Fishery Management Report No. 01-11

Area Management Report for the Sport Fisheries of Southeast Alaska, 1999

by

Paul M. Suchanek,

Stephen H. Hoffman,

Robert E. Chadwick,

Dean E. Beers,

Thomas E. Brookover,

Mark W. Schwan,

Randolph P. Ericksen,

Robert E. Johnson,

Brian J. Glynn, and

Robert W. Bentz

September 2001

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

Centimeter	cm
Deciliter	dL
Gram	g
Hectare	ha
Kilogram	kg
Kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

FISHERY MANAGEMENT REPORT NO. 01-11

AREA MANAGEMENT REPORT FOR THE SPORT FISHERIES OF SOUTHEAST ALASKA, 1999

by

Paul M. Suchanek
Stephen H. Hoffman
Robert E. Chadwick
Dean E. Beers
Thomas E. Brookover
Mark W. Schwan
Randolph P. Ericksen
Robert E. Johnson
Brian J. Glynn and
Robert W. Bentz

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska 99518-1599

September 2001

The Fishery Management Reports series was established in 1989 for the publication of an overview of Division of Sport Fish management activities and goals in a specific geographic area. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm This publication has undergone regional peer review.

Paul M. Suchanek, Mark W. Schwan, Brian J. Glynn, and Robert W. Bentz
Alaska Department of Fish and Game, Division of Sport Fish
P. O. Box 240020, Douglas, AK 99824-0020, USA

Stephen H. Hoffman
Alaska Department of Fish and Game, Division of Sport Fish
2030 Sea Level Drive, Suite 205, Ketchikan, AK 99901, USA

Robert E. Chadwick
Alaska Department of Fish and Game, Division of Sport Fish
P. O. Box 682, Craig, AK 99921, USA

Dean E. Beers
Alaska Department of Fish and Game, Division of Sport Fish
P. O. Box 667, Petersburg, AK 99833-0667, USA

Thomas E. Brookover
Alaska Department of Fish and Game, Division of Sport Fish
304 Lake Street, Room 103, Sitka, AK 99835-7563, USA

Randolph P. Ericksen
Alaska Department of Fish and Game, Division of Sport Fish
P. O. Box 330, Haines, AK 99827-0330, USA

Robert E. Johnson
Alaska Department of Fish and Game, Division of Sport Fish
P. O. Box 49, Yakutat, AK 99689-0049, USA

This document should be cited as:

Suchanek, P. M., S. H. Hoffman, R. E. Chadwick, D. E. Beers, T. E. Brookover, M. W. Schwan, R. P. Ericksen, R. E. Johnson, B. J. Glynn, and R. W. Bentz. 2001. Area management report for the sport fisheries of Southeast Alaska, 1999. Alaska Department of Fish and Game, Fishery Management Report No. 01-11, Anchorage.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (continued)

Page

TABLE OF CONTENTS (continued)

Page

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

ABSTRACT

Sport fishery management actions taken in Southeast Alaska during 1999 are summarized along with a description of the region and its sport fisheries. The region is divided into seven areas for management purposes and management and research activities along with issues in each area are described.

Key words: Southeast Alaska, fisheries management, Ketchikan, Prince of Wales, Petersburg, Wrangell, Sitka, Juneau, Haines, Skagway, Glacier Bay, Yakutat, surveys, access project, emergency order, management action

INTRODUCTION

The Southeast Region of the Division of Sport Fish, Alaska Department of Fish and Game (ADF&G), encompasses all waters of Alaska from Dixon Entrance on the south to Cape Suckling on the north (Figure 1). Southeast Alaska provides a large variety of both freshwater and saltwater sport fishing opportunities for anglers. Effort and harvests for the fisheries of Southeast Alaska are estimated through mail surveys which have been conducted annually since 1977 (Mills 1979–1994, Howe et al. 1995, 1996, 2001a, 2001b, 2001c, 2001d). About 20% of all angler-days of sport fishing effort in Alaska are expended in Southeast Alaska.

Funding for Southeast Alaska sport fish management and research programs is provided almost exclusively by sport anglers. The Federal Aid in Sport Fish Restoration Act (Wallop-Breaux), whose funds are received via federal excise taxes on sport fishing equipment and fuels, provides about 52% of the total budget. Sales of Alaska sport fishing licenses and tags (Fish and Game Fund) provide 47% of the budget, and program receipts provide the remainder of the funding. An overview of FY 2000 (July 1, 1999 to June 30, 2000) spending plans by management area and fishery for the Division of Sport Fish in Southeast Alaska can be found in the FY2000 regional management report (ADF&G, *unpublished*).

The Wallop-Breaux Amendments also mandate that at least 15% of annual federal aid funding go toward recreational power boating access projects. The Sport Fish Division Access Program is a statewide effort designed to improve angler access to the state's sport fishing resources. Access projects undertaken by the Division of Sport Fish in Southeast Alaska are categorized into either large "CIP" projects for developing or improving major facilities or "Small Access Site Maintenance" projects for small repairs or improvements at existing sites. Projects are also classified as either "motorized boating" projects or "non-boating" projects. Funds spent on "non-boating" projects do not count toward the 15% mandatory spending.

The primary mission of ADF&G is to manage, protect, maintain, and improve the fish, game, and aquatic plant resources of Alaska. The department's primary goals are to ensure that Alaska's renewable fish and wildlife resources and their habitats are conserved and managed on the sustained yield principle, and that use and development of these resources are in the best interest of the economy and well-being of the people of the State. To achieve this mission for the State's sport fisheries and sport fishery resources, the Division of Sport Fish has the three following primary goals: 1) conservation of wild stocks of sport fish; 2) a diversity of recreational fishing opportunities; and 3) optimum social and economic benefits from recreational fisheries.

MANAGEMENT AREAS

Sport fish management and research programs for Southeast Alaska are conducted from ADF&G offices located in Ketchikan, Klawock, Petersburg, Sitka, Juneau, Haines, and Yakutat. For administrative purposes, these offices each correspond to surrounding management areas (Figure 1). These management areas also closely correspond to the eight survey areas for which

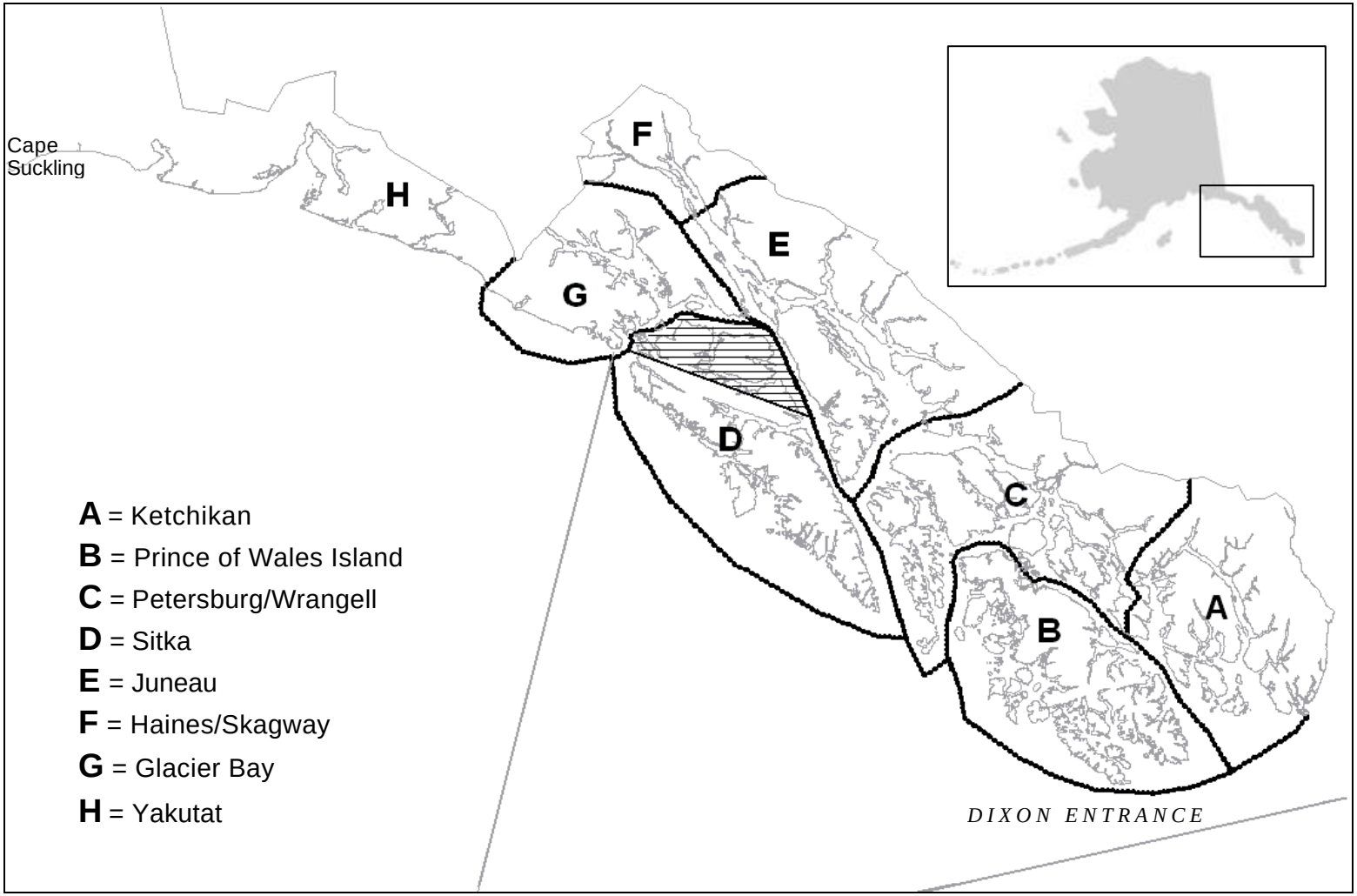

Figure 1.–Boundaries of the seven management areas and eight harvest survey reporting areas (A–H) in Southeast Alaska. The Juneau management area includes the Glacier Bay mail survey area and the hatched portion of the Sitka mail survey area.

harvests are estimated through the statewide mail survey (Howe et al. 2001d). The areas listed in the mail survey include: Ketchikan (A); Prince of Wales Island (B); Kake, Petersburg, Wrangell, and Stikine (C); Sitka (D); Juneau (E); Haines/ Skagway (F); Glacier Bay (G); and Yakutat (H) (Figure 1). The Glacier Bay area in the mail survey is managed from the Juneau office while the northern half of Chichagof Island is also managed from the Juneau office but corresponds to a portion of the Sitka area in mail surveys.

SPORT FISHERIES

Southeast Alaska provides major sport fishing opportunities for several fish species which are limited in distribution in Alaska. In 1999, for example, Southeast Alaska provided 96% of the cutthroat trout *Oncorhynchus clarki* and 68% of the steelhead *O. mykiss* sport catches in Alaska (Howe et al. 2001d). Major opportunities for salmon and bottomfish also abound, as the region produced the following percentages of total Alaska sport harvests in 1999: 39% of chinook salmon *O. tshawytscha*, 49% of coho salmon *O. kisutch*, 30% of Pacific halibut *Hippoglossus stenolepis*, 59% of rockfish *Sebastes* spp., and 73% of lingcod *Ophiodon elongatus*.

EFFORT

Most sport fishing effort in Southeast Alaska occurs in salt water; the remaining 20% occurs in fresh water (Figure 2). Marine angling effort has increased from about 200,000 angler-days in 1980 to nearly 440,000 in 1999. Similarly, freshwater effort increased from about 50,000 angler-days in 1980 to about 100,000 angler-days in 1999. Most of the recent increases in fishing effort have been due to increases in nonresident fishing effort, as Alaska resident fishing effort has been stable.

Although effort targeted on specific species has not been estimated through mail surveys, creel survey information and local knowledge by area management biologists has been used to estimate

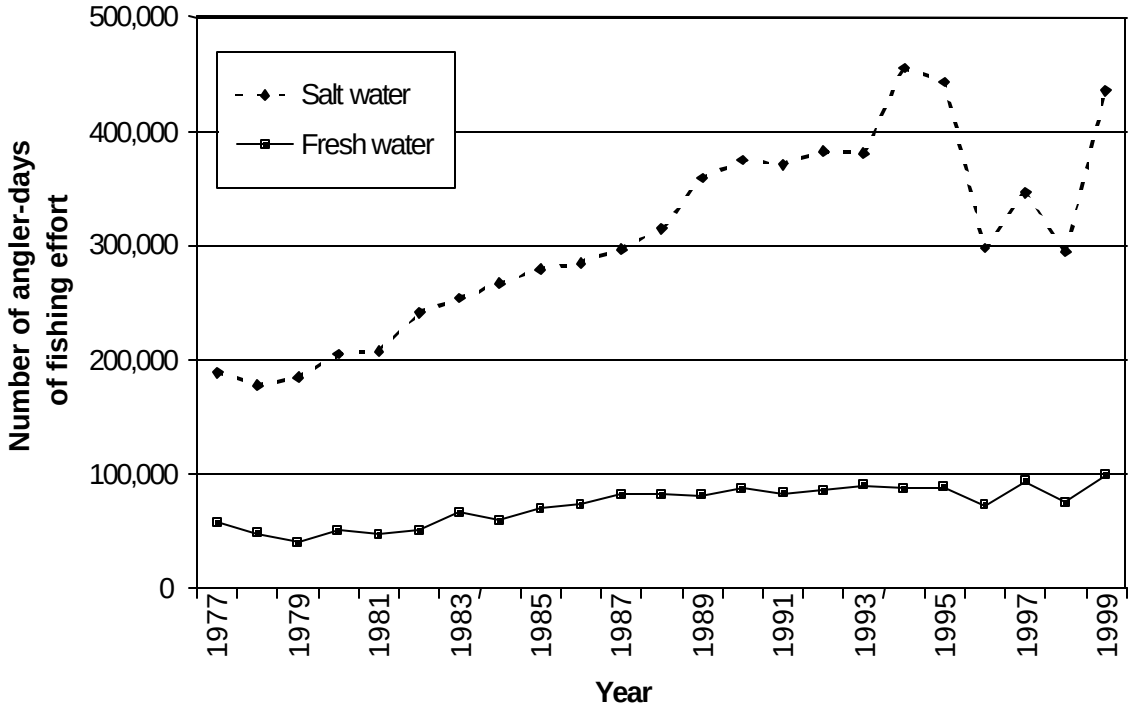

Figure 2.–Estimated angler-days of fishing effort in salt water and fresh water in Southeast Alaska, 1977–1999.

effort for the major species of sport fish in Southeast Alaska during 1998 (Table 1). Target species varied substantially depending on whether anglers were fishing from a boat or shore in marine waters or in fresh water. Over 75% of the regionwide fishing effort was targeted on chinook salmon, coho salmon, or bottomfish (primarily Pacific halibut). About 44% of freshwater fishing effort was for trout or char (primarily Dolly Varden *Salvelinus malma*), while only about 4% of marine fishing effort was for these species. About two-thirds of all fishing effort was for anadromous salmon species.

