

**KLAG LAKE SOCKEYE SALMON (*ONCORHYNCHUS NERKA*)
STOCK ASSESSMENT PROJECT: 2007 ANNUAL REPORT**

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TABLE OF CONTENTS

| | |
|-------------------------|----|
| LIST OF TABLES | 3 |
| LIST OF FIGURES | 3 |
| LIST OF APPENDICES..... | 3 |
| ABSTRACT..... | 4 |
| INTRODUCTION | 4 |
| OBJECTIVES | 5 |
| METHODS | 6 |
| ACKNOWLEDGEMENTS..... | 14 |
| REFERENCES CITED..... | 15 |

LIST OF TABLES

| | |
|--|----|
| Table 1. Age and sex composition of sockeye salmon sampled from the Klag Lake escapement in 2007..... | 11 |
| Table 2. Length composition (rounded to nearest 5mm) of adult sockeye salmon returning to Klag Lake in 2007..... | 12 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1. Location of Klag Bay on Chichagof Island..... | 7 |
| Figure 2. 2007 Daily sockeye escapement and relative water level..... | 9 |
| Figure 3. Escapement totals into Klag Lake since 2001..... | 10 |

LIST OF APPENDICES

| | |
|---|----|
| Appendix A. Numbers of subsistence fishing permits, total annual subsistence harvest, and average number of sockeye harvested per permit. (ADF&G Commercial Fisheries Database 2008)..... | 17 |
| Appendix B. Daily weir count data sheet..... | 18 |
| Appendix C. Sockeye salmon harvest daily interview form (Subsistence and Sport)..... | 19 |
| Appendix D. 2007 daily weir count..... | 20 |
| Appendix E. ASL data for the 2007 escapement scale samples..... | 22 |
| Appendix F. Harvest data for the 2007 Klag Bay sport and subsistence fishery..... | 45 |

ABSTRACT

From 8-July through 25-September, the 2007 sockeye salmon (*Oncorhynchus nerka*) escapement into Klag Lake was estimated by means of weir counts and subsistence and sport harvest was estimated by means of creel surveys. The weir count resulted in a total escapement estimate of 9,194 sockeye salmon. The most abundant age class in 2007 was 1.3 comprising 54.6% of the samples aged. The second largest age class was 1.2 comprising 29.4% of the total sample. The overall escapement was down from 17,695 in 2006 while the subsistence harvest was up from 2,127 to 3,011 sockeye salmon. Subsistence users were primarily responsible for the sockeye salmon harvest with 2,986 of the overall harvest being for subsistence use. Sport anglers reported taking only 25 sockeye salmon. The exploitation rate by sport and subsistence users was approximately 25% of the terminal area abundance.

Key words: Sockeye salmon, *Oncorhynchus nerka*, subsistence, Chichagof Isand, Klag Lake, Sitka, escapment, mark-recapture, weir, harvest survey.

INTRODUCTION

This introduction was taken directly (with slight modifications) from Woody and Conitz (2008). Brian Woody was the weir manager during the 2007 field season.

Currently, Klag Lake (ADF&G Stream No. 113-72-002) is one of the largest producers of sockeye salmon in Southeast Alaska (Conitz and Cartwright 2002; Lorrigan et al. 2004; Conitz et al. 2005; Stahl et al. 2007; Woody and Conitz 2008). For subsistence users in Sitka, it is second or third in importance, after Necker Bay and, depending on the year, Redoubt Lake. The abundance of Redoubt Lake sockeye salmon has fluctuated a great deal in recent years (Geiger 2003). In years when sockeye salmon runs to Redoubt Lake are small and conservation measures are in place, subsistence users rely more heavily on fish from Klag Bay. Fisheries managers became concerned about increasing effort and large sockeye salmon harvests in Klag Bay during some seasons. Having no adequate estimates of abundance for Klag Lake sockeye salmon, managers at ADF&G were compelled to implement conservative management practices when fishing effort appeared to be high. For example, they closed the subsistence fishery early in 1997, after observing few fish in the system during aerial surveys (Dave Gordon ADF&G Division of Commercial Fisheries, personal communication 2005). In 2000 the Sitka Tribe of Alaska (STA), the U.S. Forest Service, and ADF&G responded to concerns about possible over-harvesting of Klag Lake sockeye salmon stocks by initiating a three-year sockeye salmon monitoring project at Klag Lake, in 2001, with a second three-year study approved for 2004 – 2006. The project was then renewed for 2007-2009.

ADF&G has compiled subsistence fishery data since 1985 from subsistence permit holders who returned their harvest information at the end of the season or upon requesting a permit for the following season. For the five-year period, 2002 – 2006, the average annual harvest of sockeye salmon from Klag Bay increased to more than three times what it was in the preceding seventeen years, 1985 – 2001, and the number of permits issued annually for Klag Bay doubled during the same recent period (Appendix A). Furthermore, the average harvest per permit increased from

25 to 40 sockeye salmon. However, these reported annual harvest totals do not necessarily represent the actual sockeye harvest, because ADF&G does not independently verify the user-reported harvest numbers. Evidence from the few subsistence sockeye salmon systems in which on-site harvest surveys have been conducted shows that harvests are typically, but not always, under-reported; the degree of under-reporting appears to be highly variable (Conitz and Cartwright 2003 and 2005; Lewis and Cartwright 2004; Lorrigan et al. 2004; Conitz et al. 2005). Klag Bay subsistence fishers have exhibited the unusual practice of reporting higher harvest numbers on their permits than during on-site interviews. Possibly, they obtain more accurate fish counts when they process their harvests after returning to Sitka. An important project objective was to obtain accurate annual estimates of fishing effort and sockeye salmon harvest in Klag Bay, using direct observation and interviews in the sport and subsistence fisheries.

Prior to the start of the Klag Lake subsistence sockeye salmon project, the only escapement data available for Klag Lake were unreliable aerial survey counts for some years. The Klag Lake subsistence sockeye salmon project was initiated to provide accurate annual sockeye salmon escapement estimates, using a weir and mark-recapture study. From 2001 through 2005 the weir counts, verified with mark-recapture estimates, ranged from approximately 12,000 to 23,000 fish (Conitz et al. 2005). Overall, the Klag Lake sockeye salmon population appeared to be stable and adequate to support subsistence and sport harvests at existing levels. The purpose of the 2007 to 2009 continuation of the project, therefore, was to monitor this stock through annual estimates of escapement, harvest, and run timing.

OBJECTIVES

1. Estimate the escapement of sockeye salmon using a weir and validate using mark-recapture methods with a coefficient of variation less than 10%.
2. Describe the run-timing, or proportional daily passage of sockeye salmon through the weir.
3. Describe the escapement age, sex and length composition.
4. Estimate sport and subsistence harvest in Klag Bay using an on-sight creel survey with a coefficient of variation less than 15%.

