (1.1%). Sex composition of the coho salmon escapement was estimated to include 6,393 males (56.8%) and 4,869 females (43.2%). Average length of male age-1.1, -2.1, and -3.1 coho salmon was 497 mm, 544 mm, and 616 mm, respectively. Average length of female age-1.1 and -2.1 coho salmon was 558 mm and 552 mm respectively. The one age-3.1 female in the sample had a length of 540 mm. Overall, male coho salmon lengths ranged from 415 mm to 675 and female lengths ranged from 470 to 625 mm.

Habitat Profiling

Water temperature, air temperature and stage measurement were generally measured every morning from 14 June through 17 September (Appendix G.12). Water temperatures ranged from 4° C to 15° C, and air temperatures ranged from 0° C to 25° C. Stage measurements ranged from 34 cm to 104 cm. No discharge measurements were taken on George River in 2000. One water sample was collected from the George River near the weir site on 12 August. The sample was submitted for general chemical analysis at the ADF&G Limnology Laboratory, and results are described in Appendix G.8.

2001

Operations

The resistance board weir was operated from 25 June through 22 September in 2001. High water, panel repair and panel retrofitting delayed installation. The existing weir components were retrofitted with upgraded materials identified to improve performance and durability. Details of the application and performance of these upgrades are described in Stewart (2002) and Linderman et al. (2002). The weir was relocated approximately 25 yards upstream of the original site to bypass a large depression in the river channel created by scouring at the rigid weir sections in previous years. Forty-five feet of additional resistance board panels were added, which replaced most of the remaining fixed weir. Project operations were interrupted by a high water event from 19 through 26 August. River stage was estimated to have peaked at approximately 155 cm during this event. Weir operations were discontinued at 2000 hours on 22 September and camp closure began the following day. The weir substrate rail was left in the river after the remaining weir components were dismantled and removed.

Fish Passage

Chinook Salmon. Total annual chinook salmon escapement in 2001 was 3,309 fish, including an estimated passage of 43 fish (1.3%) during the inoperable periods (Table 1). Estimated passage for the inoperable period of 15 through 25 June was derived by the proportion method, the chinook salmon passage at the George River weir in 2000 used as the model dataset. Estimated passage for the inoperable period of 19 through 26 August was derived by the linear method.

The first chinook salmon was observed on 26 June, the second day of operation, and the peak daily passage of 610 fish occurred on 12 July. The last chinook salmon was observed on 4 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 9 July and central fifty-percent of the run occurred between 6 and 12 July.

Chum Salmon. Total annual escapement was determined to be 11,601 fish in 2001, including an estimated passage of 382 fish (3.3%) during inoperable periods (Table 2). Estimated passage for the inoperable period of 15 through 25 June was derived by the proportion method, the chum salmon passage at the George River weir in 2000 used as the model dataset. Estimated passage for the inoperable period of 19 through 26 August was derived by the linear method.

The first chum salmon was observed on 25 June, the second day of operation, and the peak daily passage of 610 fish occurred on 14 July. The last chum salmon was observed on 19 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 18 July and central fifty-percent of the run occurred between 12 and 26 July.

Coho Salmon. Total annual escapement in 2001 was 14,398 fish, including an estimated passage of 5,613 fish (38.9%) for the inoperable periods (Table 3). Estimated passage for the inoperable period of 19 through 26 August was derived by the linear method. No coho salmon estimates were necessary for the inoperable period of 15 through 25 June.

The first coho salmon was observed on 27 July, the thirty-third day of operation, and the peak daily passage of 1,534 fish occurred on 16 August. The last coho salmon was observed on 22 September, and they were still passing upstream in small numbers when the weir was dismantled on 23 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 21 August and central fifty-percent of the run occurred between 17 and 28 August.

Other Species. Passage in 2001 also included 24 sockeye salmon, 83 pink salmon, 87 Arctic grayling, 107 whitefish, 2 northern pike and 15,840 longnose suckers (Appendix D.1 and D.2). Ninety percent of the total longnose suckers passed upstream by 14 July, the twentieth day of operation. Small numbers of suckers migrated back downstream throughout the summer, most of the downstream passage occurred in late July and early August.

Carcass Counts. Carcass counts in 2001 included 240 chinook salmon, 847 chum salmon and 6 coho salmon (Appendix E). The first chinook salmon carcass was observed on 9 July the fourteenth day of operations, and median chinook salmon carcass passage date was 4 August. The first chum salmon carcass was observed on 26 June the second day of operations, and the median chum salmon carcass passage date was 5 August. The first coho salmon carcass was observed on 16 August the fifty-second day of operations, and coho salmon carcasses were still passing the weir when dismantled on 23 September.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 67 chinook salmon in 2001. Samples were collected from three pulses ranging in size from 16 to 27 fish per pulse. Age was determined for 62 of the 67 fish sampled (92.5%). Aged samples accounted for 1.8% of the chinook salmon escapement and were adequate for estimating ASL composition of the total annual escapement (Table 4 and 5). Chinook salmon escapement was partitioned into three temporal strata based on the dates when samples were collected.

As applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (48.8%), followed by age-1.3 (30.6%), age-1.2 (12.5%), and age-1.5 (8.1%). No age-2.2 chinook salmon was in the sample. Sex composition of the total annual chinook salmon escapement was estimated to include 2,217 males (67.0%) and 1,092 females (33.0%). Average length for age-1.2, -1.3, -1.4, and -1.5 male chinook salmon was 568 mm, 648 mm, 848 mm and 903 mm respectively. Average length for age-1.4 and -1.5 female chinook salmon was 822 mm and 877 mm, respectively. The one age-1.2 female chinook salmon had a length of 458 mm, and no age-1.3 females were in the sample. Overall, male chinook salmon lengths ranged from 461 to 1015 mm, and female lengths ranged from 458 to 914 mm.

Chum Salmon. Scale samples, sex and length from 818 chum salmon in 2001. Samples were collected from five pulses ranging in size from 25 to 211 fish per pulse. Age was determined for 782 of the 818 fish sampled (95.6%). The aged sample accounted for 6.8% of the chum salmon escapement and was adequate for estimating the ASL composition of the total annual escapement (Table 6 and 7). Chum salmon escapement was partitioned into five temporal strata based on the dates when the samples were taken.

Applied to the total annual escapement, age-0.3 chum salmon was the most abundant age class (66.3%), followed by age-0.4 (33.7%). No age-0.2 or -0.5 fish was in the sample. Sex composition of the chum salmon escapement was estimated to include 5,422 males (46.7%) and 6,179 females (53.3%). Average length for age-0.3 and -0.4 male chum salmon was 566 mm and 588 mm, respectively. Average length for age-0.3 and -0.4 female chum salmon was 538 mm and 555 mm, respectively. Overall, male chum salmon lengths ranged from 455 to 681 mm, and female lengths ranged from 320 to 670 mm.

Coho Salmon. Scale samples, sex and length from 462 coho salmon in 2001. Samples were collected from four pulses ranging in size from 10 to 171 fish per pulse. Age was determined for 371 of the 462 fish sampled (80.3%). The aged sample accounted for 2.6% of the coho salmon escapement and was adequate for estimating the ASL composition of the total annual escapement (Table 8 and 9). Coho salmon escapement was partitioned into three temporal strata based on dates samples were collected.

Applied to the total annual escapement, age-2.1 coho salmon was the most abundant age class (65.6%), followed by age-3.1 (33.6%), and age-1.1 (0.8%). Sex composition of the coho salmon escapement was estimated to include 6,725 males (46.7%) and 7,673 females (53.3%). Average length for age-1.1, -2.1, and -3.1 male coho salmon was 501 mm, 566 mm, and 553 mm, respectively. Average length for age-2.1 and -3.1 female coho salmon was 552 mm and 556 mm, respectively. No age-1.1 female coho salmon were in the sample. Overall, male coho salmon lengths ranged from 385 to 671 mm, and female lengths ranged from 378 to 632 mm.

Salmon Mark/Recapture

A total of 65 spaghetti tagged coho salmon were observed passing upstream through the weir in 2001, of which 42 (64.6%) were recaptured and the tag numbers were recorded (Kerkvliet and Hamazaki 2002).

Habitat Profiling

Water temperature, air temperature and stage measurement were generally measured every morning from 9 June through 22 September (Appendix G.13). Water temperatures ranged from 4°C to 12°C, and air temperatures ranged from -1°C to 20°C. Stage measurements ranged from 52 cm to 127 cm. A high water level event began on 17 August and the highest recorded stage measurement during this event was estimated at 155 cm on 21 August. No discharge measurements were taken and no water samples were collected for chemical analysis in 2001.

Aerial Surveys

Aerial surveys of George River drainage were conducted on 27 and 28 July in 2001. Four index areas were defined on the mainstem of George River, two were defined on the East Fork, one was defined on the North Fork and one was defined on the South Fork (Figure 5). Total River counts included 1,152 chinook salmon and 472 chum salmon. Aerial survey counts broken down by tributary included 1,104 chinook salmon and 472 chum salmon in the mainstem, 27 chinook salmon and 0 chum salmon in the East Fork, 12 chinook salmon and 0 chum salmon in the North Fork, and 12 chinook salmon and 0 chum salmon in the South Fork (Table 10). Survey conditions on the mainstem were rated good, conditions on the East Fork were rated poor, and conditions on the North and South Forks were both rated fair.

2002

Operations

The resistance board weir was operated from 21 June through 20 September in 2002. A May flood event caused by ice damming on the Kuskokwim River severely damaged approximately 70 feet of the substrate rail. An additional 50 feet of substrate rail was intact but damaged to being unusable. The spare substrate rail components at the site were not sufficient to replace the damaged sections, so additional materials were ordered and scavenged from other Kuskokwim River weir projects.

The weir was relocated approximately 50 yards downstream of the 2001 location to bypass several large depressions in the river channel created by the May flood event. Turbid water conditions in mid-June created difficulties during re-installation of the rail, but installation was complete by 21 June. Low water conditions contributed to uninterrupted operations for the remainder of the operational period. The enclosed passage chute was installed in early July. Weir operations were discontinued at 2100 hours on 20 September and camp closure began the following day. The weir rail was dismantled and removed from the river to prevent a repeat of the damage during the spring flood in 2002.

Fish Passage

Chinook Salmon. Total annual escapement in 2002 was 2,444 fish, including an estimated passage of one fish (0.0%) during the inoperable period (Table 1). Estimated passage for the inoperable period of 15 through 21 June was derived by the proportion method, the chinook salmon passage at the Tatlawiksuk River weir in 2002 used as the model dataset.

The first chinook salmon was observed on 21 June, the first day of operation, and the peak daily passage of 420 fish occurred on 30 June. The last chinook salmon was observed on 22 August. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 5 July and central fifty-percent of the run occurred between 30 June and 11 July.

Chum Salmon. Total annual escapement in 2002 was 6,543 fish, including an estimated passage of 14 fish (0.2%) during the inoperable period (Table 2). Estimated passage for the inoperable period of 15 through 21 June was derived by the proportion method, the chum salmon passage at the Tatlawiksuk River weir in 2002 used as the model dataset.

The first chum salmon was observed on 21 June, the first day of operation, and the peak daily passage of 518 fish occurred on 6 July. The last chum salmon was observed on 12 September. Based on the operational period of 15 June through 20 September and inclusive of the estimated passage, median passage date was 10 July and central fifty-percent of the run occurred between 3 and 16 July.

Coho Salmon. Total annual coho salmon escapement in 2002 was 6,759 fish (Table 3). No estimates of coho salmon passage were necessary in 2002.

The first coho salmon was observed on 28 July, the thirty-eighth day of operation, and the peak daily passage of 1,906 fish occurred on 6 September. The last coho salmon was observed on 20 September, and they were still passing upstream in small numbers when the weir was dismantled on 21 September. Based on the operational period of 15 June through 20 September, median passage date was 6 September and central fifty-percent of the run occurred between 30 August and 7 September.

Other Species. Passage in 2002 also included 17 sockeye salmon, 630 pink salmon, 144 Arctic grayling, 186 whitefish, 19 northern pike, 23 char and 6,374 longnose suckers (Appendix D.1 and D.2). Ninety percent of the total longnose suckers passed upstream by 24 July, the thirty-fourth day of operation. Small numbers of suckers migrated back downstream throughout the summer, most downstream passage occurred in late August and early September.

Carcass Counts. Carcass counts in 2002 included 78 chinook salmon, 832 chum salmon and 14 coho salmon (Appendix E). The first chinook salmon carcass was observed on 28 June the eighth day of operations, and the median chinook salmon carcass passage date was 29 July. The first chum salmon carcass was observed on 23 June the third day of operations, and the median chum salmon carcass passage date was 23 July. The first coho salmon carcass was observed on 7 August the forty-eighth day of operations, and coho salmon carcasses were still passing the weir when it was dismantled on 23 September.

ASL Composition of Escapement

Chinook Salmon. Scale samples, sex and length were collected from 360 chinook salmon in 2002. Samples were collected from five pulses ranging in size from 27 to 118 fish per pulse. Age was determined for 315 of the 360 fish sampled (87.5%). Aged samples accounted for 12.9% of the chinook salmon escapement and were adequate for estimating the ASL composition of total annual escapement (Table 4 and 5). Chinook salmon escapement was partitioned into five temporal strata based on dates when samples were collected.

Applied to the total annual escapement, age-1.4 chinook salmon was the most abundant age class (60.9%), followed by age-1.3 (18.3%), age-1.2 (12.6%) and age-1.5 (8.2%). Sex composition of the total annual chinook salmon escapement was estimated as 1,453 males (59.4%) and 991 females (40.6%). Average length for age-1.2, -1.3, -1.4 and -1.5 male chinook salmon was 481 mm, 693 mm, 818 mm and 891 mm, respectively. Average length for age-1.3, -1.4 and -1.5 female chinook salmon was 648 mm, 843 mm, and 898 mm, respectively. No age-1.2 female fish were in the sample. Overall, male chinook salmon lengths ranged from 362 to 970 mm, and female lengths ranged from 543 to 973 mm.

Chum Salmon. Scale samples, sex and length were collected from 984 chum salmon in 2002. Samples were collected from six pulses ranging in size from 67 to 221 fish per pulse. Age was determined for 955 of the 984 fish sampled (97.1%). The aged sample accounted for 14.6% of the chum salmon escapement and was adequate for estimating ASL composition of the total annual escapement (Table 6 and 7). Chum salmon escapement was partitioned into six temporal strata based on dates when samples were collected.

Applied to the total annual escapement, age-0.3 chum salmon was the most abundant age class (46.3%), followed by age-0.4 (45.8%), age-0.2 (6.4%) and age-0.5 (1.5%). Sex composition of the chum salmon escapement was estimated to include 3,445 males (52.7%) and 3,098 females (47.3%). Average length for age-0.2, -0.3, -0.4 and -0.5 male chum salmon was 534 mm, 582 mm, 602 mm and 612 mm, respectively. Average length for age-0.2, -0.3, -0.4 and -0.5 female chum salmon was 510 mm, 544 mm, 570 mm, and 577 mm, respectively. Overall, male chum salmon lengths ranged from 436 to 682 mm and female lengths ranged from 435 to 650 mm.

Coho Salmon. Scale samples, sex and length were collected from 84 coho salmon in 2002, but the sample was not adequate for estimating the ASL composition of the total annual escapement. Age was determined for 72 of the 80 fish sampled and included 65 age-2.1 fish and 7 age-3.1 fish (Table 8 and 9). Sex composition of the sample included 52 males and 20 females. Male coho salmon ranged in length from 418 to 653 mm, and females ranged from 487 to 604 mm.

Salmon Mark/Recapture

A total of 125 spaghetti tagged chum salmon were observed passing upstream through the weir in 2002, of which 101 (80.8%) were recaptured and the tag numbers recorded (Table 11). A total of 40 fish out of the 2,141 chum salmon examined had a secondary mark, and none of these 40 fish had lost their spaghetti tags (Kerkvliet and Hamazaki *in progress*).

A total of four spaghetti tagged sockeye salmon were observed passing upstream through the weir in 2002, and all four were recaptured and tag numbers recorded (Kerkvliet and Hamazaki *in progress*). These four fish were the only sockeye salmon examined for secondary marks.

A total of 100 spaghetti tagged coho salmon were observed passing upstream through the weir in 2002, of which 61 (61.0%) were recaptured and tag recorded (Table 11). A total of 7 fish out of the 359 coho salmon examined had a secondary mark, and none of these 7 fish had lost their spaghetti tags (Kerkvliet and Hamazaki *in progress*).

A total of 5 radio tagged chinook salmon were observed passing upstream through the weir in 2002. Results from the radio-telemetry study will be reported separately.

Habitat Profiling

Water temperature, air temperature and stage measurement were generally measured every morning from 12 June through 24 September (Appendix G.14). Water temperatures ranged from 3°C to 15°C, and air temperatures ranged from -2°C to 24.5°C. Stage measurements ranged from 10 cm to 73 cm. A period of high water began on 12 September with a highest recorded stage measurement of 73 cm. From measurements taken on 7 August, discharge of George River near the weir site was estimated to be 19.2 m^3/s at a stage measurement of 14.5 cm (Appendix G.15). Two water samples were collected from George River on 18 June and 18 July. Collections were submitted for general chemical analysis at the ADF&G Limnology Laboratory, and results are described in Appendix G.8.

Aerial Surveys

Aerial surveys of the George River drainage were conducted on 23 and 24 July in 2002 and conformed to the same index areas defined in 2001. Total River counts included 604 chinook salmon and 360 chum salmon (Table 10). Aerial survey counts broken down by tributary included 469 chinook salmon and 320 chum salmon in the mainstem, and 135 chinook salmon and 40 chum salmon in the East Fork. Mainstem survey conditions were rated as good, and the East Fork survey conditions were rated as fair. The North Fork and South Fork were not surveyed in 2002.

DISCUSSION

Operations

The weir design used on the George River has evolved over the years in response to various challenges. The goal has been reliable assessment of the salmon populations with minimal down time. The optimal weir design needs a quick recovery following inevitable inoperable periods, mostly caused by high water events. The fixed-panel weir used from 1996 through 1998 failed to recover quickly. In 1999, the fixed-panel weir was replaced with a resistance board weir similar to the design used successfully on the Middle Fork Goodnews and East Fork Andreafsky Rivers (Estensen 2002, Tobin and Harper 1998).

Initial plans in 1999 were to install the fixed-panel weir in early June and transition to the resistance board weir once materials arrived and were ready for installation; however, high water throughout June and early July prevented construction of the fixed weir and the resistance board weir was installed and operational by 14 July. Since 1999, several improvements have been incorporated into the resistance board weir used on George River and progress has been made toward achieving the design goal.

The resistance board panels used in 1999 improved performance during high water events, but the fixed-panel sections used along the stream margins were prone to scouring, which compromised operations. Replacement of the fixed-panel sections with additional resistance board weir sections in 2001 improved performance by limiting the remaining fixed panels to shallow water regions found along river margins. Other refinements incorporated in 2001 were identical to those incorporated at the Tatlawiksuk River weir and exhibited similar performance as described in Linderman et al. (2002).

Water turbidity has challenged operations over the years at George River weir. Fish identification became difficult when water levels increased because of the concurrent decrease in water clarity. The design of the fish trap introduced with the resistance board weir in 1999 addressed this challenge by adding to the fish counting chute a hinged gate that could be raised to direct fish toward the water's surface. A similar trap design in the fixed-panel weir proved too fragile. A limitation to the 1999 design was as water levels approached the top of the hinged gate (approx. 100 cm); the ramp had to be raised too high for effective fish passage. As resources allow, a larger counting chute with a longer ramp are recommended for the George River weir.

Rail damage that occurred on the George River weir in 2002 was an unforeseeable event. The rail is typically not removed from the river when the weir is dismantled because it can promote channel stability at the rail site and facilitates faster installation the following season. Minor rail damage is to be expected when leaving the rail in over winter, but the damage found in the spring of 2002 delayed installation and added to operational costs. In the future, the rail should be dismantled and removed from the river with the rest of the weir.

The enclosed passage chute incorporated in 2002 was a useful tool for increasing fish passage efficiency. Most fish were enumerated through the fish trap, but the enclosed passage chute provided quick access to a second passage location that could be used concurrent with the fish trap. Unfortunately, the enclosed chute was heavy, which made it cumbersome to install and remove, and reduced its ease of relocation to optimal fish passage locations as was originally intended. Still, the enclosed passage chute helped to expedite fish passage as originally intended, for continuous use. Future designs should incorporate a lighter frame to reduce the weight of the enclosed passage chute.

The design changes implemented at the George River weir improved effectiveness of project operations by reducing inoperable periods and increasing efficiency of fish passage, but effective operation includes more than just optimizing the structural components.

The purpose for operating weirs is to provide a reliable assessment of salmon populations, which in turn will aid in salmon management. Spawning Pacific salmon have limited energy stores during the culmination of their life cycle; therefore, the activities we undertake to monitor these fish should not interfere with their successful spawning. Individuals charged with design and operation of the George River weir and other weirs need to be attentive to this responsibility by recognizing conditions that threaten the well being of fish populations, and taking actions to safeguard these populations even if a void in the database results.

For example, when the George River weir was inoperable because of high water conditions, the crew was instructed to leave the fish passage gates open to avoid impeding fish migration. In addition, when fish displayed hesitancy in passing through the weir, crews were instructed to open additional sections of the weir to encourage fish passage, to pass fish at any time of the day or night fish appeared motivated to move, and to forgo collecting biological samples if the added stress appeared detrimental to fish passage. Our purpose is reliable escapement assessment to improve salmon management; part of that purpose includes operating projects in a manner that ensures the well being of the fish we are mandated to protect.

Fish Passage

Chinook Salmon

Total Annual Escapement. Chinook salmon escapements in 1996 and 1997 of 7,716 and 7,823 fish were higher than any subsequent years at George River (Figures 6 and 7). These escapements were two to three times the escapements of 3,548 fish in 1999, the 2,960 fish in 2000, the 3,309 fish in 2001, and the lowest escapement recorded to date of 2,444 fish in 2002.

Currently, no formal escapement goals exist for George River chinook salmon to serve as a benchmark for assessing the adequacy of escapements. Therefore, we are left with making an assessment by comparison with other abundance indicators, particularly those few tributaries with formal escapement goals (Figures 8 and 9). Overall, chinook salmon escapements in 1996 and 1997 were considered good in the Kuskokwim River drainage, including George River (Burkey et al 2000a). Escapement goals were achieved in both of these years at Kogrukluk River and at most of the aerial survey streams. In contrast, 1999 and 2000 were considered especially poor years for chinook salmon escapement in the Kuskokwim River drainage, consistent with escapements to George River. The 1999 and 2000 escapements for Kogrukluk River and for aerial survey streams were half to a third of the goals. In 2001 and 2002, chinook salmon escapements began to improve throughout most of the Kuskokwim River drainage; however, George River was an exception to this trend. George River escapements were low in 1999 and 2000, and continued to remain low through 2002. The Takotna River was the only other tributary with a relatively low chinook salmon escapement in 2002 (Clark and Molyneaux 2003b).

Assessing the adequacy of George River chinook salmon escapement in 1998 is speculative because total annual chinook salmon escapement was not determined that year; although some inferences can be made based on collected passage data. In 1998, chinook salmon passage through 7 July was 2,442 fish, which was intermediate to the higher abundances seen from 1996 through 1997, and the lower abundances seen from 1999 through 2002 (Figures 6 and 7). Extrapolating chinook salmon passage after 7 July based on the average proportion to date from all years when escapement was determined yields a total annual chinook salmon escapement of approximately 4,700 fish in 1998. Although speculative, this exercise offers some insight into total annual escapement of chinook salmon in 1998. While the chinook salmon escapement goal for the Kogrukluk River was cautiously described as having been achieved in 1998, the overall Kuskokwim River Chinook Index fell short of the index objective (Figure 8). The Aniak River was the only stream in which the aerial survey escapement goal was achieved (Figure 9; Burkey et al. 2002). Available information neither supports nor refutes the approximation of chinook salmon escapement to the George River in 1998. However, the lack of passage data after 7 July in 1998, and the conflicting trends seen in George River chinook salmon escapements over the years prevent any conclusions about chinook salmon escapement in 1998.

The number of chinook salmon seen in the George River is influenced by the harvest activity in the mainstem Kuskokwim River (Burkey et al. 2002). Chinook salmon are perhaps the most important salmon species for subsistence fishers in the Kuskokwim River. The ten-year average annual subsistence harvest from 1991 through 2000 of 80,653 chinook salmon is more than any other salmon species, and the trend has been stable for more than a decade. The directed commercial harvest of chinook salmon was discontinued in 1987 in response to a prolonged period of low chinook salmon runs, and in recognition of the subsistence priority for harvesting whatever surplus existed over escapement needs. An incidental harvest of chinook salmon continued in the chum salmon directed commercial fishery, the average annual incidental commercial harvest from 1991 through 2000 was 18,081 fish. The down turn in harvest since 1999 is believed to be reflective of an overall decrease in run size; however, low commercial harvests in 1993, 1994 and 1996 through 1998 were caused in part by conservation measures directed at chum salmon and limits in the commercial salmon markets. Decreased harvests led the Board to classify Kuskokwim River chinook salmon as a stock of concern in September 2000 (5AAC 39.222; Burkey et al 2000a).

Because of the stock of concern classification, the Board instituted a three-part rebuilding plan.

First, was little expectation of any commercial fishing during June and July of 2001 and 2002 to avoid incidental harvest of chinook salmon. The outlook was purposely phrased as "little expectation" as a hedge in case chinook salmon runs returned much stronger than expected. Second, subsistence fishers were placed on a fishing schedule in 2001 and 2002 intended to allow blocks of salmon to pass through the fishery unmolested, while still providing fishers with adequate time to achieve their harvest needs. The subsistence fishing schedule could be discontinued if salmon runs returned much stronger than expected, as was the case in 2002 when the schedule was discontinued on 28 June. Additional measures taken in 2001 resulted in the closure of the George River to the taking of subsistence caught chinook salmon. Third, the Board limited recreational sport fishers to one chinook salmon per day in 2001, down from the normal bag limit of three fish per day. On 10 May 2001 the federal subsistence board adopted a Special Action, which resulted in closure of all federal waters within the Yukon Delta National Wildlife Refuge to the sport harvest of chinook salmon. An inseason measure taken in 2001 was the 14 July closure of sport fishing for chinook salmon in the George River drainage and all waters within a one-quarter mile radius of its confluence with the Kuskokwim River because of the poor returns to date at the George River weir. For 2002, the one chinook salmon per day bag limit was continued, plus, the opening day for chinook salmon directed sport fishing was delayed from May 1 until June 15.

Inherent in the establishment of a rebuilding plan is the need for benchmarks that define what the planners are trying to achieve and some means of measuring success. Escapement goals provide such a measure, but the George River does not presently have a chinook salmon escapement goal. Kuskokwim River tributaries with defined escapement goals were generally at 30 to 50 percent of their goals in 1999 and 2000, but escapement goals on these tributaries in 2001 and 2002 were described as having been achieved (Figures 8 and 9). The dissimilar pattern of abundance seen on George River in 2001 and 2002 raises more questions than answers regarding the status of George River chinook salmon stocks, and reinforces the need for continued salmon escapement monitoring of George River salmon.

Passage Estimates. In accordance with project objectives, chinook salmon passage was estimated for inoperable periods in 1996, 1997, 1999, 2000, 2001, and 2002 to determine total annual chinook salmon escapement for 15 June through 20 September (Figure 7). Estimated passage accounted for less than 2.0% of total annual chinook salmon escapements in 1997, 2000, 2001 and 2002, and less than 13.0% in 1996 (Table 1). The authors believe these estimates are an acceptable approximation of chinook salmon passage in these years, in part because they represent such a small percentage of the total annual escapements.

The 1999 chinook salmon estimate is more speculative because it represents 31.3% of the total annual escapement; still, the estimate is believed to be a reasonable approximation of the unobserved chinook salmon passage that year (Table 1). The estimate was derived using the proportion method, the chinook salmon passage at the Tatlawiksuk River weir in 1999 used as the model data set. This model data set was used because the chinook salmon passage observed during the operational period at the George River in 1999 had characteristics similar to the chinook salmon passage at the Tatlawiksuk River during this same time (Figure 10). This similarity is strong enough to generate a reasonable approximation of unobserved chinook salmon passage at the George River weir in 1999.

The situation in 1998 was extreme and chinook salmon passage was not estimated, because no method appeared to exist for reasonably estimating the large gap in passage data after 7 July. The protracted high water conditions throughout the Kuskokwim River drainage that year caused similar gaps in passage data at other Kuskokwim River escapement projects, precluding the availability of a model data set. Additionally, the reliability of any estimates would be questionable because of the large gap in passage at George River in 1998.

Run Timing. Complete run timing information for chinook salmon is available for 1996, 1997 and 1999 through 2002 (Table 1, Figure 11). Median passage date ranged from 30 June in 1997 to 19 July in 1999, and overall run timing was earliest 1997 and latest in 1999 as well. The run timing of chinook salmon was earlier overall than chum and coho salmon in the George River, but the inter-annual run timing pattern between these species varied; for example, in 1997 the run timing for chinook salmon was early, but chum salmon were late and coho salmon were intermediate (Tables 1- 3).

Chum Salmon

Total Annual Escapement. The chum salmon escapement in 1996 of 19,393 fish was higher than any subsequent year in which escapement was determined at the George River (Figures 6 and 12). Escapements in 1999 and 2001 of 11,552 and 11,601 fish respectively were intermediate in range. At the low end of the range were 1997, 2000 and 2002 with escapements of 5,907, 3,492 and 6,543 fish respectively.

Currently, no formal escapement goals exist for George River chum salmon to serve as a benchmark for assessing the adequacy of escapements; therefore, we are left with making an assessment by comparison with other abundance indicators, particularly those few tributary streams with escapement goals (Figure 13). Throughout most of the Kuskokwim River drainage, the years 1997, 1999 and 2000 were considered to be especially poor for chum salmon escapements (Burkey et al 2000b). In all three of these years, escapements to Kogrukluk River were less than half the escapement goal, and in 1999 and 2000 passage at Aniak River sonar also fell short the escapement goal. At George River, chum salmon escapements were low in 1997 and 2000, but near average in 1999. In 2001 and 2002, chum salmon escapements improved throughout most of the Kuskokwim River drainage because passage at Kogrukluk and Aniak River was above goal, and comparable to the high escapements seen in 1996. However, the George River was again an exception to Kuskokwim River trends because chum salmon escapements in 2001 and 2002 being marginal at best.

Assessing the adequacy of George River chum salmon escapement in 1998 is speculative because total annual chum salmon escapement was not determined; however, some inferences can be made based on the limited passage data collected. If we compare the chum salmon passage through 7 July in 1998 with corresponding time periods at the George River in other years, the chum salmon abundance in 1998 of 4,990 fish appears average to above average (Figures 6 and 12). Furthermore, if we extrapolate chum salmon passage after 7 July in 1998 based on the average proportion to date from all years when escapement was determined, total annual chum salmon escapement to the George River in 1998 would have been approximately 16,800 fish. This approximation is a speculative exercise used to show the potential run size of chum salmon in 1998. Estimated chum salmon passage at Kogrukluk River weir, and the chum salmon passage index at Aniak River sonar, was above their formal escapement goals in 1998 like they were in 2001and 2002 (Figure 13). However, the conflicting trend between the George River and the Kogrukluk and Aniak Rivers complicates any assessment of the 1998 George River approximation. Additionally, the lack of passage data at the George River after 7 July, and the as yet unpredictability of annual chum salmon abundance in the George River prevents any conclusions about chum salmon escapement in 1998.

The level of chum salmon escapement seen in the George River is influenced by harvest activity in the mainstem Kuskokwim River. Over eighty percent of subsistence harvest and all commercial harvest occurs downstream of the George River confluence. Subsistence harvest levels for chum salmon have generally declined over the past few decades, but this species continues to be an important food source for subsistence users. The ten-year average annual subsistence harvest from 1991 through 2000 includes 67,662 chum salmon, which ranks second only to chinook salmon in numbers of fish harvested (Burkey et al. 2002). The commercial fishery that typically operates on the lower Kuskokwim River in June and July has a ten-year average annual harvest from 1991 through 2000 of 216,406 chum salmon. The commercial harvest has waned since the late 1980s, because of low run sizes and decreasing market interest in the species. The especially low commercial harvests in 1993, 1997 and in 1999 through 2000, were driven by low run sizes (Burkey et al 2000b).

In September 2000, the Board classified Kuskokwim River chum salmon as a yield concern because of the chronic inability of managers to maintain expected harvest levels (5AAC 39.222; Burkey et al 2000b). The Board finding considered this trend driven by a decrease in chum salmon productivity, and independent of the confounding influence of the waning commercial market for chum salmon. This finding lead state managers to develop a rebuilding plan that called for a more conservative harvest management strategy for chum salmon. Steps taken to implement the chum salmon rebuilding plan mirrored steps taken for chinook salmon. First, little if any commercial fishing during June and July of 2001 was expected. The outlook was purposely phrased as "little expectation" as a hedge in case the chum salmon run came back unexpectedly strong. A similar outlook was adopted for 2002. Second, subsistence fishers were placed on a fishing schedule in 2001 and 2002 intended to protract the harvest and allow blocks of salmon to pass through the fishery unmolested. The subsistence fishing schedule was, however, intended to provide fishers with adequate time to achieve their harvest needs. Additional measures taken in 2001 resulted in closure of George River to the taking of subsidence caught chum salmon. In 2002, the subsistence fishing schedule was discontinued on 28 June in response to a much stronger return of chum salmon than expected. Third, the Board limited recreational sport fishers to one chum salmon per day in 2001, down from the normal bag limit of five fish per day. Furthermore, on 10 May 2001 the federal subsistence board adopted an Emergency Action, which closed all federal waters within the Yukon Delta National Wildlife Refuge to sport harvest of chum salmon. Additional measures taken in 2001 included the 12

July closure of chum salmon directed sport fishing in all waters of the Kuskokwim River drainage. In 2002, the one chum salmon per day bag limit was continued, plus, opening day for chum salmon directed sport fishing was delayed from May 1 until June 15.

The rebuilding plan brought attention to the need for establishing benchmarks that better defined what managers were trying to achieve, and that provided some measure of assessing success. Escapement goals provide such a measure, but as of this writing, George River does not have any chum salmon escapement goals. The dissimilar trends in George River chum salmon stocks limits our ability to assess the adequacy of annual returns, and heightens the need for continued monitoring of George River salmon stocks.

Passage Estimates. In accordance with project objectives, chum salmon passage was estimated for the inoperable periods in 1996, 1997, 1999, 2000, 2001, and 2002 to determine total annual chum salmon escapement for period 15 June through 20 September (Figure 12). Estimated passage accounted for less than 3.5% of the total annual chum salmon escapements in 1997, 2000, 2001 and 2002, and less than 15.0% in 1996 (Table 2). The authors believe these estimates are an acceptable approximation of chum salmon passage in these years, in part because they represent such a small percentage of the total annual escapements.

The 1999 chum salmon estimate is more speculative because it represents 30.4% of the total annual escapement; however, the estimate is believed to be a reasonable approximation of unobserved chum salmon passage in this year (Table 2). The estimate was derived using the proportion method with the chum salmon passage at the Tatlawiksuk River weir in 1999 used as the model data set. This model data set was used because the chum salmon passage observed during the operational period at George River in 1999 had characteristics similar to the chum salmon passage at Tatlawiksuk River during this same period (Figure 10). This similarity is strong enough to generate a reasonable approximation of unobserved chum salmon passage at the George River weir in 1999.

As with chinook salmon, the situation in 1998 was extreme and chum salmon passage was not estimated because no method appeared reasonable for estimating the large gap in passage data after 7 July. High water conditions throughout the Kuskokwim River drainage again precluded the availability of a model data set, and any estimates would be questionable because of a large gap in passage data at the George River.

Run Timing. Complete run timing information for chum salmon is available for 1996, 1997 and 1999 through 2002 (Table 2, Figure 11). Median passage date ranged from 8 July in 1996 to 20 July in 1999, and overall run timing was earliest in 1996 and latest in 1999. The years 1996, 2000 and 2002 had similar earlier overall run timing, and the years 1997, 1999 and 2001 had similar later overall run timing. Overall chum salmon run timing was intermediate to chum and coho salmon run timing, but the inter-annual run timing pattern between these species varied; for example, in 1997 run timing for chinook salmon was early, but chum salmon were late and coho salmon were intermediate (Tables 1, 2 and 3).

Coho Salmon

Total Annual Escapement. Assessing total annual coho salmon escapements in the George River has been challenging in certain years. The coho salmon run occurs during late summer when rain and high water events are commonplace throughout the Kuskokwim region. This challenge to operations is evidenced by the premature termination of projects in 1996 and 1998, and by the frequency of inoperable periods in late July and August. The fixed weir used from 1996 through 1998 was more vulnerable to extended inoperable periods during high water events than was the resistance board weir. Even so, the resistance board weir was rendered inoperable by larger flooding events, but had the improved benefit of quick return to operational status once water levels receded.

Despite the trials of late summer weir operation, obtaining annual coho salmon escapement data from the George River was successful more often than not. Total annual coho salmon escapement in 2001 of 14,398 fish was higher than any subsequent year (Figures 6 and 14). Total annual escapements in 1997, 1999 and 2000 of 9,210, 8,914 and 11,262 fish respectively were more intermediate in range. At the low end of the range was the 2002 total annual escapement of 6,759 fish.

Similar to chinook and chum salmon, no formal escapement goal exists for George River coho salmon. Escapements can only be assessed through comparisons to other projects, which \ have coho salmon escapement goals, specifically the Kogrukluk River. As an alternative, comparisons can be made based on the relative ranked order of annual abundance. For George River, a ranked order of annual abundance from highest to lowest was 2001, 2000, 1997, 1999, and 2002 (Figure 15). In contrast, the ranked order of abundance at the Kogrukluk River for these same years was 2000, 2001, 2002, 1999, and 1997. Additionally, the Kogrukluk River coho salmon escapement in 2000 met the escapement goal while the 2001 escapement did not. This is in direct contrast with George River, which had an all time high escapement in 2001 and a 25% lower escapement in 2000. The only other escapement project with coho salmon trends similar to George River is Tuluksak River, but this comparison is limited to escapement data from 2001 and 2002 only. As with chinook and chum salmon trends, escapement trends of George River coho salmon do not follow trends seen in other Kuskokwim River tributaries, which furthers the need for continued monitoring of George River salmon stocks.

The level of coho salmon escapement seen in the George River is influenced by harvest activity in the mainstem Kuskokwim River. Over eighty percent of coho salmon subsistence harvest, and all commercial harvest occurs downstream of the George River confluence. The ten-year average of annual subsistence harvest in the Kuskokwim River from 1991 through 2000 includes 33,699 coho salmon, which is third behind the chinook and chum salmon harvests (Burkey et al. 2002). The subsistence harvest of coho salmon has generally declined over the past decade, but harvest increased slightly in 2000 to 33,786 fish. Most of the annual coho salmon harvest occurs in the commercial fishery that typically operates on the lower Kuskokwim River in late July and August. The ten-year average of annual commercial harvest from 1991 through 2000 includes 453,755 fish, higher than any other salmon species. Annual harvests have sharply declined since the 1996 peak of 937,299 fish largely because of low run sizes.

The relatively high volume of coho salmon harvested in the commercial fishery, coupled with the price paid per pound, makes coho salmon the most valuable species for Kuskokwim River commercial fishers (Burkey et al. 2002). This value was further amplified in 2001 and 2002 when the chum salmon directed commercial fishery did not occur because of reduced processor capacity, and in recognition of the chum and chinook salmon rebuilding plan. An important component of these facts is that the sale of coho salmon helps to support subsistence activities pursued by fishers and their families.

Passage Estimates. In accordance with project objectives, coho salmon passage was estimated for the inoperable periods in 1997, 2000 and 2001 to determine total annual coho salmon escapement for the period 15 June through 20 September (Figure 14). Estimated passage accounted for less than 3.0% of the total annual coho salmon escapements in 1997 and 2000 (Table 3). These estimates are an acceptable approximation of coho salmon passage in these years, in part because they represent such a small percentage of the total annual escapements.

The 2001 coho salmon estimate is more speculative because it represents 38.9% of the total annual escapement, 48 days of operation when passage was observed, and eight days of in-operation for which estimates were made (Table 3). The estimate spans over one third of the run, and is assumed a reasonable approximation of the coho salmon passage during that time. The estimate was derived by the linear method because no other data set exhibited passage characteristics similar to the observed coho salmon passage at George River in 2001. This estimate is a reasonable, and even conservative representation of coho salmon passage at George River in 2001 when compared to coho salmon passage at the Kogrukluk and Takotna River weirs in 2001 (Clark and Molyneaux 2003a, Clark and Molyneaux 2003b).

Coho salmon estimates were not made in 1996 and 1998 because so few coho salmon were observed before premature termination of project operations in these years. Observed coho salmon passage in these years accounted for less than 1% of their total annual escapement based on the average percent passage to date from all years coho salmon escapement was determined (Table 3). Additionally, lack of any observed passage data beyond the 1% point precludes any inferences regarding coho salmon escapements in 1996 and 1998.

Run Timing. Complete run timing information for coho salmon is available for 1997, and 1999 through 2002 (Table 3, Figure 11). Median passage date ranged from 21 August in 2000 and 2001 to 6 September in 2002, but overall run timing was earliest in 2000 and latest in 1999. The years 2000 and 2001 had similar overall early run timing, and the years 1999 and 2002 had similar overall late run timing. Overall run timing in 1997 was intermediate to these years. Overall coho salmon run timing was latest compared to chum and coho salmon run timing, but the inter-annual run timing pattern between these species varied; for example, in 1997 the run timing for chinook salmon was early, but chum salmon were late and coho salmon were intermediate (Tables 1, 2 and 3).

Other Species

Other salmon species observed in George River include small numbers of sockeye and pink salmon (Appendix D.1). The highest observed passage of sockeye salmon was 445 fish in 1997, but in other years passage was fewer than 100. Highest observed passages of pink salmon were 644 fish in 1996 and 630 fish in 2002, and in other years the passage was less than 100 fish. The low escapements reported for sockeye and pink salmon are likely not unusual because George River is not a primary spawning tributary for these species.

Longnose suckers are the most abundant non-salmon species counted through the George River weir. The highest recorded passage of 15,840 fish occurred in 2001 (Appendix D.2). However, abundance estimates are incomplete because upstream migration of this species starts before the beginning of weir operations. In late July and Early August, longnose suckers migrated downstream at the end of their spawning period. Most suckers were small enough to pass through spaces between weir panel pickets, but some fish were not. Passage chutes were incorporated into the weir to accommodate downstream sucker migration. Additionally, timing of downstream sucker migration often coincided with periods of high water, and complete submergence of weir panels during high water events facilitated downstream sucker migration. Longnose suckers have been reported as common in the Aniak, Tatlawiksuk and Takotna Rivers, but they appear to be uncommon or absent from the Kwethluk, Tuluksak and Kogrukluk Rivers.

Small numbers of whitefish were observed passing upstream through the weir in some years, the highest passage of 192 fish recorded in 2002 (Appendix D.1). Passage estimates of whitefish, however, are incomplete because most species of whitefish can freely pass through the weir.

Small numbers of northern pike, Arctic grayling and char were observed passing upstream through the weir in some years (Appendix D.1). These fish were thought to be resident species. Most of these fish, especially Arctic Grayling, were small enough to pass through weir panel pickets.

Carcass Counts

Carcass counts used in the past estimated the temporal period fish reside in the river, which is generally termed "stream life". Stream life for chinook salmon and chum salmon has been estimated by determining the number of days between the median upstream fish passage date, and the median downstream fish carcass date, however this analysis is misleading for many reasons, and does not accurately represent salmon stream life (Figures 16 and 17). Reasons for this assessment include the small proportion of carcasses to escapements, annual variability of carcass to escapement proportions, and potential biases in sex ratios between carcasses and escapement. The small proportion of carcasses at the weir has positive ramifications for aerial stream surveys because most observable spawning salmon and their carcasses reside upstream of the river's first four miles during late July when surveys are typically flown. Another benefit is the protracted retention of carcasses on the spawning grounds enhances the absorption of marine derived nutrients within the George River (Cederholm et al. 1999, Cederholm et al. 2000).

ASL Composition of Escapement

For the purposes of this report, the authors will focus on describing trends seen within the George

River dataset coupled with broad reference to the generalized historical trends described in DuBois and Molyneaux (2000) and unpublished Kuskokwim River ASL data for the years 2000 through 2002 (L. DuBois, ADF&G, Anchorage, personal communication). Probably the greatest value in collecting ASL information is for future development of spawner-recruit models used for establishing escapement goals (e.g., Clark and Sandone 2001). The information can also be used for forecasting future runs, and to illustrate long-term trends in ASL composition (for example, Bigler et al. 1996)

Chinook Salmon

ASL Data Revision. Results of the 1996 and 1997 George River chinook salmon ASL revisions were more accurate than the original estimates based on the following comparisons. In the original George River dataset, approximately 13.5% of the female chinook salmon measuring less than 719 mm in length were identified as females, whereas 2.5% of the sex-confirmed female chinook salmon from Kuskokwim River District W1 commercial catches measured less than 719 mm in length (Figure 4). In addition, an average of 7.8% of age-1.2 chinook salmon in the original George River dataset were identified as female, whereas they comprised only 1.1% among the sex-confirmed chinook salmon (Figure 18). Trends that caused the original 1996 and 1997 ASL data to be suspect essentially disappeared over subsequent years as weir crews became more proficient at sexing chinook salmon (Table 4). The revised estimates were also in better agreement with historical ASL trends seen elsewhere in the Kuskokwim River basin (DuBois and Molyneaux 2000).

The most notable changes made the revised estimates a more accurate representation of George River ASL composition: a reduction in the overall percentage of females, a reduction in the percentage of age-1.2 females, and an increase in female length range (Figures 18 and 19). Revisions resulted in reciprocal increases and decreases in male age, sex and length compositions.

Although the methodology used to generate revised ASL composition estimates may have changed a small number of females to males incorrectly, the revised estimates are a more accurate representation of George River chinook salmon ASL trends; therefore, the revised 1996 and 1997 ASL estimates supercede the original 1996 and 1997 ASL estimates.

Sample Collection. Chinook salmon samples were adequate for generating ASL composition estimates from 1996 through 1997, and from 2001 through 2002. Obtaining an adequate number of chinook salmon samples was problematic from 1998 through 2000 (Table 4 and 5). The premature termination of project operations in 1998 prevented total annual escapement determination, and consequently prevented continued collection of chinook salmon samples. Although total annual escapement was determined in 1999, late start-up of project operations prevented collection of chinook salmon samples during the first third of the run. In 2000, sample sizes collected throughout the season were inadequate for estimating ASL composition. Chinook salmon sampled in these years showed relative trends in age, sex and length between years, but inadequacy of the samples prevented any inference of these trends on the total annual chinook salmon escapements.

Higher abundance of fish in 1996 and 1997 contributed to collection of an adequate number of chinook salmon samples. Lower relative abundance of chinook salmon in 1999 and 2000 made achieving sample size goals more difficult. When chinook salmon abundance was low, leaving the rear trap door open to allow adequate numbers of fish to accumulate in the trap for a sampling period was not effective.

Active sampling was implemented in 2001 to increase chinook salmon sample sizes. Active sampling involved collection of chinook salmon samples during regular counting periods as described in Linderman et al. (2002). Active sampling was used with moderate success in 2001, and with great success in 2002 (Table 4). Although chinook salmon abundance was low in 2001 and 2002, active sampling increased chinook salmon sample sizes enough to meet sample size criteria for ASL composition of chinook salmon escapement estimates,

Summary. From 1996 through 1997, and from 2001 through 2002, age-1.4 chinook salmon were consistently the dominant age class at George River (Table 4). The respective percentages of age-1.4 fish from theses years were 39.8, 53.7, 48.8 and 60.9%. Although ASL composition of chinook salmon escapement was not determined from 1998 through 2000, a similar trend was seen in the 1999 and 2000 chinook salmon samples. A similar trend was not seen in the 1998 samples, but premature termination of project operations in 1998 may have skewed samples towards younger aged fish. Based on historical ASL data from other Kuskokwim River escapement projects, a dissimilar trend was seen in other chinook salmon populations. In general, annual percentages of age-1.4 chinook salmon in these populations were dictated by annual fluctuations in the percentages of other age classes. Additionally, most other Kuskokwim River chinook salmon populations consistently showed more overall chinook salmon age classes than those from George River.

From 1996 through 1997, and from 2001 through 2002, males were the dominant sex, and the percentage of females increased as the runs progressed (Table 4, Figure 20). The pooled average percentage of male fish was 61.2%, and the pooled average percentage of female fish was 38.8%. Additionally, the pooled average percentage of female fish increased from 29.2% to 44.6% as the runs progressed in these years. Although ASL composition of chinook salmon escapement was not determined from 1998 through 2000, similar trends can be inferred. The percentage of females was higher than males in 1999 and 2000, but the 1999 samples were collected late in the run when female fish are more dominant, and the sample sizes in 2000 were inadequate. Based on historical ASL data from other Kuskokwim River escapement projects, similar trends have been seen in other chinook salmon populations. Male chinook salmon have consistently been the dominant sex in these populations, male chinook salmon percentages fluctuating between 60% and 70%, and female chinook salmon percentages fluctuating between 30% and 40%. In general, the trend of female percentages increasing as the runs progressed occurs in other Kuskokwim River chinook salmon populations.

From 1996 through 1997, and from 2001 through 2002, George River chinook salmon exhibited length partitioning by age class, and age-1.3 and -1.4 female chinook salmon tended to be larger than age-1.3 and -1.4 males (Figure 21). The pooled average length of age-1.3, -1.4 and -1.5 female fish for these years was 735 mm, 844 mm and 895 mm, and the pooled average length of age-1.2, -1.3, -1.4 and -1.5 male fish for these years was 551 mm, 695 mm, 839 mm and 900 mm respectively. The pooled average length of age-1.3 and -1.4 female fish for these years was 789 mm, and the pooled average length of age-1.3, and -1.4 male fish for these years was 767 mm.

Although ASL composition of chinook salmon escapement was not determined from 1998 through 2000, similar trends were seen in chinook salmon samples collected in these years. Based on historical ASL data from other Kuskokwim River escapement projects, similar trends in length compositions exist in other chinook salmon populations. Length partitioning by age class is evident in these populations, even in those, which have a larger number of chinook salmon age classes than the George River. Additionally, female chinook salmon from these populations were consistently larger than males of the same age class.

Chum Salmon

Sample Collection. Chum salmon samples were adequate for generating ASL composition estimates from 1996 through 1997, and from 2000 through 2002; but obtaining an adequate number of chum salmon samples was problematic in 1998 and 1999 (Table 6 and 7). Premature termination of project operations in 1998 prevented continued collection of chum salmon ASL samples. Chum salmon samples collected in 1999 did not meet the criteria for generating ASL composition estimates because late start-up of project operations prevented sample collection during the first third of the run. Chum salmon sampled in these years showed relative trends in age, sex and length between years, but lack of escapement and ASL data in 1998 and inadequate sample size in 1999 prevented any inference of these trends on the total annual chum salmon escapement.

Summary. From 1996 through 1997, and 2000 through 2002 at George River, younger aged chum salmon consistently increased as their runs progressed with the pooled average percentage of age-0.3 fish increasing from 36% to 73% in these years (Figure 22). Although ASL composition of chum salmon escapement was not determined in 1998 and 1999, a similar trend was seen in chum salmon samples collected in these years. Based on historical ASL data from other Kuskokwim River escapement projects, the trend of younger aged chum salmon percentages increasing over time exists in other chum salmon populations.

From 1996 through 1997 and 2000 through 2002, the percentage of female fish consistently increased as their runs progressed in the George River, with the pooled average percentage of female fish increasing from 38% to 65% in these years (Figure 20). Although ASL composition of chum salmon escapement was not determined in 1999, a similar trend was seen in the chum salmon samples that were collected. Chum salmon samples collected in 1998 were inconclusive regarding any increase in female percentage over time. Based on historical ASL data from other Kuskokwim River escapement projects, a general trend of increasing female percentage over time exists in other Kuskokwim River chum salmon populations. The one exception to this trend was at Kogrukluk River, which consistently exhibited chum salmon sex compositions dissimilar to trends seen elsewhere in the Kuskokwim River drainage.

From 1996 through 1997, and 2000 through 2002, age-0.3 and -0.4 fish exhibited length partitioning, and male chum salmon tended to be larger than females in George River (Figure 23). The pooled average length of age-0.3 and -0.4 female fish for these years was 549 mm and 559 mm respectively, and pooled average length of age-0.3 and -0.4 male fish for these years was 576 mm and 593 mm respectively. Overall pooled average length of female fish for these years was 554 mm, and overall pooled average length of male fish for these years was 585 mm. Although ASL composition of chum salmon escapement was not determined in 1998 and 1999, similar trends were seen in chum salmon samples collected in these years. Based on historical ASL data from other Kuskokwim River escapement projects, similar trends in length compositions exist in other chum salmon populations. Kuskokwim River chum salmon populations consistently exhibited length partitioning of age-0.3 and -0.4 fish, and males were consistently larger than females.

Coho Salmon

Sample Collection. Coho salmon samples were adequate for generating ASL composition estimates in 1997, and from 1999 through 2001. No coho salmon samples were collected in 1996 and 1998 because significant numbers of coho salmon had not entered the George River when project operations ended prematurely. Additionally, obtaining an adequate number of coho salmon samples was problematic in 2002 (Tables 8 and 9). Low water conditions that persisted throughout the month of August in 2002 appear to have delayed coho salmon migration into George River (Figure 14). Support for this conclusion comes from the trend of increasing coho salmon passage coinciding with increasing stage measurement combined with recaptured coho salmon tag data, to be discussed further in the coho mark-recapture section of this report. Project leaders were concerned added stress of ASL sampling on an already delayed coho salmon run would not be beneficial to the coho salmon population, and decided to discontinue coho salmon sampling in 2002. Coho salmon sampled in 2002 showed relative trends in age, sex and length between years, but inadequate sample size prevented any inference of these trends on total annual coho salmon escapement.