Table 1.–Percent distribution of fishing effort by targeted species in marine and fresh waters of Southeast Alaska, 1998. Overall, 80% of effort was expended in marine waters and 20% in fresh waters during 1998.

	Percentage of:		
Target species or group	Marine	Fresh	Total
Salmon:			
Chinook salmon	42	6	34
Coho salmon	22	30	24
Pink salmon	7	8	7
Chum salmon *O. keta*	1	1	1
Sockeye salmon *O. nerka*	<0.5	8	2
Salmon subtotal	71	54	68
Bottomfish:	25	0	20
Other:			
Dolly Varden	3	10	5
Steelhead	<0.5	17	4
Cutthroat trout	<0.5	13	3
Rainbow trout	0	3	1
Brook trout *Salvelinus fontinalus*	0	1	s
Landlocked salmon	0	2	<0.5
Kokanee	0	<0.5	<0.5
Arctic grayling *Thymallus arcticus*	0	<0.5	<0.5
Other subtotal	4	46	12

HARVEST OR TOTAL CATCH OF IMPORTANT SPECIES

As previously noted, the most important fisheries in the region are those for anadromous salmon. Sport harvests of coho and chinook salmon in Southeast Alaska have increased greatly in recent years (Figure 3). In 1980, sport harvests of chinook totaled about 20,000 but from 1995 to 1999 averaged over 61,000. The chinook salmon harvest would have been even greater in recent years, except that the sport fishery has been allocated a fixed percentage of the quota set under the U.S./Canada Pacific Salmon Treaty since 1992. Coho salmon harvests increased over fivefold, from about 33,000 in 1980 to an average of nearly 188,000 from 1995–1999. Pink salmon *O. gorbuscha* harvests increased from about 35,000 in 1980 to an average of 70,000 from 1995–1999.

The next most important fisheries in Southeast Alaska are those for bottomfish, including primarily Pacific halibut, rockfish, and lingcod (Figure 4). Pacific halibut harvests have increased from about 6,000 fish in 1978 to an average of 100,000 from 1995 to 1999. Rockfish harvests increased steadily from 1977 to 1988, when they peaked at 57,000, declined for several years to a low of 26,000, and then increased again to peak at 71,000 in 1999. Because lingcod distribution is limited primarily to the outer coast, harvests have been restricted mainly to the Sitka and Prince of Wales Island areas. Lingcod harvests averaged about 18,000 annually for the last five years.

The most important trout and char fisheries are those for Dolly Varden, cutthroat trout, and steelhead. Dolly Varden harvests peaked in the mid-1980s at about 60,000 and have since declined, averaging about 20,000 from 1995 to 1999 (Figure 5). Only about 1 out of 4 Dolly Varden caught are harvested. Cutthroat trout harvests declined from about 23,000 in the late 1970s to about 15,000 in 1993. In 1994, more restrictive regulations (minimum size limits and reduced bag limits) were placed on all cutthroat trout fisheries and since then the harvest has averaged about 5,000. Since these restrictive management actions were taken, only about 1 of 8 cutthroat caught have been harvested. A minimum size limit for steelhead was also enacted in 1994, and harvests since that time have averaged about 300 of a average annual catch of 14,000. Prior to 1994, steelhead harvests had averaged 3,200, with a peak of 5,400 in 1989.

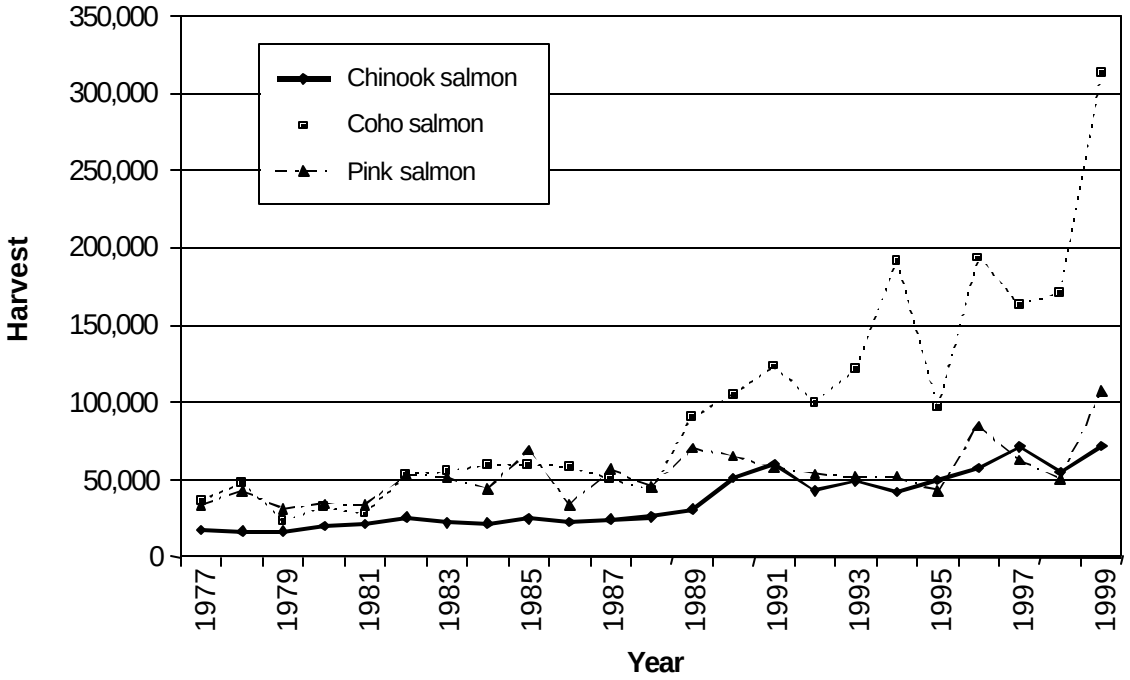

Figure 3.–Estimated sport harvests of chinook, coho, and pink salmon in Southeast Alaska, 1977–1999.

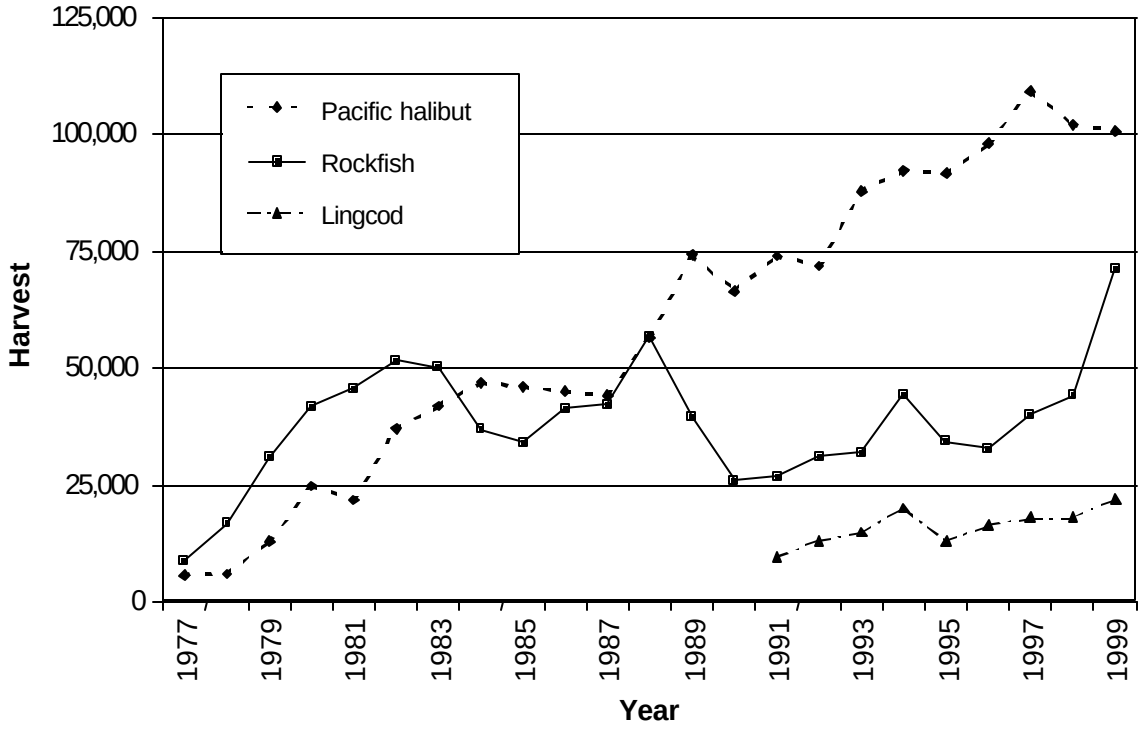

Figure 4.–Estimated sport harvests of Pacific halibut, rockfish, and lingcod in Southeast Alaska, 1977–1999.

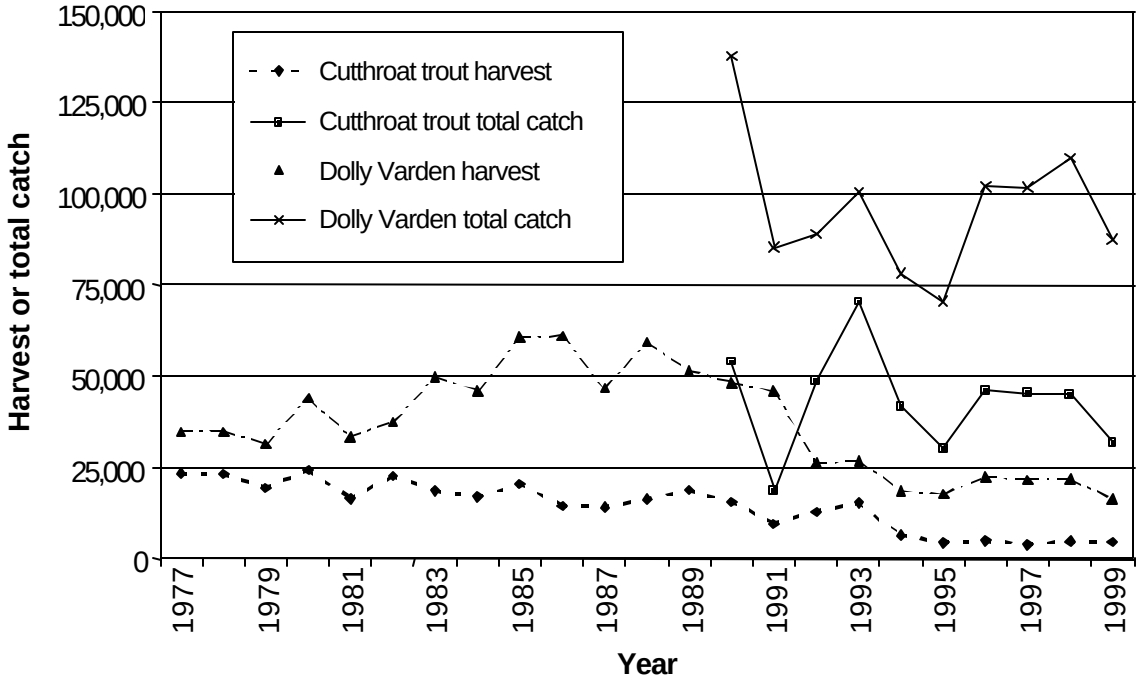

Figure 5.–Estimated sport harvests of cutthroat trout and Dolly Varden in Southeast Alaska, 1977–1999, and total catches of these species, 1990–1999.

REGIONWIDE ACTIONS AND ISSUES

ALASKA BOARD OF FISHERIES

Several Alaska Board of Fisheries meetings were scheduled for January and February 2000, so staff worked on several written and oral staff reports during preparations for these meetings.

PACIFIC SALMON TREATY

Lengthy negotiations ended in 1999 with the signing of a number of long-term (10-year) annexes to the US/Canada Pacific Salmon Treaty. With the exception of chinook salmon, annexes concerned either Alaska-Canada or Northwest States-Canada fishing arrangements. Abundance-based management is a key component of most of the fishing arrangements. The coastwide chinook annex is of primary importance to the sport fishery in Southeast Alaska, as it sets the quota from which the sport fishery has a fixed percentage allocation. The other 2 annexes of importance to Alaska, the Northern Boundary and Transboundary Rivers, directly impact commercial fisheries, primarily. Ancillary agreements also established several new committees, a management plan for conservation of coho salmon in the Alaska-Canada boundary area in years of low abundance, and a mechanism for a trust account for additional fishery studies and habitat restoration.

CHINOOK SALMON MANAGEMENT

Chinook salmon are fully allocated in Southeast Alaska among user groups. A quota, established under the US/Canada Pacific Salmon Treaty, limits the harvest of chinook salmon by all commercial and sport fisheries in Southeast Alaska. The Alaska Board of Fisheries has allocated a share of this quota to the sport fishery along with various commercial fisheries.

Inseason Management

Management of chinook salmon in Southeast Alaska is based on abundance. Each year the preliminary chinook salmon quota is determined based on the projected abundance of chinook

salmon determined by a coastwide model which calculates a preseason abundance index. For 1999 the chinook salmon preseason abundance index resulted in an all-gear quota of 177,000 fish, of which the sport fishery was initially allocated 32,200 fish (excluding most harvests of Alaska hatchery fish and harvest in the Situk River).

The Southeast Alaska Chinook Salmon Management Plan (5AAC 47.055) defined how ADF&G was to manage the sport fishery to achieve the 1999 chinook salmon allocation. According to this plan, as soon as the preseason abundance index is announced, the bag limit for the sport fishery is set at 1, 2, or 3 fish; whichever comes closest to harvesting the sport allocation. The abundance index was not obtained until late June. It was then estimated that a 1-fish bag limit, implemented on July 3, would result in a total sport harvest in 1999 of 42,800 'treaty' chinook salmon, which came closest to the sport allocation. This projected harvest (42,800) became the sport harvest target for the 1999 season.

Therefore, the chinook salmon bag and possession limit in most of the marine waters of Southeast Alaska was reduced to 1 fish 28 inches or more in length on July 3, 1999 (E.O. 1-19-99). Regulations remained unchanged in terminal harvest areas where the chinook salmon bag limit had been increased by emergency order. Harvests remained stronger than expected for the rest of the season. Preliminary treaty harvest was estimated at 47,400, which was about 11% above the inseason target of 42,800.

Terminal Harvest Area Management

Regulations provide for increased bag limits to increase harvests of Alaska hatchery chinook salmon in terminal areas. In 1999, bag limits were increased in a number of both freshwater and marine areas to harvest excess hatchery chinook salmon <28 inches in length. These areas are described for each management area later in the report. Most of these Alaska hatchery chinook salmon do not count toward the allocation.

PROHIBITION ON HEADING OR FILLETING OF SALMON

In 1998, the Alaska Board of Fisheries gave ADF&G the authority to prohibit heading or filleting of salmon when and where creel sampling programs were in place. This regulation change was intended to provide for increased recoveries of coded wire tagged chinook and coho salmon for estimation of the contributions of both wild and hatchery stocks. This was especially important regarding Alaska hatchery chinook salmon, since these fish generally do not count toward the annual quota.

