Alaska Fisheries Data Series Number 2002-4

Estimation of Coho Salmon Escapement in the Ugashik Lakes, Alaska Peninsula National Wildlife Refuge, Alaska, 2001

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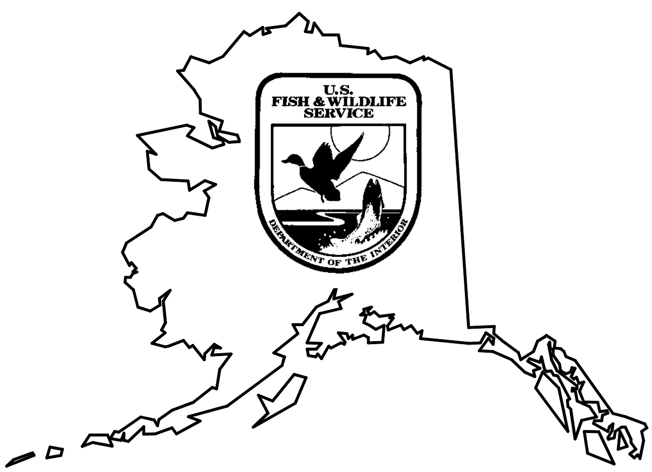

July 2002

United States Department of the Interior
Fish and Wildlife Service
Region 7
Fishery Resources

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Estimation of coho salmon escapement in the Ugashik lakes, Alaska Peninsula National Wildlife Refuge, Alaska, 2001

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Abstract. - From 26 July to 28 September 2001, hourly counts were conducted from counting towers to estimate the escapement of coho salmon *Oncorhynchus kisutch* into the Ugashik lakes. Estimated escapement for the season was 3,606 coho salmon and daily escapement estimates ranged from -6 on 8 August to 534 on 16 September. A total of 155 coho salmon were sampled for biological data. Three age classes were identified. Age 2.1 dominated the sample (82%), followed by age 1.1 (7%), and age 3.1 (2%). Estimated male to female ratio was 1.6:1 and mid-eye to fork lengths ranged from 465 to 687 mm. The estimated escapement of other Pacific salmon during the same time period were 27,792 sockeye salmon *O. nerka*, 5,676 chum salmon *O. keta*, 486 chinook salmon *O. tshawytscha* and 642 pink salmon *O gorbuscha*.

INTRODUCTION

Coho salmon *(Oncorhynchus kisutch)* is an important subsistence species for the residents of Ugashik and Pilot Point (Wright et al. 1985). A significant portion of the coho salmon harvested by local subsistence users is taken from the Ugashik lakes (Figure 1) located within the Alaska Peninsula National Wildlife Refuge (Wright et al. 1985). In-season salmon escapement monitoring in the Ugashik Commercial Management District is focused mainly on sockeye salmon *(Oncorhynchus nerka)*. The Alaska Department of Fish and Game (ADFG) does monitor the catch and harvest of coho salmon from commercial, subsistence, and sport fishing. However, this information is compiled after the subsistence fishery is over and therefore, does not provide an estimate of in-season run strength. Current in-season management of coho salmon is based on catch/effort indices from the commercial fishery. (Keith Weiland, ADFG Personal Communication) and escapement is indexed post-season from a single aerial survey (Glick et al. 2000).

