

Fishery Data Series No. 97-32

**Harvest Estimate for the Gastineau Hatchery
Roadside Sport Fishery in Juneau, Alaska
during 1996**

by

Dean E. Beers

November 1997

Alaska Department of Fish and Game

Division of Sport Fish



Symbols and Abbreviations

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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H_A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km	east	E	confidence interval	C.I.
liter	L	north	N	correlation coefficient	R (multiple)
meter	m	south	S	correlation coefficient	r (simple)
metric ton	mt	west	W	covariance	cov
milliliter	ml	Copyright	©	degree (angular or temperature)	°
millimeter	mm	Corporate suffixes:		degrees of freedom	df
Weights and measures (English)		Company	Co.	divided by	÷ or / (in equations)
cubic feet per second	ft ³ /s	Corporation	Corp.	equals	=
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	fork length	FL
inch	in	et alii (and other people)	et al.	greater than	>
mile	mi	et cetera (and so forth)	etc.	greater than or equal to	≥
ounce	oz	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
pound	lb	id est (that is)	i.e.,	less than	<
quart	qt	latitude or longitude	lat. or long.	less than or equal to	≤
yard	yd	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
Spell out acre and ton.		months (tables and figures): first three letters	Jan,...,Dec	logarithm (base 10)	log
Time and temperature		number (before a number)	# (e.g., #10)	logarithm (specify base)	log ₂ , etc.
day	d	pounds (after a number)	# (e.g., 10#)	mideye-to-fork	MEF
degrees Celsius	°C	registered trademark	®	minute (angular)	'
degrees Fahrenheit	°F	trademark	™	multiplied by	x
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	not significant	NS
minute	min	United States of America (noun)	USA	null hypothesis	H_0
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
Spell out year, month, and week.				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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SPORT FISHERY IN JUNEAU, ALASKA DURING 1996**

by

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Development of this manuscript was partially financed by the Federal Aid in Sport Fish Restoration Act
(16 U.S.C. 777-777K) under Project F-10-12, Job No. S-1-1.

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This document should be cited as:

Beers, Dean E. 1997. Harvest estimate for the Gastineau Hatchery Roadside Sport Fishery in Juneau, Alaska during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-32, Anchorage.

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ABSTRACT

Angler effort and harvests of chinook salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, and pink salmon *Oncorhynchus gorbuscha* were estimated at Gastineau Hatchery from 21 June to 29 September 1996. An estimated 19,189 (SE = 557) angler-hours were expended to harvest a total of 695 (SE = 73) large chinook salmon at least 28 inches (71 cm) in total length, 88 (SE = 31) small chinook salmon (< 28 inches in length), 2,860 (SE = 285) large coho salmon at least 16 inches (41 cm) in length, 765 (SE = 130) small coho salmon (< 16 inches in length), 2,274 (SE = 250) chum salmon, and 1,039 (SE = 135) pink salmon.

Key words: Creel survey, roadside, angler effort and harvest, sport fishery, hatchery, chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, chum salmon, *Oncorhynchus keta*, pink salmon, *Oncorhynchus gorbuscha*, Juneau, Gastineau Hatchery, Southeast Alaska.

INTRODUCTION

Roadside sport fisheries in marine waters near Juneau offer unique fishing opportunities for both Alaskan residents and tourists visiting the area. In 1995 anglers spent an estimated 24,327 angler-days of shoreline saltwater fishing along the Juneau roadside (Howe et al. 1996). This represents an estimated 47% of the total marine shoreline participation (51,469 angler days) in Southeast Alaska and 17% of the total marine participation (145,854 angler days) in the Juneau area during 1995. Demand for roadside fishing opportunities in the Juneau area is very high as about 39% of the population of Southeast Alaska resided in the Juneau borough in 1990 according to the U.S. census, and the area is also visited by over 400,000 tourists each summer (McDowell Group 1994). The Gastineau Hatchery, located about 3 miles north of Juneau (Figure 1), is a popular destination for tourists and residents alike: 102,600 paying customers toured the facility in 1996 (Rick Focht, Gastineau Hatchery operations manager, Juneau, personal communication). The hatchery is owned and operated by Douglas Island Pink and Chum, Inc. (DIPAC), a private non-profit corporation.

Although harvests for the entire Juneau road system are estimated by questionnaires mailed annually to sport anglers, an on-site creel survey was used to obtain more timely and detailed information on the sport fishery for terminal runs of chinook, coho, chum, and pink salmon to Gastineau Hatchery. The sport fishery at the

hatchery targets chinook, pink and chum salmon from late June through August, and then coho salmon in September.

In 1991, the hatchery, in cooperation with the Alaska Department of Fish and Game (ADF&G) through the Sport Fish Partnership Program, installed a floating dock to increase access for road-side anglers. Salmon enhancement at Gastineau and nearby Sheep Creek hatcheries (Figure 1) have been extensive in recent years (Table 1), particularly for chinook and coho salmon, the two species of salmon most preferred by anglers in Southeast Alaska (Jones & Stokes 1991).

Since 1993, ADF&G staff have assisted Gastineau Hatchery in developing an on-site creel survey program to estimate sport harvests at the site. Hatchery personnel conduct the survey, while ADF&G analyzed the data to estimate effort and harvests. In 1995 an estimated 157 large chinook salmon (SE = 36), 2,212 large coho salmon (SE = 303), 2,047 chum salmon (SE = 254), and 3,421 pink salmon (SE = 250) were harvested between 3 July and 25 September (Beers 1996).

Sport harvests of chinook salmon in Southeast Alaska are limited by a management plan which also requires estimation of contributions of hatchery chinook salmon stocks. In 1994, ADF&G entered into an agreement with the Gastineau Hatchery to rear chinook salmon for release at several sites in the Juneau area, including waters around the hatchery. The creel