In 1998, initial enactment of this regulation, in combination with some extra catch sampling, increased sampling rates for chinook salmon from 18% (in 1997) to 29% and coho sampling rates from 15% to 33%. Therefore, the heading and filleting regulation was again enacted in 1999 for marine boat anglers returning to any harbors or boat launches connected to the following ports during the following time periods:

Juneau and Yakutat:

April 24-September 26 (E.O. 1-04-99)

Ketchikan, and Sitka:

April 26-September 26 (E.O. 1-04-99)

Craig and Klawock:

April 26-September 12 (E.O. 1-04-99)

Petersburg:

May 3-July 11 (E.O. 1-20-99)

Wrangell:

April 26-July 7 (E.O. 1-20-99)

Haines:

May 10-June 27 (E.O. 1-04-99)

Anglers were allowed to gut and gill chinook and coho salmon before returning to port, and anglers could fillet and head their chinook and coho salmon on their boats once they had returned to a docking facility and tied their boat up to a float. Due in part to this regulation change, overall CWT sampling rates for 1999 remained excellent at 26% for chinook salmon and 31% for coho salmon.

SPORT GUIDING BUSINESSES

A total of 618 registered sport guiding businesses had inseason mailing addresses in Southeast Alaska in 1999. These businesses were linked with 958 guides with inseason mailing addresses in Southeast Alaska. Guides and businesses with permanent mailing addresses in Southeast Alaska

totaled 824 and 619, respectively, for 1999. More businesses (669) indicated that they intended to provide guide services in salt water in Southeast Alaska only while 34 additional businesses indicated that they would provide marine guide services in both Southeast and Southcentral Alaska. Freshwater guide services in Southeast Alaska were to be provided by up to 423 businesses.

Table 2.–Number of active chartering businesses and vessels by mail survey area of Southeast Alaska for 1999, based on reported port of landing from logbooks.

Mail survey area	No. of businesses	No. of vessels
Ketchikan	76	110
Prince of Wales I.	65	150
Petersburg/Wrangell	52	59
Sitka	165	229
Juneau	84	114
Haines/Skagway	13	18
Glacier Bay	22	26
Yakutat	8	12
Regionwide totals [a]	424	649

[a] Overall totals for businesses and vessels are lower than the sum by area, as some businesses and vessels unloaded fish and/or clients in more than one SWHS area.

CHARTER/GUIDE VESSEL LICENSING

All vessels used in charter/guided sport fishing activities were again required to be licensed with Commercial Fisheries Entry Commission (CFEC) in 1999. A total of 1,276 vessels were licensed with home ports in Southeast Alaska, an increase of 3% (36 vessels) over 1998. This total includes those used in fresh water or for transporting anglers to shore as well as those used for marine charters.

CHARTER LOGBOOK PROGRAM

The mandatory saltwater charter logbook program first implemented in 1998 was continued in 1999. Logbook information was again turned into the department on a weekly basis.

In Southeast Alaska during 1999, a total of 840 logbooks were distributed. By the end of the season, forms were received from 649 vessels from 424 businesses documenting charter fishing activities in Southeast Alaska during 1999 (Table 2). Since some businesses reported landings from more than one area, the distribution by mail survey area counts some businesses and vessels more than once. Also, some trips had no reported port of landing so the area for the vessel and business could not be classified, however, most of these businesses and vessels are already tabulated elsewhere by area.

The distribution of reported logbook effort and harvest by mail survey area indicated that the Sitka area was the most heavily used area in Southeast Alaska (Table 3). Overall, charter clients expended about 102,000 angler-days of salmon fishing effort and 58,000 angler-days of bottomfishing effort (many fished for both targets on a given day) in Southeast Alaska. This was an increase of 13% in salmon fishing effort, and a decline of 11% in bottomfishing effort from that reported in 1998. Reported harvests included about 35,000 chinook salmon, 186,000 coho salmon, 56,000 pink salmon, 69,000 Pacific halibut, 11,000 lingcod, and 29,000 rockfish. Most harvests were similar to those reported for 1998, with the exception of coho harvest, which increased 70% in 1999.

PACIFIC HALIBUT MANAGEMENT

The North Pacific Fisheries Management Council (NPFMC) adopted Guideline Harvest Levels (GHLs) for the sport charter fishery for Pacific halibut in most of Alaska in September 1997. These GHLs applied to the International Pacific Halibut Commission (IPHC) Area 2C (all of Southeast Alaska south of Cape Spencer) and Area 3A (Yakutat area and Southcentral Alaska). In December 1997, the NPFMC was notified by the National Marine Fisheries Service (NMFS) that the GHLs could not be implemented without accompanying regulations. A committee was tasked with developing a list of management measures which could be implemented by the National Marine Fisheries Service (NMFS) in order to keep the charter fleet within their respective GHLs.

Table 3.–Marine charter logbook effort and harvest by clients by mail survey area for Southeast Alaska (based on area fished), 1999.

MAIL SURVEY AREA	CLIENT ANGLER-DAYS [a]		HARVESTS OF IMPORTANT SPECIES					
	Salmon	Bottomfish	Chinook salmon	Coho salmon	Pink salmon	Pacific halibut	Lingcod	Rockfish
Ketchikan	22,634	4,649	4,116	21,339	26,595	4,950	332	2,234
Prince of Wales I.	22,068	16,683	7,633	68,469	11,483	22,557	4,800	8,999
Petersburg/ Wrangell	2,849	3,345	979	3,101	1,424	3,514	85	890
Sitka	33,540	22,735	17,462	68,078	6,755	26,056	4,701	12,321
Juneau	14,382	6,258	3,035	18,349	8,565	7,120	110	3,527
Haines/ Skagway	2,618	429	1,203	79	68	303	0	34
Glacier Bay	2,313	2,074	505	4,124	1,476	2,125	49	187
Yakutat	1,198	1,947	239	2,956	41	2,864	849	640
Total	101,602	58,120	35,172	186,495	56,407	69,489	11,026	28,832
Change from 1998	+13%	–11%	+1%	+70%	+9%	+2%	–10%	+7%

[a] Client angler-days for salmon and bottomfish should not be summed because many anglers fish for both types of fish on the same trip. Summing across the two types of fisheries will produce an overestimate of total client angler-days fished.

In April, 1999 the NPFMC approved 4 alternatives for analysis by NPFMC staff in managing the GHLs, and for instituting a vessel moratorium for entry into the halibut charter fishery. Department staff in Douglas, Anchorage, and Homer assisted NPFMC staff with the analysis by providing summary statistics from onsite survey programs in Southeast and Southcentral Alaska, and from data collected in the Statewide Harvest Survey (SWHS). These data were instrumental in establishing criteria (i.e. line limits, annual limits, trip limits, bag limits, etc.) for analysis of the 4 approved alternatives and provided the regulatory 'tools' necessary to restrict harvests in the charter sector. At the December meeting, NPFMC staff presented their draft analysis to Council members who then approved release of the analysis to the public. The draft analysis will be made available for public review by early 2000, and final action is expected by the NPFMC during the February, 2000 meeting.

A summary of fishery performance statistics for monitored Pacific halibut fisheries in Southeast Alaska for 1999 can be found in a report presented to the International Pacific Halibut Commission (Jaenicke and Frenette *Unpublished*).

FEDERAL SUBSISTENCE TAKEOVER

On October 1, 1999, the federal government took over subsistence management on federal lands. Federal regulations, published in the Federal Register January 8, 1999, became effective on October 1, but the new federal subsistence management program will be phased in by spring 2000, when the major subsistence fisheries begin. Although no management actions were taken in 1999, groundwork was continued on providing a program which could take a more active management role in future years. Additionally, the Division worked with Northern Southeast Aquaculture Association to submit a pre-proposal for a coho and sockeye stock monitoring project at

Salmon Lake near Sitka, which was advanced to the next stage for funding consideration. NSRAA submitted a more detailed fishery investigation plan, which was ultimately not approved for funding in federal fiscal year 2000.

ENHANCEMENT

Hatchery chinook and coho salmon are released in large numbers in Southeast Alaska and provide substantial fishing opportunities for sport anglers. In 1999, about 6.6 million chinook salmon smolts were released by hatcheries throughout Southeast Alaska. Of these, about 2.05 million chinook smolts were paid for by sport anglers. Chinook releases paid for by sport anglers included about 800,000 smolts in the Ketchikan area, 670,000 in the Petersburg area, and 580,000 in the Juneau area. About 100,000 coho smolts released in the Petersburg area from Crystal Lake hatchery were also funded by sport anglers. Hatchery released coho smolts and fry in Southeast Alaska totaled 14.6 million during 1999.

A large number of chinook salmon taken in Southeast Alaska also originate from hatcheries in British Columbia, and others are taken from hatcheries in Washington and Oregon. Much smaller numbers of non-Alaskan hatchery coho salmon are also taken. Detailed estimates of hatchery contributions for both Alaskan and non-Alaskan stocks taken by marine boat sport fisheries of Southeast Alaska are presented in Hubartt et al. (2000).

AREA-SPECIFIC PROGRAMS, ACTIONS AND ISSUES

KETCHIKAN AREA

The Ketchikan management area includes all freshwater and saltwater systems from the middle of the Cleveland Peninsula south to the Alaska/ Canada border in Dixon Entrance (Figure 6). This area includes the communities of Ketchikan, Metlakatla, Meyers Chuck, and Hyder, and numerous islands—the largest of which are Revillagigedo, Annette, and Gravina. The major marine sport fisheries in the Ketchikan area are for chinook salmon, coho salmon, pink salmon, and bottomfish (Pacific halibut, rockfish, and lingcod). Major freshwater sport fisheries include steelhead, cutthroat trout, Dolly Varden, coho, pink, and sockeye salmon. Permanent Sport Fish management staff consists of a Fishery Biologist III, Stephen Hoffman, and an assistant Fishery Biologist II, Glenn Freeman, both stationed in Ketchikan.

Local Management and Research Programs

Marine Creel

The 1999 season marked the eighth year of expanded marine creel surveys in the Ketchikan area. Up to 4 technicians were employed between late April and the end of September to interview anglers at major harbors and boat launches for harvest information and collection of coded wire tag (CWT) data. Estimates generated from this study indicated that anglers harvested 4,814 chinook salmon, 20,719 coho salmon, 21,460 pink salmon, 350 chum salmon, 22 sockeye salmon, 5,126 Pacific halibut, 296 lingcod and 3,282 rockfish during 1999. In addition, local anglers harvested 4,959 Dungeness crab and 57,920 shrimp. Overall, 1999 was the best year for chinook salmon since 1993, a little below average for coho salmon, and record lows for Pacific halibut, rockfish, lingcod and sockeye salmon. Chum salmon harvest was also below average as was shrimp and Dungeness crab harvest.

Salmon Research

Three major salmon research programs were active in the Ketchikan area in 1999. Chinook salmon research entailed inserting coded wire tags (CWTs) into juvenile chinook salmon on the Unuk River and mark-recapture studies on the Unuk and Keta rivers. The CWT studies were undertaken to determine fisheries interceptions and exploitation, while the mark-recapture studies were conducted to estimate total escapement. Coho salmon research on the Unuk River included marking of juvenile coho salmon with CWTs to determine fisheries interceptions and mark-recapture studies of returning adults to estimate total escapement into the drainage. Wild stock coho smolts in the Naha River were also tagged to determine fisheries interceptions and exploitation.

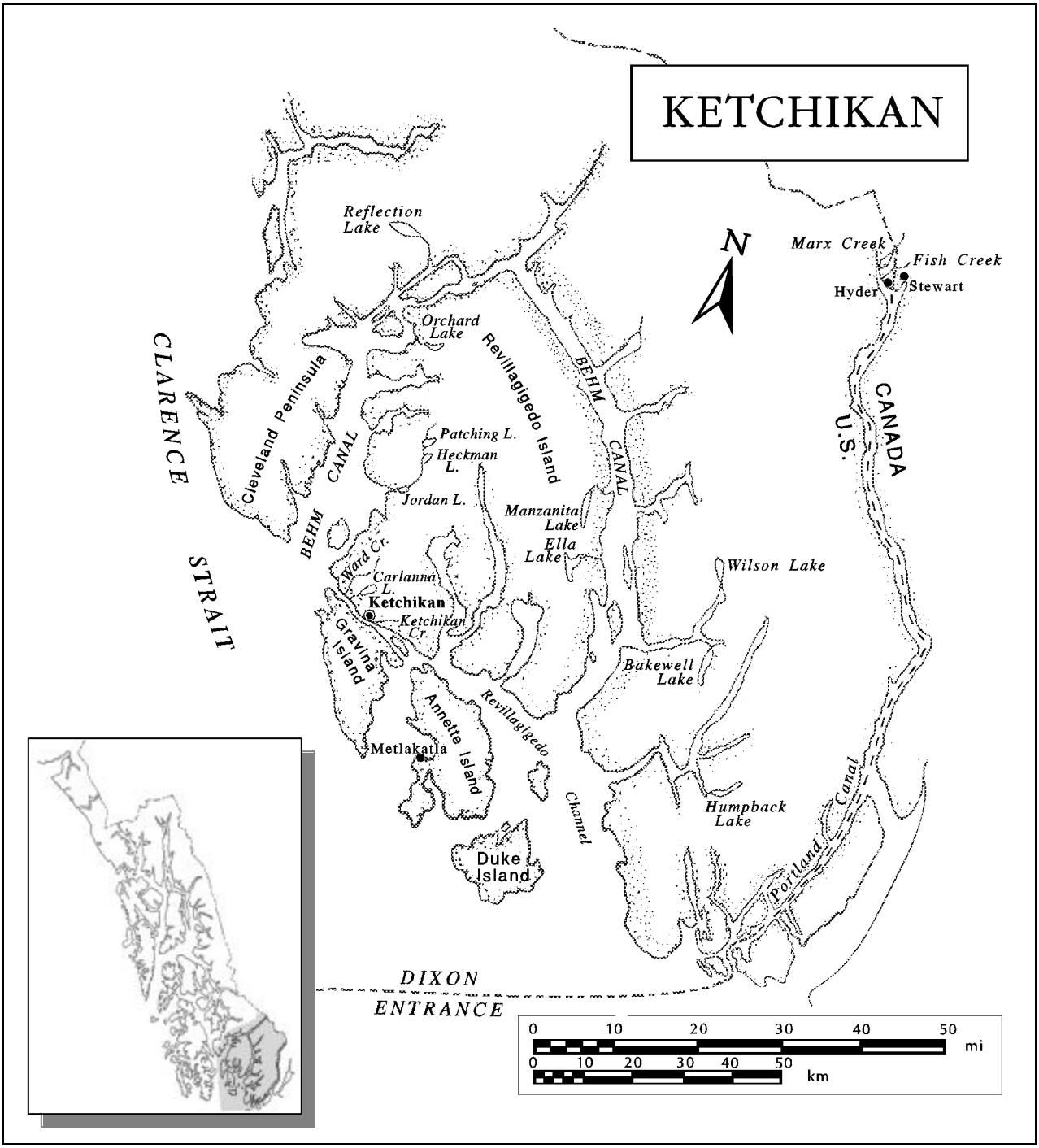

Figure 6.–Ketchikan management area.