Summary. In 1997, and from 1999 through 2001, age-2.1 coho salmon was the dominant age class in George River (Table 8). The percentage of age-2.1 coho salmon fluctuated between highs in the mid to upper 90% in 1997 and 2000, and lows in the mid to upper 60% in 1999 and 2001 (Figure 22). The 1999 and 2001 reduction in percentage of age-2.1 coho salmon was primarily caused by an increase in age-3.1 fish, the low percentage of age-1.1 coho remaining relatively constant throughout all years. Although ASL composition of coho salmon escapement was not determined in 2002, sample results do infer age-2.1 coho salmon was the dominant age class, because all sampled fish were determined to be age-2.1. Based on historical ASL data from other Kuskokwim River escapement projects, the trend of age-2.1 coho salmon dominance also exists in other Kuskokwim River coho salmon populations.

In 1997, and from 1999 through 2001, the percentages of male to female coho salmon remained close to a 50%-50% split in George River (Figure 20). Additionally, the percentage of females remained relatively constant as the runs progressed in these years, the pooled averages only increasing from 44.8% to 50.9%. Lack of ASL data in 2002 precludes any comparison of coho salmon sex composition to other project years. Based on historical ASL data from other Kuskokwim River escapement projects, the trend of male to female percentages remaining close to a 50% – 50% split was generally seen in other Kuskokwim River coho salmon populations.

In 1997, and from 1999 through 2001, male and female coho salmon lengths remained relatively constant as runs progressed in the George River (Figure 24). Additionally, male coho salmon length ranges were similar to female length ranges in these years, pooled male lengths ranged from 528 mm to 573 mm, and pooled female lengths ranging from 535 to 571. Lack of ASL data in 2002 precludes any comparison of coho salmon length composition to other project years. Based on historic ASL data from other Kuskokwim River escapement projects, male and female coho salmon lengths in other coho salmon populations remained relatively constant as their runs progressed, although mean length was generally smaller during the first third of their runs. Additionally, other Kuskokwim River coho salmon populations exhibited a trend of similarity between male and female length ranges.

Mark/Recapture Tag Recovery

Findings of the 2001 and 2002 salmon mark/recapture tagging and radio-telemetry projects are to be discussed in detail by Kerkvliet and Hamazaki (2002 and *in progress*) and Stuby (*in draft*). In 2001, the mark/recapture tagging project operated near Kalskag and Aniak focused on coho salmon. Tag recoveries in 2001 at the George River weir and other weir projects were hampered by high and turbid water conditions throughout the Kuskokwim region in late summer. This report will summarize findings pertinent to the George River, with an emphasis on findings derived from the recovered chum and coho salmon spaghetti tags in 2002.

In 2002 the mark/recapture tagging project was broadened to include chum, and sockeye salmon along with coho salmon, and refinements were made at the weir sites to enhance the number of recovered spaghetti tags. Most notable among these refinements was the use of viewing windows that aided in the identification and recapture of spaghetti tagged fish during periods of unfavorable water conditions.

Chum Salmon

The daily observed and recovered tags at the weir were similar to each other, and were well distributed throughout most of the chum salmon run, but run timing of tagged fish was later than the overall chum salmon passage (Figures 25 and 26). Distribution of recovered tags indicates they were representative of the total number of chum salmon observed returning to George River; however the later run timing of tagged fish suggests either: the earlier portion of the George River chum salmon run had a lower likelihood of being tagged at the Kalskag-Aniak tagging site, and the later portion had a high likelihood of being tagged; or the upstream migration of tagged fish was delayed relative to the untagged fish.

Recovery of the numbered spaghetti tags provided an opportunity to examine the distribution of tagged George River chum salmon relative to the total chum salmon catch at the Kalskag-Aniak tagging site, and allowed for an examination of the transit time and swimming speed of these fish between the tagging site and the weir. Chum salmon tags recovered at George River were well distributed over the total chum salmon catch at the Kalskag-Aniak tagging site (Figure 27). These findings indicate chum salmon migrating to George River were well represented by the tagging project. Transit time for these fish from the tagging site to the weir ranged from 4 to 19 days with a mean transit time of 7 days (Table 12). The migration speed ranged from 9 to 49 km per day, a mean migration speed of 30 km per day.

Recovery of the numbered chum salmon spaghetti tags also provided some preliminary information about run timing of specific spawning populations passing the Kalskag-Aniak tagging site. Tag recoveries from five tributary escapement projects including Aniak River sonar, and the George, Tatlawiksuk, Kogrukluk and Takotna River weirs suggest a distinct difference in run timing between spawning populations of these tributaries as they passed the Kalskag-Aniak tagging site. Run timing was progressively earlier at the Kalskag-Aniak site the farther upstream these spawning tributaries were located (Figure 28). The general progression, from earliest to latest, was Takotna River, Kogrukluk River, Tatlawiksuk River, George River and Aniak River. The median passage dates between the Takotna and Aniak Rivers spanned 24 days. Knowledge of the difference in run timing between spawning populations is a fundamental insight necessary for managing fisheries to ensure escapement goals are met.

The ratio of observed tagged chum salmon to total annual chum salmon escapement was highest at the George River weir when compared to similar ratios at the Kogrukluk, Tatlawiksuk and Takotna River weirs (C. Kerkvliet, ADF&G Anchorage, personal communication). These weirs are located in tributaries farther upstream from George River. The higher chum salmon tag ratio in George River indicates this spawning population had a higher probability of capture at the tagging site than did chum salmon bound for tributaries farther up the Kuskokwim River.

The difference in tag ratios between tributaries does not appear to be a result of tag loss. Of the 2,141 chum salmon examined for secondary marks at George River, no untagged fish were found to have a secondary mark, indicating any tag loss was minimal. Similar findings were reported at the other tributary escapement projects (C. Kerkvliet, ADF&G, Anchorage, personal communication).

Coho Salmon

Daily and observed coho salmon tags were dissimilar to each other and were not as well distributed throughout the coho run as chum salmon were (Figures 25 and 26). Most tags were recovered between the 30% and 90% points of the coho salmon run, indicating they were not as representative of the total number of coho salmon observed returning to George River as recovered chum salmon tags were. Less effort was directed toward coho salmon tag recovery during the beginning of the coho salmon run. Researchers thought active recovery of spaghetti tagged coho salmon might add undo stress to an already delayed coho salmon run, and tag recovery was suspended until coho salmon began to arrive at the weir in higher numbers. High and turbid water conditions in early September also hampered recovery efforts for a brief period.

Similar to chum salmon, recovery of the numbered spaghetti tags provided an opportunity to examine the distribution of tagged George River coho salmon relative to the total chum salmon catch at the Kalskag-Aniak tagging site, and allowed for an examination of the transit time and swimming speed of these fish between the tagging site and the weir. Coho salmon tags recovered at George River were well distributed over the total chum salmon catch at the Kalskag-Aniak tagging site (Figure 27). This finding indicates coho salmon migrating to George

River were well represented by the tagging project, and recovered tags may represent coho passage at the weir better than what the recovered tags to weir passage comparison suggests. The transit time for these fish from the tagging site to the weir ranged from 6 to 34 days with a mean transit time of 16 days (Table 13). The migration speed ranged from 5 to 33 km per day with a mean migration speed of 13 km per day.

Similar transit time and migration speed findings at the Takotna and Kogrukluk Rivers reinforce the conclusion coho salmon migration into the George River was delayed because of low water conditions, which persisted throughout much of August. Mean migration speed of tagged Takotna River coho salmon was 30 km per day and the mean migration speed for tagged Kogrukluk River coho salmon was 26 km per day (Clark and Molyneaux 2003a, Clark and Molyneaux 2003b). The mean migration speed of 13 km per day for tagged George River coho salmon was less than half the mean migration speed seen at the Takotna and Kogrukluk River weirs. This observed speed would suggest George River coho salmon were traveling slower than coho salmon bound for these other tributaries. However, the similarities between the Takotna and Kogrukluk River migration speeds are disproportionate to the reduced migration speed seen at George River. Historical data from middle and upper Kuskokwim River coho salmon escapement projects indicated a trend of similar run timing between spawning populations, and they typically arrive at their natal streams within one week of each other in a given year. The comparative travel speeds of Takotna and Kogrukluk River coho combined with the similarities in run timing for middle and upper Kuskokwim River populations suggests coho salmon traveling through the Kuskokwim River to the George River should have been traveling at the same speed as other Kuskokwim River coho salmon populations. Additionally, the trend of increases in coho salmon passage coinciding with increases in stage measurement at the George River weir in 2002 suggests coho salmon migration was related to water levels in George River (Figure 14). These trends combined indicate coho salmon migration to the George River weir was delayed. Researchers thought low water conditions persistent at the George River throughout late July and August in 2002 caused coho salmon to either hold within the George River downstream of the weir site, or hold in the Kuskokwim River near the George River confluence.

Recovery of the numbered coho salmon spaghetti tags also provided some preliminary information about run timing of specific spawning populations passing the Kalskag-Aniak tagging site. Tag recoveries from four tributary escapement projects including the George, Tatlawiksuk, Kogrukluk and Takotna River weirs suggest a distinct difference in run timing between spawning populations of these tributaries as they passed the Kalskag-Aniak tagging site (Figure 28). The general progression, from earliest to latest, was Takotna River, Tatlawiksuk River, Kogrukluk River and George River. Run timing as not progressively earlier the farther upstream these spawning tributaries were located. The Kogrukluk River is farther upstream from the tagging sites than the Tatlawiksuk River is, but tagged coho salmon run timing for Kogrukluk River fish was later than Tatlawiksuk River fish.

The ratio of observed tagged coho salmon to total annual coho salmon escapement was similar between the George Kogrukluk, Tatlawiksuk and Takotna River weirs (C. Kerkvliet, ADF&G Anchorage, personal communication). The similarity between coho salmon tag ratios at these projects indicates spawning populations in these tributaries had a relatively equal probability of capture at the tagging sites.

Of the 359 coho salmon examined for secondary marks at George River, no untagged fish were found to have a secondary mark indicating tag loss was minimal. Similar findings were reported at the other tributary escapement projects (C. Kerkvliet, ADF&G, Anchorage, personal communication).

Habitat Profiling

From 1996 through 2002, water temperatures fluctuated between 3 °C and 19 °C, and air temperature fluctuated between -2 °C and 26 °C. Note, in some years, air and water temperatures were not recorded for the entire targeted operational period because of late start-up, early take-out and premature termination of project operations. Air temperature did not appear to have an effect on fish in any given year.

From 1996 through 2002, observed river stage fluctuated between 10 cm and 139 cm. Note, in some years, river stage measurements were not recorded for the entire targeted operational period because of late start-up, early take-out and premature termination of project operations. Some moderate to large increases in daily chinook, chum and coho salmon passage do coincide with increasing river stage (Figures 9, 13 and 14). This coincidence appeared to be especially evident during the low water level conditions in 2002 when coho salmon passage briefly surged with modest increases in river stage.

The two water stage benchmarks were established in George River in 1998, and remained operable through 2002 (Appendix C). Comparisons to 1996 and 1997 stage measurements are approximations. The benchmarks are not permanent structures. Their height above the datum plane should be linked to a permanent structure along the stream bank, yet undone. Instability of the bank along the camp side of the river prevents the possibility of a permanent link to the benchmarks. These benchmarks will have to be evaluated and maintained annually to ensure success in comparing water levels.

Estimates of discharge were made near the weir site in 1997, 1999 and 2002 (Appendix X.Y). Highest discharge was 127.7 m^3/s on 8 June in 1999, when the river stage was at 85.0 cm. Lowest recorded discharge was 15.9 m^3/s on 6 August in 1997 at a river stage of 17.2 cm. Investigators intended to estimate discharge a minimum of three times each season, however, this objective was precluded because availability of equipment and trained staff was limited.

On 1 September, 1997, the discharge of the mainstem George River upstream of the East Fork confluence was estimated at 9.1 m^3/s, and the discharge estimate of the East Fork George River was 10.9 m^3/s, for a combined total at the confluence of 20.0 m^3/s. On that same date, discharge of the mainstem George River near the weir site was estimated to be 21.7 m^3/s, 1.7 m^3/s greater than the combined upstream estimates. The eight percent increase between the confluence and the weir could be a result of additional inflow from tributary streams, a shift in subsurface flow, and the precision of measurements used to estimate discharge.

Aerial Surveys

Aerial stream surveys were flown throughout much of the George River drainage in 2000 and 2001 to determine distribution of spawning salmon, and to provide a paired data set with weir counts for determining the feasibility of developing an aerial survey of total annual escapement. Chinook salmon were observed throughout much of the mainstem George River and in the east, south and north forks of the river; however, 66.2% of the live chinook salmon and 60.4% of the chinook salmon redds were in index area 102 of the mainstem George River (Table 10, Figure 5). Chum salmon observed throughout the mainstem George River, were found only in the East Fork tributary stream. . Similar to chinook salmon, 62.5% of the chum salmon were found in index area 102 of the mainstem George River.

Aerial surveys of the George River drainage resulted in paired data sets between total annual escapement and aerial survey counts in 2001 and 2002. Researchers hoped these paired data sets might allow aerial surveys to be used as a future proxy of total annual escapement; however, two years are insufficient for drawing any conclusions. Paired data should continue to be collected until more definitive conclusions can be made.

The aerial survey index areas defined on the George River in 2001 are only applicable to the surveys conducted in 2001 and 2002 (Figure 5). The authors recommend all future aerial surveys use this same index area convention.

CONCLUSIONS

1) **The evolution of the weir and modification of operational procedures since inception of the George River weir project has:**
   a) Increased the reliability of the weir to span the targeted operational period,
   b) Increased the overall effectiveness of the weir regarding accomplishment of project objectives, and
   c) Determined the weir rail should be removed from the river each year.

2) **Total annual escapements of chinook, chum and coho salmon at the George River weir project have:**
   a) Indicated chinook salmon escapements declined since inception of the project in 1996, which is in contrast to chinook salmon escapement trends seen elsewhere in the Kuskokwim River drainage,
   b) Indicated chum salmon escapements have declined overall since the project's inception in 1996, and annual George River chum salmon escapements have not followed a pattern similar to chum salmon escapement trends seen elsewhere in the Kuskokwim River drainage, and

c) Indicated coho salmon escapements have remained relatively constant since the project's inception in 1996, and annual George River coho salmon escapements have not followed a pattern similar to coho salmon escapement trends seen elsewhere in the Kuskokwim River drainage.

3) **The ASL data collected at the George River weir project has:**
   a) Indicated revised ASL composition of chinook salmon escapement estimates are more accurate than the original ASL composition estimates, and
   b) Indicated trends similar to existing ASL data of Kuskokwim River salmon stocks.

4) **The mark-recapture tag data collected at the George River weir in 2002 has:**
   a) Indicated travel time and travel speed of chum and coho salmon from the tagging sites in 2002,
   b) Indicated coho salmon migration into the George River was delayed in 2002 because of low water conditions, and
   c) Indicated run timing separations between chum and coho salmon spawning populations based on spawning tributary location within the Kuskokwim River drainage.

5) **The habitat profile data collected at the George River weir project has:**
   a) Allowed for comparative water levels between years and enabled better assessment of weir performance.

6) **The aerial surveys conducted on the George River in 2001 and 2002 has:**
   a) Generated index areas of the George River drainage,
   b) Indicated where most chinook and chum salmon spawn in the George River drainage, and
   c) Generated paired data sets between aerial survey counts and total annual escapements used to generate escapement estimates from aerial survey indices.

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Table 1. Historical chinook salmon passage at George River weir, 1996 - 2002.

= poor escapement year in the Kuskokwim River basin

Date	Daily Passage 1996	1997	1998	1999	2000	2001	2002	Cumulative Passage 1996	1997	1998	1999	2000	2001	2002	Percent Passage 1996	1997	1999	2000	2001	2002
6/15	23 b	26	c	0 b	0 b	0 b	0 b	23	26		0	0	0	0	0	0	0	0	0	0
6/16	11 b	13 a	c	0 b	0 b	0 b	0 b	34	39		0	0	0	0	0	0	0	0	0	0
6/17	10 b	11	c	0 b	0 e	0 b	0 b	44	50		0	0	0	0	1	1	0	0	0	0
6/18	7 b	8	c	0 b	0	0 b	0 b	51	58		0	0	0	0	1	1	0	0	0	0
6/19	37 b	42	c	0 b	0	0 b	0 b	88	100		0	0	0	0	1	1	0	0	0	0
6/20	0 b	0	c	0 b	0	0 b	0 b	88	100		0	0	0	0	1	1	0	0	0	0
6/21	27	17	c	0 b	0	0 b	3 e	115	117		0	0	0	3	1	1	0	0	0	0
6/22	17	18	1 d	0 b	2	2 b	55	132	135	1	0	2	2	58	2	2	0	0	0	2
6/23	269	362	3	9 b	10	11 b	40	401	497	4	9	12	13	98	5	6	0	0	0	4
6/24	762	488	4	5 b	11	12 b	5	1,163	985	8	14	23	25	103	15	13	0	1	1	4
6/25	214	907	14	5 b	5	6 e	8	1,377	1,892	22	19	28	31	111	18	24	1	1	1	5
6/26	41	288	44	14 b	1	15	30	1,418	2,180	66	33	29	46	141	18	28	1	1	1	6
6/27	183	514	35	9 b	120	16	24	1,601	2,694	101	43	149	62	165	21	34	1	5	2	7
6/28	98	397	170	33 b	0	100	43	1,699	3,091	271	76	149	162	208	22	40	2	5	5	9
6/29	91 a	566	126	12 b	8	305	24	1,790	3,657	397	88	157	467	232	23	47	2	5	14	10
6/30	84	767	164	5 b	8	15	420	1,874	4,424	561	93	165	482	652	24	57	3	6	15	27
7/01	1,034	456	288	38 b	63	43	366	2,908	4,880	849	131	228	525	1,018	38	62	4	8	16	42
7/02	712 a	277	397	12 b	416	163	23	3,619	5,157	1,246	142	644	688	1,041	47	66	4	22	21	43
7/03	389	584	428	31 b	115	8	107	4,008	5,741	1,674	173	759	696	1,148	52	73	5	26	21	47
7/04	320	347	287	62 b	69	36	39	4,328	6,088	1,961	235	828	732	1,187	56	78	7	28	22	49
7/05	280	221	245	33 b	48	32	102	4,608	6,309	2,206	268	876	764	1,289	60	81	8	30	23	53
7/06	579	294	203	36 b	51	531	92	5,187	6,603	2,409	304	927	1,295	1,381	67	84	9	31	39	57
7/07	180	93	33 d	33 b	231	246	138	5,367	6,696	2,442	337	1,158	1,541	1,519	70	86	10	39	47	62
7/08	122	34	c	31 b	137	36	127	5,489	6,730		368	1,295	1,577	1,646	71	86	10	44	48	67
7/09	436	37	c	50 b	81	70	80	5,925	6,767		418	1,376	1,647	1,726	77	87	12	46	50	71
7/10	127	29	c	95 b	15	155	22	6,052	6,796		513	1,391	1,802	1,748	78	87	14	47	54	72
7/11	376	33	c	188 b	495	64	142	6,428	6,829		701	1,886	1,866	1,890	83	87	20	64	56	77
7/12	53	245	c	280 b	116	610	37	6,481	7,074		981	2,002	2,476	1,927	84	90	28	68	75	79
7/13	60	31	c	128 b	10	57	55	6,541	7,105		1,109	2,012	2,533	1,982	85	91	31	68	77	81
7/14	127	11	c	68	22	113	74	6,668	7,116		1,177	2,034	2,646	2,056	86	91	33	69	80	84
7/15	324	65	c	206	17	86	29	6,992	7,181		1,383	2,051	2,732	2,085	91	92	39	69	83	85
7/16	78	6	c	185	146	26	35	7,070	7,187		1,568	2,197	2,758	2,120	92	92	44	74	83	87
7/17	67	22	c	21	104	45	42	7,137	7,209		1,589	2,301	2,803	2,162	92	92	45	78	85	88
7/18	107	42	c	58	13	97	22	7,244	7,251		1,647	2,314	2,900	2,184	94	93	46	78	88	89
7/19	63	87	c	260	219	41	25	7,307	7,338		1,907	2,533	2,941	2,209	95	94	54	86	89	90
7/20	49	111	c	456	9	88	29	7,356	7,449		2,363	2,542	3,029	2,238	95	95	67	86	92	92
7/21	58	83	c	43	13	34	27	7,414	7,532		2,406	2,555	3,063	2,265	96	96	68	86	93	93
7/22	26	49	c	196	41	46	25	7,440	7,581		2,602	2,596	3,109	2,290	96	97	73	88	94	94
7/23	29	32	c	61	87	17	9	7,469	7,613		2,663	2,683	3,126	2,299	97	97	75	91	94	94
7/24	54	7	c	161	22	4	18	7,523	7,620		2,824	2,705	3,130	2,317	97	97	80	91	95	95
7/25	34	41	c	203	25	12	6	7,557	7,661		3,027	2,730	3,142	2,323	98	98	85	92	95	95
7/26	17	18	c	159	34	14	11	7,574	7,679		3,186	2,764	3,156	2,334	98	98	90	93	95	95
7/27	9 b	9	c	37	43	16	19	7,583	7,688		3,223	2,807	3,172	2,353	98	98	91	95	96	96
7/28	25 b	25	c	58	10	28	15	7,608	7,713		3,281	2,817	3,200	2,368	99	99	92	95	97	97
7/29	7 b	7	c	47	11	17	7	7,615	7,720		3,328	2,828	3,217	2,375	99	99	94	96	97	97
7/30	13 b	13	18	19	5	5	15	7,628	7,733	2,460	3,347	2,833	3,222	2,390	99	99	94	96	97	98
7/31	13 b	13	14	24	26	7	6	7,640	7,746	2,474	3,371	2,859	3,229	2,396	99	99	95	97	98	98
8/01	4 b	4	6	7	13 e	6	6	7,644	7,750	2,480	3,378	2,872	3,235	2,402	99	99	95	97	98	98
8/02	5 b	5	25	37	11 b	9	5	7,649	7,755	2,505	3,415	2,883	3,244	2,407	99	99	96	97	98	98
8/03	7 b	7	c	20	13	4	8	7,656	7,762		3,435	2,896	3,248	2,415	99	99	97	98	98	99
8/04	4 b	4	c	21	5	3	3	7,660	7,766		3,456	2,901	3,251	2,418	99	99	97	98	98	99
8/05	4 b	4	c	12	6 b	2	5	7,664	7,770		3,468	2,907	3,253	2,423	99	99	98	98	98	99
8/06	2 b	2	c	6	3	7	0	7,666	7,772		3,474	2,910	3,260	2,423	99	99	98	98	99	99
8/07	3 b	3	c	4	3	6	0	7,669	7,775		3,478	2,913	3,266	2,423	99	99	98	98	99	99

-Continued-

Table 1. (page 2 of 2)

- poor escapement year in the Kuskokwim River basin.

Date	Daily Passage 1996	1997	1998	1999	2000	2001	2002	Cumulative Passage 1996	1997	1998	1999	2000	2001	2002	Percent Passage 1996	1997	1999	2000	2001	2002
8/08	3 b	3	c	2	8	9	3	7,672	7,778		3,480	2,921	3,275	2,426	99	99	98	99	99	99
8/09	5 b	5	c	10	0	3	1	7,677	7,783		3,490	2,921	3,278	2,427	99	99	98	99	99	99
8/10	1 b	1	c	0	1	1	3	7,678	7,784		3,490	2,922	3,279	2,430	100	100	98	99	99	99
8/11	3 b	3	c	3	6	2	3	7,681	7,787		3,493	2,928	3,281	2,433	100	100	98	99	99	100
8/12	8 b	8	c	1	6	3	4	7,689	7,795		3,494	2,934	3,284	2,437	100	100	98	99	99	100
8/13	5 b	5	c	7	2	2	1	7,694	7,800		3,501	2,936	3,286	2,438	100	100	99	99	99	100
8/14	3 b	3	c	2	7	0	1	7,697	7,803		3,503	2,943	3,286	2,439	100	100	99	99	99	100
8/15	4 b	4	c	16	5	1	1	7,701	7,807		3,519	2,948	3,287	2,440	100	100	99	100	99	100
8/16	8 b	8	c	5	2	1	1	7,708	7,815		3,524	2,950	3,288	2,441	100	100	99	100	99	100
8/17	1 b	1	c	5	0	4	0	7,709	7,816		3,529	2,950	3,292	2,441	100	100	99	100	99	100
8/18	1 b	1	c	0	1	1	2	7,710	7,817		3,529	2,951	3,293	2,443	100	100	99	100	100	100
8/19	0 b	0	c	1	2	2 b	0	7,710	7,817		3,530	2,953	3,295	2,443	100	100	99	100	100	100
8/20	3 b	3	c	4	0	2 b	0	7,713	7,820		3,534	2,953	3,297	2,443	100	100	100	100	100	100
8/21	2 b	2	c	4	0	2 b	0	7,715	7,822		3,538	2,953	3,299	2,443	100	100	100	100	100	100
8/22	1 b	1	c	0	1	2 b	1	7,716	7,823		3,538	2,954	3,301	2,444	100	100	100	100	100	100
8/23	0 b	0	c	0	2	1 b	0	7,716	7,823		3,538	2,956	3,302	2,444	100	100	100	100	100	100
8/24	0 b	0	c	0	0	1 b	0	7,716	7,823		3,538	2,956	3,303	2,444	100	100	100	100	100	100
8/25	0 b	0	c	1	0	1 b	0	7,716	7,823		3,539	2,956	3,304	2,444	100	100	100	100	100	100
8/26	0 b	0	c	1	2	1 b	0	7,716	7,823		3,540	2,958	3,305	2,444	100	100	100	100	100	100
8/27	0 b	0	c	2	0	2	0	7,716	7,823		3,542	2,958	3,307	2,444	100	100	100	100	100	100
8/28	0 b	0	c	0	0	1	0	7,716	7,823		3,542	2,958	3,308	2,444	100	100	100	100	100	100
8/29	0 b	0	c	0	1	0	0	7,716	7,823		3,542	2,959	3,308	2,444	100	100	100	100	100	100
8/30	0 b	0	c	1	0	0	0	7,716	7,823		3,543	2,959	3,308	2,444	100	100	100	100	100	100
8/31	0 b	0	c	0	0	0	0	7,716	7,823		3,543	2,959	3,308	2,444	100	100	100	100	100	100
9/01	0 b	0	c	2	0	0	0	7,716	7,823		3,545	2,959	3,308	2,444	100	100	100	100	100	100
9/02	0 b	0	c	0	0	0	0	7,716	7,823		3,545	2,959	3,308	2,444	100	100	100	100	100	100
9/03	0 b	0	c	0	0	0	0	7,716	7,823		3,545	2,959	3,308	2,444	100	100	100	100	100	100
9/04	0 b	0	c	0	0	1	0	7,716	7,823		3,545	2,959	3,309	2,444	100	100	100	100	100	100
9/05	0 b	0	c	1	0	0	0	7,716	7,823		3,546	2,959	3,309	2,444	100	100	100	100	100	100
9/06	0 b	0	c	0	0	0	0	7,716	7,823		3,546	2,959	3,309	2,444	100	100	100	100	100	100
9/07	0 b	0	c	0	0	0	0	7,716	7,823		3,546	2,959	3,309	2,444	100	100	100	100	100	100
9/08	0 b	0	c	1	0	0	0	7,716	7,823		3,547	2,959	3,309	2,444	100	100	100	100	100	100
9/09	0 b	0	c	0	0	0	0	7,716	7,823		3,547	2,959	3,309	2,444	100	100	100	100	100	100
9/10	0 b	0	c	0	0	0	0	7,716	7,823		3,547	2,959	3,309	2,444	100	100	100	100	100	100
9/11	0 b	0	c	0	0	0	0	7,716	7,823		3,547	2,959	3,309	2,444	100	100	100	100	100	100
9/12	0 b	0	c	1	0	0	0	7,716	7,823		3,548	2,959	3,309	2,444	100	100	100	100	100	100
9/13	0 b	0	c	0	0	0	0	7,716	7,823		3,548	2,959	3,309	2,444	100	100	100	100	100	100
9/14	0 b	0	c	0	1	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/15	0 b	0	c	0	0	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/16	0 b	0 b	c	0	0	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/17	0 b	0 b	c	0	0 b	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/18	0 b	0 b	c	0	0 b	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/19	0 b	0 b	c	0	0 b	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
9/20	0 b	0 b	c	0	0 b	0	0	7,716	7,823		3,548	2,960	3,309	2,444	100	100	100	100	100	100
Total	7,716	7,823	2,505	3,548	2,960	3,309	2,444													
Obs.	6,751	7,821	2,505	2,439	2,930	3,266	2,443													
Est (%)	12.5	0.2	0.0	31.3	1.0	1.3	0.0													

a = Daily passage was estimated due to the occurance of a hole in the weir.

b = The weir was not operational; daily passage was estimated.

c = The weir was not operational; daily passage was not estimated

d = Partial day count, passage was not estimated.

e = Partial day count, passage was estimated.

Table 2. Historical chum salmon passage at George River weir, 1996 - 2002.

= poor escapement year in the Kuskokwim River basin.

Date	Daily Passage							Cumulative Passage							Percent Passage					
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	1999	2000	2001	2002
6/15	1 b	0	c	0 b	0 b	0 b	0 b	1	0	0	0	0	0	0	0	0	0	0	0	0
6/16	2 b	2 a	c	0 b	0 b	0 b	1 b	2	2	0	0	0	0	1	0	0	0	0	0	0
6/17	3 b	2	c	0 b	0 e	0 b	1 b	6	4	0	0	0	0	2	0	0	0	0	0	0
6/18	2 b	0	c	0 b	0	0 b	1 b	7	4	0	0	0	0	2	0	0	0	0	0	0
6/19	5 b	2	c	0 b	0	0 b	2 b	12	6	0	0	0	0	4	0	0	0	0	0	0
6/20	2 b	0	c	0 b	0	0 b	1 b	14	6	0	0	0	0	5	0	0	0	0	0	0
6/21	65	2	c	0 b	5	17 b	11 e	79	8	0	0	5	17	16	0	0	0	0	0	0
6/22	613	3	1 d	0 b	6	20 b	107	692	11	1	0	11	36	123	4	0	0	0	0	2
6/23	1,314	35	0	0 b	38	126 b	58	2,006	46	1	0	49	162	181	10	1	0	1	1	3
6/24	692	52	6	21 b	17	56 b	23	2,698	98	7	21	66	219	204	14	2	0	2	2	3
6/25	49	43	23	8 b	17	56 e	124	2,747	141	30	29	83	275	328	14	2	0	2	2	5
6/26	376	49	162	21 b	1	10	245	3,123	190	192	50	84	285	573	16	3	0	2	2	9
6/27	508	79	116	29 b	90	17	118	3,631	269	308	79	174	302	691	19	5	1	5	3	11
6/28	167	34	289	78 b	0	39	237	3,798	303	597	157	174	341	928	20	5	1	5	3	14
6/29	191 a	178	288	78 b	4	140	149	3,989	481	885	235	178	481	1,077	21	8	2	5	4	16
6/30	215	204	399	67 b	12	7	203	4,204	685	1,284	302	190	488	1,280	22	12	3	5	4	20
7/01	498	64	634	106 b	108	40	175	4,702	749	1,918	408	298	528	1,455	24	13	4	9	5	22
7/02	730 a	77	388	100 b	273	110	34	5,432	826	2,306	507	571	638	1,489	28	14	4	16	5	23
7/03	961	267	557	117 b	128	21	151	6,393	1,093	2,863	625	699	659	1,640	33	18	5	20	6	25
7/04	1,074	83	605	128 b	77	26	37	7,467	1,176	3,468	752	776	685	1,677	39	20	7	22	6	26
7/05	326	174	960	109 b	72	68	192	7,793	1,350	4,428	862	848	753	1,869	40	23	7	24	6	29
7/06	606	111	439	164 b	218	228	518	8,399	1,461	4,867	1,025	1,066	981	2,387	43	25	9	31	8	36
7/07	575	52	123 d	199 b	162	425	339	8,974	1,513	4,990	1,224	1,228	1,406	2,726	46	26	11	35	12	42
7/08	629	49	c	183 b	47	173	186	9,603	1,562		1,407	1,275	1,579	2,912	50	26	12	37	14	45
7/09	852	40	c	376 b	40	319	198	10,455	1,602		1,784	1,315	1,898	3,110	54	27	15	38	16	48
7/10	241	62	c	454 b	58	349	317	10,696	1,664		2,238	1,373	2,247	3,427	55	28	19	39	19	52
7/11	446	45	c	469 b	436	546	399	11,142	1,709		2,706	1,809	2,793	3,826	57	29	23	52	24	58
7/12	343	207	c	483 b	161	600	279	11,485	1,916		3,189	1,970	3,393	4,105	59	32	28	56	29	63
7/13	394	7	c	325 b	91	429	149	11,879	1,923		3,514	2,061	3,822	4,254	61	33	30	59	33	65
7/14	489	12	c	182	41	610	203	12,368	1,935		3,696	2,102	4,432	4,457	64	33	32	60	38	68
7/15	556	158	c	194	22	537	276	12,924	2,093		3,890	2,124	4,969	4,733	67	35	34	61	43	72
7/16	232	51	c	333	150	325	205	13,156	2,144		4,223	2,274	5,294	4,938	68	36	37	65	46	75
7/17	462	236	c	327	88	427	154	13,618	2,380		4,550	2,362	5,721	5,092	70	40	39	68	49	78
7/18	514	207	c	394	55	502	189	14,132	2,587		4,944	2,417	6,223	5,281	73	44	43	69	54	81
7/19	667	575	c	768	144	533	131	14,799	3,162		5,712	2,561	6,756	5,412	76	54	49	73	58	83
7/20	322	300	c	709	18	427	63	15,121	3,462		6,421	2,579	7,183	5,475	78	59	56	74	62	84
7/21	387	342	c	316	41	330	115	15,508	3,804		6,737	2,620	7,513	5,590	80	64	58	75	65	85
7/22	273	144	c	379	87	397	65	15,781	3,948		7,116	2,707	7,910	5,655	81	67	62	78	68	86
7/23	321	292	c	465	172	208	73	16,102	4,240		7,581	2,879	8,118	5,728	83	72	66	82	70	88
7/24	525	207	c	533	116	264	70	16,627	4,447		8,114	2,995	8,382	5,798	86	75	70	86	72	89
7/25	449	238	c	443	76	244	60	17,076	4,685		8,557	3,071	8,626	5,858	88	79	74	88	74	90
7/26	508	110	c	353	56	337	74	17,584	4,795		8,910	3,127	8,963	5,932	91	81	77	90	77	91
7/27	195 b	42	c	195	47	341	66	17,779	4,837		9,105	3,174	9,304	5,998	92	82	79	91	80	92
7/28	130 b	176	c	292	34	314	44	17,910	5,013		9,397	3,208	9,618	6,042	92	85	81	92	83	92
7/29	204 b	96	c	148	28	233	69	18,114	5,109		9,545	3,236	9,851	6,111	93	86	83	93	85	93
7/30	130 b	71	546	65	26	189	44	18,244	5,180	5,536	9,610	3,262	10,040	6,155	94	88	83	93	87	94
7/31	95 b	133	367	286	63	172	32	18,339	5,313	5,903	9,896	3,325	10,212	6,187	95	90	86	95	88	95
8/01	107 b	41	295	221	33 e	145	36	18,446	5,354	6,198	10,117	3,358	10,357	6,223	95	91	88	96	89	95
8/02	74 b	28	193	214	23 b	180	25	18,520	5,382	6,391	10,331	3,381	10,537	6,248	95	91	89	97	91	95
8/03	101 b	35	c	216	22	131	34	18,620	5,417		10,547	3,403	10,668	6,282	96	92	91	97	92	96
8/04	80 b	70	c	166	3	85	27	18,700	5,487		10,713	3,406	10,753	6,309	96	93	93	98	93	96
8/05	59 b	50	c	137	7 b	85	20	18,760	5,537		10,850	3,413	10,838	6,329	97	94	94	98	93	97
8/06	77 b	38	c	61	1	103	26	18,837	5,575		10,911	3,414	10,941	6,355	97	94	94	98	94	97
8/07	27 b	32	c	63	3	84	9	18,863	5,607		10,974	3,417	11,025	6,364	97	95	95	98	95	97

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Table 2. (page 2 of 2)

= poor escapement year in the Kuskokwim River basin.

Date	Daily Passage							Cumulative Passage							Percent Passage					
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	1999	2000	2001	2002
8/08	27 b	33	c	82	2	109	9	18,890	5,640		11,056	3,419	11,134	6,373	97	95	96	98	96	97
8/09	44 b	13	c	73	6	75	15	18,934	5,653		11,129	3,425	11,209	6,388	98	96	96	98	97	98
8/10	71 b	17	c	24	3	63	24	19,005	5,670		11,153	3,428	11,272	6,412	98	96	97	98	97	98
8/11	41 b	25	c	22	6	35	14	19,047	5,695		11,175	3,434	11,307	6,426	98	96	97	98	97	98
8/12	53 b	34	c	28	2	41	18	19,100	5,729		11,203	3,436	11,348	6,444	98	97	97	98	98	98
8/13	24 b	39	c	56	17	22	8	19,124	5,768		11,259	3,453	11,370	6,452	99	98	97	99	98	99
8/14	24 b	32	c	34	5	11	8	19,148	5,800		11,293	3,458	11,381	6,460	99	98	98	99	98	99
8/15	36 b	9	c	58	2	13	12	19,183	5,809		11,351	3,460	11,394	6,472	99	98	98	99	98	99
8/16	24 b	12	c	24	2	19	8	19,207	5,821		11,375	3,462	11,413	6,480	99	99	98	99	98	99
8/17	9 b	8	c	11	2	14	3	19,216	5,829		11,386	3,464	11,427	6,483	99	99	99	99	99	99
8/18	33 b	5	c	23	1	38	11	19,248	5,834		11,409	3,465	11,465	6,494	99	99	99	99	99	99
8/19	15 b	6	c	25	3	23 b	5	19,263	5,840		11,434	3,468	11,488	6,499	99	99	99	99	99	99
8/20	15 b	7	c	20	7	20 b	5	19,278	5,847		11,454	3,475	11,508	6,504	99	99	99	100	99	99
8/21	3 b	6	c	6	4	18 b	1	19,281	5,853		11,460	3,479	11,526	6,505	99	99	99	100	99	99
8/22	24 b	0	c	7	0	15 b	8	19,305	5,853		11,467	3,479	11,541	6,513	100	99	99	100	99	100
8/23	27 b	0	c	6	1	12 b	9	19,331	5,853		11,473	3,480	11,553	6,522	100	99	99	100	100	100
8/24	3 b	0	c	1	0	10 b	1	19,334	5,853		11,474	3,480	11,563	6,523	100	99	99	100	100	100
8/25	9 b	2	c	5	3	7 b	3	19,343	5,855		11,479	3,483	11,570	6,526	100	99	99	100	100	100
8/26	0 b	5	c	3	1	5 b	0	19,343	5,860		11,482	3,484	11,575	6,526	100	99	99	100	100	100
8/27	6 b	5	c	1	1	3	2	19,349	5,865		11,483	3,485	11,578	6,528	100	99	99	100	100	100
8/28	0 b	1	c	4	1	2	0	19,349	5,866		11,487	3,486	11,580	6,528	100	99	99	100	100	100
8/29	3 b	4	c	1	1	1	1	19,352	5,870		11,488	3,487	11,581	6,529	100	99	99	100	100	100
8/30	0 b	6	c	3	1	0	0	19,352	5,876		11,491	3,488	11,581	6,529	100	99	99	100	100	100
8/31	18 b	9	c	7	0	2	6	19,370	5,885		11,498	3,488	11,583	6,535	100	100	100	100	100	100
9/01	0 b	1	c	5	2	0	0	19,370	5,886		11,503	3,490	11,583	6,535	100	100	100	100	100	100
9/02	6 b	0	c	4	0	1	2	19,376	5,886		11,507	3,490	11,584	6,537	100	100	100	100	100	100
9/03	0 b	4	c	2	1	1	0	19,376	5,890		11,509	3,491	11,585	6,537	100	100	100	100	100	100
9/04	6 b	0	c	9	0	1	2	19,382	5,890		11,518	3,491	11,586	6,539	100	100	100	100	100	100
9/05	0 b	4	c	7	1	0	0	19,382	5,894		11,525	3,492	11,586	6,539	100	100	100	100	100	100
9/06	3 b	1	c	8	0	1	1	19,385	5,895		11,533	3,492	11,587	6,540	100	100	100	100	100	100
9/07	0 b	7	c	4	0	1	0	19,385	5,902		11,537	3,492	11,588	6,540	100	100	100	100	100	100
9/08	0 b	0	c	3	0	3	0	19,385	5,902		11,540	3,492	11,591	6,540	100	100	100	100	100	100
9/09	0 b	0	c	4	0	3	0	19,385	5,902		11,544	3,492	11,594	6,540	100	100	100	100	100	100
9/10	3 b	5	c	0	0	0	1	19,387	5,907		11,544	3,492	11,594	6,541	100	100	100	100	100	100
9/11	0 b	0	c	4	0	2	0	19,387	5,907		11,548	3,492	11,596	6,541	100	100	100	100	100	100
9/12	6 b	0	c	0	0	1	2	19,393	5,907		11,548	3,492	11,597	6,543	100	100	100	100	100	100
9/13	0 b	0	c	1	0	1	0	19,393	5,907		11,549	3,492	11,598	6,543	100	100	100	100	100	100
9/14	0 b	0	c	0	0	1	0	19,393	5,907		11,549	3,492	11,599	6,543	100	100	100	100	100	100
9/15	0 b	0	c	1	0	0	0	19,393	5,907		11,550	3,492	11,599	6,543	100	100	100	100	100	100
9/16	0 b	0 b	c	1	0	0	0	19,393	5,907		11,551	3,492	11,599	6,543	100	100	100	100	100	100
9/17	0 b	0 b	c	0	0 b	0	0	19,393	5,907		11,551	3,492	11,599	6,543	100	100	100	100	100	100
9/18	0 b	0 b	c	0	0 b	0	0	19,393	5,907		11,551	3,492	11,599	6,543	100	100	100	100	100	100
9/19	0 b	0 b	c	0	0 b	2	0	19,393	5,907		11,551	3,492	11,601	6,543	100	100	100	100	100	100
9/20	0 b	0 b	c	1	0 b	0	0	19,393	5,907		11,552	3,492	11,601	6,543	100	100	100	100	100	100
Total	19,393	5,907	6,391	11,552	3,492	11,601	6,543													
Obs.	16,681	5,906	6,391	8,044	3,430	11,219	6,529													
Est (%)	14.0	0.0	0.0	30.4	1.8	3.3	0.3													

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational; daily passage was estimated.
c = The weir was not operational; daily passage was not estimated
d = Partial day count, passage was not estimated.
e = Partial day count, passage was estimated.

Table 3. Historical coho salmon passage at the George River weir, 1996-2002.

= poor escapement year in the Kuskokwim River basin.

Date	Daily Passage							Cumulative Passage							Percent Passage				
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1997	1999	2000	2001	2002
6/15	0 b	0	c	0 b	0 b	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/16	0 b	0 a	c	0 b	0 b	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/17	0 b	0	c	0 b	0 e	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/18	0 b	0	c	0 b	0	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/19	0 b	0	c	0 b	0	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/20	0 b	0	c	0 b	0	0 b	0 b	0	0		0	0	0	0	0	0	0	0	0
6/21	0	0	c	0 b	0	0 b	0 e	0	0		0	0	0	0	0	0	0	0	0
6/22	0	0	0 d	0 b	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0
6/23	0	0	0	0 b	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0
6/24	0	0	0	0 b	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0
6/25	0	0	0	0 b	0	0 e	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/28	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/29	0 a	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/01	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/02	0 a	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/03	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/04	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/05	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/06	0	0	0	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/07	0	0	0 d	0 b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/08	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/09	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/10	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/11	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/12	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/13	0	0	c	0 b	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/14	0	0	c	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/15	0	0	c	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
7/16	1	0	c	0	0	0	0	1	0		0	0	0	0	0	0	0	0	0
7/17	0	0	c	0	0	0	0	1	0		0	0	0	0	0	0	0	0	0
7/18	0	0	c	0	0	0	0	1	0		0	0	0	0	0	0	0	0	0
7/19	1	0	c	0	0	0	0	2	0		0	0	0	0	0	0	0	0	0
7/20	3	2	c	0	0	0	0	5	2		0	0	0	0	0	0	0	0	0
7/21	0	1	c	0	0	0	0	5	3		0	0	0	0	0	0	0	0	0
7/22	0	2	c	0	1	0	0	5	5		0	1	0	0	0	0	0	0	0
7/23	6	0	c	0	2	0	0	11	5		0	3	0	0	0	0	0	0	0
7/24	22	2	c	0	0	0	0	33	7		0	3	0	0	0	0	0	0	0
7/25	47	2	c	0	0	0	0	80	9		0	3	0	0	0	0	0	0	0
7/26	93	1	c	0	5	0	0	173	10		0	8	0	0	0	0	0	0	0
7/27	c	2	c	0	4	1	0		12		0	12	1	0	0	0	0	0	0
7/28	c	3	c	1	0	0	1		15		1	12	1	1	0	0	0	0	0
7/29	c	2	c	0	0	0	3		17		1	12	1	4	0	0	0	0	0
7/30	c	3	7	0	0	3	1		20	7	1	12	4	5	0	0	0	0	0
7/31	c	9	8	0	9	6	1		29	15	1	21	10	6	0	0	0	0	0
8/01	c	9	14	0	5 e	7	2		38	29	1	26	17	8	0	0	0	0	0
8/02	c	22	23	1	7 b	11	9		60	52	2	33	28	17	1	0	0	0	0
8/03	c	25	c	0	11	9	13		85		2	44	37	30	1	0	0	0	0
8/04	c	52	c	1	6	3	22		137		3	50	40	52	1	0	0	0	1
8/05	c	41	c	12	16 b	12	16		178		15	66	52	68	2	0	1	0	1
8/06	c	59	c	0	23	25	18		237		15	89	77	86	3	0	1	1	1
8/07	c	75	c	3	25	22	6		312		18	114	99	92	3	0	1	1	1

-Continued-

Table 3. (page 2 of 2)

= poor escapement year in the Kuskokwim River basin

Date	Daily Passage 1996	1997	1998	1999	2000	2001	2002	Cumulative Passage 1996	1997	1998	1999	2000	2001	2002	Percent Passage 1997	1999	2000	2001	2002
8/08	c	69	c	4	119	62	14		381		22	233	161	106	4	0	2	1	2
8/09	c	70	c	6	5	32	12		451		28	238	193	118	5	0	2	1	2
8/10	c	35	c	8	53	13	43		486		36	291	206	161	5	0	3	1	2
8/11	c	71	c	13	116	2	15		557		49	407	208	176	6	1	4	1	3
8/12	c	198	c	4	245	252	54		755		53	652	460	230	8	1	6	3	3
8/13	c	170	c	23	909	273	13		925		76	1,561	733	243	10	1	14	5	4
8/14	c	213	c	32	480	123	14		1,138		108	2,041	856	257	12	1	18	6	4
8/15	c	92	c	33	263	187	231		1,230		141	2,304	1,043	488	13	2	20	7	7
8/16	c	44	c	70	207	1,534	115		1,274		211	2,511	2,577	603	14	2	22	18	9
8/17	c	59	c	94	186	1,301	22		1,333		305	2,697	3,878	625	14	3	24	27	9
8/18	c	103	c	116	558	709	33		1,436		421	3,255	4,587	658	16	5	29	32	10
8/19	c	70	c	68	216	937 b	11		1,506		489	3,471	5,524	669	16	5	31	38	10
8/20	c	346	c	186	1,177	870 b	10		1,852		675	4,648	6,394	679	20	8	41	44	10
8/21	c	334	c	193	1,451	803 b	19		2,186		868	6,099	7,197	698	24	10	54	50	10
8/22	c	1,152	c	85	435	735 b	525		3,338		953	6,534	7,932	1,223	36	11	58	55	18
8/23	c	131	c	186	49	668 b	146		3,469		1,139	6,583	8,600	1,369	38	13	58	60	20
8/24	c	162	c	139	220	601 b	48		3,631		1,278	6,803	9,201	1,417	39	14	60	64	21
8/25	c	66	c	96	273	533 b	38		3,697		1,374	7,076	9,734	1,455	40	15	63	68	22
8/26	c	275	c	141	310	466 b	12		3,972		1,515	7,386	10,200	1,467	43	17	66	71	22
8/27	c	64	c	206	1,228	430	133		4,036		1,721	8,614	10,630	1,600	44	19	76	74	24
8/28	c	60	c	230	1,101	368	23		4,096		1,951	9,715	10,998	1,623	44	22	86	76	24
8/29	c	17	c	198	637	480	2		4,113		2,149	10,352	11,478	1,625	45	24	92	80	24
8/30	c	1,471	c	70	244	262	53		5,584		2,219	10,596	11,740	1,678	61	25	94	82	25
8/31	c	358	c	107	97	402	641		5,942		2,326	10,693	12,142	2,319	65	26	95	84	34
9/01	c	482	c	1,296	55	450	106		6,424		3,622	10,748	12,592	2,425	70	41	95	87	36
9/02	c	202	c	718	131	190	48		6,626		4,340	10,879	12,782	2,473	72	49	97	89	37
9/03	c	161	c	72	145	233	65		6,787		4,412	11,024	13,015	2,538	74	49	98	90	38
9/04	c	151	c	185	73	98	102		6,938		4,597	11,097	13,113	2,640	75	52	99	91	39
9/05	c	261	c	113	91	41	372		7,199		4,710	11,188	13,154	3,012	78	53	99	91	45
9/06	c	58	c	108	14	63	1,906		7,257		4,818	11,202	13,217	4,918	79	54	99	92	73
9/07	c	234	c	114	0	64	679		7,491		4,932	11,202	13,281	5,597	81	55	99	92	83
9/08	c	34	c	425	10	192	372		7,525		5,357	11,212	13,473	5,969	82	60	100	94	88
9/09	c	375	c	331	11	101	57		7,900		5,688	11,223	13,574	6,026	86	64	100	94	89
9/10	c	428	c	86	3	166	40		8,328		5,774	11,226	13,740	6,066	90	65	100	95	90
9/11	c	174	c	35	14	37	86		8,502		5,809	11,240	13,777	6,152	92	65	100	96	91
9/12	c	47	c	566	3	13	373		8,549		6,375	11,243	13,790	6,525	93	72	100	96	97
9/13	c	141	c	676	2	45	107		8,690		7,051	11,245	13,835	6,632	94	79	100	96	98
9/14	c	105	c	917	3	82	47		8,795		7,968	11,248	13,917	6,679	95	89	100	97	99
9/15	c	174	c	653	5	35	24		8,969		8,621	11,253	13,952	6,703	97	97	100	97	99
9/16	c	70 b	c	60	3	88	22		9,039		8,681	11,256	14,040	6,725	98	97	100	98	99
9/17	c	70 b	c	36	3 b	143	13		9,108		8,717	11,259	14,183	6,738	99	98	100	99	100
9/18	c	50 b	c	145	2 b	127	9		9,158		8,862	11,261	14,310	6,747	99	99	100	99	100
9/19	c	30 b	c	49	1 b	13	4		9,188		8,911	11,262	14,323	6,751	100	100	100	99	100
9/20	c	22 b	c	3	0 b	75	8		9,210		8,914	11,262	14,398	6,759	100	100	100	100	100
Total	173	9,210	52	8,914	11,262	14,398	6,759												
Obs.	173	8,969	52	8,930	11,228	8,802	6,759												
Est (%)	0.0	2.6	0.0	0.0	0.3	38.9	0.0												

a = Daily passage was estimated due to the occurance of a hole in the weir.

b = The weir was not operational; daily passage was estimated.

c = The weir was not operational; daily passage was not estimated

d = Partial day count, passage was not estimated.

e = Partial day count, passage was estimated.