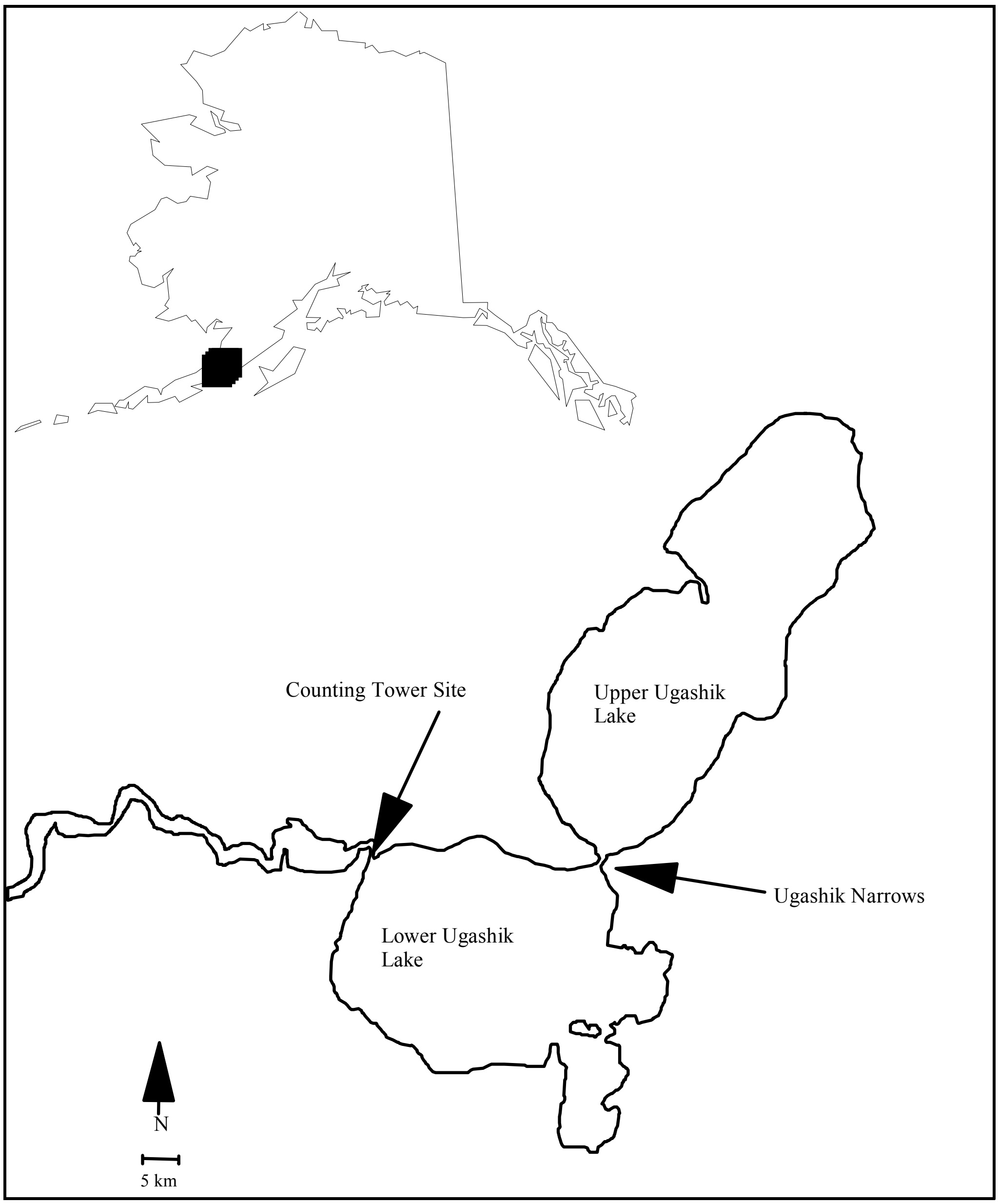

Figure 1. Location of coho salmon counting tower site on the Ugashik River, Alaska Peninsula National Wildlife Refuge, 2001

The 2000 commercial harvest of coho salmon in the Ugashik Commercial Management District was 1,269, below the ten-year average of 18,237. In 2000, an estimated 467 coho salmon were harvested by subsistence users in the Ugashik district, slightly higher than the ten-year average of 402 (Morstad et al. 2001). In 1998, sport anglers harvested 263 coho salmon (Howe et al. 1999), also below the ten year average of 451 fish. Estimates of the commercial, subsistence, and sport harvest however, are made for broad geographic areas rather than specific rivers or lakes. For example, sport harvest information reported for the Ugashik system encompasses the King Salmon, Dog Salmon, and Ugashik drainages (Howe et al. 1998). During the summer of 1998, the ADFG and the U. S. Fish and Wildlife Service (USFWS) conducted a creel census at the Ugashik Narrows (Figure 1), and documented a catch of 177 and harvest of 44 coho salmon (Jaenicke and Squibb 2000).

The need for an in-season escapement estimate was demonstrated during the 2000 fishing season when ADFG Sport Fish received numerous phone calls demanding regulatory action because of poor coho salmon fishing success by sport anglers (Dan Dunaway, ADFG Personal Communication). Concerns of a lack of coho salmon were also voiced by the subsistence fishery users outside of the Conservation Unit boundary (Anonymous Ugashik Village subsistence fisher, Personal Communication). Because commercial fishing success was in the acceptable range early in the season (Keith Weiland, ADFG Personal Communication) no action was taken to close the fisheries.

Subsistence users are concerned that the lack of an in-season estimate of coho salmon escapement may allow the sport fishery to over harvest the population. Representatives from Ugashik Traditional Village, Bristol Bay Native Association (BBNA), and King Salmon Fishery Resource Office (KSFRO) discussed solutions to the lack of escapement information for coho salmon and the subsistence/sport fishing conflict. An agreement was reached that the first step toward resolving the conflict would be to obtain an accurate estimate of escapement. The parties agreed that the best way to evaluate escapement would be to extend the operation of the ADFG sockeye salmon counting tower through the coho salmon season.