Trout Research

No trout research occurred in this area in 1999, because of budget reductions.

Management Actions

Herring Cove Closure

The Herring Cove Special Harvest Area was closed to sport fishing from October 1 through November 30, 1999 (E.O. 1-31-99). This closure included Herring Cove Creek upstream of the bridge (which is already closed year-round), Herring Cove Creek downstream of the bridge, and that portion of Herring Cove bounded by a line from a point of land on George Inlet at the east side of Lot 39, USS 3397, bearing 18°12' to a point of land on the southern edge of Lot 91, USS 2403. This closure was implemented to protect hatchery coho salmon milling within this area which serve as the brood source for the Whitman Lake hatchery operated by Southern Southeast Regional Aquaculture Association (SSRAA) on upper Herring Cove Creek.

Ketchikan Creek Management

Ketchikan Creek was opened to sport fishing for all species from August 23 through September 14, 1999 (E.O. 1-27-99). The bag and possession limit for chinook salmon in Ketchikan Creek was two chinook salmon 28 inches or more in length and two chinook salmon <28 inches in length. The bag and possession limit for all other salmon 16 inches or more in length was two per day in the aggregate, and two in possession. This opening was implemented to target surplus hatchery fish (chinook and coho salmon) plus abundant wild stock pink salmon.

Pink Salmon

The pink salmon bag limit in fresh and marine waters located in the Ketchikan and Prince of Whales Island management areas were increased to 12 per day and 24 in possession from July 26 through October 31, 1999 (E.O. 1-23-99). This increase was implemented to allow sport anglers to take advantage of a robust peak salmon return to these two areas.

Sockeye Salmon

The sockeye salmon bag and possession limit in salt water within Yes Bay and the freshwater drainage of McDonald Lake were liberalized from July 29 through October 31, 1999 (E.O. 1-24-99). The bag limit was increased to 12 and the possession limit to 24, to allow sport anglers opportunity to harvest additional sockeye salmon as a result of a large return to this area.

Chinook Salmon

The chinook salmon bag and possession limit was increased in two terminal fishery areas (Mt. Point and Neets Bay) near Ketchikan to harvest surplus hatchery produced fish from July 1 through August 1, 1999 (E.O. 1-14-99). The bag and possession limit was increased to 4 chinook salmon 28" or more in length and 4 chinook salmon <28" in length. In addition, the department implemented a personal use gillnet fishery for residents in the Herring Cove terminal harvest area one day per week between July 6 and July 29, 1999 (E.O. 1-16-99). This fishery was opened to harvest surplus chinook salmon returning to Whitman Lake hatchery (operated by SSRAA) located on Herring Cove Creek. Drift gillnets 60 feet or less were allowed, with a bag and possession limit of 12 chinook salmon of any size.

Surveys

Salmon

Chinook salmon escapement surveys were conducted by helicopter and/or foot on several area index streams to obtain yearly trend comparisons (Table 4). Escapement surveys on Ketchikan area chinook salmon index streams showed that the Unuk River escapement was down, while the Chickamin River escapement was up from 1998. Blossom and Keta river counts both showed an increase from 1998. The Blossom River was the only system which did not reach its escapement goal range in 1999.

Helicopter/foot/weir escapement surveys were also conducted on 18 of 19 coho salmon index streams in the Ketchikan area (Table 5). Coho salmon escapements in general were slightly

Table 4.–Helicopter escapement survey peak counts of chinook salmon in Ketchikan area index systems, 1988–1999.

Year	Blossom	Keta	Unuk	Chickamin
1988	384	575	1,746	786
1989	344	1,155	1,149	934
1990	257	606	591	564
1991	239	272	655	487
1992	150	217	874	346
1993	303	362	1,068	389
1994	161	306	711	388
1995	217	175	722	356
1996	220	297	1,167	422
1997	132	246	636	272
1998	91	106	840	391
1999	212	276	680	492
Lower goal	250	250	650	450
Upper goal	500	500	1,400	900

above average in these index streams. High water hampered surveys, and in many streams only one survey was completed.

Steelhead

Research conducted on steelhead in the Ketchikan area in 1999 consisted of repetitive snorkel surveys of adult escapement in 5 of 6 index streams. These counts will be used to track escapement trends in area streams for any future in-season or Board of Fisheries actions (Table 6). Peak 1999 counts for 2 of the index streams showed an increase from 1998 and 3 declined from 1998. Since snorkel surveys count a higher percentage of the total escapement, it can be misleading to compare 1999 data to foot counts made prior to 1997. High water and heavy snow interfered with completion of surveys in 1999.

Table 5.–Peak helicopter, foot, or weir escapement survey counts of coho salmon in Ketchikan area streams, 1994–1999.

Stream name (survey type)	1994	1995	1996	1997	1998	5-yr mean (94–98)	1999	1999 % of mean
Barrier Creek (H)	175	220	230		50	169	25	15%
Blossom River (H)	775	800	829	1,143	1,004	910	598	66%
Carroll Creek (H)	475	400	240	140	24	256	425	166%
Choca Creek (H)	225	180	220	175	190	198	225	114%
Eulachon River (H)	755	435	383	420	460	491	657	134%
Fish Creek (Hyder) (F)	496	95	465	258	502	363	800	22%
Grant Creek (H)	220	94	92	30	130	113	127	112%
Herman Creek (H)	265	250	94	75	94	156	75	48%
Hugh Smith Creek (W)	1,679	1,758	964	732	1,129	1,252	1,238 [a]	99%
Humpback Creek (H)	560	82	440	32	256	247	520	190%
Humpy Creek (H)	155	185	80			140	107	76%
Indian Creek (H)	560	600	570	100	304	427	356	83%
Keta River (H)	1,100	1,155	1,506	571	1,169	1,100	1,895	172%
King Creek (H)	325	415	457	55	411	333	627	188%
Klahini River (H)	200	165	40	60	120	117	150	128%
Marten River (H)	2,205	1,385	1,924	759	1,961	1,647	1,518	92%
McDonald L (Hatchery Cr) (F)	381	561	335	552	710	508	258	51%
Reflection L (Upr Short Cr.) (H)	116	42	312		71	135		
Tombstone River (H)	850	2,446	1,806	847	666	1,323	840	63%
							Mean	112%

H = helicopter; F = foot; W = weir.

[a] Incomplete weir count because of extended high water in 1999.

Enhancement

Chinook salmon. This was the fourth year of a Cooperative Agreement (96-004) between ADF&G Division of Sport Fish and SSRAA to release chinook salmon smolts at their Neets Bay and Whitman Lake hatchery facilities. The goal of this agreement is to jointly finance the release of 650,000 chinook salmon smolts at Neets Bay (250,000 from SSRAA plus 400,000 from the Division's Crystal Lake Hatchery in Petersburg) and 760,000 at Whitman Lake (SSRAA-produced fish) to enhance local sport and commercial fisheries. In 1999, 541,000 smolts were released at Neets Bay and 742,000 at Whitman Lake. Adult returns from these releases will begin in the year 2001, when 2-ocean adults (≅ 28" in length) will return, followed by increased returns of 3-ocean fish in 2002, 4-ocean in 2003, and 5-ocean in 2004.

In addition to chinook salmon releases from this project, the Deer Mountain hatchery, owned and operated by Ketchikan Indian Corporation (KIC), released 51,000 chinook salmon smolts into Ketchikan Creek as part of its ongoing hatchery program. No divisional funds were used to pay for this project.

Coho and chum salmon. The Division is not involved in either coho or chum salmon enhancement in the Ketchikan area. SSRAA released over 3.0 million coho salmon at its Neets Bay and Whitman Lake facilities in 1999. KIC also released approximately 63,000 summer run coho salmon in Ketchikan Creek using their funding. Both programs benefit commercial and sport fisheries in the Ketchikan area. SSRAA also released 45.1 million summer and 19.8 million fall run chum salmon at its Neets Bay facility in 1999. Chum returns from 1995–1996 releases were exceptionally poor, and sport anglers benefited little from these releases.

Rainbow trout and steelhead. The Division is not involved in either rainbow trout or steelhead enhancement in the Ketchikan area, other than providing triploid rainbow trout eggs to KIC. These eggs are shipped to the Deer Mountain Hatchery, where KIC raises them for release in the Ketchikan Creek City Park Kids Day fishery and to enhance the sport fisheries in Carlanna and Harriet Hunt lakes. In 1999, KIC released 2,000 triploid rainbows in the City Park Kids Fishing Day project, 20,000 in Harriet Hunt Lake and 5,000 fish in Carlanna Lake. KIC also released 4,000 steelhead smolts in Ketchikan Creek in 1999 to enhance the Ketchikan Creek sport fishery.

Access Projects

In 1999, Ketchikan area staff were involved in review and/or development of four boat ramp projects, one trail project, one fishing pier project, and one freshwater cabin project (Table 7).

Other Issues

Hydroelectric Projects

Division staff reviewed and made field inspection trips to five hydroelectric projects in 1999 (Table 8). Staff spent considerable time reviewing these projects, attending interagency meetings, and working with project consultant firms.

Timber Harvest

Logging activities continued to be planned or implemented in the Ketchikan area during 1999. Twelve different timber harvest plans were reviewed and comments provided to Habitat Division staff concerning potential impacts on various freshwater sport fisheries (Table 9).

Table 6.–Annual peak steelhead escapement counts for Ketchikan area streams, 1994–1999. The 1994–1996 surveys were by foot; 1997–1999 surveys were snorkel surveys.

Stream	1994	1995	1996	1997	1998	5-year mean	1999	% change 1998 to 1999
White River	12	77	42	84	86	60	60	–30%
Ketchikan Creek	NS	16	42	48	47	38	19	–60%
Naha River	15	33	37	20	31	27	49	+58%
Ward Creek	NS	NS	NS	10	41	26	NS	
McDonald Lake	67	66	60	145	86	85	100	+16%
Humpback Creek	30	27	20	91	24	38	4	–84%

NS = not surveyed

Table 7.–Ketchikan area access projects, 1999.

City/ borough	Project title	Amenities	Type	Funding status	Cost	Status
Ketchikan	Knudsen Cove Boat Ramp Improvements	Marine ramp, parking, float	B	FY 96	$200,000	completed in 1999
Ketchikan	Bar Harbor Ramp Improvements	Marine ramp, parking, float	B	FY 97	$170,000	completed in 1999
Ketchikan	Mt. Point/Knudsen Cove Restrooms	Restrooms	B	FY 98	$90,000	completed in 1999
Hyder	Hyder Boat Launch Improvements	Marine ramp, parking, float	B	FY 98	$100,000	delayed until 2001
Ketchikan	Herring Cove Access Improvements	Trail	N	FY 99	$174,000	on hold
Ketchikan	Thomas Basin Fishing Pier	Fishing dock	N	FY 99	$100,000	on hold
Ketchikan	Perseverance Lake Cabin and Skiff	Cabin with skiff	N	proposed	$30,000	canceled

B = boating; N = non-boating.

Table 8.–Hydroelectric projects in the Ketchikan area, 1999.

Name	Status	Species of concern
Ketchikan Lakes	Up for re-licensing. Final terms & conditions due. Intervention by ADF&G possible.	All species of salmon; steelhead; rainbow, brook, and cutthroat trout; and Dolly Varden in lake.
Connell Lake	1st stage consultation. ADF&G drafting study needs.	All species of salmon; steelhead; rainbow and cutthroat trout; Dolly Varden.
Whitman Lake	1st stage consultation. ADF&G drafting study needs.	Dolly Varden
Mahoney Lake	Correctly licensed, awaiting construction, compliance monitoring.	Sockeye, coho, pink, and chum salmon; steelhead; rainbow and cutthroat trout. Arctic grayling in upper Mahoney Lake
Swan Lake	Currently licensed, fisheries monitoring studies under review.	Dolly Varden, kokanee

Table 9.–Ketchikan area timber harvest plans, 1999.

Name	Status
N. Revillagigedo Island	Timber harvest continuing
Upper Carroll Inlet	Timber sales released but no buyers
Sea Level – Thorne Arm	FEIS completed
Emerald Bay	In USFS planning stage
Gravina Island	In USFS planning stage
Knot (salvage sale – Carroll Inlet)	EA completed
Several DNR timber sales	In planning phase
Ketchikan Gateway Borough	Timber sale in progress
Sea Alaska – Cleveland Peninsula	In planning phase; LTF permit renewed
Salty Timber Sale (FS – George Inlet)	EA completed
Mahoney Lake (Cape Fox Corp.)	Road constructed; logging completed 12/99
Rainbow Creek (Cape Fox Corp.)	Roads constructed; logging completed 8/99

PRINCE OF WALES ISLAND AREA

The Prince of Wales Island (PWI) management area includes all freshwater systems draining Prince of Wales Island and a number of adjacent smaller islands (Figure 7). The major marine fisheries of the area are for chinook salmon, coho salmon, pink salmon, and bottomfish (Pacific halibut, rockfish, and lingcod). Major freshwater sport fisheries include steelhead, cutthroat trout, Dolly Varden, coho salmon, pink salmon, and sockeye salmon. Permanent Sport Fish management staff consists of one Fishery Biologist II, Robert Chadwick, stationed in Klawock.

Local Management and Research Programs

Marine Catch Sampling

A marine CWT sampling project was operated for the seventh season on the west coast of PWI. Two technicians sampled harbors, boat launches, and lodges in Craig and Klawock from late April through mid-September to collect coded wire tag information from charter and non-charter anglers returning to port in these locations. Harvest estimates of the different species caught in marine waters off PWI are derived from the Statewide Harvest Survey (SWHS) and only inseason CWT data were collected by the technicians. Coded wire tag data collected in 1999 indicated that 33% of the chinook salmon caught were from non-Alaskan hatcheries (primarily Canada) and only 3% from Alaska hatcheries. Most coho salmon were from Alaska hatcheries but they constituted only 7% of the harvest. During 1999, the chinook fishery was only average but the coho fishery was well above average.

Trout Research

In 1999, proposals were submitted to the Alaska Board of Fisheries by ADF&G to nominate the Control Lake, Sweetwater Lake, and Klawock Lake systems to the regional list of "high use" trout lakes. The three nominated water bodies met criteria for designation as "high use," but minimal trout data were available for Control Lake and the Sweetwater system. Sampling with baited hoop traps was conducted in 1999 on the Control Lake and Sweetwater systems to determine if anglers would still have the opportunity to harvest trout under the more restrictive "high use" minimum size limit of 14 inches. Cutthroat trout >14 inches were caught in both Control Lake and the Sweetwater system.