Table 4. Age and sex of chinook salmon at the George River weir based on escapement samples collected with a fish trap, 1996 - 2002. [ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.2 (4) Esc.	1.2 (4) %	1.3 (5) Esc.	1.3 (5) %	2.2 (5) Esc.	2.2 (5) %	1.4 (6) Esc.	1.4 (6) %	1.5 (7) Esc.	1.5 (7) %	Total Esc.	Total %
1996 [c]	6/24 - 25 (6/15 - 6/26)	44	M	161	11.4	419	29.6	32	2.3	129	9.1	65	4.6	806	56.8
			F	0	0.0	97	6.8	0	0.0	322	22.7	193	13.6	612	43.2
			Subtotal	161	11.4	516	36.4	32	2.3	451	31.8	258	18.2	1,418	100.0
	6/28, 7/2 (6/27 - 7/4)	57	M	51	1.8	460	15.8	0	0.0	715	24.6	459	15.8	1,685	57.9
			F	0	0.0	102	3.5	0	0.0	511	17.5	613	21.0	1,226	42.1
			Subtotal	51	1.8	562	19.3	0	0.0	1,226	42.1	1,072	36.8	2,911	100.0
	7/7, 9 (7/5 - 8/22)	90	M	339	10.0	602	17.8	0	0.0	527	15.6	339	10.0	1,807	53.3
			F	0	0.0	113	3.3	0	0.0	866	25.5	602	17.8	1,581	46.7
			Subtotal	339	10.0	715	21.1	0	0.0	1,393	41.1	941	27.8	3,388	100.0
	Season	191	M	551	7.1	1,481	19.2	32	0.4	1,371	17.8	863	11.2	4,298	55.7
			F	0	0.0	312	4.0	0	0.0	1,699	22.0	1,408	18.2	3,419	44.3
			Total	551	7.1	1,793	23.2	32	0.4	3,070	39.8	2,271	29.4	7,717	100.0
1997 [c]	6/24, 26, 27 (6/15 - 27)	64	M	758	28.1	379	14.1	0	0.0	421	15.6	0	0.0	1,557	57.8
			F	0	0.0	84	3.1	0	0.0	1,052	39.1	0	0.0	1,137	42.2
			Subtotal	758	28.1	463	17.2	0	0.0	1,473	54.7	0	0.0	2,694	100.0
	6/28 - 30 (6/28 - 7/3)	87	M	1,156	37.9	315	10.3	0	0.0	560	18.4	0	0.0	2,031	66.7
			F	0	0.0	35	1.2	0	0.0	981	32.2	0	0.0	1,016	33.3
			Subtotal	1,156	37.9	350	11.5	0	0.0	1,541	50.6	0	0.0	3,047	100.0
	7/7 - 11 (7/4 - 12)	69	M	522	39.1	39	2.9	0	0.0	290	21.8	0	0.0	850	63.8
			F	0	0.0	0	0.0	0	0.0	483	36.2	0	0.0	483	36.2
			Subtotal	522	39.1	39	2.9	0	0.0	773	58.0	0	0.0	1,333	100.0
	7/14 - 18; 21, 23, 27 (7/13 - 8/22)	49	M	275	36.7	46	6.1	0	0.0	138	18.4	0	0.0	459	61.2
			F	0	0.0	15	2.1	0	0.0	275	36.7	0	0.0	290	38.8
			Subtotal	275	36.7	61	8.2	0	0.0	413	55.1	0	0.0	749	100.0
	Season	269	M	2,710	34.6	779	10.0	0	0.0	1,409	18.0	0	0.0	4,897	62.6
			F	0	0.0	134	1.7	0	0.0	2,791	35.7	0	0.0	2,926	37.4
			Total	2,710	34.6	913	11.7	0	0.0	4,200	53.7	0	0.0	7,823	100.0
1998 [d]	6/30- 7/1	49	M		36.7		34.7		0.0		6.1		0.0		77.6
			F		0.0		14.3		0.0		8.2		0.0		22.4
			Subtotal		36.7		49.0		0.0		14.3		0.0		100.0
	7/6	26	M		19.2		42.3		0.0		3.8		0.0		65.4
			F		0.0		11.5		0.0		23.1		0.0		34.6
			Subtotal		19.2		53.8		0.0		26.9		0.0		100.0
	Season	75	M		30.7		37.3		0.0		5.3		0.0		73.3
			F		0.0		13.3		0.0		13.3		0.0		26.7
			Total	1,443	30.7	2,383	50.7		0.0	879	18.7		0.0	4,700	100.0
1999 [e]	7/18-19 (7/15 - 7/20)	32	M		9.4		9.4		0.0		37.5		0.0		56.3
			F		0.0		12.5		0.0		31.3		0.0		43.8
			Subtotal		9.4		21.9		0.0		68.8		0.0		100.0
	7/24 (7/21 - 9/12)	22	M		9.1		4.5		0.0		18.2		0.0		31.8
			F		0.0		0.0		0.0		68.2		0.0		68.2
			Subtotal		9.1		4.5		0.0		86.4		0.0		100.0
	Season	54	M		9.3		7.4		0.0		29.6		0.0		46.3
			F		0.0		7.4		0.0		46.3		0.0		53.7
			Total	330	9.3	525	14.8		0.0	2,693	75.9		0.0	3,548	100.0

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Table 4. (page 2 of 2)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	1.2 (4) Esc.	1.2 (4) %	1.3 (5) Esc.	1.3 (5) %	2.2 (5) Esc.	2.2 (5) %	1.4 (6) Esc.	1.4 (6) %	1.5 (7) Esc.	1.5 (7) %	Total Esc.	Total %
2000 [e]	7/4-5	51	M		7.8		9.8		0.0		27.5		0.0		45.1
			F		0.0		7.8		0.0		47.1		0.0		54.9
			Total		7.8		17.6		0.0		74.5		0.0		100.0
	7/11, 21	21	M		9.5		14.3		0.0		23.8		4.8		52.4
			F		4.8		14.3		0.0		28.6		0.0		47.6
			Subtotal		14.3		28.6		0.0		52.4		4.8		100.0
	Season	72	M		8.3		11.1		0.0		26.4		1.4		47.2
			F		1.4		9.7		0.0		41.7		0.0		52.8
			Total	287	9.7	616	20.8		0.0	2,016	68.1	41	1.4	2,960	100.0
2001	6/30-7/2 (6/15-7/6)	15	M	158	13.3	714	60.0	0	0.0	238	20.0	0	0.0	1,110	93.3
			F	0	0.0	0	0.0	0	0.0	80	6.7	0	0.0	80	6.7
			Total	158	13.3	714	60.0	0	0.0	318	26.7	0	0.0	1,190	100.0
	7/8-10 (7/7-12)	24	M	103	8.3	258	20.8	0	0.0	310	25.0	52	4.2	723	58.3
			F	0	0.0	0	0.0	0	0.0	413	33.3	103	8.3	517	41.7
			Subtotal	103	8.3	258	20.8	0	0.0	723	58.3	155	12.5	1,240	100.0
	7/13-14,17-18,25 (7/13 - 8/28)	23	M	114	13.0	38	4.3	0	0.0	191	21.7	38	4.3	382	43.5
			F	39	4.4	0	0.0	0	0.0	382	43.5	76	8.7	497	56.5
			Subtotal	153	17.4	38	4.3	0	0.0	573	65.2	114	13.0	879	100.0
	Season	62	M	359	11.4	1,013	30.6	0	0.0	738	22.3	89	2.7	2,217	67.0
			F	36	1.1	0	0.0	0	0.0	877	26.5	179	5.4	1,092	33.0
			Total	414	12.5	1,013	30.6	0	0.0	1,615	48.8	268	8.1	3,309	100.0
2002	6/25 - 30 (6/15 - 30)	110	M	160	24.5	83	12.7	0	0.0	249	38.2	0	0.0	492	75.5
			F	0	0.0	0	0.0	0	0.0	130	20.0	30	4.5	160	24.5
			Subtotal	160	24.5	83	12.7	0	0.0	379	58.2	30	4.5	652	100.0
	7/1 - 3 (7/1 - 6)	77	M	19	2.6	123	16.9	0	0.0	208	28.6	19	2.6	369	50.6
			F	0	0.0	19	2.6	0	0.0	275	37.6	66	9.1	360	49.4
			Subtotal	19	2.6	142	19.5	0	0.0	483	66.2	85	11.7	729	100.0
	7/10 - 14 (7/7 - 15)	64	M	88	12.5	110	15.6	0	0.0	176	25.0	33	4.7	407	57.8
			F	0	0.0	11	1.6	0	0.0	264	37.5	22	3.1	297	42.2
			Subtotal	88	12.5	121	17.2	0	0.0	440	62.5	55	7.8	704	100.0
	7/17 - 21 (7/16 - 22)	44	M	33	15.9	56	27.3	0	0.0	37	18.2	5	2.3	130	63.6
			F	0	0.0	0	0.0	0	0.0	56	27.3	18	9.1	75	36.4
			Subtotal	33	15.9	56	27.3	0	0.0	93	45.5	23	11.4	205	100.0
	7/24 - 27, 30 - 31, 8/1 - 2, 8 (7/23 - 9/20)	20	M	8	5.0	46	30.0	0	0.0	0	0.0	0	0.0	54	35.0
			F	0	0.0	0	0.0	0	0.0	92	60.0	8	5.0	100	65.0
			Subtotal	8	5.0	46	30.0	0	0.0	92	60.0	8	5.0	154	100.0
	Season	315	M	307	12.6	418	17.1	0	0.0	671	27.4	57	2.3	1,453	59.4
			F	0	0.0	30	1.2	0	0.0	817	33.5	144	5.9	991	40.6
			Total	307	12.6	448	18.3	0	0.0	1,488	60.9	201	8.2	2,444	100.0
Grand Total [f]		775	M	2698	12.9	3149	15.1	30	0.1	3391	18.6	968	4.6	10735	51.4
			F	1203	5.8	764	3.7	0	0	6285	30.1	1913	9.2	10167	48.6
			Total	3902	18.7	3913	18.7	30	0.1	10176	48.7	2881	13.8	20902	100

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] Results represent the revised estimated ASL composition of escapement, results representing the original estiamted ASL composition of escapement are located in Appendix X.Y.

[d] The weir washed out in 1998, ASL composition of escapement was not estimated.

[e] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata.

[f] The number of fish in the "Grand Total" are the sums of the "Season" totals; percentages are derived from those sums.

Table 5. Mean length (mm) of chinook salmon at the George River weir based on escapement samples collected with a fish trap, 1996 - 2002. [a]

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
1996 [b]	6/24 - 25 (6/15 - 6/26)	M	Mean Length	546	675	600	823	807
			Std. Error	30	13	-	27	148
			Range	500- 664	575- 734	600- 600	742- 860	659- 955
			Sample Size	5	13	1	4	2
		F	Mean Length		782		894	880
			Std. Error		33		17	38
			Range		742- 848		812- 963	724- 986
			Sample Size	0	3	0	10	6
	6/28, 7/2 (6/27 - 7/4)	M	Mean Length	620	716		880	912
			Std. Error	-	12		24	31
			Range	620- 620	664- 775		669 - 981	710- 998
			Sample Size	1	9	0	14	9
		F	Mean Length		814		854	932
			Std. Error		35		15	12
			Range		779- 848		785 - 938	859- 987
			Sample Size	0	2	0	10	12
	7/7, 9 (7/5 - 8/22)	M	Mean Length	601	724		830	919
			Std. Error	33	20		24	33
			Range	520- 775	595- 885		640- 972	714- 1010
			Sample Size	9	16	0	14	9
		F	Mean Length		820		853	909
			Std. Error		33		9	11
			Range		767- 879		749- 925	939- 1000
			Sample Size	0	3	0	23	16
	Season	M	Mean Length	587	708	600	855	907
			Range	500- 775	575- 885	600- 600	640- 981	659- 1010
			Sample Size	15	38	1	32	20
		F	Mean Length		806		861	911
			Range		742- 879		749- 963	724- 1000
			Sample Size	0	8	0	43	34
1997 [b]	6/24, 26, 27 (6/15 - 27)	M	Mean Length	589	739		840	
			Std. Error	12	22		21	
			Range	504- 669	660- 820		713- 923	
			Sample Size	18	9	0	10	0
		F	Mean Length		745		861	
			Std. Error		16		7	
			Range		729- 761		794- 967	
			Sample Size	0	2	0	25	0

-Continued-

Table 5. (page 2 of 5)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
1997 [b] (cont.)	6/28 - 30 (6/28 - 7/3)	M	Mean Length	560	720		816	
			Std. Error	12	15		15	
			Range	425- 718	634- 778		700- 895	
			Sample Size	33	9	0	16	0
		F	Mean Length		746		841	
			Std. Error		-		7	
			Range		746- 746		760- 923	
			Sample Size	0	1	0	28	0
	7/7 - 11 (7/4 - 12)	M	Mean Length	563	795		851	
			Std. Error	10	35		19	
			Range	470- 638	760- 830		705- 983	
			Sample Size	27	2	0	15	0
		F	Mean Length				843	
			Std. Error				8	
			Range				771- 900	
			Sample Size	0	0	0	25	0
	7/14 - 18; 21, 23, 27 (7/13 - 8/22)	M	Mean Length	556	690		865	
			Std. Error	16	53		27	
			Range	457- 680	594- 777		749- 998	
			Sample Size	18	3	0	9	0
		F	Mean Length		785		843	
			Std. Error		-		11	
			Range		785- 785		735- 914	
			Sample Size	0	1	0	18	0
	Season	M	Mean Length	568	731		835	
			Range	425- 718	594- 830		700- 998	
			Sample Size	96	23	0	50	0
		F	Mean Length		750		849	
			Range		729- 785		735- 967	
			Sample Size	0	4	0	96	0
1998 [c]	6/30- 7/1	M	Mean Length	543	669		794	
			Std. Error	13	13		27	
			Range	420- 641	568- 780		745- 837	
			Sample Size	18	17	0	3	0
		F	Mean Length		726		852	
			Std. Error		28		24	
			Range		612- 840		788- 905	
			Sample Size	0	7	0	4	0
	7/6	M	Mean Length	539	689		785	
			Std. Error	21	20		-	
			Range	465- 591	581- 832		785- 785	
			Sample Size	5	11	0	1	0

-Continued-

Table 5. (page 3 of 5)

Year	Sample Dates (Stratum Dates)	Sex		Age Class				
				1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
1998 [c] (cont.)	7/6 (cont.)	F	Mean Length		730		843	
			Std. Error		21		15	
			Range		690- 760		783- 874	
			Sample Size	0	3	0	6	0
1999 [d]	7/18 - 19 (7/15 - 7/20)	M	Mean Length	497	757		803	
			Std. Error	48	74		24	
			Range	415- 580	640- 895		700- 915	
			Sample Size	3	3	0	12	0
		F	Mean Length		844		816	
			Std. Error		23		23	
			Range		805- 905		655- 955	
			Sample Size	0	4	0	10	0
	7/24 (7/21 - 9/12)	M	Mean Length	500	800		915	
			Std. Error	60	-		28	
			Range	440- 560	800- 800		860- 990	
			Sample Size	2	1	0	4	0
		F	Mean Length				852	
			Std. Error				8	
			Range				790- 890	
			Sample Size	0	0	0	15	0
2000 [d]	7/4-5	M	Mean Length	529	731		871	
			Std. Error	23	43		16	
			Range	490-580	650-835		785-965	
			Sample Size	4	5	0	14	0
		F	Mean Length		765		846	
			Std. Error		12		13	
			Range		740-785		725-945	
			Sample Size	0	4	0	24	0
	7/11, 21	M	Mean Length	585	700		845	940
			Std. Error	85	64		35	-
			Range	500-670	600-820		770-940	940-940
			Sample Size	2	3	0	5	1
		F	Mean Length	580	807		858	
			Std. Error	-	19		28	
			Range	580-580	770-830		800-980	
			Sample Size	1	3	0	6	0
2001	6/30-7/2 (6/15-7/6)	M	Mean Length	602	638		788	
			Std. Error	6	15		72	
			Range	596-608	584-736		684-925	
			Sample Size	2	9	0	3	0
		F	Mean Length				792	
			Std. Error				-	
			Range				792-792	
			Sample Size	0	0	0	1	0

-Continued-

Table 5. (page 4 of 5)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
2001	7/8-10	M	Mean Length	551	658		870	820
(cont.)	(7/7-12)		Std. Error	36	16		29	-
			Range	515-587	605-687		767-965	820-820
			Sample Size	2	5	0	6	1
		F	Mean Length				806	876
			Std. Error				21	38
			Range				734-873	838-914
			Sample Size	0	0	0	8	2
	7/13-14,17-18,25	M	Mean Length	535	765		887	1015
	(7/13 - 8/28)		Std. Error	47	-		23	-
			Range	461-622	765-765		842-960	1015-1015
			Sample Size	3	1	0	5	1
		F	Mean Length	458			845	880
			Std. Error	-			17	1
			Range	458-458			767-907	878-881
			Sample Size	1	0	0	10	2
	Season	M	Mean Length	568	648		848	903
			Range	461-622	584-765		684-965	820-1015
			Sample Size	7	15	0	14	2
		F	Mean Length	458			822	877
			Range	458-458			734-907	838-914
			Sample Size	1	0	0	19	4
2002	6/25 - 30	M	Mean Length	492	663		793	
	(6/15 - 30)		Std Error	9	14		11	
			Range	402- 580	592- 761		635- 940	
			Sample Size	27	14	0	42	0
		F	Mean Length				855	883
			Std Error				12	19
			Range				747- 950	816- 928
			Sample Size	0	0	0	22	5
	7/1 - 3	M	Mean Length	474	708		835	939
	(7/1 - 6)		Std Error	4	16		14	31
			Range	470- 478	668- 880		670- 946	908- 970
			Sample Size	2	13	0	22	2
		F	Mean Length		709		843	898
			Std Error		67		10	9
			Range		642- 775		680- 930	866- 925
			Sample Size	0	2	0	29	7
	7/10 - 14	M	Mean Length	470	696		837	861
	(7/7 - 15)		Std Error	20	16		17	30
			Range	372- 569	613- 761		720- 955	811- 914
			Sample Size	8	10	0	16	3
		F	Mean Length		543		837	895
			Std Error		-		8	2
			Range		543- 543		764- 935	893- 897
			Sample Size	0	1	0	24	2

-Continued-

Table 5. (page 5 of 5)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.2 (4)	1.3 (5)	2.2 (5)	1.4 (6)	1.5 (7)
2002 (cont.)	7/17 - 21 (7/16 - 22)	M	Mean Length	462	696		796	903
			Std Error	30	16		19	-
			Range	362- 621	588- 787		716- 894	903- 903
			Sample Size	7	12	0	8	1
		F	Mean Length				834	933
			Std Error				12	16
			Range				773- 914	896- 973
			Sample Size	0	0	0	12	4
	7/24 - 27, 30 - 31, 8/1 - 2, 8 (7/23 - 9/20)	M	Mean Length	460	693			
			Std Error	-	29			
			Range	460- 460	601- 807			
			Sample Size	1	6	0	0	0
		F	Mean Length				848	878
			Std Error				8	-
			Range				800- 897	878- 878
			Sample Size	0	0	0	12	1
	Season	M	Mean Length	481	693		818	891
			Range	362- 621	588- 880		635- 955	811- 970
			Sample Size	45	55	0	88	6
		F	Mean Length		648		843	898
			Range		543- 775		680- 950	816- 973
			Sample Size	0	3	0	99	19
	Grand Total [e]	M	Mean Length	558	700	600	838	910
			Range	457-775	575-885	600-600	669-998	812-1010
			Sample Size	130	118	1	181	25
		F	Mean Length	514	702		842	893
			Range	425-645	634-879		640-967	659-1000
			Sample Size	34	28	0	260	60

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

[b] Results represent the revised estimated ASL composition of escapement, results representing the original estiamted ASL composition of escapement are located in Appendix X.Y.

[c] The weir washed out in 1998, ASL composition of escapement was not determined.

[d] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata.

[e] The number of fish in the "Grand total" are the sum of the "Season" totals; percentages are derived from those sums.

Table 6. Age and sex of chum salmon at the George River weir based on escapement samples collected with a fish trap. [ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
1996	6/22 - 23	47	M	0	0.0	403	10.6	1,295	34.1	243	6.4	1,941	51.1
	(6/15 - 28)		F	80	2.1	809	21.3	969	25.5	0	0.0	1,858	48.9
			Subtotal	80	2.1	1,212	31.9	2,264	59.6	243	6.4	3,798	100.0
	7/5 - 6	177	M	0	0.0	1,804	31.1	1,968	33.9	33	0.6	3,804	65.5
	(6/29 - 7/8)		F	0	0.0	1,115	19.2	885	15.3	0	0.0	2,001	34.5
			Subtotal	0	0.0	2,919	50.3	2,853	49.2	33	0.6	5,805	100.0
	7/11	91	M	50	2.2	700	30.8	375	16.5	25	1.1	1,151	50.5
	(7/9 - 13)		F	75	3.3	726	31.8	325	14.3	0	0.0	1,125	49.5
			Subtotal	125	5.5	1,426	62.6	700	30.8	25	1.1	2,276	100.0
	7/16 - 17	203	M	11	0.5	744	33.0	388	17.2	0	0.0	1,143	50.7
	(7/14 - 18)		F	56	2.5	743	33.0	311	13.8	0	0.0	1,110	49.3
			Subtotal	67	3.0	1,487	66.0	699	31.0	0	0.0	2,253	100.0
	7/20	69	M	0	0.0	645	39.1	143	8.7	0	0.0	789	47.8
	(7/19 - 22)		F	72	4.3	574	34.8	215	13.0	0	0.0	860	52.2
			Subtotal	72	4.3	1,219	73.9	358	21.7	0	0.0	1,649	100.0
	7/25 - 26	178	M	0	0.0	1,398	38.7	303	8.4	43	1.1	1,745	48.3
	(7/23 - 9/12)		F	0	0.0	1,503	41.6	365	10.1	0	0.0	1,868	51.7
			Subtotal	0	0.0	2,901	80.3	668	18.5	43	1.1	3,613	100.0
	Season	765	M	61	0.4	5,694	30.5	4,473	21.7	343	1.9	10,571	54.5
			F	283	1.1	5,470	29.3	3,069	15.1	0	0.0	8,822	45.5
			Total	310	1.5	11,616	59.8	7,137	36.8	330	1.9	19,393	100.0
1997	7/4, 7 - 11	95	M	0	0.0	444	23.1	625	32.6	41	2.1	1,109	57.9
	(6/15 - 7/12)		F	0	0.0	302	15.8	484	25.3	20	1.1	807	42.1
			Subtotal	0	0.0	746	38.9	1,109	57.9	62	3.2	1,916	100.0
	7/14 - 18	190	M	0	0.0	380	30.5	387	31.1	13	1.1	780	62.6
	(7/13 - 19)		F	0	0.0	276	22.1	184	14.7	7	0.5	466	37.4
			Subtotal	0	0.0	656	52.6	571	45.8	20	1.6	1,246	100.0
	7/21 - 24	163	M	0	0.0	439	28.8	421	27.6	9	0.6	869	57.1
	(7/20 - 25)		F	0	0.0	346	22.7	308	20.3	0	0.0	654	42.9
			Subtotal	0	0.0	785	51.5	729	47.9	9	0.6	1,523	100.0
	7/27 - 31	125	M	0	0.0	257	38.4	171	25.6	0	0.0	428	64.0
	(7/26 - 8/1)		F	11	1.6	171	25.6	54	8.0	5	0.8	241	36.0
			Subtotal	11	1.6	428	64.0	225	33.6	5	0.8	669	100.0
	8/4 - 6	30	M	0	0.0	76	30.0	42	16.7	0	0.0	118	46.7
	(8/2 - 7)		F	0	0.0	110	43.3	25	10.0	0	0.0	135	53.3
			Subtotal	0	0.0	186	73.3	67	26.7	0	0.0	253	100.0
	8/08 - 13	38	M	16	5.3	40	13.1	16	5.3	0	0.0	71	23.7
	(8/8 - 9/10)		F	16	5.2	197	65.8	16	5.2	0	0.0	229	76.3
			Subtotal	32	10.5	237	78.9	32	10.5	0	0.0	300	100.0
	Season	641	M	16	0.3	1,635	27.7	1,663	28.2	63	1.1	3,376	57.2
			F	26	0.4	1,402	23.7	1,070	18.1	32	0.5	2,531	42.8
			Total	42	0.7	3,037	51.4	2,732	46.3	95	1.6	5,907	100.0
1998[c]	6/30 - 7/1	166	M		0.0		47.0		10.9		0.0		57.8
			F		0.0		33.7		8.4		0.0		42.2
			Subtotal		0.0		80.7		19.3		0.0		100.0

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Table 6. (page 2 of 3)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
1998 [c] (cont.)	7/5 - 6	156	M		0.0		57.0		9.6		0.0		66.7
			F		0.0		27.6		5.1		0.6		33.3
			Subtotal		0.0		84.6		14.7		0.6	6,391	100.0
1999 [d]	(6/24 - 7/14)	0	M										
			F										
			Subtotal										
	7/17 - 19 (7/15-20)	194	M		0.0		29.9		29.9		0.0		59.8
			F		0.0		28.9		11.3		0.0		40.2
			Subtotal		0.0		58.8		41.2		0.0		100.0
	7/23 - 24 (7/21-28)	198	M		0.0		31.3		17.2		1.0		49.5
			F		0.0		34.4		16.1		0.0		50.5
			Subtotal		0.0		65.7		33.3		1.0		100.0
	8/2 - 3 (7/29-8/6)	193	M		0.0		32.7		15.0		0.5		48.2
			F		0.0		37.8		14.0		0.0		51.8
			Subtotal		0.0		70.5		29.0		0.5		100.0
	8/9 (8/7-9/25)	26	M		0.0		23.1		23.1		0.0		46.2
			F		0.0		26.9		26.9		0.0		53.8
			Subtotal		0.0		50.0		50.0		0.0		100.0
	Season	611	M										
			F										
			Total									11,552	
2000	7/4 - 6 (6/15 - 7/7)	67	M	0	0.0	293	23.9	531	43.3	19	1.5	843	68.7
			F	0	0.0	202	16.4	165	13.4	18	1.5	385	31.3
			Subtotal	0	0.0	495	40.3	696	56.7	37	3.0	1,228	100.0
	7/10 - 12 (7/8 - 16)	57	M	18	1.8	239	22.8	275	26.3	18	1.8	551	52.6
			F	0	0.0	238	22.8	257	24.6	0	0.0	495	47.4
			Subtotal	18	1.8	477	45.6	532	50.9	18	1.8	1,046	100.0
	7/21, 24 - 25 (7/17 - 26)	86	M	0	0.0	209	24.4	268	31.4	0	0.0	476	55.8
			F	0	0.0	218	25.6	159	18.6	0	0.0	377	44.2
			Subtotal	0	0.0	427	50.0	427	50.0	0	0.0	853	100.0
	7/28 - 30 (7/27 - 9/5)	25	M	15	4.0	73	20.0	15	4.0	0	0.0	102	28.0
			F	14	4.0	161	44.0	87	24.0	0	0.0	263	72.0
			Subtotal	29	8.0	234	64.0	102	28.0	0	0.0	365	100.0
	Season	235	M	33	1.0	813	23.3	1,089	31.2	37	1.1	1,972	56.5
			F	15	0.4	819	23.4	668	19.1	18	0.5	1,520	43.5
			Total	48	1.4	1,632	46.7	1,757	50.3	55	1.6	3,492	100.0
2001	6/30, 7/1 (6/15 - 7/4)	25	M	0	0.0	164	24.0	302	44.0	0	0.0	466	68.0
			F	0	0.0	0	0.0	219	32.0	0	0.0	219	32.0
			Subtotal	0	0.0	164	24.0	521	76.0	0	0.0	685	100.0
	7/9-11, 13-14 (7/5 - 15)	200	M	0	0.0	1,050	24.5	1,242	29.0	0	0.0	2,292	53.5
			F	0	0.0	1,028	24.0	964	22.5	0	0.0	1,992	46.5
			Subtotal	0	0.0	2,078	48.5	2,206	51.5	0	0.0	4,284	100.0
	7/17 - 19 (7/16 - 21)	201	M	0	0.0	785	30.8	177	7.0	0	0.0	962	37.8
			F	0	0.0	1,202	47.3	380	14.9	0	0.0	1,582	62.2
			Subtotal	0	0.0	1,987	78.1	557	21.9	0	0.0	2,544	100.0

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Table 6. (page 3 of 3)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 0.2 (3) Esc.	0.2 (3) %	0.3 (4) Esc.	0.3 (4) %	0.4 (5) Esc.	0.4 (5) %	0.5 (6) Esc.	0.5 (6) %	Total Esc.	Total %
2001 (cont.)	7/24 - 25, 27 (7/22 - 29)	201	M	0	0.0	930	39.8	151	6.5	0	0.0	1,082	46.3
			F	0	0.0	1,024	43.8	233	9.9	0	0.0	1,256	53.7
			Subtotal	0	0.0	1,954	83.6	384	16.4	0	0.0	2,338	100.0
	7/31, 8/2-3, 5, 10 (7/30 - 9/19)	155	M	0	0.0	508	29.1	113	6.4	0	0.0	621	35.5
			F	0	0.0	1,005	57.4	124	7.1	0	0.0	1,129	64.5
			Subtotal	0	0.0	1,513	86.5	237	13.5	0	0.0	1,750	100.0
	Season	782	M	0	0.0	3,437	29.6	1,985	17.1	0	0.0	5,422	46.7
			F	0	0.0	4,259	36.7	1,920	16.6	0	0.0	6,179	53.3
			Total	0	0.0	7,696	66.3	3,905	33.7	0	0.0	11,601	100.0
2002	6/24 - 27 (6/15 - 29)	200	M	0	0.0	210	19.5	447	41.5	16	1.5	673	62.5
			F	0	0.0	92	8.5	280	26.0	32	3.0	404	37.5
			Subtotal	0	0.0	302	28.0	727	67.5	48	4.5	1,077	100.0
	7/1 - 4, 6 (6/30 - 7/8)	218	M	17	0.9	455	24.8	555	30.3	17	0.9	1,044	56.9
			F	0	0.0	370	20.2	421	22.9	0	0.0	791	43.1
			Subtotal	17	0.9	825	45.0	976	53.2	17	0.9	1,835	100.0
	7/10 - 13 (7/9 - 15)	193	M	47	2.6	472	25.9	415	22.8	10	0.5	944	51.8
			F	10	0.5	472	25.9	387	21.2	9	0.5	877	48.2
			Subtotal	57	3.1	944	51.8	802	44.0	19	1.0	1,821	100.0
	7/17 - 19 (7/16 - 21)	191	M	90	10.5	175	20.4	130	15.2	4	0.5	399	46.6
			F	45	5.2	278	32.5	135	15.7	0	0.0	458	53.4
			Subtotal	135	15.7	453	52.9	265	30.9	4	0.5	857	100.0
	7/24 - 27 (7/22 - 28)	88	M	51	11.4	82	18.2	51	11.4	0	0.0	185	40.9
			F	57	12.5	149	32.9	62	13.6	0	0.0	267	59.1
			Subtotal	108	23.9	231	51.1	113	25.0	0	0.0	452	100.0
	7/30 - 8/8 (7/29 - 9/20)	65	M	62	12.3	100	20.0	31	6.2	8	1.5	200	40.0
			F	38	7.7	177	35.4	85	16.9	0	0.0	301	60.0
			Subtotal	100	20.0	277	55.4	116	23.1	8	1.5	501	100.0
	Season	955	M	267	4.1	1,494	22.8	1,630	24.9	54	0.8	3,445	52.7
			F	149	2.3	1,538	23.5	1,369	20.9	42	0.7	3,098	47.3
			Total	416	6.4	3,032	46.3	2,999	45.8	96	1.5	6,543	100.0
	Grand Total [e]	1,737	M	377	0.8	13,957	28.4	11,032	22.4	521	1.1	25,886	52.6
			F	472	1.0	14,428	29.3	8,329	16.9	92	0.2	23,327	47.4
			Total	849	1.7	28,385	57.7	19,361	39.3	613	1.2	49,213	100.0

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] The weir washed out in 1996, ASL composition of escapement was not determined.

[d] Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata.

[e] The number of fish in the "Grand Total" are the sum of the "Season" totals; percentages are derived from those sums.

Table 7. Mean length (mm) of chum salmon at the George River weir based on escapement samples collected with a fish trap.[a]

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1996	6/22 - 23	M	Mean Length		616	625	644
	(6/15 - 28)		Std. Error		25	6	37
			Range		553- 702	589- 675	573- 698
			Sample Size	0	5	16	3
		F	Mean Length	598	556	590	
			Std. Error	-	6	8	
			Range	598- 598	516- 589	544- 623	
			Sample Size	1	10	12	0
	7/5 - 6	M	Mean Length		601	616	613
	(6/29 - 7/8)		Std. Error		5	5	-
			Range		509- 703	526- 689	613- 613
			Sample Size	0	55	60	1
		F	Mean Length		553	562	
			Std. Error		5	8	
			Range		494- 619	459- 657	
			Sample Size	0	34	27	0
	7/11	M	Mean Length	595	608	609	577
	(7/9 - 13)		Std. Error	6	8	8	-
			Range	589- 601	521- 702	548- 656	577- 577
			Sample Size	2	28	15	1
		F	Mean Length	561	558	551	
			Std. Error	19	7	14	
			Range	537- 598	498- 639	443- 624	
			Sample Size	3	29	13	0
	7/16 - 17	M	Mean Length	580	596	611	
	(7/14 - 18)		Std. Error	-	5	6	
			Range	580- 580	442- 689	522- 679	
			Sample Size	1	67	35	0
		F	Mean Length	550	563	578	
			Std. Error	15	4	6	
			Range	500- 576	474- 635	499- 640	
			Sample Size	5	67	28	0
	7/20	M	Mean Length		590	595	
	(7/19 - 22)		Std. Error		6	21	
			Range		548- 653	548- 689	
			Sample Size	0	27	6	0
		F	Mean Length	598	556	590	
			Std. Error	-	6	8	
			Range	598- 598	516- 589	544- 623	
			Sample Size	1	10	12	0

-Continued-

Table 7. (page 2 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1996 (cont.)	7/25 - 26 (7/23 - 9/10)	M	Mean Length		585	589	583
			Std. Error		4	10	41
			Range		522- 651	523- 678	542- 623
			Sample Size	0	69	15	2
		F	Mean Length		545	561	
			Std. Error		4	8	
			Range		483- 614	506- 641	
			Sample Size	0	74	18	0
	Season	M	Mean Length	592	595	614	626
			Range	580- 601	442- 703	522- 689	542- 698
			Sample size	3	251	147	7
		F	Mean Length	560	552	570	
			Range	496- 598	460- 639	443- 657	
			Sample size	12	238	107	0
1997	7/4, 7- 11 (6/15 - 7/12)	M	Mean Length		572	608	635
			Std. Error		9	7	14
			Range		465- 628	526- 678	620- 649
			Sample Size	0	21	30	2
		F	Mean Length		552	564	570
			Std. Error		7	6	-
			Range		505- 599	500- 625	570- 570
			Sample Size	0	15	24	1
	7/14 - 18 (7/13 - 19)	M	Mean Length		562	588	617
			Std. Error		4	4	22
			Range		508- 632	530- 667	595- 639
			Sample Size	0	58	59	2
		F	Mean Length		536	541	605
			Std. Error		4	5	-
			Range		458- 615	483- 602	605- 605
			Sample Size	0	42	28	1
	7/21 - 24 (7/20 - 25)	M	Mean Length		556	579	564
			Std. Error		4	6	-
			Range		515- 629	501- 667	564- 564
			Sample Size	0	47	45	1
		F	Mean Length		536	565	
			Std. Error		4	5	
			Range		479- 580	514- 619	
			Sample Size	0	37	33	0

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Table 7. (page 3 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1997 (cont.)	7/27 - 31 (7/26 - 8/1)	M	Mean Length		559	570	
			Std. Error		4	6	
			Range		500- 640	519- 641	
			Sample Size	0	48	32	0
		F	Mean Length	506	535	547	563
			Std. Error	4	5	11	-
			Range	502- 509	477- 587	494- 595	563- 563
			Sample Size	2	32	10	1
	8/4 - 6 (8/2 - 7)	M	Mean Length		549	581	
			Std. Error		8	14	
			Range		521- 592	538- 613	
			Sample Size	0	9	5	0
		F	Mean Length		519	527	
			Std. Error		8	8	
			Range		478- 579	514- 540	
			Sample Size	0	13	3	0
	8/10 - 13 (8/8 - 9/10)	M	Mean Length	514	540	595	
			Std. Error	43	12	13	
			Range	471- 557	508- 578	582- 607	
			Sample Size	2	5	2	0
		F	Mean Length	503	516	514	
			Std. Error	22	8	8	
			Range	481- 524	372- 576	506- 522	
			Sample Size	2	25	2	0
	Season	M	Mean Length	514	561	591	621
			Range	471- 557	465- 640	501- 678	564- 649
			Sample Size	2	188	173	5
		F	Mean Length	504	535	558	576
			Range	481- 524	372- 615	483- 625	563- 605
			Sample Size	4	164	100	3
1998 [b]	6/30 - 7/1	M	Mean Length		581	607	
			Std. Error		3	9	
			Range		511- 643	540- 706	
			Sample Size	0	78	18	0
		F	Mean Length		555	564	
			Std. Error		3	8	
			Range		508- 608	503- 624	
			Sample Size	0	56	14	0

-Continued-

Table 7. (page 4 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
1998 [b] (cont.)	7/5 - 6	M	Mean Length		587	616	
			Std. Error		3	7	
			Range		513- 669	555- 654	
			Sample Size	0	89	15	0
		F	Mean Length		557	573	560
			Std. Error		4	11	-
			Range		510- 614	515- 620	560- 560
			Sample Size	0	43	8	1
1999 [c]	7/17 - 19 (7/15 - 20)	M	Mean Length		573	593	
			Std. Error		3	4	
			Range		510- 630	525- 660	
			Sample Size	0	58	58	0
		F	Mean Length		547	559	
			Std. Error		3	6	
			Range		495- 600	515- 595	
			Sample Size	0	56	22	0
	7/23 - 24 (7/21 - 28)	M	Mean Length		580	596	590
			Std. Error		4	5	10
			Range		500- 650	525- 655	580- 600
			Sample Size	0	62	34	2
		F	Mean Length		552	563	
			Std. Error		3	6	
			Range		480- 605	495- 665	
			Sample Size	0	68	32	0
	8/2 - 3 (7/29 - 8/6)	M	Mean Length		572	575	575
			Std. Error		3	6	-
			Range		505- 650	505- 630	575- 575
			Sample Size	0	63	29	1
		F	Mean Length		536	553	
			Std. Error		3	6	
			Range		480- 595	490- 605	
			Sample Size	0	73	27	0
	8/9 (8/7 - 9/20)	M	Mean Length		554	581	
			Std. Error		17	13	
			Range		485- 600	540- 625	
			Sample Size	0	6	6	0
		F	Mean Length		539	507	
			Std. Error		10	7	
			Range		500- 570	480- 530	
			Sample Size	0	7	7	0

-Continued-

Table 7. (page 5 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2000	7/4, 6 (6/15-7/7)	M	Mean Length		579	608	605
			Std. Error		5	6	-
			Range		545- 610	545- 660	605- 605
			Sample Size	0	16	29	1
		F	Mean Length		576	587	580
			Std. Error		11	11	-
			Range		520- 665	555- 635	580- 580
			Sample Size	0	11	9	1
	7/10, 12 (7/8 - 16)	M	Mean Length	570	576	604	520
			Std. Error	-	5	6	-
			Range	570- 570	545- 610	565- 645	520- 520
			Sample Size	1	13	15	1
		F	Mean Length		552	572	
			Std. Error		7	5	
			Range		490- 580	545- 600	
			Sample Size	0	13	14	0
	7/21, 24, 25 (7/17 - 26)	M	Mean Length		575	600	
			Std. Error		6	8	
			Range		520- 640	520- 675	
			Sample Size	0	21	27	0
		F	Mean Length		555	561	
			Std. Error		6	6	
			Range		495- 615	500- 585	
			Sample Size	0	22	16	0
	7/28 (7/27- 9/5)	M	Mean Length	570	598	575	
			Std. Error	-	20	-	
			Range	570- 570	540- 645	575- 575	
			Sample Size	1	5	1	0
		F	Mean Length	555	546	565	
			Std. Error	-	7	12	
			Range	555- 555	510- 575	530- 610	
			Sample Size	1	11	6	0
	Season	M	Mean Length	570	579	605	562
			Range	570- 570	520- 645	520- 675	520- 605
			Sample Size	2	55	72	2
		F	Mean Length	555	558	572	580
			Range	555- 555	490- 665	500- 635	580- 580
			Sample Size	1	57	45	1

-Continued-

Table 7. (page 6 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2001	6/30, 7/1 (6/15-7/4)	M	Mean Length		566	590	
			Std. Error		15	10	
			Range		508- 600	555- 658	
			Sample Size	0	6	11	0
		F	Mean Length			549	
			Std. Error			12	
			Range			494- 602	
			Sample Size	0	0	8	0
	7/9, 10, 11, 13, 14 (7/5 - 15)	M	Mean Length		573	592	
			Std. Error		4	4	
			Range		521- 645	518- 681	
			Sample Size	0	49	58	0
		F	Mean Length		543	556	
			Std. Error		5	4	
			Range		461- 606	491- 631	
			Sample Size	0	48	45	0
	7/17 - 19 (7/16 - 21)	M	Mean Length		568	582	
			Std. Error		4	7	
			Range		491- 678	523- 623	
			Sample Size	0	62	14	0
		F	Mean Length		545	564	
			Std. Error		4	6	
			Range		320- 670	493- 625	
			Sample Size	0	95	30	0
	7/24, 25, 27 (7/22 - 29)	M	Mean Length		556	578	
			Std. Error		3	11	
			Range		497- 621	518- 657	
			Sample Size	0	80	13	0
		F	Mean Length		527	546	
			Std. Error		3	7	
			Range		422- 582	487- 618	
			Sample Size	0	88	20	0
	7/31, 8/2, 3, 5, 10 (7/30-9/19)	M	Mean Length		565	571	
			Std. Error		5	9	
			Range		455- 635	523- 635	
			Sample Size	0	45	10	0
		F	Mean Length		535	541	
			Std. Error		3	12	
			Range		470- 597	494- 640	
			Sample Size	0	89	11	0

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Table 7. (page 7 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2001 (cont.)	Season	M	Mean Length		566	588	
			Range		455- 678	518- 681	
			Sample Size	0	242	106	0
		F	Mean Length		538	555	
			Range		320- 670	487- 640	
			Sample Size	0	320	114	0
2002	6/24 - 27 (6/15 - 29)	M	Mean Length		592	603	639
			Std. Error		5	3	15
			Range		528- 639	518- 682	616- 667
			Sample Size	0	39	83	3
		F	Mean Length		555	586	586
			Std. Error		9	3	14
			Range		444- 607	547- 650	551- 645
			Sample Size	0	17	52	6
	7/1 - 4, 6 (6/30 - 7/8)	M	Mean Length	516	594	606	626
			Std. Error	19	4	4	1
			Range	497- 535	544- 679	553- 681	625- 627
			Sample Size	2	54	66	2
		F	Mean Length		560	578	
			Std. Error		4	3	
			Range		489- 613	533- 649	
			Sample Size	0	44	50	0
	7/10 - 13 (7/9 - 15)	M	Mean Length	548	579	600	578
			Std. Error	10	4	5	-
			Range	515- 575	519- 655	528- 665	578- 578
			Sample Size	5	50	44	1
		F	Mean Length	484	545	563	548
			Std. Error	-	4	5	-
			Range	484- 484	474- 601	465- 623	548- 548
			Sample Size	1	50	41	1
	7/17 - 19 (7/16 - 21)	M	Mean Length	534	573	592	562
			Std. Error	7	6	7	-
			Range	436- 577	474- 677	507- 658	562- 562
			Sample Size	20	39	29	1
		F	Mean Length	511	537	562	
			Std. Error	9	4	5	
			Range	476- 557	435- 612	503- 631	
			Sample Size	10	62	30	0

-Continued-

Table 7. (page 8 of 8)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 0.2 (3)	0.3 (4)	0.4 (5)	0.5 (6)
2002 (cont.)	7/24 - 27 (7/22 - 28)	M	Mean Length	538	575	597	
			Std. Error	7	6	12	
			Range	506- 575	518- 625	522- 648	
			Sample Size	10	16	10	0
		F	Mean Length	510	532	535	
			Std. Error	8	6	9	
			Range	459- 541	480- 602	490- 592	
			Sample Size	11	29	12	0
	7/30 - 8/8 (7/29 - 9/20)	M	Mean Length	526	546	609	598
			Std. Error	9	10	21	-
			Range	465- 554	501- 609	559- 660	598- 598
			Sample Size	8	13	4	1
		F	Mean Length	517	526	553	
			Std. Error	9	5	9	
			Range	486- 537	490- 570	514- 605	
			Sample Size	5	23	11	0
	Season	M	Mean Length	534	582	602	612
			Range	436- 577	474- 679	507- 682	562- 667
			Sample Size	45	211	236	8
		F	Mean Length	510	544	570	577
			Range	459- 557	435- 613	465- 650	548- 645
			Sample Size	27	225	196	7
	Grand Total [d]	M	Mean Length	552	576	598	587
			Range	471-601	465-703	501-689	542-698
			Sample Size	47	508	414	10
		F	Mean Length	533	547	566	579
			Range	481-614	372-639	433-657	563-605
			Sample Size	28	602	355	8

a "Season" mean lengths are weighted by the escapement passage in each stratum.

b The weir washed out in 1998, ASL composition of escapement was not determined.

c Sampling dates do not meet criteria for estimating escapement percentages for some or all of the strata

c The number of fish in the "Grand total" are the sum of the "Season" totals; percentages are derived from those sums.

Table 8. Age and sex of coho salmon at the George River weir based on escapement samples collected with a fish trap.[ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1 (3) Esc.	1.1 (3) %	2.1 (4) Esc.	2.1 (4) %	3.1 (5) Esc.	3.1 (5) %	Total Esc.	Total %
1996	The weir was not operational through coho season in 1996.										
1997	8/4- 7, 10- 12 (7/20 - 8/16)	60	M	0	0.0	722	56.7	21	1.7	743	58.3
			F	0	0.0	531	41.6	0	0.0	531	41.7
			Subtotal	0	0.0	1,253	98.3	21	1.7	1,274	100.0
	8/20 - 26 (8/17 - 28)	71	M	0	0.0	1,829	64.8	40	1.4	1,868	66.2
			F	0	0.0	914	32.4	39	1.4	954	33.8
			Subtotal	0	0.0	2,743	97.2	79	2.8	2,822	100.0
	8/30- 31, 9/3- 4 (8/29 - 9/20)	73	M	210	4.1	2,522	49.3	0	0.0	2,732	53.4
			F	0	0.0	2,312	45.2	70	1.4	2,382	46.6
			Subtotal	210	4.1	4,834	94.5	70	1.4	5,114	100.0
	Season	204	M	210	2.3	5,072	55.1	61	0.7	5,343	58.0
			F	0	0.0	3,757	40.8	110	1.2	3,867	42.0
			Total	210	2.3	8,829	95.9	171	1.9	9,210	100.0
1998	The weir was not operational through coho season in 1998.										
1999	8/28- 31 (7/28 - 8/31)	107	M	108	4.7	978	42.0	195	8.4	1,283	55.1
			F	22	0.9	674	29.0	348	15.0	1,043	44.9
			Subtotal	130	5.6	1,652	71.0	543	23.4	2,326	100.0
	9/2- 4 (9/1 - 9/6)	99	M	50	2.0	1,057	42.4	554	22.2	1,661	66.7
			F	0	0.0	630	25.3	201	8.1	831	33.3
			Subtotal	50	2.0	1,687	67.7	755	30.3	2,492	100.0
	9/10, 12- 13 (9/7 - 9/20)	132	M	0	0.0	1,645	40.2	683	16.7	2,327	56.8
			F	62	1.5	1,241	30.3	465	11.3	1,769	43.2
			Subtotal	62	1.5	2,886	70.5	1,148	28.0	4,096	100.0
	Season	338	M	159	1.8	3,680	41.3	1,432	16.0	5,271	59.1
			F	84	0.9	2,544	28.5	1,015	11.4	3,643	40.9
			Total	243	2.7	6,224	69.8	2,447	27.4	8,914	100.0
2000	8/13-15 (7/22 - 8/18)	150	M	0	0.0	1,931	59.3	22	0.7	1,953	60.0
			F	43	1.3	1,237	38.0	21	0.6	1,302	40.0
			Subtotal	43	1.3	3,168	97.3	43	1.3	3,255	100.0
	8/21-22, 24 (8/19 - 26)	116	M	107	2.6	2,493	60.3	0	0.0	2,600	62.9
			F	0	0.0	1,531	37.1	0	0.0	1,531	37.1
			Subtotal	107	2.6	4,024	97.4	0	0.0	4,131	100.0
	8/29 - 30 (8/27 - 9/20)	99	M	0	0.0	1,762	45.5	78	2.0	1,840	47.5
			F	0	0.0	2,036	52.5	0	0.0	2,036	52.5
			Subtotal	0	0.0	3,798	98.0	78	2.0	3,876	100.0
	Season	365	M	107	0.9	6,186	54.9	100	0.9	6,393	56.8
			F	43	0.4	4,804	42.7	22	0.2	4,869	43.2
			Total	150	1.3	10,999	97.6	122	1.1	11,262	100.0
2001	8/9, 28-30 (7/27 - 9/1)	148	M	85	0.7	3,999	31.7	1,872	14.9	5,956	47.3
			F	0	0.0	4,254	33.8	2,382	18.9	6,636	52.7
			Subtotal	85	0.7	8,253	65.5	4,254	33.8	12,592	100.0

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Table 8. (page 2 of 2)

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.1 (3) Esc.	1.1 (3) %	2.1 (4) Esc.	2.1 (4) %	3.1 (5) Esc.	3.1 (5) %	Total Esc.	Total %
2001 (cont.)	9/4-7 (9/2 - 9)	135	M	7	0.7	298	30.4	145	14.8	451	45.9
			F	0	0.0	320	32.6	211	21.5	531	54.1
			Subtotal	7	0.7	618	63.0	356	36.3	982	100.0
	9/12-15 (9/10 - 20)	88	M	19	2.3	215	26.1	84	10.2	318	38.6
			F	0	0.0	356	43.2	150	18.2	506	61.4
			Subtotal	19	2.3	571	69.3	234	28.4	824	100.0
	Season	371	M	111	0.8	4,512	31.4	2,102	14.6	6,725	46.7
			F	0	0.0	4,930	34.2	2,743	19.0	7,673	53.3
			Total	111	0.8	9,442	65.6	4,845	33.6	14,398	100.0
2002[c]	8/6 - 8 (6/15 - 8/16)	11	M		0.0		72.7		9.1		81.8
			F		0.0		18.2		0.0		18.2
			Subtotal		0.0		90.9		9.1		100.0
	8/23 - 26 (8/17 - 30)	55	M		0.0		61.8		9.1		70.9
			F		0.0		27.3		1.8		29.1
			Subtotal		0.0		89.1		10.9		100.0
	9/3 (8/31 - 9/20)	6	M		0.0		66.7		0.0		66.7
			F		0.0		33.3		0.0		33.3
			Subtotal		0.0		100.0		0.0		100.0
	Season	72	M								
			F								
			Subtotal							6,759	
	Grand Total[d]	1279	M	573	1.3	19,293	44.3	3,700	8.5	23,566	54.1
			F	127	0.3	15,959	36.7	3,890	8.9	19,976	45.9
			Total	700	1.6	35,252	100.0	7,590	17.4	43,542	100.0

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[c] Sample sizes do not meet criteria for estimating escapement percentages for some or all of the strata.

[d] The number of fish in the "Grand Total" are the sum of the "Season" totals; percentages are derived from those sums.

Table 9. Mean length (mm) of coho salmon at the George River weir based on escapement samples collected with a fish trap. [a]

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1 (3)	2.1 (4)	3.1 (5)
1996		The weir was not operational through coho season in 1996				
1997	8/4- 7, 10- 12 (7/20 - 8/16)	M	Mean Length		528	534
			Std. Error		9	-
			Range		383- 615	534- 534
			Sample Size	0	34	1
		F	Mean Length		541	
			Std. Error		9	
			Range		456- 632	
			Sample Size	0	25	0
	8/20 - 26 (8/17 - 28)	M	Mean Length		554	587
			Std. Error		6	-
			Range		456- 651	587- 587
			Sample Size	0	46	1
		F	Mean Length		562	558
			Std. Error		7	-
			Range		483- 631	558- 558
			Sample Size	0	23	1
	8/30- 31, 9/3- 4 (8/29 - 9/15)	M	Mean Length	569	556	
			Std. Error	19	9	
			Range	541- 606	425- 653	
			Sample Size	3	36	0
		F	Mean Length		571	595
			Std. Error		5	-
			Range		527- 651	595- 595
			Sample Size	0	34	1
	Season	M	Mean Length	569	551	569
			Range	541- 606	383- 653	534- 587
			Sample Size	3	116	2
		F	Mean Length		564	581
			Range		456- 651	558- 595
			Sample size	0	82	2
1998		The weir was not operational through coho season in 1998.				

-Continued-

Table 9. (page 2 of 4)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1 (3)	2.1 (4)	3.1 (5)
1999	8/28- 31 (7/28 - 8/31)	M	Mean Length	497	528	518
			Std. Error	6	7	15
			Range	480- 510	405- 605	450- 585
			Sample Size	5	45	9
		F	Mean Length	595	547	547
			Std. Error	-	5	7
			Range	595- 595	495- 580	495- 590
			Sample Size	1	31	16
	9/2- 4 (9/1 - 9/6)	M	Mean Length	495	546	568
			Std. Error	5	7	9
			Range	490- 500	415- 620	500- 645
			Sample Size	2	42	22
		F	Mean Length		549	554
			Std. Error		8	3
			Range		445- 600	545- 575
			Sample Size	0	25	8
	9/10, 12- 13 (9/7 - 9/24)	M	Mean Length		559	573
			Std. Error		5	9
			Range		460- 620	485- 640
			Sample Size	0	53	22
		F	Mean Length	518	535	553
			Std. Error	28	6	10
			Range	490- 545	445- 600	475- 635
			Sample Size	2	40	15
	Season	M	Mean Length	496	547	564
			Range	480- 510	405- 620	450- 645
			Sample Size	7	140	53
		F	Mean Length	538	541	551
			Range	490- 595	445- 600	475- 635
			Sample Size	3	96	39
2000	8/13 - 15 (7/22 - 8/18)	M	Mean Length		533	565
			Std. Error		5	-
			Range		415- 625	565- 565
			Sample Size	0	89	1
		F	Mean Length	558	552	540
			Std. Error	18	4	-
			Range	540- 575	485- 620	540- 540
			Sample Size	2	57	1

-Continued-

Table 9. (page 3 of 4)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1 (3)	2.1 (4)	3.1 (5)
	8/21-22, 24 (8/19 - 26)	M	Mean Length	497	540	
			Std. Error	26	5	
			Range	445- 530	445- 655	
			Sample Size	3	70	0
		F	Mean Length		547	
			Std. Error		5	
			Range		470- 620	
			Sample Size	0	43	0
	8/29 - 30 (8/27 - 9/16)	M	Mean Length		562	630
			Std. Error		5	45
			Range		485- 635	585- 675
			Sample Size	0	45	2
		F	Mean Length		557	
			Std. Error		4	
			Range		470- 625	
			Sample Size	0	52	0
	Season	M	Mean Length	497	544	616
			Range	445- 530	415- 655	565- 675
			Sample Size	3	204	3
		F	Mean Length	558	552	540
			Range	540- 575	470- 625	540- 540
			Sample Size	2	152	1
2001 [b]	8/9, 28-30 (7/27 - 9/1)	M	Mean Length	476	566	549
			Std. Error	-	8	12
			Range	476- 476	408- 637	385- 629
			Sample Size	1	47	22
		F	Mean Length		552	553
			Std. Error		5	6
			Range		426- 625	476- 608
			Sample Size	0	50	28
	9/4-7 (9/2 - 9)	M	Mean Length	562	560	579
			Std. Error	-	7	13
			Range	562- 562	457- 635	426- 659
			Sample Size	1	41	20
		F	Mean Length		553	565
			Std. Error		6	5
			Range		449- 632	528- 620
			Sample Size	0	44	29

-Continued-

Table 9. (page 4 of 4)

Year	Sample Dates (Stratum Dates)	Sex		Age Class 1.1 (3)	2.1 (4)	3.1 (5)
	9/12-15 (9/10 - 22)	M	Mean Length	593	573	603
			Std. Error	5	11	13
			Range	588- 597	474- 665	558- 671
			Sample Size	2	23	9
		F	Mean Length		555	580
			Std. Error		7	11
			Range		378- 610	439- 626
			Sample Size	0	38	16
	Season	M	Mean Length	502	566	553
			Range	476- 597	408- 665	385- 671
			Sample Size	4	111	51
		F	Mean Length		552	556
			Range		378- 632	439- 626
			Sample Size	0	132	73
	Grand Total [c]	M	Mean Length	516	552	576
			Range	480-606	383-653	450-645
			Sample Size	17	571	109
		F	Mean Length	548	552	557
			Range	490-595	445-651	475-635
			Sample Size	5	462	115

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

[b] Sample sizes do not meet criteria for estimating escapement percentages for some or all of the strata.

