

**Fishery Data Series No. 09-60**

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**Survey of Anglers Using Southeast Alaska  
Recreational Cabins During 2006**

by

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November 2009

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Measures (fisheries)</b>	
centimeter	cm	Alaska Department of		fork length	FL
deciliter	dL	Fish and Game	ADF&G	mid-eye-to-fork	MEF
gram	g	Alaska Administrative		mid-eye-to-tail-fork	METF
hectare	ha	Code	AAC	standard length	SL
kilogram	kg	all commonly accepted		total length	TL
kilometer	km	abbreviations	e.g., Mr., Mrs., AM, PM, etc.		
liter	L			<b>Mathematics, statistics</b>	
meter	m	all commonly accepted		<i>all standard mathematical</i>	
milliliter	mL	professional titles	e.g., Dr., Ph.D., R.N., etc.	<i>signs, symbols and</i>	
millimeter	mm			<i>abbreviations</i>	
		at	@	alternate hypothesis	H <sub>A</sub>
<b>Weights and measures (English)</b>		compass directions:		base of natural logarithm	<i>e</i>
cubic feet per second	ft <sup>3</sup> /s	east	E	catch per unit effort	CPUE
foot	ft	north	N	coefficient of variation	CV
gallon	gal	south	S	common test statistics	(F, t, $\chi^2$ , etc.)
inch	in	west	W	confidence interval	CI
mile	mi	copyright	©	correlation coefficient	
nautical mile	nmi	corporate suffixes:		(multiple)	R
ounce	oz	Company	Co.	correlation coefficient	
pound	lb	Corporation	Corp.	(simple)	r
quart	qt	Incorporated	Inc.	covariance	cov
yard	yd	Limited	Ltd.	degree (angular )	°
		District of Columbia	D.C.	degrees of freedom	df
<b>Time and temperature</b>		et alii (and others)	et al.	expected value	<i>E</i>
day	d	et cetera (and so forth)	etc.	greater than	>
degrees Celsius	°C	exempli gratia		greater than or equal to	≥
degrees Fahrenheit	°F	(for example)	e.g.	harvest per unit effort	HPUE
degrees kelvin	K	Federal Information		less than	<
hour	h	Code	FIC	less than or equal to	≤
minute	min	id est (that is)	i.e.	logarithm (natural)	ln
second	s	latitude or longitude	lat. or long.	logarithm (base 10)	log
		monetary symbols		logarithm (specify base)	log <sub>2</sub> , etc.
<b>Physics and chemistry</b>		(U.S.)	\$. ¢	minute (angular)	'
all atomic symbols		months (tables and		not significant	NS
alternating current	AC	figures): first three		null hypothesis	H <sub>0</sub>
ampere	A	letters	Jan,...,Dec	percent	%
calorie	cal	registered trademark	®	probability	P
direct current	DC	trademark	™	probability of a type I error	
hertz	Hz	United States		(rejection of the null	
horsepower	hp	(adjective)	U.S.	hypothesis when true)	$\alpha$
pH	pH	United States of		probability of a type II error	
(negative log of)		America (noun)	USA	(acceptance of the null	
parts per million	ppm	U.S.C.	United States	hypothesis when false)	$\beta$
parts per thousand	ppt, ‰	U.S. state	Code	second (angular)	"
				standard deviation	SD
volts	V		use two-letter	standard error	SE
watts	W		abbreviations	variance	
			(e.g., AK, WA)	population	Var
				sample	var

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RECREATIONAL CABINS DURING 2006**

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# TABLE OF CONTENTS

	<b>Page</b>
LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
LIST OF APPENDICES.....	ii
ABSTRACT.....	1
INTRODUCTION.....	1
METHODS.....	4
RESULTS.....	6
Use and Participation.....	6
Angler Effort and Catch.....	6
Angler Experiences.....	10
DISCUSSION.....	11
ACKNOWLEDGMENTS.....	16
LITERATURE CITED.....	16
APPENDIX A.....	17
APPENDIX B.....	21
APPENDIX C.....	27
APPENDIX D.....	33

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1. Number of parties responding to the cabin survey, number not responding, and numbers fishing for trout, steelhead, and all species, by mailing and survey stratum in 2006. ....	7
2. Number of registered and responding parties, estimated effort (for all species, and for trout and steelhead), and estimated numbers of fish kept and released by system at USFS recreational cabins in Southeast Alaska, 2006. Standard errors are in parentheses. ....	8
3. Summary of how parties rated cutthroat trout fishing from the cabins they visited during 2006. ....	10
4. Summary of 489 comments (from 444 unique responses during 2006) to whether current trout regulations need to be changed in Southeast Alaska. ....	11
5. Summary of comments received in 2006 that are specific to a system or area (C & R = catch-and-release; FF = fly-fishing; and MSL = minimum size limit). ....	12
6. Comparison between the 1993 (pre-regulation change), 1999, 2002, and 2006 Cabin Survey estimates of total catch for trout (cutthroat and rainbow) and steelhead in systems that were surveyed in all years. ....	14

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1. Freshwater sport harvests and total catches of cutthroat trout in Southeast Alaska from the Statewide Harvest Survey, 1990–2006. ....	2
2. Freshwater sport harvests and total catches of rainbow trout in Southeast Alaska from the Statewide Harvest Survey, 1990–2006. ....	2
3. Freshwater sport harvests and total catches of steelhead in Southeast Alaska from the Statewide Harvest Survey, 1990–2006. ....	3
4. Freshwater sport harvests and total catches of Dolly Varden in Southeast Alaska from the Statewide Harvest Survey, 1990–2006. ....	3

## LIST OF APPENDICES

<b>Appendix</b>	<b>Page</b>
A1. Surveyed USFS recreational cabins in Southeast Alaska by ranger district, system, cabin name, presence of steelhead and trout, and 2006 ADF&G trout regulations. ....	18
B1. Cover letter sent with each questionnaire. ....	22
B2. Questionnaire, side A. ....	23
B3. Questionnaire, side B. ....	24
B4. First reminder letter to survey non-respondents. ....	25
B5. Second reminder letter to survey non-respondents. ....	26
C1. Steelhead length analysis for Southeast Alaska. ....	28
C2. The system, year, and the number of paired length measurements (FL and TL) which were used in the regression analysis to estimate TL for adult steelhead in Southeast Alaska. ....	29
C3. The estimated number and percent of legal sized steelhead, by system and year, for Southeast Alaska streams. ....	30
C4. Results of the regression analysis used to estimate the total length of adult steelhead and the percent of legal sized steelhead for Southeast Alaska. ....	31
D1. Computer data files containing data for use in preparing this report. ....	34

## ABSTRACT

We conducted a mail survey of parties reserving any of 79 U.S. Forest Service (USFS) recreational cabins located on cutthroat trout *Oncorhynchus clarki* and rainbow/steelhead *Oncorhynchus mykiss* systems in Southeast Alaska in 2006. The survey was used to estimate trout (cutthroat and rainbow, combined) and steelhead catch, harvest, and effort by users of these USFS cabins. The overall response rate to our survey was 78%.

In 2006, anglers registered to use one of the 79 cabins in our survey participated in some form of fishing during an estimated 6,120 (SE = 151) days. On 4,414 (SE = 101), or 72%, of these days, anglers were fishing for cutthroat or rainbow trout, or steelhead. The anglers targeting trout and steelhead fished an estimated 18,914 hours (SE = 584). Harvest by all anglers in this survey included an estimated 1,318 trout (SE = 58), 44 steelhead (SE = 11), and 503 Dolly Varden (SE = 39). These anglers also released 22,125 trout (SE = 1,129) for a retention rate of 6%, 1,105 steelhead (SE = 73) for a retention rate of 4%, and 4,649 Dolly Varden (SE = 347) for a retention rate of 10%.

Comparing surveys done at USFS cabins in 1993 (prior to more restrictive sport fishing regulations), with surveys conducted in 1999, 2002, and 2006, the number of registered parties in 2006 increased slightly but remained at about half (57%) of the 1993 total; the numbers of registered parties in 1999 and 2002 were also slightly more than half of the 1993 total.

Keywords: Harvest, catch, steelhead, trout, Dolly Varden, cutthroat trout, trout, rainbow trout, effort, angler, Southeast Alaska, USFS, recreation cabin, postal survey, mail survey, creel census.

## INTRODUCTION

The Alaska Board of Fisheries (BOF) promulgated more restrictive bag limits and minimum size regulations for trout (cutthroat *Oncorhynchus clarki* and rainbow trout *O. mykiss* combined) and steelhead *Oncorhynchus mykiss* in Southeast Alaska in 1994. There have been several small modifications of these regulations by the BOF since 1994 but the core regulations are still in place. Current regionwide regulations for trout include a daily bag and possession limit of two fish from 11 to 22 inches in length. More restrictive regulations apply in a number of lakes and a few local areas with intensive fisheries (e.g., along the Juneau road system). Current regionwide regulations for steelhead include a daily bag limit of one fish, 36 inches or more in total length, and an annual limit of two fish.

Sport harvest, effort, and catch of trout and steelhead (and other species) in Southeast Alaska are estimated annually through the Statewide Harvest Survey (SWHS). This mail survey is conducted by the Alaska Department of Fish and Game (ADF&G), Division of Sport Fish (for example, Jennings et al. 2006). Results of this survey show that 78% of cutthroat trout and 49% of steelhead trout harvested during 2006 in Southeast Alaska were taken in fresh water (Jennings et al.

2009). The SWHS also shows that Southeast Alaska harvests of cutthroat trout, rainbow trout, and steelhead in fresh water have remained relatively stable since 1994, although the harvest of rainbow trout has trended down since 2000 (Figures 1, 2, and 3). The more restrictive regulations adopted by the BOF in 1994 are largely responsible for the decline from relatively large harvests in the early 1990s. Total catch of steelhead reached a peak in 2000 when an estimated 24,885 (Figure 3) steelhead were caught (Walker et al. 2003) while total catches of rainbow trout and cutthroat trout have averaged 17,409 and 37,787, respectively, since 1990.

The SWHS estimated annual harvest of Dolly Varden *Salvelinus malma* has ranged between 6,000 and 14,000 fish since 1994, but the estimated catch has declined by nearly half since 2003 (from approximately 90,000 to 46,000; Figure 4; Jennings et al. 2009). The trout regulations adopted by the BOF in 1994 did not include Dolly Varden and the regionwide bag limit has remained at 10 per day (and no minimum size limit) since 1975.