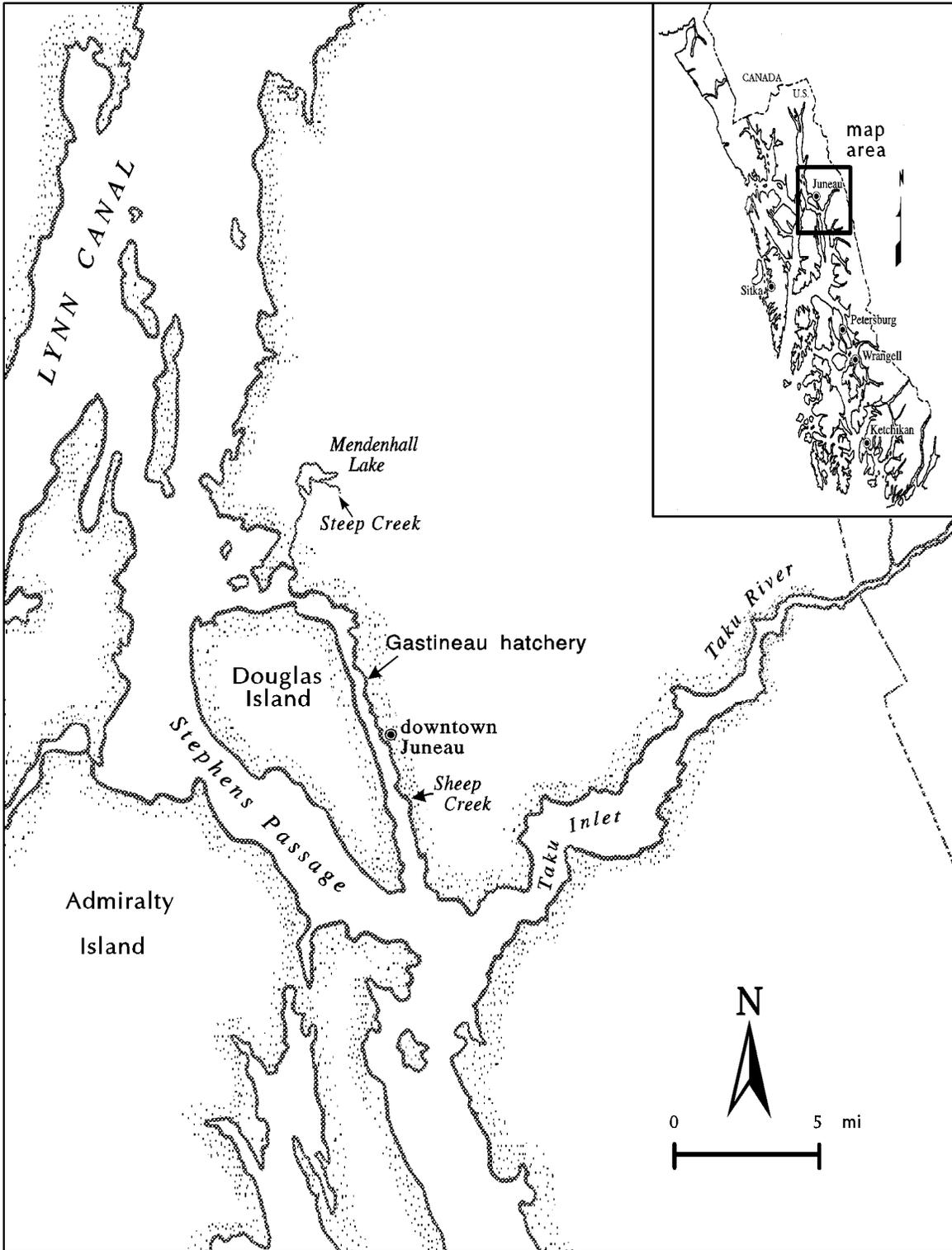


Figure 1.—Location of the Gastineau Hatchery roadside sport fishery, northern Southeast Alaska.

Table 1.— Summary of hatchery-reared salmon smolt releases at Sheep Creek and Gastineau Hatchery since 1991. All fish were reared at Gastineau or Sheep Creek hatcheries except as noted.

Year	Release site	Pink	Chum	Chinook	Coho
1991	Sheep Creek	16,258,086	37,874,036	100,543 ^a	505,287
	Gastineau Hatchery	14,846,296	11,326,584	43,595	507,819
1992	Sheep Creek	31,636,411	26,585,790	0	582,739
	Gastineau Hatchery	15,420,079	11,959,067	191,765	392,508
1993	Sheep Creek	32,660,175	27,002,939	0	562,150
	Gastineau Hatchery	15,768,972	11,891,265	207,536	477,999
1994	Sheep Creek	0	14,635,458	0	563,357
	Gastineau Hatchery	8,663,398	5,869,938	256,916	380,282
1995	Sheep Creek	0	44,673,729	28,529	611,362
	Gastineau Hatchery	8,539,515	11,825,076	158,681	422,482
1996	Sheep Creek	0	41,240,146	35,423	511,456
	Gastineau Hatchery	8,750,004	11,474,457	64,456	347,512

^a Reared at Snettisham Hatchery.

survey will provide information to properly evaluate the hatchery as a release site and terminal harvest area.

In 1996, hatchery personnel repeated the survey and ADF&G staff again provided technical planning and analysis assistance to ensure validity of the survey given personnel and budget constraints.

OBJECTIVE

The objective of the 1996 Gastineau Hatchery roadside creel survey was to estimate effort and harvests of pink, chum, coho and chinook salmon from the floating dock and beach adjacent to the hatchery from 1 July through 6 October, such that estimates were within specified values 95% of the time: angler-hours of effort +5%, pink salmon harvest +15%, chum salmon +20%, coho salmon harvest +25%, and chinook salmon harvest +35%.

METHODS

There are two survey sites: a non-snagging zone, which includes a 150-ft floating dock and 100 ft

of beach adjacent to the dock (on the side opposite the hatchery building), and an area open to snagging which includes the remaining 100 yards of beach extending to a private barge landing. Both locations are clearly marked and fishing rules are enforced by hatchery personnel. Both sites are discrete in shape and size and easily surveyed.

A stratified, two-stage roving creel survey based on expansion of sample ratios was used to estimate fishing effort and harvest from 21 June to 29 September 1996. The survey began nine days ahead of the scheduled 1 July start because chinook salmon showed up earlier than expected; a contingency sampling schedule had been prepared and was implemented so that the entire harvest of chinook salmon would be included in the survey. Also, the survey was terminated one week early because of lack of angling effort (Rick Focht, Gastineau Hatchery manager, Juneau, personal communication). Days were primary sampling units and anglers within days were secondary sampling units. Two sites (snagging and non-snagging zones), fifteen weekly (7-day) seasonal strata, and weekday versus weekend-holiday stratifications were

maintained¹. Because the survey began on the last weekday of the first weekly sample period (June 21); data for this day was expanded for that sampling day only, and not the entire weekday (Monday through Friday) period. There were 60 discrete strata.