METHODS

Study Site

Klag Bay (Figure 1) located at N 57° 38.5', W 136° 42.2' is the outermost bay in a system of inland saltwater bays or lagoons, which also includes Lake Anna and Sister Lake. Klag Lake receives drainage from approximately seven square kilometers of sparsely wooded low hills, large areas of muskeg, and numerous small shallow lakes and ponds with a maximum elevation of 550 m. With a chain of small lakes, streams, and ponds to the northeast, Klag Lake has only one active salmon spawning stream. Many smaller streams drain into the lake but anadromous salmon spawning has not been observed in these streams. Sockeye salmon are blocked from further upstream migration in the main stream by a 1.3 m high barrier falls approximately 500 m upstream. The lake itself is at a 12 m elevation and has a surface area of 83 hectares; the maximum lake depth is 43 m. The lake drains to the south via an outlet that flows through a series of 3 large ponds before emptying into the east side of Klag Bay. The extensive network of muskegs and ponds buffers flow through the system.

(Taken from Woody and Conitz 2008)

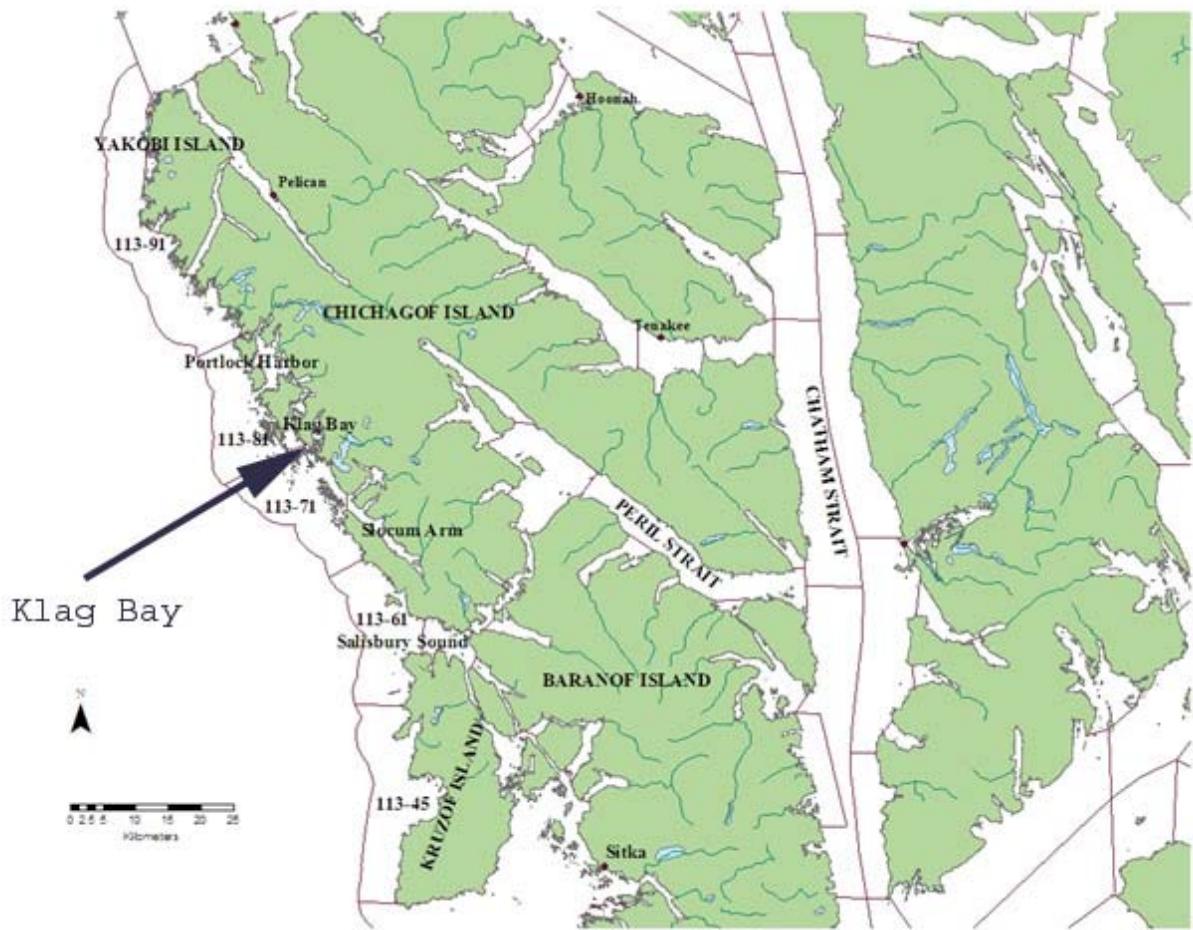


Figure 1. Location of Klag Bay on Chichagof Island.

Sockeye Salmon Escapement Estimates and Run Timing

A rigid weir was placed approximately 100 meters from the estuary in the same location and with the same construction used since 2001 (Woody and Conitz 2008). Migrating salmon were channeled into a trap fixed to the weir where they were counted by species and released upstream. Sockeye salmon were systematically marked at a rate of 1 of every 5 fish to maintain a 20% marking goal in order to conduct a mark-recapture study in the event of a weir failure or suspected breach.

A stratified, two-sample mark recapture study design was implemented as described by Arnason et al. (1996). Twenty percent of the sockeye salmon passing through the weir were collected and marked with a primary and a secondary mark. The primary mark was an adipose fin clip and the secondary marks were left ventricle fin clips during the first half of the season and right ventricle fin clips during the second half (actual dates for different strata are unknown). The mark-recapture data however was not utilized due to poor record keeping and missing data sheets. Mark-recapture data were collected but not transcribed into an electronic database and hard

copies of raw data were not filed properly, therefore, the mark-recapture portion of the study could not be conducted. However, because the Klag Bay weir was believed to be fish tight and the majority of sockeye salmon were counted, actual weir counts were considered to be accurate and reliable and were reported as the escapement estimate.

Sockeye salmon passing through the weir were counted and the count was recorded on weir count data sheets (Appendix B) and Rite-in-the-Rain™ field notebooks. Weir count data was later entered into a Microsoft Excel spreadsheet. Daily counts were called into the U.S. Forest Service via the Forest Service Radio Network and to the weir manager via satellite phone on a daily basis throughout the field season.

Escapement Sex, Age, and Size Distribution

Scales were collected from every 5th fish and prepared for analysis as described by Clutter and Whitsel (1956). According to Bromaghin (1993) a sample size of n=174 would be sufficient to estimate age composition within ten percent ($d=0.10$) of the true value ninety-five percent of the time ($\alpha=0.05$) based on seven age classes ($k=7$). Three scales were collected from the preferred location from sampled fish (INPFC 1963). Scales were placed on gum cards and were matched with sex and length data in order to describe age class and size distribution throughout the season. Length and sex data were recorded on Alaska Department of Fish and Game (ADF&G) Age-Sex-Length (ASL) sheets. Lengths were measured from mideye-to-tail-fork to the nearest millimeter (mm) and later rounded to the nearest 5 mm. The scale cards and ASL data were sent to the ADF&G Salmon Aging Laboratory in Douglas, Alaska for aging. Age classes were designated by the European aging system where freshwater and saltwater years are separated by a period (e.g. 1.3 denotes 1-year freshwater and 3-years saltwater; Koo 1962). Brood year tables were compiled by sex and brood year to describe the age structure of the returning adult sockeye salmon populations. Similar tables were constructed to describe the lengths of migrating sockeye salmon.

