

**KLAG LAKE SOCKEYE SALMON (*ONCORHYNCHUS NERKA*)
STOCK ASSESSMENT PROJECT: 2008 ANNUAL REPORT**

By

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to fulfill obligations for project 07-604

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ABSTRACT

From 14-July through 16-September, the 2008 sockeye salmon (*Onchorhynchus nerka*) escapement into Klag Lake was estimated by means of weir counts and subsistence and sport harvest was estimated by using creel surveys. The weir count resulted in a total escapement estimate of 4,213 sockeye. The peak of the run occurred on 14-August when 744 sockeye passed through the weir. The most abundant age class in 2008 was 1.2 comprising 43.5% of the samples aged. The second largest age class was 1.3 comprising 35.6% of the total sample. Age 1.2 sockeye ranged from 440 mm – 555 mm and age 1.3 ranged from 540 mm – 600 mm. The overall escapement was down from 9,194 in 2007 and the sport and subsistence harvest of 3,011 sockeye was almost identical to the 2007 harvest of 3,011. Subsistence harvesters were primarily responsible for the harvest taking 2,988 sockeye and sport anglers reporting only 25. The exploitation rate on terminal area sockeye abundance was approximately 41%.

Key words: Sockeye salmon, *Onchorhynchus nerka*, subsistence, Chichagof Isand, Klag Lake, Sitka, escapement, 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 2008 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 runs to Redoubt Lake are small and conservation measures are in place, subsistence users rely more heavily on sockeye salmon from Klag Bay. Fisheries managers became concerned about increasing effort and large sockeye 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 stocks by initiating a three-year sockeye 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 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 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 2007 the weir counts, verified with mark-recapture estimates, ranged from approximately 12,000 to 23,000 fish (Conitz et al. 2005 and 2007 unpublished data). Overall, the Klag Lake sockeye population appeared to be stable and adequate to support subsistence and sport harvests at existing levels until the sharp decline in 2007. The purpose of the 2007 to 2009 continuation of the project, therefore, is to monitor this stock through annual estimates of escapement, harvest, and run timing and ensure escapement goals are met.

OBJECTIVES

1. Estimate the escapement of sockeye 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)

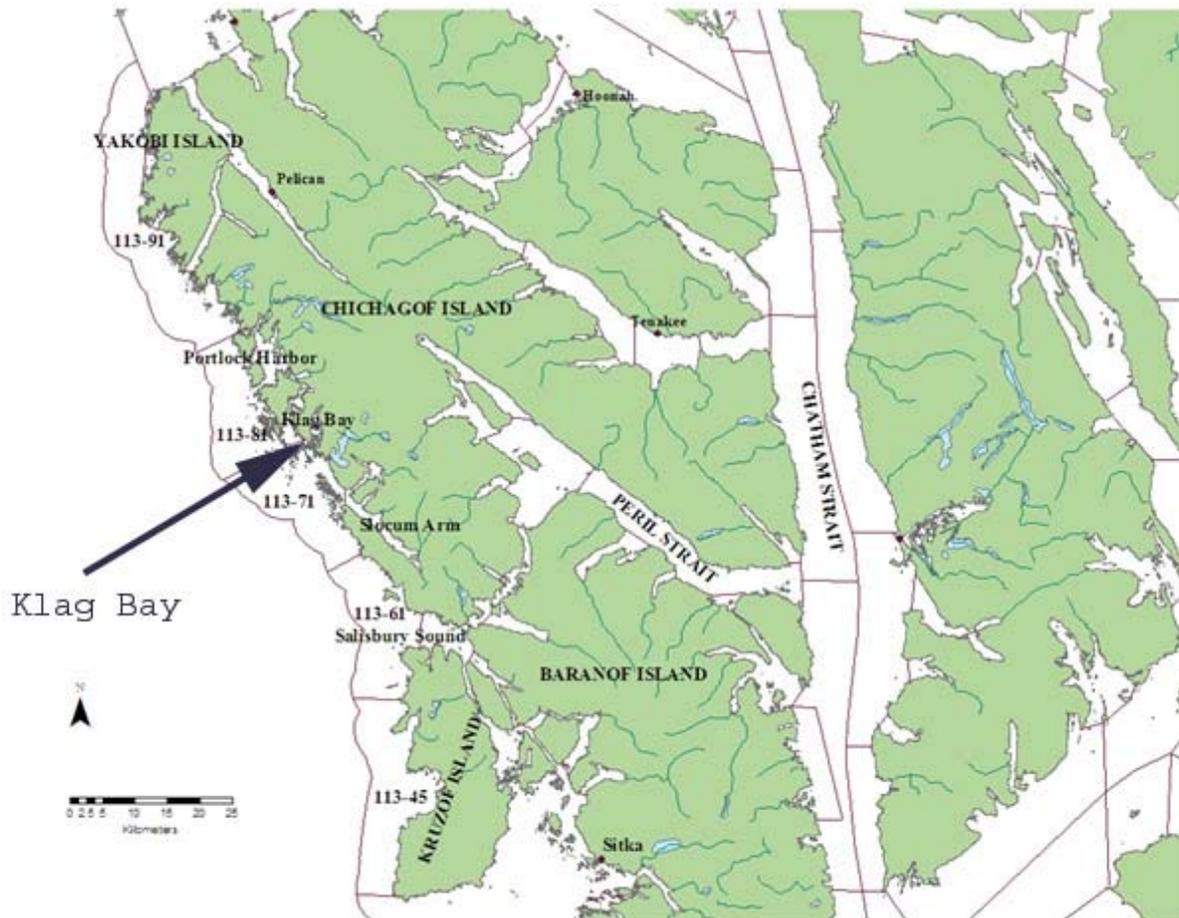


Figure 1. Location of Klag Bay on Chichagof Island.

