Fishery Data Series No. 94-6

Size and Abundance of Cutthroat Trout in Small Southeast Alaska Lakes, 1993

by

Artwin E. Schmidt

July 1994

Alaska Department of Fish and Game

Division of Sport Fish

FISHERY DATA SERIES NO. 94-6

SIZE AND ABUNDANCE OF CUTTHROAT TROUT IN SMALL SOUTHEAST ALASKA LAKES 1993

by

Artwin E. Schmidt

Alaska Department of Fish and Game
Division of Sport Fish
Anchorage, Alaska

July 1994

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Abundance and size of cutthroat trout *Oncorhynchus clarki* was measured in thirteen small, less than 50 hectare, Southeast Alaska lakes. Each lake was sampled for three days in 1993. Catches of cutthroat trout varied widely in the lakes even though the same gear and similar effort were expended on each lake. Lengths of cutthroat trout generally fell into one of three ranges according to the following lake types: 1) lakes which support anadromous fish, 2) landlocked lakes without kokanee, and 3) landlocked lakes which have kokanee populations present.

Mark-recapture experiments were conducted to estimate abundance of cutthroat trout ≥180 millimeters fork length in three of the small landlocked lakes in Southeast Alaska: Buck, Little Eva, and Upper Wolf lakes. Estimated abundance at Buck Lake was $\hat{N} = 441$, $SE[\hat{N}] = 52$; estimated abundance at Little Eva was $\hat{N} = 380$, $SE[\hat{N}] = 28$; and estimated abundance at Upper Wolf was $\hat{N} = 1233$, $SE[\hat{N}] = 113$.

KEY WORDS: Cutthroat trout, *Oncorhynchus clarki*, Southeast Alaska, abundance, harvest, size composition, length frequency, catch, Dolly Varden char, *Salvelinus malma*, kokanee, *Oncorhynchus nerka*, catch per unit effort, CPUE.

INTRODUCTION

Harvests of anadromous and resident cutthroat trout *Oncorhynchus clarki* in Southeast Alaska have declined from about 23,000 fish in 1977 to less than 9,672 in 1991, or about 60% in the past 14 years (Mills 1992). Diminishing harvests of cutthroat trout coupled with increasing effort signaled a decline in trout abundance regionwide. Prompted by conservation concerns, the Division of Sport Fish developed a public process to review stock status and efficacy of various regulations to halt this decline.

During our numerous public meetings to discuss cutthroat trout biology and populations it was apparent that we lacked good information on cutthroat trout in small landlocked lakes. This project was designed to provide a better insight into the size distribution and abundance of cutthroat trout in these lakes.

The research objectives for 1993 were:

1) to estimate the length frequency distributions of cutthroat trout in 14 small landlocked lakes in Southeast Alaska by a standard method, such that mean lengths for each lake are comparable and are estimated within ±5% of the true value 95% of the time; and

2) to estimate abundance of cutthroat trout ≥180 mm FL in three small landlocked lakes such that the estimates are within ±50% of true values 95% of the time.