Because angler effort in most Southeast Alaska drainages is relatively low, sampling rates maintained by the SWHS yield only annual harvest estimates for a few of the largest or most heavily used freshwater systems in the region; a

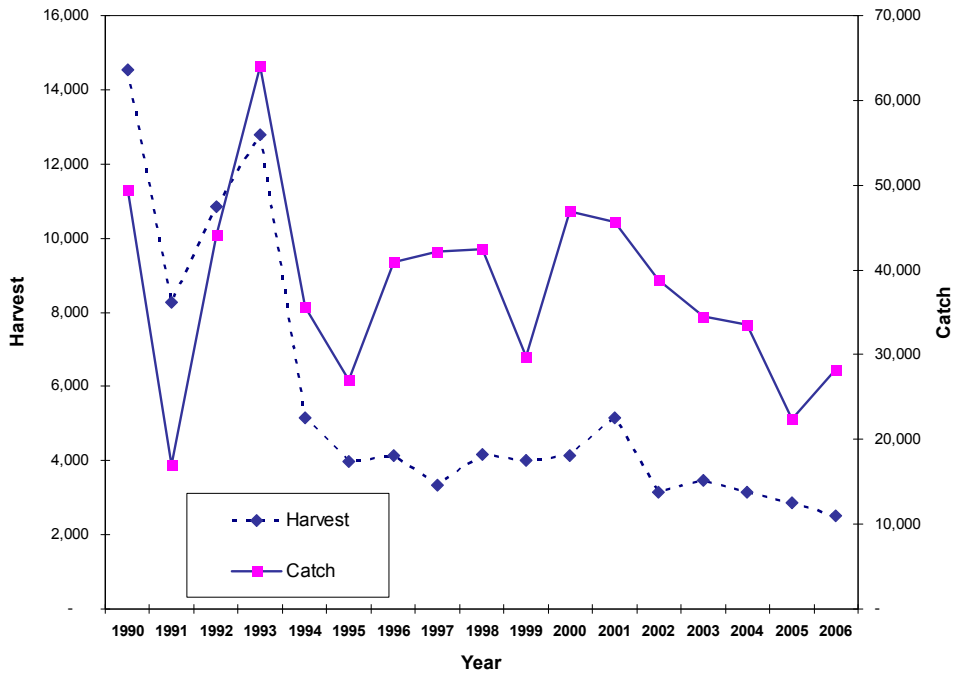


Figure 1.—Freshwater sport harvests and total catches of cutthroat trout in Southeast Alaska from the Statewide Harvest Survey, 1990–2006.

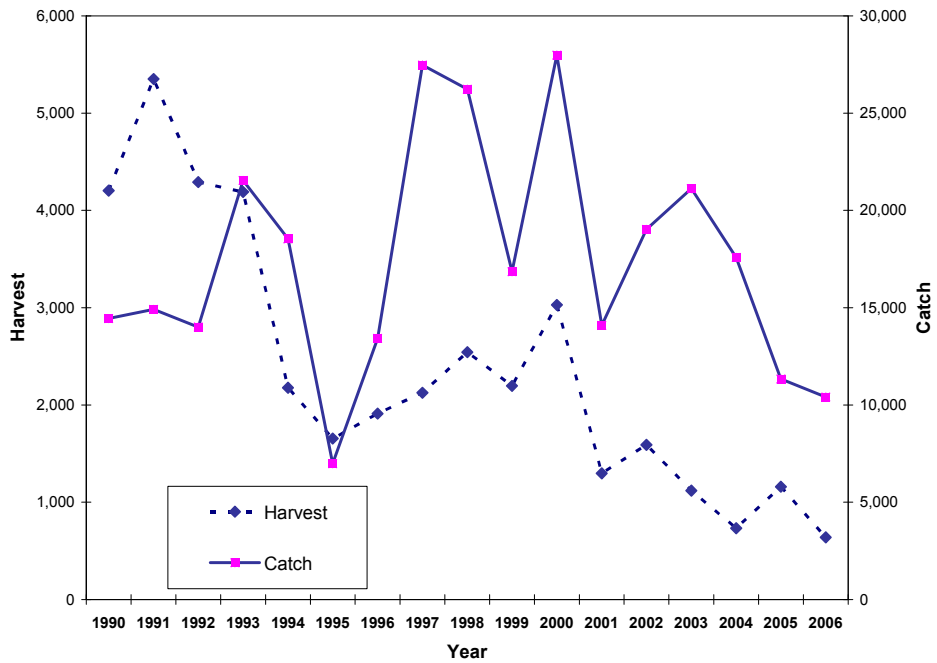


Figure 2.—Freshwater sport harvests and total catches of rainbow trout in Southeast Alaska from the Statewide Harvest Survey, 1990–2006.



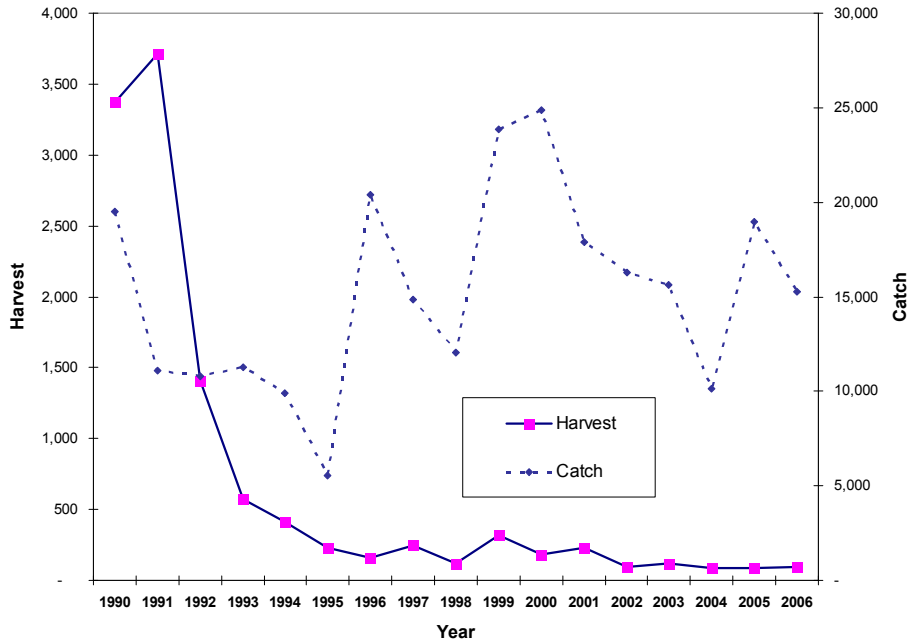


Figure 3.—Freshwater sport harvests and total catches of steelhead in Southeast Alaska from the Statewide Harvest Survey, 1990–2006.

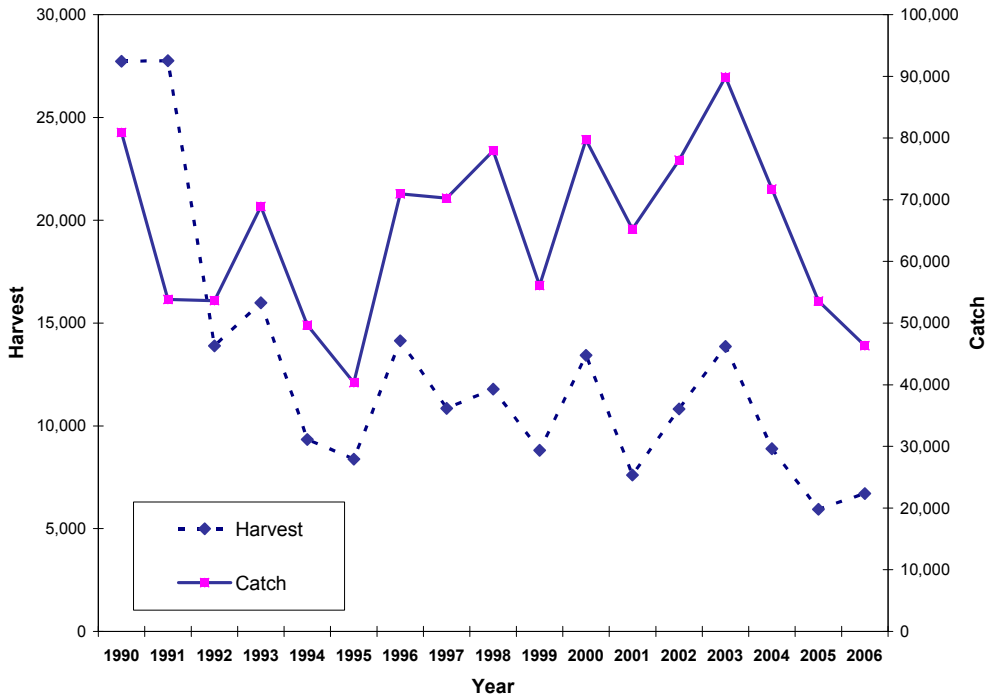


Figure 4.—Freshwater sport harvests and total catches of Dolly Varden in Southeast Alaska from the Statewide Harvest Survey, 1990–2006.

minimum of 12 responses are generally required to generate an estimate for a specific location. As a result, there is a demonstrable need to better

evaluate remote fisheries in the region (Schwan 1990). There are USFS cabins near 79 or more important cutthroat lakes and steelhead streams in

remote areas of Southeast Alaska. Because of the recreational opportunities they provide, sport fishing from these cabins accounts for a significant proportion of the SWHS estimates of freshwater trout harvest in Southeast Alaska (e.g., over 30% for cutthroat trout in 1993 and 1994 and 61% in 2002; Jones 1994, 1995; Harding et al. 2005). Periodic monitoring of angler effort, catch, and harvest at the USFS cabins prior to BOF meetings (held every 3 years) helps us identify potential conservation concerns and areas where regulations might be liberalized, evaluate effects of regulations, and provide information for BOF.

This project queried users of 79 USFS recreational cabins in Southeast Alaska using a mail survey similar to that used in past years (Jones 1993-1995; Jones and Kondzela 2001; Harding et al. 2005). The 2002 survey queried users of 75 USFS cabins. Four cabins were added to the 2006 survey (SE Heckman Lake, Harvey Lake, Swan Lake, and Anan Lake) that were either new or had been overlooked in previous surveys. All 79 cabins were near water bodies that had either cutthroat or rainbow trout, and about half of the cabins were near streams that also have steelhead runs. The objective of sampling in 2006 was to estimate angler effort (i.e., total days fished and hours fished for trout) and catch and harvest of steelhead and trout (cutthroat and rainbow, combined) by system (stream or lake).