In-season escapement information could have improved the decision making process and provided better conservation security for the coho salmon population. Also, an in-season estimate of escapement would ensure that a sufficient number of coho salmon is available for subsistence harvest. An accurate post-season escapement estimate may diminish concerns about over-harvest and will help in resolving the conflict between subsistence and sport users. The information provided by this project will aid the Bristol Bay Regional Advisory Council and the Federal Subsistence Board in evaluating regulatory proposals regarding management of coho salmon stocks in the Ugashik lakes drainage. The specific objectives for the project were:

1. Estimate daily and seasonal escapement of coho salmon in the Ugashik lakes.

2. Estimate the age and sex compositions of coho salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20.

3. Estimate the mean length of coho salmon by age and sex.

METHODS

Escapement Estimate

Counts of coho salmon at the Ugashik tower site were taken using the same equipment, location, and procedures used by the ADFG Commercial Fisheries Division to estimate sockeye salmon escapement in the drainage. Enumeration sampling followed the protocols established by the Department's Commercial Fisheries Division (Alaska Department of Fish and Game 1984). Counting towers and associated sampling methods have been used in the Bristol Bay area for several decades (Anderson 2000). Escapement is estimated by expanding 10-minute counts of fish passage made every hour of the calendar day for each bank of the river. The 10-minute counts are multiplied by an expansion factor of six to estimate passage for each hour. The 24 hourly estimates from each bank are then summed to provide daily passage estimates.

A light-colored metal panel was anchored to the river bottom near each bank to provide a contrasting background for optimal fish identification. Polarized sunglasses were worn by the crew to minimize glare off the water surface. Artificial lights were used to obtain counts during the night.

Age, Sex, and Length Data

A beach seine (30.5m long, 3.1m deep, and 7.6cm stretch mesh) was the primary gear used to capture salmon for collecting age, sex, and length data. Seining was conducted five to six times per week throughout the season at several locations near the counting tower. We estimated that we would need to sample 138 coho per week to meet the objectives listed in the original study plan, based on the methods of Bromaghin (1993).

Coho salmon lengths were measured from mid-eye-to-fork of the tail to the nearest millimeter and sex was determined by observing external characteristics. Three to four scale samples were collected from the preferred area (Jearld 1983) from each coho salmon sampled. Scale samples were cleaned and mounted on gum cards for making scale impressions. Scale impression were made on clear acetate with a laboratory press. Ages were interpreted from impressions independently by two researchers, and any conflicting age determinations were re-analyzed jointly until both researchers agreed on an age determination. Age designations were expressed in the European fashion (Koo 1962), where numerals preceding the decimal denote freshwater annuli, and numerals following the decimal refer to the marine annuli.

Data Analyses

The sex, age, and length composition of each stratum and seasonal totals were estimated using standard stratified random sampling methods (Cochran, 1977). Within a given stratum m, the proportion of coho salmon passing the tower that are of sex i and age *j* (p_{ijm}) was estimated as:

$$\hat{p}_{ijm} = \frac{n_{ijm}}{n_{i+m}} \qquad 1.1$$

where n_{ijm} denotes the number of coho salmon sex i and age j sampled during stratum m and a subscript of "+" represents summation over all possible values of the corresponding variable, e.g., n_{i+m} denotes the total number of coho salmon sampled in stratum m. The variance of $\hat{p}_{ijm}$ was estimated as:

$$\hat{v}\left(\hat{p}_{ijm}\right) = \left(1 - \frac{n_{i+m}}{N_{i+m}}\right) \frac{\hat{p}_{ijm}\left(1 - \hat{p}_{ijm}\right)}{n_{i+m} - 1} \qquad 1.2$$

where N_{i+m} denotes the total number of coho salmon passing the tower in stratum m. The number of coho salmon of sex i and age j passing the tower in stratum m (N_{ijm}) was estimated as:

$$\hat{N}_{ijm} = N_{i+m}\,\hat{p}_{ijm} \qquad 2.1$$

with estimated variance

$$\hat{v}\left(\hat{N}_{ijm}\right) = N_{i+m}^{2}\,\hat{v}\left(\hat{p}_{ijm}\right) \qquad 2.2$$

Estimates of proportions for the entire period of tower operation are computed as weighted sums of the stratum estimates, i.e.,

$$\hat{p}_{ij} = \sum_{m} \left(\frac{N_{i+m}}{N_{i++}}\right) \hat{p}_{ijm} \qquad 3.1$$

with estimated variance:

$$\hat{v}\left(\hat{p}_{ij}\right) \quad = \quad \sum_{m}\left(\frac{N_{i+m}}{N_{i++}}\right)^{2}\hat{v}\left(\hat{p}_{ijm}\right) \qquad 3.2$$

The total number of coho salmon in a sex and age category passing the tower during the entire period of operation is estimated as:

$$\hat{N}_{ij} \quad = \quad \sum_{m}\hat{N}_{ijm} \qquad 4.1$$

with estimated variance

$$\hat{v}\left(\hat{N}_{ij}\right) \quad = \quad \sum_{m}\hat{v}\left(\hat{N}_{ijm}\right) \qquad 4.2$$

If the observed mean length of coho salmon of sex i and age j sampled in stratum m is denoted x_{ijm}, the sample mean length of coho of sex i and age j within stratum m was computed as

$$\overline{x}_{ijm} = \frac{\sum x_{ijm}}{n_{ijm}} \qquad 5.1$$

with corresponding sample variance s^2_{ijm},

$$s^2_{ijm} = \left(1-\frac{n_{ijm}}{\hat{N}}\right)\frac{\sum\left(x_{ijm}-\overline{x}_{ijm}\right)^{2}}{n_{ijm}-1} \qquad 5.2$$

the mean length of all coho salmon sex i and age j was estimated as a weighted sum of the stratum means, i.e.,

$$\hat{x}_{ij} = \sum_{m}\left(\frac{\hat{N}_{ijm}}{\hat{N}_{ij}}\right)x_{ijm} \qquad 6.1$$