Subsistence and Sport Sockeye Salmon Harvest in Klag Bay

The harvest of sockeye salmon in Klag Bay was determined using a creel survey throughout the season. Harvest efforts took place in Klag Bay directly in front of the U.S. Forest Service cabin where the crew was housed during the season. Therefore, the field crew was able to interview nearly all fishermen involved in the sockeye salmon harvest. If a fishing party was missed or declined an interview, it was noted on the creel survey as a “missed interview”. Data was collected and recorded on creel survey data sheets (Appendix C) and in Rite-in-the-Rain™ field notebooks. Harvest data was later entered into a Microsoft Excel spreadsheet.

Surveyors recorded the date, time, harvest type (subsistence or sport), harvest method (gear used), number of each gear type used, number of hours fished, and number of each fish species collected. For the purpose of this report only data regarding the harvest of sockeye salmon are presented. Overall harvest efforts were calculated by multiplying the number of each gear type

by the number of hours fished per gear type. The number of fish harvested were then be divided by the number of effort hours to calculate catch-per-unit-effort (CPUE).

RESULTS

Sockeye Escapement Estimates and Run Timing

The first sockeye salmon was observed passing the weir on 10-July and the run ended on 25-September. The peak of the run occurred on 5-September with a total of 937 fish passing the weir (Figure 2). A total of 9,194 sockeye salmon were counted through the weir by the end of the run, down from 17,695 in 2006 (Figure 3). As in previous years the peak of the run occurred in conjunction with high water levels (Stahl et al. 2007; Woody and Conitz 2008), however, between 26-August and 28-August the second, third, and fifth highest daily escapements (771, 690, and 603 sockeye salmon respectively) occurred. Prior to the beginning of the run water levels increased from 0.18m to 0.20m. No major change in water occurred until a rain event raised the water level from 0.23m to 0.51m between 30-August and 2-September. Daily weir count data is available in Appendix D. In addition to sockeye salmon there were 1,891 coho salmon (*Onchorhynchus kisutch*), 11,598 pink salmon (*Onchorhynchus gorbuscha*), and 70 dolly varden (*Salvelinus namaycush*) counted through the weir.

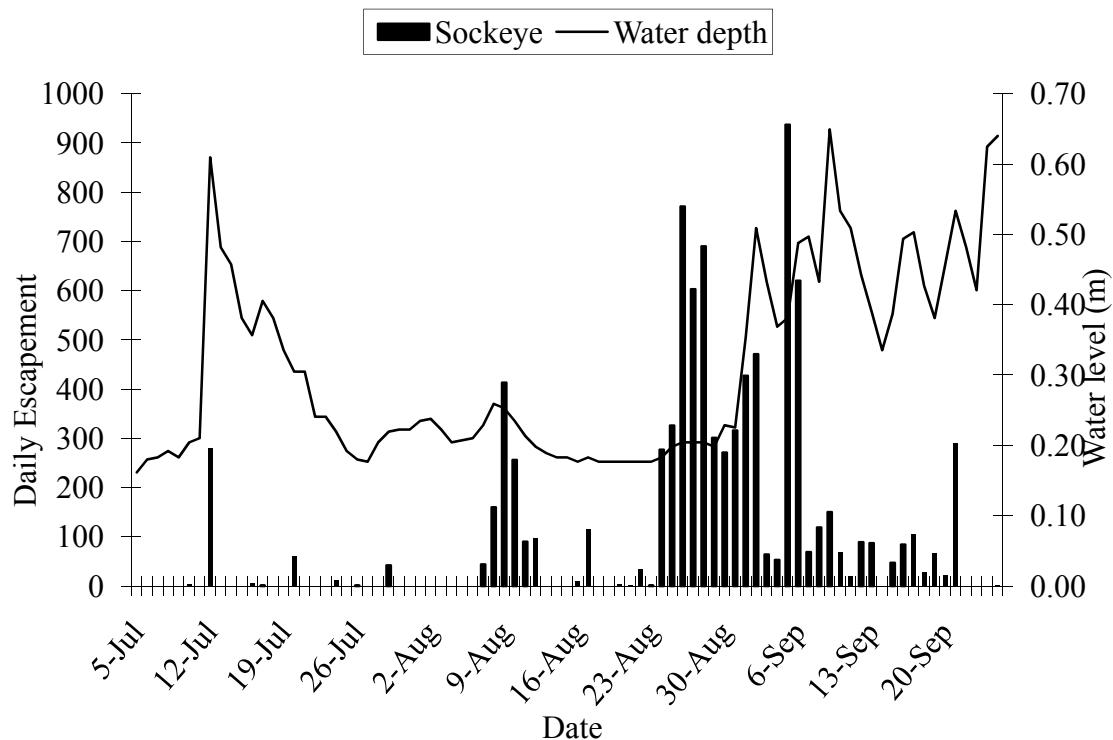


Figure 2. 2007 Daily sockeye salmon escapement and relative water level.

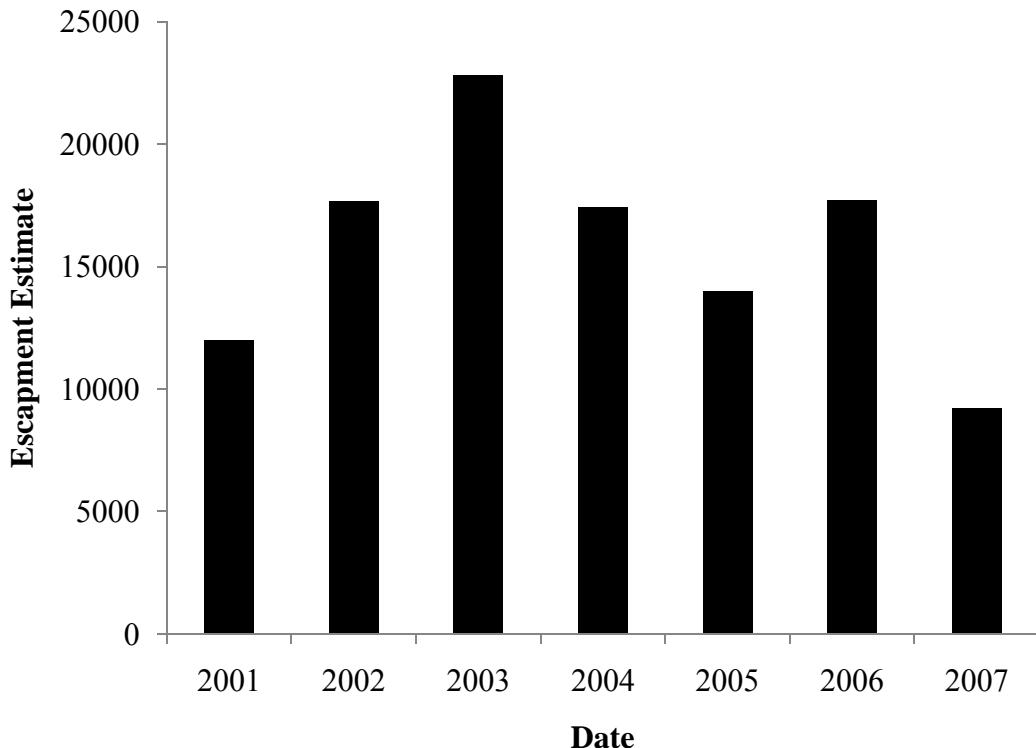


Figure 3. Escapement totals into Klag Lake since 2001.