The survey also presented the opportunity to query USFS cabin users about the quality of their fishing experience (excellent, good, fair, poor) and their attitudes about fishing regulations for trout in Southeast Alaska. Anglers were asked to list particular systems where current regulations might be modified (i.e., allow bait, or catch and release fishing only). Similar questions in previous years helped us to monitor the experiences and preferences of these users.

## METHODS

A mail survey was used to estimate angler effort and trout and steelhead catch and harvest by registered users of 79 USFS cabins in 2006 (Appendices A1–B5). There are 136 USFS cabins in Southeast Alaska that provide fishing opportunities ranging from none to both marine and freshwater. Sport fish area management

biologists and trout research staff selected 79 cabins for the survey that are located on or near important steelhead streams and cutthroat-rainbow lakes. USFS cabins in the Yakutat area were not selected for the survey because the number of anglers who reserve cabins and fish in the Yakutat area is insignificant compared to total angler use in the area. The cabins chosen included 36 cabins on steelhead systems.

USFS personnel compiled mailing addresses of party “heads” that registered to use USFS cabins in 2006. The party heads were subsequently mailed a questionnaire and cover letter (Appendices B1–B3). To protect the privacy of cabin users and comply with the Federal Privacy Act, the names and addresses of people who reserved USFS cabins were not provided to ADF&G, and the USFS conducted and handled all mailings. After each mailing, ADF&G was sent an electronic list of codes representing parties who made a reservation and were sent a survey.

Anglers completing the survey returned their forms (identified with ID codes in place of names and addresses) to the Douglas ADF&G office. We then provided the USFS with coded ID numbers of those individuals not responding, so they could send reminders to the non-respondents (Appendices B4 and B5).

It was not an objective of this study to estimate catch, effort, or harvest of trout or steelhead by anglers that did not appear on USFS lists. Those anglers might include users with day access (e.g., boat, hiking, or float plane), users with other lodging, or those who gained access through job related activities (e.g., employees of logging companies, ADF&G, or the USFS). Because users in different seasons tend to have different objectives (e.g., spring steelhead and fall hunting), the survey was stratified by season: spring (January 1 to May 31), summer (June 1 to September 31) and fall (October 1 to December 31). For example, the total and average effort fished for trout in the summer stratum is higher than in the spring or fall. Similarly, most reported effort for steelhead occurred in the spring stratum, simply because this is when most steelhead runs occur in Southeast Alaska. Also, providing questionnaires nearer the time of the visit allowed party heads to more accurately recall their visits.

The USFS was requested to prepare reservation lists on May 31, September 30, and December 31, 2006; initial mailings were scheduled for June 7 and October 11, 2006, and January 10, 2007. However, initial actual mailings were actually sent on June 7 and October 20, 2006, and January 11, 2007.

Mailings to party heads in each season stratum were conducted separately. After 3 weeks, a reminder letter was sent to all non-respondents (Appendix B4). If, after 3 additional weeks, a response was still not received, a second reminder was sent (Appendix B5).

Our questionnaire was designed to estimate the number of days that anglers participated in some form of fishing, the number of these days that anglers were fishing for trout (cutthroat or rainbow), the number of hours these fisherman targeted trout and steelhead, and the numbers of trout, steelhead, and Dolly Varden harvested or released. We assumed that effort not spent fishing for trout or steelhead was spent fishing for other species (e.g., salmon).

Data from responding parties were compiled into electronic spreadsheets for processing. Comments found on the forms were parsed for information about angler experiences, and catch and effort data germane to the survey questions. For example, many anglers failed to specify their catch or effort in the provided spaces on the survey form, but did provide comments like “we only fished for salmon and caught no trout” that let us unambiguously impute unbiased responses to survey questions. Common-sense data imputations were also made during data entry to reduce missing data items. For example, if a response about steelhead catch was omitted and steelhead are known to be absent from that system, a value of 0 was entered. Or, if a respondent reported fishing for 1 day and catching trout, but did not report days fished for trout, a value of 1 for days fished for trout was imputed.

In each temporal stratum, the total harvest estimated from responding parties  $H_r$  at each cabin was the sum over mailings  $m = 1..3$ :

$$H_r = \sum_{m=1}^3 H_{r,m} \quad (1)$$

Assuming responses (effort and harvest per party) to each mailing was similar, the total harvest  $H$  at each stream or lake was calculated as:

$$H = \left( \frac{N}{N_r} \right) H_r \quad (2)$$

$$\text{var}[H] = \left(1 - \frac{N_r}{N}\right) N^2 \frac{\sum_{i=1}^{N_r} (H_r - \bar{H}_r)^2}{N_r(N_r - 1)} \quad (3)$$

where  $N_r$  = number of responding parties and  $N$  = number of parties on the USFS reservation list. ANOVA was used to investigate our assumption that mean effort (total-days, trout-days, and trout-hours), harvest, and releases of trout or steelhead per responding party was similar by mailing.

Total effort  $E$  and catch  $C$  at each cabin were estimated as above after substituting the appropriate variable for  $H$ . The yearly estimates for each system are the sum of the seasonal estimates.

Occasionally, catch and effort data was not recorded for respondents who reported fishing. The missing data were imputed in two stages. In the first stage, we used linear regression to estimate total angler effort (days fished) for any party that reported fishing but omitted this statistic. If the number of anglers was omitted, that was estimated by regressing numbers of anglers in a party who fished against party size, by season and system type. Next, the number of days fished was estimated by regressing days fished on length of stay for anglers who fished, by season and system type.

All other missing data were estimated during computer processing using multiple imputation techniques in SAS (Proc MI; SAS 1990). The procedure was not an attempt to estimate missing values, but to simulate them ( $n = 5$ ) and adjust the variance based on the uncertainty of the missing values.

Five completed (fully-imputed) data sets and 5 estimates of  $H$  (or  $E$  or  $C$ ) were computed. Let each of the  $D = 5$  complete data estimates and variances (e.g.,  $H$  and  $\text{var}(H)$  in eq.(2) and (3)) be  $\hat{\Theta}_d$  and  $W_d$ ,  $d = 1..D$ . Combined estimates were

computed using the formula for multiply-imputed data sets (Little and Rubin 2002). The final point estimate (of  $H$ ,  $E$ , or  $C$ ) is:

$$\bar{\Theta}_D = \frac{1}{D} \sum_{d=1}^D \hat{\Theta}_d \quad (4)$$

and variance  $T_D = \text{var}(\bar{\Theta}_D)$  is:

$$\bar{W}_D = \frac{1}{D} \sum_{d=1}^D \hat{W}_d \quad (5)$$

$$B_D = \frac{1}{D-1} \sum_{d=1}^D (\hat{\Theta}_d - \bar{\Theta}_D)^2 \quad (6)$$

$$T_D = \bar{W}_D \left( \frac{D+1}{D} \right) B_D \quad (7)$$

where  $\bar{W}_D$  is the average within-imputation variance component and  $B_D$  is a between-imputation component (Little and Rubin 2002).

The proportion of parties reporting either excellent, good, fair, or poor fishing experiences in each system was calculated as  $p_r = E_r / E$ , where  $E_r$  is the count of respondents reporting experience  $r$  and  $E = \sum E_r$ .

## RESULTS

### USE AND PARTICIPATION

A total of 1,430 parties reserved USFS cabins in Southeast Alaska in 2006 and 1,064 party heads responded to our survey (Table 1). Excluding 51 undeliverable surveys and 20 reservations associated with administrative uses by USFS and ADF&G personnel, the overall response was 78%. Approximately 85% (907) of the 1,064 non-administrative parties responding to the survey reported they used their cabin reservation. Of the 907 parties that used their reservations, 547 (60%) of the party heads report that someone in their party fished.

The average size of responding parties that used their cabin reservation was 3.6 (SD = 1.5) members, (Table 1). The average number of nights parties stayed at a cabin was 2.9 (SD =

2.1), and ranged from 1 to 10 nights (maximum allowed).

Users from 45 different US states and 4 foreign countries reserved the cabins included in our survey. Approximately 68% (967 of 1,430 total parties) gave an Alaska address when the reservation was made and are assumed to be Alaska residents. Other parties reserving cabins in Southeast Alaska during 2006 were from Japan, Australia, Canada, and New Zealand.

Of all reservations, the Windfall Lake cabin, a 3.5-mile hike off the road system near Juneau, had the most registered parties—a total of 186 parties reserved the cabin in 2006 (Table 2). Peterson Lake, a 4.3-mile hike off the Juneau roadside, was the second highest with 106 registered parties.

### ANGLER EFFORT AND CATCH

Anglers registered to use one of the cabins in our survey participated in some form of fishing on an estimated 6,120 (SE = 151) days in 2006 (Table 2). On 4,414 (SE = 101), or 72%, of these days, anglers were fishing for cutthroat or rainbow trout, or steelhead. The anglers targeting trout and steelhead fished an estimated 18,914 hours (SE = 584).

Harvest by all anglers in this survey included an estimated 1,318 trout (SE = 58), 44 steelhead (SE = 11), and 503 Dolly Varden (SE = 39) (Table 2). These anglers also released 22,125 trout (SE = 1,129) for a retention rate of 6%, 1,105 steelhead (SE = 73) for a retention rate of 4%, and 4,649 Dolly Varden (SE = 347) for a retention rate of 10%.

Given the high response rate (78%), the likelihood of a substantial non-response bias was minimal. Estimates of effort and catch of trout and steelhead were highly variable throughout Southeast Alaska, and some sites were more popular than others (Table 2). The two systems with the highest number of reservations, Peterson and Windfall lake cabins (both on the Juneau road system), together produced modest trout catches (1.4% of the survey total), but accounted for 21% of the reservations and 3.5% of the trout days fished. The system with the most effort for trout was the Karta River system (three cabins) on Prince of Wales Island, where 2,126 angler-hours

Table 1.—Number of parties responding to the cabin survey, number not responding, and numbers fishing for trout, steelhead, and all species, by mailing and survey stratum in 2006.