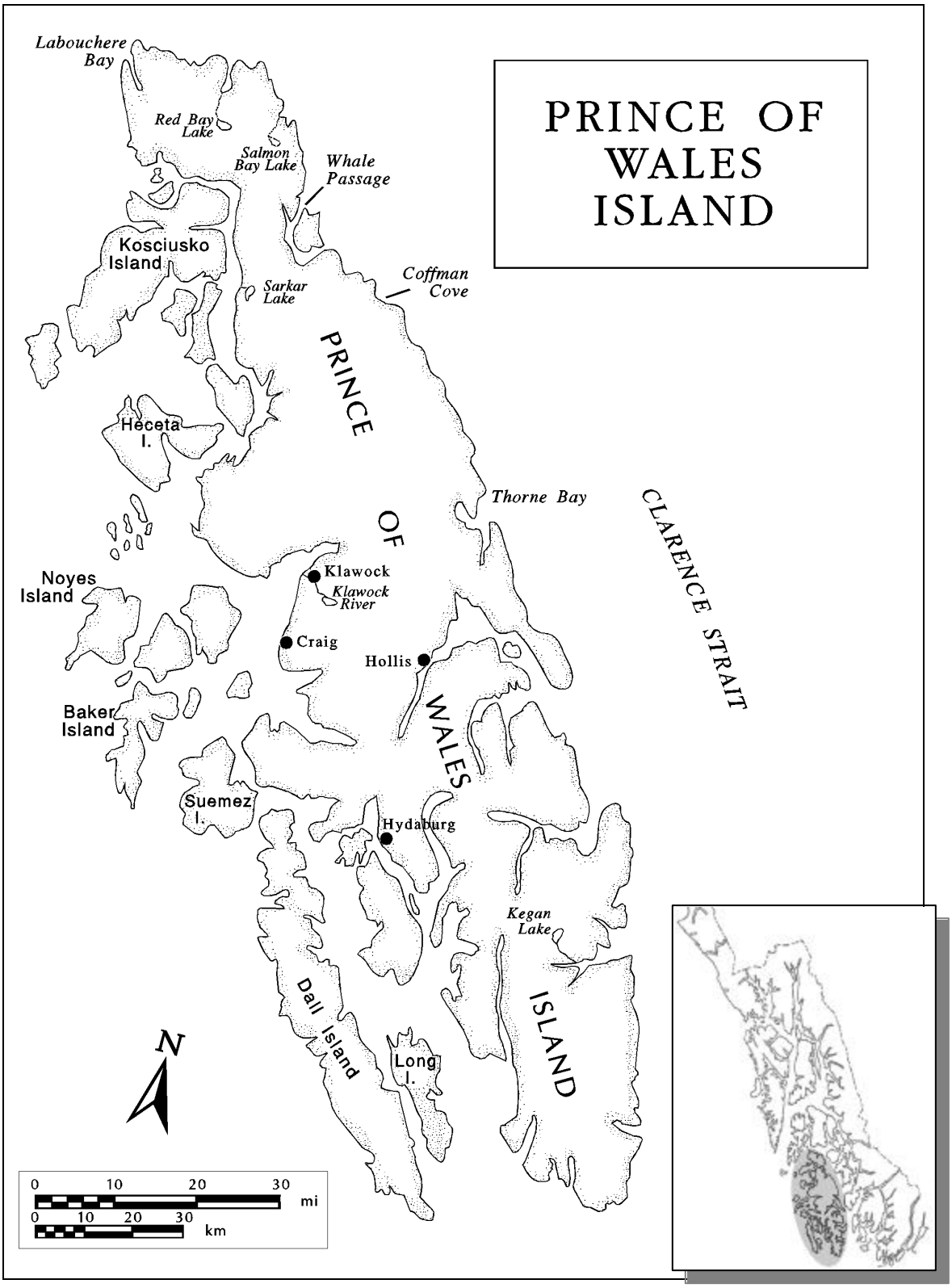

Figure 7.–Prince of Wales Island management area.

Management Actions

In 1999, three emergency orders were enacted in the PWI area. Due to a decline in the number of fall and spring steelhead returning to the Luck Lake drainage, this drainage was closed to sport fishing from March 6 through June 15, 1999 (E.O. 1-1-99). Also in 1999, pink salmon returns were expected to exceed regional escapement goals by 25%. To allow for additional harvest of these surplus pink salmon, the bag limit was increased to 12 and 24 in possession in all waters in the PWI area (E.O. 1-23-99) from July 26–October 31. Additionally, E.O. 1-25-99 allowed the use of bait in the fresh waters of the Neck Lake outlet stream, downstream from the highway bridge, to increase the harvest of surplus hatchery coho salmon.

Escapement Surveys

Coho Salmon

Coho salmon escapements into 4 streams were monitored in the PWI area by means of foot or helicopter surveys (Table 10). Multiple foot surveys were conducted on 108 Creek and Port St. Nicholas Creek until the peak and a decrease in the run could be identified. When the peak of the run was identified in the foot survey streams, and the weather permitted, both the Maybeso River and the Harris River were surveyed by helicopter on the same day. The coho salmon counts were all below the 5-year average, and only the Maybeso River and Port St. Nicholas Creek counts increased from 1998. Although these counts are all below average, it should be noted that the summer and fall of 1999 were very wet due to many high water events causing foot and helicopter survey conditions to be less than optimal.

Steelhead

Weekly snorkel surveys in two index streams (Harris River and Eagle Creek) were objectives of the PWI steelhead research project in 1999. Information derived from these surveys are used to monitor trends in area streams for any future inseason or Board of Fisheries actions. Because snorkel surveys count a higher percentage of the total escapement, it can be misleading to compare 1999 data to foot counts made prior to 1997. Harris River peak counts were higher in 1999 than in 1998 (Table 11). Low steelhead counts on Eagle Creek during March and April, coupled with evidence of an alarming amount of bait and snagging gear in conjunction with a bulldozed snow trail, prompted a closure of the Luck Lake Drainage to all sport fishing. In mid-May, 118 steelhead were counted in Eagle Creek which is over twice as many steelhead counted in 1998. This doubling of the count in one season is likely a function of a decrease in illegal take caused by the closure of sport fishing in the Luck Lake drainage during the peak of spawning season.

Enhancement

The department was not involved in enhancement on PWI in 1999. The Prince of Wales Island Hatchery Association (POWHA) which operates the Klawock Hatchery released 1.79 million coho smolts, 580,000 sockeye smolts, and 500 steelhead smolts in 1999. A total of 14,555 adult coho and 5,226 sockeye salmon returned to Klawock Lake. These fish were paid for with POWHA grant funds. SSRAA released 1.4 million coho salmon into Neck Lake using their own funds. A total of 26,000 coho returned to Neck Lake outlet from the 1997 SSRAA release. Anglers utilized coho salmon returning to Neck Lake outlet in the salt water. Unlike most areas of Southeast Alaska, no enhancement of chinook salmon took place on PWI in 1999.

Access Projects

In 1999, the Craig marine boat ramp and Coffman Cove marine boat ramp were finished. The Hollis boat ramp improvements have been delayed by the Alaska Department of Transportation pending possible relocation of the ramp to Clark Bay (Table 12).

Habitat Issues

Water Use Projects

PWI sport fish staff spent considerable time in 1999 reviewing and making field inspections of several operational and proposed hydroelectric projects on PWI. Staff time was spent conducting field inspections at the operational Black Bear Lake hydro project, proposed Three Mile Creek

Table 10.–Peak helicopter or foot escapement survey counts of coho salmon in Prince of Wales area streams, 1994–1999.

Stream name (survey type)	1994	1995	1996	1997	1998	5-yr mean (94–98)	1999	1999 % of mean
"108" Creek (F)	178	60	601	163	242	249	163	65%
Harris River (H)	410	670	483	NS	839	480	321	66%
Maybeso River (H)	216	232	221	NS	81	188	183	97%
Port St. Nicholas Creek (F)	153	49	32	53	52	68	54	79%

H = helicopter; F = foot.

NS = not surveyed

Table 11.–Annual peak steelhead escapement counts for Prince of Wales Island area streams, 1994–-1999. The 1994–1996 surveys were by foot or weir; 1997–1999 surveys were snorkel surveys.

Stream	1994	1995	1996	1997	1998	5-yr mean (94–98)	1999	1999 % of mean
Index Systems:								
Eagle Creek	34	21	17	90	56	44	118	268%
Harris River	30	44	67	104	156	80	192	240%
Other Systems:								
Karta River	22	14	11	NS	31	20	25	125%

NS = not surveyed

Table 12.–Prince of Wales area 1999 boating access projects.

City/borough	Project title	Amenities	Funding	Cost
Hollis	Hollis Boat Launch Ramp Improvements	Marine ramp, parking	FY 98	$150,000
Coffman Cove	Coffman Cove Boat Launch	Marine ramp, parking	Completed 1999	$75,000
Craig	Craig Marine Boat Ramp	Launch and float	Completed 1999	$350,000

Klawock City Water project, and proposed sites for projects at Wolf Lake, Reynolds Creek, and the south fork of Black Bear Creek. Numerous inter-agency meetings concerning these projects were also attended.

Timber Harvest

Thirteen different timber harvest plans and 5 salvage timber sales were reviewed by sport fish staff in 1999 (Table 13). Division staff provided comments on these projects through PWI Habitat Division.

Road Construction

Sport fish staff continued monitoring federal highway projects on the island in 1999: Big Salt Road (17 miles of re-alignment and paving) and Hydaburg Road (22 miles of re-alignment and paving) projects were continued. Bridge and culvert crossings were monitored throughout the summer. The project plan for the re-alignment of the Coffman Cove road was also reviewed by staff and comments were submitted. The Hydaburg road project was completed in 1999, but the other 2 projects will continue to be monitored by sport fish staff in 2000.

Table 13.–Prince of Wales Island area timber harvest plans, 1999.

Name	Managing agency
Luck Lake Timber Sale	USFS
Staney Creek Timber Sale	USFS
Whoop-de-do Timber Sale	USFS
Trocadero/Cable/Snipe Timber Sale	USFS
Polkapillar Timber Sale	USFS
Shaken Timber Sale	USFS
Vestal Timber Sale	USFS
Soda Bay	USFS
Kina Cove	STC
Port Caldera	STC
KHC Klawock	KHC
Trocadero Bay	SSI

USFS = U.S. Forest Service

STC = Sealaska Timber Corporation

KHC = Klawock Henya Corporation

SSI = Shaan Seet Incorporated

PETERSBURG/WRANGELL AREA

The Petersburg/Wrangell management area includes the islands of Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, and Wrangell and all mainland waters in the vicinity of these islands (Figure 8). The area's major sport fisheries occur in marine waters for chinook and coho salmon, and bottomfish (Pacific halibut and rockfish). The major freshwater sport fisheries include chinook and coho salmon, steelhead, cutthroat trout, and Dolly Varden. Permanent Sport Fish management staff consists of one Fishery Biologist III, Dean Beers, stationed in Petersburg.

Local Management and Research Programs

Salmon

Salmon management and research plans focused primarily on wild chinook salmon stocks from the Stikine River and local chinook salmon releases from Crystal Lake Hatchery at Blind Slough near Petersburg. Sport fisheries target wild stocks during late May and early June while hatchery returns peak near the end of June and early July.

The Stikine River is one of the 2 largest producers of chinook salmon in Southeast Alaska (Pahlke 1997). To track rebuilding efforts, a cooperative program continued in 1999 between Sport Fish Division, the Canada Department of Fisheries and Oceans, and the Tahltan Band to estimate escapement and inriver harvest rate of Stikine River chinook salmon. Results from the study estimated that a spawning abundance of 15,616 large chinook salmon would, on average, produce maximum sustained yield. A new escapement range of 15,000 to 26,000 large spawners was developed by the department (Bernard et al. 2000).

Crystal Lake Hatchery chinook salmon returns are allocated between commercial and sport user groups by the Wrangell Narrows-Blind Slough Terminal Harvest Area Management Plan (5 AAC 33.381) (Table 14). At low projected levels of returns, the entire run (in excess of those needed for egg takes) is allocated to the sport fishery. In 1999, 4,200 adult chinook salmon were allocated to the marine boat fishery, shoreline fishery, and broodstock maintenance; the commercial fishery

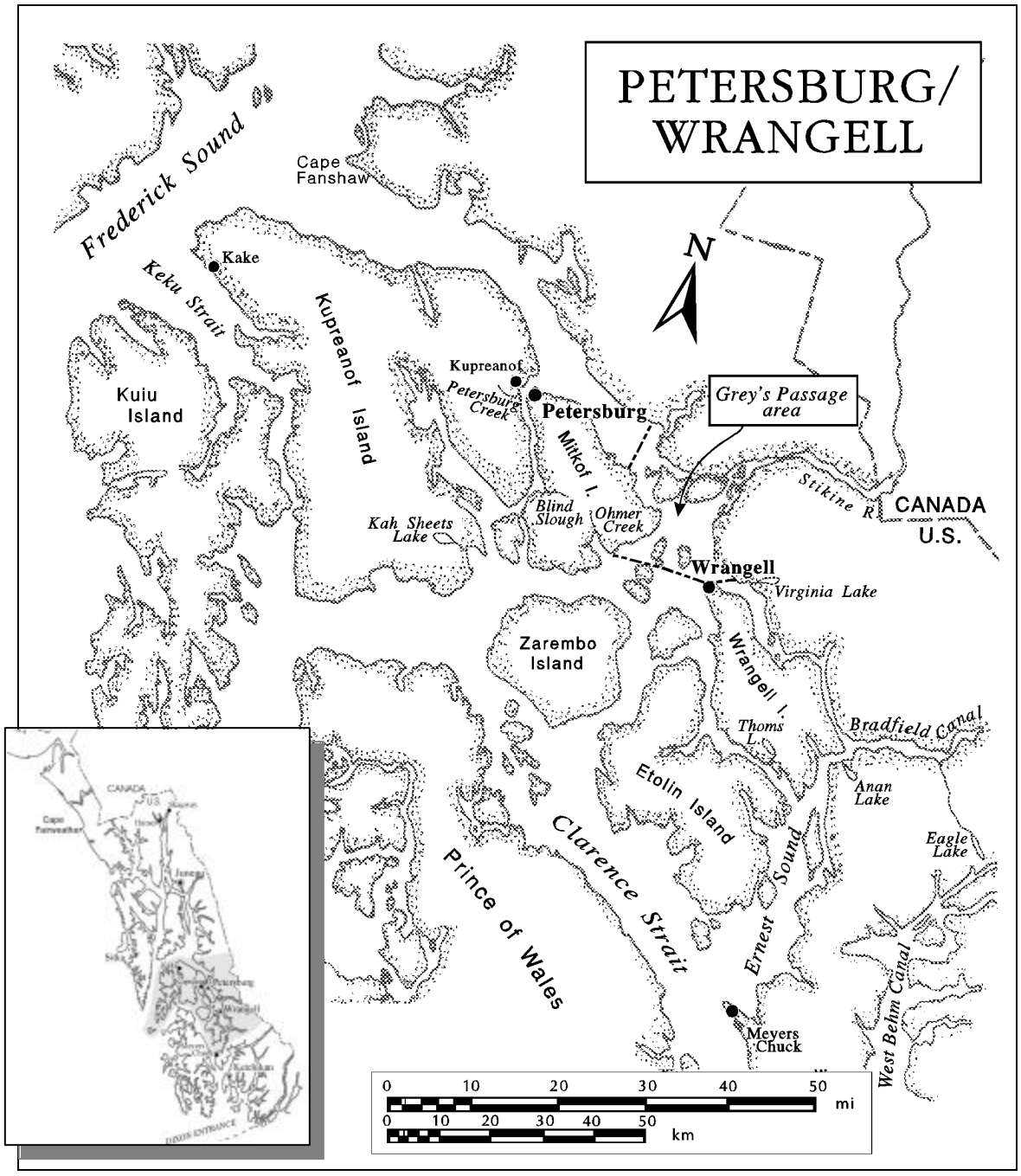

Figure 8.–Petersburg/Wrangell management area.

was allocated 200 chinook salmon. About 1,000 chinook salmon are required for broodstock maintenance to meet release goals at Blind Slough (600,000 smolts) and Earl West Cove (400,000 smolts). Both releases are Andrew Creek broodstock.