[c] "Grand Total" mean lengths are simple averages of the "Season" mean lengths.

Table 10. Aerial Survey Counts by index area for George River chinook and chum salmon, 2001 - 2002.

		2001 Index Area					2002 Index Area				
		101	102	103	104	TOTAL	101	102	103	104	TOTAL
Mainstem	Live King	62	872	112	58	1,104	63	291	94	21	469
	King Redd	5	106	12	9	132	21	74	22	5	122
	King Carcass	2	32	0	5	39	0	0	0	0	0
	Live Chum	35	335	51	51	472	60	185	70	5	320
	Chum Carcass	0	0	0	0	0					0
East Fork	Live King	1	25	N/A	N/A	26	83	52	N/A	N/A	135
	King Redd	0	0	N/A	N/A	0	30	12	N/A	N/A	42
	King Carcass	0	1	N/A	N/A	1	0	0	N/A	N/A	0
	Live Chum	0	0	N/A	N/A	0	25	15	N/A	N/A	40
	Chum Carcass	0	0	N/A	N/A	0	0	0	N/A	N/A	0
South Fork	Live King	12	N/A	N/A	N/A	12	*	*	*	*	0
	King Redd	0	N/A	N/A	N/A	0	*	*	*	*	0
	King Carcass	0	N/A	N/A	N/A	0	*	*	*	*	0
	Live Chum	0	N/A	N/A	N/A	0	*	*	*	*	0
	Chum Carcass	0	N/A	N/A	N/A	0	*	*	*	*	0
North Fork	Live King	10	N/A	N/A	N/A	10	*	*	*	*	0
	King Redd	2	N/A	N/A	N/A	2	*	*	*	*	0
	King Carcass	2	N/A	N/A	N/A	2	*	*	*	*	0
	Live Chum	0	N/A	N/A	N/A	0	*	*	*	*	0
	Chum Carcass	0	N/A	N/A	N/A	0	*	*	*	*	0
TOTAL RIVER	Live King	1,152					604				
	King Redd	134					164				
	King Carcass	42					0				
	Live Chum	472					360				
	Chum Carcass	0					0				

N/A = Not aplicable

* = Stream not surveyed in given year

Table 11. Daily, cumulative and percentage of chum and coho salmon tags recoverd and observed at the George River weir, and tagged at Kalskag-Aniak, 2002.

	Daily Tags						Cumulative Tags						Percent Tags					
	CHUM			COHO			CHUM			COHO			CHUM			COHO		
Date	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged
6/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/16	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/17	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/18	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/19	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/20	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/21	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/22	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
6/23	0	0	2	0	0	0	0	0	3	0	0	3	0	0	3	0	0	0
6/24	0	0	3	0	0	0	0	0	6	0	0	6	0	0	6	0	0	0
6/25	1	1	3	0	0	0	1	1	9	0	0	9	1	1	9	0	0	0
6/26	0	0	1	0	0	0	1	1	10	0	0	10	1	1	10	0	0	0
6/27	0	0	0	0	0	0	1	1	10	0	0	10	1	1	10	0	0	0
6/28	0	0	7	0	0	0	1	1	17	0	0	17	1	1	17	0	0	0
6/29	2	3	0	0	0	0	3	4	17	0	0	17	3	3	17	0	0	0
6/30	3	3	3	0	0	0	6	7	20	0	0	20	6	6	20	0	0	0
7/1	0	1	3	0	0	0	6	8	23	0	0	23	6	6	23	0	0	0
7/2	0	0	2	0	0	0	6	8	25	0	0	25	6	6	25	0	0	0
7/3	1	1	1	0	0	0	7	9	26	0	0	26	7	7	26	0	0	0
7/4	0	0	3	0	0	0	7	9	29	0	0	29	7	7	29	0	0	0
7/5	3	3	3	0	0	0	10	12	32	0	0	32	10	10	32	0	0	0
7/6	6	8	3	0	0	0	16	20	35	0	0	35	16	16	35	0	0	0
7/7	3	4	3	0	0	0	19	24	38	0	0	38	19	19	38	0	0	0
7/8	1	1	10	0	0	0	20	25	48	0	0	48	20	20	48	0	0	0
7/9	0	0	4	0	0	0	20	25	52	0	0	51	20	20	51	0	0	0
7/10	2	3	2	0	0	0	22	28	54	0	0	53	22	22	53	0	0	0
7/11	3	5	3	0	0	0	25	33	57	0	0	56	25	26	56	0	0	0
7/12	10	10	2	0	0	0	35	43	59	0	0	58	35	34	58	0	0	0
7/13	7	7	0	0	0	0	42	50	59	0	0	58	42	40	58	0	0	0
7/14	7	7	0	0	0	0	49	57	59	0	0	58	49	46	58	0	0	0
7/15	2	3	0	0	0	0	51	60	59	0	0	58	50	48	58	0	0	0
7/16	2	3	3	0	0	0	53	63	62	0	0	61	52	50	61	0	0	0
7/17	4	4	3	0	0	0	57	67	65	0	0	64	56	54	64	0	0	0
7/18	1	5	3	0	0	0	58	72	68	0	0	67	57	58	67	0	0	0
7/19	0	0	2	0	0	0	58	72	70	0	0	69	57	58	69	0	0	0
7/20	1	1	3	0	0	0	59	73	73	0	0	72	58	58	72	0	0	0
7/21	2	4	1	0	0	0	61	77	74	0	0	73	60	62	73	0	0	0
7/22	2	2	0	0	0	0	63	79	74	0	0	73	62	63	73	0	0	0
7/23	4	5	0	0	0	0	67	84	74	0	0	73	66	67	73	0	0	0
7/24	1	1	1	0	0	0	68	85	75	0	0	74	67	68	74	0	0	0
7/25	3	3	1	0	0	0	71	88	76	0	0	75	70	70	75	0	0	0
7/26	0	0	0	0	0	0	71	88	76	0	0	75	70	70	75	0	0	0
7/27	0	0	1	0	0	0	71	88	77	0	0	76	70	70	76	0	0	0
7/28	1	2	3	0	0	0	72	90	80	0	0	79	71	72	79	0	0	0
7/29	1	3	3	0	0	0	73	93	83	0	0	82	72	74	82	0	0	0
7/30	1	1	1	0	0	0	74	94	84	0	0	83	73	75	83	0	0	0
7/31	0	1	2	0	0	0	74	95	86	0	0	85	73	76	85	0	0	0
8/1	2	2	3	0	0	1	76	97	89	0	0	88	75	78	88	0	0	2
8/2	1	1	0	0	0	0	77	98	89	0	0	88	76	78	88	0	0	2
8/3	2	2	1	0	0	0	79	100	90	0	0	89	78	80	89	0	0	2
8/4	3	3	2	0	1	1	82	103	92	0	1	91	81	82	91	0	1	3
8/5	1	1	0	0	0	0	83	104	92	0	1	91	82	83	91	0	1	3
8/6	3	3	4	0	0	0	86	107	96	0	1	95	85	86	95	0	1	3
8/7	1	1	0	0	0	0	87	108	96	0	1	95	86	86	95	0	1	3
8/8	0	0	1	0	0	1	87	108	97	0	1	96	86	86	96	0	1	5

-Continued-

Table 11. (page 2 of 2)

	Daily Tags						Cumulative Tags						Percent Tags					
	CHUM			COHO			CHUM			COHO			CHUM			COHO		
Date	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged	Recoverd	Observed	Tagged
8/9	2	2	1	0	0	0	89	110	98	0	1	3	88	88	97	0	1	5
8/10	3	3	0	1	1	1	92	113	98	1	2	4	91	90	97	2	2	7
8/11	1	1	2	0	0	3	93	114	100	1	2	7	92	91	99	2	2	11
8/12	2	2	0	0	0	3	95	116	100	1	2	10	94	93	99	2	2	16
8/13	1	1	0	0	0	2	96	117	100	1	2	12	95	94	99	2	2	20
8/14	1	2	0	0	0	4	97	119	100	1	2	16	96	95	99	2	2	26
8/15	1	2	0	0	2	1	98	121	100	1	4	17	97	97	99	2	4	28
8/16	0	0	0	0	0	2	98	121	100	1	4	19	97	97	99	2	4	31
8/17	0	0	0	0	0	2	98	121	100	1	4	21	97	97	99	2	4	34
8/18	1	1	0	0	0	2	99	122	100	1	4	23	98	98	99	2	4	38
8/19	1	1	0	0	0	1	100	123	100	1	4	24	99	98	99	2	4	39
8/20	0	1	0	0	0	1	100	124	100	1	4	25	99	99	99	2	4	41
8/21	0	0	0	0	0	4	100	124	100	1	4	29	99	99	99	2	4	48
8/22	0	0	0	0	4	5	100	124	100	1	8	34	99	99	99	2	8	56
8/23	0	0	0	0	1	2	100	124	100	1	9	36	99	99	99	2	9	59
8/24	0	0	0	0	0	6	100	124	100	1	9	42	99	99	99	2	9	69
8/25	0	0	0	0	1	4	100	124	100	1	10	46	99	99	99	2	10	75
8/26	0	0	0	0	0	1	100	124	100	1	10	47	99	99	99	2	10	77
8/27	0	0	0	0	0	3	100	124	100	1	10	50	99	99	99	2	10	82
8/28	0	0	0	0	0	2	100	124	100	1	10	52	99	99	99	2	10	85
8/29	0	0	0	0	0	2	100	124	100	1	10	54	99	99	99	2	10	89
8/30	0	0	0	0	0	1	100	124	100	1	10	55	99	99	99	2	10	90
8/31	0	0	1	3	7	1	100	124	101	4	17	56	99	99	100	7	17	92
9/1	0	0	0	0	2	0	100	124	101	4	19	56	99	99	100	7	19	92
9/2	0	0	0	1	1	3	100	124	101	5	20	59	99	99	100	8	20	97
9/3	0	0	0	0	0	0	100	124	101	5	20	59	99	99	100	8	20	97
9/4	0	0	0	0	0	2	100	124	101	5	20	61	99	99	100	8	20	100
9/5	0	0	0	5	6	0	100	124	101	10	26	61	99	99	100	16	26	100
9/6	1	1	0	26	27	0	101	125	101	36	53	61	100	100	100	59	53	100
9/7	0	0	0	15	16	0	101	125	101	51	69	61	100	100	100	84	69	100
9/8	0	0	0	4	4	0	101	125	101	55	73	61	100	100	100	90	73	100
9/9	0	0	0	1	1	0	101	125	101	56	74	61	100	100	100	92	74	100
9/10	0	0	0	2	2	0	101	125	101	58	76	61	100	100	100	95	76	100
9/11	0	0	0	3	3	0	101	125	101	61	79	61	100	100	100	100	79	100
9/12	0	0	0	0	13	0	101	125	101	61	92	61	100	100	100	100	92	100
9/13	0	0	0	0	2	0	101	125	101	61	94	61	100	100	100	100	94	100
9/14	0	0	0	0	4	0	101	125	101	61	98	61	100	100	100	100	98	100
9/15	0	0	0	0	0	0	101	125	101	61	98	61	100	100	100	100	98	100
9/16	0	0	0	0	1	0	101	125	101	61	99	61	100	100	100	100	99	100
9/17	0	0	0	0	0	0	101	125	101	61	99	61	100	100	100	100	99	100
9/18	0	0	0	0	1	0	101	125	101	61	100	61	100	100	100	100	100	100
9/19	0	0	0	0	0	0	101	125	101	61	100	61	100	100	100	100	100	100
9/20	0	0	0	0	0	0	101	125	101	61	100	61	100	100	100	100	100	100
TOTAL	101	125	101	61	100	61												

Table 12. Tagged chum salmon recaptured at the George River weir, 2002.

Tagging Location	Date Tagged	Date Recaptured	Tag Number	Tag Identification	Adipose Punch	Travel Time (days)	Travel Speed (km/d)
Birch Tree	6/16	6/25	15039	ADF&G-02-green	n	9	18
Birch Tree	6/23	6/30	15551	ADF&G-02-green	y	7	23
Kalskag	6/23	6/29	9128	ADF&G-02-pink	y	6	33
Birch Tree	6/24	7/5	15624	ADF&G-02-green	y	11	15
Birch Tree	6/24	6/30	15659	ADF&G-02-green	y	6	27
Birch Tree	6/24	6/29	15687	ADF&G-02-green	y	5	33
Birch Tree	6/25	7/6	15938	ADF&G-02-green	y	11	15
Kalskag	6/25	7/5	9259	ADF&G-02-pink	y	10	20
Birch Tree	6/25	6/30	15791	ADF&G-02-green	y	5	33
Birch Tree	6/26	7/15	15957	ADF&G-02-green	y	19	9
Birch Tree	6/28	7/13	16709	ADF&G-02-green	y	15	11
Birch Tree	6/28	7/12	16483	ADF&G-02-green	y	14	12
Birch Tree	6/28	7/12	16704	ADF&G-02-green	y	14	12
Kalskag	6/28	7/8	9414	ADF&G-02-pink	y	10	20
Kalskag	6/28	7/6	9452	ADF&G-02-pink	y	8	24
Kalskag	6/28	7/6	9456	ADF&G-02-pink	y	8	24
Kalskag	6/28	7/3	9439	ADF&G-02-pink	y	5	39
Kalskag	6/30	7/14	19093	ADF&G-02-blue	n	14	14
Kalskag	6/30	7/6	9598	ADF&G-02-pink	y	6	33
Birch Tree	6/30	7/5	17170	ADF&G-02-green	y	5	33
Kalskag	7/1	7/7	9716	ADF&G-02-pink	y	6	33
Birch Tree	7/1	7/6	17463	ADF&G-02-green	y	5	33
Kalskag	7/1	7/6	9644	ADF&G-02-pink	y	5	39
Kalskag	7/2	7/7	9771	ADF&G-02-pink	y	5	39
Kalskag	7/2	7/7	9846	ADF&G-02-pink	y	5	39
Kalskag	7/3	7/11	10005	ADF&G-02-pink	y	8	24
Kalskag	7/4	7/13	10199	ADF&G-02-pink	y	9	22
Birch Tree	7/4	7/11	18752	ADF&G-02-green	y	7	23
Kalskag	7/4	7/10	10193	ADF&G-02-pink	y	6	33
Birch Tree	7/5	7/13	13281	ADF&G-02-white	y	8	20
Kalskag	7/5	7/12	10455	ADF&G-02-pink	y	7	28
Kalskag	7/5	7/10	10316	ADF&G-02-pink	y	5	39
Birch Tree	7/6	7/14	13669	ADF&G-02-white	y	8	20
Kalskag	7/6	7/14	11136	ADF&G-02-pink	n	8	24
Kalskag	7/6	7/11	10562	ADF&G-02-pink	y	5	39
Kalskag	7/7	7/13	10797	ADF&G-02-pink	y	6	33
Kalskag	7/7	7/12	10687	ADF&G-02-pink	y	5	39
Kalskag	7/7	7/12	10711	ADF&G-02-pink	y	5	39
Kalskag	7/8	7/20	11602	ADF&G-02-pink	n	12	16
Kalskag	7/8	7/17	11328	ADF&G-02-pink	y	9	22
Kalskag	7/8	7/14	11453	ADF&G-02-pink	n	6	33
Birch Tree	7/8	7/13	14495	ADF&G-02-white	y	5	33
Kalskag	7/8	7/13	11516	ADF&G-02-pink	y	5	39
Birch Tree	7/8	7/12	14288	ADF&G-02-white	y	4	41
Birch Tree	7/8	7/12	14289	ADF&G-02-white	y	4	41
Birch Tree	7/8	7/12	14543	ADF&G-02-white	y	4	41
Birch Tree	7/8	7/12	14561	ADF&G-02-white	y	4	41
Kalskag	7/8	7/12	11539	ADF&G-02-pink	n	4	49
Birch Tree	7/9	7/14	14944	ADF&G-02-white	y	5	33
Kalskag	7/9	7/14	11658	ADF&G-02-pink	y	5	39
Kalskag	7/9	7/14	11785	ADF&G-02-pink	n	5	39
Birch Tree	7/9	7/13	14825	ADF&G-02-white	y	4	41
Birch Tree	7/10	7/17	5319	ADF&G-02-green	n	7	23
Kalskag	7/10	7/15	11981	ADF&G-02-pink	y	5	39

-Continued-

Table 12. (page 2 of 2)

Tagging Location	Date Tagged	Date Recaptured	Tag Number	Tag Identification	Adipose Punch	Travel Time (days)	Travel Speed (km/d)
Kalskag	7/11	7/17	12458	ADF&G-02-pink	n	6	33
Kalskag	7/11	7/17	12464	ADF&G-02-pink	y	6	33
Kalskag	7/11	7/16	12452	ADF&G-02-pink	n	5	39
Kalskag	7/12	7/18	12729	ADF&G-02-pink	n	6	33
Kalskag	7/12	7/16	12674	ADF&G-02-pink	n	4	49
Kalskag	7/16	7/22	1091	ADF&G-01-pink	y	6	33
Birch Tree	7/16	7/21	21701	ADF&G-02-green	y	5	33
Kalskag	7/16	7/21	1093	ADF&G-01-pink	y	5	39
Birch Tree	7/17	7/23	21814	ADF&G-02-green	y	6	27
Kalskag	7/17	7/23	1324	ADF&G-01-pink	y	6	33
Birch Tree	7/17	7/22	22009	ADF&G-02-green	y	5	33
Birch Tree	7/18	7/25	22207	ADF&G-02-green	y	7	23
Kalskag	7/18	7/24	2132	ADF&G-01-pink	y	6	33
Birch Tree	7/18	7/23	22247	ADF&G-02-green	y	5	33
Kalskag	7/19	7/25	2306	ADF&G-01-pink	y	6	33
Birch Tree	7/19	7/23	22518	ADF&G-02-green	y	4	41
Birch Tree	7/20	7/28	5142	FWS-02-Fl-yellow	y	8	20
Kalskag	7/20	7/29	4070	FWS-02-Fl-orange	n	9	22
Birch Tree	7/20	7/25	5267	FWS-02-Fl-orange	n/a	5	33
Birch Tree	7/21	8/4	2704	ADF&G-01-pink	y	14	12
Kalskag	7/24	8/1	4726	FWS-02-Fl-orange	y	8	24
Kalskag	7/25	7/30	5000	FWS-02-Fl-orange	y	5	39
Birch Tree	7/27	8/10	23020	ADF&G-02-green	y	14	12
Kalskag	7/28	8/3	19533	ADF&G-02-blue	y	6	33
Kalskag	7/28	8/2	19514	ADF&G-02-green	y	5	39
Kalskag	7/28	8/1	19423	ADF&G-02-blue	y	4	49
Birch Tree	7/29	8/6	23597	ADF&G-02-green	y	8	20
Kalskag	7/29	8/4	19440	ADF&G-02-blue	y	6	33
Kalskag	7/29	8/4	19649	ADF&G-02-blue	y	6	33
Birch Tree	7/30	8/3	23791	ADF&G-02-green	y	4	41
Birch Tree	7/31	8/7	19839	ADF&G-02-blue	y	7	28
Kalskag	7/31	8/5	29043	ADF&G-02-pink	y	5	39
Birch Tree	8/1	8/9	24194	ADF&G-02-green	y	8	20
Birch Tree	8/1	8/6	24094	ADF&G-02-green	y	5	33
Birch Tree	8/1	8/6	24156	ADF&G-02-green	y	5	33
Birch Tree	8/3	8/10	24693	ADF&G-02-green	y	7	23
Birch Tree	8/4	8/10	24813	ADF&G-02-green	y	6	27
Kalskag	8/4	8/9	29426	ADF&G-02-pink	y	5	39
Kalskag	8/6	8/13	29688	ADF&G-02-pink	y	7	28
Kalskag	8/6	8/12	29596	ADF&G-02-pink	n	6	33
Kalskag	8/6	8/12	29647	ADF&G-02-pink	y	6	33
Birch Tree	8/6	8/11	25215	ADF&G-02-green	y	5	33
Kalskag	8/8	8/15	29722	ADF&G-02-pink	y	7	28
Birch Tree	8/9	8/14	25746	ADF&G-02-green	y	5	33
Birch Tree	8/11	8/18	25977	ADF&G-02-green	y	7	23
Kalskag	8/11	8/19	29969	ADF&G-02-pink	y	8	24
Birch Tree	8/31	9/6	27618	ADF&G-02-green	n	6	27
Total			100				
Range						4 - 19	9 - 49
Mean						7	30

Table 13. Tagged coho salmon recaptured at the George River weir, 2002.

Tagging Location	Date Tagged	Date Recaptured	Tag Number	Tag Identification	Adipose Punch	Travel Time (days)	Travel Speed (km/d)
Kalskag	8/1	8/10	24189	ADF&G-02-green	y	9	22
Birch Tree	8/4	9/7	24854	ADF&G-02-green	y	34	5
Kalskag	8/8	9/5	29792	ADF&G-02-pink	y	28	7
Birch Tree	8/10	9/7	36167	ADF&G-02-white	y	28	6
Birch Tree	8/11	9/6	25911	ADF&G-02-green	y	26	6
Birch Tree	8/11	9/6	25955	ADF&G-02-green	y	26	6
Kalskag	8/11	9/6	29941	ADF&G-02-pink	y	26	8
Birch Tree	8/12	9/6	25990	ADF&G-02-green	y	25	7
Birch Tree	8/12	9/2	26008	ADF&G-02-green	y	21	8
Kalskag	8/12	9/6	20172	ADF&G-02-blue	y	25	8
Birch Tree	8/13	9/7	26121	ADF&G-02-green	y	25	7
Kalskag	8/13	9/5	20189	ADF&G-01-blue	y	23	8
Birch Tree	8/14	9/7	26252	ADF&G-02-green	y	24	7
Birch Tree	8/14	9/6	26237	ADF&G-02-green	y	23	7
Birch Tree	8/14	8/31	26253	ADF&G-02-green	y	17	10
Kalskag	8/14	8/31	31065	ADF&G-02-pink	y	17	11
Kalskag	8/15	9/7	31107	ADF&G-02-pink	y	23	8
Birch Tree	8/16	9/6	26495	ADF&G-02-green	y	21	8
Birch Tree	8/16	9/5	36360	ADF&G-02-white	y	20	8
Birch Tree	8/17	9/7	36415	ADF&G-02-white	y	21	8
Kalskag	8/17	9/7	20295	ADF&G-02-blue	y	21	9
Kalskag	8/18	9/10	20313	ADF&G-02-blue	y	23	8
Kalskag	8/18	9/7	20314	ADF&G-02-blue	y	20	10
Birch Tree	8/19	8/31	36464	ADF&G-02-white	y	12	14
Kalskag	8/20	9/6	20373	ADF&G-02-blue	y	17	11
Birch Tree	8/21	9/8	27084	ADF&G-02-green	y	18	9
Birch Tree	8/21	9/6	27049	ADF&G-02-green	y	16	10
Birch Tree	8/21	9/6	35090	ADF&G-02-white	y	16	10
Kalskag	8/21	9/6	31345	ADF&G-02-pink	y	16	12
Birch Tree	8/22	9/6	27112	ADF&G-02-green	y	15	11
Birch Tree	8/22	9/6	35161	ADF&G-02-white	y	15	11
Birch Tree	8/22	9/6	35176	ADF&G-02-white	y	15	11
Birch Tree	8/22	9/6	35183	ADF&G-02-white	y	15	11
Kalskag	8/22	9/6	31488	ADF&G-02-pink	y	15	13
Kalskag	8/23	9/7	31623	ADF&G-02-pink	y	15	13
Kalskag	8/23	9/6	31614	ADF&G-02-pink	y	14	14
Birch Tree	8/24	9/6	27244	ADF&G-02-green	n	13	13
Birch Tree	8/24	9/6	27253	ADF&G-02-green	y	13	13
Kalskag	8/24	9/7	31667	ADF&G-02-pink	y	14	14
Kalskag	8/24	9/6	31670	ADF&G-02-pink	y	13	15
Kalskag	8/24	9/6	31681	ADF&G-02-pink	y	13	15
Kalskag	8/24	9/6	31705	ADF&G-02-pink	y	13	15
Birch Tree	8/25	9/6	27318	ADF&G-02-green	y	12	14
Kalskag	8/25	9/6	31829	ADF&G-02-pink	y	12	16
Kalskag	8/25	9/5	31810	ADF&G-02-pink	y	11	18
Kalskag	8/25	9/5	31825	ADF&G-02-pink	y	11	18
Kalskag	8/26	9/9	20411	ADF&G-02-blue	y	14	14
Birch Tree	8/27	9/7	27414	ADF&G-02-green	y	11	15
Kalskag	8/27	9/7	20423	ADF&G-02-blue	y	11	18
Kalskag	8/27	9/7	30107	ADF&G-02-pink	y	11	18
Birch Tree	8/28	9/6	27441	ADF&G-02-green	y	9	18

-Continued-

Table 13. (page 2 of 2)

Tagging Location	Date Tagged	Date Recaptured	Tag Number	Tag Identification	Adipose Punch	Travel Time (days)	Travel Speed (km/d)
Kalskag	8/28	9/7	30144	ADF&G-02-pink	y	10	20
Kalskag	8/29	9/7	30183	ADF&G-02-pink	y	9	22
Kalskag	8/29	9/6	30191	ADF&G-02-pink	y	8	24
Birch Tree	8/30	9/8	27540	ADF&G-02-green	y	9	18
Kalskag	8/31	9/10	30317	ADF&G-02-pink	y	10	20
Birch Tree	9/2	9/11	27863	ADF&G-02-green	y	9	18
Birch Tree	9/2	9/8	35474	ADF&G-02-white	y	6	27
Kalskag	9/2	9/8	30412	ADF&G-02-pink	y	6	33
Birch Tree	9/4	9/11	27956	ADF&G-02-green	y	7	23
Birch Tree	9/4	9/11	28011	ADF&G-02-green	n	7	23
Total			60				
Range						6 - 34	5 - 33
Mean						16	13

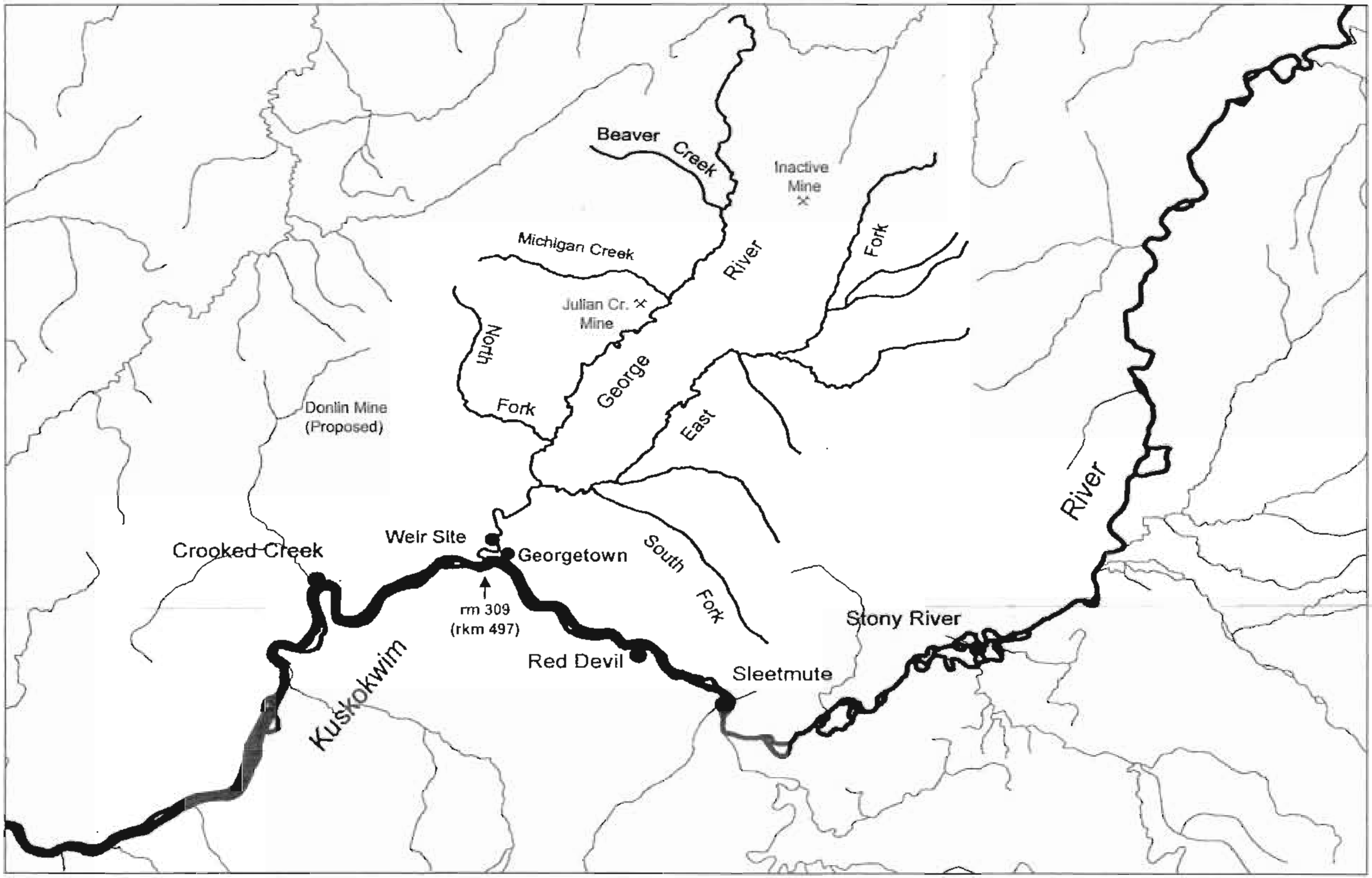


Figure 1. George River, middle Kuskokwim River basin.

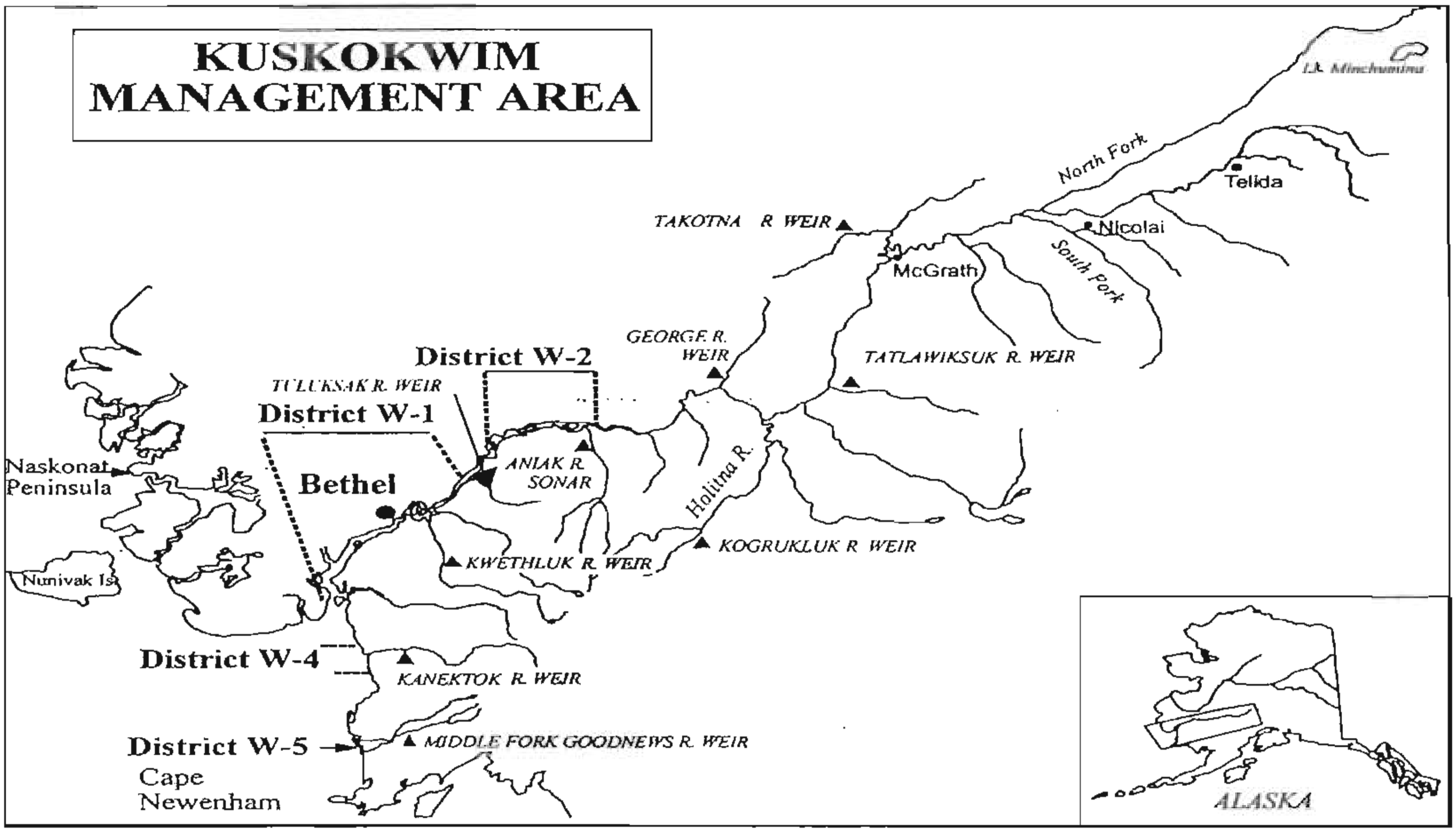
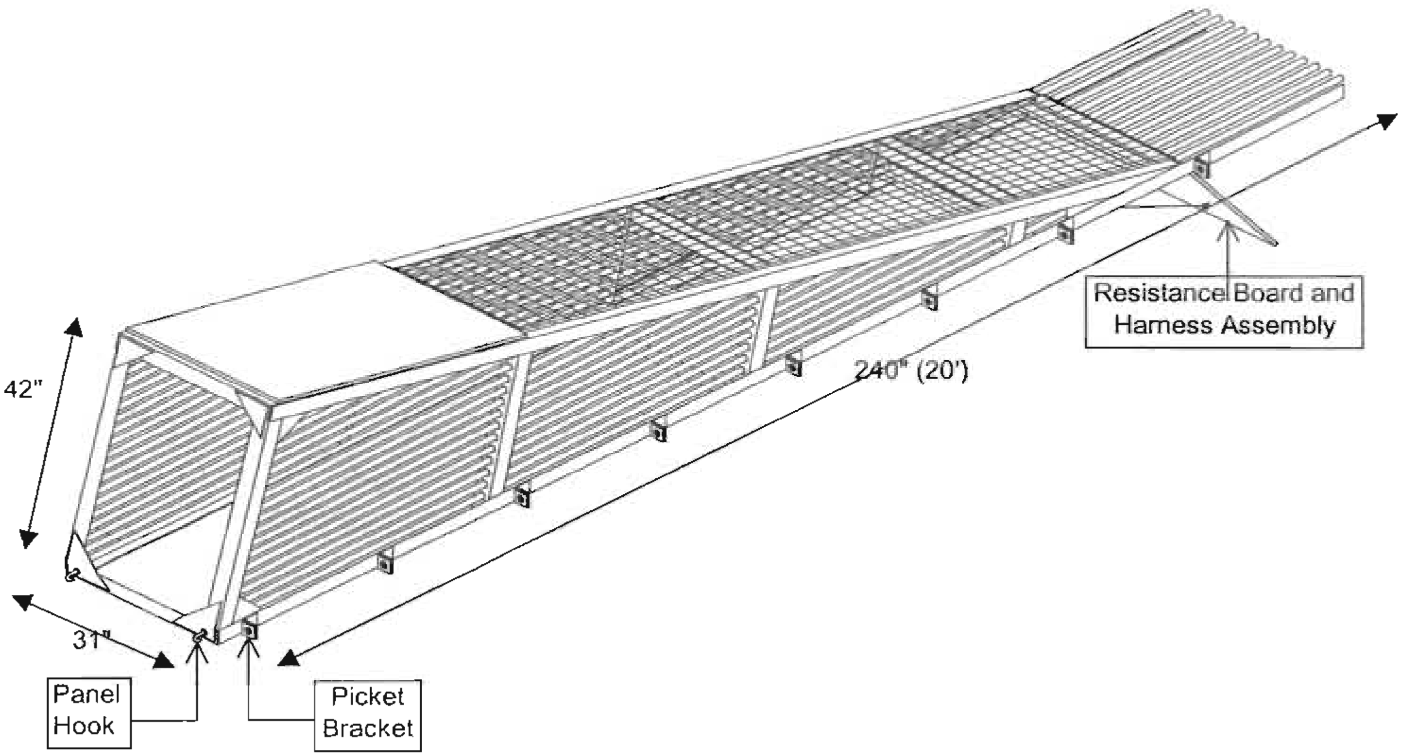


Figure 2. Kuskokwim Area salmon management districts and escapement monitoring projects.



General Materials:

Frame - 3" x 3/16" aluminum angle
Sidewalls - 1" schedule 40 PVC electrical conduit
Top Cover(s) - 48" x 31" x3/4" plywood, 3" vinyl coated wire mesh cut to size
Picket Bracket - 3" x 3" x 1/2" UHMW plate riveted to a 3" - 3" x 3/16" piece of aluminum angle, both drilled to accept a 1" schedue 40 connector picket

Note: refer to Stewart (2002) for details of resistnace board and harness assembly, and panel hooks.

Figure 3. Enclosed passge chute used in the George River weir, 2002.

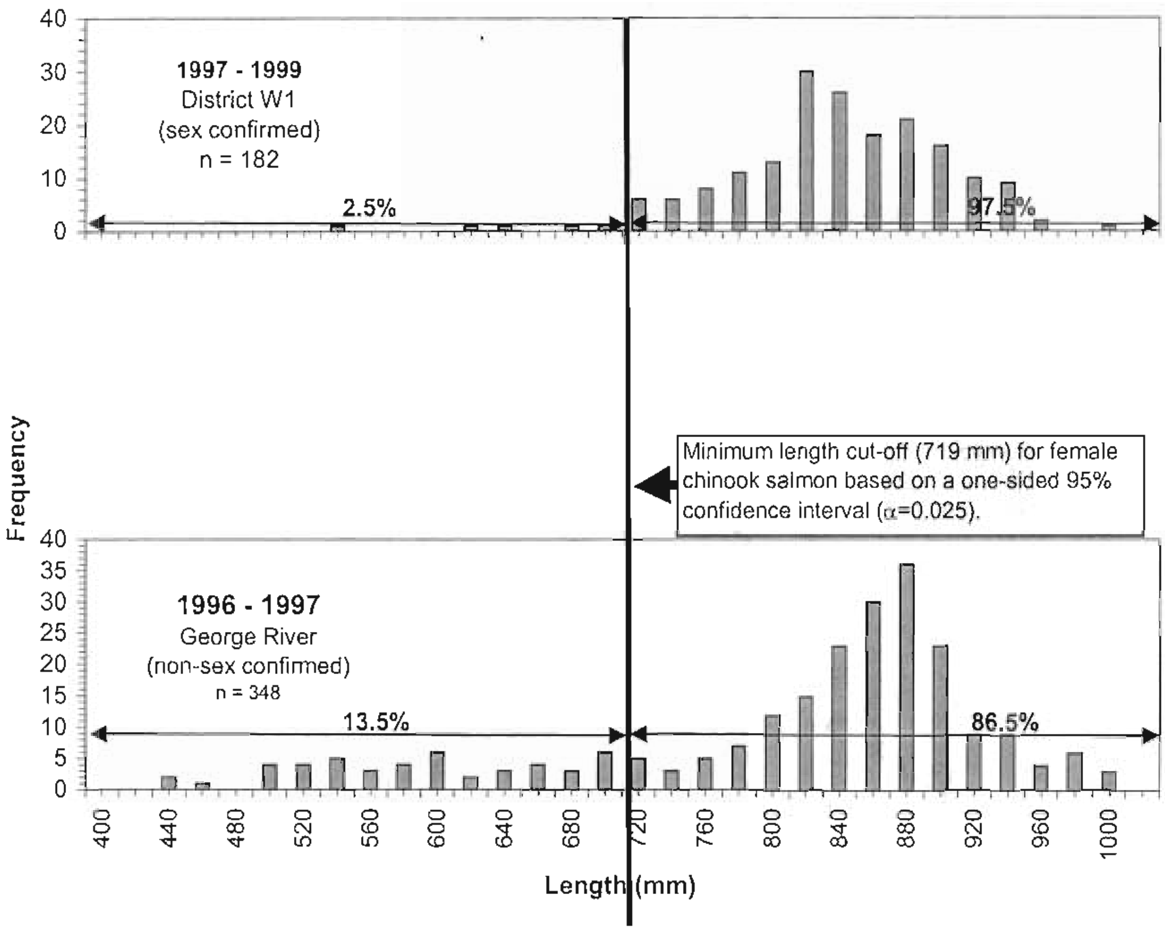


Figure 4. Comparison of sex confirmed and non-sex confirmed female chinook salmon length frequencies from the District W1 commercial catch (1997-1999) and the George River weir (1996-1997) showing the minnimum length cut off derived from the sex confirmed sample.

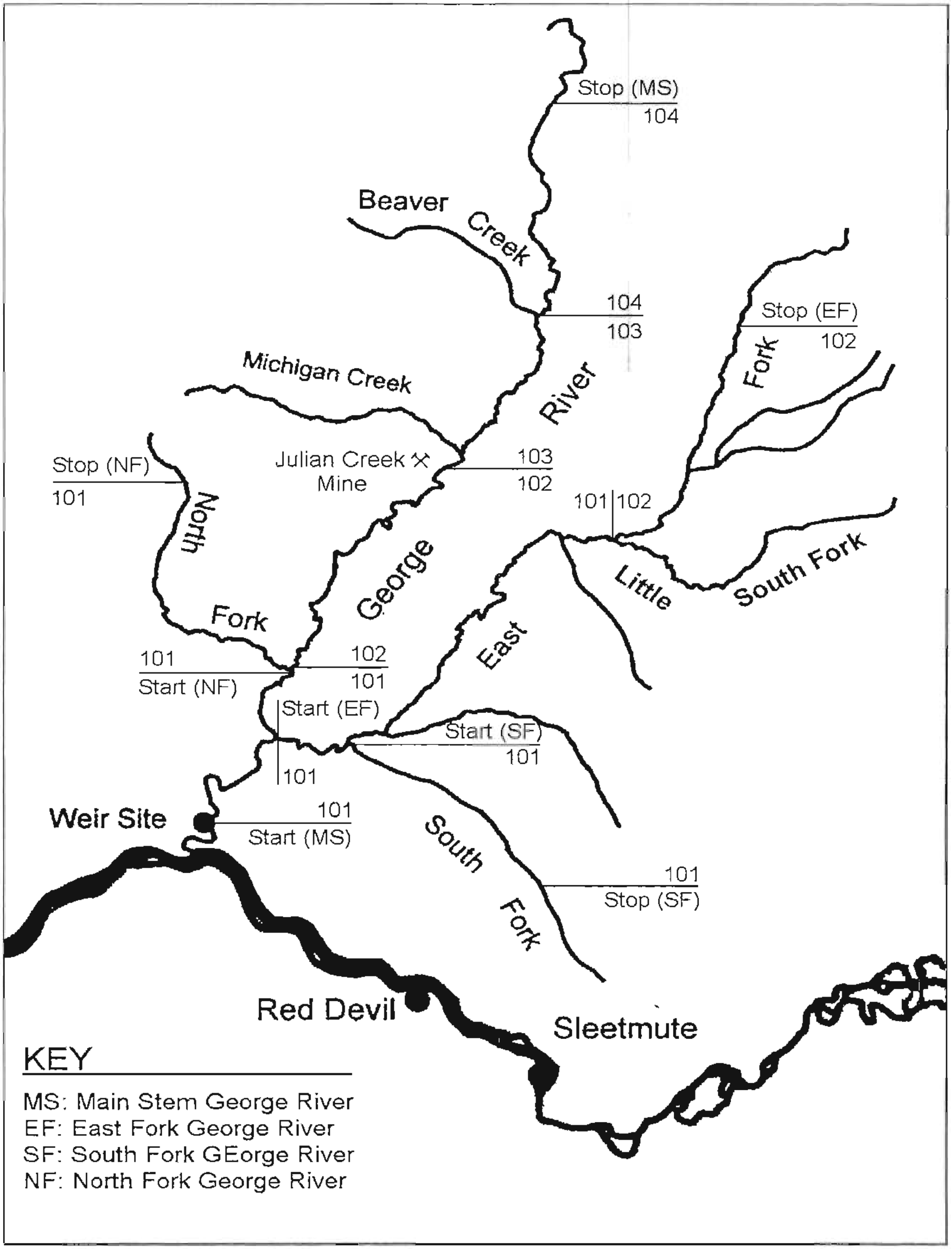


Figure 5. Aerial survey index map for the George River drainage.

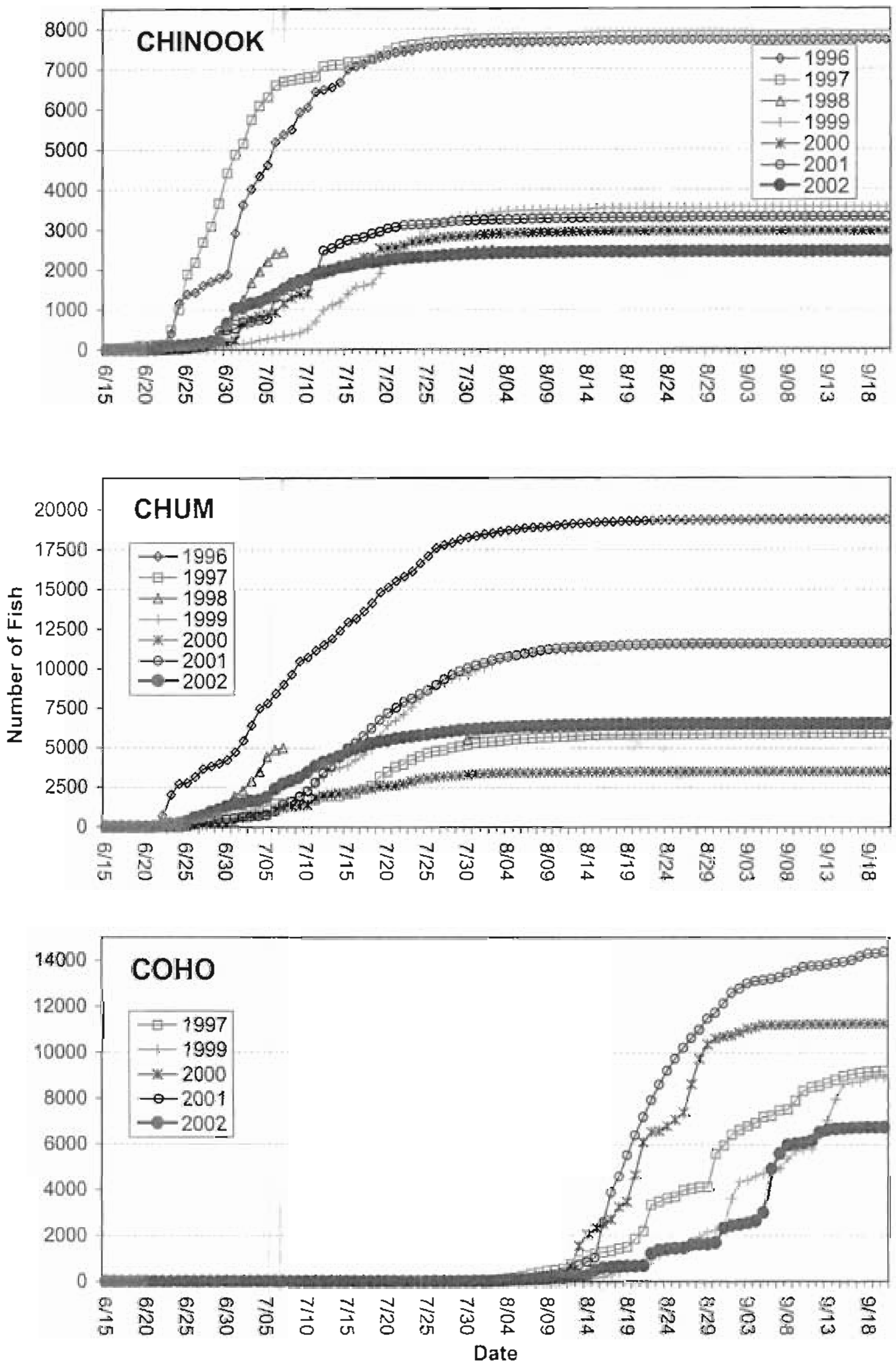


Figure 6. Historical cumulative passage of chinook, chum and coho salmon at the George River weir.

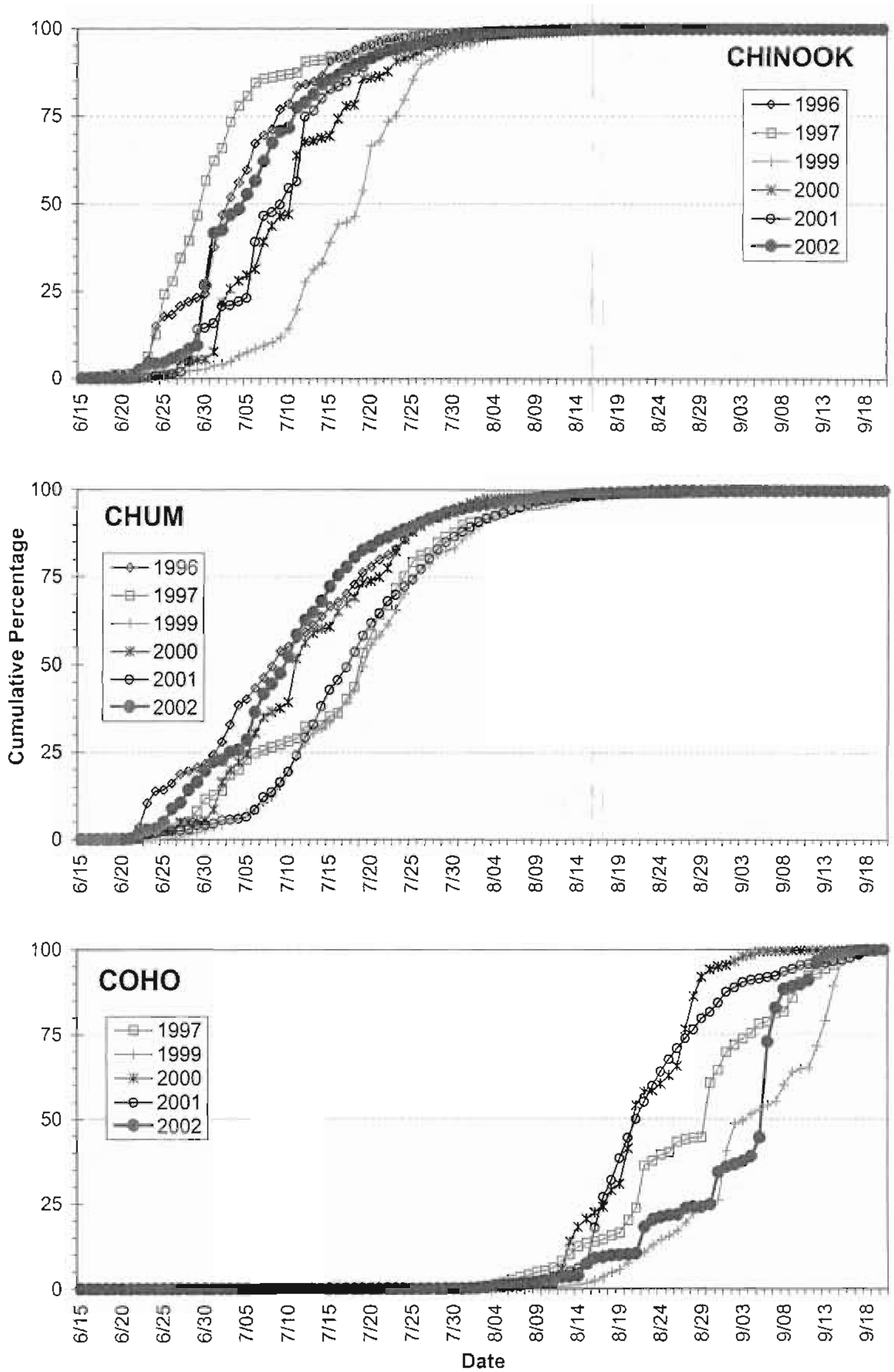


Figure 11. Historical cumulative percent passage of chinook, chum and coho salmon at the George River weir.