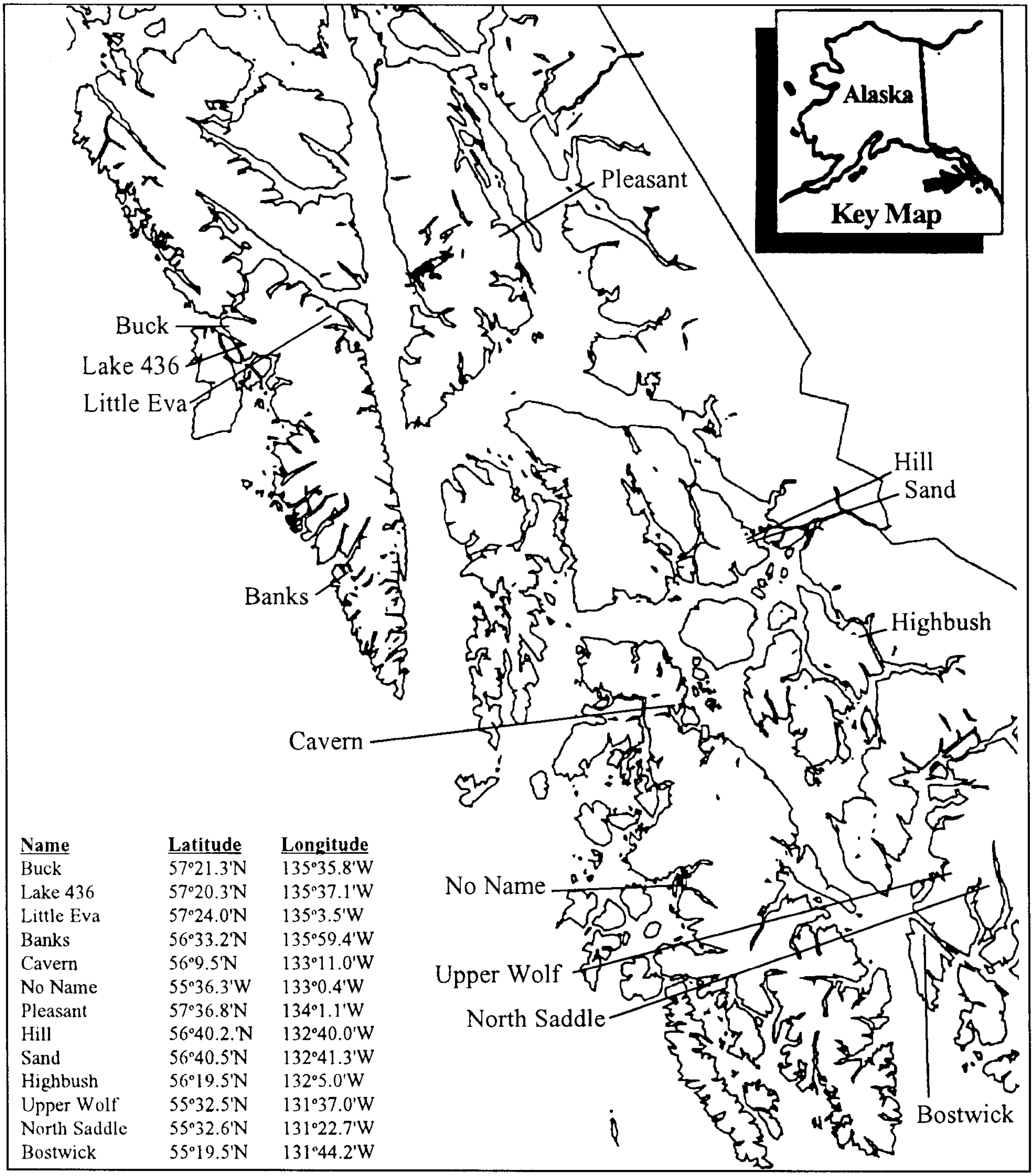
METHODS

Length Frequency

Thirteen lakes in Southeast Alaska (Figure 1) were sampled for three days each in 1993. The lakes were selected to provide a representative sample of small landlocked lakes in Southeast Alaska. Each sampling trip (to each lake) deployed a fixed amount of gear to collect length data.

Overnight sets of four large minnow traps (1 m long and 0.5 m wide) and four baited collapsible hoop traps (1.5 m in length and 0.6 m in diameter, with a 9-cm opening in each end of the trap, and a mesh size of 1 cm) were set to achieve a uniform density of gear across the lake. Investigators also fished all of the various habitats (shoreline, open water, inlet and outlet shoals) of the lake with hook-and-line gear. Effort by gear type was kept approximately constant in each lake so comparisons of catch could be made among lakes.

All cutthroat trout ≥180 mm FL were measured to the nearest mm FL and marked with a shallow anal fin clip so that the same fish could not be sampled twice. The size of 180 mm was chosen as the size below which most anglers would not keep a fish. Records were also kept of the numbers of Dolly Varden *Salvelinus malma* captured in each lake, by area and gear type.



Name	Latitude	Longitude
Buck	57°21.3'N	135°35.8'W
Lake 436	57°20.3'N	135°37.1'W
Little Eva	57°24.0'N	135°3.5'W
Banks	56°33.2'N	135°59.4'W
Cavern	56°9.5'N	133°11.0'W
No Name	55°36.3'W	133°0.4'W
Pleasant	57°36.8'N	134°1.1'W
Hill	56°40.2.'N	132°40.0'W
Sand	56°40.5'N	132°41.3'W
Highbush	56°19.5'N	132°5.0'W
Upper Wolf	55°32.5'N	131°37.0'W
North Saddle	55°32.6'N	131°22.7'W
Bostwick	55°19.5'N	131°44.2'W

Figure 1. Map showing locations of lakes surveyed in Southeast Alaska, 1993.

Abundance Estimate

Of the thirteen lakes sampled for cutthroat trout length frequency, three lakes with the highest catch-per-unit-effort (CPUE) were chosen for additional investigation. Two-occasion mark-recapture experiments were used to estimate abundance of cutthroat trout ≥180 mm FL in each lake. One 10-day trip was made to each lake to capture fish for marking (event 1), and one 10-day trip to each lake was needed to inspect fish for marks (event 2). Each lake was divided into an inlet zone and an outlet zone of roughly equal size to facilitate consistent recording of locations where fish were marked and recaptured. Fish were captured with large minnow traps, collapsible hoop traps, and fyke nets baited with salmon roe and hook-and-line gear.

During the first event, each fish ≥180 mm FL was measured to the nearest mm FL, marked by shallowly clipping the dorsal or ventral lobe of the caudal fin to identify in which section of the lake it was caught, and released in the area of capture. Fish ≤180 mm FL were only counted. During the second event each fish ≥180 mm FL was given an adipose clip (so the same fish could not be sampled twice), examined for the presence of other marks, and measured for length.

During each sampling trip, gear was systematically moved through the two sampling areas, on a day-by-day basis, so that each gear type fished the same length of time in each area. Overnight sets of four large minnow traps and four baited collapsible hoop traps were set to achieve a uniform density of gear across the lake. Depth of each trap or net was determined and recorded. Hook-and-line gear was used in each major sampling area at each lake such that effort was approximately equal in each area.

The hypothesis that fish of different sizes were captured with equal probability during the second sampling event was tested with a Kolmogorov-Smirnov (K-S) 2-m sample test (α=0.05) that compared lengths of fish marked in event 1 against the lengths of fish recaptured in event 2. A chi-square test compared the number of marked fish recaptured in event 2 to the number not-recaptured in specific categories.

The assumption that fish had an equal chance of being marked or that complete mixing (of marks) occurred between sampling events was evaluated by testing if (given *some* mixing between areas) marked fish were recovered with equal probability in each area of the lake. If this was not so, a Darroch estimator (Seber 1982, Darroch 1961) was used to estimate abundance:

$$\underline{U} = \mathbf{D}_u \mathbf{M}^{-1} \underline{a} \tag{1}$$

where $\underline{U}$ = vector of the estimated number of *unmarked* fish in each area during the second sampling event,

$\mathbf{D}_u$ = diagonal matrix of the number of *unmarked* fish captured in each area during the second sampling event,

$\mathbf{M}$ = matrix (m_{ij}) of the number of tagged fish recovered in area (j) which were released in area i, and

$\underline{a}$ = vector of the number of tagged fish released in area i;

and abundance $\hat{\underline{N}} = \underline{U} + \underline{a}$. The variance-covariance matrix for $\underline{U}$ was estimated using the approximation for $E[(\hat{\underline{U}}-\underline{U})(\hat{\underline{U}}-\underline{U})^T]$ as explained by Seber (1982) on page 433.