Sockeye 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 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 and right ventricle fin clips. 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 not believed to have been breached and all sockeye entering the stream were believed to have been accounted for, actual weir counts were considered 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 ($d=10$) 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 mid-eye-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.

Subsistence and Sport Sockeye 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 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 was presented. Overall harvest effort was calculated by multiplying the number of each gear type by the number of hours fished per gear type. The number of fish harvested will 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 was observed passing the weir on 14-July and the run ended on 16-September. The peak of the run occurred on 14-August with a total of 744 fish passing the weir (Figure 2). A total of 4,273 sockeye were counted through the weir by the end of the run, down from 9,194 in 2007 and 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). Daily weir count data is available in Appendix D. In addition to sockeye there were 6,021 coho (*Onchorhynchus kisutch*), 11,558 pink salmon (*Onchorhynchus gorbuscha*), 5 chum salmon (*Onchorhynchus keta*) and 166 dolly varden (*Salvelinus namaycush*) counted through the weir.

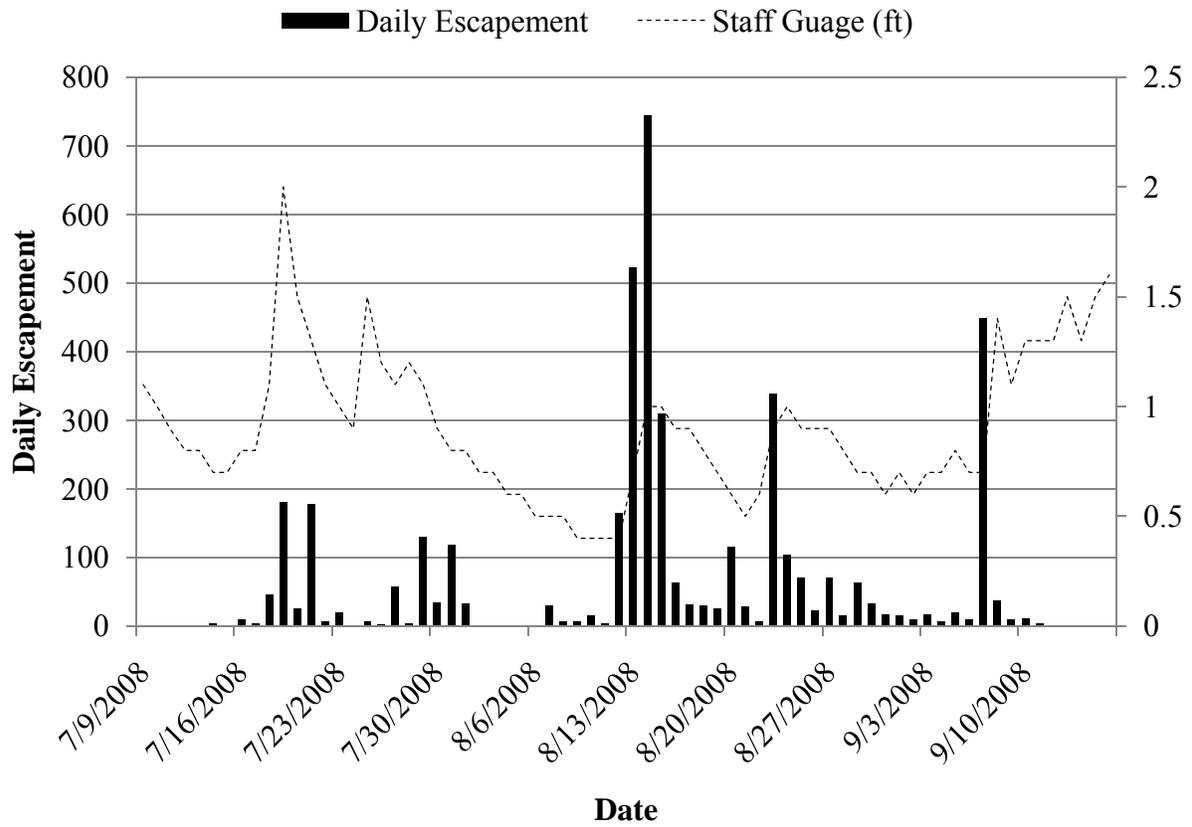


Figure 2. 2008 Daily sockeye escapement and relative water level.