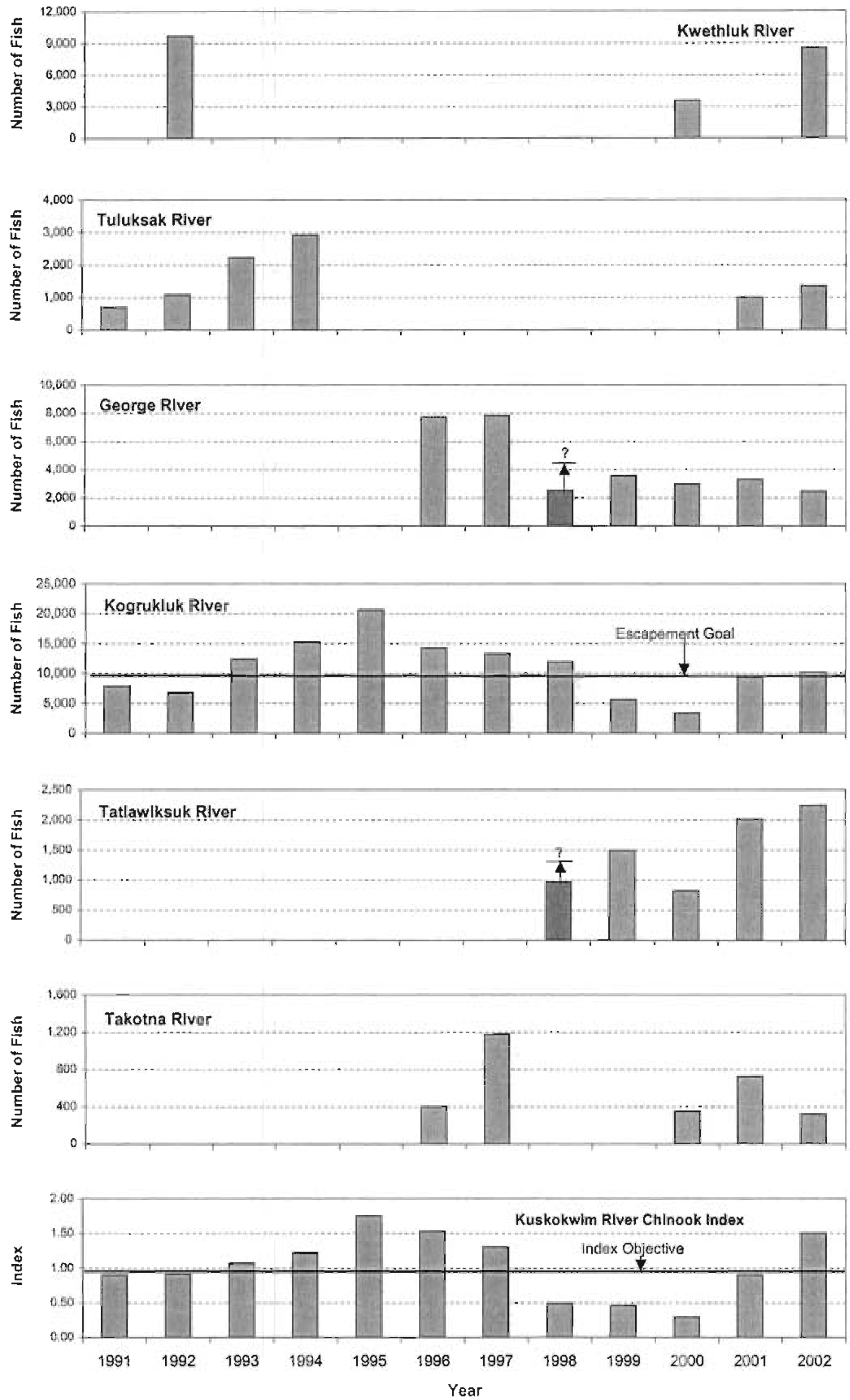


Figure 7. Chinook salmon escapement into six Kuskokwim River tributaries, and Kuskokwim River chinook salmon aerial survey indicies, 1991-2002.

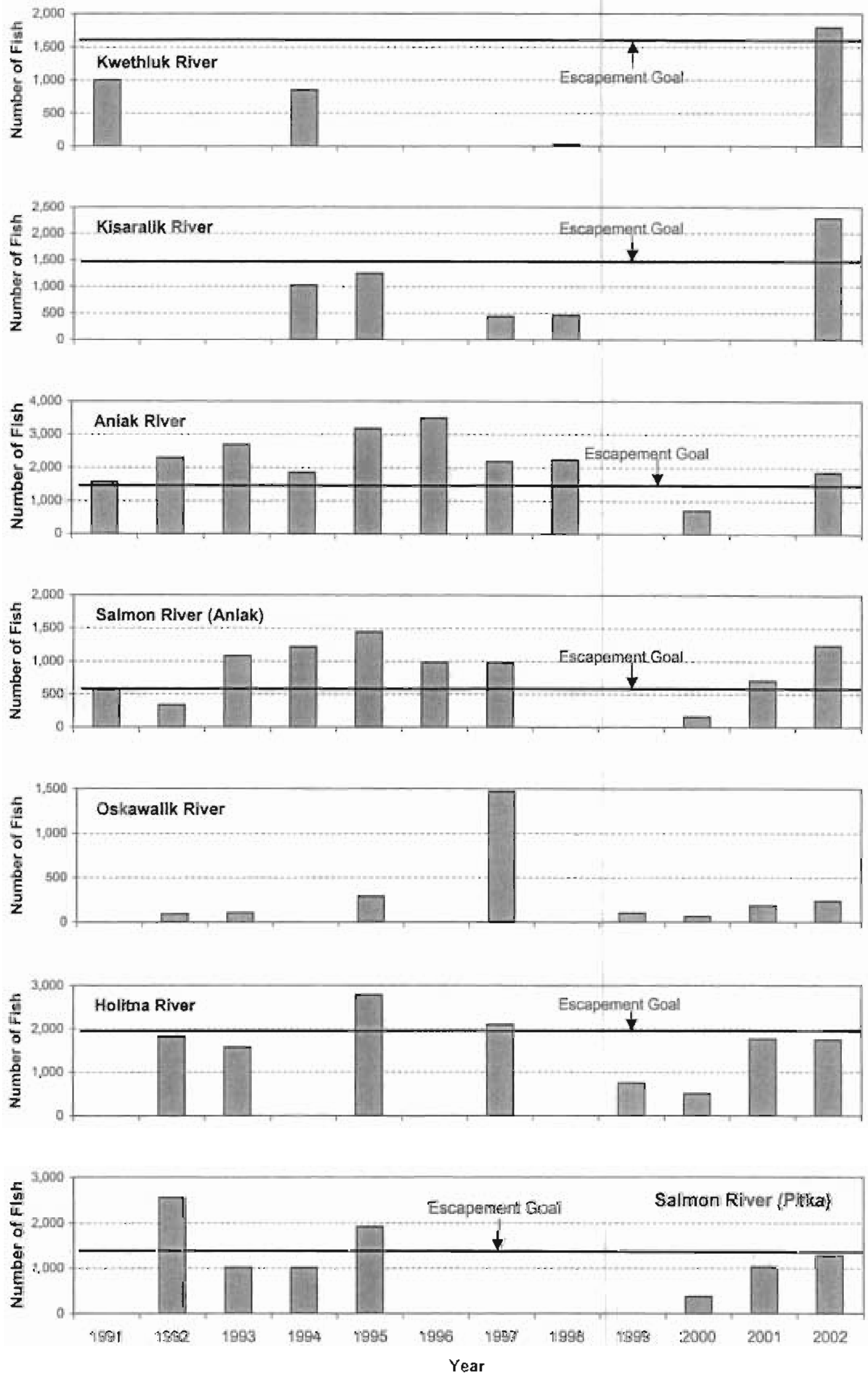


Figure 8. Aerial Survey Counts of Chinook Salmon in Seven Kuskokwim River tributaries, 1991 - 2002.

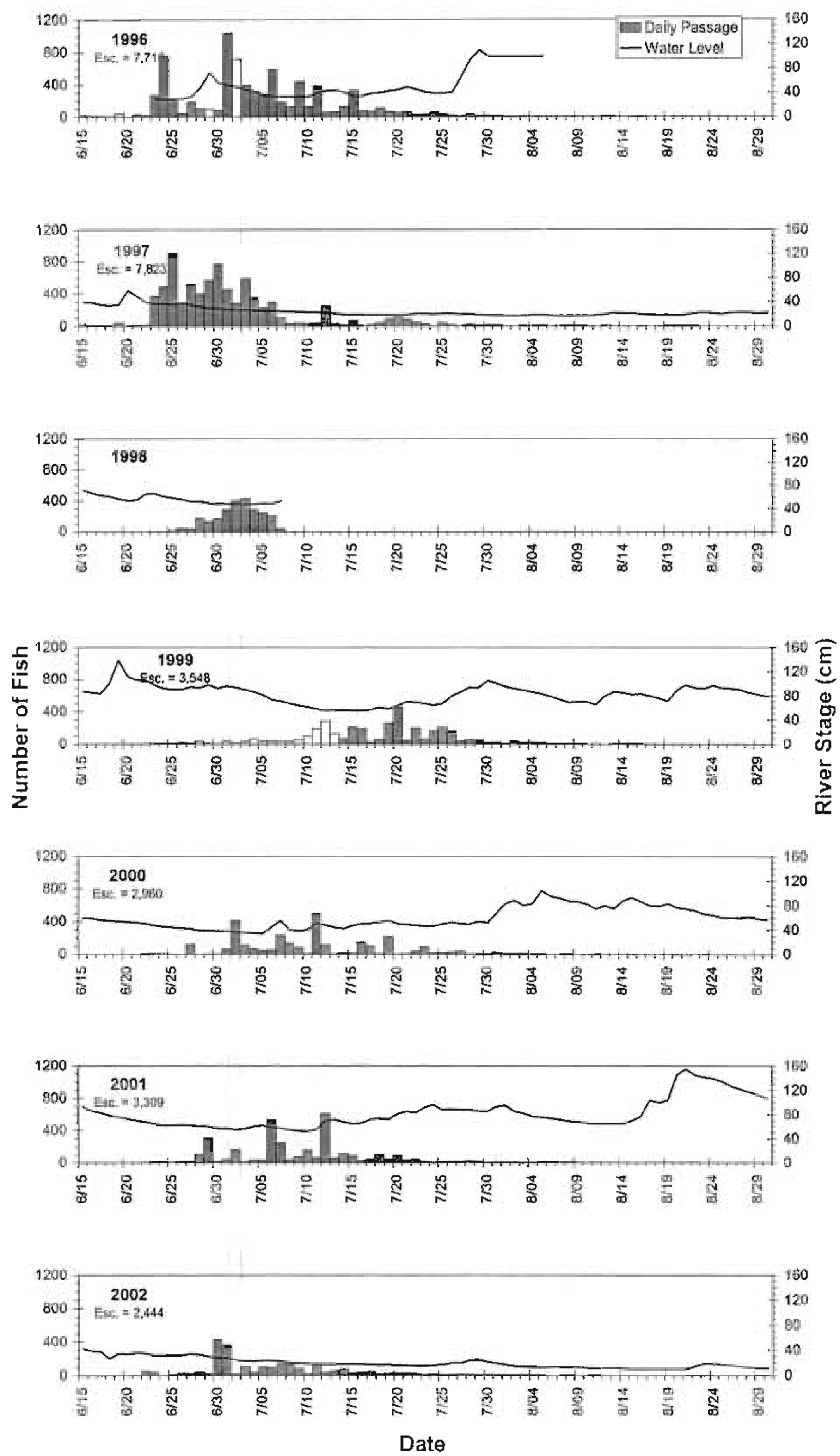


Figure 9. Daily chinook salmon passage relative to daily river stage at the George River Weir, 1996 - 2002 (solidbars represent observed passage, open bars represent estimated passage).

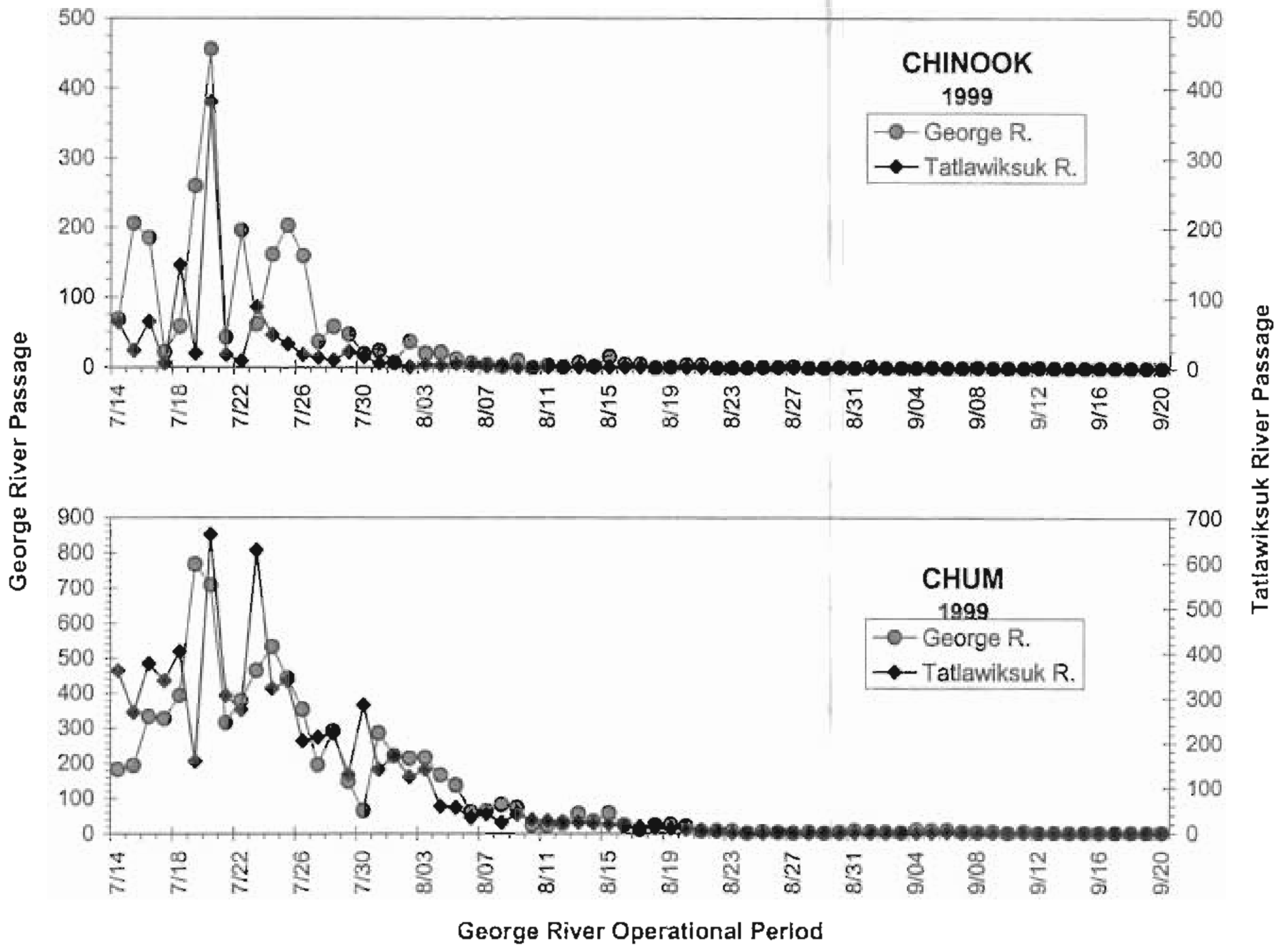


Figure 10. Observed passage of chinook and chum salmon at the George and Tatlawiksuk Rivers during the operational period at the George River, 1999.

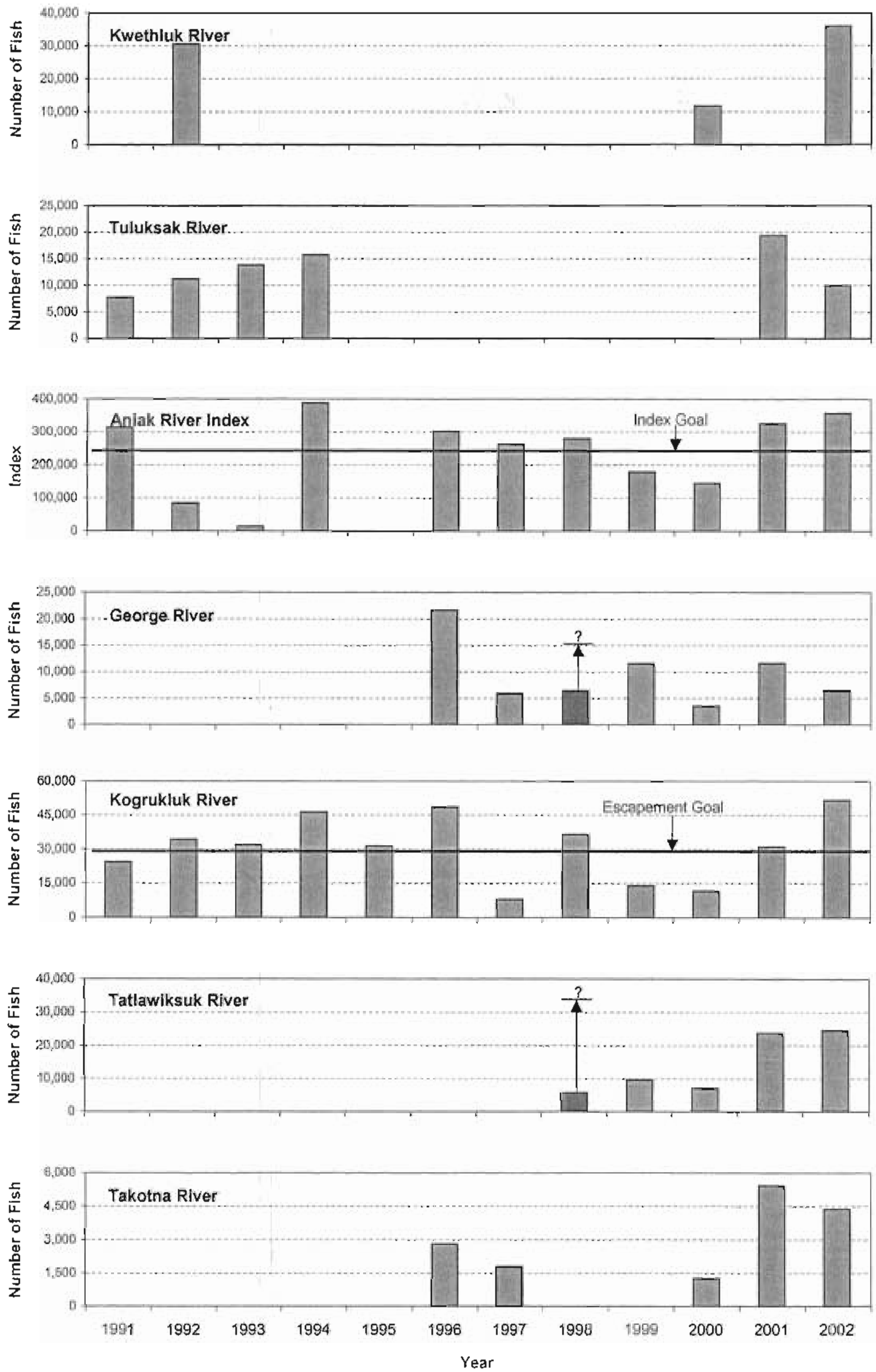


Figure 12. Chum salmon escapement into seven Kuskokwim River Tributaries, 1991-2002.

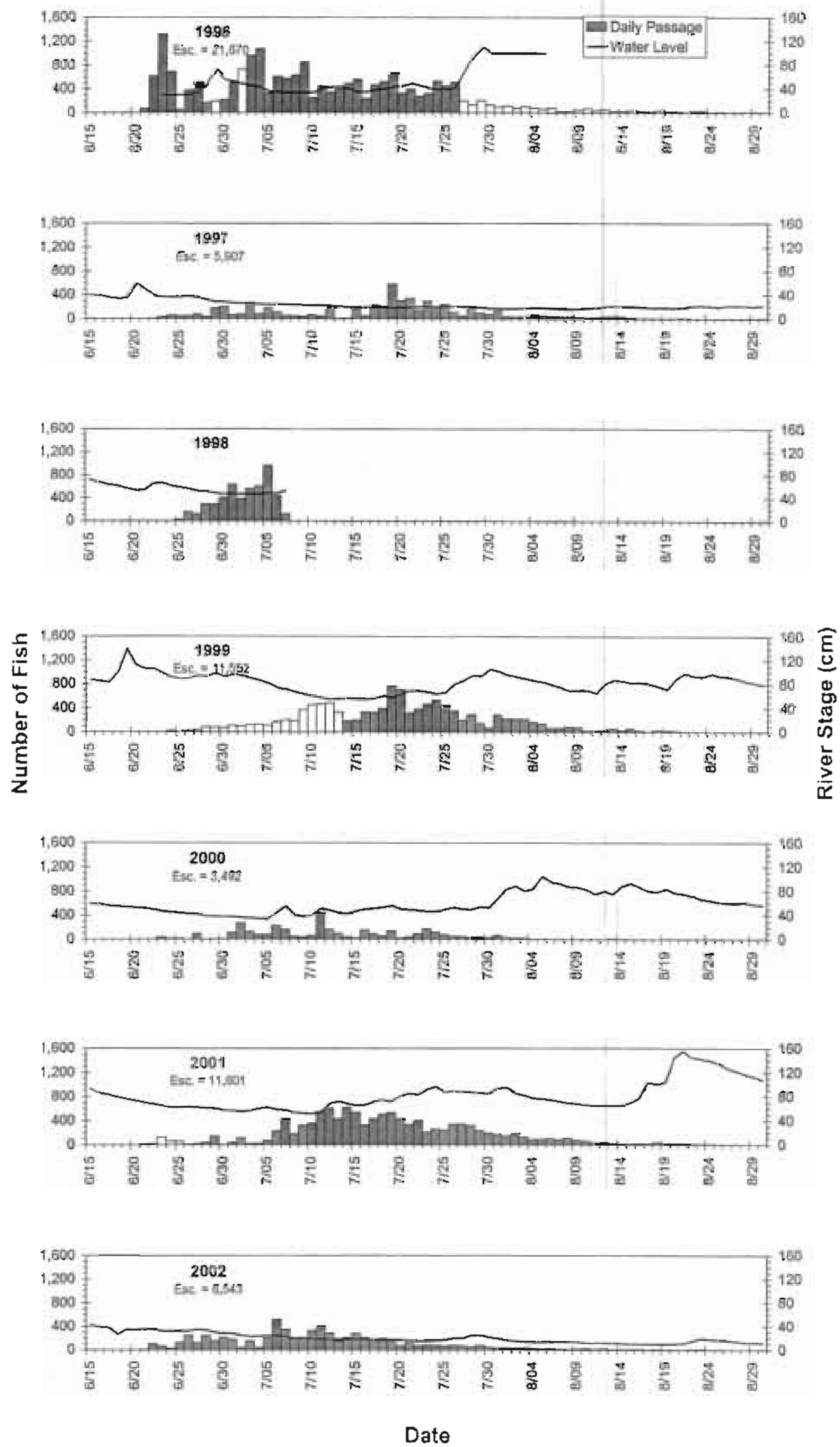


Figure 13. Daily chum salmon passage relative to daily river stage at the George River weir, 1996 - 2002 (solid bars represent observed passage, open bars represent estimated passage).

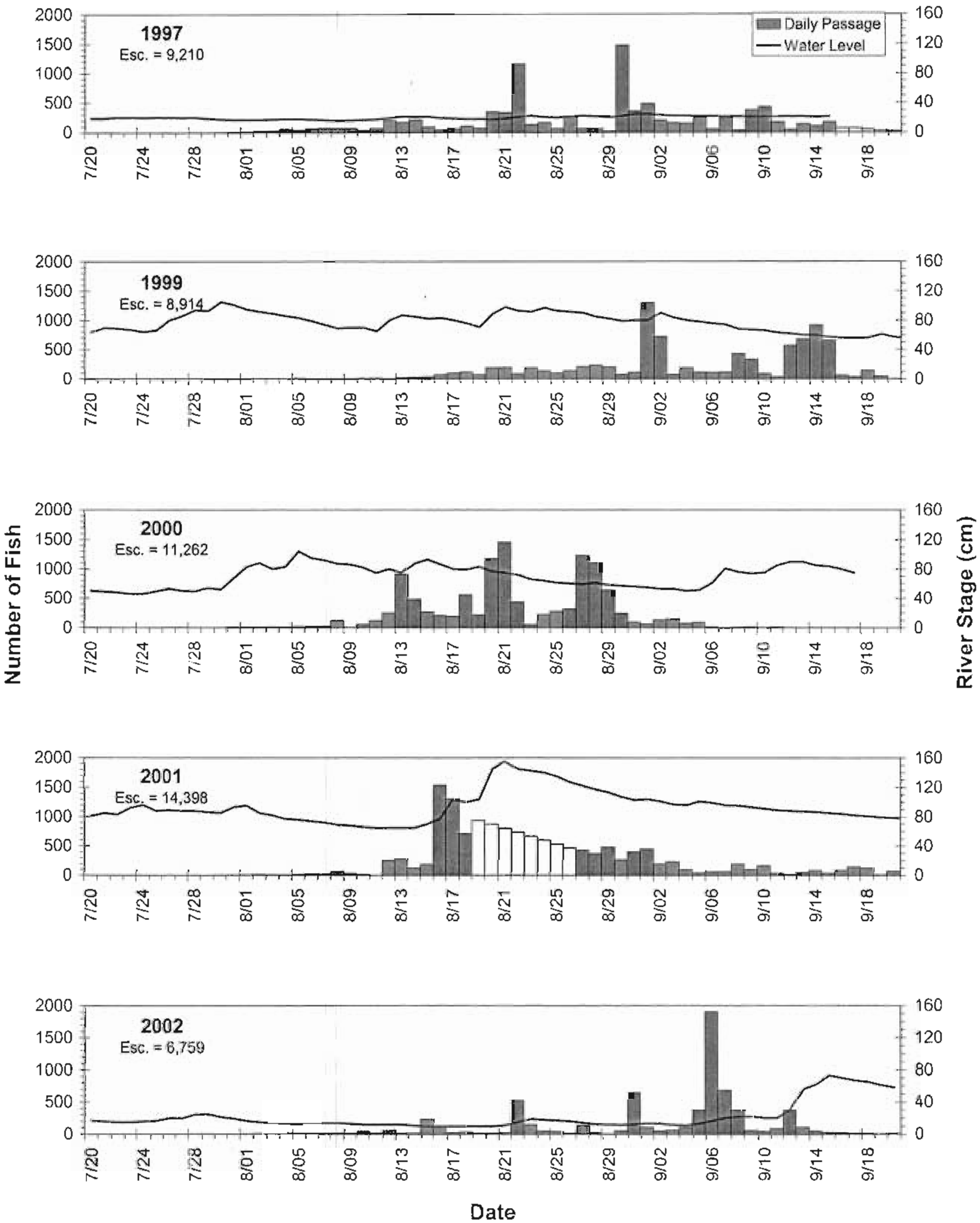


Figure 14. Daily coho salmon passage relative to daily river stage at the George River weir, 1997 - 2002 (solid bars represent observed passage, open bars represent estimated passage).

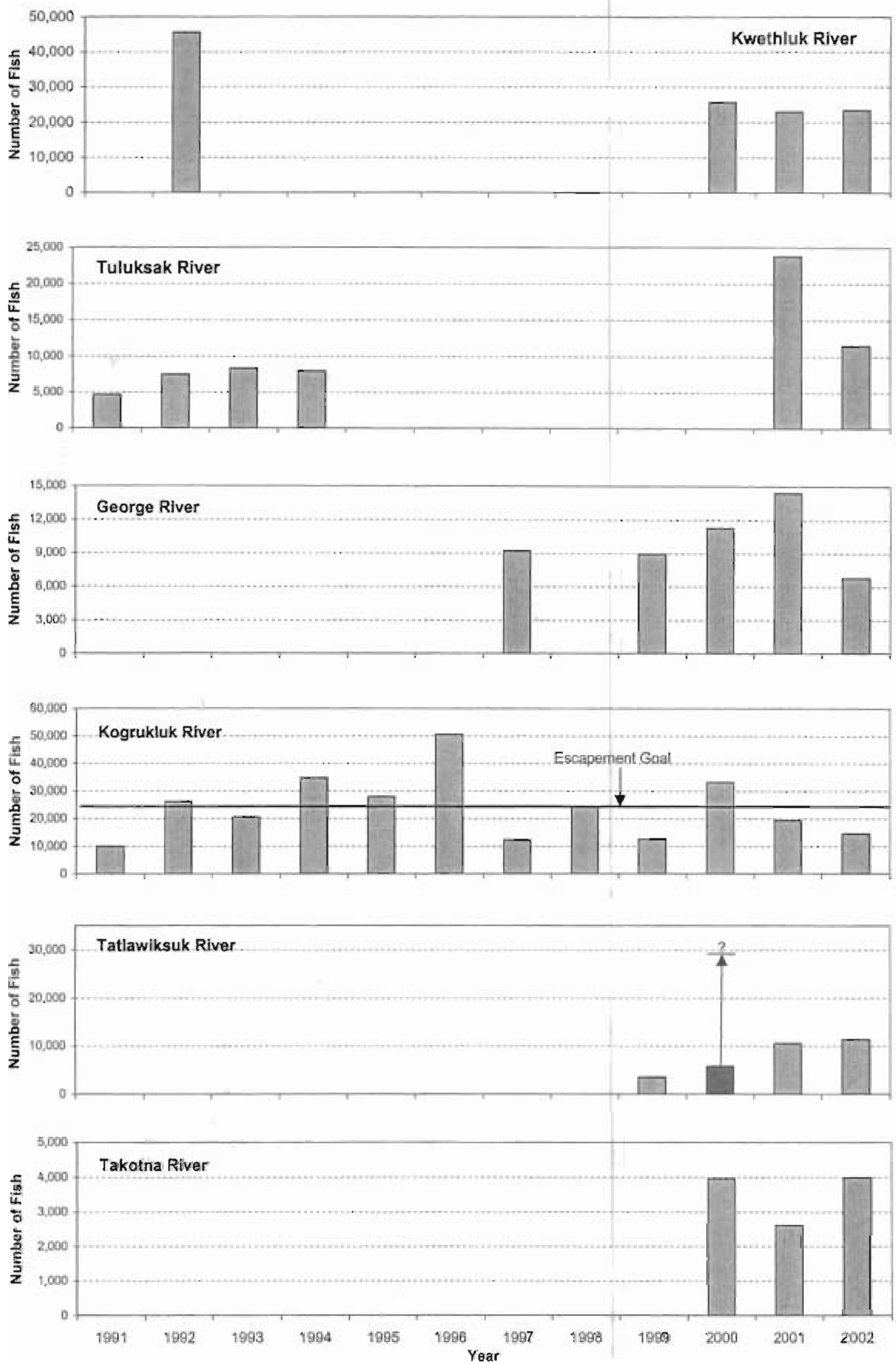


Figure 15. Coho salmon escapement into six Kuskokwim River tributaries, 1991-2002.

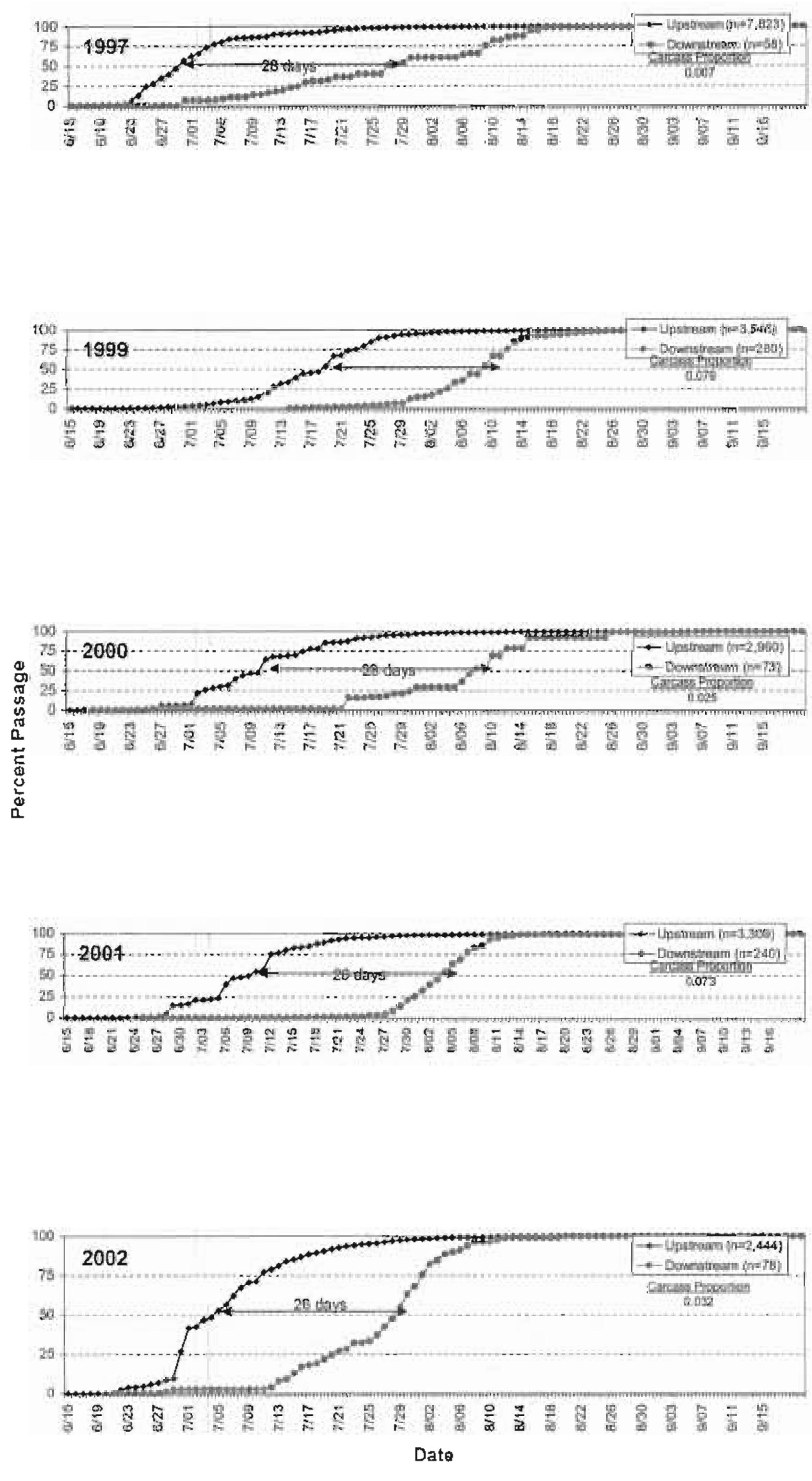


Figure 16. Comparison of percent upstream chinook salmon passage and percent downstream chinook carcass passage at the George River weir, 1996-2002.

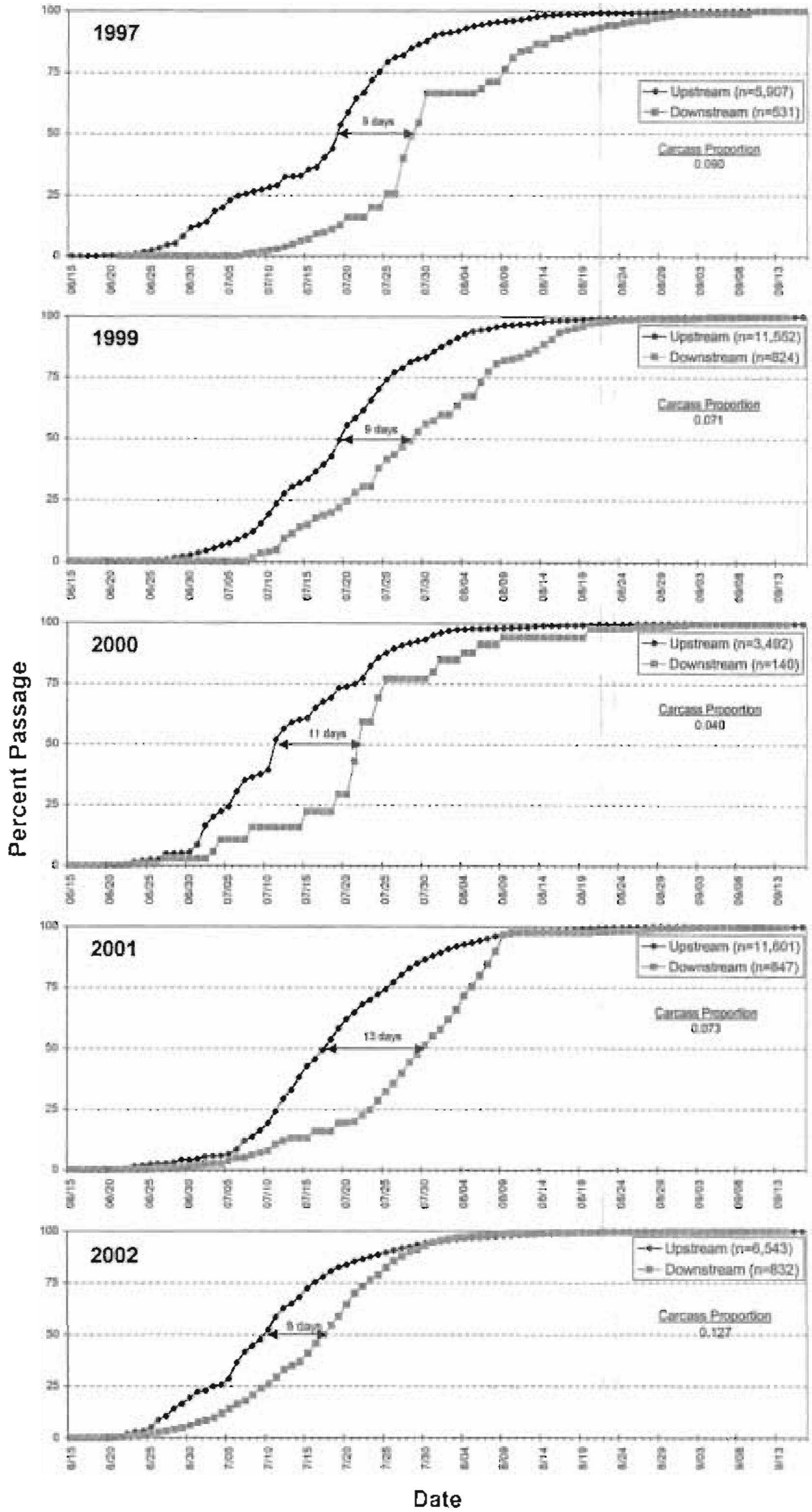


Figure 17. Comparison of percent upstream chum salmon passage and percent downstream chum carcass passage at the George River weir, 1997-2002.

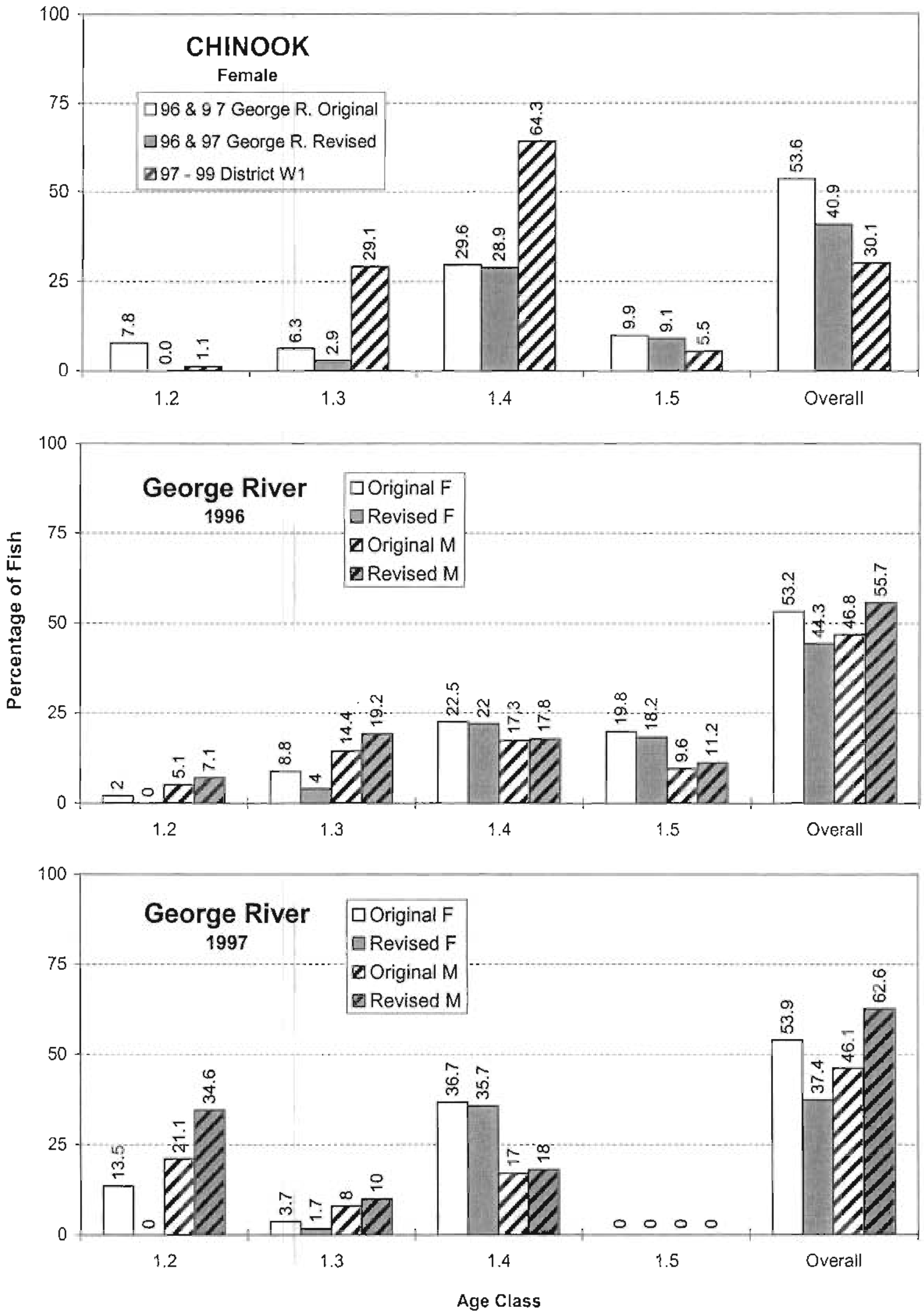


Figure 18. Comparison of original and revised age and sex percentages for chinook salmon from the George River in 1996 and 1997, and from the District W1 sex confirmed commercial catch in 1997 - 1999.

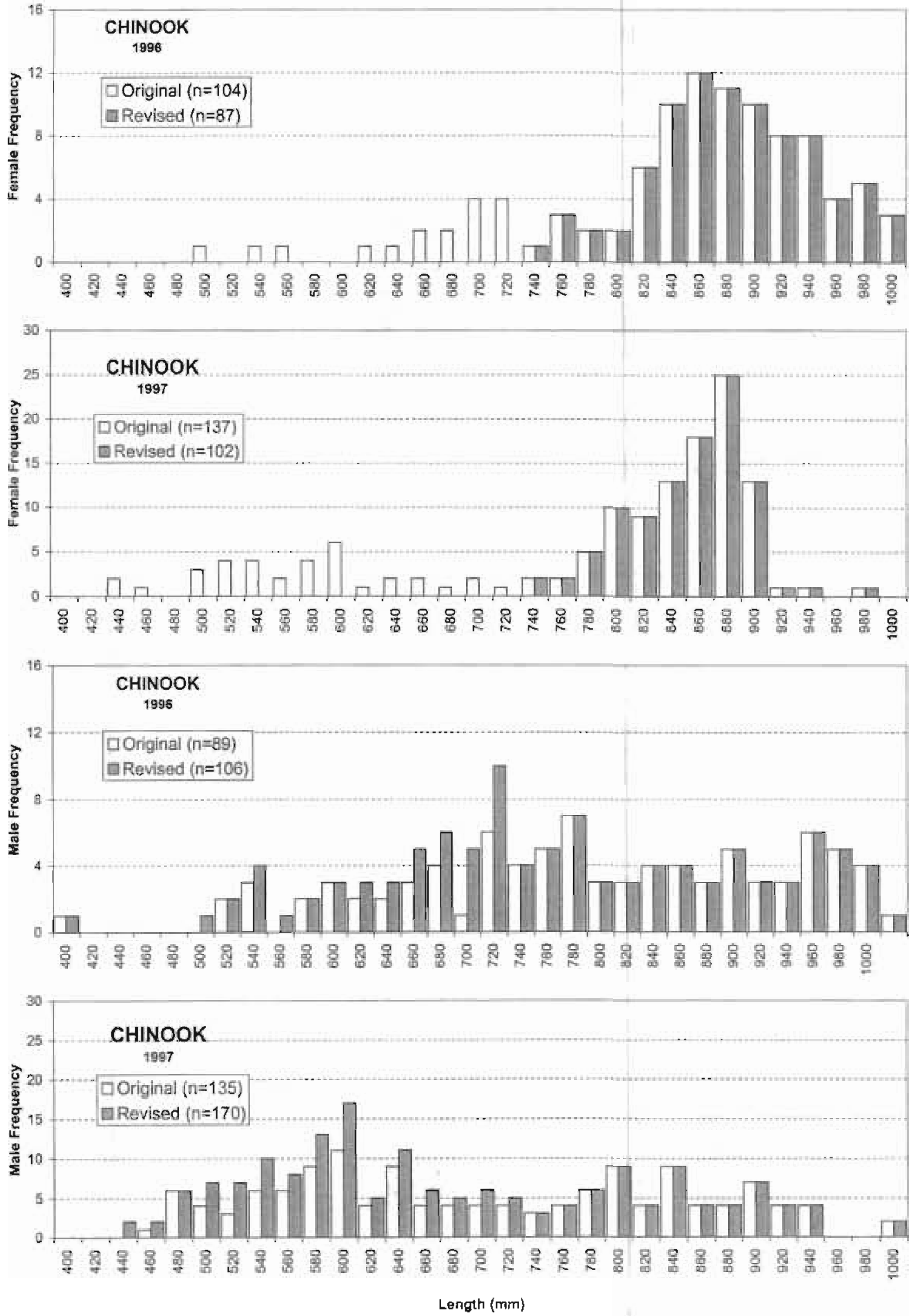


Figure 19. Comparison of original and revised length frequencies for male and female chinook salmon from the George River, 1996 and 1997.

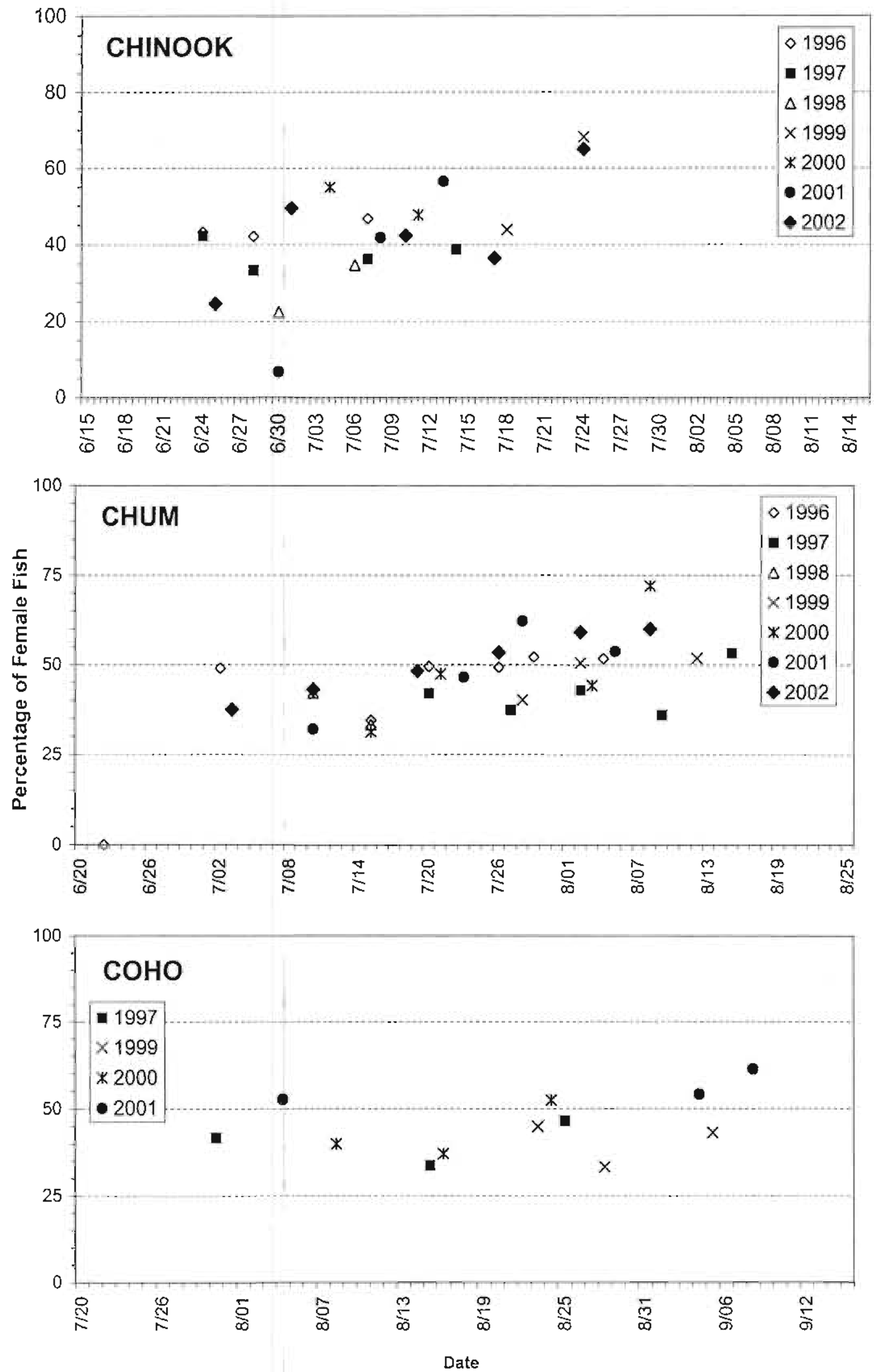


Figure 20. Percentage of female chinook, chum and coho salmon by sample date at the George River weir, 1996 - 2002.

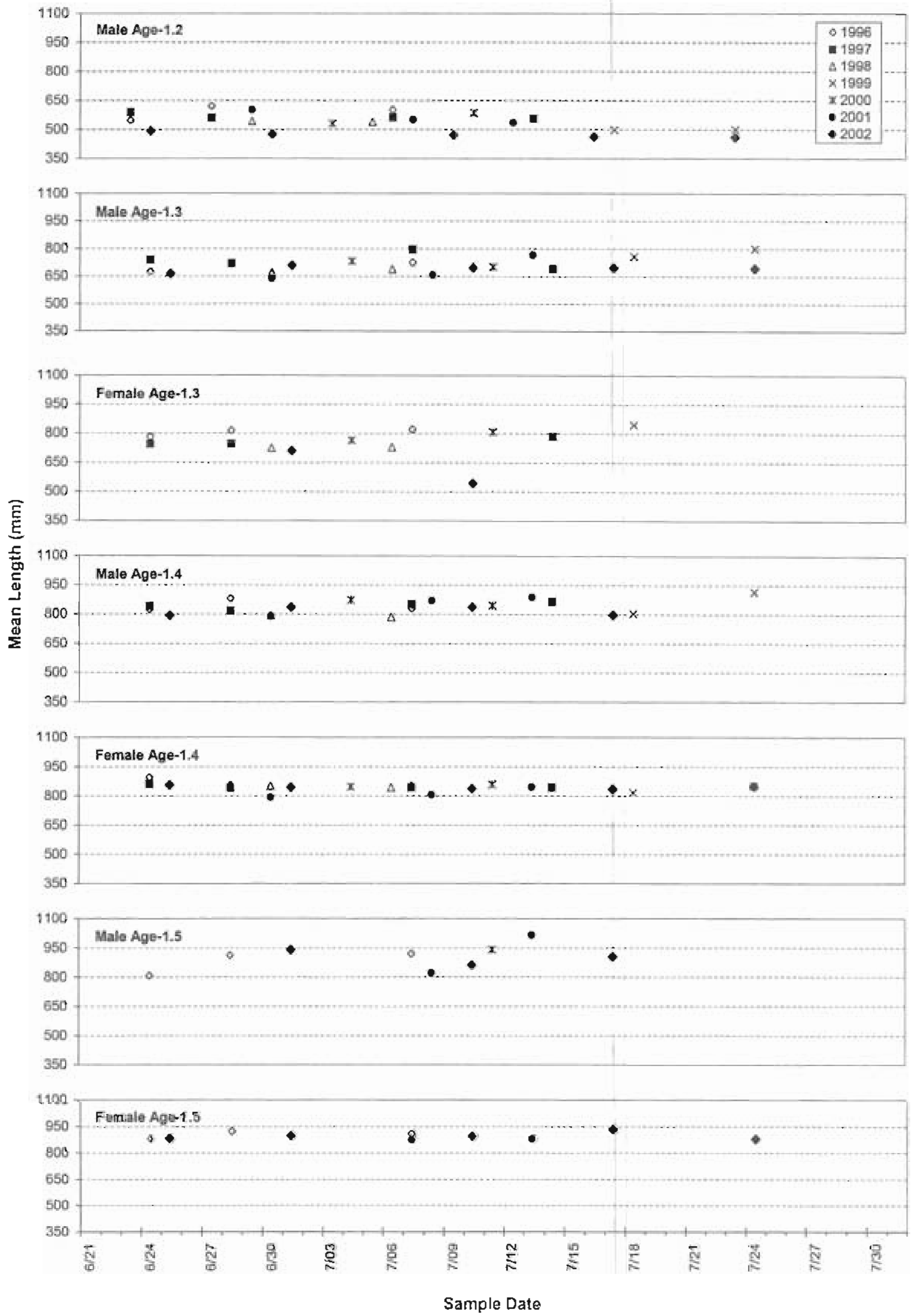
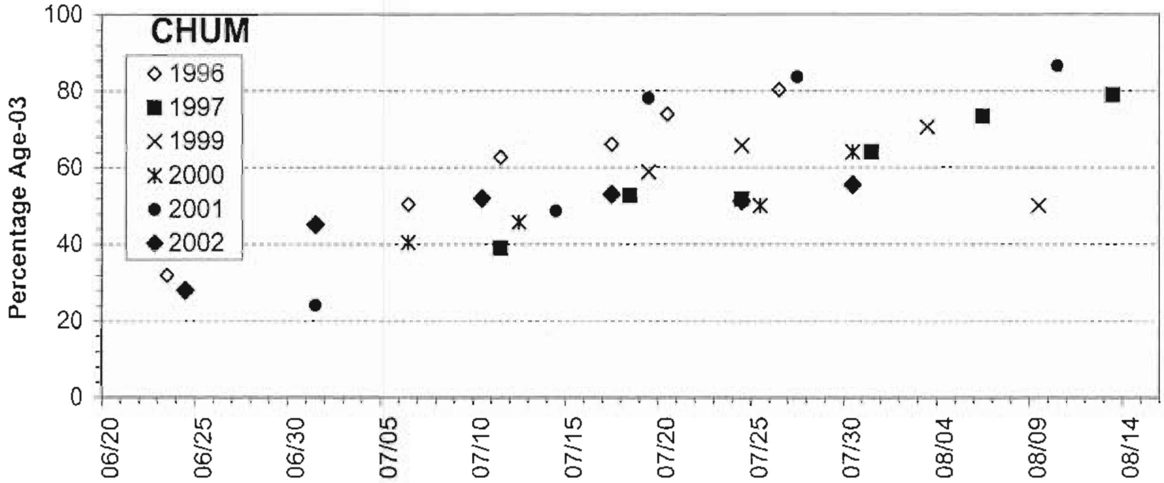


Figure 21. Mean length (mm) at age of chinook salmon by sample date at the George River weir, 1996 - 2002.