An approximate estimator of the variance of $\hat{x}_{ij}$ was obtained using the delta method (Seber1982),

$$\hat{v}(\hat{x}_{ij}) = \sum_m \left\{ \hat{v}(\hat{N}_{ijm}) \left[\frac{x_{ijm}}{\sum_x \hat{N}_{ijx}} - \sum_y \frac{\hat{N}_{ijy}}{\left(\sum_x \hat{N}_{ijx}\right)^2} x_{ijy} \right]^2 + \left(\frac{\hat{N}_{ijm}}{\sum_x \hat{N}_{ijx}} \right)^2 s_{ijm}^2 \right\} \qquad 6.2$$

RESULTS

Escapement Estimate

Salmon counting began at 00:00 hours on 26 July 2001 and continued hourly through 23:00 hours on 28 September 2001. During this time there were 16 days during which no coho salmon were counted (Appendix 1). These days occurred at the beginning (26 July-1 August, and 6 August) and end (18, 29, and 22-27 September) of the study period. There was also one day (8 August) during which more coho salmon were counted passing the site traveling downstream rather than upstream, which resulted in a negative value for the escapement estimate on that day.

Total estimated coho salmon escapement into the Ugashik lakes during the study was 3,606 (Figure 2, Appendix 1). Daily estimated escapements range from 534 coho salmon on 16 September to -6 coho salmon on 8 August. The average passage rate for the study period was 55 ± 5 coho salmon per day. Other species of salmon were also counted as they passed the tower site. Total estimates for these species during the study were 27,792 sockeye salmon, 5,676 chum salmon, 486 chinook salmon and 642 pink salmon (Appendix 1).

Age, Sex, and Length Data

Age, sex, and length data were grouped into three time strata for estimates (26 July-20 August, 21 August-4 September, and 5-28 September) rather than weekly strata as was originally planned. This change was made because we were unable to capture 138 coho salmon for sampling each week, even though considerable effort was spent on this task.