The hatchery also maintains a small coho release program using Crystal Creek stock to mitigate the loss of coho salmon spawning habitat from Crystal Creek due to hatchery construction; the release goal is 100,000 coho smolts each year (Table 15).

Table 14.–Contributions of Crystal Lake hatchery chinook salmon to sport and commercial fisheries, 1995–1998.

	Sport				Commercial			
Year	Mixed saltwater boat[a]	Terminal saltwater boat[b]	Terminal shoreline[c]	Sport total	Mixed stock[d]	Terminal[e]	Commercial total	Percent sport
1995	465	737	391	1,593	2,923	1,165	4,088	28
1996	474	1,489	617	2,580	3,807	1,933	5,740	31
1997[f]	280	851	1,204	2,055	1,307	801	2,108	49
1998	257	968	774	1,742	1,181	0	1,181	60

[a] Estimated from regionwide dockside creel sampling programs.

[b] Statewide harvest survey.

[c] Statewide harvest survey (includes both freshwater and estuary/saltwater shoreline harvest).

[d] Estimated from regionwide commercial port sampling programs.

[e] Fish ticket information.

[f] First year under the Wrangell Narrows/Blind Slough Terminal Harvest Area Management Plan.

Table 15.–Contributions of Crystal Lake hatchery coho salmon to sport and commercial fisheries, 1995–1998.

	Sport						
Year	Mixed saltwater boat[a]	Terminal saltwater boat[b]	Terminal shoreline[c]	Sport total	**Commercial total** [d]	**Personal use total** [e]	**Percent sport**
1995	0	704	915	1,619	975	198	58
1996	37	612	129	778	1,884	105	28
1997	158	162	485	805	2,202	177	25
1998	0	66	182	248	1,185	170	16

[a] Estimated from regionwide dockside creel sampling programs; no active local creel surveys for coho salmon.

[b] Statewide harvest survey.

[c] Statewide harvest survey (includes both freshwater and estuary/saltwater shoreline harvest).

[d] Estimated from regionwide commercial port sampling programs.

[e] Personal use harvest reports.

A dockside monitoring program (creel survey) to document Alaskan hatchery chinook salmon contributions and tracking of local catch rates in both Petersburg and Wrangell was continued in 1999 as part of the regionwide inseason chinook salmon management program (Table 16).

A stock assessment program for coho salmon at Slippery Creek on Kuiu Island began in early April. This project is a cooperative project with the U.S. Forest Service. It is the only inside area stock assessment program for coho salmon between the Taku River (Juneau) and Hugh Smith Lake (Ketchikan) and is one of several new coho stock assessment programs ADF&G is developing to provide timely data about run strength for inseason management.

In 1999, 13,000 coho salmon smolts were coded-wire-tagged below the lake outlet and sampled for age, length and weight. A Fishery Data Series report (No. 99-46) titled "Production of coho salmon from Slippery Creek, 1997–1998" was published in December 1999.

Table 16.–Sampled effort and harvest (effort or harvest during times sampled only) statistics from the Petersburg and Wrangell marine boat catch sampling programs in 1999.

	Petersburg	Wrangell
Sampling period [a]	5/03–7/11	4/26–7/04
Angler-hours of salmon fishing	3,550	6,397
Chinook salmon harvested	349 [b]	304
Chinook salmon sampled [c]	292	284
Chinook salmon CPUE (hrs/fish)	10.2	21.0
Angler-hours of bottomfishing	2,492	434
Pacific halibut harvested	521	66
Rockfish harvested	40	10

[a] Sampling conducted 5 days per week by one sampler working 7-h shifts.

[b] In addition, at least 492 chinook salmon were taken during the Petersburg Salmon Derby, 473 of which were sampled for missing adipose fins.

[c] Fish were sampled for presence or absence of adipose fins, and heads were collected from fish with missing adipose fins.

Trout

Advisory committees in Wrangell and Petersburg were informed of regulations which would allow for the use of bait or reduced size limits at select landlocked lakes, but no lakes were nominated.

Management Actions

Wrangell Narrows Terminal Harvest Area Management

A return of 4,400 chinook salmon was forecast for the terminal waters of Wrangell Narrows which encompasses waters in section 6A south of 56° 46' N. latitude (Martinsen's dock) and east of the longitude of the northern tip of Woewodski Island. Under the Wrangell Narrows-Blind Slough Terminal Harvest Area Management Plan, the terminal waters of Wrangell Narrows were opened by emergency order to a daily sport harvest of 3 chinook salmon 28 inches or larger and 6 chinook salmon <28 inches June 1 through July 31 (E.O. 1-07-99). The freshwater portion of the chinook sport fishery in Blind Slough is open all year. The sport bag limit in this area was 3 chinook salmon 28 inches or larger and 3 chinook salmon <28 inches. Bait was allowed in Blind Slough beginning June 15, and salmon hooked elsewhere than in the mouth could be retained.

Arctic Grayling Stocking

Wolf Track Lake, located near Petersburg on the southwest end of Mitkof Island, was examined to see if Arctic grayling stocked in 1998 were reproducing. While no evidence of reproduction was found, fish were observed jumping in the lake, indicating that some of the transplanted fish have survived the winter. Wolf Track Lake remains closed to fishing (E.O. 1-17-98) until investigations of spawning success and documentation of juvenile rearing are completed.

Surveys

Sport Fish staff were only responsible for adult steelhead surveys while Commercial Fisheries staff conducted coho salmon surveys.

Petersburg Creek

Four weekly snorkel surveys for adult steelhead were conducted during the month of May. A peak count of 115 fish was observed on May 11 under normal visibility and average water conditions.

Marten Creek

Three weekly snorkel surveys for adult steelhead were conducted during the month of May. A peak count of 18 fish was observed on May 19 under excellent visibility and low water conditions.

Access Projects

Shoemaker Bay (Wrangell)

A permanent shower/restroom facility is proposed adjacent to the current parking area at Shoemaker Harbor near Wrangell. The $50,000 improvement is currently in the bid phase.

South Harbor (Petersburg)

Designs were submitted by the city of Petersburg to replace the aging boat ramp and add more parking for sport anglers at South Harbor. The

plans were finalized, and building is expected to begin in the fall of 2000.

Other Issues

Crystal Lake Hatchery

Statewide funding cuts in Sport Fish Division led to an announcement that the hatchery would close July 1, 1999 unless alternative funding could be found. Crystal Lake Hatchery is the only state-owned and operated hatchery facility in Southeast Alaska. The hatchery was eventually fully funded for FY2000, and it was determined that a private non-profit corporation should take over management of the facility. On Dec 31, 1999, the hatchery manager and assistant manager retired under the state system and became Southern Southeast Regional Aquaculture Association (SSRAA) employees. Public meetings were held in November to discuss alternative funding possibilities and future funding of the hatchery by the department.

Habitat

The City of Petersburg proposed relicensing of the Blind Slough Hydroelectric Project, and so communication protocols with state and federal agencies were developed, and public scoping meetings were held in December. Critical fisheries issues included maintaining adequate flows to sustain Crystal Lake Hatchery, Crystal Creek, and Blind River.

The Sunrise Lake Water Supply and Hydroelectric Project on Woronkofski Island (near Wrangell) was put on hold while the City of Wrangell determines if they want to fund environmental studies necessary for licensing.

SITKA AREA

The Sitka management area includes all waters of Baranof Island, Yakobi Island, and Chichagof Island west of a line extending from Point Hayes to Column Point (Figure 9). Sitka (about 8,000 residents) is the only large community located within the Sitka Management Area. Smaller communities include Pelican, Baranof Warm Springs and Port Alexander. The Sitka management area provides about 20% of the sport fishing effort in Southeast Alaska. Permanent Sport Fish management staff consists of one Fishery Biologist III, Thomas Brookover, stationed in Sitka.

The Sitka area supports one of the largest marine sport fisheries in Southeast Alaska. In 1999, more chinook salmon, coho salmon, and Pacific halibut, were harvested in Sitka than in any other management area in Southeast Alaska. Harvests near Sitka of lingcod and each species mentioned above were the second largest in Alaska.

In 1999, marine angling comprised 92% of the sport fishing effort in the Sitka area. Marine sport fishing effort in the Sitka area has increased more rapidly than most other areas in Southeast Alaska, from about 40,000 angler-days in 1980 to over 105,000 in 1999. In contrast, freshwater fishing effort in the Sitka area has increased from about 6,000 angler-days in 1987 to 8,400 angler-days in 1999.

Much of the recent increase in marine fishing effort is guided. Distribution of reported logbook effort and harvest indicated that the Sitka area was the most heavily used area in Southeast Alaska. In 1999, 264 guided sport fishing vessels representing 193 businesses were active (i.e. submitted at least one logbook sheet) in the Sitka area, which represents 42% of all vessels and 49% of all businesses active in Southeast Alaska. Guided anglers took 69%, 86% and 90% of the chinook salmon, coho salmon, and Pacific halibut harvested in the portion of the Sitka marine boat sport fishery monitored by creel surveys during 1999.

Local Management and Research Programs

Marine Creel

Since 1992, a marine creel survey has been conducted in Sitka as part of an expanded regional program to monitor sport harvests of chinook salmon in Southeast Alaska. Primary goals of the program are to estimate inseason regionwide harvests of chinook salmon, chinook salmon of Alaska hatchery origin, and coho salmon of Alaska hatchery origin in the Ketchikan, Juneau and Sitka fisheries. Additional tasks include estimating angler effort, harvest and catch of all Pacific salmon species, Pacific halibut, lingcod,

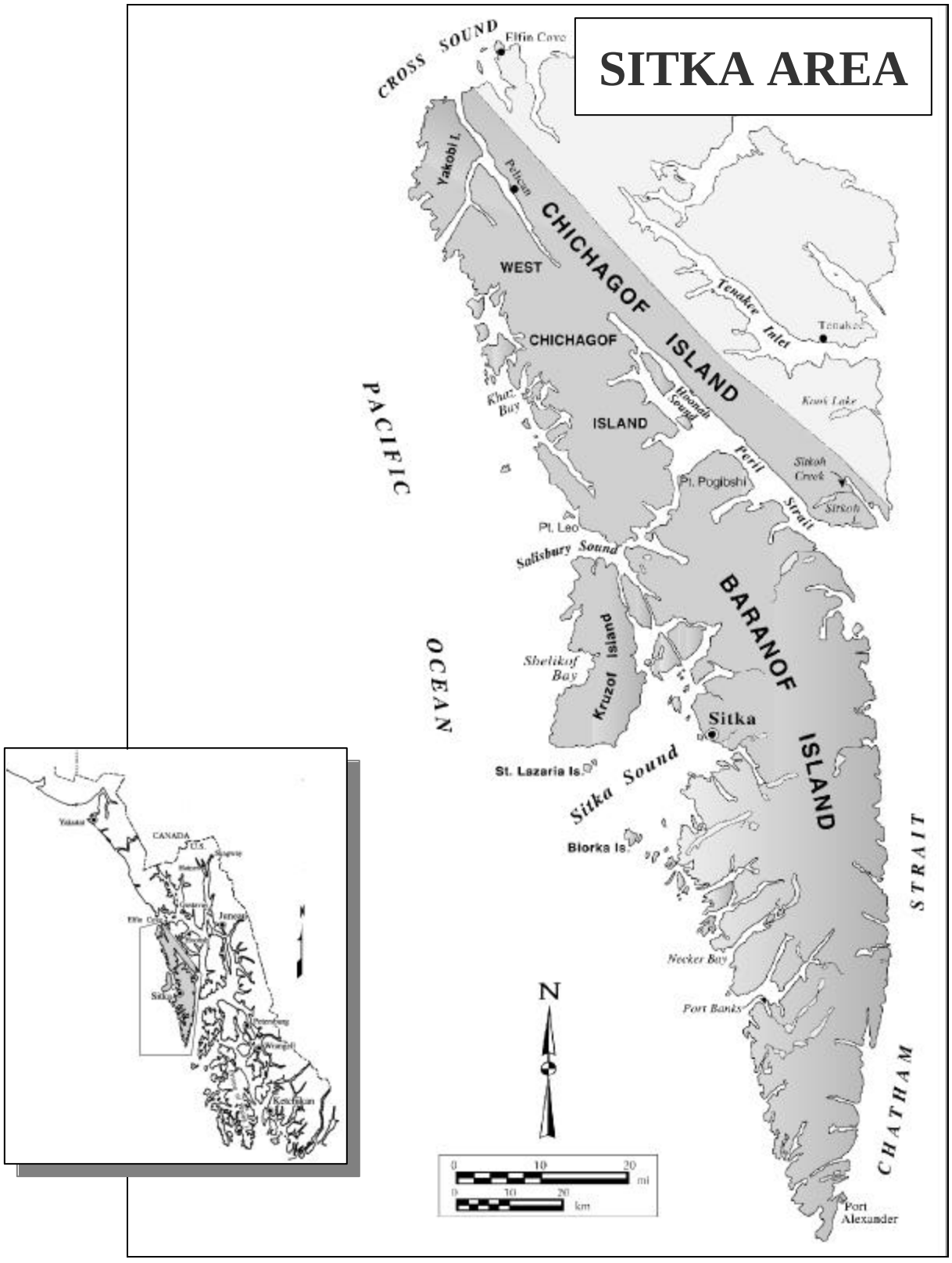

Figure 9.–Sitka management area.

rockfish and Dolly Varden; harvest per unit effort (HPUE) for chinook and coho salmon and Pacific halibut; and average weights of Pacific halibut harvested in the above fisheries. Five technicians were employed to conduct the creel survey of the Sitka marine boat fishery from April 26 to September 26, 1999.

Catch rates for chinook salmon in the Sitka marine fishery were about average throughout the 1999 season, except during May, when catch rates were above average. The estimated harvest of 20,804 chinook salmon was the third largest harvest in the Sitka sport fishery and constituted about 37% of the sport harvest of chinook salmon in Southeast Alaska. Alaska hatcheries contributed about 12% of the Sitka chinook harvest; non-Alaska hatcheries contributed about 28%. Hatcheries along the west coast of Vancouver Island contributed about 54% of the non-Alaska hatchery component. The large chinook harvest in the Sitka fishery contrasted with weak harvests observed in most other areas of the region.