The sampling day was defined as beginning at early civil twilight or 0600 (whichever was later) and ending at late civil twilight as computed for the mid-day of the sample week. Most angling at the site was expected to occur between these hours. During each sampling day, anglers were counted six times. The first 'count' in each sampling day occurred, according to a random selection, at the mid-point of the first, second, or last third of the first one-sixth of each sampling day. Subsequent 'counts' were conducted at intervals equal to one-sixth the length of each sampling day. These counts were considered instantaneous and reflected fishing effort at the time of the count.

Effort was estimated by multiplying the average angler count for the day for each location by the hours available for sampling each day. The harvest per unit effort (HPUE) for each fish species was estimated from completed-trip interviews. The estimated harvest was obtained from the product of the effort and HPUE estimates.

When not counting anglers, the technician interviewed anglers completing their trip without regard to angler success (angler harvest). Interviews were conducted during one-hour periods that alternated between sites (non-snagging or snagging). The site to start interviews in each strata was selected at random and then alternated each day sampled.

During each interview, anglers were asked to report their effort and harvest at the site being sampled. As many completed-trip interviews as possible were obtained during each day selected for sampling. Since hatchery technicians had other assigned duties, interviews were not conducted at some times each day; however, sampling of anglers exiting the survey area was expected to occur

roughly in proportion to the number exiting the site at different times of the day.

Angler effort, estimates of total harvest, associated variances and standard errors were calculated according to the following procedures.

The harvest in each stratum was estimated by

$$\hat{H}_h = D_h \bar{H}_h \quad (1)$$

$$\bar{H}_h = \frac{\sum_{i=1}^{d_h} \hat{H}_{hi}}{d_h} \quad (2)$$

where \hat{H}_{hi} is the estimated harvest in day i stratum h , d_h is the number of days sampled in stratum h , and D_h is the total number of days in stratum h .

The variance of the harvest in each stratum was estimated by

$$V[\hat{H}_h] = (1 - f_{1h}) D_h^2 \frac{\sum_{i=1}^{d_h} (\hat{H}_{hi} - \bar{H}_h)^2}{d_h (d_h - 1)} + f_{1h}^{-1} \sum_{i=1}^{d_h} \hat{V}[\hat{H}_{hi}] \quad (3)$$

where $f_{1h} = d_h / D_h$.

The harvest for each sampling day was estimated by

$$\hat{H}_{hi} = \hat{E}_{hi} \overline{HPUE}_{hi}^* \quad (4)$$

where \overline{HPUE}_{hi}^* is the jackknife estimate of mean HPUE during stratum h day i , and \hat{E}_{hi} is the fishing effort in angler-hours during the same time.

Angler effort in each day was estimated by

$$\hat{E}_{hi} = T_h \bar{X}_{hi} \quad (5)$$

where T_h is the number of hours in a sampling day and \bar{X}_{hi} is the average number of anglers counted in day i stratum h . If $\bar{X}_{hi} = 0$ and anglers were interviewed, then \hat{H}_{hi} in equation

¹ Weekdays = Mondays–Fridays. Weekend/holidays = Saturdays, Sundays, Independence Day (4 July), and Labor Day (2 September).

(4) was set equal to the observed harvest. In contrast, if $\bar{x}_{hi} > 0$ and *no* anglers were interviewed, then \overline{HPUE}_{hi}^* in equation (4) was set equal to the mean \overline{HPUE}_{hi}^* for the stratum.

The variance of E_{hi} was estimated by (Wolter 1985)

$$V[\hat{E}_{hi}] = T_h^2 \frac{\sum_{j=2}^{r_{hi}} (x_{hij} - x_{hi(j-1)})^2}{2 r_{hi} (r_{hi} - 1)} \quad (6)$$

where r_{hi} is the number of times anglers were counted in day *i*.

The variance of the harvest H_{hij} in a period was estimated by (Goodman 1960)

$$V[\hat{H}_{hi}] = V[\hat{E}_{hi}] \overline{HPUE}_{hi}^{*2} + V[\overline{HPUE}_{hi}^*] \hat{E}_{hi}^2 - V[\hat{E}_{hi}] V[\overline{HPUE}_{hi}^*] \quad (7)$$

The \overline{HPUE}_{hi}^* and its variance were calculated according to procedures in Efron (1982). The inherent correctable bias of m_{hi}^2 (the number of interviews in a sampling period) of jackknife estimates were removed according to the procedure in Efron (1982, p. 6).

Harvest and effort (and their variances) for the entire season were the sums of the estimates for each stratum.

RESULTS

Sampling information, including angler counts and numbers of completed interviews, is presented in Appendix A1.

Effort for all species totaled 19,189 (SE = 557, RP = 6%) angler-hours. The highest levels of effort were expended during the chinook and coho salmon fisheries. An estimated 2,860 (SE = 285, RP = 20%) large coho at least 16 inches (41 cm) in length, 2,274 (SE = 250, RP = 22%) chum, 1,039 (SE = 135, RP = 26%) pink and 695 (SE = 73, RP = 21%) large chinook salmon at least 28 inches (71 cm) in length were harvested at Gastineau Hatchery from 21 June to 29 September (Table 2). Anglers harvested most chinook salmon in late June and early July, although

small numbers were taken later during the chum and pink salmon fishery. Most of the chum salmon harvest occurred in July while the majority of the pink salmon harvest took place in August. Coho salmon harvests were strong from mid-August to mid-September. In addition, 88 (SE = 31) small chinook less than 28 inches (71 cm) and 765 (SE = 130) small coho salmon less than 16 inches (41 cm) in length were harvested. A small portion of effort and chinook salmon harvest occurred two days prior to the start of the survey (19-20 June); hatchery personnel interviewed 20 anglers exiting the site with fish. During this pre-survey period, technicians observed 15 large and 1 small chinook salmon harvested; adding this harvest to the creel survey estimate gives a minimum harvest estimate of 710 large and 89 small chinook salmon.

Appendix A2 contains a listing of the final data sets used for the analysis.

DISCUSSION

Although effort (angler-hours) at the site was slightly lower in 1996 than in 1995 (Beers 1996), a regular influx of salmon from late June to mid-September allowed for continued fishing opportunity throughout the survey period. Harvests of chinook and chum salmon were the highest on record, whereas pink salmon harvests were below average and large coho salmon harvests about average (Table 3).

Early arrival of chinook salmon at the site necessitated implementation of the contingency sampling schedule on 21 June and as noted, a few chinook were harvested prior to the survey. Also, because a few anglers fished outside the sampled fishing day during the creel survey season, estimates of total harvest may contain a small negative bias.