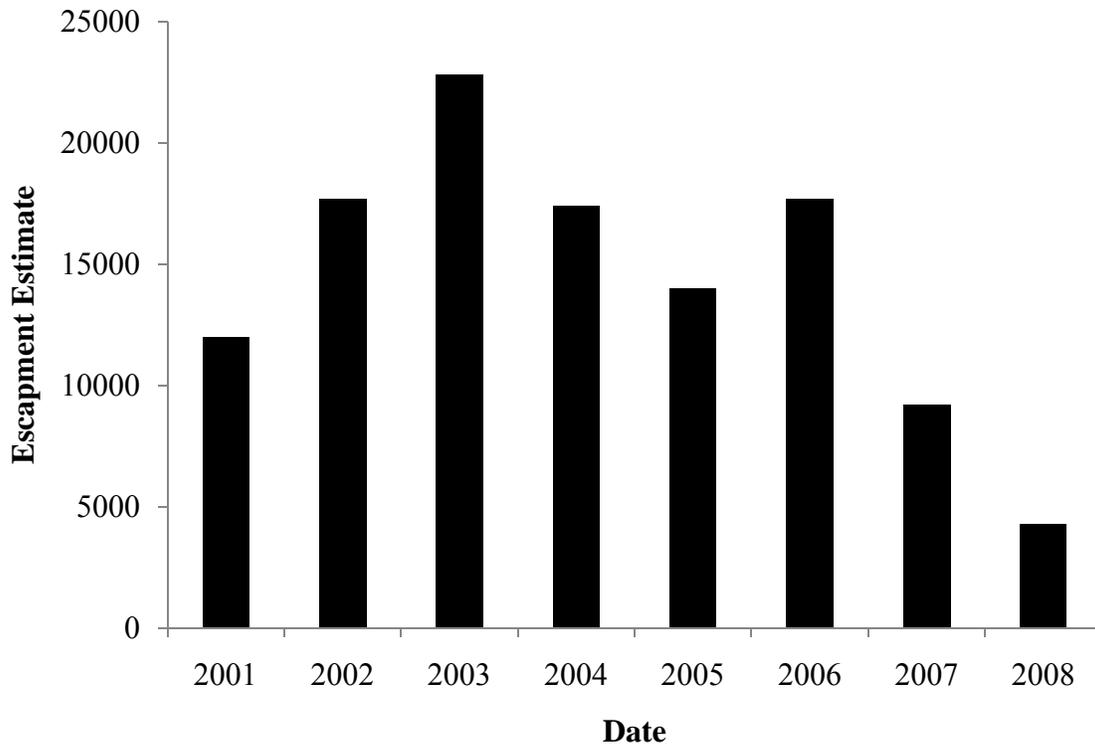


Figure 3. Escapement totals into Klag Lake since 2001.

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. 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 ($k=7$). A total of 730 sockeye were sampled during the 2008 field season. Of those, 277 could not be analyzed due to missing data or unreadable scales leaving 503 for analysis. With this sample size estimates can be reported as being within seven and one half percent ($d=0.075$) of the true value ninety-nine percent ($\alpha=0.01$) of the time based on seven age classes ($k=7$).

Of the 503 samples included in analysis, there were 191 (38%) males and 312 (62%) females. There were seven age classes and age class 1.2 was the most abundant at approximately 43.5% of the total sample, followed by age 1.3 which comprised approximately 35.6% (Table 1). Age class 1.2 was the largest in both male (17.3%) and female (26.2%) stocks. ASL data is available in Appendix E.

Table 1. Age and sex composition of sockeye salmon sampled from the Klag Lake escapement in 2008.

Age	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Total
Male								
Sample Size	0	87	62	0	0	32	10	191
% Population	-	17.3%	12.3%	-	-	6.4%	2.0%	38%
Std. Error	-	1.7%	1.5%	-	-	1.1%	0.6%	
Female								
Sample Size	1	132	117	0	0	39	23	312
% Population	0.2%	26.2%	23.3%	0.0%	0.0%	7.8%	4.6%	62%
Std. Error	0.2%	2.0%	1.9%	0.0%	0.0%	1.2%	0.9%	
All Fish								
Sample Size	1	219	179	0	0	71	33	503
% Population	0.2%	43.5%	35.6%	0.0%	0.0%	14.1%	6.6%	
Std. Error	0.2%	2.2%	2.1%	0.0%	0.0%	1.6%	1.1%	

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 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 returning to Klag Lake in 2008.

Age	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Total
Male								
Sample Size	0	87	62	0	0	32	10	191
Mean Length	-	505	570	-	-	500	575	
Std. Error	-	1.8	1.4	-	-	2.5	1.4	
Female								
Sample Size	1	132	117	0	0	39	23	312
Mean Length	380	495	559	-	-	495	570	
Std. Error	-	1.1	0.7	-	-	1.1	0.6	
All Fish								
Sample Size	1	219	179	0	0	71	33	503
Mean Length	380	495	560	-	-	495	570	
Std. Error	-	1.1	0.8	-	-	1.3	0.7	

Subsistence and Sport Sockeye Harvest in Klag Bay

Between 4-July and 1-September a total of 25 subsistence user groups (number of people in each group unknown) and 15 sport anglers harvested sockeye from Klag Bay. The total sockeye harvest in 2008 was 3,013 fish. Subsistence harvesters reported to creel survey technicians a total harvest of 2,988 sockeye salmon and sport users reported harvesting 25 sockeye salmon. Subsistence users utilizing beach seines were the primary harvesters with 2,774 sockeye salmon harvested while gillnet users only accounted for 214 sockeye salmon harvested. CPUE was calculated separately for subsistence and sport users. Subsistence users reported a total of approximately 116.5 effort hours and the CPUE was approximately 25.7 sockeye/hour. Sport anglers reported a total of 42 effort hours and the CPUE was approximately 0.6 sockeye/hour. In addition to sockeye, there were 329 coho, 9 chum (*Onchorhynchus keta*), and 7 pink salmon harvested from Klag Bay. Combining the sockeye harvest at the terminal end of the Klag Bay outflow with the weir count, a total of 7,226 sockeye migrated back to the Klag system for spawning. The exploitation rate by sport and subsistence users was approximately 41% of the terminal area abundance.

DISCUSSION

The 2008 sockeye escapement (4,231) into Klag Lake dropped sharply (over 50%) from the 2007 season of 9,194, this after a previous years drop from 17,695 (2006). 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 is 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 2008 (3,013) was up from 2007 when 3,011 sockeye were harvested in Klag Bay while escapement declined from 9,194 to 4,213 sockeye. Being one of Southeast Alaska's largest subsistence sockeye producers, the steadily increasing harvest levels, and the sharp decline in escapement numbers in 2007 and 2008, Klag Bay supports a fishery that if not carefully monitored and managed could become unsustainable. It is unknown if the escapement fluctuations are 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 is met.