Escapement Sex, Age, and Size Distribution

Because sampling methods were developed and implemented by different researchers in 2007, sampling goals were much higher than those described by Bromaghin. A total of 1,804 scales were collected from sockeye salmon during the 2007 field season. Of those, 766 could not be analyzed due to missing data or unreadable scales leaving 1,038 for analysis. With this sample size estimates can be reported as being within ninety-five percent ($d=0.05$) of the true value ninety-nine percent ($\alpha=0.01$) of the time based on seven age classes ($k=7$). Of the 1,038 samples included in analysis, there were 467 (45%) males and 571 (55%) females. There were seven age classes. Age class 1.3 was the most abundant at approximately 54.6% of the total sample followed by age 1.2 which comprised approximately 29.4% (Table 1). Age class 1.3 was the largest in both male (22.4%) and female (32.2%) stocks. ASL data is available in Appendix E.

Table 1. Age and sex composition of sockeye salmon sampled from the Klag Lake escapement in 2007.

| Age | 1.1 | 1.2 | 1.3 | 1.4 | 2.1 | 2.2 | 2.3 | Total |
|-----------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Male | | | | | | | | |
| Sample Size | 1 | 156 | 233 | 0 | 0 | 55 | 22 | 467 |
| % Population | 0.1% | 15.0% | 22.4% | 0.0% | 0.0% | 5.3% | 2.1% | 45% |
| Std. Error | 0.1% | 1.1% | 1.3% | - | - | 0.7% | 0.4% | |
| Female | | | | | | | | |
| Sample Size | 6 | 149 | 334 | 2 | 5 | 51 | 29 | 576 |
| % Population | 0.6% | 14.4% | 32.2% | 0.2% | 0.5% | 4.9% | 2.8% | 55.5% |
| Std. Error | 0.2% | 1.1% | 1.5% | 0.1% | 0.2% | 0.7% | 0.5% | |
| All Fish | | | | | | | | |
| Sample Size | 7 | 305 | 567 | 2 | 5 | 106 | 51 | 1042 |
| % Population | 0.7% | 29.4% | 54.6% | 0.2% | 0.5% | 9.7% | 4.9% | |
| Std. Error | 0.3% | 1.4% | 1.5% | 0.1% | 0.2% | 0.9% | 0.7% | |

Average fork length (mideye-to-tailfork) for the population sample and for all age groups was 540mm and ranged between 340mm and 680mm. Male sockeye salmon averaged 545mm and females averaged 540mm. The largest age class of fish (age 1.3) had an average length of 570mm and ranged between 540mm and 680mm. Length, age, and sex data is available in Table 2.

Table 2. Length composition (rounded to nearest 5mm) of adult sockeye salmon returning to Klag Lake in 2007.

| Age | 1.1 | 1.2 | 1.3 | 1.4 | 2.1 | 2.2 | 2.3 | Total |
|-----------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Male | | | | | | | | |
| Sample Size | 1 | 156 | 233 | 0 | 0 | 55 | 22 | 467 |
| Mean Length | 350 | 510 | 575 | 0 | 0 | 510 | 580 | |
| Std. Error | - | 1.0 | 0.8 | - | - | 0.8 | 0.7 | |
| Female | | | | | | | | |
| Sample Size | 6 | 149 | 334 | 2 | 5 | 51 | 29 | 576 |
| Mean Length | 365 | 500 | 560 | 575 | 370 | 490 | 570 | |
| Std. Error | 0.7 | 0.9 | 0.5 | 0.7 | 0.4 | 1.4 | 0.5 | |
| All Fish | | | | | | | | |
| Sample Size | 7 | 305 | 567 | 2 | 5 | 106 | 51 | 1042 |
| Mean Length | 360 | 505 | 570 | 575 | 370 | 505 | 575 | |
| Std. Error | 0.7 | 1.0 | 0.7 | 0.7 | 0.4 | 0.8 | 0.6 | |

Subsistence and Sport Sockeye Salmon Harvest in Klag Bay

Between 4-July and 1-September a total of 19 subsistence user groups (number of people in each group unknown) and 14 sport anglers harvested sockeye salmon from Klag Bay. The total sockeye salmon harvest in 2008 was 3,011, up from 2,127 in 2007. Subsistence harvesters reported to creel survey technicians a total harvest of 2,986 sockeye salmon and sport users reported harvesting 25. Subsistence users utilizing beach seines were the primary harvesters with 2,819 sockeye salmon harvested while gillnet users only accounted for 167. Subsistence users reported a total of 84 effort hours with a CPUE of approximately 35.6 sockeye salmon/hour (Appendix F). Subsistence effort included two anglers using sport gear for subsistence fishing. Sport anglers reported a total effort of 21 hours resulting in a CPUE of 1.2 sockeye/unit effort. In addition to sockeye salmon, there were 52 coho, 8 chum (*Onchorhynchus keta*), and 7 pink salmon harvested from Klag Bay. Combining the sockeye salmon harvest at the terminal end of the Klag Bay outflow with the weir count, a total of 12,205 sockeye salmon migrated back to the Klag system for spawning. The exploitation rate by sport and subsistence users was approximately 25% of the terminal area abundance.

DISCUSSION

The 2007 sockeye salmon escapement (9,194) into Klag Lake dropped sharply (almost 50%) from the 2006 season of 17,695 fish. Escapement estimates were taken from actual weir counts without mark-recapture estimates being made due to incomplete mark-recapture data. However, technician field notes indicate the weir remained intact and no known fish made it through uncounted. Mark-recapture analysis, when deemed valid in previous years was close to actual weir counts, indicating the weir was solid and counts at the weir are reliable (Conitz and Cartwright 2002; Lorrigan et al. 2004; Conitz et al. 2005; Woody and Conitz 2008).