Survey strata	Type of response	No. of parties	No. who used reservation	Parties who fished	Average party size	Alaska resident	Other US states	Foreign country
Spring (304 parties)	Responded 1st mailing	116	101	54	3.4	94	22	0
	Responded 2nd mailing	75	58	29	3.0	48	25	2
	Responded 3rd mailing	35	28	15	3.4	29	5	1
	Total responding	226	187	98	3.2	171	52	3
	Undeliverable	9				8	1	0
	No response	68				54	14	0
	Administrative Use	1				1		
Summer (910 parties)	Responded 1st mailing	402	359	248	3.7	254	146	2
	Responded 2nd mailing	166	141	102	3.7	78	88	0
	Responded 3rd mailing	105	93	64	3.7	65	39	1
	Total responding	673	593	414	3.7	397	273	3
	Undeliverable	34				17	15	2
	No response	190				98	91	1
	Administrative use	13				13		
Fall (215 parties)	Responded 1st mailing	107	86	27	3.5	104	3	0
	Responded 2nd mailing	31	20	7	3.8	29	2	0
	Responded 3rd mailing	27	19	6	3.8	25	2	0
	Total responding	165	128	36	3.6	158	7	0
	Undeliverable	8				7	1	0
	No response	38				37	1	0
	Administrative use	6				6		
All combined (1,430 parties)	Responded 1st mailing	625	546	329	3.6	452	171	2
	Responded 2nd mailing	272	222	134	3.5	155	115	2
	Responded 3rd mailing	167	139	84	3.6	119	46	2
	Total responding	1,064	907	547	3.6	726	332	6
	Undeliverable	51				32	17	2
	No response	296				189	106	
	Administrative use	20				20		

Table 2.—Number of registered and responding parties, estimated effort (for all species, and for trout and steelhead), and estimated numbers of fish kept and released by system at USFS recreational cabins in Southeast Alaska, 2006. Standard errors are in parentheses.

System <sup>a</sup>	Number registered	Number responded	Total days fished <sup>b</sup>	Trout (cutthroat and rainbow)				Steelhead		Dolly Varden	
				Days fished <sup>c</sup>	Hours fished	Harvest	Released	Harvest	Released	Harvest	Released
Admiralty Cove	51	44	61 (7)	42 (6)	93 (15)	4 (3)	30 (24)	0 (0)	1 (1)	7 (3)	130 (101)
Anan Bay	24	20	36 (10)	36 (8)	83 (18)	0 (0)	13 (5)	0 (0)	9 (5)	0 (0)	7 (3)
Avoss Lake	5	5	16 (4)	16 (0)	50 (10)	2 (0)	25 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Bakewell Lake	6	4	48 (14)	46 (12)	204 (65)	15 (2)	96 (27)	0 (0)	0 (0)	0 (0)	0 (0)
Baranof Lake	11	7	27 (8)	25 (6)	48 (22)	10 (6)	67 (19)	0 (0)	0 (0)	0 (0)	3 (2)
Black Bear Lake <sup>d</sup>	11	5	12 (6)	12 (5)	73 (33)	8 (4)	8 (4)	0 (0)	0 (0)	0 (0)	0 (0)
Castle River, 2	32	25	217 (28)	119 (13)	500 (76)	73 (12)	552 (159)	0 (0)	10 (4)	7 (3)	169 (32)
Checats Lake	2	1	12 (4)	12 (0)	29 (8)	12 (0)	36 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Control Lake	33	19	114 (39)	50 (25)	253 (137)	5 (3)	101 (74)	0 (0)	0 (0)	0 (0)	0 (0)
Davidof Lake	3	3	7 (3)	7 (0)	35 (0)	5 (0)	26 (0)	0 (0)	0 (0)	0 (0)	0 (0)
De Boer Lake	2	2	14 (4)	14 (0)	84 (0)	3 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Distin Lake, 2	5	5	27 (6)	22 (6)	138 (87)	1 (0)	143 (92)	0 (0)	0 (0)	2 (1)	11 (8)
Duncan Salt Chuck	21	16	88 (16)	65 (13)	155 (34)	10 (4)	60 (12)	0 (0)	0 (0)	0 (0)	0 (0)
Eagle Lake <sup>d</sup>	1	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Ella Lake	6	5	36 (9)	34 (7)	187 (73)	25 (8)	265 (160)	0 (0)	0 (0)	3 (2)	4 (2)
Essawah Lake	2	2	17 (5)	4 (0)	12 (0)	0 (0)	19 (0)	0 (0)	0 (0)	0 (0)	8 (0)
Fish Creek	54	33	185 (33)	149 (21)	631 (168)	28 (8)	241 (65)	1 (0)	9 (6)	5 (3)	48 (17)
Florence Lake	10	8	11 (5)	11 (3)	35 (12)	9 (3)	97 (46)	0 (0)	0 (0)	15 (7)	1 (1)
Gouldling Lake	7	5	9 (3)	9 (0)	35 (0)	2 (0)	46 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Harding River	9	6	53 (15)	37 (3)	211 (45)	0 (0)	2 (0)	0 (0)	0 (0)	0 (0)	22 (1)
Harvey Lake	9	9	8 (3)	8 (0)	25 (6)	0 (0)	16 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Hasselborg Lake, 3	27	22	246 (28)	228 (24)	1,353 (182)	7 (2)	3,085 (323)	0 (0)	80 (37)	0 (0)	84 (25)
Heckman Lake	35	26	258 (28)	169 (19)	682 (135)	44 (10)	527 (121)	0 (0)	5 (3)	4 (2)	73 (24)
Helm Bay	0	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Honker Lake	6	5	46 (7)	29 (1)	99 (2)	11 (0)	228 (0)	0 (0)	0 (0)	2 (0)	20 (0)
Hugh Smith Lake	6	6	47 (8)	47 (0)	260 (7)	15 (0)	143 (0)	0 (0)	0 (0)	6 (0)	36 (0)
Humpback Lake	9	7	106 (15)	103 (12)	578 (115)	94 (28)	1,924 (565)	0 (0)	0 (0)	3 (3)	7 (6)
Jim's Lake	4	4	9 (3)	9 (0)	12 (0)	2 (0)	43 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Jordan Lake	31	24	151 (20)	115 (12)	548 (80)	10 (3)	275 (42)	0 (0)	83 (12)	0 (0)	14 (2)
Kadake Creek	7	7	57 (8)	44 (1)	299 (4)	0 (0)	38 (0)	0 (0)	158 (0)	3 (0)	55 (0)
Kah Sheets Creek	24	20	114 (16)	24 (5)	94 (27)	6 (2)	44 (19)	2 (0)	9 (2)	6 (2)	54 (12)
Kah Sheets Lake	23	18	148 (27)	79 (10)	417 (123)	29 (5)	80 (14)	2 (1)	21 (9)	14 (5)	35 (11)

-continued-

Table 2.–Page 2 of 2.

System <sup>a</sup>	Number registered	Number responded	Total days fished <sup>b</sup>	Trout (cutthroat and rainbow)				Steelhead		Dolly Varden	
				Days fished <sup>c</sup>	Hours fished	Harvest	Released	Harvest	Released	Harvest	Released
Karta, 3	75	58	699 (47)	462 (29)	2,126 (161)	107 (12)	1,469 (214)	24 (12)	444 (52)	34 (6)	328 (45)
Kathleen Lake	9	6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Kegan Creek, 2	31	22	241 (35)	37 (5)	151 (15)	14 (6)	59 (17)	0 (0)	3 (3)	1 (1)	4 (2)
Kook Lake	3	3	3 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Lake Alexander	4	4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Lake Eva	17	10	150 (24)	113 (22)	505 (100)	41 (10)	374 (114)	0 (0)	8 (3)	29 (18)	1,214 (213)
Manzanita Lake, 2	20	15	108 (15)	97 (10)	477 (75)	66 (10)	583 (111)	2 (1)	14 (4)	28 (8)	27 (7)
Marten Lake	2	2	24 (5)	24 (0)	103 (30)	11 (0)	232 (0)	0 (0)	0 (0)	0 (0)	1 (0)
McDonald Lake	23	14	343 (50)	291 (46)	904 (124)	56 (15)	502 (115)	0 (0)	98 (18)	18 (6)	249 (116)
Orchard Lake	10	10	109 (11)	97 (0)	357 (11)	114 (0)	446 (0)	0 (0)	0 (0)	1 (0)	1 (0)
Patching Lake	9	5	97 (19)	97 (16)	589 (180)	4 (2)	625 (216)	0 (0)	0 (0)	0 (0)	38 (25)
Petersburg Lake	27	21	135 (20)	99 (11)	535 (61)	23 (5)	299 (67)	1 (0)	110 (27)	32 (7)	48 (13)
Peterson Lake	106	83	60 (11)	48 (6)	201 (28)	0 (0)	49 (12)	0 (0)	0 (0)	6 (2)	54 (13)
Plotnikof Lake <sup>d</sup>	7	3	50 (23)	12 (7)	62 (41)	22 (14)	48 (31)	0 (0)	0 (0)	0 (0)	0 (0)
Rainbow Lake	0	0	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Red Bay Lake	35	26	95 (18)	83 (14)	268 (58)	12 (3)	187 (56)	0 (0)	8 (6)	3 (1)	9 (5)
Reflection Lake	17	11	151 (21)	131 (17)	578 (127)	56 (11)	1,076 (194)	2 (1)	10 (6)	19 (12)	72 (44)
Salmon Bay Lake	10	8	99 (22)	42 (8)	188 (16)	9 (5)	64 (15)	0 (0)	0 (0)	55 (16)	221 (74)
Salmon Lake	48	43	123 (17)	96 (12)	369 (47)	11 (3)	172 (26)	0 (0)	12 (3)	78 (12)	375 (37)
Sarkar Lake	30	27	138 (18)	97 (9)	339 (36)	17 (4)	235 (46)	0 (0)	0 (0)	0 (0)	7 (3)
Shipley Bay	4	3	5 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (9)
Sitkoh Lake, 2	29	26	144 (18)	110 (10)	446 (60)	95 (25)	595 (30)	0 (0)	1 (0)	27 (3)	287 (58)
Staney Creek	53	39	124 (21)	52 (11)	203 (51)	6 (5)	77 (57)	3 (1)	3 (1)	6 (2)	110 (37)
Suloia Lake	7	5	22 (9)	22 (8)	48 (18)	3 (2)	43 (22)	0 (0)	0 (0)	4 (4)	1 (1)
Swan Lake	17	13	69 (16)	67 (12)	186 (46)	45 (8)	285 (53)	0 (0)	0 (0)	0 (0)	0 (0)
Sweetwater Lake	5	5	14 (4)	12 (1)	54 (0)	7 (0)	3 (0)	7 (0)	3 (0)	1 (0)	1 (0)
Turner Lake, 2	50	36	263 (32)	214 (23)	677 (95)	9 (3)	651 (123)	0 (0)	3 (1)	53 (16)	188 (53)
Twin Lakes	15	8	17 (9)	11 (5)	26 (12)	0 (0)	29 (26)	0 (0)	0 (0)	0 (0)	7 (4)
Virginia Lake	22	19	159 (18)	122 (12)	421 (61)	52 (8)	470 (59)	0 (0)	0 (0)	3 (1)	35 (7)
Wilson Lake, 2 <sup>d</sup>	22	13	160 (23)	148 (19)	731 (137)	13 (12)	3,543 (570)	0 (0)	0 (0)	5 (3)	253 (150)
Windfall Lake	186	138	130 (18)	108 (12)	476 (64)	21 (5)	253 (55)	0 (0)	1 (1)	11 (3)	292 (78)
Winstanley Lake	3	2	47 (18)	17 (1)	66 (3)	27 (2)	56 (3)	0 (0)	0 (0)	12 (7)	26 (15)
Young Lake, 2	38	23	161 (31)	140 (28)	605 (111)	47 (13)	1,470 (496)	0 (0)	2 (1)	0 (0)	3 (2)
Totals	1,410	1,064	6,120 (151)	4,414 (101)	18,914 (584)	1,318 (58)	22,125 (1,129)	44 (11)	1,105 (73)	503 (39)	4,649 (347)