While the sampling design was similar to the one used in 1995 (Beers 1996), minor changes were made to insure valid sampling techniques were used in conducting the 1996 survey. Samplers were instructed to make an effort to interview

Table 2.—Summary of estimated angler weekly effort and harvest of large chinook, small chinook, large coho, small coho, chum, and pink salmon at the Gastineau Hatchery roadside fishery in 1996.

Weekly period	Angler-hours	Var ^a	Large coho harvest	Var ^a	Small coho harvest	Var ^a	Large chinook harvest	Var ^a	Small chinook harvest	Var ^a	Chum harvest	Var ^a	Pink harvest	Var ^a
6/21-6/23 ^b	972	8,936	0	0	0	0	79	288	0	0	7	24	0	0
6/24-6/30	1,457	48,970	0	0	0	0	121	771	20	56	26	97	0	0
7/01-7/07	2,139	64,008	0	0	0	0	211	2,561	33	592	213	1,910	0	0
7/08-7/14	1,559	13,226	0	0	0	0	90	572	15	77	229	9,042	0	0
7/15-7/21	1,514	29,637	0	0	0	0	70	425	14	212	301	8,307	58	1,243
7/22-7/28	1,400	14,980	0	0	0	0	8	37	0	0	536	13,981	22	66
7/29-8/04	1,008	10,497	3	11	0	0	11	46	0	0	592	20,792	64	577
8/05-8/11	963	16,000	14	92	3	6	40	171	4	14	148	2,452	250	2,352
8/12-8/18	1,480	25,956	39	349	0	0	44	315	0	0	29	279	464	12,225
8/19-8/25	1,297	12,682	352	8,039	26	228	21	85	2	5	86	1,386	153	1,666
8/26-9/01	1,411	22,429	722	14,496	7	55	0	0	0	0	83	3,895	21	178
9/02-9/08	1,699	17,935	363	8,555	327	6,851	0	0	0	0	24	122	7	24
9/09-9/15	1,439	15,797	956	36,456	197	4,490	0	0	0	0	0	0	0	0
9/16-9/22	520	6,017	210	5,883	158	3,656	0	0	0	0	0	0	0	0
9/23-9/29	331	3,008	201	7,522	47	1,621	0	0	0	0	0	0	0	0
TOTALS	19,189	310,078	2,860	81,403	765	16,907	695 ^c	5,271	88 ^d	956	2,274	62,287	1,039	18,331

^a Variance of effort or harvest estimate.

^b Estimate of effort and harvest are for Friday, September 21 through Sunday, September 23 only

^c An additional 15 large chinook salmon were counted before the survey period.

^d An additional 1 small chinook salmon was counted before the survey period.

Table 3.—Summary of estimated angler effort and harvest of coho, chinook, chum, and pink salmon from on-site creel surveys at the Gastineau Hatchery roadside fishery in 1990 and 1993–1996.

Year (survey period)	Angler-hours	Var ^a	Large coho harvest	Var ^a	Large chinook harvest	Var ^a	Chum harvest	Var ^a	Pink harvest	Var ^a
1990 (5 May–11 Nov) ^b	5,207	227,455	69	1,224	0	-	118	2,046	4,225	924,329
1993 (5 Jul–17 Oct) ^c	15,825	340,478	7,057 ^d	270,285	118 ^d	1,178	1,515	96,332	713	9,063
1994 (4 Jul–9 Oct)	24,192	818,615	3,509	100,214	70	291	593	4,346	9,197	313,692
1995 (3 Jul–25 Sept) ^e	21,546	308,509	2,212	91,694	157	1,270	2,047	64,653	3,421	62,663
1996 (21 Jun–23 Sept)	19,189	310,078	2,860	81,403	695	5,271	2,274	62,287	1,039	18,331

^a Variance of effort and harvest

^b Suchanek, P.M. and A. E. Bingham. 1991. Harvest estimates for selected roadside fisheries near Juneau, Alaska during 1990. Alaska Department of Fish and game, Fishery Data Series No. 91-29, Anchorage

^c Beers, D. E., and R. P. Marshall. 1994. Harvest estimates for Picnic Cove and Gastineau Hatchery roadside sport fisheries in Juneau, Alaska during 1993. Alaska Department of Fish and Game, Fishery Data Series No. 94-31.

^d Includes both large and small fish

^e Beers D. E.. 1995. Harvest estimates for the Gastineau Hatchery roadside sport fishery in Juneau, Alaska during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-25.

all anglers leaving the site, so that sampling effort in each area (snagging or non-snagging zone) was proportional to the numbers of anglers exiting those areas at different times of the day, as evidenced by the angler counts and the number of anglers interviewed at each area. Relative precision of effort and harvest of chinook, coho, and chum salmon were within or near those specified values stated in the objectives. Relative precision of the pink salmon estimate was worse than expected due to poor returns of hatchery stocks which resulted in a small harvest.

Harvest estimates for coho, chum, and pink salmon for the on-site creel survey were compared to Statewide Harvest Survey (SWHS) estimates at the site for 1994 and 1995, when Gastineau Hatchery (DIPAC) was specifically listed as a site on the questionnaire (Table 4). Chinook salmon estimates were not compared because the on-site surveys for those years did not begin until the first week of July, and an unknown portion of chinook harvests were taken prior to the start of the survey. Harvest estimates were considered to be the same if confidence intervals overlap. While coho salmon estimates were well within each confidence interval both years, pink salmon estimates were appreciably

outside both estimate confidence intervals and chum salmon estimates were outside the confidence interval range in 1995 (Table 4). On-site creel survey harvest estimates for pink salmon in fisheries with high harvest rates are sometimes much higher than SWHS harvest estimates. The Ketchikan marine boat on-site creel surveys in 1993 and 1994 reported harvests of 34,352 (95% CI 23,782 -44,922) and 33,366 (95% CI = 25,142-41,590), while SWHS reported 44,922) and 33,366 (95% CI = 25,142-41,590), while SWHS reported harvests of 14,659 (95% CI = 11,614-17,839) and 12,818 (95% CI = 10,125-15,761) (Mills 1994; Howe et al. 1995).

It may be that anglers harvesting large numbers of pink salmon have poor recall when completing the postal survey and underestimate the total number of fish harvested. For some anglers, the harvest of pink salmon may be a less salient event compared to harvesting a coho salmon due to size or edibility; also, pink salmon are harvested earlier in the season than coho salmon and more time elapses between harvest and completion of the questionnaire. Another possibility is that when large numbers of

Table 4.—Comparison of Alaska statewide postal survey and on-site creel survey harvest estimates for the Gastineau Hatchery roadside sport fishery during 1994-1995.