ACKNOWLEDGEMENTS

I would like to thank Terry Suminski (U.S. Forest Service), Karen Hyer (Office of Subsistence Management), Dave Gordon (ADF&G), and Troy Tydingco (ADF&G) for their assistance in many facets of this report. I would also like to thank Iris Frank at the ADF&G Scale Ageing Laboratory for her fantastic support and work with the scales. I would like to thank the STA field crew who were responsible for the collection of data during the 2006 field season, Brian Woody who acted as weir manager and Richard Didrickson who provided assistance in transportation, data collection, and logistical support. Finally I would like to thank the sport and subsistence fishers who participated in the sockeye creel surveys

REFERENCES CITED

- Arnason, A. N., C. W. Kirby, C. J. Schwarz, and J. R. Irvine. 1996. Computer analysis of data from stratified mark-recovery experiments for estimation of salmon escapements and other populations. Canadian Technical Report of Fisheries and Aquatic Sciences 2106.
- Bromaghin, J. F. 1993. Sample size determination for interval estimation of multinomial probabilities. *The American Statistician*, 47:3 203-206.
- Clutter, R., and L. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. Bulletin of the International Pacific Salmon Fisheries Commission 9, New Westminster, British Columbia.
- Conitz, J. M. and M. A. Cartwright. 2003. Falls, Gut Bay and Kutlaku Lakes Subsistence sockeye salmon project, 2002 annual report. Alaska Department of Fish and Game, Division of commercial Fisheries, Regional Information Report 1J03-42, Juneau.
- Conitz, J. M. and M. A. Cartwright. 2005. Falls, Gut Bay and Kutlaku Lakes subsistence sockeye salmon project, 2003 annual report and 2001-2003 final report. Alaska Department of Fish and Game, Fishery Data Series No. 05-13, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds05-13.pdf>
- Conitz, J. M., M. A. Cartwright, C. Lingle, and J. Lorrigan. 2005. Klag Lake sockeye salmon (*Oncorhynchus nerka*) project: 2003 annual report and 2001-2003 final report. Alaska Department of Fish and Game, Fishery Data Series No. 05-55, Anchorage.
<http://www.sf.adfg.state.ak.us/FedAidPDFs/fds05-55.pdf>
- Cochran, W. G. 1977. Sampling techniques, third edition. John Wiley and Sons Inc. New York.
- Geiger, H. J. 2003. Sockeye salmon stock status and escapement goal for Redoubt Lake in Southeast Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J03-01, Juneau.
- INPFC (International North Pacific Fisheries Commission). 1963. Annual report 1961. Vancouver, British Columbia.
- Koo, T. S. Y. 1962. Age designation in salmon. [*In*] Studies of Alaska red salmon. University of Washington Press, Seattle.

Lewis, B. A., and M. A. Cartwright. 2004. Hetta Lake sockeye salmon stock assessment project: 2002 annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J04-10, Juneau.

Lorrigan, J., M. A. Cartwright, and J. M. Conitz. 2004. Klag Bay sockeye stock assessment 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 1J04-18, Juneau.

Mann. In Review. Klag Lake Subsistence Sockeye Salmon Project: 2007 Annual Report. USFWS Office of Subsistence management.

Woody, B. and J. Conitz. 2008. Klag Lake Subsistence Sockeye Salmon Project: 2005 Annual Report. Alaska Department of Fish and Game, Division of Sport Fish and Commercial Fisheries. Fishery Data Series No. 08-30.

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).

Year	Number of Permits	Sockeye Harvested	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
2008	57	2876	50

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 D. 2008 daily weir count.

Date	Sockeye	Coho	King	Chum	Pink	Dolly Varden	Other
7/14/2008	4	0	0	0	0	1	0
7/15/2008	0	0	0	0	0	1	0
7/16/2008	9		0	0	0	1	0
7/17/2008	3	1	0	0	0	1	0
7/18/2008	46	91	0	1	0	20	0
7/19/2008	181	24	0	0	0	23	0
7/20/2008	25	9	0	0	0	0	0
7/21/2008	177	108	0	0	0	16	0
7/22/2008	7	5	0	0	0	3	0
7/23/2008	20	2	0	0	0	0	0
7/24/2008	0	0	0	0	0	0	0
7/25/2008	6	47	0	0	0	0	0
7/26/2008	2	2	0	0	0	0	0
7/27/2008	57	5	0	0	0	0	0
7/28/2008	3	6	0	0	0	0	0
7/29/2008	129	32	0	0	0	1	0
7/30/2008	34	11	0	0	0	1	0
7/31/2008	118	1	0	0	0	0	0
8/1/2008	32	2	0	0	0	0	0
8/2/2008	1	0	0	0	0	0	0
8/3/2008	1	0	0	0	0	0	0
8/4/2008	0	0	0	0	0	1	0
8/5/2008	0	0	0	0	0	0	0
8/6/2008	0	0	0	0	0	0	0
8/7/2008	30	0	0	0	0	0	0
8/8/2008	6	0	0	0	0	0	0
8/9/2008	7	0	0	0	0	0	0
8/10/2008	15	0	0	0	0	0	0
8/11/2008	4	0	0	0	0	0	0
8/12/2008	164	3	0	0	1	0	0
8/13/2008	522	618	0	0	16	5	0
8/14/2008	744	955	0	0	166	3	0
8/15/2008	310	554	0	0	76	0	0
8/16/2008	63	83	0	0	9	0	0
8/17/2008	31	50	0	0	2	0	0
8/18/2008	30	25	0	0	8	1	0
8/19/2008	25	21	0	0	2	0	0
8/20/2008	115	22	0	0	18	0	0
8/21/2008	28	5	0	0	7	0	0
8/22/2008	6	0	0	0	22	0	0
8/23/2008	339	1158	0	0	1111	4	0