<sup>a</sup> If more than 1 cabin occurs at a given system, the number follows the site name.

<sup>b</sup> Total days fished for all species, including salmon and Dolly Varden.

<sup>c</sup> Days fished primarily for trout or steelhead.

<sup>d</sup> Estimates may be biased low as no responses were received from one or more seasonal strata in which cabin reservations were logged.

were spent to catch a total of 1,576 trout (1,469 released and 107 harvested) and 468 steelhead (444 released and 24 harvested). Angler effort from cabins in the Hasselborg and McDonald lake systems was also high (1,353 and 904 hours, respectively).

Systems with estimates of over 75 steelhead caught include the Karta River system (468), Kadake Creek (158), Petersburg Lake (111), McDonald Lake (98), Jordan Lake (83), and Hasselborg Lake (80). These six systems accounted for 90% of steelhead caught. Almost 55% of the steelhead harvested came from the Karta River system. One system, Sweetwater Lake had a higher estimate of steelhead harvested than steelhead released (7 harvested vs. 3 released).

## ANGLER EXPERIENCES

Parties who fished for trout were asked to rank their fishing experience. We received 498 replies to that question from party-heads (Table 3). The two lakes rated highest by ten or more respondents were Wilson and Hasselborg lakes with 67% and 62% rating it as excellent, respectively. Other lakes that were rated excellent by four or more respondents included Sitkoh Lake (7 responses), Swan Lake (5 responses), and Lake Eva (4 responses).

The lowest-rated systems were Sarkar Lake with 11 of 16 responses rating it as poor, and Peterson Lake near Juneau where 11 of 18 responses rated the fishing as poor. Regionwide, 41% of responses reported trout fishing as good or

Table 3.--Summary of how parties rated cutthroat trout fishing from the cabins they visited during 2006.

System	Ratings by fishing parties			
	Excellent	Good	Fair	Poor
Admiralty Cove	1		3	6
Anan Bay		2		1
Avoss Lake		1		2
Bakewell Lake		2	2	
Baranof Lake		3	1	
Black Bear Lake			2	
Castle River	2		8	6
Checats Lake			1	
Control Lake		3	1	3
Davidof lake		1		
De Boer Lake				1
Distin Lake		1	1	
Duncan Salt Chuck		2	1	4
Eagle Lake				
Ella Lake	3	1		
Essowah Lake		1		1
Fish Creek		4	6	10
Florence Lake	2		1	
Gouldling Lake		1		
Harding River		1		1
Harvey Lake			1	1
Hasselborg Lake	8	1	4	
Heckman Lake	1	4	4	6
Honker Lake	1		1	2
Hugh Smith Lake		2	3	
Humpback Lake	2	2	2	
Jim's Lake			2	
Jordan Lake	2	3	1	5
Kadake Creek		2	2	2
Kah Sheets Creek		2	2	2
Kah Sheets Lake		7	2	1
Karta	5	11	19	6

System	Ratings by fishing parties			
	Excellent	Good	Fair	Poor
Kathleen Lake				
Kegan Creek		3	1	6
Kook Lake				
Lake Alexander				
Lake Eva	4	1	2	1
Manzanita Lake	2	4	6	
Marten Lake	1			1
McDonald Lake		1	4	5
Orchard Lake	3		7	
Patching Lake	1		3	1
Petersburg Lake	2	6	4	1
Peterson Lake		6	1	11
Plotnikof Lake			1	1
Red Bay Lake	3	4	1	5
Reflection Lake	3	3	5	
Salmon Bay Lake	1	2	1	
Salmon Lake	3	5	4	6
Sarkar Lake	2	2	1	11
Shiple Bay				1
Sitkoh Lake	7	3	5	1
Staney Creek		2		4
Suloia Lake	1			
Swan Lake	5		2	
Sweetwater Lake			1	1
Turner Lake	3	5	9	9
Twin Lakes		2		
Virginia Lake	3	3	5	4
Wilson Lake	8		3	1
Windfall Lake	1	10	4	13
Winstanley Lake	2			
Young Lake	4	3	3	4
Percent of total	17%	24%	29%	30%



excellent fishing, and 59% ranked the trout fishing fair or poor (Table 3).

There was a wide diversity of comments from responses to our question about evaluating our current trout regulations in specific watersheds. We received a total of 489 comments from 444 unique respondents; nearly all of these comments were related to trout regulations but some were general and were related to salmon regulations, non-resident possession limits, enforcement, the condition of the cabin and their fishing experience (Table 4).

Table 4.–Summary of 489 comments (from 444 unique responses during 2006) to whether current trout regulations need to be changed in Southeast Alaska.

Category	Number	Percent of total
<b>KEEP SAME and/or NON-SPECIFIC COMMENTS</b>		
Unclear or general comments	168	34
Leave regulations same	68	14
Base management on biology/research	2	0
<b>Total</b>	<b>238</b>	<b>49</b>
<b>MORE CONSERVATIVE REGULATIONS</b>		
Make regulations more conservative	12	2
Support catch-and-release only	92	19
Hook type regulation (single, barbless)	35	7
Support fly-fishing only	12	2
Restrict harvest of nonresidents	4	1
	<b>155</b>	<b>32</b>
<b>LESS CONSERVATIVE REGULATIONS</b>		
Liberalize regulations	11	1
Oppose catch-and-release only	12	2
Oppose fly-fishing only	22	4
Decrease minimum size limits	18	4
Increase harvest limits	12	2
Allow the use of bait	4	1
Increase opportunity for consumption	16	3
Reevaluate "Trophy Lake" regulations	1	1
	<b>96</b>	<b>20</b>
<b>Total number of regulatory comments</b>	<b>489</b>	<b>100</b>

Sixty-seven (67) responses contained recommended changes for specific river or lake systems and ranged from recommending total catch-and-release to liberalization of size and bag limits (Table 5). All ten comments regarding the Karta River system recommended changes to catch-and-release fishing. Several regulatory

recommendations were also received for systems without USFS recreational cabins—most comments were for systems in the Ketchikan area and for Prince of Wales Island (Table 5).

Nearly 90% of the comments received regarding regulation changes were general and did not pertain to any particular system or specific fishery. The comments were summarized into three categories: (keep regulations the same and/or non-specific comments, make the regulations more conservative, and make the regulations less conservative). Nearly half (49%) recommended keeping the trout regulations the same and 32% thought they should be more conservative; only 20% thought the regulations should be liberalized (Table 4).

There were 155 comments that recommended more restrictive trout regulations, of which 92 (59%) recommended catch-and-release for all trout, 35 (23%) preferred special hook regulations (i.e., single barbless hooks), and only 12 (8%) of the respondents recommended fly-fishing-only regulations.

There were 96 comments that recommended less restrictive trout regulations. Of these, 22 (22%) were opposed to any fly-fishing-only regulation, 18 (19%) would like to see the minimum size limit decreased, and 16 (17%) suggested increased opportunities for harvest.

## DISCUSSION

The overall response rate of 78% to this survey was the same as that in the 1999 and 2002 surveys (Jones and Kondzela 2001; Harding et al. 2005) and nearly identical to the 77% response rate in 1992 (Jones 1993). Angler response dropped sharply during the consecutive surveys sent in 1993 (65%, Jones 1994) and 1994 (39%, Jones 1995), but rebounded once the survey frequency dropped to once every 3 years. The return to high response rates in 1999, 2002 and 2006 suggests a benefit to maintaining a 3-year sampling schedule.

The assumption that average effort and harvest per responding party was constant across mailing is made to support the use of simple expansions to estimate parameters (Eq. 2 and 3). However, because response to the survey was 77% to 78% in each temporal survey, overall estimates are relatively insensitive to all but large differences

Table 5.—Summary of comments received in 2006 that are specific to a system or area (C & R = catch-and-release; FF = fly-fishing; and MSL = minimum size limit).