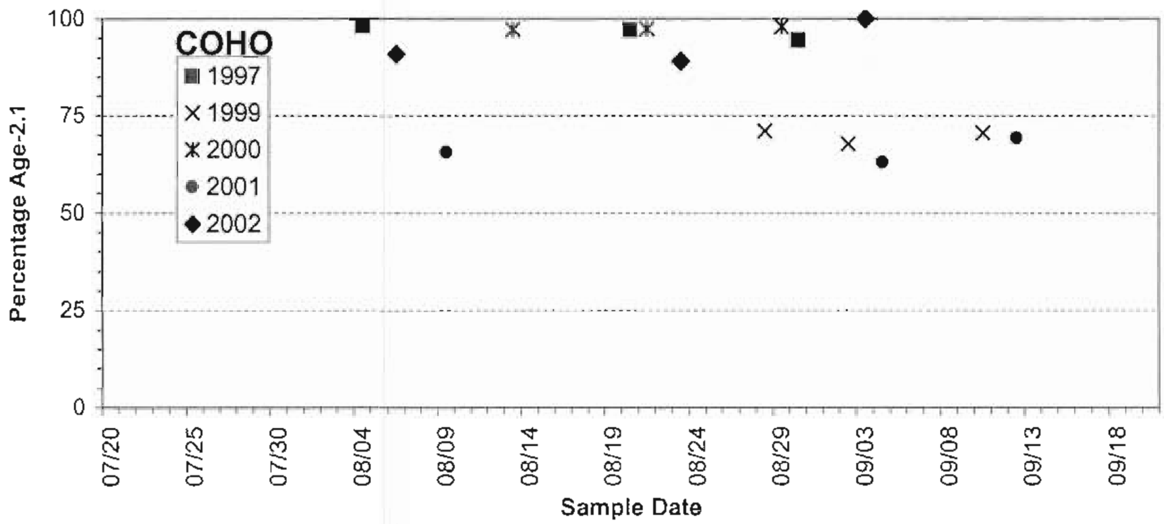


Figure 22. Percentage of age-0.3 chum salmon and age-1.2 coho salmon by sample date at the George River weir, 1996-2002.

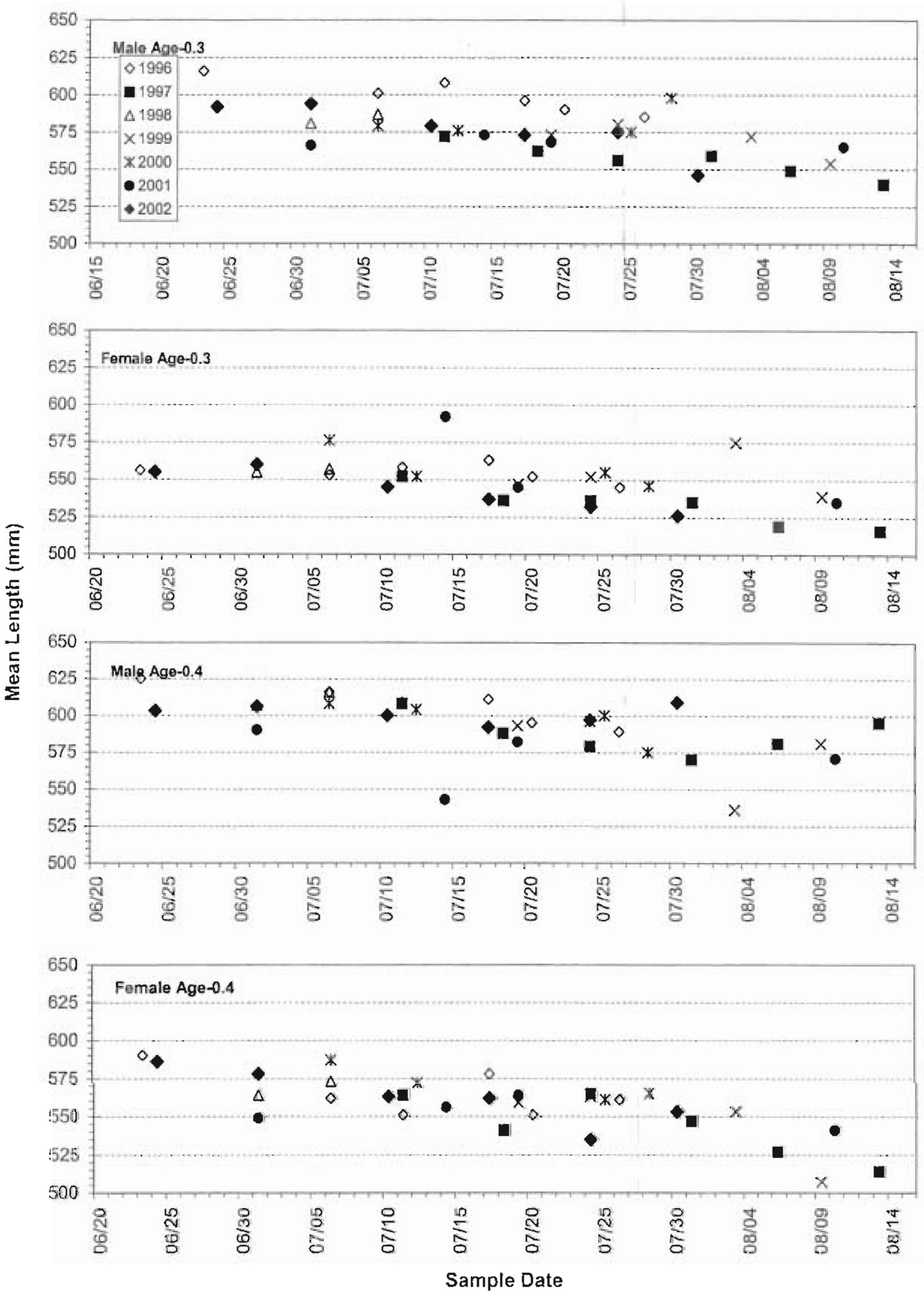


Figure 23. Mean length (mm) at age of chum salmon by sample date at the George River weir, 1996 - 2002.

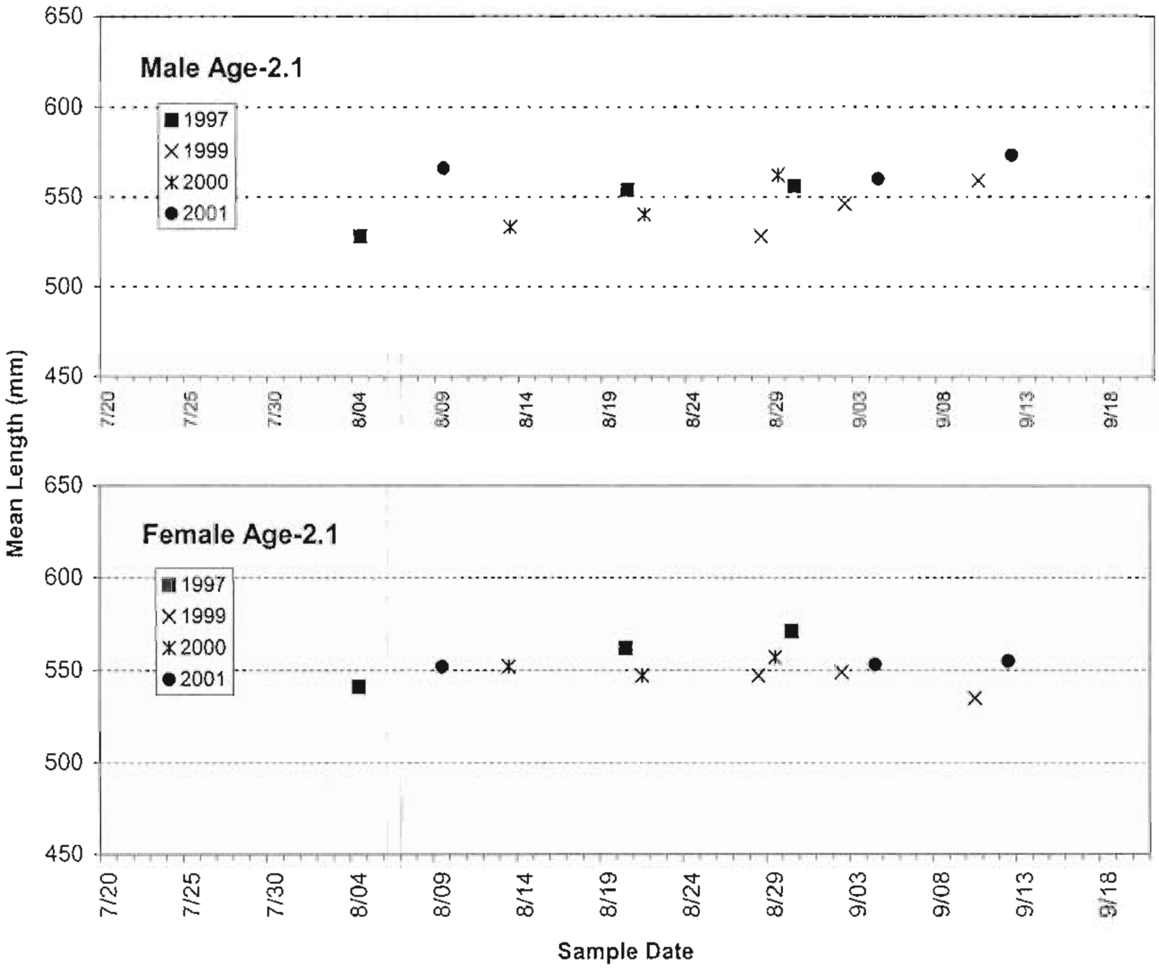


Figure 24. Mean length (mm) of age-2.1 coho salmon by sample date at the George River weir, 1997 - 2002.

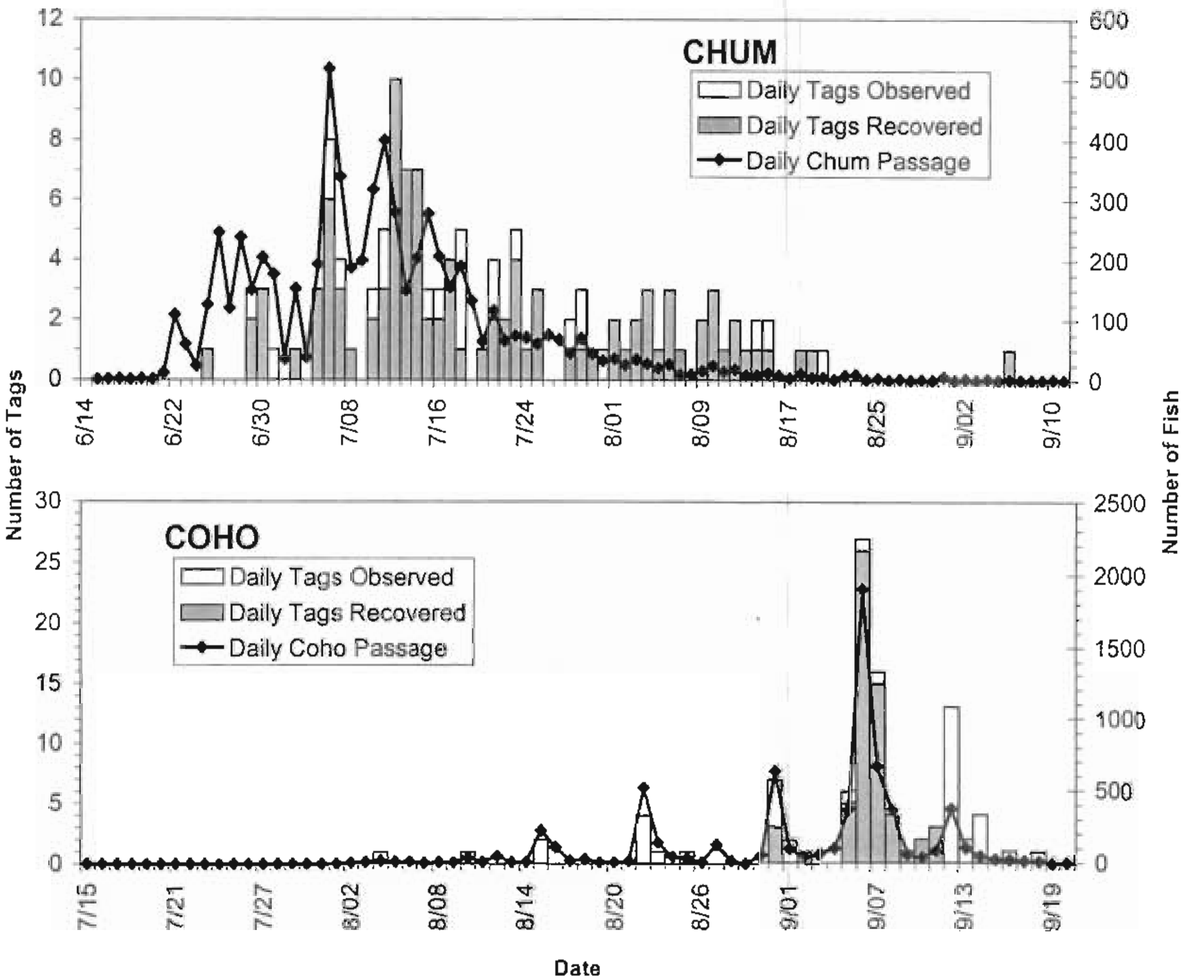


Figure 25. Daily number of observed and recovered chum and coho salmon tags, and daily passage of chum and coho salmon at the George River, 2002.

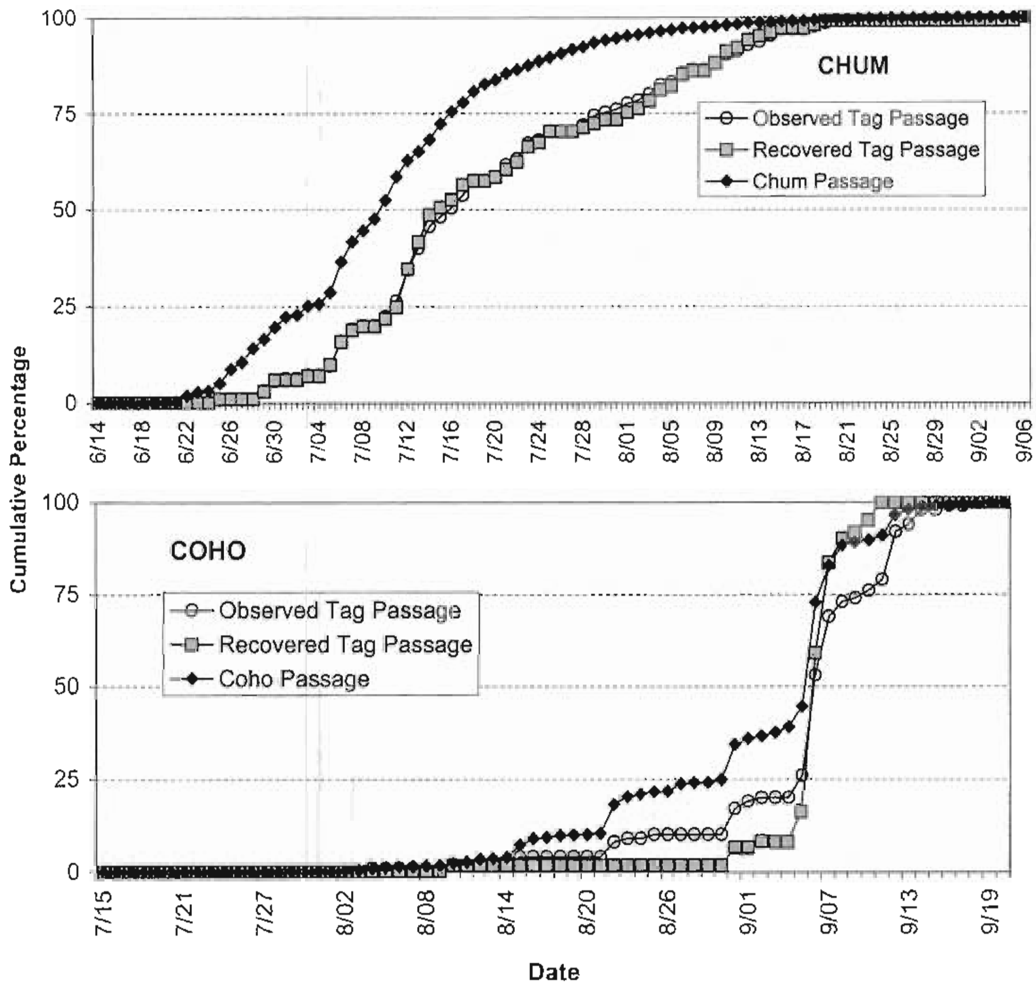


Figure 26. Cumulative percentage of observed and recovered chum and coho salmon tags, and cumulative percentage of chum and coho salmon at the George River, 2002.

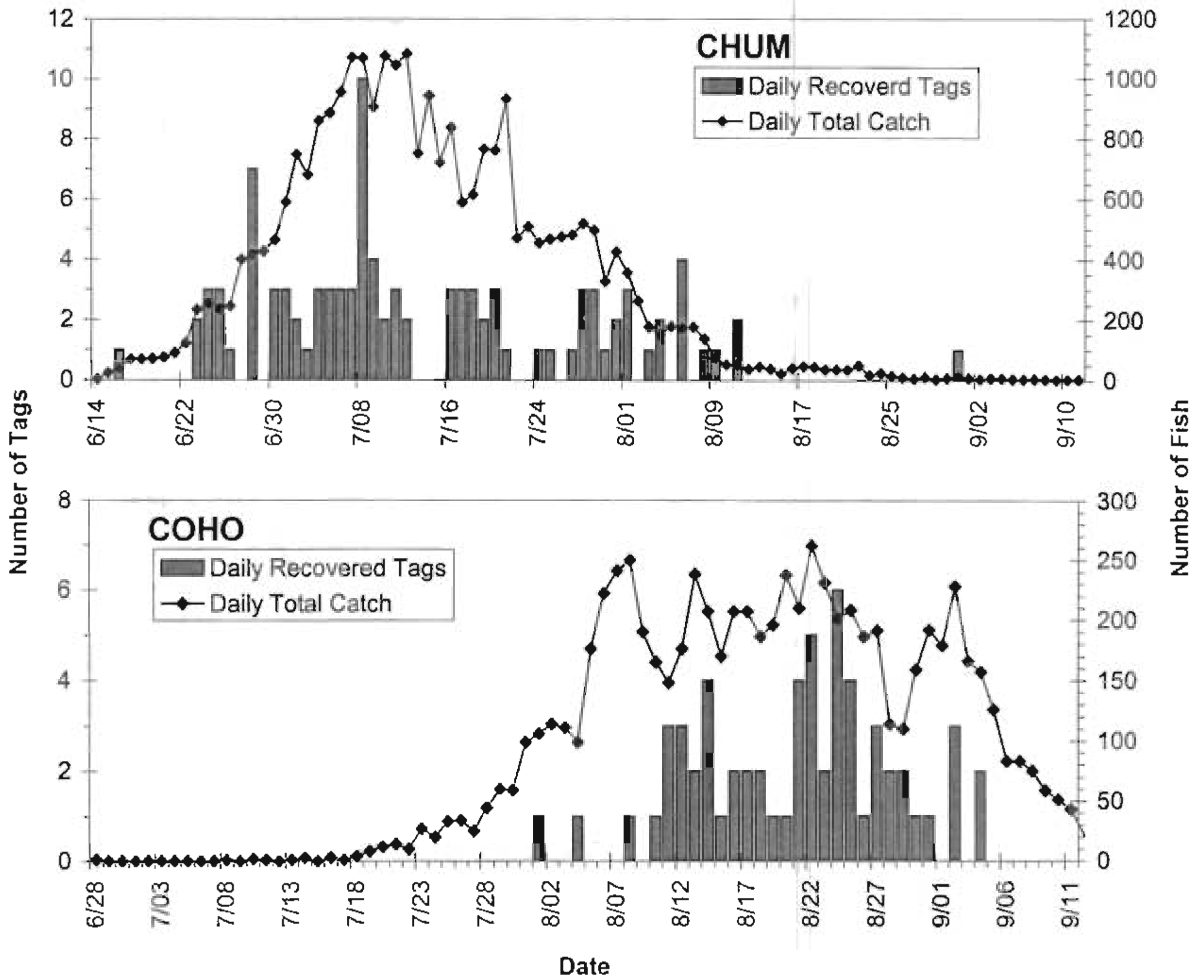


Figure 27. Daily number of George River chum and coho salmon tagged at Kalskag-Aniak, and daily catch of chum and coho salmon at Kalskag-Aniak, 2002.

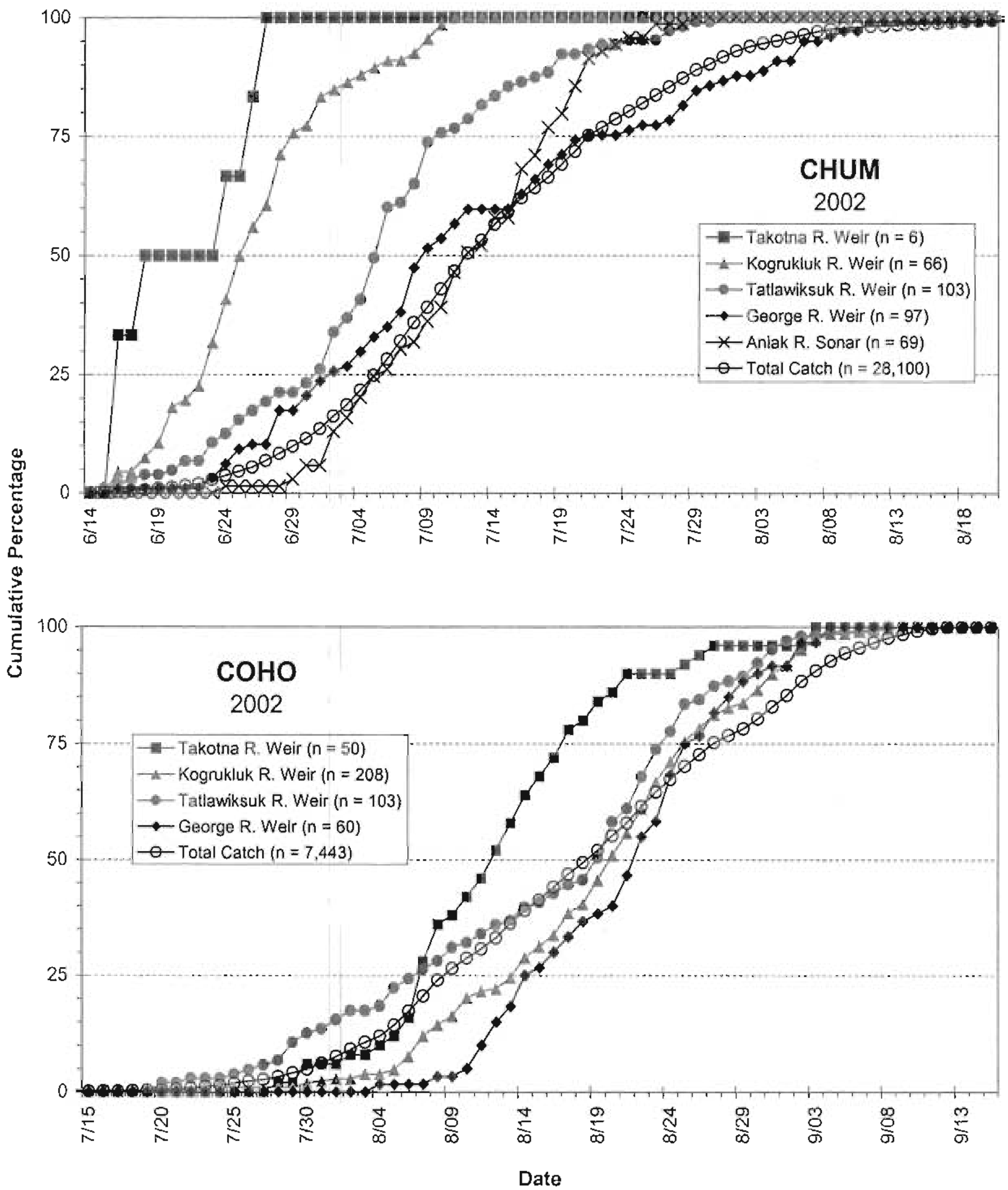


Figure 28. Cumulative percentage by date tagged of chum and coho salmon tags recovered at Aniak River sonar, and the Takotna, Kogrukluk, Tatlawiksuk, and George River weirs, plus cumulative percentage of the total chum and coho salmon catch from the Kalskag - Aniak tagging site, 2002.

APPENDIX A. HISTORY OF AERIAL SPAWNING GROUND SURVEYS OF THE GEORGE RIVER DRAINAGE.

Location	Date of Survey	Observer	Survey Conditions	Species			Comments
				Chinook	Chum	Coho	
Main Stem	Jul 23 2002	John Linderman	Good	469	320	0	surveyd from weir site to 63 mi upstream
	Jul 27&28 2001	John Linderman	Good	1,143	472	0	surveyed from weir site to 63 mi upstream
	Jul 28 1995	Charlie Burkey	Good	1,173	420	0	surveyed mouth to 25 miles upstream
	Jul 30 1993	Charlie Burkey	Fair	75	0	0	surveyed East Fork confluence to 20 miles upstream
	Jul 18 1976	Gary Schaefer	Good	199	1,298	0	surveyed mouth to 40 miles above North Fork confluence
	Oct 1 1976	Gary Schaefer	Good	0	0	0	surveyed mouth to 5 miles above North Fork confluence
	Aug 1 1975	Fritz Kuhlman	Fair	28	717		
	Jul 16 1960	Unknown	Excellent	526	470		
East Fork	Jul 24 2002	John Linderman	Poor	135	40	0	surveyd from mainstem confluence to 28 mi upstream
	Jul 27 2001	John Linderman	Poor	27	0	0	surveyd from mainstem confluence to 37 mi upstream
	Jul 24 1980	Dan Schniederhan	Fair	89	3,479	0	surveyed mouth to headwaters
	Jul 18 1976	Gary Schaefer	Fair	a few	a few		
North Fork	Jul 28 2001	John Linderman	Fair	12	0	0	surveyd from mainstem confluence to 15 mi upstream
	Jul 18 1976	Gary Schaefer	Good	a few	200	0	
	Aug 1 1975	Fritz Kuhlman	Fair	0	123	0	
	Aug 1 1975	Fritz Kuhlman	Good	3	20	0	unnamed tributary
South Fork	Jul 27 2001	John Linderman	Fair	12	0	0	surveyed 15 mi upstream from E. Fork confluence

APPENDIX B:
DATA FORMS USED FOR THE GEORGE RIVER WEIR PROJECT

Appendix B.1. Hourly fish passage form used for the George River weir project.

GEORGE RIVER WEIR

Year _______ Hourly Upstream Fish Passage

DATE: ____________________

Hour	*Observer Initials*	*Chinook*		*Sockeye*		*Chum*		*Pink*		*Coho*		*Sucker*	*Other*
		Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*		
0000													
0100													
0200													
0300													
0400													
0500													
0600													
0700													
0800													
0900													
1000													
1100													
1200													
1300													
1400													
1500													
1600													
1700													
1800													
1900													
2000													
2100													
2200													
2300													
Daily Total													
Both Sex													

Initials of Archiever:

Appendix B.2. Daily fish passage form used for the George River weir project.

GEORGE RIVER WEIR

Year _______ Daily and Cumulative Passage

Date	Archiever Initials	Chinook		Sockeye		Chum		Pink		Coho		Suckers	
		Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative
Previous Cumulative													

Appendix B.3. Hourly fish carcass count form used for the George River weir project.

GEORGE RIVER WEIR

Year _______ Hourly Fish Carcass Count

DATE: ____________________

Hour	*Observer Initials*	*Chinook*		*Sockeye*		*Chum*		*Pink*		*Coho*		*Sucker*	*Other*
		Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*		
0000													
0100													
0200													
0300													
0400													
0500													
0600													
0700													
0800													
0900													
1000													
1100													
1200													
1300													
1400													
1500													
1600													
1700													
1800													
1900													
2000													
2100													
2200													
2300													
Daily Total													
Both Sex													

Initials of Archiever:

Appendix B.4. Daily fish carcass count form used for the George River weir project.

GEORGE RIVER WEIR

Year __________ Weir Carcass Counts

Date	*Archiever*	*Chinook*		*Sockeye*		*Chum*		*Pink*		*Coho*		*Suckers*	
	Initials	*Daily*	*Cumulative*	*Daily*	*Cumulative*	*Daily*	*Cumulative*	*Daily*	*Cumulative*	*Daily*	*Cumulative*	*Daily*	*Cumulative*
Pervious Cumulative													

Appendix B.5. ASL Sampling form used for the George River Weir project.

ASL Sampling Field Form

Location: ______________________ Species: ______________________ Date: ______________________

Crew: ______________________ Trap Opened/Closed: ______________________

No.	Card No.	Letter A, B…	Sex		Length (mm)	Tag No.	Tag Color	AD Punch	Fish Color	Comments
			M	F						

Appendix B.6. Tag recovery form used for the George River weir project.

Tag Recovery Data Entry Form

Page ____ of _____ **Weir Location:** ____________________

Crew: ____________________

Date (MMDD)	Species	Tag Information				Sample Type	Comments
		Tag No.	Tag Color	Adipose Punch	Fish Color		

Appendix B.7. Tagged to untagged fish form used for the George River weir project.

Daily Summary of Tagged and Untagged Salmon Counted Past Weir

Page ____ of ____ **Weir Location:** __________

Species: **Crew:** __________

Date (MMDD)	Total Number of Tags Recovered by Tag Color							No. of Tags Pass Weir	No. Untagged Fish Pass Weir	Total Fish Passed	Comments
	Pink	Green	White	Blue	Green Mono.	Fl. Yellow	Fl. Orange				

Appendix B.8. Secondary mark sampling form used for the George River weir project.

Daily Summary Form for Salmon Examined for Adipose Hole Punches

Page ____ of ____ Weir Location: __________

Species: Crew:

Week	Date (MMDD)	Tag Colors							Total No. of Fish with Tags	No. of Fish Adipose Punch and No Tag	Total No. of Fish Examined	Sample Type	Comments
		Pink	Green	White	Blue	Green Mono.	Fl. Yellow	Fl. Orange					

Appendix B.9. Climatology form used for the George River weir project.

Weather and Stream Observations

Report Observations A Minimum Of Two Times Each Day - Preferably 7 a.m. and 5 p.m.

Location ______________________ Year ____________ Page ________

Date	Time Observed	Sky	Precipitation		Wind	Temperature		Water Level (cm)	Water Clarity	Comments / Other
			Code	Amount (mm)		Air	Water			

CODES:

SKY
- 0 = no observation
- 1 = clear or mostly clear (<10% cloud cover)
- 2 = cloud cover not more that 50% of sky
- 3 = cloud cover more that 50% sky
- 4 = complete overcast
- 5 = thick fog

PRECIPITATION
- A = intermittent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunderstorms w/ or w/out rain

Report Water Level More Frequently When Levels Are Changing Rapidly

Appendix B.10. Discharge form used for the George River weir project.

File No. ________ Page ____ of ____
Crew ________ Date ________
Habitat Location ________ Sampling Site ________ River Mile ____ Meter Type ____ No. ____
HUC ________ Gage Number ____ Height ____
Description

Weather

Distance from Head Pin (m)								Velocity mps						
LB RB	Angle	Angle Coef.	Vel Depth (m)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Point	Mean Vertical	Mean Cell	Mean Cell Depth (m)	Cell Width (m)	Cell Area (m^2)	Flow (m^3/s)

Depth
Average m
Maximum m

Velocity
Average m/sec
Maximum m/sec

River Total

Notes:

Appendix B.11. Aerial survey data entry form used in the Kuskokwim area.

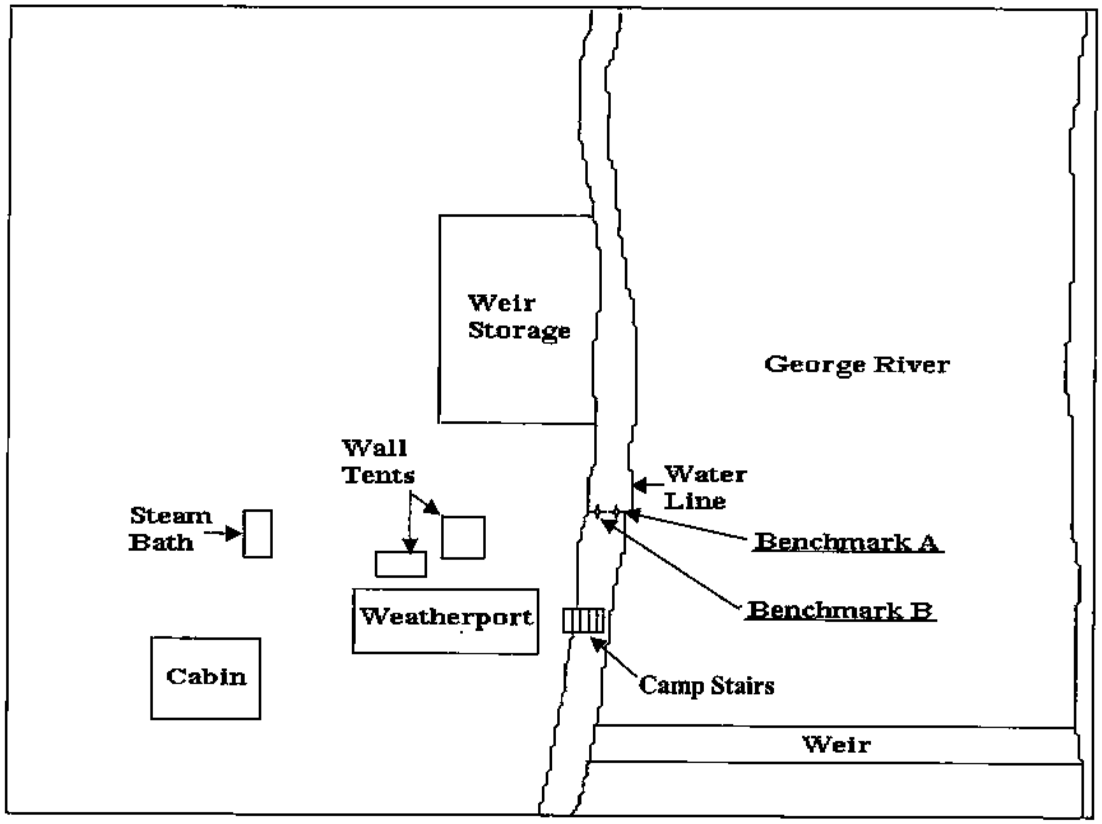
A-Y-K SALMON ESCAPEMENT OBSERVATIONS - KUSKOKWIM AREA.

LATITUDE	LONGITUDE	DATE	STREAM NAME	DRAINAGE
N	W	M D Y		

INDEX AREA	KING LIVE	KING CARCASS	KING REDD	CHUM LIVE	CHUM CARCASS	PINK LIVE	PINK CARCASS	SOCKEYE LIVE	SOCKEYE CARCASS	COHO LIVE	COHO CARCASS
1 0 1											
1 0 2											
1 0 3											
1 0 4											
1 0 5											
TOTAL											
DATA											

UNIDENTIFIED SALMON	SURVEY METHOD	WIND	WEATHER	WATER VIS.	BOTTOM	TIME	DISTANCE SURVEYED	SPAWN STAGE	RATING	OBSERVER	OBSERVING AGENCY

APPENDIX C. GEORGE RIVER WATER LEVEL BENCHMARK LOCATIONS AND DESCRIPTIONS.



Benchmark A:

- Established in 2000.
- Benchmark consists of a 4-ft. x 1-in. steel pipe driven vertically into the gravel bank, with approximately 4-in of the pipe exposed above the gravel.
- Represents a river stage measurement of 85 cm from its top.
- This benchmark is located approximately 30-yds. upstream of the camp stairs, and approximatley 3-ft. up the bank from the water line at average water levels.

Benchmark B:

- Established in 2000.
- Benchmark consists of a 4-ft. x 1-in. steel pipe driven vertically into the gravel bank, with approximately 4-in of the pipe exposed above the gravel.
- Represents a river stage measurement of 93 cm from its top.
- This benchmark is located approximately 30-yds. upstream of the camp stairs, and approximatley 4-ft. up the bank from the water line at average water levels.

note: The descriptions above represent the only semi-permanent benchmarks which exist to date at the George River weir project. Benchmarks used prior to 2000 were established in each year of project operations, but were subsequently washed-out after project operations ended.

APPENDIX D:
PASSAGE OF OTHER FISH SPECIES OBSERVED AT THE GEORGE RIVER WEIR PROJECT, 1996 - 2002

Appendix D.1. Daily passage of other fish species at the George River weir, 1996 - 2002.

Date	Sockeye Salmon							Pink Salmon						
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
6/15		0							0					
6/16		0							0					
6/17		0			0				0			0		
6/18		0			0				0			0		
6/19		0			0				0			0		
6/20		0			0				0			0		
6/21	0	0			0		0	0	0			0		0
6/22	0	0	0		0		0	0	0	0		0		0
6/23	0	18	0		0		0	0	0	0		0		0
6/24	0	53	0		0		0	0	0	0		0		0
6/25	0	0	0		0	0	0	0	0	0		0	0	1
6/26	5	0	0		0	0	0	0	0	0		0	0	0
6/27	2	21	0		2	0	1	0	0	0		0	0	0
6/28	1	18	0		0	0	0	0	0	0		0	0	0
6/29	3	39	0		0	0	0	0	0	0		0	0	0
6/30	4	86	0		0	0	0	0	0	0		0	0	2
7/01	1	35	0		0	0	0	0	0	0		2	0	1
7/02	10	35	0		0	0	0	1	0	0		0	0	0
7/03	18	30	1		0	0	1	1	0	0		3	0	0
7/04	8	41	2		0	0	0	0	0	0		0	0	2
7/05	6	8	2		0	0	0	2	0	0		0	0	3
7/06	9	0	0		0	0	0	1	0	0		0	0	4
7/07	3	0	0		0	0	0	0	0	0		2	0	31
7/08	0	3			0	0	0	0	0			2	0	35
7/09	15	1			0	0	0	12	0			2	0	38
7/10	0	3			0	0	0	0	0			0	0	58
7/11	0	1			0	0	0	0	0			0	0	160
7/12	4	25			0	0	0	4	1			5	0	40
7/13	2	0			0	1	0	9	0			5	0	40
7/14	0	1		0	0	0	1	11	0		0	1	2	57
7/15	0	0		0	0	0	0	34	1		0	0	1	37
7/16	1	0		0	0	0	1	18	0		0	0	4	19
7/17	0	6		0	0	0	1	34	0		0	0	0	30
7/18	0	3		0	0	0	0	44	2		0	2	2	14
7/19	3	2		0	0	0	0	90	1		0	1	4	10
7/20	0	4		0	0	0	0	68	0		0	1	3	3
7/21	0	2		0	0	0	0	61	0		0	2	9	8
7/22	0	1		0	0	0	0	45	1		0	4	10	4
7/23	2	0		1	1	0	0	39	2		3	11	8	2
7/24	0	2		1	2	0	2	68	0		3	5	1	0
7/25	2	1		0	0	0	0	74	1		0	0	2	2
7/26	0	0		0	0	0	0	28	0		1	4	0	2
7/27		0		0	1	0	0		0		2	5	1	0
7/28		1		0	0	1	0		1		0	0	3	2
7/29		7		0	0	0	0		0		1	0	6	6
7/30		0	0	0	1	0	0		0	0	1	0	0	2
7/31		1	1	0	0	1	1		1	3	7	0	1	0
8/01		0	0	0		1	0		1	0	2		1	1
8/02		0	1	1		0	0		0	1	0		1	0
8/03		0		0	0	1	0		0		1	0	2	0
8/04		1		1	0	0	0		0		5	0	2	1
8/05		2		0	0	1	1		0		4	0	7	0
8/06		3		1	0	2	1		0		1	0	1	0
8/07		1		0	0	0	0		0		3	0	6	0
8/08		1		0	0	3	0		1		4	0	0	0
8/09		4		4	0	2	0		1		5	0	2	0
8/10		0		1	1	1	0		1		1	0	0	0
8/11		0		0	0	1	2		0		7	0	0	0
8/12		3		2	2	4	0		0		1	0	0	1
8/13		6		2	0	1	1		0		9	0	0	0
8/14		4		0	0	0	0		0		9	0	1	0
8/15		0		1	0	0	1		0		3	0	0	0
8/16		0		1	0	2	0		0		3	0	0	0
8/17		0		0	1	0	0		0		4	0	0	0
8/18		0		4	0	0	0		0		6	0	0	0
8/19		1		2	0		0		0		2	0		0
8/20		1		1	2		0		0		0	0		0
8/21		0		0	2		2		0		0	0		0
8/22		0		3	0		0		0		6	0		3
8/23		0		2	0		0		0		2	0		0
8/24		1		2	0		0		0		1	0		0
8/25		1		2	1		0		0		0	0		0
8/26		2		0	1		0		0		0	0		0
8/27		0		0	0	0	0		0		0	0	0	0
8/28		0		1	4	0	0		0		0	0	0	0
8/29		2		0	1	0	0		0		0	0	0	1
8/30		3		0	0	1	0		2		1	0	0	0
8/31		0		2	0	0	0		0		0	0	0	0
9/01		0		2	0	0	0		0		1	0	0	0

Date	Whitefish							Grayling						
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
6/15		0							0					
6/16		0							0					
6/17		0			0				0			0		
6/18		0			0				0			0		
6/19		0			0				0			0		
6/20		0			0				0			0		
6/21	0	0			1		4	0	0			0		0
6/22	0	0	0		0		31	0	0	0		0		0
6/23	0	0	0		0		37	0	0	1		0		3
6/24	0	0	0		0		3	0	0	4		0		0
6/25	0	0	0		1	1	1	0	0	0		1	6	0
6/26	0	0	0		0	2	6	0	0	0		5	11	0
6/27	0	0	0		1	3	5	0	0	0		13	5	0
6/28	0	0	0		0	2	1	0	0	0		0	7	2
6/29	0	0	0		0	0	0	0	0	0		0	1	0
6/30	0	0	0		0	0	2	0	0	1		0	3	1
7/01	0	0	0		0	1	1	0	0	0		0	0	0
7/02	0	0	0		0	1	0	0	0	0		2	1	0
7/03	0	0	0		0	0	4	0	0	0		19	0	0
7/04	0	0	0		0	0	3	0	0	0		2	1	0
7/05	0	0	0		0	0	1	0	0	0		10	0	0
7/06	0	0	0		0	0	2	0	0	0		5	0	0
7/07	0	0	0		0	5	6	0	0	0		2	0	1
7/08	0	0			0	2	2	0	0			0	0	0
7/09	0	0			0	4	0	0	0			2	0	0
7/10	0	0			0	10	4	0	0			1	1	1
7/11	0	0			0	10	4	0	0			0	5	0
7/12	0	0			0	7	3	0	0			5	1	0
7/13	0	0			0	9	1	0	0			1	1	6
7/14	0	0		0	0	13	1	0	0		0	0	3	0
7/15	0	0		0	0	8	7	0	0		0	0	3	3
7/16	0	0		0	0	7	6	0	0		0	0	0	3
7/17	0	0		0	0	1	2	0	0		0	0	4	0
7/18	0	0		0	0	0	3	0	0		0	1	1	0
7/19	0	0		0	0	0	0	0	0		0	0	0	1
7/20	0	0		0	0	1	0	0	0		0	0	4	0
7/21	0	0		0	0	2	2	0	0		0	0	3	1
7/22	0	0		0	0	0	2	0	0		0	1	0	1
7/23	0	0		0	0	0	3	0	0		0	0	0	1
7/24	0	0		0	0	0	0	0	0		0	0	0	2
7/25	0	0		0	0	0	0	0	0		0	0	0	2
7/26	0	0		0	0	0	0	0	0		0	0	0	2
7/27		0		0	0	1	3		0		0	0	0	0
7/28		0		0	0	0	2		0		0	0	0	0
7/29		0		0	0	0	3		0		0	0	0	3
7/30		0	0	0	0	0	2		0	0	0	0	0	2
7/31		0	0	0	0	0	2		0	0	0	0	0	0
8/01		0	0	0		0	1		0	0	0		0	2
8/02		0	0	0		0	0		0	0	1		0	6
8/03		0		0	0	0	1		0		0	0	0	1
8/04		0		0	0	0	0		0		0	0	0	0
8/05		0		0	0	0	1		0		0	0	0	1
8/06		0		0	0	0	0		0		0	0	0	1
8/07		0		0	0	0	1		0		0	0	0	0
8/08		0		0	0	0	0		0		0	0	0	0
8/09		0		0	0	0	0		0		0	0	0	1
8/10		0		0	0	0	0		0		0	0	0	0
8/11		0		0	0	0	0		0		0	0	0	0
8/12		0		0	0	1	0		0		0	2	1	0
8/13		0		0	0	0	0		0		1	0	2	4
8/14		0		0	0	0	0		0		0	0	0	3
8/15		0		0	0	0	1		0		0	0	0	3
8/16		0		0	0	1	0		0		0	0	0	2
8/17		0		0	0	0	0		0		0	0	0	1
8/18		0		0	0	0	1		0		0	0	0	1
8/19		0		0	0		0		0		0	1		2
8/20		0		0	0		0		0		0	0		1
8/21		0		0	0		0		0		0	0		2
8/22		0		0	0		0		0		0	0		3
8/23		0		0	0		0		0		0	0		2
8/24		0		0	0		0		0		0	0		2
8/25		0		0	0		0		0		0	0		4
8/26		0		0	0		0		1		0	0		1
8/27		0		0	0	2	3		0		0	0	0	7
8/28		0		0	0	2	2		0		1	0	0	3
8/29		0		0	0	0	0		0		0	0	0	6
8/30		0		0	0	2	0		0		0	0	0	3
8/31		0		0	0	0	1		0		0	0	0	3
9/01		0		0	0	2	0		0		0	0	1	3

Date	Northern Pike							Char						
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
6/15		0							0					
6/16		0							0					
6/17		0			0				0			0		
6/18		0			0				0			0		
6/19		0			0				0			0		
6/20		0			0				0			0		
6/21	0	0			0		0	0	0			0		0
6/22	0	0	0		0		2	0	0	0		0		0
6/23	0	0	0		0		3	0	0	0		0		0
6/24	0	0	0		0		0	0	0	0		0		0
6/25	0	0	0		0	0	1	0	0	0		0	0	0
6/26	0	0	1		0	0	2	0	0	0		0	0	0
6/27	0	0	0		0	1	1	0	0	0		0	0	0
6/28	0	0	0		0	0	1	0	0	0		0	0	0
6/29	0	0	0		0	0	0	0	0	0		0	0	0
6/30	0	0	0		0	0	0	0	0	0		0	0	0
7/01	0	0	0		0	0	0	0	0	0		0	0	0
7/02	0	0	0		0	0	0	0	0	0		0	0	0
7/03	0	0	0		0	0	1	0	0	0		0	0	0
7/04	0	0	0		0	0	1	0	0	0		0	0	0
7/05	0	0	0		0	0	0	0	0	0		0	0	0
7/06	0	0	0		0	0	0	0	0	0		0	0	0
7/07	0	0	0		0	0	2	0	0	0		0	0	0
7/08	0	0			0	0	0	0	0			0	0	0
7/09	0	0			0	0	0	0	0			0	0	0
7/10	0	0			0	0	0	0	0			0	0	0
7/11	0	0			0	0	0	0	0			0	0	0
7/12	0	0			0	0	0	0	0			0	0	0
7/13	0	0			0	0	0	0	0			0	0	0
7/14	0	0		0	0	0	1	0	0		0	0	0	0
7/15	0	0		0	0	0	1	0	0		0	0	0	0
7/16	0	0		0	0	0	0	0	0		0	0	0	0
7/17	0	0		0	0	0	0	0	0		0	0	0	0
7/18	0	0		0	0	0	1	0	0		0	0	0	2
7/19	0	0		0	0	0	0	0	0		0	0	0	1
7/20	0	0		0	0	0	0	0	0		0	0	0	0
7/21	0	0		0	0	0	0	0	0		0	0	0	1
7/22	0	0		0	0	0	0	0	0		0	0	0	1
7/23	0	0		0	0	0	0	0	0		0	0	0	2
7/24	0	0		0	0	0	0	0	0		0	0	0	2
7/25	0	0		0	0	0	0	0	0		0	0	0	0
7/26	0	0		0	0	0	0	0	0		0	0	0	1
7/27		0		0	0	0	0		0		0	0	0	1
7/28		0		0	0	0	0		0		0	0	0	0
7/29		0		0	0	0	0		0		0	0	0	0
7/30		0	0	0	0	0	0		0	0	0	0	0	1
7/31		0	0	0	0	0	0		0	0	0	0	0	0
8/01		0	0	0		0	0		0	0	0		0	0
8/02		0	0	0		0	0		0	0	0		0	2
8/03		0		0	0	0	0		0		0	0	0	1
8/04		0		0	0	0	0		0		0	0	0	0
8/05		0		0	0	0	0		0		0	0	0	1
8/06		0		0	0	1	0		0		0	0	0	0
8/07		0		0	0	0	0		0		0	0	0	0
8/08		0		0	0	0	0		0		0	0	0	0
8/09		0		0	0	0	0		0		0	0	0	0
8/10		0		0	0	0	0		0		0	0	0	0
8/11		0		0	0	0	0		0		0	0	0	0
8/12		0		0	0	0	0		0		0	0	0	0
8/13		0		0	0	0	0		0		0	0	0	0
8/14		0		0	0	0	0		0		0	0	0	0
8/15		0		0	0	0	0		0		0	0	0	0
8/16		0		0	0	0	0		0		0	0	0	1
8/17		0		0	0	0	0		0		0	0	0	0
8/18		0		1	0	0	0		0		0	0	0	1
8/19		0		0	0		0		0		0	0		1
8/20		0		0	0		0		0		0	0		1
8/21		0		0	0		0		0		0	0		0
8/22		0		0	0		1		0		0	0		0
8/23		0		0	0		0		0		0	0		0
8/24		0		0	0		0		0		0	0		0
8/25		0		0	0		0		0		0	0		0
8/26		0		0	0		0		0		0	0		0
8/27		0		0	0	0	0		0		0	0	0	0
8/28		0		0	0	0	0		0		0	0	0	0
8/29		0		0	0	0	0		0		0	0	0	1
8/30		0		0	0	0	0		0		0	0	0	0
8/31		0		0	0	0	0		0		0	0	0	0
9/01		0		0	0	0	0		0		0	0	0	0

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Appendix D.1. (page 2 of 2)

Date	Sockeye Salmon 1996	1997	1998	1999	2000	2001	2002	Pink Salmon 1996	1997	1998	1999	2000	2001	2002
9/02		0		0	0	0	0		0		0	0	0	0
9/03		0		0	0	0	0		0		0	0	0	1
9/04		0		0	0	0	0		0		0	0	0	0
9/05		0		0	0	0	0		0		0	0	0	1
9/06		0		2	0	0	0		0		0	0	0	0
9/07		0		0	0	0	1		0		0	0	0	0
9/08		0		0	0	0	0		0		0	0	0	0
9/09		0		0	0	0	0		0		1	0	0	0
9/10		0		0	0	0	0		0		0	0	0	0
9/11		0		0	0	0	0		0		0	0	0	0
9/12		0		0	0	0	0		0		0	0	0	0
9/13		0		0	0	0	0		0		0	0	0	0
9/14		0		0	0	0	0		0		0	0	0	0
9/15		0		0	0	1	0[a]		0		0	0	0	0
9/16				0	0	0	0				0	0	0	0
9/17				0		0	0				0		0	0
9/18				0		0	0				0		0	0
9/19				0		0	0				0		0	0
9/20				0		0	0				0		0	0
Total	98	445	9	39	22	24	17	644	17	4	97	61	83	630

Date	Whitefish 1996	1997	1998	1999	2000	2001	2002	Grayling 1996	1997	1998	1999	2000	2001	2002
9/02		0		0	0	0	0		0		0	0	1	0
9/03		1		0	0	0	0		0		0	0	0	0
9/04		0		0	0	0	1		0		0	0	0	0
9/05		0		0	0	0	1		0		0	0	0	0
9/06		0		0	0	0	1		0		0	0	0	2
9/07		0		0	0	0	2		0		0	0	0	3
9/08		0		0	0	0	1		0		0	0	2	1
9/09		0		0	0	4	0		0		0	0	1	2
9/10		0		0	0	1	0		0		0	0	0	0
9/11		0		0	0	0	1		0		0	0	0	0
9/12		0		0	0	0	1		0		0	0	0	0
9/13		0		0	0	0	0		0		2	0	0	0
9/14		0		0	0	3	0		0		0	0	0	0
9/15		0		0	0	0	0		0		0	0	0	0
9/16				0	0	0	0				0	0	0	0
9/17				0		2	1				0		0	1
9/18				0		3	1				0		0	1
9/19				0		0	0				0		0	0
9/20				0		0	1				0		0	4
Total	0	1	0	0	2	105	192	0	1	6	3	75	83	142

Date	Northern Pike 1996	1997	1998	1999	2000	2001	2002	Char 1996	1997	1998	1999	2000	2001	2002
9/02		0		0	0	0	1		0		0	0	0	0
9/03		0		0	0	0	0		0		0	0	0	0
9/04		0		0	0	0	0		0		0	0	0	0
9/05		0		0	0	0	0		0		0	0	0	0
9/06		0		0	0	0	0		0		0	0	0	0
9/07		0		0	0	0	0		0		0	0	0	0
9/08		0		0	0	0	0		0		0	0	0	0
9/09		0		1	0	0	0		0		0	0	0	0
9/10		0		0	0	0	0		0		0	0	0	0
9/11		0		0	0	0	1		0		0	0	0	0
9/12		0		0	0	0	0		0		0	0	0	0
9/13		0		0	0	0	0		0		0	0	0	0
9/14		0		0	0	0	0		0		0	0	0	0
9/15		0		0	0	0	0		0		0	0	0	0
9/16				0	0	0	0				0	0	0	0
9/17				0		0	0				0		0	0
9/18				0		0	0				0		0	0
9/19				0		0	0				0		0	0
9/20				0		0	0				0		0	0
Total	0	0	1	2	0	2	20	0	0	0	0	0	0	23

= Weir was not operational

Appendix D.2. Historic sucker passage at the George River weir, 1996-2002.