8/24/2008	104	429	0	0	674	0	0
8/25/2008	70	97	0	0	298	0	0
8/26/2008	22	142	0	0	198	0	0
8/27/2008	70	248	0	0	612	2	0
8/28/2008	15	80	0	0	164	2	0
8/29/2008	63	137	0	0	513	2	0
8/30/2008	33	50	0	0	135	1	0
8/31/2008	16	16	0	0	121	2	0
9/1/2008	15	13	0	0	333	0	0
9/2/2008	9	23	0	0	100	1	0
9/3/2008	17	44	0	0	429	4	0
9/4/2008	6	41	0	0	110	3	0
9/5/2008	20	79	0	0	298	1	0
9/6/2008	10	34	0	1	361	0	0
9/7/2008	448	475	0	0	2955	41	0
9/8/2008	37	170	0	0	1692	12	0
9/9/2008	10	39	0	3	571	5	0
9/10/2008	11	50	0	0	342	3	0
9/11/2008	3	6	0	0	104	2	0
9/12/2008	0	0	0	0	0	0	0
9/13/2008	0	0	0	0	0	0	0
9/14/2008	0	0	0	0	0	0	0
9/15/2008	0	0	0	0	0	0	0
9/16/2008	0	8	0	0	110	3	0
Totals	4273	6021	0	5	11558	166	0

Appendix E. ASL data for the 2008 escapement scale samples.

SAMPLE_DATE	STAT_WEEK	AGE_EUROPEAN	SEX_CODE	LENGTH (mm)
			M = 1 F = 2	
7/14/2008	29	12	2	470
7/14/2008	29	13	2	540
7/16/2008	29	12	1	440
7/16/2008	29	12	1	450
7/16/2008	29	12	1	490
7/16/2008	29	12	1	500
7/16/2008	29	12	1	520
7/16/2008	29	13	2	545
7/16/2008	29	13	2	550
7/16/2008	29	13	2	585
7/18/2008	29	12	1	510
7/18/2008	29	12	1	510
7/18/2008	29	12	1	535
7/18/2008	29	13	1	540
7/18/2008	29	13	1	545
7/18/2008	29	13	1	565
7/18/2008	29	13	1	580
7/18/2008	29	13	2	590
7/19/2008	29	12	1	450
7/19/2008	29	12	1	460
7/19/2008	29	12	1	490
7/19/2008	29	12	1	500
7/19/2008	29	12	2	535
7/19/2008	29	13	2	550
7/19/2008	29	13	2	560
7/19/2008	29	13	2	600
7/27/2008	31	12	1	480
7/27/2008	31	12	1	480
7/27/2008	31	22	1	480
7/27/2008	31	12	1	485
7/27/2008	31	12	1	490
7/27/2008	31	22	1	490
7/27/2008	31	22	1	500
7/27/2008	31	12	1	515
7/27/2008	31	12	1	520
7/27/2008	31	13	1	545
7/27/2008	31	13	1	545
7/27/2008	31	13	1	545
7/27/2008	31	22	1	545

7/27/2008	31	13	1	550
7/27/2008	31	13	2	555
7/27/2008	31	23	2	560
7/27/2008	31	13	2	570
7/30/2008	31	12	1	505
7/30/2008	31	12	1	550
7/30/2008	31	13	1	550
7/30/2008	31	13	1	550
7/30/2008	31	13	2	560
7/30/2008	31	13	2	570
8/1/2008	31	12	1	480
8/1/2008	31	12	1	500
8/1/2008	31	12	1	510
8/1/2008	31	12	1	510
8/1/2008	31	12	1	510
8/1/2008	31	22	1	520
8/1/2008	31	22	1	525
8/1/2008	31	12	1	530
8/1/2008	31	12	1	530
8/1/2008	31	12	2	530
8/1/2008	31	13	2	540
8/1/2008	31	13	2	560
8/1/2008	31	23	2	560
8/1/2008	31	13	2	570
8/1/2008	31	23	2	580
8/1/2008	31	23	2	600
8/7/2008	32	12	1	470
8/7/2008	32	12	1	480
8/7/2008	32	12	1	480
8/7/2008	32	12	2	500
8/7/2008	32	12	2	500
8/7/2008	32	12	2	510
8/7/2008	32	12	2	520
8/7/2008	32	13	2	540
8/7/2008	32	13	2	540
8/10/2008	33	12	1	475
8/10/2008	33	22	1	475
8/10/2008	33	12	2	485
8/10/2008	33	12	2	495
8/10/2008	33	12	2	500
8/10/2008	33	12	2	540
8/10/2008	33	13	2	575
8/10/2008	33	13	2	600
8/12/2008	33	22	1	480
8/12/2008	33	22	1	490
8/12/2008	33	12	1	510

8/12/2008	33	22	1	510
8/12/2008	33	13	2	545
8/12/2008	33	22	2	545
8/12/2008	33	13	2	570
8/12/2008	33	13	2	575
8/13/2008	33	12	1	445
8/13/2008	33	22	1	450
8/13/2008	33	12	1	460
8/13/2008	33	22	1	460
8/13/2008	33	22	1	465
8/13/2008	33	12	1	470
8/13/2008	33	12	1	470
8/13/2008	33	12	1	470
8/13/2008	33	12	1	475
8/13/2008	33	12	1	475
8/13/2008	33	12	1	480
8/13/2008	33	12	1	485
8/13/2008	33	12	1	500
8/13/2008	33	12	1	500
8/13/2008	33	12	1	500
8/13/2008	33	12	1	500
8/13/2008	33	22	1	500
8/13/2008	33	12	1	510
8/13/2008	33	12	1	510
8/13/2008	33	22	1	510
8/13/2008	33	22	1	515
8/13/2008	33	12	1	520
8/13/2008	33	22	1	520
8/13/2008	33	22	1	520
8/13/2008	33	22	1	520
8/13/2008	33	12	1	525
8/13/2008	33	12	1	530
8/13/2008	33	12	1	530
8/13/2008	33	12	1	530
8/13/2008	33	12	1	530
8/13/2008	33	12	2	535
8/13/2008	33	12	2	540
8/13/2008	33	12	2	545
8/13/2008	33	13	2	545
8/13/2008	33	13	2	545
8/13/2008	33	13	2	550
8/13/2008	33	13	2	550
8/13/2008	33	13	2	550
8/13/2008	33	22	2	550
8/13/2008	33	13	2	555
8/13/2008	33	13	2	555