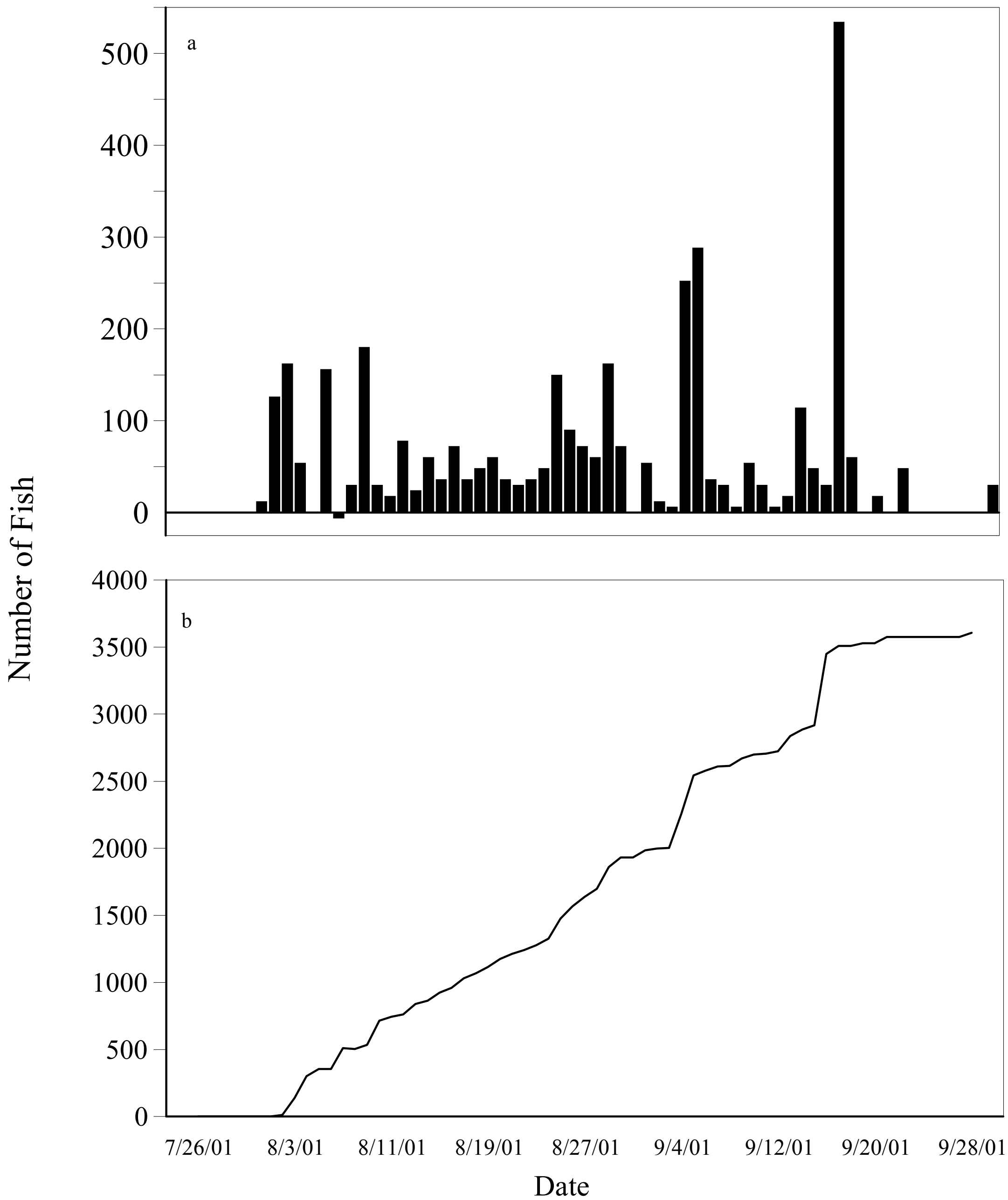

Figure 2. Estimated daily (a) and cumulative escapement (b) of coho salmon into the Ugashik lakes Alaska Peninsula National Wildlife Refuge, 2001.

We captured 155 coho salmon during the season (Table 1). Of these, 9% (14) had unreadable scales. While three age classes occurred in the samples, age 2.1 coho salmon comprised 82% of the total sample. Age 1.1 coho salmon comprised 7%, and age 3.1 coho salmon comprised 2% of the total sample.

The estimated male-to-female sex ratio for the 2001 Ugashik coho salmon run was 1.6:1 (Table 1). While there were more males than females in samples from all three strata, the greatest male-to-female ratio, 6.3:1 occurred in the sample for the first stratum (26 July to 20 August), while the remaining two strata had ratios closer to 1:1 (1.2:1 and 1.3:1).

Lengths of coho salmon samples ranged from 465 to 687 mm, and 60% of all coho salmon samples were less than 610 mm (Figure 3, Table 1). Within each age class, mean length of females was generally greater than that of males.

DISCUSSION

Escapement Estimate

We think our counting period encompassed most of the coho salmon run entering the Ugashik lakes to spawn. This assumption appears to be supported by distribution of counts over the season: no coho salmon were counted during the first seven days of operations and only five coho salmon were counted during the last seven days of operations. Studies of other Bristol Bay systems, such as the Egegik (Russell 1996 and Wieland 1996) and Kulukak (Price and Larson 1999) systems, also suggest that our study began early enough to monitor the beginning of the coho salmon run. However, none of these studies were continued late enough into the season to determine when coho salmon runs ended.

The estimated escapement of 3,606 coho salmon into the Ugashik lakes was lower than preseason expectations. Preseason estimates of a run of 7,000 to 10,000 were based on coho salmon runs in the Becharof Lake system where coho salmon runs have been documented between 7,000 and 24,000 (Russell 1996 and Wieland 1996). The Becharof system is similar in rearing and spawning habitat and geographically close to the Ugashik lakes.

Although the 2001 estimated escapement was lower than expected, it was higher than ADFG's 2,400 index average for the Ugashik lakes (Keith Weiland, ADFG Personal Communication). The 2001 ADFG aerial survey conducted on 27 September counted 2,790 coho salmon in the two Ugashik lakes and an additional 450 fish in the Ugashik River below the counting tower. Price and Larson (1999) found aerial estimates as likely to over as under

Table 1. Estimated escapement and temporally stratified age, sex, and mean mid-eye to fork length data with 90% confidence intervals of coho salmon sampled in the Ugashik lakes Alaska Peninsula National Wildlife Refuge, 2001.

Age	Sex	N	Percent	Mean Length mm	Estimated Escapement
Stratum 1 26 July to 20 August					
1.1	F	1	3 ± 6	600	41 ± 66
	M	0	0	0	0
2.1	F	3	10 ± 9	605 ± 83	122 ± 110
	M	24	83 ± 12	577 ± 74	973 ± 136
3.1	F	0	0	0	0
	M	0	0	0	0
Unaged	F	0	0	0	0.0
	M	1	4 ± 6	576	41 ± 66
Total	F	4	14 ± 1	604 ±68	162 ± 125
	M	25	86 ± 1	577 ± 72	1,014 ± 125
Stratum 2 21 August to 4 September					
1.1	F	7	9 ± 5	567 ± 86	102 ± 59
	M	4	5 ± 4	536 ± 45	58 ± 45
2.1	F	23	31 ± 9	596 ± 68	336 ± 93
	M	29	39 ± 9	571 ± 78	423 ± 98
3.1	F	2	3 ± 3	648 ± 37	29 ± 32
	M	2	3 ± 3	565 ± 16	29 ± 32
Unaged	F	1	1 ± 2	590	15 ± 23
	M	6	8 ± 5	542 ± 60	88 ± 55
Total	F	33	45 ± 1	593 ± 75	482 ± 100
	M	41	55 ± 1	563 ± 74	598 ± 100
Stratum 3 5 September to 28 September					
1.1	F	0	0	0	0
	M	2	4 ± 4	642 ± 60	52 ± 59
2.1	F	19	36 ± 11	613 ± 59	493 ± 146
	M	24	46 ± 11	607 ± 81	623 ± 152
3.1	F	0	0	0	0
	M	1	2 ± 3	664	26 ± 42
Unaged	F	4	8 ± 6	632 ± 35	104 ± 81
	M	2	4 ± 4	591 ± 3	52 ± 59
Total	F	23	44 ± 1	616± 56	597 ± 151
	M	29	56 ± 1	610 ± 78	753 ± 151