If marking ratios were equal across areas, Chapman's modification of the Peterson method (Seber 1982) was used to estimate abundance:

$$\hat{N} = \frac{(n_1+1)(n_2+1)}{(m_2+1)} - 1 \qquad (2)$$

and has an associated variance:

$$V[\hat{N}] = \frac{(n_1+1)(n_2+1)(n_1-m_2)(n_2-m_2)}{(m_2+1)^2(m_2+2)} \qquad (3)$$

where $\hat{N}$ = abundance of cutthroat trout ≥180 mm FL,

n_1 = number of fish marked and released in the 1^{st} sampling event,

n_2 = number of fish inspected for marks in the 2^{nd} sampling event, and

m_2 = number of marked fish recaptured in the 2^{nd} sampling event.

RESULTS

Length Frequency

Catch of cutthroat trout varied widely in the thirteen lakes (Table 1), even though the same gear and similar effort were expended on each lake. Catch by gear type showed that sport fishing with hook and line was the most effective gear for cutthroat trout, although it was usually not very effective on Dolly Varden (Table 2). Lakes generally fell into one of three categories: 1) lakes which support anadromous fish, 2) landlocked lakes without kokanee, and 3) landlocked lakes which have kokanee populations present. Although the original plan was to sample unexploited lakes, most lakes showed evidence of angling and many had roads, trails, and shelters indicating various amounts of use.

Lake Eva, Pleasant Lake and Wolf Lake which have kokanee present had the larger cutthroat trout of all lakes studied (Figure 2). Little Eva and Pleasant lakes which are difficult to access have the largest cutthroat trout. Upper Wolf has developed access by trail and had generally smaller fish than did the other two lakes with kokanee.

The open-system lakes (Hill, Sand, Bostwick, and Cavern) generally had fish present which were smaller than those in lakes with kokanee but larger than those in the non-anadromous systems. Midsummer is not a good time to sample anadromous lakes for anadromous cutthroat trout as many of the larger cutthroat are in the ocean during this time.

Table 1. Physical and chemical characteristics of lakes sampled and numbers of cutthroat trout ≥180mm fork length and all Dolly Varden caught during standardized sampling.

NAME	AREA (HA)	DATE	MAX. DEPTH (M)	SP. COND. (μ℧)	pH	TEMP (C)	CATCH cutthroat	CATCH DV
Landlocked Lakes With Kokanee								
LITTLE EVA	25.3	7/23	12	20	7.2	17.5	79	23
PLEASANT	46.3	6/29	ND*	ND*	ND*	ND*	45	118
UPPER WOLF	41.6	7/5	10	10	6.4	18.0	159	100
Lakes with Anadromous Fish								
CAVERN	11.2	7/28	10	121	7.4	19.0	19	345
BOSTWICK	28.2	7/9	20	20	6.7	20.5	65	19
HILL	3.4	8/18	8	11	6.4	18.0	4	35
SAND	16.8	8/21	14	89	6.5	17.0	17	177
Landlocked Lakes Without Kokanee								
N SADDLE	25.3	7/14	20	10	6.6	21.0	24	353
LK 436	23.2	7/15	15	20	7.2	17.0	104	25
BANKS	47.0	7/8	45	20	6.5	18.0	36	0
BUCK	20.3	8/11	19	20	7.2	18.0	159	0
NONAME	7.6	9/15	8	38	6.8	15.5	19	317
HIGHBUSH	29.3	8/13	51	32	6.0	18.0	0	652

* Not Determined

Table 2. Sampling effort (hours), catch, and catch-per-unit-effort (CPUE, fish per hour) by lake, gear and species, 1993.

Lake Date	Gear	Effort	Cutthroat Trout ≥180 mm FL Catch	Cutthroat Trout ≥180 mm FL CPUE	Dolly Varden (all) Catch	Dolly Varden (all) CPUE
Little Eva 7/21-24/93	Minnow Trap	249	12	0.05	1	0.00
	Hoop Trap	255	15	0.06	8	0.03
	Sport	19	52	2.74	14	0.74
Pleasant 6/28-30/93	Minnow Trap	255	5	0.02	67	0.26
	Hoop Trap	257	1	0.00	48	0.19
	Sport	20	39	1.95	3	0.15
Upper Wolf 7/5-8/93	Minnow Trap	254	79	0.31	33	0.13
	Hoop Trap	257	56	0.22	67	0.26
	Sport	20	24	1.20	0	0.00
Cavern 7/26-29/93	Minnow Trap	254	2	0.01	178	0.70
	Hoop Trap	259	8	0.03	167	0.64
	Sport	20	9	0.45	0	0.00
Bostwick 7/17-20/93	Minnow Trap	256	23	0.09	4	0.02
	Hoop Trap	258	39	0.15	15	0.06
	Sport	20	3	0.15	0	0.00
Hill 8/16-19/93	Minnow Trap	255	2	0.01	13	0.05
	Hoop Trap	258	0	0	18	0.07
	Sport	20	2	0.10	4	0.02
Sand 8/19-22/93	Minnow Trap	255	5	0.02	47	0.18
	Hoop Trap	258	4	0.02	130	0.50
	Sport	20	8	0.40	0	0.00
North Saddle 7/12-15/93	Minnow Trap	255	8	0.03	221	0.87
	Hoop Trap	258	3	0.01	132	0.51
	Sport	20	13	0.65	0	0.00
Lk 436 7/13-17/93	Minnow Trap	253	43	0.17	5	0.02
	Hoop Trap	261	46	0.18	20	0.08
	Sport	20	15	0.75	0	0.00
Banks 7/6-9/93	Minnow Trap	258	15	0.06	0	0.00
	Hoop Trap	257	17	0.07	0	0.00
	Sport	20	4	0.20	0	0.00
Buck 7/28-31/93	Minnow Trap	259	45	0.17	0	0.00
	Hoop Trap	259	76	0.29	0	0.00
	Sport	20	38	1.90	0	0.00
Noname 9/13-16/93	Minnow Trap	254	3	0.01	130	0.51
	Hoop Trap	256	3	0.01	186	0.73
	Sport	20	13	0.65	1	0.05
Highbush 8/12-14/93	Minnow Trap	226	0	0	419	1.85
	Hoop Trap	227	0	0	232	1.02
	Sport	18	0	0	1	0.06