8/13/2008	33	22	2	555
8/13/2008	33	13	2	560
8/13/2008	33	13	2	560
8/13/2008	33	13	2	560
8/13/2008	33	13	2	560
8/13/2008	33	13	2	560
8/13/2008	33	13	2	560
8/13/2008	33	13	2	565
8/13/2008	33	13	2	565
8/13/2008	33	13	2	565
8/13/2008	33	13	2	570
8/13/2008	33	13	2	570
8/13/2008	33	13	2	570
8/13/2008	33	13	2	570
8/13/2008	33	13	2	580
8/13/2008	33	13	2	580
8/13/2008	33	13	2	580
8/13/2008	33	13	2	580
8/13/2008	33	13	2	590
8/13/2008	33	13	2	590
8/13/2008	33	13	2	600
8/13/2008	33	13	2	600
8/13/2008	33	13	2	610
8/13/2008	33	23	2	615
8/14/2008	33	22	1	445
8/14/2008	33	22	1	450
8/14/2008	33	22	1	450
8/14/2008	33	12	1	460
8/14/2008	33	12	1	470
8/14/2008	33	12	1	470
8/14/2008	33	12	1	470
8/14/2008	33	12	1	470
8/14/2008	33	12	1	470
8/14/2008	33	12	1	480
8/14/2008	33	12	1	480
8/14/2008	33	12	1	480
8/14/2008	33	12	1	480
8/14/2008	33	22	1	480
8/14/2008	33	12	1	485
8/14/2008	33	12	1	490
8/14/2008	33	12	1	490
8/14/2008	33	12	1	490
8/14/2008	33	12	1	490
8/14/2008	33	12	1	490
8/14/2008	33	22	1	490
8/14/2008	33	12	1	495
8/14/2008	33	12	1	495

8/14/2008	33	22	1	495
8/14/2008	33	22	1	495
8/14/2008	33	12	1	500
8/14/2008	33	12	1	500
8/14/2008	33	12	1	500
8/14/2008	33	12	1	500
8/14/2008	33	22	1	500
8/14/2008	33	22	1	500
8/14/2008	33	12	1	505
8/14/2008	33	12	1	510
8/14/2008	33	12	1	510
8/14/2008	33	12	1	510
8/14/2008	33	12	2	510
8/14/2008	33	12	2	515
8/14/2008	33	12	2	515
8/14/2008	33	12	2	515
8/14/2008	33	12	2	515
8/14/2008	33	12	2	520
8/14/2008	33	12	2	520
8/14/2008	33	12	2	520
8/14/2008	33	12	2	520
8/14/2008	33	12	2	525
8/14/2008	33	12	2	530
8/14/2008	33	12	2	530
8/14/2008	33	12	2	530
8/14/2008	33	12	2	530
8/14/2008	33	22	2	530
8/14/2008	33	12	2	535
8/14/2008	33	12	2	540
8/14/2008	33	12	2	540
8/14/2008	33	12	2	540
8/14/2008	33	12	2	540
8/14/2008	33	13	2	540
8/14/2008	33	13	2	540
8/14/2008	33	22	2	540
8/14/2008	33	12	2	545
8/14/2008	33	13	2	545
8/14/2008	33	22	2	545
8/14/2008	33	12	2	550
8/14/2008	33	13	2	550
8/14/2008	33	13	2	550
8/14/2008	33	13	2	550
8/14/2008	33	13	2	550
8/14/2008	33	22	2	550
8/14/2008	33	12	2	555
8/14/2008	33	13	2	560

8/14/2008	33	13	2	560
8/14/2008	33	13	2	565
8/14/2008	33	13	2	570
8/14/2008	33	13	2	570
8/14/2008	33	13	2	575
8/14/2008	33	13	2	575
8/14/2008	33	23	2	575
8/14/2008	33	13	2	580
8/14/2008	33	13	2	580
8/14/2008	33	13	2	580
8/14/2008	33	13	2	580
8/14/2008	33	13	2	590
8/14/2008	33	13	2	590
8/14/2008	33	23	2	590
8/14/2008	33	13	2	600
8/15/2008	33	22	1	450
8/15/2008	33	22	1	455
8/15/2008	33	12	1	460
8/15/2008	33	12	1	460
8/15/2008	33	12	1	460
8/15/2008	33	12	1	470
8/15/2008	33	12	1	480
8/15/2008	33	22	1	480
8/15/2008	33	22	1	480
8/15/2008	33	22	1	485
8/15/2008	33	12	1	490
8/15/2008	33	12	1	490
8/15/2008	33	12	1	490
8/15/2008	33	22	1	490
8/15/2008	33	22	1	490
8/15/2008	33	22	1	490
8/15/2008	33	12	1	495
8/15/2008	33	12	1	495
8/15/2008	33	12	2	495
8/15/2008	33	12	2	500
8/15/2008	33	12	2	500
8/15/2008	33	12	2	500
8/15/2008	33	12	2	500
8/15/2008	33	12	2	510
8/15/2008	33	12	2	510
8/15/2008	33	12	2	515
8/15/2008	33	22	2	520
8/15/2008	33	13	2	535
8/15/2008	33	13	2	540
8/15/2008	33	13	2	540