Catch rates for coho salmon were well above average through the entire season and were 63% higher than 1998 rates. Anglers averaged one fish or more per angler-hour from July 19 through September 19. Estimated harvest of coho salmon in the 1999 Sitka marine fishery (73,757) was the highest on record and 64% greater than the previous record high set in 1998. Like chinook salmon, the coho harvest was notably stronger in Sitka than in other areas of Southeast Alaska, where totals more closely approximated average levels. The hatchery contribution was above average (26%) and composed almost entirely of Alaska production. Hatchery contributions were unusual in that Neets Bay hatchery, near Ketchikan, contributed about 70% more fish to the Sitka fishery than did the local Medvejie hatchery.

Most sport fishing effort for bottomfish was directed at areas outside of Sitka Sound. Catch rates for Pacific halibut were also high relative to previous years and consistently exceeded average levels from mid-July through mid-September, when catch rates averaged about two angler-hours per halibut kept. High catch rates were due at least partially to a continuing shift in effort from areas inside Sitka Sound to areas outside of Sitka Sound.

Nakwasina River Coho Salmon Stock Assessment

The Nakwasina River drainage is one of the larger river systems on Baranof Island and one of 7 systems in the Sitka Management Area surveyed annually for escapement of coho salmon. Aerial and foot surveys conducted from 1988 to 1999 documented peak counts ranging from 104 (1988) to 654 (1992) coho salmon in the Nakwasina River. Average survey counts in the Nakwasina River represent the third largest for streams surveyed in the Sitka area.

The Nakwasina River is important to area sport fisheries because it supports a significant population of coho salmon, is easily accessed from Sitka, and is one of the few rivers in Sitka Sound that attracts freshwater sport fishing effort for coho salmon. From 1984 to 1999, estimated angler effort expended in Nakwasina Sound and river ranged from 31 to 891 angler days. In the 1960s, most of the anadromous portion of the Nakwasina River valley, including riparian zones, was clearcut to the stream bank (G. Killinger, Sitka Ranger District, U.S. Forest Service, Sitka, personal communication). Nakwasina River coho salmon are of special concern because of the potential risk of excessive exploitation in combination with likely impacts to the stock from habitat damage.

In 1998, Division staff began a CWT project for coho salmon in the Nakwasina River to estimate the smolt abundance and the harvest of this stock in commercial and sport fisheries. This ongoing investigation will be used to assess whether current regulations ensure sustained yield of this stock and provide for maximum sport fishing opportunity.

Recoveries of CWTs from adult coho salmon in 1999 were used to estimate smolt abundance, harvest, and the exploitation rate of stocks originating from the Nakwasina River in 1998. From April 19 through May 20, 1998, between 50 and 100 baited minnow traps were fished daily in the Nakwasina River. During this period, 9,980 coho salmon smolt ≥70 mm fork length were marked with an adipose finclip and CWT of codes 04-46-29 or 04-46-30. In 1999, 49 adult coho salmon bearing CWTs from the

Nakwasina River were recovered in random sampling of marine fisheries. This corresponds to an estimated harvest of 1,983 (SE = 605) in the sampled (marine sport and commercial troll) fisheries. The sport fishery harvested an estimated 105 fish. Estimated smolt abundance in 1998 from the Nakwasina River was 102,794 (SE = 15,255).

Baited minnow traps were again fished in the lower Nakwasina River from April 22 to June 2, 1999, and 3,971 coho salmon smolt ≥70 mm FL were successfully released after being given a CWT and adipose fin clip. Due to lower than expected smolt numbers, late outmigration timing, and difficult trapping conditions, the number of fish marked and released was less than the sampling objective (10,000 fish). Only 6 overnight mortalities occurred, and tag retention in sampled fish was 99.8% at 24 hours after tagging. Smolt data collected in 1998 and 1999 are reported along with adult harvest and recovery data collected in 1999 in an FDS report (Brookover et al. *In press*).

Green Lake Brook Trout Stock Assessment

Brook trout were planted in Heart, Thimbleberry and Green Lakes near Sitka in 1932. Green Lake was the largest of the 3 lakes and, in 1979, its surface area increased more than twofold when a hydroelectric dam was constructed at the outlet. The brook trout population in Green Lake supports a low-use sport fishery with limited access.

In June and early July 1998, approximately 120,000 chinook salmon escaped into Green Lake from net pens used by Northern Southeast Regional Aquaculture Association (NSRAA) for lake rearing hatchery chinook salmon (B. Bachen, personal communication). Shortly after the discovery, NSRAA initiated a trapping effort to better understand the magnitude of the fry released and recapture as many as possible. NSRAA agreed to a request by Sport Fish Division to measure captured brook trout (results were presented in Suchanek et al. (*In press*).

In 1999, Sport Fish Division and NSRAA jointly conducted a mark-recapture project to estimate the population abundance and length composition of brook trout in Green Lake, and test the hypothesis that less than 5% of the population is present in the deep water of Green Lake. The study design was based on the Petersen model and consisted of two 14-day events during July and August. Abundance was estimated at 3,229 (SE = 900), and 5% of the fish captured were in water deeper than 35 m (Brookover et al. 2000). Average size of fish captured was 232 (SE = 2.1) mm FL. Another population study should be conducted in 2002 to determine if the brook trout population has changed substantially since introduction of chinook salmon into Green Lake.

Baranof Lake Research

Baranof Lake is relatively unique among large lakes in Southeast Alaska in that it supports only one species of fish, cutthroat trout. Physical and biological data were first collected from Baranof Lake in 1981 (Schmidt 1982). The average length of cutthroat trout in the 1981 sample (primarily sport caught) was 350 mm FL and fish up to 500 mm FL were collected, indicating that the potential for a high-quality fishery existed in Baranof Lake.

Baranof Lake is now a moderately popular recreation area. In a mail survey that censused parties reserving U.S. Forest Service (USFS) cabins on 13 cutthroat lakes throughout Southeast Alaska during 1992, Jones (1994) estimated that 528 (8%) of the total 6,338 hours fished and 113 (7%) of 1,573 total angler-days were expended at Baranof Lake. These estimates only reflect effort exerted by USFS cabin users; the fishing pressure at Baranof Lake was probably greater because of the expansion of tourism at Baranof Warm Springs (A. Schmidt, Sitka, Alaska, personal communication). The estimated number of cutthroat trout caught at Baranof Lake during 1994 is the highest estimate ever for any single system in Alaska (Table 17).

A project is underway to directly estimate maximum sustained yield (MSY) for a small number of diverse recreational cutthroat trout fisheries in Southeast Alaska, including the Baranof Lake fishery. The study is taking place at lakes with relatively high (Baranof Lake) and low (Turner Lake) densities of cutthroat trout.

Data collection and subsequent analysis to estimate MSY and natural survival (and mortality)

Table 17.–Estimated abundance and survival of cutthroat trout ≥180 mm FL and angler effort (number of anglers and days fished)**, harvest and total catch of cutthroat trout at Baranof Lake, 1990–1999.** Fishing effort and catch statistics from SWHS.

Statistic	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Abundance (SE)					12,186[a] (888)	7,224[b] (533)	7,050[b] (612)	5,582[b] (487)	7,794[b] (759)	6,961[c] (652)
Survival rate (SE)					0.42 (0.03)	0.58 (0.05)	0.52 (0.05)	0.61 (0.06)	0.46 (0.04)	
Number of anglers	426	319	399	362	321	451	234	671	513	320
Angler-days fished	617	497	608	842	693	1,109	364	1,111	702	498
Harvest	426	392	422	841	361	218	144	337	223	95
Total catch	1,413	654	1,952	2,943	4,304	1,940	2,192	2,910	2,888	1,020

[a] Petersen estimate.

[b] Jolly-Seber estimate.

[c] Preliminary Petersen estimate; i.e., all abundance assumptions not statistically tested.

rates at Baranof Lake will be completed as part of this research plan. MSY estimates will be based on sampling events separated by 4 years, the period during which recruitment from a parent brood to sampling gear is largely complete. Since annual sampling in each system began in 1994, the first estimates of MSY will be available in 2000. Since multiple (perhaps 3) estimates of MSY for each system are probably needed to insure robustness of the relationships, the experiment at Baranof Lake will extend through the year 2002. Other benefits of the sampling include direct estimates of the natural survival rate, among the first for cutthroat trout in Alaska (Table 17).

During May and June, 1994, an in-season mark-recapture abundance experiment was conducted at Baranof Lake (Der Hovanisian and Marshall 1995). The abundance of cutthroat trout ≥180 mm FL was estimated at 12,186 (SE = 888), for a density of approximately 38 fish per hectare. This density ranked Baranof Lake foremost among carefully studied large lakes in Southeast Alaska (Florence, Wilson, Hasselborg, and Turner). Subsequent Jolly-Seber abundance estimates for the years 1995 to 1998 ranged from 5,582 to 7,794 cutthroat trout ≥180 mm FL (Table 17).

Two 10-day sample trips to Baranof Lake were conducted between June 4 and July 3, 1999; 1,197 cutthroat trout ≥180 mm FL were captured, tagged (or previous tags recorded), and released. Approximately 17% of the fish captured had been marked during previous years. Preliminary analysis of the 1999 Baranof data (inseason estimate) generated an abundance estimate of 6,961 (SE = 652), which is similar to the previous Jolly-Seber estimates. At the conclusion of these research efforts, it is hoped that maximum sustainable harvests of resident cutthroat trout in other Southeast Alaska lakes can be bracketed by analogy to the sustainable harvests from low and high productivity lakes (on an acre-by-acre basis, for example).

Salmon Lake Coho Salmon

In 1999, we initiated a CWT project for coho salmon in Salmon Lake to estimate smolt abundance and harvest of this stock in commercial and sport fisheries. Unusually late ice out delayed the startup of the trapping and tagging operations, and the project was terminated mid-season when it became evident that the number of fish tagged would fall well short of the 5,000 fish goal. From May 21 through May 31, approximately 50 baited minnow traps were fished daily in Salmon Lake.

During this period, 584 coho smolts (>84 mm FL) were released with an adipose finclip and CWT. The average catch per trap-day was 1.18 smolt. Given the low number of smolt tagged during 1999, project objectives will not be met, and no work will be conducted on the adult return in 2000.

While there are potentially a number of factors that may have contributed to the low capture rates at Salmon Lake during 1999, two are most likely. First, a large number of smolts may have emigrated from the system prior to the onset of the study, and second, abundance relative to past studies appeared low. Analysis of the length data for tagged smolts revealed a decrease in the percentage of fish over 100 mm FL from May 25 (32%) to May 28 (20%) to June 1 (10%). Only 1 of 34 taggable coho salmon captured, but not tagged, on June 2 and June 4 was larger than 100 mm. For comparison, 74% and 93% of Salmon Lake coho smolts tagged in 1985 and 1986 were larger than 100 mm (Schmidt 1986, Schmidt 1987). Based on studies that show larger smolts tend to leave earlier in the smolt outmigration, the low and declining proportion of large fish captured at Salmon Lake in 1999 may indicate that a considerable emigration occurred prior to initiation of trapping in 1999. On the other hand, failures of certain year classes would result in similar observations. While the decline in fish size may suggest early emigration, the extent to which capture rates can be attributed to low abundance remains unknown.

Lake Stocking Projects

Swan Lake. Swan Lake, located in downtown Sitka, is the site of an annual Junior Trout Derby for young anglers. Each year, Sport Fish Division supplements the rainbow trout population in Swan Lake with approximately 300 subcatchable rainbow trout from Sukoi Lake, Kruzof Island. The purpose of this program is to improve angler success by increasing the availability of rainbow trout in Swan Lake. Its objectives are to produce 200 angler-days of fishing effort and to provide for a harvest of 150 rainbow trout each year.

On June 8 and 9, 1999, 216 trout were captured in Sukoi Lake and retained for release in Swan Lake. On June 9, the trout were transported in an aerated tank via floatplane to Sitka airport and then transferred to a truck. There were 21 mortalities during transport, so only 195 rainbow trout were successfully released into Swan Lake.

Rainbow trout were captured in Sukoi Lake in hoop traps baited with salmon eggs or hook-and-line gear. Five baited hoop traps were set along the lake perimeter in 2.5–4 ft of water June 8 and 9. Traps set June 8 and checked within 2.0–5.5 h yielded 10 to 189 rainbow trout per trap. Three traps fished overnight from 11.2 to 16.5 h yielded catches of 20, 46 and 79 rainbow trout. Dolly Varden composed about 15–20% of the total trap catches, and 89 Dolly Varden were caught in the overnight sets. One hoop trap set near an inlet in the southwest corner of the lake was the most productive. Five hours of hook-and-line effort was expended in the upper 100 m of the outlet stream, and 129 rainbow trout were captured.

All fish captured were measured to the nearest mm FL. Rainbow trout caught in hoop traps in Sukoi Lake ranged from 53 to 255 mm, and rainbow trout caught by hook-and-line in the outlet stream ranged from 90 to 240 mm. Only healthy fish were kept for stocking.

More than 2,000 rainbow trout were observed during a foot survey of the Sukoi Lake outlet stream June 8. Heavy spawning activity observed in the upper 100 m of the outlet stream indicated that spawning was at or near its peak. Of fish captured in the outlet stream, approximately two-thirds appeared to be mature spawners and all were released (none retained for transport).

Beaver Lake. Beaver Lake, 5 miles south of Sitka, supports the only Arctic grayling fishery near a roadside in Southeast Alaska. Recent enhancement efforts at Beaver Lake began in 1986 with the introduction of 10,000 Arctic grayling fry, and continued with stocking 15,000 Arctic grayling fry each year. The purpose of this program was to increase Arctic grayling sport fishing opportunities in Beaver Lake by supplementing an existing Arctic grayling stock originally introduced in 1965. The objectives were to generate at least 750 angler-days of fishing effort and provide a harvest of 250 Arctic grayling per year. From 1988 through 1998, annual harvests Arctic grayling averaged 56 fish

(range 0–418). This program was discontinued after 1997, because of low abundance of the brood stock source and recent policy restrictions placed on transporting fish over large geographic distances and on utilization of sac-fry for stocking purposes.

In 1999, Sport Fish Division and USFS Sitka Ranger District staff helped Sitka High School students conduct a mark-recapture study to provide students exposure to fisheries research. The study design was based on the Petersen model and consisted of two 5-day sampling events during June. The study was discontinued after 4 sampling days due to extremely low captures of Arctic grayling. Between June 15 and June 18, hoop traps, fyke nets, minnow traps and hook-and-line gear were used to capture Arctic grayling. All traps and nets were baited with disinfected salmon eggs and small shrimp and set overnight for 24-hour periods. Hoop traps were fished such that depth of the lake was fished uniformly, fyke nets were set parallel to the shoreline at 2-m depths, minnow traps were fished in water <2 m near the shoreline, and hook-and-line gear was fished from the shoreline. Effort totaled 12 trap-days for minnow traps, 12 trap-days for hoop traps, 6 trap-days for fyke nets and 19 rod-hours for hook and line. Nine fish were captured; 4 in fyke nets and 5 by hook-and-line. All fish captured were tagged with Floy tags, measured to the nearest mm FL and released. No marked fish were recaptured. Fork lengths ranged from 260 mm to 320 mm.