The subsistence and sport harvest in 2007 (3,011) was up from 2006 when 2,127 sockeye salmon were harvested in Klag Bay while escapement declined from 17,695 to 9,194 sockeye salmon. Being one of Southeast Alaska's largest subsistence sockeye salmon producers, the steadily increasing harvest levels, and the sharp decline in escapement numbers in 2007, Klag Bay supports a fishery that if not carefully monitored and managed could become unsustainable. It is unknown if the escapement fluctuation is due to anthropogenic or natural causes. Without knowing the impact of the commercial fishery on the system, management is only possible at the sport and subsistence level. If commercial harvest significantly impacts the Klag Bay stock, this could cause subsistence users to be denied the opportunity to meet their subsistence needs in the event the fishery is shut down due to poor escapement numbers.

It is my recommendation that the Klag Bay weir project be continued in order to monitor stock levels and ensure adequate escapement levels are met. I would also recommend that research be initiated in order to assess the commercial impact on the Klag Bay sockeye salmon stock as well as other Southeast Alaska sockeye salmon stocks that are important to the subsistence users of rural communities such as Sitka. If there is a significant impact on these stocks by the commercial fishery, managing it more conservatively at the commercial level would help to ensure subsistence needs are met while maintaining escapement goals.

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Appendix A. Numbers of subsistence fishing permits, total annual subsistence harvest, and average number of sockeye salmon harvested per permit. (ADF&G Commercial Fisheries Database 2008).

| Year | Number of Permits | Sockeye Harvest | Average Harvest per Permit |
|------|-------------------|-----------------|----------------------------|
| 1985 | 29 | 582 | 20 |
| 1986 | 46 | 919 | 20 |
| 1987 | 42 | 816 | 19 |
| 1988 | 26 | 629 | 24 |
| 1989 | 5 | 114 | 23 |
| 1990 | 5 | 115 | 23 |
| 1991 | 1 | 23 | 23 |
| 1992 | 11 | 276 | 25 |
| 1993 | 59 | 1626 | 28 |
| 1994 | 31 | 809 | 26 |
| 1995 | 28 | 1098 | 39 |
| 1996 | 100 | 3381 | 34 |
| 1997 | 42 | 1106 | 26 |
| 1998 | 33 | 834 | 25 |
| 1999 | 42 | 1048 | 25 |
| 2000 | 48 | 1082 | 23 |
| 2001 | 65 | 1325 | 20 |
| 2002 | 94 | 4065 | 43 |
| 2003 | 70 | 2475 | 35 |
| 2004 | 75 | 3196 | 43 |
| 2005 | 63 | 2431 | 39 |
| 2006 | 42 | 1885 | 45 |
| 2007 | 43 | 2190 | 51 |

Appendix B. Daily weir count data sheet.

Sockeye Salmon Daily Weir Count Data Form

| | | |
|-----------|-------------|-----------|
| Lake | Weather | Samplers: |
| Trap | Water Level | |
| Date | Water Temp | |
| Mark Used | Air Temp | |

| Sampling Period | Time | Fish Counts By Species | | | | | | | # of Sockeye Marked |
|--|------|------------------------|------|------|------|------|--------------|-------|---------------------|
| | | Sockeye | Coho | King | Chum | Pink | Dolly Varden | Other | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| Daily Totals | | | | | | | | | |
| Number of mortalities at the weir (indicate whether marked or not) | | | | | | | | | |

Appendix C. Sockeye salmon harvest daily interview form (Subsistence and Sport).

Sockeye Salmon Harvest Daily Interview Form (Subsistence and Sport)

Stream :

Samplers:

Date:

Start Time:

End Time:

Appendix D. 2007 daily weir count.

| Date | Sockeye | Coho | King | Chum | Pink | Dolly Varden | Other |
|-----------|---------|------|------|------|------|--------------|-------|
| 7/8/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/9/2007 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 7/10/2007 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/11/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/12/2007 | 279 | 5 | 0 | 0 | 0 | 5 | 0 |
| 7/13/2007 | 20 | 1 | 0 | 0 | 0 | 1 | 0 |
| 7/14/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/15/2007 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| 7/16/2007 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/17/2007 | 1 | 5 | 0 | 0 | 0 | 2 | 0 |
| 7/18/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/19/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/20/2007 | 60 | 9 | 0 | 0 | 0 | 0 | 0 |
| 7/21/2007 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/22/2007 | 12 | 1 | 0 | 0 | 0 | 0 | 0 |
| 7/23/2007 | 24 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/24/2007 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/25/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/26/2007 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/27/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/28/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/29/2007 | 42 | 3 | 0 | 0 | 0 | 0 | 0 |
| 7/30/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7/31/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/1/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/2/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/3/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/4/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/5/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/6/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/7/2007 | 44 | 4 | 0 | 0 | 0 | 0 | 0 |
| 8/8/2007 | 160 | 58 | 0 | 0 | 2 | 0 | 0 |
| 8/9/2007 | 413 | 17 | 0 | 0 | 1 | 0 | 0 |
| 8/10/2007 | 256 | 3 | 0 | 0 | 0 | 0 | 0 |
| 8/11/2007 | 90 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8/12/2007 | 96 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/13/2007 | 22 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/14/2007 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/15/2007 | 3 | 0 | 0 | 0 | 0 | 1 | 0 |
| 8/16/2007 | 10 | 1 | 0 | 0 | 0 | 0 | 0 |