8/15/2008	33	13	2	540
8/15/2008	33	13	2	540
8/15/2008	33	13	2	545
8/15/2008	33	13	2	545
8/15/2008	33	13	2	550
8/15/2008	33	13	2	550
8/15/2008	33	13	2	550
8/15/2008	33	23	2	550
8/15/2008	33	23	2	550
8/15/2008	33	23	2	550
8/15/2008	33	13	2	555
8/15/2008	33	23	2	555
8/15/2008	33	13	2	560
8/15/2008	33	13	2	560
8/15/2008	33	23	2	560
8/15/2008	33	23	2	560
8/15/2008	33	13	2	565
8/15/2008	33	13	2	565
8/15/2008	33	13	2	565
8/15/2008	33	13	2	565
8/15/2008	33	13	2	565
8/15/2008	33	13	2	570
8/15/2008	33	13	2	570
8/15/2008	33	13	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	23	2	570
8/15/2008	33	13	2	575
8/15/2008	33	13	2	575
8/15/2008	33	13	2	580
8/15/2008	33	23	2	580
8/15/2008	33	13	2	585
8/15/2008	33	13	2	590
8/15/2008	33	13	2	610
8/16/2008	33	12	1	450
8/16/2008	33	22	1	450
8/16/2008	33	12	1	460
8/16/2008	33	12	1	460
8/16/2008	33	12	1	470
8/16/2008	33	22	1	470
8/16/2008	33	12	1	480
8/16/2008	33	12	1	480
8/16/2008	33	12	1	490
8/16/2008	33	12	1	490
8/16/2008	33	12	1	490

8/16/2008	33	12	1	490
8/16/2008	33	12	1	490
8/16/2008	33	12	1	495
8/16/2008	33	12	1	500
8/16/2008	33	12	1	500
8/16/2008	33	12	1	500
8/16/2008	33	22	1	500
8/16/2008	33	22	1	500
8/16/2008	33	12	1	510
8/16/2008	33	12	1	510
8/16/2008	33	12	2	515
8/16/2008	33	12	2	515
8/16/2008	33	12	2	520
8/16/2008	33	12	2	520
8/16/2008	33	22	2	520
8/16/2008	33	12	2	530
8/16/2008	33	12	2	530
8/16/2008	33	13	2	540
8/16/2008	33	13	2	540
8/16/2008	33	13	2	540
8/16/2008	33	22	2	540
8/16/2008	33	13	2	545
8/16/2008	33	12	2	550
8/16/2008	33	13	2	555
8/16/2008	33	23	2	555
8/16/2008	33	23	2	555
8/16/2008	33	13	2	560
8/16/2008	33	13	2	560
8/16/2008	33	13	2	560
8/16/2008	33	13	2	560
8/16/2008	33	13	2	560
8/16/2008	33	13	2	560
8/16/2008	33	23	2	560
8/16/2008	33	13	2	570
8/16/2008	33	13	2	575
8/16/2008	33	13	2	580
8/16/2008	33	23	2	580
8/16/2008	33	13	2	590
8/16/2008	33	23	2	590
8/17/2008	34	12	1	450
8/17/2008	34	12	1	450
8/17/2008	34	12	1	460
8/17/2008	34	12	2	460
8/17/2008	34	12	2	470
8/17/2008	34	12	2	480
8/17/2008	34	22	2	495

8/17/2008	34	22	2	510
8/17/2008	34	22	2	525
8/17/2008	34	13	2	540
8/17/2008	34	13	2	540
8/17/2008	34	22	2	540
8/17/2008	34	13	2	555
8/17/2008	34	13	2	560
8/17/2008	34	23	2	560
8/17/2008	34	13	2	570
8/17/2008	34	13	2	570
8/19/2008	34	12	1	450
8/19/2008	34	12	1	470
8/19/2008	34	12	2	480
8/19/2008	34	12	2	490
8/19/2008	34	12	2	490
8/19/2008	34	12	2	495
8/19/2008	34	23	2	555
8/19/2008	34	13	2	565
8/19/2008	34	13	2	570
8/19/2008	34	23	2	570
8/19/2008	34	13	2	580
8/21/2008	34	12	1	470
8/21/2008	34	12	1	490
8/21/2008	34	12	1	490
8/21/2008	34	12	2	490
8/21/2008	34	22	2	490
8/21/2008	34	12	2	495
8/21/2008	34	12	2	495
8/21/2008	34	12	2	495
8/21/2008	34	12	2	500
8/21/2008	34	12	2	530
8/21/2008	34	12	2	530
8/21/2008	34	13	2	535
8/21/2008	34	13	2	560
8/21/2008	34	13	2	560
8/21/2008	34	13	2	560
8/23/2008	34	11	1	380
8/23/2008	34	22	1	440
8/23/2008	34	12	1	455
8/23/2008	34	12	1	460
8/23/2008	34	12	1	460
8/23/2008	34	12	1	460
8/23/2008	34	12	1	460
8/23/2008	34	12	1	460
8/23/2008	34	12	1	460
8/23/2008	34	22	2	460