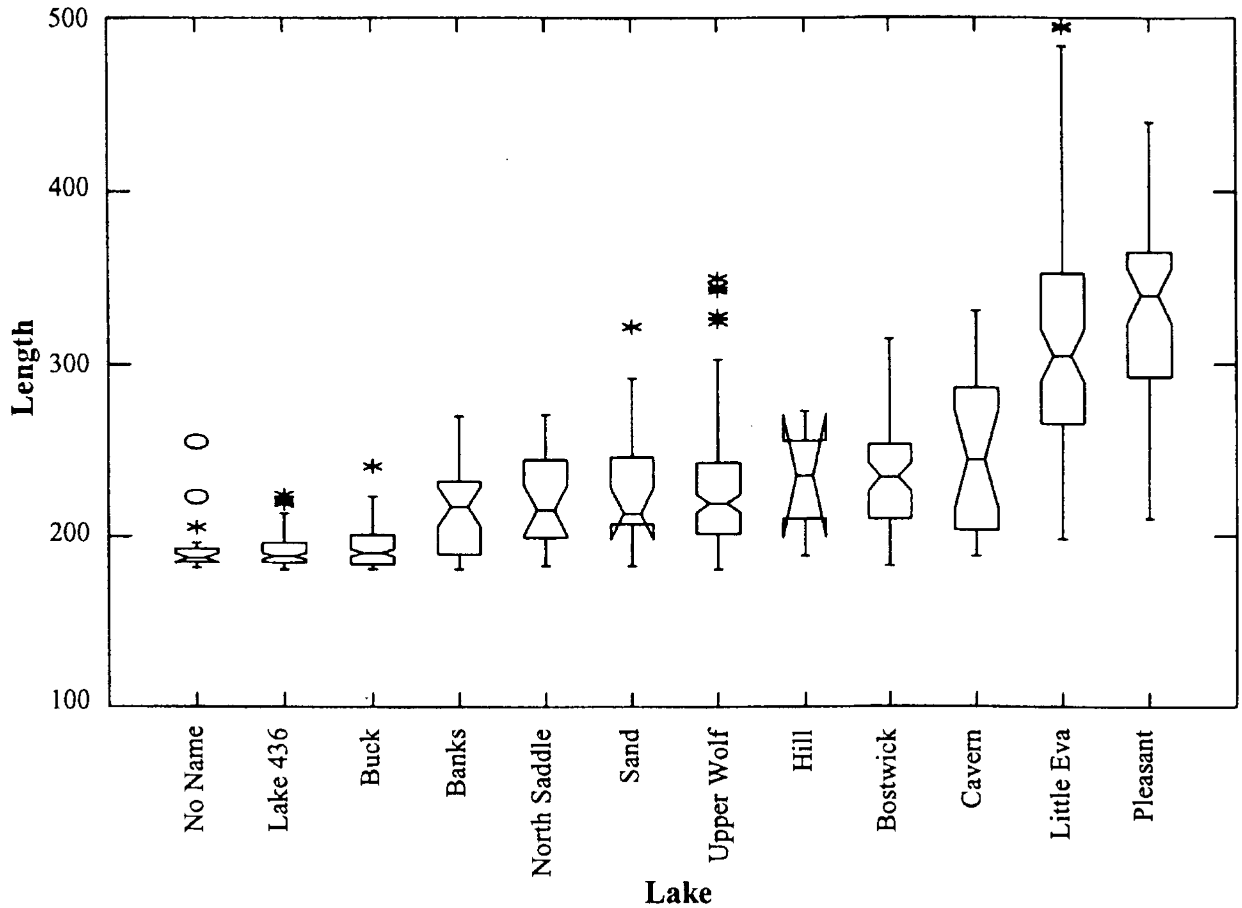


Figure 2. Boxplot of lengths of cutthroat trout caught with standardized gear and effort in twelve cutthroat lakes throughout Southeast Alaska, 1993. The top and bottom of the box rectangles are the upper and lower quartiles of the data, respectively; the median is portrayed by the horizontal line segment within the notched rectangles; the lengths of the vertical lines relative to the box show the tails of the distribution; and the notches provide an approximate 95% test of the null hypothesis that the true medians are equal.

The small landlocked lakes sampled (Buck, Lake 436, Banks, North Saddle, and Noname) had the smallest size distribution of cutthroat of all lakes studied. No cutthroat were found in Highbush lake which reportedly had a good population of cutthroat at one time. No Dolly Varden were caught in Banks or Buck lakes.

Abundance Estimate

Buck Lake, Little Eva, and Upper Wolf lakes which were sampled for length frequency of cutthroat trout were selected for population estimation of cutthroat trout. The lakes with highest preliminary catches of cutthroat trout were chosen as we felt these lakes would likely have the highest populations of cutthroat.

Buck Lake:

Two hundred and eleven (211) cutthroat trout ≥ 180 mm fork length were marked during the first sampling event. Two hundred and forty (240) cutthroat trout ≥ 180 mm fork length were examined for marks during the second event; ninety-five (95) had been "marked" in the first sample event.

The distribution of lengths of fish recaptured in sampled in event 2 was not significantly different from the distribution of lengths in event 1 (d_{max} = 0.056, P = <0.001), and distribution of lengths of fish sampled in events one and two were not significantly different (d_{max}=0.099, P=0.22) (Figure 3). These tests concludes that there was no size selective sampling during either event.