Year	Survey type	Coho	95% CI	Pink	95% CI	Chum	95% CI
1994	On-site ^a	3,520	2,899 - 4,141	9,197	8,099 - 10,295	593	464 - 722
1994	Statewide ^b	2,935	1,665 - 4,414	3,227	1,875 - 4,745	413	117 - 812
1995	On-site ^c	2,634	2,007 - 3,261	3,421	2,931 - 3,911	2,047	1,549 - 2,545
1995	Statewide ^d	1,721	718 - 3,259	1,115	636 - 1,708	790	477-1,159

^a On-site survey estimates from: Beers, D. E. 1995. Harvest estimate for the Gastineau Hatchery roadside sport fishery in Juneau, Alaska during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-25.

^b Postal survey estimates from: Howe, A. L., G. Fidler, and M. J. Mills. 1995. Harvest, catch, and participation in Alaska sport fisheries during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-24, Anchorage.

^c On-site survey estimates from: Beers, D. E. 1996. Harvest estimate for the Gastineau Hatchery roadside sport fishery in Juneau, Alaska during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-27.

^d Postal survey estimates from: Howe, A. L., G. Fidler, and M. J. Mills. 1996. Harvest, catch, and participation in Alaska sport fisheries during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-32, Anchorage.

pink salmon congregate near terminal sites they are relatively easy to catch and therefore harvested at greater rates by young anglers who are not required to purchase fishing licenses and therefore not included in the postal survey. On-site surveys may overestimate harvests if the survey is poorly designed or samplers are not recording data properly.

CONCLUSIONS AND RECOMMENDATIONS

As the highest-use roadside sport fishery in the Juneau area, Gastineau Hatchery plays an important role in providing fishing opportunities for urban anglers and tourists who may not have the time or economic resources to participate in remote roadside or marine boat fisheries. Also, pressure on local wild stocks of salmon on the Juneau road system is likely lessened due to opportunities provided at the hatchery. Documentation of harvests at the site through creel surveys can be used to supplement harvest and catch information for the Juneau area provided by the Statewide Harvest Survey.

Results of the 1996 creel survey show that

roadside anglers benefited greatly from enhancement efforts at Gastineau Hatchery. Marine boat anglers in the Juneau area harvested an additional 976 (SE = 240) chinook salmon and 2,141 (SE = 363) coho salmon destined for Gastineau Hatchery (Hubartt et al. *In prep*). The success and continuation of the Gastineau Hatchery coho, pink, and chum salmon fisheries is directly tied to the ability of the hatchery to meet production goals. Chinook salmon enhancement at the facility is accomplished through a cooperative agreement with ADF&G; continued monitoring of harvests at the site will help evaluate the success of the program.

In recent years harvest and catch information for chinook salmon from this fishery has had little impact on U.S./Canada treaty obligations or inseason management decisions, but if tighter restrictions for chinook salmon are enacted in the future, management of terminal hatchery sites could become a more important tool in the regional management plan. In recent years increased chinook returns at the site have generated higher effort levels early in the

survey; chinook salmon estimates would be more comprehensive if the survey was scheduled to begin the third week in June.

If Gastineau Hatchery plans to continue the survey, continued effort is needed to implement the survey as designed in the operational plan. Additions to the Gastineau hatchery creel staff in 1996 greatly improved the quality of data recording over previous years; continued effort to employ technicians with fisheries experience and education are essential for success of the survey.

ACKNOWLEDGMENTS

I wish to thank the Gastineau Hatchery creel survey staff of Alison Costello, Heather Janes, Ron Whitcraft, and Bryce Mander for their valuable data collection efforts; Rene Howell for training, data collection and reduction; hatchery manager Rick Focht supervised the Gastineau Hatchery data collection effort. I also thank Bob Marshall for help with experimental design and editorial comment. Paul Suchanek provided additional editorial comment.

LITERATURE CITED

- Beers, D. E. 1996. Harvest estimates for the Gastineau Hatchery roadside sport fishery in Juneau, Alaska during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-27.
- Efron, B. 1982. The jackknife, the bootstrap and other resampling plans. Society for Industrial and Applied Mathematics, CBMS-NSF Monograph 38, Philadelphia, Pennsylvania.

- Goodman, L. A. 1960. On the exact variance of products. *Journal of the American Statistical Association* 55:708-713.
- Howe, A. L., G. Fidler, and M. J. Mills. 1995. Harvest, catch, and participation in Alaska sport fisheries during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-24, Anchorage.
- Howe, A. L., G. Fidler, and M. J. Mills. 1996. Harvest, catch, and participation in Alaska sport fisheries during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-32, Anchorage.
- Hubartt, D. J., A. E. Bingham, and P.M. Suchanek. *In Press*. Harvest estimates for selected marine sport fisheries in Southeast Alaska during 1996. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.
- Jones & Stokes Associates, Inc. 1991. Southeast Alaska sport fishing economic study. Final Research Report. December 1991. (JSA 88-028.) Sacramento, California. Prepared for Alaska Department of Fish and Game, Sport Fish Division, Research and Technical Services Section, Anchorage.
- McDowell Group, Inc. 1994. Alaska visitor patterns, opinions and planning. Alaska Visitor Statistics Program. Summer 1993. Prepared for Department of Commerce & Economic Development, Alaska Division of Tourism, Juneau.
- Mills, M. J. 1994. Harvest, catch, and participation in Alaska sport fisheries during 1993. Alaska Department of Fish and Game, Fishery Data Series No. 94-28, Anchorage.
- Wolter, K. M. 1985. Introduction to variance estimation. Springer-Verlag, New York.

APPENDIX A

Appendix A1.--Summary of sampling results by date at Gastineau Hatchery in 1996.