System	Number of comments	Specific comment
Black Bear Lake	1	lower size limits, increase bag limits
Castle River	1	one fish/day with slot limit 10 to 16 inches
Control Lake	1	support C & R in this area
Fish Creek	4	(1) don't liberalize bag limit; (3) C&R
Harvey Lake	1	doesn't need to be FF only
Hasselborg Lake	2	(1) keep as trophy lake; (1) support C&R
Heckman Lake	2	(1) poor fishing; question validity of 14" MSL
Hugh Smith Lake	1	increase MSL for trout
Kah Sheets Creek	1	don't make this C & R
Karta & McDonald Lakes	1	McDonald and Karta lake should be C & R
Karta Lake	1	C&R for trout
Karta River	6	(6) C&R; (2) fly-fishing only in spring; (1) barbless hook
Karta system	3	(3) C&R; (1) not FF only; (1) No C&R for sockeye
Lake Eva	2	(1) keep regulations same; (1) C&R
Lake Eva & Polatouskie	1	C&R in Eva & Polatouskie
McDonald Lake	2	(2) C&R; (1) with artificial bait only
Petersburg Creek	1	C&R for steelhead
Peterson Creek	1	FF and C&R
Peterson Lake	1	C&R especially at Peterson Lake
Red Bay Lake	1	C&R, single hook
Salmon Bay Lake	1	C&R all trout
Salmon Lake Sitka	1	regulations OK
Sarkar Lake	3	(2) regulations OK and keep restrictive; (1) C&R but not FF
Sarkar system	1	C&R for Honker Divide
Sitkoh Lake	1	C&R
Swan Lake	2	(1) no bait; (1) barbless hooks
Turner Lake	5	(5) support current regulations; (5) support C&R
Virginia Lake	2	(2) increase bag limits
Windfall Lake	4	(2) C&R; (1) not FF only; (1) No C&R for sockeye
Youngs Lake / Admiralty Creek	1	C&R, single barbless hooks
Plotnikof	1	C&R all large rainbows
Kegan	1	C&R
Comments received regarding non-surveyed systems:		
Naha (Jordan Lake System)	2	all Ketchikan systems C&R steelhead; support C&R but not FF only
POW	1	Not FF only on all POW systems.
Salt Chuck	1	C&R or trophy fish, single hook only
Sashin Lake	1	reduce size limit and increase bag limits
Sadie Lake	1	reduce size limit
Ward Creek	1	C&R
Naha	2	(2) C&R
Thorne	1	C&R and/or FF for steelhead

between the estimated mean responses per mailing and some presumed unbiased estimates. ANOVA supports our assumption for each estimation ( $P \geq 0.1$ ) except for one spring-strata variable (trout-hrs,  $P = 0.05$ ) and four summer-strata variables (total-days,  $P = 0.08$ ; trout-days,  $P = 0.01$ ; trout-hrs,  $P = 0.04$ ; and steelhead released,  $P = 0.06$ ). A simple deterministic simulation was used to estimate potential bias in these estimates that

could exist due to our expanding by estimated mean values, instead of more likely modeled values. In only one case did potential bias exceed 5%; the overall estimate for steelhead released could be biased low by 11% (120 fish).

Harding et al. (2005) first used multiple imputation methods to deal with item non-response in our cabin surveys. Prior to that, a

variety of hot-deck or mean imputation methods had been used (Jones and Kondzela 2001). Multiple imputation has the advantage of being cleanly implemented in SAS, and conducive to appropriately inflating variance estimates for the item imputations.

In contrast to the item imputations above, we manually imputed estimates for total angler-days when that variable was missing in order to take advantage of the strong correlations between the size of a party and length of stay, and angler effort for parties that fished. While this imputation was not accompanied by a variance-inflating adjustment, the frequency of the imputation (for one or more anglers of parties who reported fishing) was 8%, so downward bias in our variance estimate due to this procedure is again relatively small. Finally, we constrained or set the value of trout-days fished to the value for total-days fished for one or more anglers in 6% of parties who reported fishing to facilitate admissible imputations. This also introduced another small bias to the estimates.

The estimated total freshwater catch of trout (cutthroat and rainbow trout, combined) from the 2006 SWHS for Southeast Alaska totaled 41,820 (Jennings et al. 2009; trout harvest = 3,143, SE = 513) and catch = 38,677, SE = 5,036). Estimated total trout catch from the 2006 USFS cabin survey (23,443) is 56% of the SWHS estimate. This suggests that the surveyed USFS cabins provide access for over half of the fishing opportunities for cutthroat and rainbow trout in the region. The estimated total trout catch from the USFS cabin survey in 1999 was 58% of the SWHS estimate and in 2002 it was 39%.

Overall catch rates for trout (harvest + release) in 2006 were comparable to prior recreational cabin survey results as anglers caught an average of 1.2 trout per targeted angler-hour. This compares to past averages of 1.3, 1.8, 0.6, 1.3, and 1.8 trout per angler-hour at recreational cabins during 2002, 1999, 1994, 1993, and 1992, respectively (Harding et al. 2005; Jones and Kondzela 2001; Jones 1995, 1994, 1993). The catch per unit effort for trout in 2006 was highest at Wilson, Jim's, Humpback, and Florence lakes, all with average catch rates above 3 trout per angler-hour. Comparison of the 2006 trout catch estimates with systems that have been surveyed each time

(Table 6) reveals trend information. The 2006 catch estimate is about 59% of the 1993 estimate, prior to the revision of the regional trout regulations in 1994. Estimates of trout catch from the 1999 and 2002 survey were 72% and 55%, respectively, of the 1993 estimate. Cabin reservations were approximately 52% lower in 1999 than in 1993, but the number of cabin reservations increased slightly during 2002 and then again during 2006. Steelhead catches during 2006 were down slightly from 2002 but still slightly higher than the 1993 estimate. It is unknown why cabin reservations have remained below the 1993 levels, but higher air charter costs due to increased fuel and insurance costs may be one factor.

The retention rate for trout during 2006 (6%) dropped by more than half from the 15% we estimated in 2002 (Harding et al. 2005). This decrease is a reversal from the increase in retention rate observed between 1999 (7%) (Jones and Kondzela 2001) to the 15% in 2002. At the 2000 BOF meeting the minimum size limit for trout was reduced from 12 inches to 11 inches; thus there were less restrictive regulations in place during the 2002 and 2006 cabin surveys. The regulatory change may help account for the higher retention rate during 2002 but the dramatic reduction between 2002 and 2006 may be explained by the increasing popularity of catch-and-release trout fishing (Cooke et al. 2002).

Anglers reported harvesting 4% of their steelhead catch during 2006, a slight increase from 2002 (3%; Harding et al. 2005); during 1999 1% of the steelhead catch was retained (Jones and Kondzela 2001). Since the 1994 BOF action, the minimum size limit for steelhead remained very restrictive, only 1 fish/day and 2 fish/year over 36 inches. An extensive analysis of all available length data collected at numerous weir sites throughout Southeast Alaska estimate that in any given year or system approximately 3% to 5% of adult steelhead are available for legal harvest (See Appendix C for ADF&G analysis).

A lengthy, difficult process between ADF&G and the USFS was required to set up this survey. We began to survey USFS cabin users during 2005, but abandoned the survey after the spring (January–May) sampling event when federal attorneys concluded the USFS could no longer provide ADF&G with the name/addresses needed

Table 6.—Comparison between the 1993 (pre-regulation change), 1999, 2002, and 2006 Cabin Survey estimates of total catch for trout (cutthroat and rainbow) and steelhead in systems that were surveyed in all years.

System	Registered Parties				Trout Catch				Steelhead Catch			
	1993	1999	2002	2006	1993	1999	2002	2006	1993	1999	2002	2006
Admiralty Cove	67	55	54	51	442	157	91	34	5	5		1
Anan Bay	15	22	20	24	107	10	58	13	10	3	6	9
Bakewell Lake	17	8	10	6	545	456	398	111				
Baranof Lake	16	7	9	11	500	104	63	77				
Castle River	29	36	34	32	802	1,080	413	625	2	5		10
Distin Lake	29	11	6	5	154	95	17	144				
Eagle Lake	5	7	4	1	9	410	33					
Ella Lake	86	13	7	6	2,539	449	104	290				
Essowah Lake	9	4	4	2	7	11	15	19				
Fish Creek	74	51	55	54	474	524	730	269	474	160	107	10
Florence Lake	27	18	18	10	2,187	405	481	106				
Gouldling Lake	9	6	9	7	76	287	169	48				
Hasselborg Lake	87	26	31	27	2,992	1,595	2,584	3,092				80
Heckman Lake	33	21	3	35	1,267	434	11	571	20	20	3	5
Hugh Smith Lake	11	3	3	6	8	48	74	158				
Humpback Lake	33	7	7	9	2,818	776	1,812	2,018			62	
Jim's Lake	29	20	11	4	835	403	293	45				
Jordan Lake	36	26	31	31	283	691	600	285	33	43	69	83
Kadake Creek	7	7	9	7	75	32	140	38		52	65	158
Kah Sheets Lake/Ck	44	43	33	47	319	228	215	159	5	39	18	34
Karta <sup>a</sup>	112	46	75	75	3,125	1,313	1,951	1,576	327	195	944	468
Kegan Creek	48	25	34	31	1,047	236	432	73				3
Kook Lake	14	8	8	3	141	506	102					
Lake Alexander	31	9	4	4	550	122						
Lake Eva	38	20	23	17	477	1,738	726	415			9	8
Manzanita Lake	61	15	20	20	1,247	2,392	694	649		2	15	16
McDonald Lake	33	15	21	23	282	831	764	558	216	6	16	98
Orchard Lake	18	6	6	10	1,274	198	135	560				
Patching Lake	25	7	17	9	1,639	76	398	629				
Petersburg Lake	21	17	3	27	17	152	160	322		23	26	111
Red Bay Lake	18	9	24	35	32	40	252	199			61	8
Reflection Lake	20	12	7	17	121	249	832	1,132				12
Salmon Bay Lake	29	15	10	10	646	728	333	73	38	44		

<sup>a</sup> In the Karta system in 1993, Salmon Lake was not surveyed for steelhead catch.

-continued-

Table 6.–Page 2 of 2.

System	<u>Registered Parties</u>				<u>Trout Catch</u>				<u>Steelhead Catch</u>			
	1993	1999	2002	2006	1993	1999	2002	2006	1993	1999	2002	2006
Salmon Lake	42	30	41	48	463	345	102	183				12
Sarkar Lake	51	26	26	30	175	263	210	252		3	2	
Sitkoh Lake	35	22	18	29	342	820	234	690	5	80	22	1
Staney Creek	76	34	30	53	666	95	37	83			2	6
Sweetwater Lake	74	12	31	5	986	78	92	10				10
Turner Lake	77	40	50	50	752	848	1,152	660				3
Virginia Lake	19	19	24	22	1,201	1,264	919	522				
Wilson Lake	42	17	18	22	4,410	4,913	1,937	3,556				
Young Lake	68	37	37	38	721	1,007	329	1,517		19		2
Total	1,615	832	885	953	36,753	26,409	20,093	21,761	1,135	699	1,428	1,148

to poll users. After many discussions, an agreement was reached whereby only USFS personnel would have access to the “private” information. The USFS would physically conduct the mailings, and completed forms would be returned directly to the Douglas ADF&G office (see methods section). This new arrangement worked well and the authors feel there was no compromise in the data integrity or statistical design.