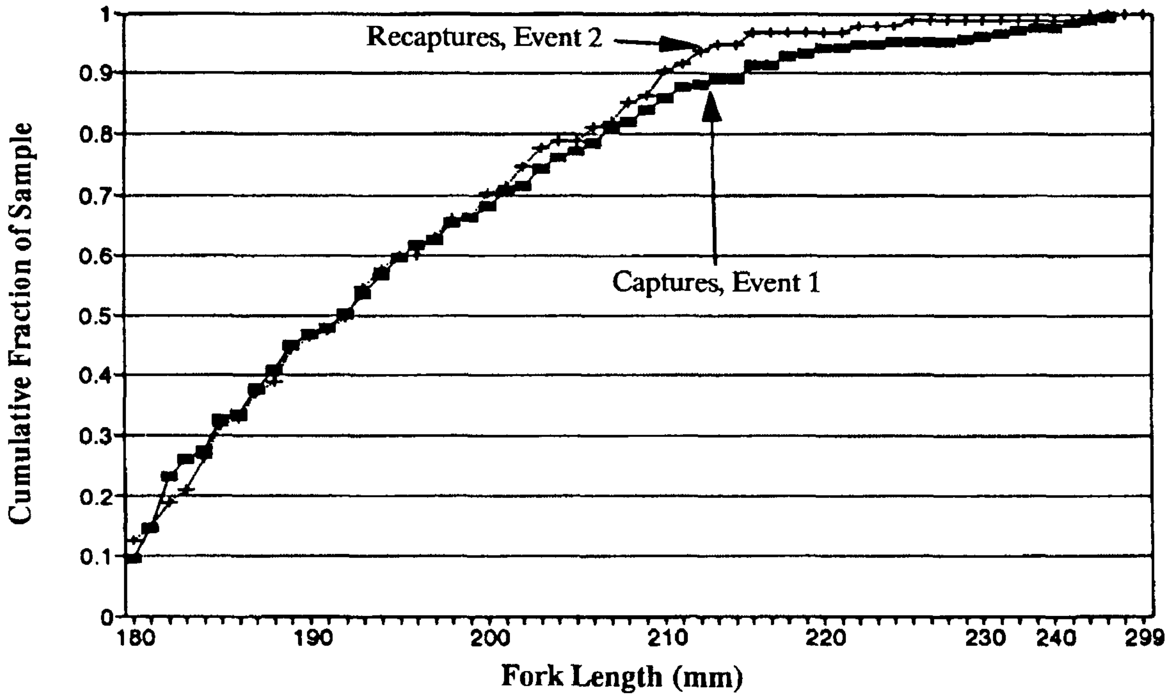
Some mixing of fish between sampling areas did occur between sampling events (Table 3), and the hypothesis of equal probability of capture by area was rejected (Table 4), suggesting that Darroch's estimator should be used to estimate abundance. Darroch's model estimated abundance at $\hat{N}$ = 441, SE[$\hat{N}$] = 52 which was slightly lower than the Chapman estimate of $\hat{N}$ = 531, SE[$\hat{N}$] = 31 using the same mark-recapture data.

Little Eva Lake:

One hundred eighty one (181) cutthroat trout ≥ 180 mm fork length were marked during the first sampling event. One hundred thirty-one (131) cutthroat trout ≥ 180 mm fork length were examined for marks during the second event and sixty-two (62) had been "marked" in the first sample event.

The distribution of lengths of fish recaptured in sampled in event 2 was not significantly different from the distribution of lengths in event 1 (d_{max} = 0.094, P = 0.809), but distribution of lengths of fish sampled in events one and two were different (d_{max}=0.019, P=0.0065) (Figure 4). This concludes that either sampling during event 1 was size selective or that size distribution or behavior of the fish changed between sampling events.

Mixing of fish between sampling areas occurred during the sampling hiatus (Table 5), and the hypothesis of equal probability of sampling is supported (Table 6) so Chapman's formulae were used to estimate $\hat{N}$ = 380, SE[$\hat{N}$] = 28.