Table 1. Continued.

Age	Sex	N	Percent	Mean Length mm	Estimated Escapement
Seasonal Totals					
1.1	F	8	4 ± 2	576 ± 63	143 ± 88
	M	6	3 ± 2	586 ± 52	110 ± 74
2.1	F	45	26 ± 6	606 ± 40	951 ± 205
	M	77	56 ± 6	585 ± 46	2,020 ± 226
3.1	F	2	1 ± 1	648 ± 37	29 ± 32
	M	3	1 ± 1	612 ± 49	55 ± 53
Unaged	F	5	3 ± 2	603 ± 31	118 ± 84
	M	9	6 ± 3	587 ± 41	180 ± 104
	F	60	34 ± 1	606 ± 41	1,241 ± 220
Total	M	95	66 ± 1	584 ± 46	2,365 ± 220

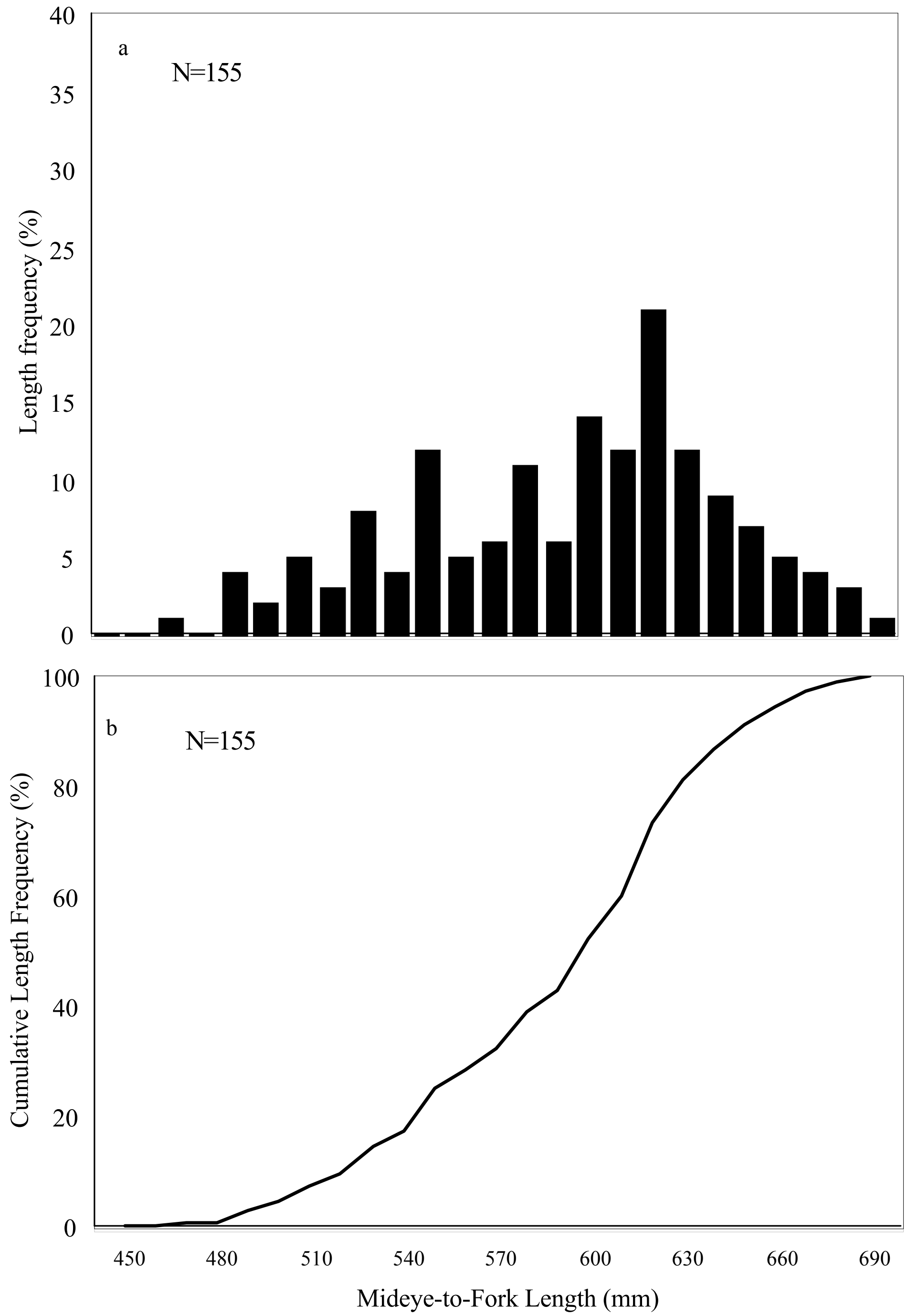

Figure 3. Length frequency (a) and cumulative length frequency (b) of coho salmon sampled in the Ugashik lakes Alaska Peninsula National Wildlife Refuge, 2001.

estimate escapement estimates derived from tower counts and the correlation between the two methods was weaker for coho salmon than other salmon species. Because of variability in aerial counts and the lack of other historical escapement data for the Ugashik lakes, it is not clear whether the tower or aerial estimates are more accurate.

We are not sure whether making 10-minute counts each hour provided an accurate estimate of coho salmon escapement. Although this method has been shown to produce accurate salmon escapement estimates fro large runs of several thousand salmon (Anderson 2000), it may not work well for small runs of only a few thousand salmon. Various sources of error are involved in making accurate estimates based on visual counts from towers, including observer error, visibility, salmon passage variation within each hour, and the proportion of the run available to observers. Some of these sources of error can be examined using video technology (Irvine et al 1991; Hiebert et al. 2000; Otis and Dickson 2001). We are currently using digital video technology to estimate salmonid escapement in the Togiak River watershed with favorable results. The water clarity and size of the Ugashik River are similar to the location used in the Togiak project, indicating video technology is an option to explore in estimating escapement in the Ugashik lakes

The 2001 tower counts have provided a baseline index of coho salmon escapement of into the Ugashik lakes. This baseline index can provide the Federal Subsistence Board with information needed to make informed decisions concerning subsistence issues within the Ugashik lakes. Final evaluation of the 2001 escapement estimate can only be accomplished upon completion of this project when additional yearly counts have been collected.

Age, Sex, and Length Data

The age composition of the Ugashik coho salmon run is similar to that estimated for other Bristol Bay coho salmon runs. Age 2.1 coho salmon were the most abundant age group in samples collected from the Ugashik lakes during our study (82% ; Table1), as well as in samples collected during other studies on the Egegik (65%; Russell 1996), Kulukak (77%; Price and Larson 1999) and Nushagak (81%; West and Gray 2001) systems, Given the dominance of a single age group, the number of coho salmon that need to be sampled in future years to maintain the desired 90% confidence intervals with a maximum width of 0.20 will be much fewer than the 138 per stratum goal set for this year.