## ACKNOWLEDGMENTS

We thank Lance Lerum and Robbie Piehl (USFS staff) for their tremendous assistance and for their willingness to assist ADF&G staff in successfully completing this survey. We also thank Randy Mullen for helping design and implement this survey. As always, this was a group effort and projects like this would not be possible without the help of many people, and everyone’s efforts are greatly appreciated.

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**APPENDIX A**  
**SUPPLEMENTAL SURVEY DATA FOR 2006**

Appendix A1.—Surveyed USFS recreational cabins in Southeast Alaska by ranger district, system, cabin name, presence of steelhead and trout, and 2006 ADF&G trout regulations.

Ranger district	System	Cabin name	Steelhead	Trout	Trout regulations <sup>a</sup>
Admiralty Island	Admiralty Creek	Admiralty Cove	Yes	Yes	11"
Admiralty Island	Distin Lake	Distin Shelter		Yes	25"
Admiralty Island	Distin Lake	Sportsmen		Yes	25"
Admiralty Island	Florence Lake	East Florence		Yes	Bait Lake
Admiralty Island	Hasselborg Lake	Big Shaheen		Yes	25"
Admiralty Island	Hasselborg Lake	Hasselborg Creek		Yes	11"
Admiralty Island	Hasselborg Lake	Little Shaheen		Yes	25"
Admiralty Island	Jim's Lake	Jim's Lake		Yes	25"
Admiralty Island	Lake Alexander	Lake Alexander		Yes	14"
Admiralty Island	Lake Kathleen	Lake Kathleen		Yes	11"
Admiralty Island	Young Lake	North Young Lake	Yes <sup>b</sup>	Yes	14"
Admiralty Island	Young Lake	South Young Lake	Yes <sup>c</sup>	Yes	14"
Juneau	Peterson Lake	Peterson Lake		Yes	14"
Juneau	Turner Lake	East Turner Lake		Yes	C&R
Juneau	Turner Lake	West Turner Lake		Yes	C&R
Juneau	Windfall Lake	Windfall Lake	Yes	Yes	14"
Ketchikan	Fish Creek	Fish Creek	Yes	Yes	11"
Ketchikan	Heckman Lake	Heckman Lake	Yes	Yes	14"
Ketchikan	Heckman Lake	SE Heckman Lake <sup>b</sup>	Yes	Yes	14"
Ketchikan	Jordan Lake	Jordan Lake	Yes	Yes	14"
Ketchikan	McDonald Lake	McDonald Lake	Yes	Yes	14"
Ketchikan	Orchard Lake	Plenty Cutthroat		Yes	25"
Ketchikan	Patching Lake	Patching Lake		Yes	25"
Ketchikan	Rainbow Lake	Rainbow Lake		Yes	11"
Ketchikan	Reflection Lake	Reflection Lake	Yes	Yes	25"
Misty Fiords	Bakewell Lake	Bakewell		Yes	14"
Misty Fiords	Ella Lake	Ella Narrows		Yes	25"
Misty Fiords	Ella Lake	Red Alders		Yes	25"
Misty Fiords	Hugh Smith Lake	Hugh Smith Lake		Yes	11"
Misty Fiords	Humpback Lake	Humpback Lake		Yes	25"
Misty Fiords	Manzanita Lake	Beaver Camp	Yes	Yes	25"
Misty Fiords	Manzanita Lake	Manzanita Lake	Yes	Yes	25"
Misty Fiords	Upper Checats Lake	Checats		Yes	11"
Misty Fiords	Wilson Lake	Wilson Narrows		Yes	25"
Misty Fiords	Wilson Lake	Wilson View		Yes	25"
Misty Fiords	Winstanley Lake	Winstanley Lake		Yes	11"
Petersburg	Castle River	Castle Flats	Yes	Yes	11"
Petersburg	Castle River	Castle River	Yes	Yes	11"
Petersburg	Deboer Lake	Deboer Lake		Yes	11"
Petersburg	Duncan Salt Chuck	Salt Chuck East	Yes	Yes	11"
Petersburg	Harvey Lake	Harvey Lake <sup>b</sup>		Yes	11"
Petersburg	Kadake Creek	Kadake Bay	Yes	Yes	11"
Petersburg	Kah Sheets Creek	Kah Sheets Bay	Yes	Yes	11"
Petersburg	Kah Sheets Lake	Kah Sheets Lake	Yes	Yes	14"
Petersburg	Petersburg Lake	Petersburg Lake	Yes	Yes	14"
Petersburg	Swan Lake	Swan Lake <sup>b</sup>		Yes	11"

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Ranger district	System	Cabin name	Steelhead	Trout	Trout regulations <sup>a</sup>
Prince of Wales	Control Lake	Control Lake		Yes	11"
Prince of Wales	Honker Lake	Honker Lake		Yes	11"
Prince of Wales	Karta	Karta Lake	Yes	Yes	14"
Prince of Wales	Karta	Karta River	Yes	Yes	14"
Prince of Wales	Karta	Salmon Lake		Yes	14"
Prince of Wales	Red Bay Lake	Red Bay Lake	Yes	Yes	14"
Prince of Wales	Salmon Bay Lake	Salmon Bay Lake	Yes	Yes	14"
Prince of Wales	Sarkar Lake	Sarkar Lake	Yes	Yes	14"
Prince of Wales	Shiple Lake	Shiple Bay	Yes	Yes	11"
Prince of Wales	Staney Creek	Staney Creek	Yes	Yes	14"
Prince of Wales	Sweetwater Lake	Sweetwater Lake		Yes	11"
Prince of Wales	Black Bear	Black Bear Lake		Yes	11"
Prince of Wales	Essowah Lake	Essowah Lake		Yes	11"
Prince of Wales	Kegan Creek	Kegan Cove	Yes	Yes	14"
Prince of Wales	Kegan Creek	Kegan Creek	Yes	Yes	14"
Sitka	Avoss Lake	Avoss Lake		Yes	11"
Sitka	Baranof Lake	Baranof Lake		Yes	14"
Sitka	Davidof Lake	Davidof Lake		Yes	11"
Sitka	Goulding Lake	Goulding Lake		Yes	14"
Sitka	Kook Lake	Kook Lake		Yes	14"
Sitka	Lake Eva	Lake Eva	Yes	Yes	14"
Sitka	Plotnikof Lake	Plotnikof Lake	Yes <sup>c</sup>	Yes	11"
Sitka	Salmon Lake	Salmon Lake	Yes	Yes	14"
Sitka	Sitkoh Lake	Sitkoh Lake East	Yes	Yes	14"
Sitka	Sitkoh Lake	Sitkoh Lake West	Yes	Yes	14"
Sitka	Suloia Lake	Suloia Lake		Yes	11"
Wrangell	Anan River	Anan Bay	Yes	Yes	11"
Wrangell	Anan Lake	Anan Lake <sup>b</sup>	Yes	Yes	14"
Wrangell	Eagle Lake	Eagle Lake		Yes	25"
Wrangell	Harding River	Harding River	Yes	Yes	11"
Wrangell	Martin Lake	Martin Lake		Yes	11"
Wrangell	Twin Lakes	Twin Lakes		Yes	11"
Wrangell	Virginia Lake	Virginia Lake		Yes	14"
Total # of Cabins			36	79	

<sup>a</sup> 11" = 11 inch minimum size, 14" = 14 inch minimum size, 25" = 25 inch minimum size, C&R = catch and release only, Bait Lake = bait allowed, no minimum size

<sup>b</sup> Cabins not previously surveyed but added to the 2006 survey.

<sup>c</sup> Plotnikof Lake and Young Lake both have cabins located above barrier falls on streams with steelhead. At Plotnikof Lake you can take about a 4-mile boat ride to the outlet stream, then hike a 4 to 5-mile trail to the stream below the barrier falls that has steelhead. At Young Lake, one can hike down the outlet stream and access the creek below the barrier falls to fish for steelhead.



**APPENDIX B**  
**QUESTIONNAIRE AND REMINDER LETTERS**

Appendix B1.–Cover letter sent with each questionnaire

**File Code:** 2620-3/2330

**Date:** June 1, 2006

(merged name)  
(merged address)

Dear Mr./Mrs. (merged last name):

The US Forest Service (USFS) is assisting the Alaska Department of Fish and Game (ADF&G) with surveying anglers about their fishing experience while using USFS public recreation cabins in Southeast Alaska during 2006. Because you reserved the (merged field i.e., West Turner Lake Cabin) on (merged field- Date) we are asking for your participation with this survey. Information about you or your party's fishing experience while using the USFS cabin is important to this study.

Please complete and return the enclosed survey form directly to ADF&G in the postage-paid, addressed envelope provided with this letter. The U.S. Forest Service respects your privacy and has not shared any personal information with ADF&G or any other group or individual. Your responses to this survey will also remain strictly confidential; only the summary of information from all respondents will ever be published. ADF&G intends to publish a summary of information resulting from the 2006 survey on its web site sometime in April 2007. To view the results of the most recent survey (2002), please visit the ADF&G web site at <http://www.sf.adfg.state.ak.us/Region1/trout/cabin.cfm>.

Information about sport fishing at the USFS public recreation cabins is important to the management of the fisheries resources. Your information and that of other anglers will help the Alaska Department of Fish and Game and the US Forest Service work together to sustain your opportunities to enjoy Alaska's recreational fishing. Thank you for participating in our survey.

If you have any questions or privacy concerns related to the procedures that were followed in conducting this survey, please contact me at (907) 790-7479.

Sincerely,

Lance Lerum, Ecologist  
Tongass National Forest

Enclosure



Lake or Stream system

Date of reservation

### GENERAL QUESTIONS

1. Did you stay at the U.S. Forest Service cabin you reserved at the location and date above?

Yes  No

If you answered YES, please go to question 2. If you answered NO, did someone else use your reservation?

Yes  No

If your cabin reservation was not used, this is all the information we need. Please return this form in the enclosed envelope. Thanks for your help.

2. How many people stayed at the cabin? \_\_\_\_\_

3. Did anyone in your party fish during your stay?

Yes  No  I don't know.