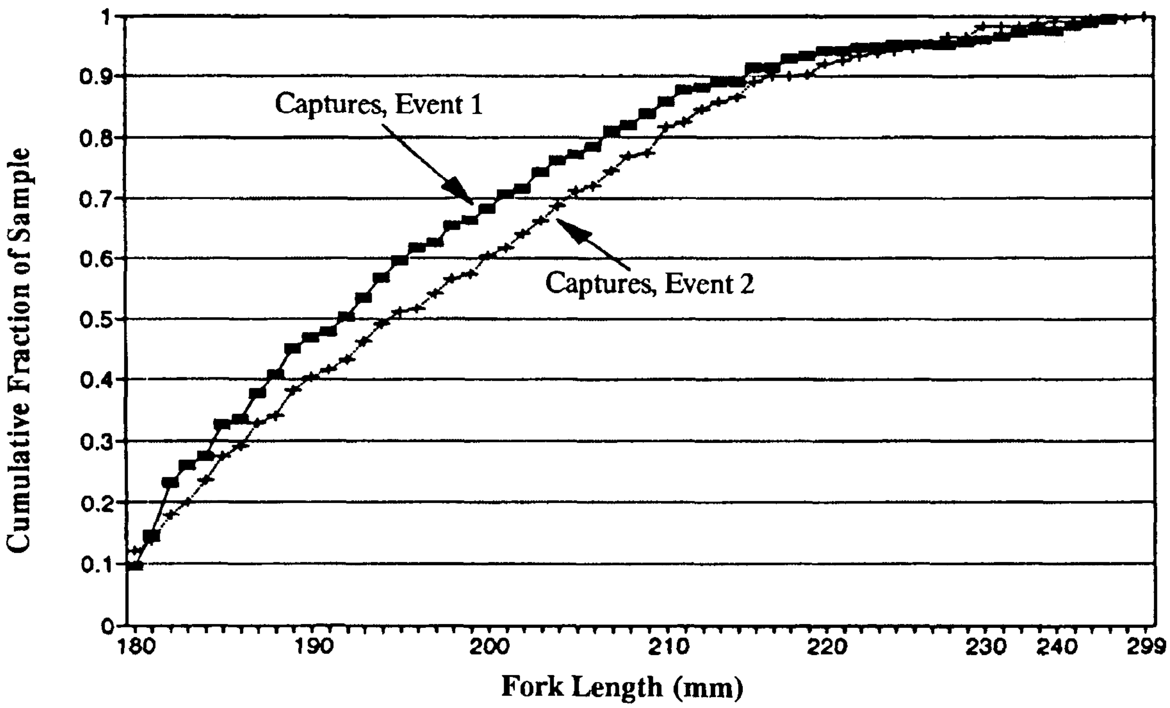


Figure 3. Cumulative histogram of lengths of cutthroat trout marked versus lengths of cutthroat trout recaptured (upper panel) and versus lengths of cutthroat trout examined for marks (lower panel), Buck Lake, 1993.

Table 3. Numbers of cutthroat trout ≥180 mm FL recovered by tagging and recovery area (m_{ij}), marked by area (a_i), and unmarked captures by area (u_j), sampling event 2, Buck Lake, 1993.

	Recovery area		
Tagging area	I	II	a_i
I	20	26	78
II	6	43	133
u_j	68	77	

Table 4. Numbers of marked and unmarked cutthroat trout ≥180 mm FL captured in sampling event 2, by recovery area, Buck Lake, 1993.

	Recovery area		
	I	II	
Marked fish	26	69	95
Unmarked fish	68	77	145
	94	146	240

$\chi^2 = 9.19$, df = 1, P = 0.002

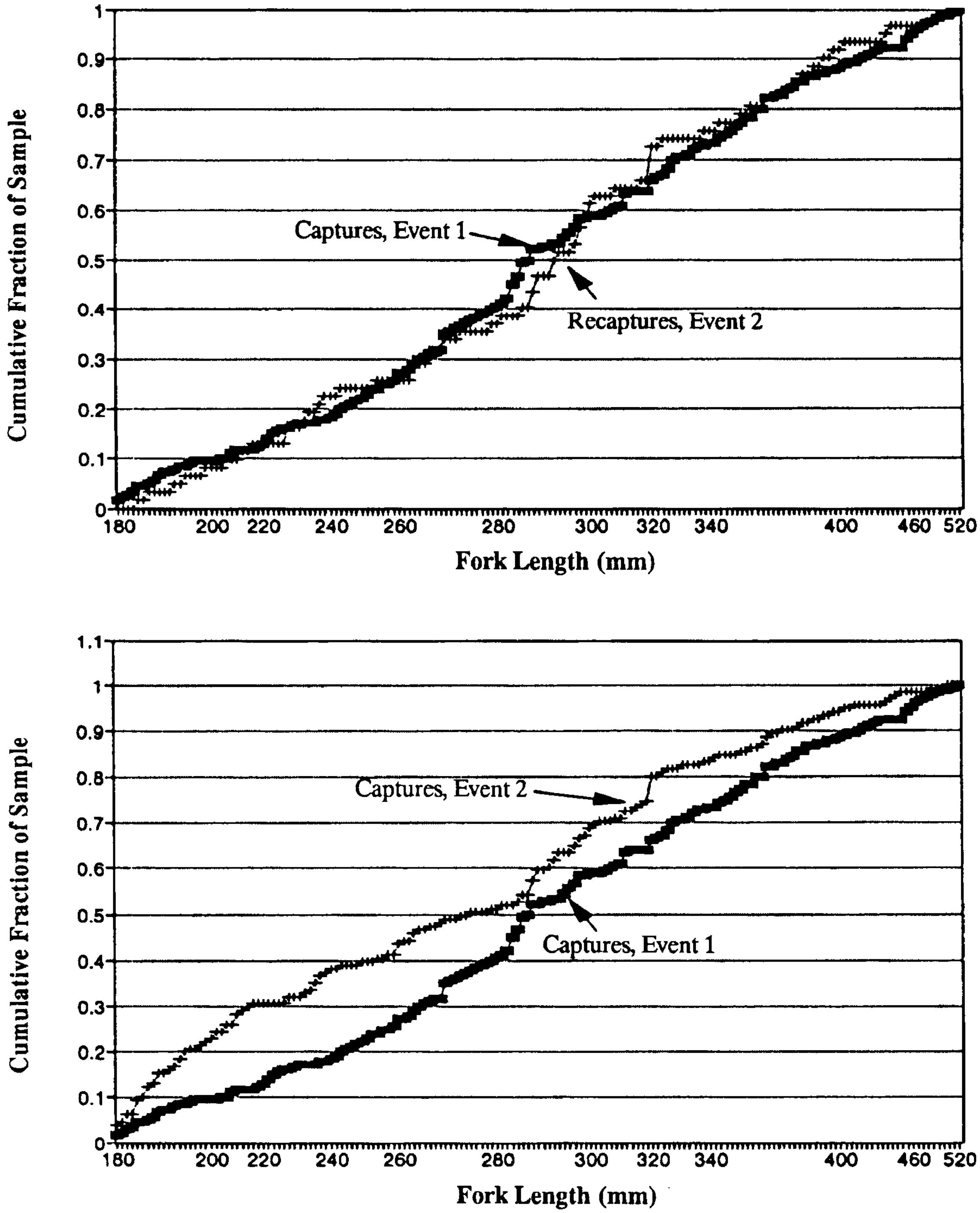


Figure 4. Cumulative histogram of lengths of cutthroat trout marked versus lengths of cutthroat trout recaptured (upper panel) and versus lengths of cutthroat trout examined for marks (lower panel), Little Eva Lake, 1993.

Table 5. Numbers of cutthroat trout ≥180 mm FL recovered by tagging and recovery area (m_{ij}), marked by area (a_i), and unmarked captures by area (u_j), sampling event 2, Little Eva Lake, 1993.