The estimated male-female sex ratio for the 2001 Ugashik coo salmon run of 1.6:1 (Table 1) was within the range of sex ratios reported for other stocks of coho salmon in Alaska (Sandercock 1991). Sandercock (1991) also reports some coho salmon runs in Alaska exhibit a greater abundance of males to females throughout the run, whether or not the sex ratio of the Ugashik lakes coho salmon run is skewed in uncertain. However, size selection by commercial fishing does not appear to be a factor in the sex ratio observed in the 2001 sample. Limited commercial fishing effort (five days) occurred during the first and second sampling periods and resulted in 976 coho salmon harvested (Keith Weiland, ADFG Personal Communication).

The length data obtained in 2001 provides a baseline needed to detect any changes in the characteristics of this stock in the future. However, it is unclear what characteristics are representative of the historical composition, those of 2001 or future characteristics.

CONCLUSIONS

Escapement of coho salmon into the Ugashik lakes in 2001 was less than we expected, but appears to be meeting current subsistence needs. Whether or not this level of escapement can sustain runs larger enough to support subsistence needs in unknown at this time. Further escapement data is needed to determine the biological significance of the escapement estimate of 2001. Although less abundant than expected, the age, length, and sex composition was similar to that observed for other stocks of coho salmon in the Bristol Bay area.

RECOMMENDATIONS

The following recommendations are offered for the next two years of this study:

1 Examine the use of video technology to either validate or replace tower counting methods for coho salmon.

2. Re-examine age-sex-length sampling goals based on information collected during the 2001 season.

ACKNOWLEDGMENTS

We thank the field crew for their hard work and dedication: Jim Enright, Mike Harrington, Casey Jacobs, Karen McCanbly, and Nick Neketa. We also thank the staff of the Ugashik River Lodge, Bob and Carol Dreeszen, and the King Salmon Fishery Resource Office staff for their insight and assistance throughout the 2001 field season. The U.S. Fish and Wildlife Service, Office of Subsistence Management provided funding support for this project through the Fisheries Resource Monitoring Program. We thank the Alaska Department of Fish and Game, Division of Commercial Fisheries and the Bristol Bay Native Association for providing equipment and personnel.