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|---------------|-------------|-------------|----------|----------|--------------|-----------|----------|
| 8/17/2007 | 115 | 2 | 0 | 0 | 0 | 0 | 0 |
| 8/18/2007 | 14 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8/19/2007 | 23 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/20/2007 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/21/2007 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/22/2007 | 33 | 0 | 0 | 0 | 1 | 0 | 0 |
| 8/23/2007 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 8/24/2007 | 277 | 116 | 0 | 0 | 10 | 0 | 0 |
| 8/25/2007 | 326 | 73 | 0 | 0 | 11 | 1 | 0 |
| 8/26/2007 | 771 | 81 | 0 | 0 | 51 | 4 | 0 |
| 8/27/2007 | 603 | 43 | 0 | 0 | 49 | 0 | 0 |
| 8/28/2007 | 690 | 36 | 0 | 0 | 58 | 0 | 0 |
| 8/29/2007 | 301 | 3 | 0 | 0 | 31 | 0 | 0 |
| 8/30/2007 | 271 | 16 | 0 | 0 | 13 | 0 | 0 |
| 8/31/2007 | 316 | 4 | 0 | 0 | 15 | 0 | 0 |
| 9/1/2007 | 427 | 86 | 0 | 0 | 297 | 0 | 0 |
| 9/2/2007 | 471 | 121 | 0 | 0 | 529 | 0 | 0 |
| 9/3/2007 | 64 | 12 | 0 | 0 | 398 | 2 | 0 |
| 9/4/2007 | 53 | 11 | 0 | 0 | 355 | 1 | 0 |
| 9/5/2007 | 937 | 209 | 0 | 0 | 1769 | 4 | 0 |
| 9/6/2007 | 620 | 133 | 0 | 0 | 2417 | 1 | 0 |
| 9/7/2007 | 69 | 101 | 0 | 0 | 315 | 0 | 0 |
| 9/8/2007 | 119 | 54 | 0 | 0 | 267 | 0 | 0 |
| 9/9/2007 | 150 | 78 | 0 | 0 | 355 | 0 | 0 |
| 9/10/2007 | 68 | 18 | 0 | 0 | 391 | 0 | 0 |
| 9/11/2007 | 19 | 55 | 0 | 0 | 168 | 2 | 0 |
| 9/12/2007 | 89 | 80 | 0 | 0 | 185 | 0 | 0 |
| 9/13/2007 | 87 | 29 | 0 | 0 | 109 | 0 | 0 |
| 9/14/2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9/15/2007 | 47 | 62 | 0 | 0 | 366 | 0 | 0 |
| 9/16/2007 | 84 | 36 | 0 | 0 | 86 | 0 | 0 |
| 9/17/2007 | 104 | 46 | 0 | 0 | 702 | 2 | 0 |
| 9/18/2007 | 28 | 14 | 0 | 0 | 85 | 1 | 0 |
| 9/19/2007 | 66 | 77 | 0 | 0 | 115 | 2 | 0 |
| 9/20/2007 | 22 | 4 | 0 | 0 | 250 | 12 | 0 |
| 9/21/2007 | 289 | 109 | 0 | 0 | 1234 | 3 | 0 |
| 9/22/2007 | 20 | 17 | 0 | 0 | 303 | 6 | 0 |
| 9/23/2007 | 6 | 6 | 0 | 0 | 66 | 2 | 0 |
| 9/24/2007 | 26 | 46 | 0 | 0 | 573 | 16 | 0 |
| 9/25/2007 | 2 | 1 | 0 | 0 | 21 | 0 | 0 |
| Totals | 9194 | 1891 | 0 | 0 | 11598 | 70 | 0 |

Appendix E. ASL data for the 2007 escapement scale samples.

| SAMPLE_DATE | SEX_CODE | Length | AGE_EUROPEAN |
|-------------|----------|--------|--------------|
| 7/15/2007 | 2 | 530 | 12 |
| 7/15/2007 | 1 | 630 | 13 |
| 7/16/2007 | 2 | 490 | 22 |
| 7/16/2007 | 1 | 550 | 23 |
| 7/16/2007 | 1 | 580 | 23 |
| 7/16/2007 | 2 | 590 | 13 |
| 7/16/2007 | 1 | 620 | 23 |
| 7/20/2007 | 1 | 500 | 12 |
| 7/20/2007 | 2 | 510 | 12 |
| 7/20/2007 | 1 | 530 | 12 |
| 7/20/2007 | 2 | 560 | 13 |
| 7/20/2007 | 1 | 570 | 13 |
| 7/20/2007 | 1 | 610 | 23 |
| 7/20/2007 | 1 | 630 | 13 |
| 7/20/2007 | 1 | 640 | 13 |
| 7/20/2007 | 1 | 670 | 13 |
| 7/22/2007 | 2 | 470 | 12 |
| 7/22/2007 | 1 | 580 | 13 |
| 7/22/2007 | 2 | 580 | 13 |
| 7/22/2007 | 2 | 600 | 13 |
| 7/22/2007 | 1 | 630 | 13 |
| 7/22/2007 | 1 | 640 | 13 |
| 7/23/2007 | 2 | 530 | 12 |
| 7/23/2007 | 2 | 540 | 13 |
| 7/23/2007 | 2 | 600 | 13 |
| 7/23/2007 | 2 | 600 | 13 |
| 7/23/2007 | 1 | 620 | 13 |
| 7/29/2007 | 2 | 390 | 21 |
| 7/29/2007 | 2 | 520 | 12 |
| 7/29/2007 | 2 | 540 | 12 |
| 7/29/2007 | 2 | 560 | 13 |
| 7/29/2007 | 1 | 570 | 13 |
| 7/29/2007 | 1 | 580 | 13 |
| 7/29/2007 | 2 | 590 | 14 |
| 7/29/2007 | 1 | 590 | 23 |
| 7/29/2007 | 1 | 600 | 13 |
| 7/29/2007 | 1 | 610 | 13 |
| 7/29/2007 | 1 | 610 | 13 |
| 7/29/2007 | 1 | 610 | 13 |
| 8/7/2007 | 1 | 500 | 12 |
| 8/7/2007 | 2 | 520 | 22 |
| 8/7/2007 | 1 | 570 | 13 |
| 8/7/2007 | 2 | 570 | 13 |

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| 8/7/2007 | 2 | 590 | 23 |
| 8/7/2007 | 1 | 600 | 23 |
| 8/7/2007 | 1 | 610 | 13 |
| 8/7/2007 | 1 | 620 | 13 |
| 8/7/2007 | 1 | 620 | 13 |
| 8/8/2007 | 2 | 510 | 22 |
| 8/8/2007 | 2 | 520 | 12 |
| 8/8/2007 | 2 | 530 | 12 |
| 8/8/2007 | 1 | 570 | 13 |
| 8/8/2007 | 2 | 570 | 13 |
| 8/8/2007 | 2 | 570 | 13 |
| 8/8/2007 | 1 | 590 | 13 |
| 8/8/2007 | 1 | 590 | 13 |
| 8/8/2007 | 2 | 600 | 13 |
| 8/8/2007 | 1 | 600 | 23 |
| 8/8/2007 | 1 | 600 | 23 |
| 8/8/2007 | 1 | 610 | 13 |
| 8/8/2007 | 1 | 620 | 13 |
| 8/8/2007 | 1 | 620 | 13 |
| 8/8/2007 | 2 | 620 | 13 |
| 8/8/2007 | 1 | 630 | 13 |
| 8/8/2007 | 1 | 640 | 13 |
| 8/9/2007 | 2 | 510 | 12 |
| 8/9/2007 | 2 | 530 | 12 |
| 8/9/2007 | 1 | 540 | 13 |
| 8/9/2007 | 1 | 550 | 12 |
| 8/9/2007 | 1 | 550 | 12 |
| 8/9/2007 | 2 | 550 | 13 |
| 8/9/2007 | 2 | 560 | 13 |
| 8/9/2007 | 1 | 570 | 13 |
| 8/9/2007 | 1 | 580 | 13 |
| 8/9/2007 | 2 | 590 | 13 |
| 8/9/2007 | 1 | 590 | 13 |
| 8/9/2007 | 2 | 600 | 13 |
| 8/9/2007 | 1 | 620 | 13 |
| 8/9/2007 | 1 | 650 | 13 |
| 8/9/2007 | 1 | 660 | 13 |
| 8/10/2007 | 1 | 500 | 12 |
| 8/10/2007 | 2 | 500 | 12 |
| 8/10/2007 | 1 | 500 | 22 |
| 8/10/2007 | 2 | 510 | 12 |
| 8/10/2007 | 2 | 530 | 12 |
| 8/10/2007 | 2 | 540 | 13 |
| 8/10/2007 | 1 | 540 | 22 |
| 8/10/2007 | 2 | 570 | 13 |