	Recovery area		
Tagging area	I	II	a_i
I	18	15	89
II	11	18	92
u_j	30	39	

Table 6. Numbers of marked and unmarked cutthroat trout ≥180 mm FL captured in sampling event 2, by recovery area, Little Eva Lake, 1993.

	Recovery area		
	I	II	
Marked fish	29	33	62
Unmarked fish	30	39	69
	59	72	131

$\chi^2 = 0.14$, df = 1, P = 0.705

Upper Wolf Lake:

Three hundred fifty-three (353) cutthroat trout ≥ 180 mm fork length were marked during the first sampling event. Two hundred thirty-six (236) cutthroat ≥ 180 mm fork length were examined for marks during the second event, and sixty-seven (67) had been "marked" in the first sample event.

The distribution of lengths of fish recaptured in sampled in event 2 was not significantly different form the distribution of lengths in event 1 (d_{max} = 0.0636, P = 0.62), and distribution of lengths of fish sampled in events one and two were similar (d_{max}=0.136, P=0.25) (Figure 5). These tests conclude that there was no size selective sampling.

Mixing of fish between sampling areas occurred during the sampling hiatus (Table 7) and the hypothesis of equal probability of sampling is supported (Table 8) so Chapman's formulae were used to estimate $\hat{N}$ = 1,233, SE[$\hat{N}$] = 113.

DISCUSSION

Sampling during two sampling periods of ten days each resulted in a high fraction of the estimated population being caught at least one time. This fraction was 42% in Upper Wolf Lake, 66% in Little Eva Lake, and 81% in Buck Lake. Sport fishing gear was found to be the most effective gear type for sampling cutthroat trout ≥ 180 mm in fork length. Catch rates averaged 0.28 cutthroat trout per hour in lakes with anadromous cutthroat, 0.83 cutthroat trout per hour in landlocked lakes without kokanee present, and 1.96 fish per hour in landlocked lakes which also had kokanee present. Estimated population numbers were small, even though we estimated population in three of the lakes having the highest catch per unit effort during the initial three-day sampling periods.

Population estimates of cutthroat trout ≥ 180 mm fork length for the three lakes studied were divided by the lakes areas in hectares to determine a population density of cutthroat per unit of surface area in the lakes. Density estimates were 29.6 fish per hectare in Upper Wolf Lake, 26.1 fish per hectare in Buck Lake, and 15 fish per hectare in Little Eva Lake (average 23.6 fish per hectare). Length frequency sampling using standardized effort and gear on these same lakes earlier in the season (Table 1) resulted in an average density index (cutthroat trout caught/surface area in hectares) of 4.9 cutthroat trout per acre (range of 3.3 to 7.8). The relationship between population density and density index (23.6/4.9 or a factor of 4.8) might be used to calculate an approximate density of cutthroat trout in the other lakes which were only sampled for length frequency with standardized gear and effort earlier in the year (Table 1).

The calculated density (number of cutthroat trout caught during length frequency sampling / surface area in hectares X 4.8) ranges from a low value of 3.6 fish per hectare (Banks Lake) to a high of 37.4 fish per hectare (Buck Lake). These extreme values both occurred in landlocked lakes which did not have any other fish species present and receive very little if any angling. Other landlocked lakes without kokanee, but which had sympatric Dolly Varden, had calculated densities of 4.3 cutthroat trout per hectare (North Saddle Lake), 12.0 cutthroat trout per hectare (No Name Lake), and 21.6 cutthroat trout per hectare (Lk 436). North Saddle was