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Appendix 1. Daily coho salmon counts and estimated cumulative escapement into the Ugashik lakes Alaska Peninsula National Wildlife Refuge, 2001.

	Daily Counts					Cumulative Estimated Escapement				
Date	sockeye	coho	chum	chinook	pink	sockeye	coho	chum	chinook	pink
July 26	736	0	0	1	12	4,416	0	0	6	72
27	516	0	0	3	-1	7,512	0	0	24	66
28	336	0	0	0	0	9,528	0	0	24	66
29	274	0	2	3	19	11,172	0	12	42	180
30	149	0	1	2	4	12,066	0	18	54	204
31	93	0	1	4	3	12,624	0	24	78	222
Aug. 1	150	0	-7	1	-2	13,524	0	-18	84	210
2	117	2	1	0	2	14,226	12	-12	84	222
3	277	21	3	1	7	15,888	138	6	90	264
4	151	27	13	2	14	16,794	300	84	102	348
5	150	9	5	-1	8	17,694	354	114	96	396
6	86	0	9	1	9	18,210	354	168	102	450
7	132	26	19	3	1	19,002	510	282	120	456
8	149	-1	25	-1	3	19,896	504	432	114	474
9	47	5	25	2	1	20,178	534	582	126	480
10	118	30	47	6	2	20,886	714	864	162	492
11	144	5	95	4	3	21,750	744	1,434	186	510
12	77	3	22	4	4	22,212	762	1,566	210	534
13	119	13	41	8	1	22,926	840	1,812	258	540
14	49	4	64	-2	4	23,220	864	2,196	246	564
15	12	10	39	3	2	23,292	924	2,430	264	576
16	89	6	37	5	7	23,826	960	2,652	294	618
17	31	12	43	1	2	24,012	1,032	2,910	300	630
18	69	6	82	3	4	24,426	1,068	3,402	318	654
19	-90	8	67	-1	-1	23,886	1,116	3,804	312	648
20	130	10	18	3	-3	24,666	1,176	3,912	330	630
21	99	6	26	2	0	25,260	1,212	4,068	342	630
22	182	5	20	0	0	26,352	1,242	4,188	342	630
23	-38	6	53	1	1	26,124	1,278	4,506	348	636
24	36	8	29	6	1	26,340	1,326	4,680	384	642
25	16	25	2	6	4	26,436	1,476	4,692	420	666
26	48	15	13	3	0	26,724	1,566	4,770	438	666
27	-29	12	-6	3	-3	26,550	1,638	4,734	456	648
28	24	10	9	1	0	26,694	1,698	4,788	462	648
29	36	27	6	-2	0	26,910	1,860	4,824	450	648
30	11	12	36	1	0	26,976	1,932	5,040	456	648
31	31	0	26	2	0	27,162	1,932	5,196	468	648
Sept. 1	14	9	16	-3	0	27,246	1,986	5,292	450	648
2	9	2	14	2	0	27,300	1,998	5,376	462	648
3	14	1	1	1	0	27,384	2,004	5,382	468	648
4	31	42	12	2	0	27,570	2,256	5,454	480	648
5	10	48	14	2	0	27,630	2,544	5,538	492	648
6	17	6	11	-1	0	27,732	2,580	5,604	486	648
7	7	5	8	0	0	27,774	2,610	5,652	486	648
8	2	1	2	0	-1	27,786	2,616	5,664	486	642

Appendix 1. Continued.

Date	Daily Counts					Cumulative Estimated Escapement				
	sockeye	coho	chum	chinook	pink	sockeye	coho	chum	chinook	pink
Sept 9	0	9	0	0	0	27,786	2,670	5,664	486	642
10	0	5	2	0	0	27,786	2,700	5,676	486	642
11	0	1	0	0	0	27,786	2,706	5,676	486	642
12	0	3	0	0	0	27,786	2,724	5,676	486	642
13	0	19	0	0	0	27,786	2,838	5,676	486	642
14	0	8	0	0	0	27,786	2,886	5,676	486	642
15	0	5	0	0	0	27,786	2,916	5,676	486	642
16	0	89	0	0	0	27,786	3,450	5,676	486	642
17	0	10	0	0	0	27,786	3,510	5,676	486	642
18	1	0	0	0	0	27,792	3,510	5,676	486	642
19	0	3	0	0	0	27,792	3,528	5,676	486	642
20	0	0	0	0	0	27,792	3,528	5,676	486	642
21	0	8	0	0	0	27,792	3,576	5,676	486	642
22	0	0	0	0	0	27,792	3,576	5,676	486	642
23	0	0	0	0	0	27,792	3,576	5,676	486	642
24	0	0	0	0	0	27,792	3,576	5,676	486	642
25	0	0	0	0	0	27,792	3,576	5,676	486	642
26	0	0	0	0	0	27,792	3,576	5,676	486	642
27	0	0	0	0	0	27,792	3,576	5,676	486	642
28	0	5	0	0	0	27,792	3,606	5,676	486	642