8/23/2008	34	12	2	465
8/23/2008	34	12	2	470
8/23/2008	34	12	2	470
8/23/2008	34	22	2	470
8/23/2008	34	12	2	475
8/23/2008	34	22	2	475
8/23/2008	34	12	2	480
8/23/2008	34	12	2	485
8/23/2008	34	12	2	490
8/23/2008	34	12	2	490
8/23/2008	34	12	2	490
8/23/2008	34	22	2	490
8/23/2008	34	12	2	495
8/23/2008	34	12	2	495
8/23/2008	34	12	2	495
8/23/2008	34	12	2	495
8/23/2008	34	12	2	495
8/23/2008	34	12	2	495
8/23/2008	34	12	2	500
8/23/2008	34	12	2	500
8/23/2008	34	22	2	510
8/23/2008	34	13	2	535
8/23/2008	34	13	2	535
8/23/2008	34	13	2	535
8/23/2008	34	13	2	535
8/23/2008	34	13	2	550
8/23/2008	34	13	2	570
8/23/2008	34	13	2	570
8/23/2008	34	13	2	580
8/23/2008	34	13	2	580
8/23/2008	34	23	2	580
8/24/2008	35	22	1	460
8/24/2008	35	12	1	470
8/24/2008	35	12	1	470
8/24/2008	35	12	1	490
8/24/2008	35	12	1	490
8/24/2008	35	22	1	500
8/24/2008	35	12	1	505
8/24/2008	35	22	1	505
8/24/2008	35	12	1	510
8/24/2008	35	12	2	515
8/24/2008	35	12	2	515
8/24/2008	35	22	2	515
8/24/2008	35	12	2	520
8/24/2008	35	13	2	535
8/24/2008	35	13	2	540
8/24/2008	35	13	2	540

8/24/2008	35	13	2	550
8/24/2008	35	13	2	550
8/24/2008	35	13	2	555
8/24/2008	35	13	2	555
8/24/2008	35	13	2	560
8/24/2008	35	13	2	560
8/24/2008	35	13	2	570
8/24/2008	35	23	2	575
8/24/2008	35	13	2	610
8/26/2008	35	22	1	490
8/26/2008	35	12	2	510
8/27/2008	35	12	1	450
8/27/2008	35	12	1	465
8/27/2008	35	12	1	470
8/27/2008	35	22	2	470
8/27/2008	35	12	2	490
8/27/2008	35	22	2	495
8/27/2008	35	13	2	535
8/27/2008	35	13	2	535
8/27/2008	35	13	2	540
8/27/2008	35	13	2	555
8/27/2008	35	13	2	560
8/27/2008	35	13	2	570
8/28/2008	35	13	2	565
8/30/2008	35	23	1	560
8/30/2008	35	13	2	570
8/31/2008	36	12	1	470
8/31/2008	36	12	1	515
8/31/2008	36	13	2	540
9/2/2008	36	22	2	480
9/2/2008	36	12	2	515
9/2/2008	36	13	2	540
9/2/2008	36	13	2	540
9/2/2008	36	13	2	555
9/2/2008	36	13	2	555
9/2/2008	36	23	2	570
9/7/2008	37	22	2	460
9/7/2008	37	13	2	535
9/7/2008	37	13	2	540
9/7/2008	37	13	2	540
9/7/2008	37	13	2	555
9/7/2008	37	13	2	570
9/7/2008	37	13	2	570
9/7/2008	37	13	2	600
9/8/2008	37	22	1	500
9/8/2008	37	13	1	570

9/8/2008	37	13	2	570
9/8/2008	37	13	2	580
9/8/2008	37	23	2	580
9/8/2008	37	23	2	600

Appendix F. Harvest data for the 2008 Klag Bay sport and subsistence fishery.

Date	Gear Type and Number				Effort		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
7/4/2008	1	0	1	0	3	3	50	0	0	0	0
7/4/2008	1	0	0	0	3	3	30	0	0	0	0
7/5/2008	0	0	0	1	1	1	2	0	0	0	0
7/6/2008	1	1	0	0	1	1	100	5	0	0	0
7/9/2008	1	0	1	0	7	7	199	0	0	0	0
7/9/2008	0	0	0	1	1	1	0	0	0	0	0
7/12/2008	1	1	0	0	6	6	550	0	0	0	0
7/12/2008	1	1	0	0	1	1	50	4	0	0	0
7/13/2008	1	0	1	0		0	0	0	0	0	0
7/15/2008	1	1	0	0	5	5	300	0	0	0	0
7/15/2008	0	0	0	2	4	8	12	1	0	0	0
7/16/2008	1	1	0	0	2.5	2.5	137	2	3	0	0
7/16/2008	0	0	0	2	6	12	19	3	0	0	0
7/18/2008	1	0	1	0	6	6	83	17	3	0	1
7/20/2008	1	1	0	0	6	6	30	45	0	0	0
7/21/2008	1	1	0	0	9	9	180	0	0	0	0
7/23/2008	1	0	1	0	2	2	75	0	0	0	0
7/27/2008	0	0	0	4	5	20	50	0	0	0	0
7/29/2008	1	1	0	0	1	1	274	0	0	0	0
7/29/2008	1	1	0	0	4	4	149	12	0	0	0
7/30/2008	1	1	0	0	5	5	300	0	0	0	0
7/31/2008	1	0	1	0	10	10	101	15	0	0	0

7/31/2008	0	0	0	3	1	3	4	0	0	0	0
8/1/2008	1	1	0	0	3	3	0	5	0	0	0
8/2/2008	1	1	0	0	4	4	20	20	0	0	0
8/2/2008	1	1	0	0	5	5	200	75	0	0	0
8/3/2008	1	1	0	0	4	4	56	30	0	0	0
8/5/2008	1	0	2	0	5	10	20	20	0	0	0
8/7/2008	0	0	0	2	2	4	0	9	0	0	0
8/9/2008	0	0	0	2	2	4	0	2	0	0	0
8/15/2008	1	1	0	0	0	0	10	30	0	0	0
8/31/2008	1	0	1	0	4	4	12	31	1	0	0
9/1/2008	1	0	1	0	4	4	0	3	2	0	6
Totals		15	10	17	122.5	158.5	3013	329	9	0	7