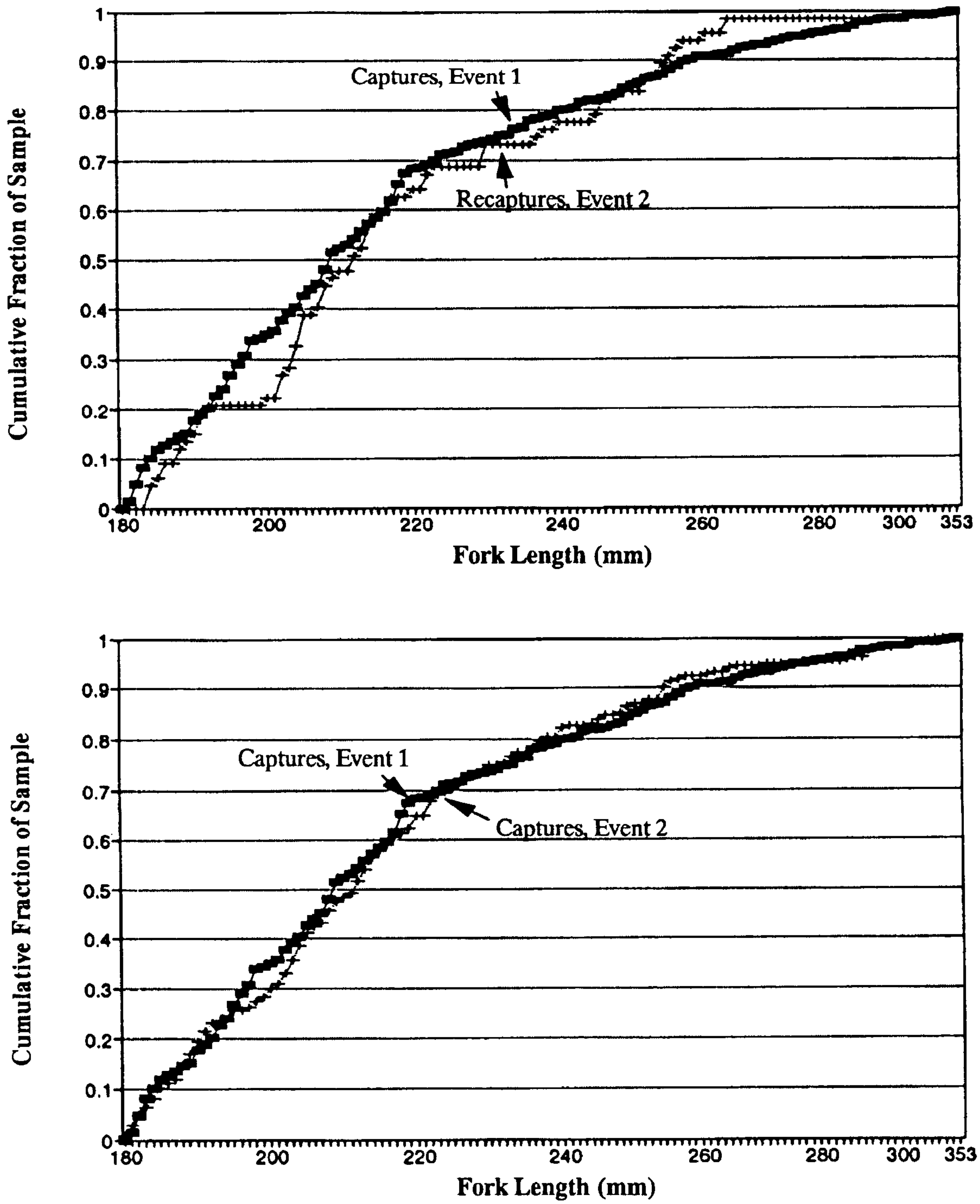


Figure 5. Cumulative histogram of lengths of cutthroat trout marked versus lengths of cutthroat trout recaptured (upper panel) and versus lengths of cutthroat trout examined for marks (lower panel), Upper Wolf Lake, 1993.

Table 7. Numbers of cutthroat trout ≥180 mm FL recovered by tagging and recovery area (m_{ij}), marked by area (a_i), and unmarked captures by area (u_j), sampling event 2, Upper Wolf Lake, 1993.

	Recovery area		
Tagging area	I	II	a_i
I	27	8	182+9[a]
II	4	28	161+1[a]
u_j	94	75	

[a] There were 9 cutthroat marked in area II with a dorsal caudal clip which was the mark reserved for marking in area I, and one cutthroat marked in area I with a ventral caudal clip which was the mark reserved for area II. Therefore, an uncertainty exists in the mixing data.

Table 8. Numbers of marked and unmarked cutthroat trout ≥180 mm FL captured in sampling event 2, by recovery area, Upper Wolf Lake, 1993.

	Recovery area I	Recovery area II	
Marked fish	31	36	67
Unmarked fish	94	75	169
	125	111	236

$\chi^2 = 1.69$, df = 1, P = 0.194

recently accessed by a logging road and has received greatly increased fishing pressure in the past year and a half. No Name Lake is immediately accessible from the road system on Prince of Wales Island. Lake 436 near Sitka is remote and receives very little fishing pressure.

Calculated densities of cutthroat trout in lakes with kokanee ranged from 4.8 (Pleasant Lake) to 18.2 (Upper Wolf) fish per hectare, while calculated densities in anadromous lakes varied from 4.8 to 11.0 cutthroat trout per hectare.

ACKNOWLEDGEMENTS

I appreciate the efforts of John DerHovanisian, Jan O'Dell, Bob Chadwick and Loyal Johnson for their outstanding work in the field and for their insights into the information we collected.

LITERATURE CITED

Darroch, J. N. 1961. The two-sample capture-recapture census when tagging and sampling are stratified. Biometrika 48:241-60.

Mills, M. J. 1992. Harvest, catch, and participation in Alaska Sport Fisheries during 1991. Alaska Department of Fish and Game, Fishery Data Series No.92-40, Anchorage.

Seber, G.A.F. 1982. The estimation of animal abundance. Charles Griffin and Company, London, Great Britain.

Appendix A

Appendix A. List of computer data files for studies of cutthroat trout size and abundance in small southeast Alaska lakes in 1994.

Data File	Description
Bankslen.dbf	dBase file of Banks Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Bost_len.dbf	dBase file of Bostwick Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Bucklen.dbf	dBase file of Buck Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Cavrnlen.dbf	dBase file of Cavern Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Hilllen.dbf	dBase file of Hill Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Lk436len.dbf	dBase file of Lake 436 cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Llevalen.dbf	dBase file of Little Lake Eva cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Nnam_len.dbf	dBase file of No Name Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Nsadllen.dbf	dBase file of North Saddle Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Pleaslen.dbf	dBase file of Pleasant Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.

- continued -

Sandlen.dbf	dBase file of Sand Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Wolf_len.dbf	dBase file of Upper Wolf Lake cutthroat trout length frequency sampling data including date, gear type, trap number, and fork lengths of trout caught.
Buck2len.dbf	dBase data file of Buck Lake cutthroat population estimation sampling including date caught, gear type, trap number, fork length, area of capture,mark placed on fish prior to release (REL_MK), and mark on fish when recaptured (REC_MK).
Llev2len.dbf	dBase data file of Little Lake Eva cutthroat population estimation sampling including date caught, gear type, trap number, fork length, area of capture,mark placed on fish prior to release (REL_MK), and mark on fish when recaptured (REC_MK).
Wolf2len.dbf	dBase data file of Upper Wolf Lake cutthroat population estimation sampling including date caught, gear type, trap number, fork length, area of capture,mark placed on fish prior to release (REL_MK), and mark on fish when recaptured (REC_MK).
Buckks.wk1	Lotus file of Buck2len.dbf data separated into mark and recapture events with explanatory title.
Llkevks.wk1	Lotus file of Llev2len.dbf data separated into mark and recapture events with explanatory title.
Wolfks.wk1	Lotus file of Wolf2len.dbf data separated into mark and recapture events with explanatory title.

Data files are archived at and available from, the Alaska Department of Fish and Game, Division of Sport Fish, Research and Technical Services, 333 Raspberry Road, Anchorage Alaska, 99815-1599.