Week	Stratum ^a	Date	Site	ANGLER COUNTS			INTERVIEW SAMPLING INFORMATION							
				No.	Mean	SD	No.	Effort	Large chinook harvest	Small chinook harvest	Large coho harvest	Small coho harvest	Pink harvest	Chum harvest
6/21-6/23	WD	21JUN	NONSNAG	6	7.33	4.08	35	62.25	1	0	0	0	0	0
6/21-6/23	WD	21JUN	SNAGGING	6	9.67	5.54	33	64.00	8	0	0	0	0	0
6/21-6/23	WE/H	22JUN	NONSNAG	6	11.67	7.63	43	95.00	6	0	0	0	0	0
6/21-6/23	WE/H	22JUN	SNAGGING	6	7.17	4.92	19	36.75	8	0	0	0	0	2
6/21-6/23	WE/H	23JUN	NONSNAG	6	11.67	7.71	50	106.25	1	0	0	0	0	0
6/21-6/23	WE/H	23JUN	SNAGGING	6	8.33	5.13	21	40.50	4	0	0	0	0	0
6/24-6/30	WD	25JUN	NONSNAG	6	13.33	8.09	52	107.25	5	1	0	0	0	0
6/24-6/30	WD	25JUN	SNAGGING	6	7.83	4.31	33	44.45	6	0	0	0	0	1
6/24-6/30	WD	26JUN	NONSNAG	6	4.33	1.97	34	68.00	4	1	0	0	0	1
6/24-6/30	WD	26JUN	SNAGGING	6	5.67	2.94	8	9.75	1	0	0	0	0	0
6/24-6/30	WD	28JUN	NONSNAG	6	5.50	5.47	21	53.50	3	0	0	0	0	0
6/24-6/30	WD	28JUN	SNAGGING	6	1.67	1.63	15	20.25	2	1	0	0	0	1
6/24-6/30	WE/H	29JUN	NONSNAG	6	8.67	6.44	26	41.80	2	1	0	0	0	1
6/24-6/30	WE/H	29JUN	SNAGGING	6	5.00	4.20	20	34.10	6	3	0	0	0	5
6/24-6/30	WE/H	30JUN	NONSNAG	6	4.00	3.74	20	21.30	2	0	0	0	0	0
6/24-6/30	WE/H	30JUN	SNAGGING	6	2.17	2.79	9	8.50	1	0	0	0	0	0
7/01-7/07	WD	01JUL	NONSNAG	5	7.60	5.90	18	18.55	2	0	0	0	0	0
7/01-7/07	WD	01JUL	SNAGGING	5	4.00	4.06	14	15.05	1	0	0	0	0	6
7/01-7/07	WD	02JUL	NONSNAG	6	13.00	13.22	35	70.60	7	0	0	0	0	1
7/01-7/07	WD	02JUL	SNAGGING	6	9.17	7.63	14	28.30	5	2	0	0	0	6
7/01-7/07	WE/H	04JUL	NONSNAG	6	6.67	6.22	39	77.25	9	1	0	0	0	0
7/01-7/07	WE/H	04JUL	SNAGGING	6	4.33	4.23	21	42.50	6	2	0	0	0	14
7/01-7/07	WE/H	06JUL	NONSNAG	6	12.83	7.36	32	69.25	1	1	0	0	0	3
7/01-7/07	WE/H	06JUL	SNAGGING	6	8.50	9.31	28	55.25	5	0	0	0	0	2
7/01-7/07	WE/H	07JUL	NONSNAG	5	14.60	8.82	27	47.00	0	0	0	0	0	1
7/01-7/07	WE/H	07JUL	SNAGGING	5	9.20	6.53	23	44.00	7	0	0	0	0	9
7/08-7/14	WD	08JUL	NONSNAG	6	6.50	4.42	32	70.00	0	0	0	0	0	1
7/08-7/14	WD	08JUL	SNAGGING	6	5.33	3.08	14	32.80	6	1	0	0	0	0
7/08-7/14	WD	10JUL	NONSNAG	6	4.67	2.58	19	26.75	3	0	0	0	0	0
7/08-7/14	WD	10JUL	SNAGGING	6	5.50	3.89	21	30.75	1	2	0	0	0	5
7/08-7/14	WD	11JUL	NONSNAG	5	7.60	6.11	23	54.75	1	0	0	0	0	3
7/08-7/14	WD	11JUL	SNAGGING	5	4.80	4.49	21	23.80	3	0	0	0	0	24
7/08-7/14	WE/H	13JUL	NONSNAG	6	7.33	3.44	23	49.50	1	0	0	0	0	4
7/08-7/14	WE/H	13JUL	SNAGGING	6	6.67	3.44	19	40.00	4	0	0	0	0	8
7/08-7/14	WE/H	14JUL	NONSNAG	6	11.67	9.58	28	48.00	0	0	0	0	0	2
7/08-7/14	WE/H	14JUL	SNAGGING	6	8.17	8.93	23	33.25	2	0	0	0	0	3