Date	Daily							Cumulative							% Passage				
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	2000	2001	2002
6/15	c	429	c	c	c	c	c		429							7			
6/16	c	262 a	c	c	c	c	c		691							11			
6/17	c	68	c	c	45 d	c	c		759			45				12	1		
6/18	c	223	c	c	348	c	c		982			393				15	5		
6/19	c	100	c	c	34	c	c		1,082			427				17	6		
6/20	c	0	c	c	73	c	c		1,082			500				17	7		
6/21	519	276	c	c	238	c	25 d	519	1,358			738		25	15	21	10		0
6/22	832	70	2 d	c	343	c	344	1,351	1,428	2		1,081		369	38	22	14		6
6/23	703	204	46	c	927	c	700	2,054	1,632	48		2,008		1,069	58	25	26		17
6/24	238	72	218	c	686	c	44	2,292	1,704	266		2,694		1,113	65	27	35		17
6/25	285	120	106	c	1,204	29 d	132	2,577	1,824	372		3,898	29	1,245	73	28	51	0	20
6/26	62	162	688	c	130	819	118	2,639	1,986	1,060		4,028	848	1,363	74	31	52	5	21
6/27	285	285	921	c	262	1,439	90	2,924	2,271	1,981		4,290	2,287	1,453	83	35	56	14	23
6/28	2	366	987	c	6	2,105	236	2,926	2,637	2,968		4,296	4,392	1,689	83	41	56	28	26
6/29	1 a	336	877	c	8	5,831	10	2,927	2,973	3,845		4,304	10,223	1,699	83	46	56	65	27
6/30	0	245	1,102	c	0	369	88	2,927	3,218	4,947		4,304	10,592	1,787	83	50	56	67	28
7/01	1	491	472	c	8	88	150	2,928	3,709	5,419		4,312	10,680	1,937	83	58	56	67	30
7/02	15 a	215	115	c	9	905	3	2,943	3,924	5,534		4,321	11,585	1,940	83	61	56	73	30
7/03	29	405	330	c	395	5	24	2,972	4,329	5,864		4,716	11,590	1,964	84	68	61	73	31
7/04	0	305	119	c	324	14	2	2,972	4,634	5,983		5,040	11,604	1,966	84	72	66	73	31
7/05	25	205	195	c	965	32	16	2,997	4,839	6,178		6,005	11,636	1,982	85	76	78	73	31
7/06	43	176	101	c	24	8	189	3,040	5,015	6,279		6,029	11,644	2,171	86	78	78	74	34
7/07	19	74	16 d	c	400	241	432	3,059	5,089	6,295		6,429	11,885	2,603	86	79	84	75	41
7/08	2	301	c	c	12	200	449	3,061	5,190			6,441	12,085	3,052	86	84	84	76	48
7/09	149	4	c	c	107	842	87	3,210	5,394			6,548	12,927	3,139	91	84	85	82	49
7/10	2	79	c	c	13	168	358	3,212	5,473			6,561	13,095	3,497	91	85	85	83	55
7/11	6	6	c	c	261	494	353	3,218	5,479			6,822	13,589	3,850	91	86	89	86	60
7/12	1	109	c	c	576	331	333	3,219	5,588			7,398	13,920	4,183	91	87	96	88	66
7/13	3	24	c	c	184	164	232	3,222	5,612			7,582	14,084	4,415	91	88	99	89	69
7/14	0	31	c	54	0	219	46	3,222	5,643		54	7,582	14,303	4,461	91	88	99	90	70
7/15	21	2	c	42	66	38	98	3,243	5,645		96	7,648	14,341	4,559	92	88	99	91	72
7/16	15	0	c	25	1	57	409	3,258	5,645		121	7,649	14,398	4,968	92	88	99	91	78
7/17	15	39	c	20	0	4	265	3,273	5,684		141	7,649	14,402	5,233	92	89	99	91	82
7/18	15	1	c	9	0	129	236	3,288	5,685		150	7,649	14,531	5,469	93	89	99	92	86
7/19	0	10	c	14	2	92	132	3,288	5,695		164	7,651	14,623	5,601	93	89	100	92	88
7/20	8	420	c	18	1	148	3	3,296	6,115		182	7,652	14,771	5,604	93	95	100	93	88
7/21	146	76	c	4	2	178	27	3,442	6,191		186	7,654	14,949	5,631	97	97	100	94	88
7/22	102	25	c	4	2	81	14	3,544	6,216		190	7,656	15,030	5,645	100	97	100	95	89
7/23	0	72	c	3	4	66	46	3,544	6,288		193	7,660	15,096	5,691	100	98	100	95	89
7/24	0	5	c	0	1	79	41	3,544	6,293		193	7,661	15,175	5,732	100	98	100	96	90
7/25	0	21	c	2	7	30	11	3,544	6,314		195	7,668	15,205	5,743	100	99	100	96	90
7/26	0	0	c	3	6	19	8	3,544	6,314		198	7,674	15,224	5,751	100	99	100	96	90
7/27	c	0	c	2	4	33	4		6,314		200	7,678	15,257	5,755		99	100	96	90
7/28	c	6	c	0	0	32	5		6,320		200	7,678	15,289	5,760		99	100	97	90
7/29	c	4	c	0	0	54	18		6,324		200	7,678	15,343	5,778		99	100	97	91
7/30	c	6	8	0	0	8	18		6,330	6,303	200	7,678	15,351	5,796		99	100	97	91
7/31	c	17	4	0	1	8	64		6,347	6,307	200	7,679	15,359	5,860		99	100	97	92
8/01	c	2	270	0	0 e	72	50		6,349	6,577	200	7,679 b	15,431	5,910		99	100	97	93
8/02	c	0	55	0	1 b	20	9		6,349	6,632	200	7,680 b	15,451	5,919		99	100	98	93
8/03	c	0	c	0	2	6	107		6,349		200	7,682	15,457	6,026		99	100	98	95

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Appendix D.2. (page 2 of 2)

Date	Daily							Cumulative							% Passage				
	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	2000	2001	2002
8/04	c	1	c	0	1	0	20		6,350		200	7,683	15,457	6,046		99	100	98	95
8/05	c	0	c	4	1 b	8	19		6,350		204	7,684 b	15,465	6,065		99	100	98	95
8/06	c	0	c	0	0	11	14		6,350		204	7,684	15,476	6,079		99	100	98	95
8/07	c	0	c	0	0	12	15		6,350		204	7,684	15,488	6,094		99	100	98	96
8/08	c	0	c	0	0	147	4		6,350		204	7,684	15,635	6,098		99	100	99	96
8/09	c	0	c	2	0	13	2		6,350		206	7,684	15,648	6,100		99	100	99	96
8/10	c	0	c	0	0	1	3		6,350		206	7,684	15,649	6,103		99	100	99	96
8/11	c	0	c	1	0	9	6		6,350		207	7,684	15,658	6,109		99	100	99	96
8/12	c	0	c	0	0	4	2		6,350		207	7,684	15,662	6,111		99	100	99	96
8/13	c	0	c	0	3	62	3		6,350		207	7,687	15,724	6,114		99	100	99	96
8/14	c	0	c	0	0	3	15		6,350		207	7,687	15,727	6,129		99	100	99	96
8/15	c	0	c	0	0	19	6		6,350		207	7,687	15,746	6,135		99	100	99	96
8/16	c	0	c	0	0	39	7		6,350		207	7,687	15,785	6,142		99	100	100	96
8/17	c	0	c	0	0	5	10		6,350		207	7,687	15,790	6,152		99	100	100	97
8/18	c	0	c	3	0	12	11		6,350		210	7,687	15,802	6,163		99	100	100	97
8/19	c	0	c	2	0	7 b	2		6,350		212	7,687	15,809	6,165		99	100	100	97
8/20	c	0	c	0	0	6 b	5		6,350		212	7,687	15,815	6,170		99	100	100	97
8/21	c	0	c	0	0	5 b	2		6,350		212	7,687	15,820	6,172		99	100	100	97
8/22	c	0	c	0	0	4 b	5		6,350		212	7,687	15,824	6,177		99	100	100	97
8/23	c	0	c	1	0	4 b	12		6,350		213	7,687	15,828	6,189		99	100	100	97
8/24	c	0	c	4	0	3 b	14		6,350		217	7,687	15,831	6,203		99	100	100	97
8/25	c	0	c	2	0	2 b	26		6,350		219	7,687	15,833	6,229		99	100	100	98
8/26	c	1	c	2	1	1 b	9		6,351		221	7,688	15,834	6,238		99	100	100	98
8/27	c	13	c	1	0	0	23		6,364		222	7,688	15,834	6,261		99	100	100	98
8/28	c	6	c	2	0	1	19		6,370		224	7,688	15,835	6,280		99	100	100	99
8/29	c	1	c	1	0	0	6		6,371		225	7,688	15,835	6,286		99	100	100	99
8/30	c	21	c	2	0	0	3		6,392		227	7,688	15,835	6,289		100	100	100	99
8/31	c	2	c	1	0	3	7		6,394		228	7,688	15,838	6,296		100	100	100	99
9/01	c	0	c	2	0	1	6		6,394		230	7,688	15,839	6,302		100	100	100	99
9/02	c	0	c	2	0	1	4		6,394		232	7,688	15,840	6,306		100	100	100	99
9/03	c	7	c	2	0	0	5		6,401		234	7,688	15,840	6,311		100	100	100	99
9/04	c	0	c	2	0	0	16		6,401		236	7,688	15,840	6,327		100	100	100	99
9/05	c	0	c	3	0	0	1		6,401		239	7,688	15,840	6,328		100	100	100	99
9/06	c	0	c	0	0	0	6		6,401		239	7,688	15,840	6,334		100	100	100	99
9/07	c	0	c	0	0	0	2		6,401		239	7,688	15,840	6,336		100	100	100	99
9/08	c	0	c	0	0	0	2		6,401		239	7,688	15,840	6,338		100	100	100	99
9/09	c	0	c	0	0	0	4		6,401		239	7,688	15,840	6,342		100	100	100	99
9/10	c	0	c	0	0	0	2		6,401		239	7,688	15,840	6,344		100	100	100	100
9/11	c	0	c	0	0	0	3		6,401		239	7,688	15,840	6,347		100	100	100	100
9/12	c	0	c	0	0	0	10		6,401		239	7,688	15,840	6,357		100	100	100	100
9/13	c	1	c	2	0	0	2		6,402		241	7,688	15,840	6,359		100	100	100	100
9/14	c	0	c	0	0	0	0		6,402		241	7,688	15,840	6,359		100	100	100	100
9/15	c	2	c	0	0	0	1		6,404		241	7,688	15,840	6,360		100	100	100	100
9/16	c	c	c	1	0	0	5				242	7,688	15,840	6,365			100	100	100
9/17	c	c	c	1	c	0	6				243		15,840	6,371				100	100
9/18	c	c	c	1	c	0	3				244		15,840	6,374				100	100
9/19	c	c	c	2	c	0	0				246		15,840	6,374				100	100
9/20	c	c	c	0	c	0	0				246		15,840	6,374				100	100
Total	3,544	6,404	6,632	246	7,688	15,840	6,374												
Obs.	3,528	7,892	6,632	278	7,686	15,808	6,374												
Est (%)	0.5	2.5	0.0	0.0	0.0	0.2	0.0												

a = Daily passage was estimated due to the occurance of a hole in the weir.
b = The weir was not operational due to high water; in some cases daily passage was estimated.
c = Incomplete Count
c = The weir was not operational; daily passage was not estimated

APPENDIX E. CARCASS COUNTS OF CHINOOK, CHUM AND COHO SALMON AT THE GEORGE RIVER WEIR, 1996 - 2002.

	Daily Carcass Passage																				
	Chinook							Chum							Coho						
Date	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
6/15		0							0							0					
6/16		0							0							0					
6/17		0			0				0			0				0			0		
6/18		0			0				0			0				0			0		
6/19		0			0				0			0				0			0		
6/20		0			0				0			0				0			0		
6/21	0	0			0		0	0	0			0		0	0	0			0		0
6/22	0	0	0		0		0	0	0	0		0		0	0	0	0		0		0
6/23	0	0	0		0		0	0	0	0		0		1	0	0	0		0		0
6/24	0	0	0		0		0	0	0	0		0		0	0	0	0		0		0
6/25	1	0	0		0	0	0	4	0	0		0	0	0	0	0	0		0	0	0
6/26	0	0	0		1	0	0	1	0	0		0	1	2	0	0	0		0	0	0
6/27	0	0	0		0	0	0	0	0	0		0	0	1	0	0	0		0	0	0
6/28	0	0	0		0	0	1	1	0	0		0	1	3	0	0	0		0	0	0
6/29	3	0	0		0	0	1	5	0	0		1	0	2	0	0	0		0	0	0
6/30	0	4	0		0	0	0	4	0	2		0	0	1	0	0	0		0	0	0
7/01	0	0	0		0	0	0	6	0	2		0	0	3	0	0	0		0	0	0
7/02	1	0	0		0	0	0	10	1	3		0	3	8	0	0	0		0	0	0
7/03	1	0	0		0	0	0	8	0	4		3	0	6	0	0	0		0	0	0
7/04	2	0	0		0	0	0	13	0	2		0	0	7	0	0	0		0	0	0
7/05	2	1	0		0	0	0	11	0	10		0	0	5	0	0	0		0	0	0
7/06	0	1	0		0	0	0	23	0	10		0	10	11	0	0	0		0	0	0
7/07	2	0	0		0	0	0	25	4			0	1	11	0	0	0		0	0	0
7/08	0	0			0	0	0	19	2			0	3	9	0	0			0	0	0
7/09	6	2			0	1	0	40	4			4	2	11	0	0			0	0	0
7/10	10	0			0	0	0	53	2			7	0	18	0	0			0	0	0
7/11	10	1			0	0	0	44	3			0	10	17	0	0			0	0	0
7/12	8	1			0	0	1	55	4			0	11	20	0	0			0	0	0
7/13	3	1			0	0	2	33	6			0	1	14	0	0			0	0	0
7/14	3	2		0	0	0	1	50	7		14	7	9	22	0	0		0	0	0	0
7/15	5	1		1	0	1	3	45	4		15	0	9	27	0	0		0	0	0	0
7/16	7	3		0	0	0	3	69	12		4	0	6	18	0	0		0	0	0	0
7/17	8	1		1	0	0	1	73	3		7	0	22	26	0	0		0	0	0	0
7/18	10	0		0	0	1	1	65	7		37	0	14	31	0	0		0	0	0	0
7/19	5	1		1	0	0	2	56	9		18	0	8	16	0	0		0	0	0	0
7/20	14	2		1	0	0	2	130	17		21	0	0	15	0	0		0	0	0	0
7/21	36	0		0	0	0	2	126	0		8	9	0	34	0	0		0	0	0	0
7/22	29	0		2	10	1	1	143	0		23	0	25	41	0	0		0	0	0	0
7/23	11	2		0	0	0	3	108	21		8	0	0	34	0	0		0	0	0	0
7/24	9	0		3	0	0	0	72	0		9	0	0	38	0	0		0	0	0	0
7/25	10	0		1	1	2	1	126	30		18	10	28	37	0	0		0	0	0	0
7/26		0		1	0	0	3		0		21	0	0	48		0		0	0	0	0
7/27		6		2	1	4	4		76		28	19	5	45		1		0	0	0	0
7/28		1		4	2	9	4		48		20	23	23	27		0		0	0	0	0
7/29		1		0	0	12	6		28		0	0	17	25		0		0	0	0	0
7/30		4	6	16	2	17	6		65	26	62	14	32	22		0	0	0	0	0	0
7/31		0	0	5	4	11	4		0		30	11	33	29		0	0	0	0	0	0
8/01		0	10	2		18	6		0	24	15		27	26		0	0	0		0	0
8/02		0	13	7		16	5		0	51	26		35	20		0	0	0		0	0
8/03		0		12	0	15	2		0		21	0	39	17		0		0	0	0	0
8/04		0		12	0	22	3		0		30	0	27	10		0		0	0	0	0
8/05		0		21	0	22	1		0		27	0	33	15		0		0	0	0	0

-Continued-

APPENDIX E. (page 2 of 2)

	Daily Carcass Passage																				
	Chinook							Chum							Coho						
Date	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002	1996	1997	1998	1999	2000	2001	2002
8/06		2		7	5	13	1		10		10	4	31	13		0		0	0	0	0
8/07		1		23	7	21	2		15		21	7	23	8		1		0	0	0	1
8/08		0		0	5	12	2		0		0	0	35	5		0		0	0	0	0
8/09		6		30	0	6	0		27		31	0	34	6		0		0	0	0	0
8/10		4		35	12	18	0		25		30	4	49	0		0		0	0	0	0
8/11		0		0	0	4	1		14		0	0	31	5		0		0	0	0	0
8/12		2		25	7	5	1		3		47	5	39	2		6		0	0	0	0
8/13		1		25	0	1	0		13		37	0	39	2		0		0	0	0	0
8/14		0		12	0	5	0		0		27	0	45	5		0		0	0	0	0
8/15		4		6	10	0	0		11		11	4	58	1		0		0	0	0	0
8/16		0		2	0	0	0		0		6	0	8	3		0		0	0	1	0
8/17		2		0	0	0	0		7		5	0	0	0		0		0	0	0	0
8/18		0		5	0	0	0		8		13	0	0	0		0		0	0	0	0
8/19		0		0	0		0		0		12	0		0		0		0	0		0
8/20		0		2	0		1		5		19	0		1		0		0	0		1
8/21		0		4	0		0		4		16	0		1		0		0	0		1
8/22		0		2	0		0		5		24	0		0		0		0	0		0
8/23		0		1	0		0		0		7	0		0		0		0	0		0
8/24		0		1	0		0		5		7	0		0		0		0	0		0
8/25		0		2	0		0		2		7	0		1		0		0	0		0
8/26		0		1	5		0		4		10	5		1		0		0	0		0
8/27		0		0	0	0	0		0		3	0	4	1		0		0	0	0	0
8/28		0		0	0	0	0		5		3	0	0	0		1		0	0	0	0
8/29		0		2	0	0	0		2		3	0	1	0		0		0	0	0	0
8/30		0		0	0	0	0		3		2	0	1	0		0		0	0	0	0
8/31		0		0	0	0	0		3		0	0	0	0		0		0	0	1	0
9/01		0		0	0	0	0		0		2	1	0	0		0		0	0	0	1
9/02		0		2	0	0	0		0		3	0	3	0		0		0	0	0	0
9/03		0		0	0	1	0		0		0	0	3	0		0		0	0	0	0
9/04		1		0	0	0	0		1		0	0	2	0		0		0	0	0	1
9/05		0		0	0	0	0		0		0	0	1	1		0		0	0	0	0
9/06		0		0	1	0	0		0		0	1	0	1		0		0	0	0	0
9/07		0		0	0	0	0		0		0	0	1	0		0		0	0	0	3
9/08		0		0	0	0	0		0		0	1	1	0		0		0	0	0	0
9/09		0		0	0	0	0		0		2	0	1	0		0		0	0	1	1
9/10		0		0	0	0	0		6		2	0	0	0		3		0	0	0	1
9/11		0		0	0	0	0		0		0	0	1	0		0		0	0	0	2
9/12		0		0	0	0	0		0		0	0	0	0		0		0	0	1	0
9/13		0		0	0	0	0		0		0	0	0	1		0		0	0	0	0
9/14		0		1	0	0	0		0		1	0	0	1		0		0	0	0	0
9/15		0		0	0	0	0		0		0	0	0	0		0		0	0	0	2
9/16				0	0	1	0				1	0	0	0				0	0	0	0
9/17				0		0	0				0		0	0				0		0	0
9/18				0		0	0				0		0	0				1		1	0
9/19				0		0	0				0		0	0				1		0	0
9/20				0		0	0				0		1	0				0		0	0
9/21				0		1					0		0					0		0	
9/22				0		0					0		0					1		1	
9/23				0							0							1			
9/24				0							0							0			
9/25				0							0							0			
Carcass Total	196	58	29	280	73	240	78	1,418	531	134	824	140	847	832	0	12	0	4	0	6	14
Escapement	7,716	7,823	2,505	3,548	2,960	3,309	2,444	21,670	5,907	6,391	11,552	3,492	11,601	6,543	173	9,210	52	8,914	11,262	14,398	6,759

[shaded box] = Weir was not operational

APPENDIX F.
COMPOSITION OF CHINOOK SALMON ESCAPEMENT ESTIMATES BA ON THE ORIGINAL DATA SETS FROM 1996 AND 1997.

Appendix F.1. Age and sex of chinook salmon at the George River weir based on the original data set, 1996 - 1997. [ab]

Year	Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class 1.2 Esc.	1.2 %	1.3 Esc.	1.3 %	2.2 Esc.	2.2 %	1.4 Esc.	1.4 %	1.5 Esc.	1.5 %	Total Esc.	Total %
1996	6/24 - 25	44	M	97	6.8	290	20.5	32	2.3	129	9.1	32	2.3	580	40.9
	(6/15 - 6/26)		F	64	4.6	226	15.9	0	0.0	322	22.7	226	15.9	838	59.1
			Subtotal	161	11.4	516	36.4	32	2.3	451	31.8	258	18.2	1,418	100.0
	6/28, 7/2	57	M	0	0.0	255	8.8	0	0.0	715	24.6	408	14.0	1,379	47.4
	(6/27 - 7/4)		F	51	1.8	307	10.5	0	0.0	511	17.5	664	22.8	1,532	52.6
			Subtotal	51	1.8	562	19.3	0	0.0	1,226	42.1	1,072	36.8	2,911	100.0
	7/7, 9	90	M	301	8.9	565	16.7	0	0.0	489	14.4	301	8.9	1,656	48.9
	(7/5 - 8/22)		F	38	1.1	150	4.4	0	0.0	904	26.7	640	18.9	1,732	51.1
			Subtotal	339	10.0	715	21.1	0	0.0	1,393	41.1	941	27.8	3,388	100.0
	Season	191	M	398	5.1	1,110	14.4	32	0.4	1,333	17.3	742	9.6	3,615	46.8
			F	153	2.0	683	8.8	0	0.0	1,737	22.5	1,529	19.8	4,102	53.2
			Total	551	7.1	1,793	23.2	32	0.4	3,070	39.8	2,271	29.4	7,717	100.0
1997	6/24, 26, 27	64	M	421	15.6	295	10.9	0	0.0	379	14.1	0	0.0	1,094	40.6
	(6/15 - 27)		F	337	12.5	168	6.3	0	0.0	1,094	40.6	0	0.0	1,600	59.4
			Subtotal	758	28.1	463	17.2	0	0.0	1,473	54.7	0	0.0	2,694	100.0
	6/28 - 30	87	M	455	14.9	245	8.0	0	0.0	525	17.3	0	0.0	1,226	40.2
	(6/28 - 7/3)		F	701	23.0	105	3.5	0	0.0	1,016	33.3	0	0.0	1,821	59.8
			Subtotal	1,156	37.9	350	11.5	0	0.0	1,541	50.6	0	0.0	3,047	100.0
	7/7 - 11	69	M	502	37.7	39	2.9	0	0.0	290	21.8	0	0.0	831	62.3
	(7/4 - 12)		F	20	1.4	0	0.0	0	0.0	483	36.2	0	0.0	502	37.7
			Subtotal	522	39.1	39	2.9	0	0.0	773	58.0	0	0.0	1,333	100.0
	7/14 - 18; 21, 23, 27	49	M	275	36.7	46	6.1	0	0.0	138	18.4	0	0.0	459	61.2
			F	0	0.0	15	2.1	0	0.0	275	36.7	0	0.0	290	38.8
	(7/13 - 8/22)		Subtotal	275	36.7	61	8.2	0	0.0	413	55.1	0	0.0	749	100.0
	Season	269	M	1,654	21.1	624	8.0	0	0.0	1,332	17.0	0	0.0	3,610	46.1
			F	1,056	13.5	289	3.7	0	0.0	2,868	36.7	0	0.0	4,213	53.9
			Total	2,710	34.6	913	11.7	0	0.0	4,200	53.7	0	0.0	7,823	100.0

[a] The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies in sums are attributed to rounding errors.

[b] The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

Appendix F.2. Mean length (mm) of chinook salmon at the George River weir based on the original data set, 1996 - 1997. [a]

Year	Sample Dates (Stratum Dates)	Sex		1.2	1.3	2.2	1.4	1.5
1996	6/24 - 25	M	Mean Length	565	674	600	823	955
	(6/15 - 6/26)		Std. Error	50	18	-	27	-
			Range	505- 664	575- 734	600- 600	742- 860	955- 955
			Sample Size	3	9	1	4	1
		F	Mean Length	518	722		894	849
			Std. Error	18	25		17	45
			Range	500- 535	648- 848		812- 963	659- 986
			Sample Size	2	7	0	10	7
	6/28, 7/2	M	Mean Length		733		880	937
	(6/27 - 7/4)		Std. Error		17		24	20
			Range		684 - 775		669 - 981	824 - 998
			Sample Size	0	5	0	14	8
		F	Mean Length	620	735		854	905
			Std. Error	-	27		15	20
			Range	620- 620	664- 848		785 - 938	710- 987
			Sample Size	1	6	0	10	13
	7/7, 9	M	Mean Length	609	726		845	945
	(7/5 - 8/22)		Std. Error	36	21		21	23
			Range	520- 775	595- 885		741- 972	812- 1010
			Sample Size	8	15	0	13	8
		F	Mean Length	542	790		844	898
			Std. Error	-	38		12	16
			Range	542- 542	699- 879		640- 925	714- 1000
			Sample Size	1	4	0	24	17
	Season	M	Mean Length	598	714	600	861	941
			Range	505- 775	575- 885	600- 600	669- 981	812- 1010
			Sample Size	11	29	1	31	17
		F	Mean Length	558	743		856	902
			Range	500- 620	648 - 879		640- 963	659- 1000
			Sample Size	4	17	0	44	37
1997	6/24, 26, 27	M	Mean Length	608	758		854	
	(6/15 - 27)		Std. Error	16	22		17	
			Range	521- 669	669- 820		786- 923	
			Sample Size	10	7	0	9	0

-Continued-

Appendix F.2. (page 2 of 2)

Year	Sample Dates (Stratum Dates)	Sex		1.2	1.3	2.2	1.4	1.5
1997	6/24, 26, 27	F	Mean Length	566	707		855	
(cont.)	(6/15 - 27)		Std. Error	15	23		9	
	(cont.)		Range	504- 619	660- 761		713- 967	
			Sample Size	8	4	0	26	0
	6/28 - 30	M	Mean Length	596	735		824	
	(6/28 - 7/3)		Std. Error	21	13		14	
			Range	472- 718	692- 778		725- 895	
			Sample Size	13	7	0	15	0
		F	Mean Length	537	693		836	
			Std. Error	13	32		8	
			Range	425- 645	634- 746		700- 923	
			Sample Size	20	3	0	29	0
	7/7 - 11	M	Mean Length	566	795		851	
	(7/4 - 12)		Std. Error	10	35		19	
			Range	470- 638	760- 830		705- 983	
			Sample Size	26	2	0	15	0
		F	Mean Length	500			843	
			Std. Error	-			8	
			Range	500- 500			771- 900	
			Sample Size	1	0	0	25	0
	7/14 - 18; 21, 23, 27	M	Mean Length	556	690		865	
	(7/13 - 8/22)		Std. Error	16	53		27	
			Range	457- 680	594- 777		749- 998	
			Sample Size	18	3	0	9	0
		F	Mean Length		785		843	
			Std. Error		-		11	
			Range		785- 785		735- 914	
			Sample Size	0	1	0	18	0
	Season	M	Mean Length	583	747		843	
			Range	457- 718	594- 830		705- 998	
			Sample Size	67	19	0	48	0
		F	Mean Length	545	706		845	
			Range	425- 645	634- 785		700- 967	
			Sample Size	29	8	0	98	0

[a] "Season" mean lengths are weighted by the escapement passage in each stratum.

APPENDIX G:
HABITAT PROFILE DATA COLLECTED AT THE GEORGE RIVER WEIR, 1996 - 2002

Appendix G.1. Daily water conditions and weather at the George River weir, 1996.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky[a] (a.m.)	Precip.[b] (a.m.)	Wind Vel. (knotts)
6/21	2030					3	0	0
6/22	1930		14			3	0	0
6/23	2100	30.0	14	20		1	0	15
6/24	2100	30.0	15	10		4	A	10
6/25	2230	30.0	13	15		4	A	5
6/26	2230	30.5	14	20		4	A	5
6/27	1200	34.0	14	24		4	0	0
6/28	1200	48.0	15	16		4	B	0
6/29	2000	73.0	9	16		4	0	0
6/30	1200	56.0	9	9		4	0	0
7/01	1200	53.0	11	18		4	0	0
7/02	1230	49.0	13	20		4	0	0
7/03	1200	46.0	13	21		1	0	0
7/04	1200	43.0	14	22		1	0	0
7/05	1200	36.0	16	25		2	0	0
7/06	1200	35.0	17	26		1	0	0
7/07	1230	34.0	17	15		2	0	0
7/08	1230	34.0	17	22		2	0	0
7/09	1230	34.0	16	20		4	B	0
7/10	1200	34.0	15	17		4	B	0
7/11	1200	40.0	15	17		4	A	30
7/12		43.0*				0	A	0
7/13		44.0*				0	A	0
7/14		41.0*				0	A	0
7/15	1700	35.0	17	25		1	0	0
7/16	1700	35.0	9	11		3	A	5
7/17	1200	39.0	12	25		4	A	5
7/18	1200	40.0	13	19		4	0	0
7/19	1200	43.0	13	18		4	0	0
7/20	1200	45.0	13	17		4	0	0
7/21	1200	49.0	16	23		3	0	0
7/22	1200	45.0	16	23		2	A	5
7/23	1200	41.0	17	26	33	1	0	5
7/24	1500	39.0	17	23	33	4	0	5
7/25	1200	39.0	16	22	31	2	0	15
7/26	1230	41.0	14	14		4	B	5
7/27	800	67.0						
7/28	1500	95.0						
7/29	730	110.0						
7/30		>100*						
7/31		>100*						
8/01		>100*						
8/02		>100*						
8/03		>100*						
8/04		>100*						
8/05	1715	>100*						

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 = partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.2. Daily water conditions and weather at the George River weir, 1997.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Temperature (°C) Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/06		20.0				4	A	0
6/07		27.0				4	A	0
6/08	2200	31.5				4	A	0
6/09	700	35.5			38	4	A	0
6/10	700	34.5			37	3	0	0
6/11	700	34.0			33	3	0	0
6/12	700	29.0			32	3	0	0
6/13	1000	30.0			33	3	0	0
6/14	700	30.0				4	A	0
6/15	1000	39.5			43	3	0	5
6/16	830	39.0				2	0	0
6/17	700	35.5			43	3	0	0
6/18	700	34.0				3	A	0
6/19	700	35.0			73	2	0	0
6/20	700	59.0			68	1	0	0
6/21	900	49.0				3	0	5
6/22	930	39.0				3	0	0
6/23	730	37.0			50	1	0	0
6/24		36.5*						
6/25	730	36.0				2	A	5
6/26	900	38.0				1	0	0
6/27	1200	35.0			45	1	0	0
6/28	1000	32.0			40	1	0	0
6/29	1300	29.0			30	2	0	0
6/30	1200	29.0			30	2	0	0
7/01	1000	27.0			25	1	0	0
7/02	1100	26.5			27	2	0	0
7/03	1000	26.5			27	3	0	0
7/04	730	25.5			30	2	0	0
7/05	730	24.5			30	2	0	0
7/06	730	24.5			28	1	0	0
7/07	730	24.0			28	2	0	0
7/08	730	23.5			30	3	0	0
7/09	730	23.0	15	13	27	4	0	0
7/10	730	22.5	13	10	25	4	0	0
7/11	730	22.5	13	9	22	4	0	0
7/12	1700	21.5	11	23	20	4	0	5
7/13	1000	20.5	12	6	19	4	0	0
7/14		19.0	19		19	3	0	0
7/15	730	19.0	12	6	20	[illegible]	0	0
7/16	730	19.0	11	4	20	3	0	0
7/17	730	19.0	12	8	23	4	0	0
7/18	730	19.0	11	8	22	4	0	0
7/19	730	18.5	12	8	25	4	A	5
7/20	1030	19.0	14	10	25	4	0	0
7/21	730	19.0	14	10	26	1	0	0
7/22	730	20.5	14	10		1	0	0
7/23	730	20.5	13	8		1	0	0
7/24	1700	20.0	17	24		2	0	0
7/25	1200	20.5	15	16	29	4	0	0
7/26	730	20.5	14	12	30	4	B	0
7/27	830	20.0	14	14	29	4	0	0
7/28	730	20.0	14	4	25	1	0	0

-Continued-

Appendix G.2. (page 2 of 2)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
7/29	730	18.5	15	8	27	1	0	0
7/30	730	17.5	15	8	20	1	0	0
7/31	730	17.0	16	10	20	2	0	0
8/01	730	17.0	15	10	22	1	0	0
8/02	730	17.0	16	10	22	3	0	0
8/03	730	17.5	17	16	25	4	A	0
8/04	730	18.0	16	15	27	3	0	0
8/05		18.0*						
8/06	730	17.5	15	9		4	0	0
8/07	715	16.5	15.5	12			0	0
8/08	730	16.0	17	12		1	0	0
8/09	730	16.3	14	12		4	0	0
8/10	1000	17.0		15		4	0	5
8/11	730	18.0	13	10		4	B	0
8/12	730	19.5	13	12		4	0	0
8/13	1030	21.5	14	11		4	0	0
8/14	730	21.3	12	6		3	0	0
8/15	730	21.0	14	10		4	0	0
8/16	730	19.5	12	8		3	0	0
8/17	730	18.5	13	9		4	0	0
8/18	730	18.0	12	11		4	0	0
8/19	730	18.0	10			4	0	0
8/20	unk	17.5	13	11		4	B	0
8/21	730	18.7	12.1	10.2		4	A	0
8/22	730	21.0	12	10		4	0	0
8/23	730	22.2	12	8.2		3	0	0
8/24	730	20.5	11.8	9.8		4	0	0
8/25	930	19.7	11.8	9.9		4	B	0
8/26	730	21.5	10.2	7.5		3	0	0
8/27	1000	22.1	10			3	0	0
8/28	1230	21.5	10.8	14.5		4	0	0
8/29	930	20.2	9.8	8.5		3	0	15
8/30	1000	22.1	10.8	13.2		4	0	5
8/31	930	24.8	11.2	16.5		3	0	0
9/01	1000	25.0	10.1	8.1		5	0	0
9/02	900	23.2	10	10		4	0	0
9/03	930	22.3	9	5		3	0	0
9/04	1000	22.0	9			3	0	0
9/05	1000	21.5	10	10.5		4	0	0
9/06	1000	21.5	10.5	9		4	0	0
9/07	1000	21.5	10.5	13		4	A	0
9/08	1000	21.0	10	10		4	A	0
9/09	1000	21.0	10	11		2	0	0
9/10	1000	21.0	12	14			0	0
9/11	1000	21.0	10	11		4	0	0
9/12	1000	21.0	10	13		4	0	0
9/13	1000	21.0	10	15		3	0	0
9/14	1000	20.0	9	8		1	0	0
9/15	1000	21.3	11	10		4	B	

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 = partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.3. Discharge of the George River near the weir site, 6 August 1997.

DISCHARGE

560.5 ft^3/s = 15.9 m^3/s

George River Weir

DISCHARGE
AH-81-04

File No. 97GEO1 | Page 1 of 2
Crew L. DuBois, Mike | Date 8/06/97
Habitat | Sampling Site George River Weir | River Mile 4.5 | Meter Type Price AA No.
Location S21N46W10CA
HUC 19030501 | Gage Number | Height 17.2 cm
Description George River 30 ft above weir. Head pin right bank (facing downstream). Record low water.
Weather Wind 5-10 from N, 100% overcast, 1200 hrs.

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area (ft.^{2})	Flow (ft^3/s)
0			0.00					0.000						
4		1	0.18		0.9	10	50	0.456	(est.)	0.23	0.09	4	0.4	0.1
9		1	0.82		0.6	12	42	0.643		0.55	0.50	5	2.5	1.4
14		1	0.48		0.9	17	42	0.902		0.77	0.65	5	3.3	2.5
19	5	0.9962	0.77		0.6	20	43.5	1.022		0.96	0.63	5	3.1	3.0
24		1	1.31		0.6	25	45	1.231		1.13	1.04	5	5.2	5.9
29		1	1.72		0.6	20	50.5	0.883		1.06	1.52	5	7.6	8.0
34	2.5	0.999	1.94		0.6	22	44	1.110		1.00	1.83	5	9.2	9.1
39		1	2.02		0.6	25	44.5	1.245		1.18	1.98	5	9.9	11.7
44	5	0.9962	1.84		0.6	22	41	1.190		1.22	1.93	5	9.7	11.7
49		1	2.00		0.6	30	42	1.577		1.38	1.92	5	9.6	13.3
54		1	1.62		0.6	30	43	1.541		1.56	1.81	5	9.1	14.1
59		1	1.87		0.6	30	42.5	1.559		1.55	1.75	5	8.7	13.5
64		1	1.41		0.6	30	41	1.615		1.59	1.64	5	8.2	13.0
69		1	1.88		0.6	30	40.5	1.635		1.62	1.65	5	8.2	13.4
74		1	2.39		0.6	35	44.5	1.735		1.68	2.14	5	10.7	18.0
79		1	1.46		0.6	20	45	0.989		1.36	1.93	5	9.6	13.1
84		1	1.23		0.6	35	45	1.716		1.35	1.35	5	6.7	9.1
94		1	1.22		0.6	35	43	1.794		1.75	1.23	10	12.3	21.5
104	15	0.9659	0.80		0.6	40	44.5	1.981		1.89	1.01	10	10.1	18.4
114		1	0.95		0.6	45	54.5	1.822		1.90	0.88	10	8.8	16.6
124		1	1.45		0.6	35	45	1.716		1.77	1.20	10	12.0	21.2
134	2.5	0.999	1.38		0.6	30	46	1.442		1.58	1.42	10	14.2	22.3
144		1	1.48		0.6	25	42	1.318		1.38	1.43	10	14.3	19.7
154		1	1.28		0.6	30	45	1.473		1.40	1.38	10	13.8	19.3
164		1	1.32		0.6	25	45	1.231		1.35	1.30	10	13.0	17.6
174		1	1.29		0.6	25	42	1.318		1.27	1.31	10	13.1	16.6
184		1	1.18		0.6	20	40.5	1.097		1.21	1.24	10	12.4	14.9
194		1	1.06		0.6	25	46.5	1.192		1.14	1.12	10	11.2	12.8
204		1	1.10		0.6	25	49	1.132		1.16	1.08	10	10.8	12.6
214		1	1.05		0.6	25	46.5	1.192		1.16	1.08	10	10.8	12.5
224		1	1.11		0.6	25	45	1.231		1.21	1.08	10	10.8	13.1
234		1	1.09		0.6	25	41.5	1.333		1.28	1.10	10	11.0	14.1
244	10	0.9848	0.48		0.6	25	41	1.349		1.34	0.79	10	7.9	10.4
254	10	0.9848	0.31		0.6	11	44	0.565		0.96	0.40	10	4.0	3.7
259	5	0.9962	1.20		0.6	25	42	1.318		0.94	0.76	5	3.8	3.5

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Appendix G.3. (page 2 of 2)

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area (ft.^{2})	Flow (ft^3/s)
264		1	2.19		0.6	30	44.5	1.490		1.40	1.70	5	8.5	11.9
269		1	2.08		0.6	30	43.5	1.523		1.51	2.14	5	10.7	16.1
274		1	1.55		0.6	31	45.5	1.505		1.51	1.82	5	9.1	13.7
279	5	0.9962	1.60		0.6	25	41.5	1.333		1.42	1.58	5	7.9	11.1
284		1	1.78		0.6	30	50	1.328		1.33	1.69	5	8.5	11.2
289	5	0.9962	1.06		0.6	25	41	1.349		1.34	1.42	5	7.1	9.5
294		1	1.18		0.6	25	39	1.417		1.38	1.12	5	5.6	7.7
304		1	1.24		0.6	25	40	1.383		1.40	1.21	10	12.1	16.9
314	5	0.9962	0.98		0.6	20	40.5	1.097		1.24	1.11	10	11.1	13.7
324		1	1.10		0.6	17	44	0.862		0.98	1.04	10	10.4	10.2
334		1	0.34		0.9	15	46	0.731		0.80	0.72	10	7.2	5.7
344		1	0.08					0.183	(est.)	0.46	0.21	10	2.1	1.0
348		1	0.00					0.000	(est.)	0.09	0.04	4	0.2	0.0
279	5	0.9962	1.60		0.6	25	41.5	1.333		1.42	1.58	5	7.9	11.1
284		1	1.78		0.6	30	50	1.328		1.33	1.69	5	8.5	11.2
289	5	0.9962	1.06		0.6	25	41	1.349		1.34	1.42	5	7.1	9.5
294		1	1.18		0.6	25	39	1.417		1.38	1.12	5	5.6	7.7
304		1	1.24		0.6	25	40	1.383		1.40	1.21	10	12.1	16.9
314	5	0.9962	0.98		0.6	20	40.5	1.097		1.24	1.11	10	11.1	13.7
324		1	1.10		0.6	17	44	0.862		0.98	1.04	10	10.4	10.2
334		1	0.34		0.9	15	46	0.731		0.80	0.72	10	7.2	5.7
344		1	0.08					0.183	(est.)	0.46	0.21	10	2.1	1.0
348		1	0.00					0.000	(est.)	0.09	0.04	4	0.2	0.0

Depth		Velocity		George River Total	560.5
Average	1.35 ft	Average	1.33 ft/sec		
Maximum	2.39 ft	Maximum	1.98 ft/sec		

Notes: Average depth and average velocity are calculated using data from 9 ft through 324 ft, which is approximately 91 percent of stream width.
Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.4. Discharge of the George River near the weir site, 1 September 1997.

DISCHARGE

765.9 ft^3/s = 21.7 m^3/s

George River Weir

DISCHARGE
AH-81-04

File No. 97GEO2 | Page 1 of 2
Crew L. DuBois, Spencer Reardon | Date 9/01/97
Habitat | Sampling Site George River Weir | River Mile 4.5 | Meter Type Price AA No.
Location S21N46W10CA
HUC 19030501 | Gage Number | Height 24.6cm
Description George River 40 ft above weir. Head pin right bank.
Weather Wind 0-5 from N, 80% overcast, water temp 12oC, 1330 hrs.

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area ($ft.^2$)	Flow (ft^3/s)
0			0.00					0.000						
6		1	0.57		0.6	11	47	0.530	(est.)	0.27	0.29	6	1.7	0.5
11		1	1.43		0.6	20	42	1.058		0.79	1.00	5	5.0	4.0
16	15	0.9659	0.65		0.6	23	44.5	1.147		1.10	1.04	5	5.2	5.5
21		1	1.14		0.6	25	46.5	1.192		1.17	0.90	5	4.5	5.2
26		1	1.95		0.6	25	42.5	1.302		1.25	1.55	5	7.7	9.6
31		1	1.99		0.6	25	46	1.205		1.25	1.97	5	9.9	12.3
36		1	1.73		0.6	30	46.5	1.426		1.32	1.86	5	9.3	12.2
41		1	2.07		0.6	30	43.5	1.523		1.47	1.90	5	9.5	14.0
46		1	2.11		0.6	30	43.5	1.523		1.52	2.09	5	10.5	15.9
51		1	1.71		0.6	35	46.5	1.661		1.59	1.91	5	9.6	15.2
56		1	1.95		0.6	25	42	1.318		1.49	1.83	5	9.2	13.6
61		1	1.90		0.6	33	41.5	1.753		1.54	1.93	5	9.6	14.8
66		1	1.48		0.6	35	45.5	1.697		1.73	1.69	5	8.5	14.6
71	5	0.9962	2.08		0.6	36	47	1.690		1.69	1.78	5	8.9	15.0
76		1	2.27		0.6	35	43.5	1.774		1.73	2.18	5	10.9	18.8
81	5	0.9962	1.93		0.6	30	50.5	1.315		1.54	2.10	5	10.5	16.2
86	10	0.9848	1.40		0.6	40	42	2.097		1.71	1.67	5	8.3	14.0
91	10	0.9848	1.12		0.6	40	45	1.959		2.03	1.26	5	6.3	12.6
96		1	1.37		0.6	40	40.5	2.173		2.07	1.25	5	6.2	12.9
101	15	0.9659	1.35		0.6	40	43	2.049		2.11	1.36	5	6.8	13.9
106		1	1.21		0.6	35	43	1.794		1.92	1.28	5	6.4	12.3
111		1	1.51		0.6	32	42	1.681		1.74	1.36	5	6.8	11.8
116	5	0.9962	0.88		0.6	38	42.5	1.969		1.83	1.20	5	6.0	10.9
121		1	1.28		0.6	36	41	1.934		1.95	1.08	5	5.4	10.5
126		1	1.72		0.6	35	41.5	1.859		1.90	1.50	5	7.5	14.2
131	10	0.9848	1.81		0.6	35	42	1.837		1.85	1.77	5	8.8	16.1
136		1	1.60		0.6	35	43	1.794		1.82	1.71	5	8.5	15.5
141		1	1.54		0.6	32	42	1.681		1.74	1.57	5	7.9	13.6
146		1	1.51		0.6	34	42	1.785		1.73	1.53	5	7.6	13.2
151		1	1.48		0.6	30	42	1.577		1.68	1.50	5	7.5	12.6
156	5	0.9962	1.63		0.6	30	40	1.655		1.62	1.56	5	7.8	12.5
161		1	1.58		0.6	28	42	1.473		1.56	1.61	5	8.0	12.6
166		1	1.45		0.6	33	41	1.775		1.62	1.52	5	7.6	12.3
171		1	1.41		0.6	30	44	1.506		1.64	1.43	5	7.2	11.7
176		1	1.35		0.6	27	41.5	1.438		1.47	1.38	5	6.9	10.2
181		1	1.43		0.6	31	41	1.668		1.55	1.39	5	7.0	10.8
186		1	1.41		0.6	32	43	1.642		1.66	1.42	5	7.1	11.8
191	10	0.9848	1.31		0.6	29	43	1.490		1.57	1.36	5	6.8	10.5
196	5	0.9962	1.28		0.6	31	45	1.522		1.51	1.30	5	6.5	9.7
201		1	1.31		0.6	31	45.5	1.505		1.51	1.30	5	6.5	9.8

-Continued-

Appendix G.4. (page 2 of 2)

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Mean Vertical	Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area ($ft.^2$)	Flow (ft^3/s)
211		1	1.29		0.6	31	41	1.668		1.59	1.30	10	13.0	20.6
221		1	1.28		0.6	31	43	1.592		1.63	1.29	10	12.9	20.9
231		1	1.33		0.6	34	42.5	1.764		1.68	1.31	10	13.1	21.9
241		1	1.41		0.6	25	43.5	1.273		1.52	1.37	10	13.7	20.8
246	10	0.9848	1.39		0.6	21	41	1.137		1.20	1.40	5	7.0	8.3
251		1	1.40		0.6	13	44.5	0.657		0.90	1.40	5	7.0	6.3
256		1	1.21		0.6	11	42.5	0.584		0.62	1.31	5	6.5	4.0
261		1	1.60		0.6	25	41	1.349		0.97	1.41	5	7.0	6.8
266		1	1.93		0.6	35	42	1.837		1.59	1.77	5	8.8	14.1
271		1	1.83		0.6	34	41	1.828		1.83	1.88	5	9.4	17.2
276	10	0.9848	1.60		0.6	35	43	1.794		1.81	1.72	5	8.6	15.3
281	5	0.9962	1.78		0.6	32	42	1.681		1.74	1.69	5	8.5	14.6
286	10	0.9848	1.63		0.6	37	44	1.853		1.77	1.71	5	8.5	14.8
291	5	0.9962	1.42		0.6	36	43	1.845		1.85	1.53	5	7.6	14.0
296	10	0.9848	1.13		0.6	32	41	1.721		1.78	1.28	5	6.4	11.2
306		1	1.21		0.6	37	42.5	1.918		1.82	1.17	10	11.7	21.3
311		1	1.30		0.6	27	41	1.456		1.69	1.26	5	6.3	10.6
316		1	1.11		0.6	30	41	1.615		1.54	1.21	5	6.0	9.3
326	10	0.9848	0.83		0.6	26	41	1.402		1.51	0.97	10	9.7	14.4
336		1	0.91		0.6	24	42	1.266		1.33	0.87	10	8.7	11.6
341		1	0.29		0.9	20	42.5	1.046		1.16	0.60	5	3.0	3.5
346		1	0.15					0.523	(est)	0.78	0.22	5	1.1	0.9
351		1	0.05					0.174	(est)	0.35	0.10	5	0.5	0.2
353		1	0.01					0.000	(est)	0.09	0.03	2	0.1	0.0
201		1	1.31		0.6	31	45.5	1.505		1.51	1.30	5	6.5	9.8
211		1	1.29		0.6	31	41	1.668		1.59	1.30	10	13.0	20.6
221		1	1.28		0.6	31	43	1.592		1.63	1.29	10	12.9	20.9
231		1	1.33		0.6	34	42.5	1.764		1.68	1.31	10	13.1	21.9
241		1	1.41		0.6	25	43.5	1.273		1.52	1.37	10	13.7	20.8
246	10	0.9848	1.39		0.6	21	41	1.137		1.20	1.40	5	7.0	8.3
251		1	1.40		0.6	13	44.5	0.657		0.90	1.40	5	7.0	6.3
256		1	1.21		0.6	11	42.5	0.584		0.62	1.31	5	6.5	4.0
261		1	1.60		0.6	25	41	1.349		0.97	1.41	5	7.0	6.8
266		1	1.93		0.6	35	42	1.837		1.59	1.77	5	8.8	14.1
271		1	1.83		0.6	34	41	1.828		1.83	1.88	5	9.4	17.2
276	10	0.9848	1.60		0.6	35	43	1.794		1.81	1.72	5	8.6	15.3
281	5	0.9962	1.78		0.6	32	42	1.681		1.74	1.69	5	8.5	14.6
286	10	0.9848	1.63		0.6	37	44	1.853		1.77	1.71	5	8.5	14.8
291	5	0.9962	1.42		0.6	36	43	1.845		1.85	1.53	5	7.6	14.0
296	10	0.9848	1.13		0.6	32	41	1.721		1.78	1.28	5	6.4	11.2
306		1	1.21		0.6	37	42.5	1.918		1.82	1.17	10	11.7	21.3
311		1	1.30		0.6	27	41	1.456		1.69	1.26	5	6.3	10.6
316		1	1.11		0.6	30	41	1.615		1.54	1.21	5	6.0	9.3
326	10	0.9848	0.83		0.6	26	41	1.402		1.51	0.97	10	9.7	14.4
336		1	0.91		0.6	24	42	1.266		1.33	0.87	10	8.7	11.6
341		1	0.29		0.9	20	42.5	1.046		1.16	0.60	5	3.0	3.5
346		1	0.15					0.523	(est)	0.78	0.22	5	1.1	0.9
351		1	0.05					0.174	(est)	0.35	0.10	5	0.5	0.2
353		1	0.01					0.000	(est)	0.09	0.03	2	0.1	0.0

Depth		Velocity		George River Total	765.9
Average	1.49 ft	Average	1.59 ft/sec		
Maximum	2.27 ft	Maximum	2.17 ft/sec		

Notes: Average depth and average velocity are calculated using data from 11 ft through 336 ft, which is approximately 92 percent of stream width. Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.5. Discharge of the Mainstem George River upstream of the East Fork confluence, 1 September 1997.

DISCHARGE

322.7 $ft^3/s = 9.1\ m^3/s$

George River, Mainstem

DISCHARGE
AH-81-04

File No. 97MSGEO — Page 1 of 1
Crew L. DuBois, Spencer Reardon — Date 9/01/97
Habitat Location — Sampling Site Mainstem George — River Mile 12 — Meter Type Price AA No.
HUC 19030501 — Gage Number — Height 24.6cm(at weir)
Description RB head pin, George River mainstem 200 ft upstream from confluence with East Fork.
Weather 100% overcast, rain, 1700 hrs.