If you answered YES, please go to Question 4. If you answered NO or I don't know, this is all the information we need. Please return this form in the enclosed envelope. Thanks for your help.

4. If you fished for cutthroat or rainbow trout during your stay at the cabin, please rate the overall quality of your fishing experience:

Poor  Fair  Good  Excellent

5. Some people have suggested that bag or size limits for trout in particular systems in Southeast Alaska should be liberalized. In contrast, others think that particular systems should be considered as catch and release or fly-fishing only. If you share either of these concerns, please list the particular systems and provide clarifying comments for us to consider.

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7. Please complete the information on the back of this form and return the form in the enclosed envelope. Thanks for your assistance.

<SEQUEN>

Appendix B3.–Questionnaire, side B.

Please provide information for **each person** that fished during your reservation at the cabin. If you do not recall the exact numbers, please estimate. In totaling the number of days fished, consider any part of a day as a whole day.

Angler #	Total Days Fished	Effort for trout or steelhead		Cutthroat/Rainbow Trout		Steelhead		Dolly Varden	
		Days	Hours	Kept	Released	Kept	Released	Kept	Released
1	5	3	17	0	12	0	2	0	0
2	4	0	0	2	6	1	0	0	12

Comments:

\* Numbers in the shaded boxes provide an example for a party of two anglers. Angler #1 fished during 5 days but only 3 of those days fishing were spent targeting trout or steelhead, with the remaining two days directed at catching either Dolly Varden or salmon. Angler #1 fished 17 hours primarily for trout or steelhead and caught a total of 12 cutthroat trout and released all 12, caught and released 2 steelhead, didn't catch any Dolly Varden.

Angler #2 fished for 4 days but did not target trout or steelhead so had 0 days and 0 hours spent for trout or steelhead. Even though angler #2 wasn't targeting trout, he caught 8 cutthroat trout and kept 2 and caught and kept a steelhead and released 12 Dolly Varden.

Appendix B4.–First reminder letter to survey non-respondents.

Dear Angler:

Some time has passed since I first requested information about your fishing activities in (name of system). I still have not received your reply.

Even if you did not fish during your stay, your response to the general questions on the first page of the survey questionnaire is important. If you haven't completed the questionnaire, please answer the questions that pertain to your trip and return the questionnaire in the enclosed postage-paid envelope.

Each questionnaire is significant to the outcome of our study. We are very interested in your fishing and experiences in this system, and the information you provide will enhance our understanding of the existing sport fishery.

If you have already returned the questionnaire, please disregard this letter and accept my sincere thanks.

Sincerely,

Lance Lerum, Ecologist  
Tongass National Forest

Appendix B5.—Second reminder letter to survey non-respondents.

Dear Angler:

I have not yet received a completed cabin survey questionnaire regarding your use of <name of system>. Even if you did not use the cabin or fish during your stay, your response to the general questions on the first page of the survey questionnaire is important. Please complete the questionnaire and return it in the postage-paid envelope that is provided for your use. Your response will be considered confidential.

Please do not underestimate the importance of your fishing activities. The information you provide is valuable to our study, and may have significant impact on the future management of our sport fish resources.

If you have already returned your questionnaire, please disregard this letter and accept my sincere thanks.

Sincerely,

Lance Lerum, Ecologist  
Tongass National Forest



**APPENDIX C**  
**STEELHEAD LENGTH ANALYSIS AND REGRESSION FOR**  
**SOUTHEAST ALASKA**

## **Steelhead Length Analysis and Regression for Southeast Alaska**

(Date of Analysis: 9/12/06)

The sport fish regulation for steelhead in Southeast Alaska has been based on total length (TL) in inches since 1994. Almost all of the steelhead length data collected at research weirs, however, has been measured as fork length (FL). An updated steelhead length regression and analysis was recently completed to update the Division of Sport Fish conversion formula for estimating TL from FL. The purpose of this exercise was to utilize new data (measurements with both FL and TL) and make the regression as representative as possible of steelhead throughout Southeast Alaska. Previous regressions were primarily based on emigrant steelhead measured during 2000 at the Situk River ( $n \approx 900$ ) while the updated regression incorporates steelhead length data from over 3,300 steelhead from eight different systems and multiple years.

The procedure followed was to estimate the total length of a steelhead, both in the original analysis and subsequently in the updated analysis, and to round the estimated length to the nearest whole inch. Thus, a legal sized fish is defined as a steelhead whose estimated length, rounded to the nearest whole inch, is greater than or equal to 36 inches. All outliers  $<6$  mm and  $>60$  mm ( $n = 184$ ) were removed from these regression analyses.

Length data from across 11 different streams and across numerous years was used to estimate the number of steelhead available for legal harvest. A regression using 3,350 paired measurements was used to develop the formula for estimating TL from FL; this data included steelhead lengths from 1,185 fish from Prince of Wales systems, 1,271 from Sitkoh Creek, and 894 from Situk River (Appendix C2). The regression formula was then applied to estimate TL for 7,940 fish. This “estimated-length” data set was then combined with 9,743 actual TL measurements creating the large data set (17,683) which was subsequently used to estimate the number of legal sized steelhead throughout Southeast Alaska (Appendix C3). This analysis estimates that approximately 4% of adult steelhead returning annually to Southeast Alaska streams are available for legal harvest.

An alternative regression analyses was also conducted to investigate potential north-to-south bias and to ensure as predictive a model as possible. Regression analyses were conducted using non-Situk fish, Situk-only fish, and all-fish combined. The non-Situk River analysis regression predicted that 4.3% of the adult steelhead escapement would be of legal harvestable size while the Situk-only regression predicted that 6.1% would be legal size; the combined regression predicts 4.9% (Appendix C4). For fish with available total length data (i.e., TL is measured and not estimated), 3.3% of the adult steelhead escapement is of legal harvestable size. Thus, in any given year or system approximately 3% to 5% of adult steelhead are available for legal harvest and our “best estimate” is that 4% are available.

Appendix C2.–The system, year, and the number of paired length measurements (FL and TL) which were used in the regression analysis to estimate TL for adult steelhead in Southeast Alaska.

System	Year	Sample size
12_Mile	2004	96
Cable	2006	69
Eagle/Luck	2006	151
Harris	2005	148
Karta River	2005	362
Ratz Creek	2005	359
Prince of Wales total		1,185
Sitkoh	2003	403
	2004	152
	2005	352
	2006	364
Sitkoh total		1,271
Situk	1994	5
	2000	889
Situk total		894
Grand total		3,350

Appendix C3.—The estimated number and percent of legal sized steelhead, by system and year, for Southeast Alaska streams.

System	Year	Total # measured	Number of legal fish	Percent legal fish
12_Mile	2004	96	2	2.1%
Cable	2006	69	2	2.9%
Eagle/Luck	2006	151	2	1.3%
Harris	2005	163	9	5.5%
Ratz Creek	2005	379	8	2.1%
Karta River	1989	1,070	0	0.0%
	1992	171	2	1.2%
	2005	362	5	1.4%
Karta River total		1,603	7	0.4%
Peterson	1989	114	5	4.4%
	1990	168	5	3.0%
	1991	218	9	4.1%
Peterson total		500	19	3.8%
Sitkoh	1982	499	35	7.0%
	1990	679	24	3.5%
	1993	303	27	8.9%
	1996	925	28	3.0%
	2003	647	12	1.9%
	2004	618	16	2.6%
	2005	352	8	2.3%
	2006	364	16	4.4%
Sitkoh total		4,387	166	3.8%
Situk River	1990	110	12	10.9%
	1992	42	1	2.4%
	1994	908	61	6.7%
	1995	352	65	18.5%
	1996	920	24	2.6%
	1997	467	14	3.0%
	1998	1,136	95	8.4%
	1999	696	22	3.2%
	2000	656	15	2.3%
	2001	632	58	9.2%
	2002	675	44	6.5%
	2003	756	18	2.4%
	2004	757	25	3.3%
	2005	781	22	2.8%
	2006	947	15	1.6%
Situk River total		9,835	491	5.0%
Ward Ck	1988	26	0	0.0%
	1989	32	1	3.1%
	1993	75	0	0.0%
	1994	314	1	0.3%
Ward Ck total		447	2	0.4%
Windfall	1997	53	2	3.8%
Southeast total		17,683	710	4.0%

Appendix C4.—Results of the regression analysis used to estimate the total length of adult steelhead and the percent of legal sized steelhead for Southeast Alaska.

Regression model	Regression formula	R Square	Regression model sample size	Number TL estimated	Estimated number legal steelhead	Estimated percent legal steelhead
Non-Situk	TL=25.955+0.998*(FL)	0.980387	2,456	7,940	344	4.3%
Situk-only	TL=27.001+1.001*(FL)	0.989508	894	7,940	484	6.1%
Actual measured lengths <sup>a</sup>				9,743	322	3.3%
Combined (Non-Situk & Situk-only)	TL=24.512+1.003*(FL)	0.980905	3,350	7,940	388	4.9%
Total regional model (Actual measured + combined)	TL=24.512+1.003*(FL)	0.980905	3,350	17,683	710	4.0%

<sup>a</sup> No regression used, actual TL measurements only.



**APPENDIX D**  
**COMPUTER FILES**

Appendix D1.–Computer data files containing data for use in preparing this report.

1. File Name	1. Description
1. All_2006.xls	1. Input for SAS programs tr_dv-analysis.sas and sh_analysis.sas
1. Summary_Fished.xls	1. Input for SAS programs tr_dv-analysis.sas and sh_analysis.sas
1. tr_dv_analysis_2006.sas	1. Imputes missing non-response items, computes trout & DV point estimates (5 simulations)
1. sh_analysis_2006_A.sas	1. Imputes missing non-response items, computes steelhead point estimates (5 simulations)
1. page_2_5Iter.xls	1. Summary of outputs from SAS programs above for respondents who fished, for input to Cabin_06.sas
1. Page_1_SAS.prn	1. Input for SAS program cabin_06.sas
1. No_fish_SAS.prn	1. Input for SAS program cabin_06.sas
1. Cabin06.sas	1. Computes variances of point estimates (EQ 5 in FDS) for each of 5 simulations
1. Cabin_06_BobSAS_5Iters_outFINAL.xls	1. Summary of outputs from Cabin06.sas used to compute estimates (EQ 4-7 in FDS)
1. Final_2006_Est.xls	1. Final estimates and formats for tables in FDS report