7/15-7/21	WD	16JUL	NONSNAG	6	10.33	10.29	31	75.50	1	0	0	0	0	2
7/15-7/21	WD	16JUL	SNAGGING	6	6.67	7.31	22	24.25	3	0	0	0	0	16
7/15-7/21	WD	18JUL	NONSNAG	6	8.00	10.18	28	44.25	1	0	0	0	0	3
7/15-7/21	WD	18JUL	SNAGGING	6	5.17	6.31	9	10.00	1	0	0	0	0	1
7/15-7/21	WD	19JUL	NONSNAG	6	5.50	5.09	29	32.75	0	0	0	0	10	4
7/15-7/21	WD	19JUL	SNAGGING	6	4.50	3.83	18	19.25	1	0	0	0	0	5
7/15-7/21	WE/H	20JUL	NONSNAG	6	6.50	3.39	17	28.35	3	0	0	0	0	7
7/15-7/21	WE/H	20JUL	SNAGGING	6	5.50	6.22	20	20.50	1	0	0	0	0	3
7/15-7/21	WE/H	21JUL	NONSNAG	6	6.67	4.46	37	53.75	1	0	0	0	1	19
7/15-7/21	WE/H	21JUL	SNAGGING	6	4.50	4.97	13	14.75	0	0	0	0	0	4
7/22-7/28	WD	22JUL	NONSNAG	6	6.83	5.71	30	47.50	0	0	0	0	1	5
7/22-7/28	WD	22JUL	SNAGGING	6	5.17	5.12	23	36.80	0	0	0	0	1	29
7/22-7/28	WD	23JUL	NONSNAG	6	9.83	7.22	40	64.60	0	0	0	0	0	8
7/22-7/28	WD	23JUL	SNAGGING	6	8.17	4.83	24	43.75	0	0	0	0	1	40
7/22-7/28	WD	26JUL	NONSNAG	6	7.33	5.75	27	56.50	1	0	0	0	0	1
7/22-7/28	WD	26JUL	SNAGGING	6	5.17	3.82	17	28.75	1	0	0	0	1	17
7/22-7/28	WE/H	27JUL	NONSNAG	6	2.67	2.88	25	46.25	0	0	0	0	0	10
7/22-7/28	WE/H	27JUL	SNAGGING	6	2.50	3.33	11	10.50	0	0	0	0	0	7
7/22-7/28	WE/H	28JUL	NONSNAG	6	4.33	4.27	27	39.00	0	0	0	0	0	8
7/22-7/28	WE/H	28JUL	SNAGGING	6	4.50	5.54	23	38.30	0	0	0	0	2	22
7/29-8/04	WD	29JUL	NONSNAG	5	4.00	3.54	39	52.50	0	0	0	0	3	4
7/29-8/04	WD	29JUL	SNAGGING	5	2.40	2.07	15	20.00	0	0	0	0	0	39
7/29-8/04	WD	01AUG	NONSNAG	6	4.83	5.64	15	36.75	0	0	0	0	3	3
7/29-8/04	WD	01AUG	SNAGGING	6	5.00	4.73	2	4.00	0	0	0	0	0	2
7/29-8/04	WD	02AUG	NONSNAG	5	2.20	2.39	12	27.80	0	0	0	0	1	11
7/29-8/04	WD	02AUG	SNAGGING	5	3.20	2.59	7	9.50	0	0	0	0	2	16
7/29-8/04	WE/H	03AUG	NONSNAG	6	3.67	5.09	8	15.25	0	0	0	0	2	0
7/29-8/04	WE/H	03AUG	SNAGGING	6	4.50	4.64	11	12.50	1	0	0	0	0	30
7/29-8/04	WE/H	04AUG	NONSNAG	6	11.00	7.04	30	53.25	1	0	1	0	5	5
7/29-8/04	WE/H	04AUG	SNAGGING	6	7.00	3.95	17	23.00	0	0	0	0	1	3
8/05-8/11	WD	07AUG	NONSNAG	6	8.33	5.09	33	48.00	1	0	1	0	7	6
8/05-8/11	WD	07AUG	SNAGGING	6	2.50	4.46	16	15.50	2	0	0	0	1	9
8/05-8/11	WD	08AUG	NONSNAG	6	3.00	2.37	20	24.25	1	0	0	0	6	2
8/05-8/11	WD	08AUG	SNAGGING	6	2.33	2.25	5	7.50	0	0	0	0	2	0
8/05-8/11	WD	09AUG	NONSNAG	6	3.00	3.69	7	8.75	0	0	1	0	3	1
8/05-8/11	WD	09AUG	SNAGGING	6	2.50	2.35	13	16.00	2	0	0	0	2	5
8/05-8/11	WE/H	10AUG	NONSNAG	6	10.00	8.34	27	66.25	1	0	0	1	12	2
8/05-8/11	WE/H	10AUG	SNAGGING	6	6.00	5.22	28	50.85	7	2	0	0	11	9
8/05-8/11	WE/H	11AUG	NONSNAG	6	3.83	4.75	12	15.75	0	0	0	0	13	0
8/05-8/11	WE/H	11AUG	SNAGGING	6	5.00	4.94	12	13.75	0	0	0	0	8	5