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area (ft.^{2})	Flow (ft^3/s)
0			0.00					0.000						
5		1	0.39		0.6	14	42	0.190	(est.)	0.10	0.20	5	1.0	0.1
10		1	0.85		0.6	35	40.5	1.904		1.05	0.62	5	3.1	3.2
15		1	1.20		0.6	50	42	2.613		2.26	1.03	5	5.1	11.6
20		1	1.58		0.6	60	44	2.989		2.80	1.39	5	7.0	19.5
25	5	0.9962	1.81		0.6	60	45.5	2.892		2.94	1.70	5	8.5	24.8
30		1	2.13		0.6	60	40.5	3.245		3.07	1.97	5	9.9	30.2
35		1	2.18		0.6	60	43.5	3.023		3.13	2.16	5	10.8	33.8
40		1	2.03		0.6	60	45	2.923		2.97	2.11	5	10.5	31.3
45		1	1.95		0.6	55	43	2.806		2.86	1.99	5	10.0	28.5
50	10	0.9848	1.96		0.6	50	45	2.441		2.62	1.96	5	9.8	25.3
55	5	0.9962	1.72		0.6	40	44	2.003		2.22	1.84	5	9.2	20.4
60	5	0.9962	1.76		0.6	40	47	1.877		1.94	1.74	5	8.7	16.8
65	5	0.9962	1.64		0.6	35	42	1.837		1.86	1.70	5	8.5	15.7
70	25	0.9063	1.44		0.6	40	40.5	2.173		2.00	1.54	5	7.7	14.0
75	30	0.866	1.39		0.6	50	46.5	2.363		2.27	1.42	5	7.1	13.9
80	15	0.9659	1.52		0.6	35	42.5	1.815		2.09	1.46	5	7.3	14.7
85	10	0.9848	1.18		0.6	33	42.5	1.713		1.76	1.35	5	6.8	11.7
90	5	0.9962	0.78		0.6	16	42	0.850		1.28	0.98	5	4.9	6.3
92.5		1	0.25		0.9	12	47	0.577		0.71	0.52	2.5	1.3	0.9
95		1	0.05					0.115	(est.)	0.35	0.15	2.5	0.4	0.1
96		1	0.00					0.000	(est.)	0.06	0.03	1	0.0	0.0

Depth: Average 1.60 ft; Maximum 2.18 ft

Velocity: Average 2.32 ft/sec; Maximum 3.24 ft/sec

George River Total (mainstem RM 12): **322.7**

Notes: Average depth and average velocity are calculated using data from 10 ft through 90 ft, which is approximately 83 percent of stream width.
Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.6. Discharge of the East Fork upstream of the confluence with the Mainstem George River, 2 August 1997.

DISCHARGE

251.5 $ft^3/s = 7.1\ m^3/s$

George River, East Fork

DISCHARGE

AH-81-04

File No. 97EFGEO1 — Page 1 of 1

Crew L. DuBois — Date 8/02/97

Habitat — Sampling Site East Fork, George — River Mile 12 — Meter Type Price AA — No.

Location

HUC 19030501 — Gage Number — Height 17.5cm(at weir)

Description RB head pin, 100 ft upstream from confluence with mainstem.

Weather Wind E at 20, 1700 hrs.

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area ($ft.^2$)	Flow (ft^3/s)
0		1	0.00					0.000						
3		1	0.35		0.9	14	45	0.698	(est.)	0.35	0.18	3	0.5	0.2
5.5		1	0.68		0.6	23	43	1.186		0.94	0.52	2.5	1.3	1.2
8		1	0.87		0.6	30	44	1.506		1.35	0.78	2.5	1.9	2.6
10.5	5	0.9962	1.26		0.6	35	44.5	1.735		1.62	1.07	2.5	2.7	4.3
13	5	0.9962	1.36		0.6	40	40.5	2.173		1.95	1.31	2.5	3.3	6.4
15.5	7.5	0.9914	1.45		0.6	45	44	2.249		2.21	1.41	2.5	3.5	7.7
18	7.5	0.9914	1.62		0.6	45	46	2.153		2.20	1.54	2.5	3.8	8.4
20.5	2.5	0.999	1.52		0.6	43	42.5	2.226		2.19	1.57	2.5	3.9	8.6
23	2.5	0.999	1.48		0.6	43	40.5	2.334		2.28	1.50	2.5	3.8	8.5
25.5		1	1.58		0.6	40	42	2.097		2.22	1.53	2.5	3.8	8.5
28	5	0.9962	1.62		0.6	45	40.5	2.441		2.27	1.60	2.5	4.0	9.0
30.5		1	1.68		0.6	55	43.25	2.790		2.62	1.65	2.5	4.1	10.8
33		1	1.92		0.6	50	44	2.496		2.64	1.80	2.5	4.5	11.9
38		1	1.98		0.6	50	40	2.743		2.62	1.95	5	9.8	25.5
40.5		1	1.88		0.6	55	40.5	2.977		2.86	1.93	2.5	4.8	13.8
43	2.5	0.999	1.90		0.6	50	41	2.676		2.83	1.89	2.5	4.7	13.3
48		1	1.60		0.6	50	40.5	2.709		2.69	1.75	5	8.8	23.6
53		1	1.38		0.6	55	44.5	2.712		2.71	1.49	5	7.5	20.2
58	5	0.9962	1.27		0.6	55	43.5	2.774		2.74	1.33	5	6.6	18.1
63		1	1.01		0.6	40	39	2.256		2.51	1.14	5	5.7	14.3
68		1	0.97		0.6	40	40	0.744		1.50	0.99	5	5.0	7.4
73		1	0.85		0.6	40	42.5	2.072		1.41	0.91	5	4.6	6.4
78		1	0.75		0.6	35	42	1.837		1.95	0.80	5	4.0	7.8
83		1	0.62		0.6	30	42.5	1.559		1.70	0.69	5	3.4	5.8
88		1	0.49		0.6	25	42	1.318		1.44	0.56	5	2.8	4.0
93		1	0.35		0.9	20	50.5	0.883		1.10	0.42	5	2.1	2.3
98		1	0.12					0.294	(est.)	0.59	0.24	5	1.2	0.7
103		1	0.05					0.126	(est.)	0.21	0.09	5	0.4	0.1
107		1	0.00					0.000	(est.)	0.06	0.03	4	0.1	0.0

Depth		Velocity	
Average	1.32 ft	Average	2.16 ft/sec
Maximum	1.98 ft	Maximum	2.98 ft/sec

East Fork George River Tot **251.5**

Notes: Average depth and average velocity are calculated using data from 5.5 ft through 88 ft, which is approximately 77 percent of stream width. Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.7. Discharge of the East Fork upstream of the confluence with the Mainstem George River, 1 September 1997.

DISCHARGE

383.3 ft^3/s = 10.9 m^3/s

George River, East Fork

DISCHARGE
AH-81-04

File No. 97EFGEO2 — Page 1 of 1
Crew L. DuBois, Spencer Reardon — Date 9/01/97
Habitat Location — Sampling Site East Fork, George — River Mile 12 — Meter Type Price AA No.
HUC 19030501 — Gage Number — Height 24.6cm(at weir)
Description RB head pin, 100 ft upstream from confluence with mainstem.
Weather 100% overcast, rain, 1800 hrs.

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area (ft.^{2})	Flow (ft^3/s)
0			0.00					0.000						
1		1	0.02					0.095	(est.)	0.05	0.01	1	0.0	0.0
3.5		1	0.41		0.6	18	42	0.954		0.52	0.22	2.5	0.5	0.3
6		1	0.81		0.6	19	45	0.940		0.95	0.61	2.5	1.5	1.4
11		1	1.28		0.6	30	42	1.577		1.26	1.05	5	5.2	6.6
16		1	1.69		0.6	61	51	2.625		2.10	1.49	5	7.4	15.6
21		1	1.90		0.6	52	44	2.595		2.61	1.80	5	9.0	23.4
26		1	1.81		0.6	57	41.5	3.010		2.80	1.86	5	9.3	26.0
31		1	1.97		0.6	56	42	2.923		2.97	1.89	5	9.5	28.0
36		1	2.22		0.6	65	45	3.164		3.04	2.10	5	10.5	31.9
41		1	2.41		0.6	59	47	2.754		2.96	2.32	5	11.6	34.3
46		1	2.22		0.6	58	42	3.027		2.89	2.32	5	11.6	33.5
51		1	1.91		0.6	54	41.5	2.854		2.94	2.07	5	10.3	30.4
56		1	1.69		0.6	53	40.5	2.870		2.86	1.80	5	9.0	25.8
61		1	1.52		0.6	57	41	3.047		2.96	1.61	5	8.0	23.7
66		1	1.41		0.6	52	41	2.782		2.91	1.47	5	7.3	21.3
71		1	1.32		0.6	49	41	2.623		2.70	1.37	5	6.8	18.4
81		1	0.95		0.6	41	40	2.254		2.44	1.14	10	11.4	27.7
91	5	0.9962	0.72		0.6	36	41.5	1.911		2.08	0.84	10	8.4	17.3
106		1	0.48		0.6	25	41.5	1.333		1.62	0.60	15	9.0	14.6
111		1	0.32		0.9	17	41	0.924		1.13	0.40	5	2.0	2.3
116		1	0.11					0.305	(est.)	0.61	0.22	5	1.1	0.7
121		1	0.10					0.231	(est.)	0.27	0.11	5	0.5	0.1

East Fork George River Tot **383.3**

	Depth		Velocity
Average	1.61 ft	Average	2.56 ft/sec
Maximum	2.41 ft	Maximum	3.16 ft/sec

Notes: Average depth and average velocity are calculated using data from 6 ft through 91 ft, which is approximately 70 percent of stream width. Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.8. Chemical analysis of water samples collected from George River, 1996 - 2002.

Parameter	EPA Std. [a] (mg/L)	Date of Sample: 1996 6/21	1996 7/1	1996 7/30	1997 6/23	1997 6/23	1997 6/23	1997 6/26	1997 9/17	1998 6/23	1998 8/8	2000 8/12	2002 6/18	2002 7/18
Depth		Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface
Location		RM 4	RM 4	RM 4	E. Fork	RM 14	RM 4	RM 5	RM 5	RM 5	RM 5	RM 5	RM 5	RM 5
Relative Water Level		Low	Moderate	Bank Full	Mod. / Low	Mod. / Low	Mod. / Low	Mod. / Low	V. Low	Moderate	Bank Full	Mod. / High	Low	V. Low
Specific Conductance (mmhos/cm)			122.0 [b]	102.0 [b]				147.0 [b]	167.0 [b]	124.0 [b]	116.0 [b]	133.0 [b]	142.0 [b]	158.0 [b]
pH	6.5 to 9.0 [e]		7.0 [b]	7.5 [b]				7.6 [b]	7.8 [b]	7.4 [b]	7.4 [b]	7.1 [b]	7.5 [b]	7.4 [b]
Alkalinity (mg/L)			55.2 [b]	47.6 [b]				70.5 [b]	78.8 [b]	61.0 [b]	54.3 [b]	59.6 [b]	65.8 [b]	82.4 [b]
Turbidity (NTU)			20.1 [b]	59.8 [b]				3.0 [b]	2.0 [b]	9.0 [b]	11.0 [b]	10.0 [b]	7.0 [b]	3.9 [b]
Color (Pt units)				38.0 [b]				20.0 [b]	14.0 [b]	27.0 [b]	27.0 [b]	21.0 [b]	15.0 [b]	14.0 [b]
Calcium (mg/L)			16.0 [b]	13.2 [b]						17.2 [b]	14.7 [b]	17.3 [b]	17.5 [b]	20.8 [b]
Magnesium (mg/L)			4.8 [b]	5.4 [b]						5.1 [b]	4.7 [b]	5.7 [b]	5.7 [b]	6.7 [b]
Iron (mg/L)	1000 [e]		1157.0 [b]	2621.0 [b]						393.0 [b]	245.0 [b]	716.0 [b]	698.0 [b]	369.0 [b]
Ammonia (mg/L N)													13.2 [b]	27.6 [b]
Nitrate + Nitrite (mg/L N)													227.7 [b]	21.8 [b]
Reactive silicon (mg/L Si)			2788.0 [b]	3280.0 [b]				1429.0 [b]	2798.0 [b]	3608.0 [b]	3771.0 [b]	3689.0 [b]	3525.0 [b]	2560.0 [b]
Aluminum (mg/L)		31 [c]		1800.0 [c]										
Antimony (mg/L)	1600 [e]	<0.1 [cg]		<0.1 [cg]										
Arsenic (mg/L)	48 [e]	<1 [cg]		1.0 [c]	<50.0 [dg]	<50.0 [dg]	<50.0 [dg]		<50.0 [dg]					
Barium (mg/L)	1000 [f]	55.1 [c]		88.7 [c]										
Beryllium (mg/L)	5.3 [e]	<0.1 [c]		0.3 [c]										
Boron (mg/L)		4 [c]		4.0 [c]										
Cadmium (mg/L)	1.1 [e]	<0.1 [cg]		<0.1 [cg]	<2.0 [dg]	<2.0 [dg]	<2.0 [dg]		<2.0 [dg]					
Calcium (mg/L)		19900 [c]		15500.0 [c]	17300.0 [d]	19600.0 [d]	18900.0 [d]		22800.0 [d]					
Cerium (mg/L)		0.06 [c]		1.9 [c]										
Chromium (mg/L)		<0.5 [cg]		2.0 [c]	<5.0 [dg]	<5.0 [dg]	<5.0 [dg]		<5.0 [dg]					
Cobalt (mg/L)		0.2 [c]		1.5 [c]										
Copper (mg/L)	12 [e]	1.2 [c]		5.1 [c]	<2.0 [dg]	<2.0 [dg]	<2.0 [dg]		<2.0 [dg]					
Iron (mg/L)	1000 [e]	1280 [c]		3340.0 [c]										
Lead (mg/L)	3.2 [e]	<0.1 [cg]		1.5 [c]	<20.0 [dg]	<20.0 [dg]	<20.0 [dg]		<20.0 [dg]					
Lithium (mg/L)		2.8 [c]		4.4 [c]										
Magnesium (mg/L)		6500 [c]		4940.0 [c]	5250.0 [d]	5940.0 [d]	5730.0 [d]		6960.0 [d]					
Manganese (mg/L)		86.8 [c]		170.0 [c]										
Mercury (mg/L)	0.012 [e]	<0.03 [cg]		<0.03 [cg]										
Nickel (mg/L)	160 [e]	0.7 [c]		3.0 [c]										
Potassium (mg/L)		670 [c]		470.0 [c]										
Scandium (mg/L)		0.5 [c]		1.9 [c]										
Silver (mg/L)	0.12 [e]	<0.05 [cg]		<0.05 [cg]										
Sodium (mg/L)		2280 [c]		1840.0 [c]										
Strontium (mg/L)		89.9 [c]		62.7 [c]										
Thallium (mg/L)	40 [e]	0.11 [c]		0.1 [c]										
Titanium (mg/L)		1.80 [c]		18.0 [c]										
Uranium (mg/L)		0.10 [c]		0.1 [c]										
Yurium (mg/L)		0.12 [c]		1.3 [c]										
Zinc (mg/L)	110 [e]	1 [c]		12.0 [c]	<4.0 [dg]	6.0 [d]	<4.0 [dg]		<4.0 [dg]					

[a] United States Environmental Protection Agency (EPA 1986).
[b] Alaska Department of Fish and Game, Limnology Unit, Soldotna, AK.
[c] Elemental Research Inc., North Vancouver, B.C., Canada.
[d] Analytical Resources, Inc.
[e] freshwater chronic criteria
[f] drinking water criteria
[g] not detected at given level of analysis

Appendix G.9. Daily water conditions and weather at the George River weir, 1998.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/09	800	91.5*				4	B	10
6/10	1700	89.0			Turbid		0	
6/11	1300	85.5	6.0	6.0	Turbid	3	A	5
6/12	715	84.0	7.0	7.0	Turbid	2	A	10
6/13	1100	79.0	6.0	10.0	Turbid	3	A/E	0
6/14	950	74.0	6.0	13.0	Turbid	2	A/E	0
6/15	715	71.5	5.0	8.0	Turbid	2	A	0
6/16	715	67.0	7.0	8.0	Turbid	1	0	0
6/17	800	63.0	6.0	8.0	Clear	1	0	0
6/18	730	61.0	7.0	9.0	Clear	1	0	0
6/19	730	57.0			Clear	4	B	SW 20
6/20	1000	53.5	8.0	9.0	24	3	A	SW 5-10
6/21	1000	54.0	7.0	8.0	24	4	B	0
6/22	830	65.0	7.0	13.0	25	1	0	0
6/23	730	66.0	9.0	9.0	25	2	0	0
6/24	730	61.0	8.5	8.0	25	5	B	0
6/25	730	58.5	6.5	5.0	25	4	0	0
6/26	730	56.0	8.5	12.5	25	1	0	0
6/27	830	52.0	9.0	16.0	25	3	0	0
6/28	730	52.0	9.5	13.0	25	3	0	0
6/29	730	49.5	10.0	20.0	25	1	0	0
6/30	730	47.5	9.0	14.0	25	2	0	0
7/01	730	48.5	14.0	14.0	Clear	3	A	SW 5-10
7/02	730	48.0	14.0	16.0	25	2	0	SW 5-10
7/03	1030	47.5	14.0	14.0	Clear	2	0	0
7/04	1030	48.0	11.0	16.0	25	4	A	0
7/05	1030	49.5	13.0	14.0	Clear	4	A	0
7/06	730	49.0	12.0	12.0	Clear	4	A	0
7/07	715	53.0	10.0	12.0	Clear	4	B	0
7/08								
7/09								
7/10								
7/11								
7/12								
7/13								
7/14								
7/15								
7/16								
7/17								
7/18								
7/19								
7/20								
7/21								
7/22								
7/23								
7/24								
7/25								

-Continued-

Appendix G.9. (page 2 of 2)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
7/26								
7/27	1700		11.0	19.0		3		
7/28								
7/29								
7/30								
7/31								
8/01								
8/02	2200	63.0	9.0	15.0		4	B	SW 15
8/03	715	90.0	9.0	14.0		4	0	S 5
8/04	730	118.0	8.0	10.0		4	A	0
8/05	730					4		
8/06	730					3		

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittaent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.10. Daily water conditions and weather at the George River weir, 1999.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/06	1700	82.0*	9.0	22.0	Turbid	1	0	S 15
6/07	830	85.0	9.0	12.0	Turbid	4	A	S 5
6/08	130	88.0	8.0	16.0	Turbid	4	A	S 10
6/09	730	92.0	6.5	9.0	Turbid	4	A	0
6/10	730	96.0	16.0	6.0	Turbid	3	A	0
6/11	730	96.0	7.0	7.0	Turbid	1	0	0
6/12	1030	93.0	10.0	21.0	Turbid	1	0	0
6/13	1030	91.0	10.0	20.0	Turbid	1	0	0
6/14	730	90.0	9.0	15.0	Clear	2	0	0
6/15	1200	87.0	11.0	24.0	Clear	1	0	0
6/16	730	85.0	11.0	15.0	Clear	2	A	0
6/17	1230	83.0	11.0	24.0	Clear	3	0	0
6/18	900	100.0	11.0	15.0	Turbid	3	B	0
6/19	930	139.0	7.0	15.0	Turbid	1	0	0
6/20	1030	112.0		20.0	Turbid	4	A	0
6/21	730	106.0	6.0	8.0	Turbid	3	A	0
6/22	1000	106.0	9.0	14.0	Turbid	3	0	0
6/23	1030	98.0	8.0	19.0	Turbid	2	0	0
6/24	730	92.0	8.0	8.0	Turbid	5	0	0
6/25	730	90.0	8.0	11.0	Turbid	5	0	0
6/26	1030	90.0	10.0	20.0	Turbid	1	0	0
6/27	1030	94.5	10.0	16.0	Turbid	1	0	0
6/28	830	93.0	11.0	18.0	Turbid	2	0	0
6/29	730	98.0	9.0	11.0	Turbid	5	0	0
6/30	730	92.0	9.0	16.0	Turbid	1	0	0
7/01	730	96.0	8.0	12.0	Turbid	5	0	0
7/02	730	94.0	9.0	14.0		4	A	NW 10-15
7/03		90.0*						
7/04		86.0*						
7/05	1100	81.0		15.0		1	0	
7/06	730	73.0	10.0	13.0		1	0	0
7/07	730	71.0	11.0	12.0		4	0	0
7/08	730	67.0	9.0	9.0	Clear	3	0	0
7/09	730	63.5	9.0	11.0	Clear	3	0	0
7/10	1030	61.0	10.0	20.0	Clear	3	0	0
7/11	1030	58.0			Clear	1	0	
7/12	700	55.0			Clear	4	A	0
7/13	730	56.0		11.0	Clear	1/5	0	0
7/14	730	56.5		12.0	Clear	4	0	0
7/15	730	55.0		10.0	Clear	3	0	0
7/16	730	55.0		10.0	Clear	4	A	0
7/17	1030	56.5	12.0	10.0	Clear	4	A	0
7/18	1030	60.5	10.0	10.0	Clear	4	A	0
7/19	730	58.0	10.0	12.0	Clear	4	A	0
7/20	730	63.5	10.0	10.0	Clear	4	A	S 5-10
7/21	730	70.0	8.0	9.0	Turbid	4	A	SE 0-5
7/22	730	69.0	9.0	4.0	Clear	1	0	0

-Continued-

Appendix G.10. (page 2 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
7/23	730	67.0	10.0	9.0	Clear	3	0	0
7/24	1100	64.0	10.0	15.0	Clear	4	A	0
7/25	730	66.5	9.0	14.0	Clear	4	B	0
7/26	730	80.0	9.0	9.0	Clear	4	A	0
7/27	730	86.0	9.0	10.0	Turbid	4	0	0
7/28	730	94.0	9.0	7.0	Turbid	4	0	0
7/29	730	93.0	9.0	12.0	Turbid	4	0	0
7/30	730	105.0	9.0	9.0	Turbid	4/5	0	0
7/31	730	101.0	8.0	18.0	Turbid	4	0	S 20+
8/01	1030	95.0	8.0	14.0	Turbid	4	0	0
8/02	730	92.0		14.0	Turbid	3	0	0
8/03	730	89.0	9.0	10.0	Turbid	3	0	0
8/04	730	86.0	10.0	18.0		4	A	S 25-40
8/05	730	83.0	9.0	14.0		3	0	0
8/06	730	79.0	10.0	10.0		1	0	0
8/07	1030	74.0	11.0	16.0		2	0	N 5-10
8/08	1030	69.0	10.0	13.0		4	A	0
8/09	730	70.0	10.0	13.0		5	0	0
8/10	730	70.0	13.0	11.0			A	SE 0-5
8/11	730	65.0	10.0	13.0		3	0	0
8/12	1835	80.0				4	A	0
8/13	730	87.0	10.0	10.0		2	0	0
8/14	1030	85.0				4	A	
8/15	1030	82.0	8.0	13.0		3	A	
8/16	730	83.0				2	0	NE 5-10
8/17	730	80.0	11.0	12.0		5	0	0
8/18	730	76.0					0	0
8/19	730	71.0					A	0
8/20	1030	89.0				4	A	SW 5-10
8/21	1030	98.0	10.0	10.0		5	0	0
8/22	1030	93.0	8.0	10.0		3	0	0
8/23	730	92.0	8.0	9.0		3	0	0
8/24	730	97.0		4.0		3	0	0
8/25	730	93.0		7.0		3	0	0
8/26	730	92.0	7.0	8.0	Clear	3	0	0
8/27	730	90.0	7.0	6.0	Clear	5	0	0
8/28	1030	85.0	7.0	10.0	Clear	1	0	0
8/29	130	82.0			Clear	5	0	NW 0-5
8/30	730	79.0		9.0	Clear	4	A	
8/31	730	80.0	7.0	8.0	Clear	4	0	0
9/01	1030	80.0	8.0	10.0	Clear	3	A	SE 10-15
9/02	1030	90.0	8.0	9.0	Clear	4	0	0
9/03	1030	84.0	8.0	8.0	Clear	1	0	0
9/04	1030	80.0	9.0	8.0	Clear	4	0	S 0-5
9/05	1030	78.0	8.0	9.0	Clear	1	0	0
9/06	1030	76.0	8.0	10.0	Clear	2	0	0
9/07	1030	74.0	4.0	9.0	Clear	3	0	0

-Continued-

Appendix G.10. (page 3 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
9/08	1030	68.0	8.0	4.0	Clear	5	0	0
9/09	1030	67.0	6.0	5.0	Clear	1	0	0
9/10	1030	66.0	5.0	5.0	Clear	1	0	0
9/11	1030	63.0	5.0	0.0	Clear	1	0	N 0-5
9/12	1030	62.0	5.0	7.0	Clear	3	0	0
9/13	1030	60.0	8.0	9.0	Clear	4	0	0
9/14	1030	60.0	9.0	5.0	Clear	5	0	0
9/15	1030	57.0	8.0	10.0	Clear	2	0	NW 0-5
9/16	1700	56.0	8.0	14.0	Clear	4	0	N 5-10
9/17	1700	56.0	10.0	12.0	Clear	1	0	0
9/18	1030	56.0	8.0	6.0	Clear	4	0	0
9/19	1030	61.0	8.0	9.0	Clear	4	A	0
9/20	1700	57.0	8.0	12.0	Clear	4	A	NW 0-5
9/21	1030	56.0	8.0	10.0	Clear	1	0	0
9/22	1030	53.0	8.0	6.0	Clear	1	0	N 0-5
9/23	1030	51.0	8.0	6.0	Clear	4	0	NE 5-10
9/24	1030	51.0	5.0	5.0	Clear	4	0	0
9/25	1030	49.0	6.0	0.0	Clear	3	0	0

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 = partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittaent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.11. Discharge of the George River near the weir site, 8 June 1999.

DISCHARGE

4,509 ft^3/s = 127.7 m^3/s

George River Weir

DISCHARGE
AH-81-04

File No. GEO99a — Page 1 of 2
Crew L. DuBois, Ronnie Vanderpool, T Sanbei — Date 06/08/99
Habitat — Sampling Site George River Weir — River Mile 4.5 — Meter Type Price AA No.
Location S21N46W10CA
HUC 19030501 — Gage Number — Height 85.0 cm
Description George River at previous year weir site. Head pin right bank. All angles assumed to be 0 as estimated secchi is 0.25m. All measurments from 40 ft through 350 ft were taken from skiff with person driving and/or person in water stablizing skiff.
Weather

Distance from Head Pin (ft.) LB RB	Angle	Angle Coef.	Vel Depth (ft.)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity fps Point	Velocity fps Mean Vertical	Velocity fps Mean Cell	Mean Cell Depth (ft.)	Cell Width (ft.)	Cell Area (ft.^{2})	Flow (ft^3/s)
0			0.62					0.409	(est.)					
10		1	1.95		0.6	25	43	1.287	(est.)	0.85	1.29	10	12.9	10.9
20		1	3.05		0.6	60	45	2.923		2.11	2.50	10	25.0	52.6
30		1	3.55		0.6	60	41	3.206		3.06	3.30	10	33.0	101.1
40		1	3.60		0.6	65	40	3.556		3.38	3.58	10	35.8	120.9
50		1	3.82		0.6	70	41	3.735		3.65	3.71	10	37.1	135.3
60		1	3.85		0.6	72	41	3.841		3.79	3.84	10	38.4	145.3
70		1	3.73		0.6	70	42	3.647		3.74	3.79	10	37.9	141.9
80		1	3.68		0.6	70	42	3.647		3.65	3.71	10	37.1	135.1
90		1	3.65		0.6	80	44	3.975		3.81	3.67	10	36.7	139.7
100		1	3.75		0.6	80	40.5	4.316		4.15	3.70	10	37.0	153.4
110		1	3.78		0.6	80	44	3.975		4.15	3.77	10	37.7	156.1
120		1	3.85		0.6	70	43	3.563		3.77	3.82	10	38.2	143.8
130		1	3.70		0.6	80	43	4.067		3.81	3.78	10	37.8	144.0
140		1	3.72		0.6	80	43	4.067		4.07	3.71	10	37.1	150.9
150		1	3.70		0.6	80	42	4.163		4.12	3.71	10	37.1	152.7
160		1	3.62		0.6	80	42	4.163		4.16	3.66	10	36.6	152.4
170		1	3.72		0.6	80	44	3.975		4.07	3.67	10	36.7	149.3
180		1	3.82		0.6	80	45	3.888		3.93	3.77	10	37.7	148.2
190		1	3.65		0.6	80	45	3.888		3.89	3.74	10	37.4	145.2
200		1	3.55		0.6	80	44	3.975		3.93	3.60	10	36.0	141.5
210		1	3.52		0.6	80	44	3.975		3.98	3.54	10	35.4	140.5
220		1	3.48		0.6	80	45	3.888		3.93	3.50	10	35.0	137.6
230		1	3.62		0.6	70	40	3.828		3.86	3.55	10	35.5	136.9
240		1	3.45		0.6	80	42	4.163		4.00	3.54	10	35.4	141.2
250		1	3.42		0.6	70	41	3.735		3.95	3.44	10	34.4	135.7
260		1	3.33		0.6	70	41	3.735		3.73	3.38	10	33.8	126.1
270		1	3.30		0.6	70	43	3.563		3.65	3.32	10	33.2	121.0
280		1	3.40		0.6	70	42	3.647		3.60	3.35	10	33.5	120.8
290		1	3.38		0.6	70	43	3.563		3.60	3.39	10	33.9	122.2
300		1	3.32		0.6	70	44	3.482		3.52	3.35	10	33.5	118.0
310		1	3.30		0.6	70	45	3.406		3.44	3.31	10	33.1	114.0
320		1	3.42		0.6	60	46	2.860		3.13	3.36	10	33.6	105.3
330		1	3.58		0.6	60	44	2.989		2.92	3.50	10	35.0	102.4
340		1	3.70		0.6	60	48	2.743		2.87	3.64	10	36.4	104.3
350		1	3.60		0.6	40	49	1.801		2.27	3.65	10	36.5	82.9
360		1	3.10		0.6	40	48	1.838		1.82	3.35	10	33.5	61.0
370		1	1.05		0.6	0	40	0.020	(est.)	0.93	2.08	10	20.8	19.3
372		1	0.00		0.6			0.000	(est.)	0.01	0.53	2	1.1	0.0

	Depth	Velocity
Average	3.56 ft	3.59 ft/sec
Maximum	3.85 ft	4.32 ft/sec

George River Total 4,509

Notes: Average depth and average velocity are calculated using data from 20 ft through 360 ft, which is approximately 91 percent of stream width. Estimates for a given row apply to point velocity, mean cell velocity, and flow.

Appendix G.12. Daily water conditions and weather at the George River weir, 2000.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/14	730	61.0				3	0	0
6/15	1030	59.0	10.0	9.0		3	0	E 15
6/16	720	58.5	9.0	3.0		4	0	0
6/17	1030	56.0	9.0	11.0		4	0	0
6/18	1030	55.0		16.0		2	0	0
6/19	748	54.0				2		
6/20	830	53.0				3		0
6/21	730	52.0	9.0	9.0		1	0	0
6/22	730	50.0	9.0	10.0		1	0	0
6/23	730	47.0	9.0	9.0		1	0	0
6/24	1030	45.0	11.0	25.0		1	0	0
6/25	1030	44.0	10.0	12.0		4	A	
6/26	730	42.5	11.0	12.0		1	0	
6/27	730	42.0	12.0	10.0		4	0	0
6/28	730	39.0	13.0	14.0		4	0	
6/29	730	38.5	12.0	12.0		4	0	0
6/30	730	38.0	11.0	11.0		4	0	0
7/01	1030	38.0	12.0	19.0		1	0	0
7/02	1030	36.5	13.0	23.0		1	0	0
7/03		35.5*	13.0	17.0				
7/04	1030	34.5	14.5	20.0		3		0
7/05	730	34.0	11.0	12.0		1		0
7/06	730	44.0	13.5	12.0		1	0	0
7/07	730	55.0	11.0	12.0		3	0	0
7/08	1030	40.0	13.0	19.0		3		0
7/09	1030	38.0	14.0	17.0		4	A	
7/10	730	40.0	13.5	14.0		4		0
7/11	730	51.0	15.0	14.0		1	0	0
7/12	1030	48.0	14.0	18.0		1	0	NW 0-5
7/13	730	44.0				4		0
7/14	730	42.0	13.0	13.0		4	A	SE 5-10
7/15	1030	47.0	11.5	12.5		4	A	SW 5-10
7/16	1030	50.0	11.0	13.0		4	A	SW 10-15
7/17	730	51.0	11.0	14.0		4	A	SW 0-5
7/18	730	53.0	11.0	8.0		5	0	0
7/19	1030	56.0	11.0	16.0		2	0	
7/20	1700	50.0						
7/21	730	49.0	11.0	10.0		4	A	
7/22	1030	48.0	11.0	14.0		3	0	S 0-5
7/23	1030	46.0	12.0	14.5		4	0	S 5-10
7/24	730	46.0	12.0	14.0		4	A	
7/25	730	49.5						
7/26	1700	53.0*						
7/27	1700	50.0						
7/28	730	49.5				4	B	
7/29	1030	54.0	11.0	8.0		4	A	
7/30	1030	52.0				4		S 10-15
7/31		67.5*						
8/01	730	83.0			Turbid	4		W 0-5
8/02	730	88.0	8.5	14.5	Turbid	3		W 10-15

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Appendix G.12. (page 2 of 2)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
8/03	1030	80.0				4		W 10-15
8/04	730	83.0	9.0	11.0		4	B	0
8/05	1030	104.0	9.0	13.5	Turbid	3		W 0-5
8/06	1030	95.0	8.0	13.0		4		SW 0-5
8/07	830	92.0	8.0	8.0		4		0
8/08	730	87.0	9.0	10.0		4		0
8/09	730	86.0	7.0	10.0		4		0
8/10	730	82.0	7.0	9.0		4	B	0
8/11	730	74.5		12.0		4	A	
8/12	1030	80.0		11.0		4	0	0
8/13	1030	75.0	7.5	13.0		4	B	W 0-5
8/14	730	87.5	7.5	9.0		3	0	0
8/15	730	93.0	7.0	4.0		1	0	0
8/16		86.5*						
8/17	730	80.0	8.0	11.0		4		0
8/18	730	79.0	8.0	14.0		4	A	
8/19	730	83.0				4	A	0
8/20	1700	77.0						
8/21	730	75.0	9.0	11.5		1	0	0
8/22	730	72.0	8.5	6.0		3	0	0
8/23	730	66.0	6.5	0.5		1	0	0
8/24	730	64.0	6.0	2.5		3	0	0
8/25	730	61.0	5.5	0.0		3	0	0
8/26	1030	60.0				3	0	0
8/27	1030	59.0	6.5	11.5		4	B	
8/28	1030	61.0	6.0	12.0		4	0	N 5
8/29	1700	58.0						
8/30		57.0*						
8/31		56.0*						
9/01	1700	55.0						
9/02	1000	53.0	6.0	11.0		3		W 10
9/03	1000	53.0	6.0	12.0		2	A	0
9/04	1000	50.0	7.0	11.0		4	A	0
9/05	1000	51.0	7.0	8.0		4	B	0
9/06	1100	61.0	7.0	8.0		4	A	0
9/07	1000	81.0	6.5	5.0		4		0
9/08	1000	76.0	6.0	8.0		4	A	0
9/09	1000	74.0	5.0	3.0		1		0
9/10	1100	75.0	6.0	5.0		4	A	0
9/11	1000	85.0	5.0	7.0		3	A	0
9/12	1000	90.0	5.0	3.0		4	A	0
9/13	1000	90.0	6.0	0.0		1	A	0
9/14	1030	85.0	4.5	4.0		2		0
9/15	1000	84.0	4.0	3.0		1		0
9/16	1000	80.0	4.0	4.0		1		0
9/17	1000	75.0	4.0	3.0		1		0

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 = partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.13. Daily water conditions and weather at the George River weir, 2001.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/09	730	122.0*		17.0		2		0
6/10	1030	117.0*	11.0	11.0		2		S 10
6/11	1700	112.0			Turbid			0
6/12	1700	107.0			Turbid			0
6/13	700	102.0	6.0	7.0	Turbid	4	A	0
6/14	700	97.0	6.0	7.0	Turbid	3	0	0
6/15	700	93.0	5.0	5.0	Turbid	1	0	0
6/16	1030	86.0			Turbid	1	0	
6/17	1030	83.0	9.0	20.0	Turbid	1	0	0
6/18	730	79.0	9.0	14.0	Turbid	1	0	0
6/19	730	76.0	9.0	14.0	Turbid	1	0	0
6/20	730	73.0	10.0	15.0	Clear	1	0	0
6/21	800	70.0				1	0	0
6/22	715	68.0	10.0	12.0	Clear	1	0	0
6/23	1000	65.0	12.0	17.0	Clear	2	0	0
6/24	1000	62.0	12.0	13.0	Clear	4	0	0
6/25	715	62.0	11.0	10.0	Clear	4	0	SW 5
6/26	730	63.0	9.0	10.0	Clear	4	0	SW 5
6/27		62.0*						
6/28	715	61.0	9.0	7.0	Clear	1	0	0
6/29	730	60.0	12.0	15.0	Clear	1	0	0
6/30	1030	57.0	12.0	14.0	Clear	4	0	W 5
7/01	1030	57.0	12.0	15.0	Clear	4	0	
7/02	730	55.0	12.0	18.0	Clear	1	A	
7/03	1700	56.5			Clear			
7/04	130	60.0	11.0	10.0	Clear	4	0	SW 5
7/05	1700	62.0			Clear			
7/06	730	58.0	11.0	11.0	Clear	2	0	0
7/07	1030	57.0	11.0	15.0	Clear	2	0	0
7/08	1000	54.0	9.0	8.0	Clear	2	0	0
7/09	730	53.0	9.0	11.0	Clear	4	0	0
7/10	1200	52.0	10.0	8.0	Clear	4	B	0
7/11	715	54.0	10.0	9.0	Clear	4	A	0
7/12	730	69.0	10.0	12.0	Turbid	4	A	SW 5-10
7/13	730	72.0	9.0	10.0	Turbid	4	A	0
7/14	1020	68.0	12.0	14.0	Turbid	4	0	0
7/15	1030	65.0	10.0	13.0	Clear	4	A	SW 10-15
7/16	715	66.0			Clear	4	A	0
7/17	730	72.0			Turbid	4	0	0
7/18	730	74.0			Turbid	5	0	0
7/19	730	72.0			Turbid	4	A	0
7/20	730	81.0				4	B	
7/21	1030	85.0	10.0	15.0		3	0	0
7/22	1030	83.0	10.0	14.0		4	B	
7/23	730	92.0	10.0	13.0		4	0	NE 5
7/24	730	96.0	9.0	11.0		4	A	
7/25	1700	88.0						

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Appendix G.13. (page 2 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
7/26	1700	89.0						
7/27	1030	88.0	10.0	13.0		4		
7/28	1030	88.0	9.0	10.0		4		
7/29	1030	86.0	10.0	19.0		2	0	0
7/30	730	85.0	10.0	11.0		4		
7/31	730	93.0	10.0	10.0		4	B	0
8/01	730	95.0	9.0	11.0		4	0	0
8/02	730	85.0	9.0	6.0		5	0	
8/03	730	82.0	9.0	8.0		4	0	
8/04	730	77.0	8.0	12.0		3	0	NE 5
8/05	730	76.0	8.0	2.0		5	0	0
8/06	730	74.0	9.0	8.0		4	0	S 5
8/07	730	72.0	9.0	5.0		5	0	
8/08	1030	69.0	11.0	15.0		1	0	S 15-20
8/09	730	68.0	10.0	7.0		1	0	0
8/10	730	66.0	9.0	11.0		4		S 5
8/11	730	65.0	10.0	11.0		4	A	0
8/12	730	65.0	11.0	10.0		4	A	
8/13	730	65.0	10.5	10.0		3	0	0
8/14	730	65.0	11.0	10.0		4	A	0
8/15	730	70.0	11.0	16.0		4	A	SW 5-10
8/16	1030	77.0	10.0	13.0		4		
8/17	730	104.0	9.0	10.0		4	A	0
8/18	1030	100.0	9.0	14.0		4	A	0
8/19	1030	104.0	9.0	10.0		4	B	S 5
8/20	1700	145.0*						
8/21	730	155.0*	9.0	10.0		3	A	
8/22	1700	145.0*						
8/23		142.5*						
8/24	730	140.0*	10.0	10.0		4		0
8/25	1030	135.0*	7.0	11.0	Turbid	2	0	0
8/26	1015	127.0	7.0	9.0	Turbid	5	0	0
8/27	1030	122.0	8.0	7.0	Turbid	4	A	0
8/28	730	117.0	7.0	7.0	Turbid	5	A	0
8/29	1030	113.0	7.0	9.0	Turbid	2	A	0
8/30	1030	107.0	6.5	6.0	Turbid	5	0	0
8/31	1030	103.0	7.0	10.0	Turbid	4	A	0
9/01	1030	104.0	7.0	8.0	Turbid	4	A	0
9/02	1030	101.0	7.0	10.0	Turbid	4	0	SE 5
9/03	1030	97.0	6.5	9.0	Turbid	3	0	0
9/04	1030	96.0	7.0	9.0	Turbid	4	A	S 5-10
9/05	1030	101.0	7.0	7.0	Turbid	4	0	SW 10-30
9/06	1030	99.0	6.0	5.5	Turbid	4	A	0
9/07	1030	96.0	6.0	7.0	Turbid	4	A	SW 10
9/08	1030	95.0	6.0	8.0	Turbid	3	0	0
9/09	1030	93.0	5.0	1.0	Clear	5	0	0
9/10	1030	91.0	5.0	0.0	Clear	5	0	NE 5

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Appendix G.13. (page 3 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
9/11	1030	89.0	5.0	-1.0	Clear	5	0	0
9/12	1030	88.0	4.5	4.0	Clear	4	0	0
9/13	1030	87.0	5.0	8.0	Clear	2	0	0
9/14	1030	86.5	5.0	7.0	Clear	3	0	0
9/15	1030	85.0	6.0	12.0	Clear	1	0	0
9/16	1030	84.0	5.0	6.0	Clear	1	0	0
9/17	1030	82.0	5.0	2.0	Clear	2	0	0
9/18	1030	81.0	6.0	10.0	Clear	4	0	NE 5
9/19	1030	79.0	5.0	4.0	Clear	4	0	W 5
9/20	1030	78.5	7.0	5.5	Clear	3	0	W 5
9/21	1030	76.0	5.0	3.0	Clear	1	0	0
9/22	1030	75.0	4.0	2.0	Clear	1	0	0

[a] Sky condition codes:
- 0 = no observation
- 1 = < 1/10 cloud cover
- 2 = partly cloudy; < 1/2 cloud cover
- 3 = mostly cloudy; > 1/2 cloud cover
- 4 = complete overcast
- 5 = thick fog

[b] Precipitation Codes:
- A = intermittaent rain
- B = continuous rain
- C = snow
- D = snow and rain
- E = hail
- F = thunder

* = River Stage was estimated.

Appendix G.14. Daily water conditions and weather at the George River weir, 2002.

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
6/11					High Turbidity			
6/12	730				High Turbidity	5	0	0
6/13	730	51			High Turbidity	1	0	0
6/14	730	45			High Turbidity	1	0	0
6/15	730	43			High Turbidity	1	0	0
6/16	730	39			High Turbidity	1	0	0
6/17	730	38			High Turbidity	1	0	0
6/18	730	26			High Turbidity	1	0	0
6/19	730	35			High Turbidity	4	0	SW 5-15
6/20	730	34.5			High Turbidity	4	A	0
6/21	730	36			High Turbidity	3	0	0
6/22	1030	35			Moderate Turbidity	1	0	0
6/23	1030	32	11	15	Moderate Turbidity	3	0	N 5
6/24	730	32	11	11	Moderate Turbidity	4	A	0
6/25	730	32	10	11	Low Turbidity	3	0	0
6/26	730	32	11	11	Low Turbidity	4	A	0
6/27	730	35	11	7	Moderate Turbidity	5	0	NW 0-5
6/28	730	33.5	11	10	Moderate Turbidity	3	A	0
6/29	1030	30	13	18	Low Turbidity	2	0	SW 0-5
6/30	1030	28	12	18	Low Turbidity	4	0	0
7/01	730	28	13	12	Clear	3	0	0
7/02	730	25	12	18	Clear	3	0	0
7/03	730	23	13	15	Clear	4	0	SW 10
7/04	730	23	10.5	13	Clear	1	0	0
7/05	730	24	11	12	Clear	4	0	0
7/06	730	24	11	12	Clear		0	0
7/07	1030	23	12	14	Clear	4	0	SW 15-20
7/08	730	20	12	12	Clear	4	0	0
7/09	730	20	12	12	Clear	4	0	0
7/10	730	19	12	10	Clear	4	0	0
7/11	730	18	13	13	Clear	4	A	0
7/12	730	18	13	10	Clear	4	A	0
7/13	1030	18	13	12	Clear	4	A	SW 5
7/14	1030	18	12	13	Clear	3	A	0
7/15	730	18	12.5	11	Clear	4	0	0
7/16	730	18	13	11	Clear	2	0	0
7/17	730	17	14	11	Clear	1	0	0
7/18	730	16	15	21	Clear	1	0	0
7/19	730	17	15	15	Clear	4	A	SW 5-10
7/20	1030	17	15	24.5	Clear	1	0	0
7/21	1030	16	14	13	Clear	3	0	0
7/22	730	15	15	13	Clear	4	A	0
7/23	730	15	14	14	Clear	4	A	0
7/24	715	16	15	15	Clear	4	A	0
7/25	715	17	14	14	Clear	4	0	0
7/26	715	20	13	13	Low Turbidity	3	B	S 0-5
7/27	1030	20	13	13	Low Turbidity	4	B	S 0-5

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Appendix G.14. (page 2 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
7/28	1030	24.5	12	12	Low Turbidity	2	0	0
7/29	715	25	11	11	Low Turbidity	1	0	0
7/30	730	21.5	12	12	Low Turbidity	1	0	0
7/31	715	19.5	13	13	Clear	1	0	0
8/01	715	16.5	14	14	Clear	1	0	0
8/02	715	15	14	14	Clear	1	0	0
8/03	1030	14	14	14	Clear	1	0	0
8/04	1030	13	14.5	14.5	Clear	1	0	S 0-5
8/05	1030	12.5	15	15	Clear	1	0	0
8/06	1030	14	15	15	Clear	4	B	0
8/07	715	14	14	14	Clear	4	0	0
8/08	800	14	12	12	Clear	3	A	0
8/09	715	13.5	12.5	12.5	Clear	4	0	0
8/10	715	12	10	10	Clear	4	0	0
8/11	730	12	11	9	Clear	4	0	0
8/12	715	12	11	10	Clear	4	0	0
8/13	715	12	10	0	Clear	4	0	0
8/14	715	11	10	1	Clear	1	0	0
8/15	715	10	11	9	Clear	5	A	0
8/16	715	10	11	11	Clear	4	0	N 5-10
8/17	1030	10	11	11	Clear	4	0	0
8/18	730	10	11	12	Clear	4	0	S 0-5
8/19	730	10	9.5	2	Clear	3	0	0
8/20	730	10	9	5	Clear	4	A	0
8/21	730	11	9.5	9	Clear	5	A	0
8/22	715	15	10	9	Clear	4	0	0
8/23	730	19	10	9.5	Low Turbidity	4	A	0
8/24	1030	18	10	11	Low Turbidity	4	A	0
8/25	1030	17	11	14	Low Turbidity	1	0	0
8/26	730	16	10	5	Clear	5	0	0
8/27	730	14	10	3.5	Clear	1	0	NW 0-5
8/28	730	12.5	10	8	Clear	4	0	0
8/29	730	12	8	4	Clear	1	0	0
8/30	730	11.5	10	8	Clear	4	0	0
8/31	1030	12	10	11	Clear	4	0	0
9/01	1030	13.5	10	8	Clear	1	0	0
9/02	1030	13	10	11	Clear	4	0	N 0-5
9/03	1030	11.5	9	6	Clear	1	0	0
9/04	1030	11	10	13.5	Clear	4	A	S 5-10
9/05	1030	13	11	14	Clear	4	A	S 5-10
9/06	1030	16.5	10	10	Low Turbidity	4	A	0
9/07	1030	20	10	10	Low Turbidity	4	A	0
9/08	1030	22	10	9	Low Turbidity	4	A	SE 0-5
9/09	1030	22	8	5	Low Turbidity	3	0	W 0-5
9/10	1030	20	7	6	Clear	4	0	0
9/11	1030	20	7	9	Clear	4	A	0
9/12	1030	30	7	8	Clear	4	0	W 30-35

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Appendix G.14. (page 3 of 3)

Date	Oservation Time	River Stage (cm)	Temperature (°C) Water	Air	Water Color	Sky [a] (a.m.)	Precip. [b] (a.m.)	Wind Vel. (knotts)
9/13	1030	56	8	10	Low Turbidity	4	A	S 5
9/14	1030	62	8	9	High Turbidity	4	A	0
9/15	1030	73	7	5	High Turbidity	4	0	NW 5-10
9/16	1030	70	6	2	High Turbidity	4	A	0
9/17	1030	67	7	7	High Turbidity	4	A	0
9/18	1030	65	6	4	Moderate Turbidity	3	0	NW 5
9/19	1030	61	5	2	Moderate Turbidity	4	A/D	0
9/20	1030	58	3	-2	Moderate Turbidity	1	0	0
9/21	1030	55	3	1	Low Turbidity	1	0	0
9/22	1030	48	4	1	Low Turbidity	3	0	0
9/23	1030	44	4	6	Low Turbidity	4	A	0
9/24	1030	44	5	8	Low Turbidity	4	0	0

[a] Sky condition codes:

0 = no observation
1 = < 1/10 cloud cover
2 = partly cloudy; < 1/2 cloud cover
3 = mostly cloudy; > 1/2 cloud cover
4 = complete overcast
5 = thick fog

[b] Precipitation Codes:

A = intermittent rain
B = continuous rain
C = snow
D = snow and rain
E = hail
F = thunder

* = River Stage was estimated.

Appendix G.15. (page 2 of 2)

Distance from Head Pin (m) LB RB	Angle	Angle Coef.	Vel Depth (m)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity mps Point	Velocity mps Mean Vertical	Velocity mps Mean Cell	Mean Cell Depth (m)	Cell Width (m)	Cell Area (m^2)	Flow (m^3/s)
66			0.51					0.282		0.27	0.53	2.0	1.1	0.286
68			0.46					0.299		0.29	0.49	2.0	1.0	0.282
70			0.36					0.254		0.28	0.41	2.0	0.8	0.227
72			0.34					0.225		0.24	0.35	2.0	0.7	0.168
74			0.29					0.219		0.22	0.32	2.0	0.6	0.140
76			0.22					0.205		0.21	0.26	2.0	0.5	0.108
78			0.16					0.160		0.18	0.19	2.0	0.4	0.069
80			0.13					0.122		0.14	0.15	2.0	0.3	0.041
82			0.06					0.000		0.06	0.10	2.0	0.2	0.012
84			0.02					0.000		0.00	0.04	2.0	0.1	0.000
86			0.00					0.000		0.00	0.01	2.0	0.0	0.000

Depth — Average 0.99 m; Maximum 1.18 m

Velocity — Average 0.32 m/sec; Maximum 0.45 m/sec

George River Total (m3/s) **19.21**

Appendix G.15. Discharge of the George River near the weir site, 7 August 2002.

DISCHARGE

19.2 m^3/s = 678.0 ft^3/s

George River Weir

File No. 02 GEO 1 | Page 1 of 1

Crew J. Linderman, R. Ciletti | Date 08/07/2002

Habitat Location S21N46W10CA | Sampling Site George Weir | River Mile 4.5 | Meter Type Price AA No.

HUC | Gage Number 1 Height 14.5 cm

Description Transect is approximately 200 m upstream of weir.
Right bank is head pin facing downstream.
A CMD 9000 Digimeter was used for velocity measurements.

Weather: Overcast @ 2000 ft, No wind, No Rain, Smokey, Air T - 14.5°c, H2O T - 14°c

Distance from Head Pin (m) LB RB	Angle	Angle Coef.	Vel Depth (m)	Stream-bed Elev.	Obs. Depth %	No. Revo-lutions	Time (sec)	Velocity mps Point	Mean Vertical	Mean Cell	Mean Cell Depth (m)	Cell Width (m)	Cell Area (m^2)	Flow (m^3/s)
0			0.00					0.000						
2			0.37					0.116		0.06	0.19	2.0	0.4	0.021
4			0.58					0.147		0.13	0.48	2.0	1.0	0.125
6			0.68					0.266		0.21	0.63	2.0	1.3	0.260
8			0.70					0.314		0.29	0.69	2.0	1.4	0.400
10			0.86					0.321		0.32	0.78	2.0	1.6	0.495
12			0.94					0.390		0.36	0.90	2.0	1.8	0.640
14			1.00					0.396		0.39	0.97	2.0	1.9	0.762
16			1.06					0.432		0.41	1.03	2.0	2.1	0.853
18			1.08					0.184		0.31	1.07	2.0	2.1	0.659
20			1.12					0.220		0.20	1.10	2.0	2.2	0.444
22			1.16					0.284		0.25	1.14	2.0	2.3	0.575
24			1.15					0.202		0.24	1.16	2.0	2.3	0.561
26			1.18					0.196		0.20	1.17	2.0	2.3	0.464
28			1.14					0.347		0.27	1.16	2.0	2.3	0.630
30			1.15					0.447		0.40	1.15	2.0	2.3	0.909
32			1.13					0.434		0.44	1.14	2.0	2.3	1.004
34			1.09					0.400		0.42	1.11	2.0	2.2	0.926
36			1.06					0.414		0.41	1.08	2.0	2.2	0.875
38			1.03					0.314		0.36	1.05	2.0	2.1	0.761
40			1.00					0.410		0.36	1.02	2.0	2.0	0.735
42			0.96					0.201		0.31	0.98	2.0	2.0	0.599
44			0.91					0.381		0.29	0.94	2.0	1.9	0.544
46			0.88					0.344		0.36	0.90	2.0	1.8	0.649
48			0.84					0.330		0.34	0.86	2.0	1.7	0.580
50			0.83					0.305		0.32	0.84	2.0	1.7	0.530
52			0.77					0.326		0.32	0.80	2.0	1.6	0.505
54			0.76					0.223		0.27	0.77	2.0	1.5	0.420
56			0.70					0.349		0.29	0.73	2.0	1.5	0.418
58			0.67					0.288		0.32	0.69	2.0	1.4	0.436
60			0.63					0.300		0.29	0.65	2.0	1.3	0.382
62			0.61					0.317		0.31	0.62	2.0	1.2	0.383
64			0.54					0.263		0.29	0.58	2.0	1.2	0.334

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