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| 8/10/2007 | 2 | 590 | 13 |
| 8/10/2007 | 2 | 590 | 13 |
| 8/10/2007 | 1 | 590 | 13 |
| 8/10/2007 | 1 | 590 | 13 |
| 8/10/2007 | 1 | 590 | 13 |
| 8/10/2007 | 2 | 600 | 13 |
| 8/10/2007 | 1 | 610 | 13 |
| 8/10/2007 | 1 | 610 | 13 |
| 8/10/2007 | 2 | 620 | 13 |
| 8/10/2007 | 1 | 620 | 23 |
| 8/10/2007 | 2 | 630 | 13 |
| 8/10/2007 | 2 | 630 | 13 |
| 8/10/2007 | 1 | 650 | 13 |
| 8/11/2007 | 1 | 420 | 12 |
| 8/11/2007 | 1 | 430 | 12 |
| 8/11/2007 | 1 | 450 | 12 |
| 8/11/2007 | 1 | 460 | 12 |
| 8/11/2007 | 2 | 460 | 12 |
| 8/11/2007 | 2 | 460 | 12 |
| 8/11/2007 | 2 | 470 | 12 |
| 8/11/2007 | 2 | 470 | 12 |
| 8/11/2007 | 1 | 470 | 22 |
| 8/11/2007 | 1 | 480 | 12 |
| 8/11/2007 | 1 | 480 | 12 |
| 8/11/2007 | 1 | 480 | 12 |
| 8/11/2007 | 1 | 490 | 12 |
| 8/11/2007 | 1 | 490 | 12 |
| 8/11/2007 | 2 | 490 | 12 |
| 8/11/2007 | 2 | 490 | 12 |
| 8/11/2007 | 2 | 500 | 12 |
| 8/11/2007 | 1 | 500 | 12 |
| 8/11/2007 | 1 | 500 | 12 |
| 8/11/2007 | 2 | 500 | 12 |
| 8/11/2007 | 1 | 500 | 12 |
| 8/11/2007 | 1 | 500 | 12 |
| 8/11/2007 | 2 | 510 | 12 |
| 8/11/2007 | 2 | 510 | 12 |
| 8/11/2007 | 1 | 510 | 12 |
| 8/11/2007 | 2 | 520 | 12 |
| 8/11/2007 | 2 | 520 | 12 |
| 8/11/2007 | 1 | 520 | 12 |
| 8/11/2007 | 1 | 530 | 12 |
| 8/11/2007 | 1 | 540 | 12 |
| 8/11/2007 | 1 | 540 | 12 |
| 8/11/2007 | 1 | 540 | 13 |

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| 8/11/2007 | 1 | 550 | 12 |
| 8/11/2007 | 2 | 550 | 12 |
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| 8/11/2007 | 2 | 550 | 13 |
| 8/11/2007 | 2 | 550 | 23 |
| 8/11/2007 | 1 | 550 | 23 |
| 8/11/2007 | 1 | 560 | 13 |
| 8/11/2007 | 1 | 560 | 13 |
| 8/11/2007 | 2 | 560 | 13 |
| 8/11/2007 | 2 | 560 | 13 |
| 8/11/2007 | 2 | 580 | 23 |
| 8/11/2007 | 2 | 590 | 13 |
| 8/11/2007 | 2 | 590 | 13 |
| 8/11/2007 | 1 | 590 | 13 |
| 8/11/2007 | 1 | 590 | 23 |
| 8/11/2007 | 1 | 600 | 13 |
| 8/11/2007 | 1 | 620 | 13 |
| 8/11/2007 | 1 | 640 | 13 |
| 8/11/2007 | 1 | 660 | 13 |
| 8/12/2007 | 1 | 450 | 12 |
| 8/12/2007 | 1 | 470 | 12 |
| 8/12/2007 | 2 | 480 | 12 |
| 8/12/2007 | 2 | 480 | 12 |
| 8/12/2007 | 1 | 480 | 22 |
| 8/12/2007 | 1 | 490 | 12 |
| 8/12/2007 | 1 | 490 | 12 |
| 8/12/2007 | 1 | 510 | 22 |
| 8/12/2007 | 1 | 520 | 12 |
| 8/12/2007 | 1 | 520 | 12 |
| 8/12/2007 | 1 | 540 | 12 |
| 8/12/2007 | 1 | 540 | 12 |
| 8/12/2007 | 2 | 540 | 13 |
| 8/12/2007 | 1 | 540 | 13 |
| 8/12/2007 | 2 | 540 | 13 |
| 8/12/2007 | 2 | 540 | 13 |
| 8/12/2007 | 1 | 540 | 22 |
| 8/12/2007 | 1 | 550 | 13 |
| 8/12/2007 | 2 | 550 | 13 |
| 8/12/2007 | 1 | 550 | 13 |
| 8/12/2007 | 1 | 550 | 13 |
| 8/12/2007 | 1 | 560 | 13 |
| 8/12/2007 | 2 | 560 | 13 |
| 8/12/2007 | 1 | 560 | 13 |
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| 8/12/2007 | 1 | 610 | 13 |
| 8/13/2007 | 1 | 450 | 12 |
| 8/13/2007 | 2 | 480 | 22 |
| 8/13/2007 | 1 | 510 | 12 |
| 8/13/2007 | 1 | 520 | 12 |
| 8/13/2007 | 1 | 530 | 22 |
| 8/13/2007 | 2 | 540 | 13 |
| 8/13/2007 | 1 | 550 | 13 |
| 8/13/2007 | 1 | 550 | 13 |
| 8/13/2007 | 1 | 560 | 13 |
| 8/13/2007 | 2 | 570 | 13 |
| 8/14/2007 | 2 | 340 | 11 |
| 8/14/2007 | 1 | 480 | 12 |
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| 8/16/2007 | 1 | 470 | 12 |
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| 8/17/2007 | 2 | 390 | 11 |
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| 8/17/2007 | 1 | 460 | 12 |
| 8/17/2007 | 1 | 460 | 22 |
| 8/17/2007 | 2 | 470 | 12 |
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| 8/17/2007 | 1 | 500 | 22 |
| 8/17/2007 | 2 | 510 | 22 |
| 8/17/2007 | 1 | 520 | 12 |

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| 8/18/2007 | 2 | 560 | 13 |
| 8/19/2007 | 1 | 350 | 11 |
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| 8/19/2007 | 1 | 540 | 22 |
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| 8/19/2007 | 1 | 550 | 12 |
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| 8/19/2007 | 1 | 560 | 23 |
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| 8/19/2007 | 1 | 590 | 13 |
| 8/20/2007 | 2 | 340 | 11 |
| 8/20/2007 | 2 | 430 | 12 |
| 8/20/2007 | 2 | 470 | 12 |
| 8/22/2007 | 1 | 440 | 12 |
| 8/22/2007 | 1 | 480 | 22 |
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| 8/22/2007 | 1 | 510 | 22 |
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| 8/25/2007 | 2 | 430 | 12 |
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| 8/26/2007 | 2 | 490 | 12 |
| 8/26/2007 | 1 | 490 | 22 |
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| 8/26/2007 | 2 | 500 | 22 |
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| 8/26/2007 | 1 | 520 | 12 |
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| 8/26/2007 | 1 | 520 | 22 |