-continued-

ANGLER COUNTS							INTERVIEW SAMPLING INFORMATION							
Week	Stratum ^a	Date	Site	No.	Mean	SD	No.	Effort	Large chinook harvest	Small chinook harvest	Large coho harvest	Small coho harvest	Pink harvest	Chum harvest
8/12-8/18	WD	12AUG	NONSNAG	6	4.00	4.94	14	14.25	0	0	0	0	3	1
8/12-8/18	WD	12AUG	SNAGGING	6	5.67	5.13	4	6.00	0	0	0	0	4	0
8/12-8/18	WD	13AUG	NONSNAG	6	9.83	9.41	33	67.00	2	0	2	0	15	2
8/12-8/18	WD	13AUG	SNAGGING	6	8.17	5.71	17	29.50	1	0	1	0	15	2
8/12-8/18	WD	16AUG	NONSNAG	6	8.00	8.51	14	18.25	1	0	0	0	4	0
8/12-8/18	WD	16AUG	SNAGGING	6	4.00	5.02	12	10.75	0	0	0	0	5	0
8/12-8/18	WE/H	17AUG	NONSNAG	6	7.17	6.08	17	22.25	2	0	0	0	11	0
8/12-8/18	WE/H	17AUG	SNAGGING	6	4.83	4.	6	9.75	0	0	2	0	1	0
8/12-8/18	WE/H	18AUG	NONSNAG	6	11.50	9.48	27	52.25	2	0	0	0	3	0
8/12-8/18	WE/H	18AUG	SNAGGING	6	6.33	5.75	12	19.50	0	0	1	0	3	0
8/19-8/25	WD	19AUG	NONSNAG	6	5.00	4.65	17	22.75	0	0	1	0	4	1
8/19-8/25	WD	19AUG	SNAGGING	6	6.00	8.17	6	11.25	0	0	4	1	0	0
8/19-8/25	WD	21AUG	NONSNAG	6	4.83	3.66	13	23.75	1	0	5	0	3	1
8/19-8/25	WD	21AUG	SNAGGING	6	8.17	6.79	17	35.65	0	0	25	1	7	8
8/19-8/25	WD	22AUG	NONSNAG	5	3.20	2.95	16	27.75	0	0	0	0	7	0
8/19-8/25	WD	22AUG	SNAGGING	5	5.60	4.39	15	29.00	1	0	9	0	5	4
8/19-8/25	WE/H	24AUG	NONSNAG	6	10.00	6.39	29	69.25	0	1	8	2	6	5
8/19-8/25	WE/H	24AUG	SNAGGING	6	9.83	5.38	26	41.80	0	0	4	0	1	0
8/19-8/25	WE/H	25AUG	NONSNAG	5	5.80	2.86	18	20.10	1	0	7	0	0	0
8/19-8/25	WE/H	25AUG	SNAGGING	5	5.60	2.79	21	32.00	2	0	8	0	4	0
8/26-9/01	WD	26AUG	NONSNAG	6	7.83	5.98	27	64.50	0	0	19	0	2	0
8/26-9/01	WD	26AUG	SNAGGING	6	10.33	5.43	12	11.75	0	0	7	0	0	4
8/26-9/01	WD	27AUG	NONSNAG	5	6.40	5.68	18	34.75	0	0	22	0	0	0
8/26-9/01	WD	27AUG	SNAGGING	5	3.80	2.95	8	8.00	0	0	9	0	1	0
8/26-9/01	WD	28AUG	NONSNAG	6	7.83	5.42	22	44.25	0	0	23	0	0	0
8/26-9/01	WD	28AUG	SNAGGING	6	3.50	5.50	12	23.25	0	0	11	2	0	0
8/26-9/01	WE/H	31AUG	NONSNAG	6	9.33	3.78	33	66.75	0	0	26	0	0	0
8/26-9/01	WE/H	31AUG	SNAGGING	6	7.33	5.61	21	36.00	0	0	16	0	0	1
8/26-9/01	WE/H	01SEP	NONSNAG	6	9.33	4.55	24	34.25	0	0	14	0	0	0
8/26-9/01	WE/H	01SEP	SNAGGING	6	3.17	3.13	13	13.25	0	0	2	0	1	0
9/02-9/08	WD	03SEP	NONSNAG	6	6.67	2.58	39	53.60	0	0	3	10	0	3
9/02-9/08	WD	03SEP	SNAGGING	6	4.17	3.76	13	10.55	0	0	0	0	0	0
9/02-9/08	WD	04SEP	NONSNAG	6	8.50	2.88	28	67.50	0	0	18	23	0	2
9/02-9/08	WD	04SEP	SNAGGING	6	6.00	3.03	14	31.00	0	0	16	5	0	1
9/02-9/08	WE/H	02SEP	NONSNAG	6	18.83	8.33	51	82.75	0	0	12	0	1	0
9/02-9/08	WE/H	02SEP	SNAGGING	6	12.17	9.37	28	47.00	0	0	14	0	0	0
9/02-9/08	WE/H	07SEP	NONSNAG	6	11.17	3.76	47	94.00	0	0	14	56	0	0
9/02-9/08	WE/H	07SEP	SNAGGING	6	6.00	2.90	15	27.00	0	0	7	0	0	0
9/02-9/08	WE/H	08SEP	NONSNAG	6	16.17	13.35	34	64.50	0	0	9	23	1	0
9/02-9/08	WE/H	08SEP	SNAGGING	6	3.00	2.10	20	14.60	0	0	7	0	0	0
9/09-9/15	WD	10SEP	NONSNAG	5	5.60	3.44	24	39.00	0	0	12	20	0	0
9/09-9/15	WD	10SEP	SNAGGING	5	4.40	3.78	19	24.55	0	0	43	0	0	0
9/09-9/15	WD	11SEP	NONSNAG	6	5.67	2.58	15	38.00	0	0	22	9	0	0
9/09-9/15	WD	11SEP	SNAGGING	6	9.67	5.	14	28.00	0	0	49	3	0	0
9/09-9/15	WD	13SEP	NONSNAG	5	7.40	2.70	20	47.10	0	0	8	4	0	0
9/09-9/15	WD	13SEP	SNAGGING	5	9.60	7.99	23	62.85	0	0	39	0	0	0
9/09-9/15	WE/H	14SEP	NONSNAG	6	7.00	5.44	22	28.00	0	0	5	0	0	0
9/09-9/15	WE/H	14SEP	SNAGGING	6	11.33	4.46	20	49.25	0	0	19	0	0	0
9/09-9/15	WE/H	15SEP	NONSNAG	6	8.33	3.93	37	60.00	0	0	7	34	0	0
9/09-9/15	WE/H	15SEP	SNAGGING	6	4.83	4.07	5	3.25	0	0	0	0	0	0
9/16-9/22	WD	17SEP	NONSNAG	6	2.00	1.10	11	17.75	0	0	2	8	0	0
9/16-9/22	WD	17SEP	SNAGGING	6	1.67	1.37	3	5.00	0	0	0	0	0	0
9/16-9/22	WD	18SEP	NONSNAG	6	2.67	1.51	13	20.50	0	0	6	26	0	0
9/16-9/22	WD	18SEP	SNAGGING	6	5.17	5.46	7	13.00	0	0	11	0	0	0
9/16-9/22	WD	20SEP	NONSNAG	5	4.60	3.21	13	27.75	0	0	10	2	0	0
9/16-9/22	WD	20SEP	SNAGGING	5	3.20	3.11	5	6.50	0	0	4	1	0	0
9/16-9/22	WE/H	21SEP	NONSNAG	6	2.50	3.02	17	18.75	0	0	0	24	0	0
9/16-9/22	WE/H	21SEP	SNAGGING	6	3.00	3.69	5	3.50	0	0	0	0	0	0
9/16-9/22	WE/H	22SEP	NONSNAG	4	0.00	0.00	4	4.00	0	0	0	0	0	0
9/16-9/22	WE/H	22SEP	SNAGGING	4	0.00	0.00	0	0.00	0	0	0	0	0	0
9/23-9/29	WD	23SEP	NONSNAG	6	1.50	0.84	7	7.75	0	0	3	6	0	0
9/23-9/29	WD	23SEP	SNAGGING	6	0.67	0.82	6	10.75	0	0	6	0	0	0
9/23-9/29	WD	24SEP	NONSNAG	6	2.33	1.37	3	5.00	0	0	3	0	0	0
9/23-9/29	WD	24SEP	SNAGGING	6	2.17	1.94	4	6.50	0	0	9	0	0	0
9/23-9/29	WE/H	28SEP	NONSNAG	6	2.17	1.47	9	8.00	0	0	1	0	0	0
9/23-9/29	WE/H	28SEP	SNAGGING	6	1.83	2.64	10	17.50	0	0	13	0	0	0
9/23-9/29	WE/H	29SEP	NONSNAG	6	2.50	1.87	6	4.50	0	0	0	0	0	0
9/23-9/29	WE/H	29SEP	SNAGGING	6	1.50	1.05	5	4.50	0	0	1	0	0	0

^a WD = weekdays (Mondays–Fridays, except 4 July and 2 Sept.); WE/H = weekend/holidays (Saturdays, Sundays, 4 July, and 2 Sept.).

Appendix A2.–Major computer files used for data analysis of Gastineau Hatchery roadside fishery in 1996.

CREEL	TXT	Raw ASCII data file of interviews and angler counts
DIPAC96	DTA	Final edited ASCII data set
DIPAC96	SAS	SAS program to reformat ASCII file
DIPAC96	SSD	Summary subset SAS data file: count and interview data
BOWDEN6A	SAS	SAS program to estimate effort, harvests, and variances