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| 8/26/2007 | 2 | 540 | 12 |
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| 8/26/2007 | 2 | 540 | 13 |
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| 8/26/2007 | 1 | 540 | 13 |
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| 8/26/2007 | 1 | 550 | 23 |
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| 9/12/2007 | 1 | 560 | 13 |
| 9/12/2007 | 2 | 560 | 13 |
| 9/12/2007 | 2 | 560 | 13 |
| 9/12/2007 | 2 | 560 | 13 |
| 9/12/2007 | 2 | 560 | 13 |
| 9/12/2007 | 1 | 570 | 13 |
| 9/12/2007 | 2 | 570 | 13 |
| 9/12/2007 | 2 | 580 | 13 |
| 9/12/2007 | 2 | 580 | 13 |
| 9/12/2007 | 1 | 590 | 13 |

| | | | |
|-----------|---|-----|----|
| 9/12/2007 | 2 | 600 | 13 |
| 9/13/2007 | 2 | 540 | 13 |
| 9/13/2007 | 2 | 540 | 13 |
| 9/13/2007 | 2 | 550 | 13 |
| 9/13/2007 | 2 | 550 | 13 |
| 9/13/2007 | 2 | 550 | 23 |
| 9/13/2007 | 2 | 570 | 13 |
| 9/13/2007 | 2 | 570 | 13 |
| 9/13/2007 | 1 | 580 | 13 |
| 9/15/2007 | 2 | 540 | 13 |
| 9/15/2007 | 2 | 560 | 13 |
| 9/15/2007 | 2 | 560 | 13 |
| 9/15/2007 | 2 | 560 | 13 |
| 9/15/2007 | 1 | 560 | 13 |
| 9/15/2007 | 2 | 560 | 13 |
| 9/15/2007 | 2 | 570 | 13 |
| 9/15/2007 | 2 | 570 | 13 |
| 9/15/2007 | 2 | 570 | 13 |
| 9/15/2007 | 2 | 570 | 23 |
| 9/19/2007 | 2 | 460 | 12 |
| 9/19/2007 | 2 | 540 | 13 |
| 9/19/2007 | 2 | 560 | 13 |
| 9/19/2007 | 2 | 560 | 13 |
| 9/19/2007 | 2 | 560 | 13 |
| 9/19/2007 | 2 | 570 | 13 |
| 9/19/2007 | 2 | 570 | 13 |
| 9/23/2007 | 1 | 560 | 13 |

Note: SEX_CODES 1=male, 2=female

Appendix F. Harvest data for the 2007 Klag Bay sport and subsistence fishery.

| Date | Gear Type and Number | | | | | | Harvest by Species | | | | |
|---------------|--------------------------------|-----------------------|--------------------|-----------------|-----------------------------------|------------------------------------|--------------------|------|---------|---------|------|
| | Use Type sub = 1 spt = 0 | Beach Seine # used | Gill Net # used | Rods # used | Hours Fished Per Rod or Net | Total Effort (gear x hrs) | Sockeye | Coho | Chum | Chinook | Pink |
| 7/6/2007 | 0 | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 0 |
| 7/7/2007 | 1 | 1 | 0 | 0 | 4 | 4 | 30 | 0 | 0 | 0 | 0 |
| 7/8/2007 | 1 | 1 | 0 | 0 | 6 | 6 | 89 | 0 | 0 | 0 | 0 |
| 7/8/2007 | 0 | 0 | 0 | 5 | 3 | 15 | 0 | 0 | 0 | 0 | 0 |
| 7/12/2007 | 1 | 1 | 0 | 0 | 3 | 3 | 180 | 0 | 1 | 0 | 1 |
| 7/12/2007 | 1 | 1 | 0 | 0 | 5 | 5 | 2 | 0 | 0 | 0 | 0 |
| 7/15/2007 | 1 | 1 | 0 | 0 | 2 | 2 | 73 | 10 | 0 | 0 | 0 |
| 7/15/2007 | 0 | 0 | 0 | 2 | 1 | 2 | 7 | 2 | 0 | 0 | 0 |
| 7/20/2007 | 1 | 0 | 1 | 0 | 3 | 3 | 40 | 1 | 0 | 0 | 0 |
| 7/21/2007 | 1 | 1 | 0 | 0 | 6 | 6 | 375 | 0 | 0 | 0 | 0 |
| 7/21/2007 | 1 | 1 | 0 | 0 | 6 | 6 | 100 | 0 | 0 | 0 | 0 |
| 7/23/2007 | 1 | 1 | 0 | 0 | 3 | 3 | 125 | 0 | 0 | 0 | 0 |
| 7/23/2007 | 1 | 1 | 0 | 0 | 11 | 11 | 400 | 0 | 0 | 0 | 0 |
| 7/24/2007 | 1 | 1 | 0 | 0 | 3 | 3 | 205 | 0 | 0 | 0 | 0 |
| 7/25/2007 | 1 | 1 | 0 | 0 | 4 | 4 | 215 | 1 | 1 | 0 | 6 |
| 7/25/2007 | 1 | 0 | 1 | 0 | 2 | 2 | 6 | 0 | 0 | 0 | 0 |
| 7/26/2007 | 1 | 1 | 0 | 0 | 2 | 2 | 295 | 2 | 5 | 0 | 0 |
| 7/26/2007 | 1 | 0 | 1 | 0 | 2 | 2 | 22 | 0 | 0 | 0 | 0 |
| 7/27/2007 | 1 | 1 | 0 | 0 | 2 | 2 | 250 | 0 | 0 | 0 | 0 |
| 7/28/2007 | 1 | 1 | 0 | 0 | 2 | 2 | 200 | 0 | 0 | 0 | 0 |
| 8/2/2007 | 1 | 1 | 0 | 0 | 3 | 3 | 280 | 6 | 1 | 0 | 0 |
| 8/2/2007 | 0 | 0 | 0 | 2 | 1 | 2 | 15 | 0 | 0 | 0 | 0 |
| 8/4/2007 | 1 | 0 | 1 | 0 | 4 | 4 | 99 | 0 | 0 | 0 | 0 |
| 8/9/2007 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 |
| 8/21/2007 | 1 | 0 | 0 | 2 | 5 | 10 | 0 | 30 | 0 | 0 | 0 |
| | Beach Seines | Gill Nets | Rods | Hours Fished | Total Effort | Sockeye | Coho | Chum | Chinook | Pink | |
| Totals | | 15 | 4 | 14 | 85 | 105 | 3011 | 52 | 8 | 0 | 7 |