This sampling indicated that abundance of Arctic grayling in Beaver Lake is low and that natural reproduction rates are also low. Comparing 1999 catch rates with catch rates during June 1990 (44 fish in three 24-hour fyke net sets; 35 fish in 6 hours of hook-and-line effort) and June 1991 (16 fish in one 24-hour fyke net set) indicates abundance has declined substantially (ADF&G unpublished data). Sampling gear, methods of capture, and sampling dates were similar during all 3 years. The absence of fish less than 270 mm in 1999 indicates low natural reproduction in contrast with fish captured in 1990 and 1991, when sac fry were stocked annually. During 1990 and 1991, fish as small as 195 mm and 111 mm were captured; in 1991, 12 of the 16 fish captured measured less than 270 mm. Given the 1999 sampling results, Beaver Lake grayling are expected to eventually die off, and no further stocking is planned.

Management Actions

Chinook Salmon Terminal Harvest Area Management

On the basis of projections by the Northern Southeast Regional Aquaculture Association (NSRAA), surplus hatchery-produced chinook salmon were expected to return to the Silver Bay and Hidden Falls terminal marine harvest areas in 1999. The Alaska Board of Fisheries, under 5 AAC 75.005, authorized the department to increase bag and possession limits and liberalize methods and means, by emergency order, when hatchery-produced fish escape through existing fisheries to designated harvest areas in numbers that exceed brood stock or cost recovery goals. In response to the surplus projection, the bag and possession limits for chinook salmon in the Silver Bay and Hidden Falls hatchery terminal harvest areas were increased to 2 fish 28 inches or more in length and 2 fish less than 28 inches in length from June 19 through July 31, 1999 (E.O. 1-15-99).

Local Sitka streams do not support wild populations of chinook salmon, but chinook salmon have been observed in Sawmill Creek and the outlet to Salmon Lake since NSRAA began a chinook salmon enhancement program. Harvest of chinook salmon was allowed by emergency order in these systems each year from 1995 through 1998, after chinook salmon were observed during stream surveys. In 1999, Sawmill Creek was surveyed beginning in early August, but chinook salmon were not observed until September 7, when eight live fish were observed in advanced stages of decay. Although these strays from local hatcheries exceeded hatchery requirements, the benefits to providing opportunity to harvest these fish was low, and the streams remained closed to the harvest of chinook salmon. Sitka area staff received no complaints regarding the lack of opportunity to harvest chinook salmon in fresh water.

Coho Salmon Closures

From 1984 to 1990, annual spawning escapements of coho salmon in Salmon Lake declined steadily from 1,500 to 200 fish, and exploitation of the stock in commercial and sport fisheries increased from 36% to 74%. Since 1990, fishing effort has continued to increase in the commercial purse seine and sport fisheries, but annual spawning escapements have not been estimated. A CWT study completed in 1995 indicated that the 1995 exploitation of Salmon Lake coho salmon was high, and the resulting escapement was low. There are no indications of recent change in the exploitation and escapement trends observed for Salmon Lake coho salmon.

During July and August 1999, strong returns of pink and chum salmon near Sitka resulted in large fishing effort in the commercial purse seine and gillnet fisheries, and sport fishing effort near Sitka continued to remain at high levels similar to recent years. By September 1, survival of 1999 returns of hatchery-produced coho salmon in the Sitka area was projected to be about 10%, similar to average historical levels. On September 10, only 5 coho salmon were observed during a boat survey of the Salmon Lake estuary and adjacent shoreline, suggesting a below average return to that system.

Therefore, effective September 10, Silver Bay inside a line from the westernmost tip of Makhnati Island to the westernmost tip of Cape Burunof and the Salmon Lake drainage were closed to the retention of coho salmon (E.O. 1-28-99). Additional conservation measures were taken in the commercial troll and Deep Inlet Terminal Harvest Area fisheries to reduce take of Salmon Lake coho salmon. Unfortunately, coho salmon escapement to Salmon Lake could not be estimated, and our ability to measure success of these conservation measures was limited. On October 22, 107 adult coho salmon were observed during a snorkel survey of the inlet stream mainstem. This observation suggests that the spawning escapement in Salmon Lake was probably not at an extremely low level, but does not provide any other meaningful indication of inriver run strength.

Sitka Sound Pacific Halibut Local Area Management Plan

The Sitka Sound Pacific Halibut Local Area Management Plan (LAMP) became effective October 29, 1999. The Sitka Sound Halibut Task Force developed the Sitka Sound LAMP in response to indications of declining Pacific halibut harvests and reduced opportunity for local fishers to catch Pacific halibut in Sitka Sound. The Task Force, composed of local user groups, determined that there was an increase in competition among users in Sitka Sound. The Task Force submitted the LAMP proposal to the North Pacific Fishery Management Council, which approved the proposal in February 1998.

The primary provisions of the LAMP include: prohibiting longline vessels >35 ft from fishing for Pacific halibut within Sitka Sound; prohibiting longline vessels <35 ft from fishing for Pacific halibut within Sitka Sound from June 1 through August 31; and prohibiting charter vessels from fishing for halibut within Sitka Sound from June 1 through August 31. The LAMP does not restrict non-guided sport fishing.

Surveys

Sitka area streams are surveyed annually to count steelhead and coho salmon. Peak counts are used as indices of spawning escapement to depict long-term trends in spawning abundance.

Beginning in 1973, stream surveys have been conducted to count spawning steelhead in Sitkoh Creek, and, beginning in 1993, Ford Arm Creek (Table 18). Visual surveys conducted by foot were replaced with snorkel surveys in 1996 (Sitkoh Creek) and 1997 (Ford Arm Creek), because snorkel surveys were found to observe a higher proportion of steelhead populations (Johnson and Jones 1998). In 1999, peak survey counts in Sitkoh and Ford Arm Creeks were less than the 1997 and 1998 counts for both systems. However, 1999 survey quality was unusually impacted by late run timing and poor conditions. Heavy spring rains, combined with melting of an unusually large winter snow pack, contributed to very high stream levels and high turbidity. As a result, 1999 survey counts were biased low relative to other years. The public also reported a

Table 18.–Peak escapement counts of steelhead in the Sitka Area, 1973–1999.

Stream	Year	Survey type (no.)	Peak survey date	Peak count
Sitkoh Creek	1973	Foot (1)	04/27	33
	1976	Foot (1)	05/17	18
	1978	Foot (1)	05/16	17
	1980	Foot (1)	06/02	42
	1981	Foot (1)	06/03	42
	1982	Foot (2)	05/30	58
	1983	Foot (1)	05/17	143
	1984	Foot (1)	05/11	92
	1985	Foot (1)	05/21	115
	1986	Foot (1)	05/21	58
	1987	Foot (1)	05/20	107
	1988	Foot (1)	05/24	17
	1989	Foot (1)	05/18	20
	1991	Foot (1)	05/14	40
	1993	Foot (1)	05/14	23
	1994	Foot (1)	05/16	67
	1995	Foot (2)	05/09	81
	1996	Snorkel (2)	05/14	270
	1997	Snorkel (1)	05/20	329
	1998	Snorkel (2)	05/12	154
	1999	Snorkel (2)	05/19	120
Ford Arm Creek	1993	Foot (3)	07/14	31
	1994	Foot (1)	05/17	67
	1995	Foot (3)	05/24	75
	1996	Foot (1)	05/16	125
	1997	Snorkel (2)	05/16	197
	1998	Snorkel (2)	05/11	103
	1999	Snorkel (3)	05/18	89

higher abundance of steelhead in the Ford Arm system over 1 week after the peak survey was conducted, indicating that the 1999 surveys did not encompass the peak spawning abundance. Extreme high water levels precluded further late-season surveys.

Sport and Commercial Fisheries staff conduct annual foot, snorkel, and aerial surveys of streams in the Sitka area to count spawning escapements of coho salmon. In 1999, heavy fall rains, consistently overcast skies, and high stream levels delayed coho salmon surveys until well after desired time periods and prevented a survey of Eagle River. To improve survey quality and offset impacts from poor weather conditions, snorkel surveys were conducted on all streams except Black River in 1999.

Coho escapement counts ranged from very low to very high for the 5 streams surveyed (Table 19). Peak counts for most small streams within Sitka Sound, including Sinitsin Creek, St. John Creeks and Nakwasina River, were well below average. Low counts in these systems are thought to be due primarily to impacts caused by late survey timing and poor survey conditions. If external causes were to blame, the quality of counts in these streams is poor, and the magnitude of the difference between the 1999 counts and other years is overstated. Counts in Starrigavan River, where survey timing was similar to timing in other years, were similar to average levels. Coho escapement along the outer coast of Chichagof Island appeared to be much stronger; the count from the Black River aerial survey was the second highest on record, and counts at the Ford Arm weir, operated by Commercial Fisheries Division, were strong as well. Average to strong counts in these systems, which were unaffected by poor weather and late timing, suggest that coho escapements were at or above average levels for most systems along the outer coast of Baranof and Chichagof Islands.

Access Projects

Replacement of the float at the Starrigavan boat ramp was completed in August 1999. FY 98 CIP funding was provided through the Sport Fish Division's Access Program for replacement of the existing float. Expansion of the existing parking lot was discussed with DNR staff in concept but the project has not yet been funded. Specifically, staff discussed expanding the existing parking lot to the north by 15 ft to provide for 14 parking spaces for vehicles only (without trailers). Currently, vehicles without trailers park in existing spaces for vehicles with trailers, rendering the spaces for trailers unusable. During weekends in the summer, parking space is fully utilized and the overflow must use more distant parking areas or utilize other launch facilities.

A fish cleaning facility was constructed for use by sport fishing vessels in Thomsen Harbor, under a Cooperative Agreement with the City and Borough of Sitka. The Sitka Harbor Department

Table 19.–Peak escapement counts of coho salmon in the Sitka Area by date, 1980–1999.

Year	Sinitsin Creek		St. John Baptist Bay Creek		Starrigavan River		Eagle River		Nakwasina River		Black River	
	Peak survey date (type)	Peak count	Peak survey date (type)	Peak count	Peak survey date (type)	Peak count	Peak survey date (type)	Peak count	Peak survey date (type)	Peak count	Peak survey date (type)	Peak count
1980	30-Sep (F)	39	9-Oct (F)	26	(F)				29-Oct (F)	70	26-Oct (F)	328
1981	6-Oct (F)	85	14-Oct (F)	51	20-Oct (F)	170	22-Sep (F)	27	7-Oct (F)	780		
1982	20-Oct (F)	46	(F)		21-Oct (F)	317						
1983	27-Sep (F)	31	13-Oct (F)	12	6-Oct (F)	45			14-Oct (F)	217		
1984	10-Oct (F)	160	10-Oct (F)	154	10-Oct (F)	385			10-Oct (F)	715	3-Oct (H)	425
1985	15-Oct (F)	144	8-Oct (F)	109	11-Oct (F)	193			7-Oct (F)	408	7-Oct (H)	1628
1986	30-Sep (F)	4	10-Oct (F)	9	10-Oct (F)	57	26-Sep (F)	245	28-Oct (F)	275	10-Oct (H)	312
1987	23-Sep (F)	32	23-Sep (F)	9	9-Oct (F)	36	24-Sep (F)	167	30-Oct (F)	47	9-Oct (H)	262
1988	3-Oct (F)	56	3-Oct (F)	71	12-Oct (F)	45	2-Sep (F)	10	27-Oct (F)	104	10-Oct (H)	280
1989	5-Oct (F)	76	5-Oct (F)	89	13-Oct (F)	101	2-Oct (F)	130	19-Oct (F)	129	13-Oct (H)	181
1990	1-Oct (F)	80	1-Oct (F)	35	17-Oct (F)	39	2-Oct (S)	214	31-Oct (F)	195	4-Oct (H)	842
1991	1-Oct (F)	186	10-Oct (F)	107	2-Oct (F)	142	17-Oct (S)	454	25-Oct (F)	621	17-Oct (H)	690
1992	23-Sep (F)	265	14-Oct (F)	110	12-Oct (F)	241	6-Oct (S)	629	30-Oct (F)	654	6-Oct (H)	866
1993	7-Oct (F)	213	6-Oct (F)	90	13-Oct (F)	256	13-Oct (S)	513			7-Oct (H)	764
1994	30-Sep (F)	313	30-Sep (F)	227	11-Oct (F)	304	1-Oct (S)	717	14-Oct (F)	404	14-Oct (H)	758
1995	26-Sep (F)	152	5-Oct (F)	99	6-Oct (F)	272	5-Oct (S)	336	29-Sep (F)	626	27-Sep (H)	1265
1996	2-Oct (F)	150	2-Oct (S)	201	17-Oct (F)	59	30-Sep (S)	488	30-Oct (F)	553	30-Sep (H)	385
1997	29-Sep (F)	90	30-Sep (S)	68	27-Oct (F)	55	30-Sep (S)	296	14-Nov (F)	239	30-Sep (H)	686
1998	1-Oct (F)	109	9-Oct (S)	57	8-Oct (F)	123	9-Oct (S)	300	2-Nov (F)	653	8-Oct (H)	1520
Mean (1980–1998)		117		85		158		313		394		700
5-yr mean (1994–1998)		163		130		163		427		495		923
1999	11-Oct (S)	48	29-Oct (S)	25	8-Oct (S)	166	NS		12-Nov (S)	291	4-Oct (H)	1,590

F = foot; S = snorkel; H = helicopter.

NS = not surveyed

Department used FY 99 CIP funding ($20,000) provided by Sport Fish Division, in conjunction with funding provided by the Department of Transportation, to combine the construction of the fish cleaning facility at the south end of the Old Thomsen breakwater with other large-scale harbor improvements. Construction of the fish cleaning facility included placement of treated wood decking and rub rail, cleats, and aluminum transition plates on three existing 20-ft by 60-ft floats, installation of freshwater lines, and relocation and installation of existing fish cleaning tables. The facility was completed in August 1999 and now provides 180 linear feet of temporary moorage for sport fishing vessels and three cleaning stations. Each cleaning station consists of 3 to 4 aluminum cleaning tables (10 total) and 2 water lines. In August, after the project was completed, City staff reported that up to 10 vessels at a time were using the facility.

The concept of a second cleaning facility located toward the south end of the city harbor system was discussed with City Harbor Department staff, but is not being pursued by the City at this time. One difficulty inherent to this potential project is a lack of land access. The concept of a boat launch facility, including boat ramp, float, parking and picnicking areas, has also been discussed with staff of the City Parks and Recreation Department but, similarly, is not being pursued at this time.

Other Issues

Razor Clam Monitoring

Prior to 1994, Kruzof Island beaches supported the primary sport, personal use and subsistence fisheries for razor clams in the Sitka area. Fisheries were concentrated at Kamenoi Beach in an area about 0.7 km long which is exposed to the ocean swell and occurred during minus tides when weather conditions were favorable. From 1977 through 1986, trends in annual harvests of razor clams in the Sitka area, which averaged about 8,700 clams, were stable (Mills 1988). After 1986, annual harvests declined until 1993, when 1,000 clams were taken (Mills 1994).

During spring 1993, numerous reports from the public indicated a substantial decrease in the number of razor clams on Kamenoi Beach. Department surveys of the fishery during April and May low tides documented a general lack of success; experienced clam diggers interviewed had been able to find very few clams. Potential causes of the decline include changes in tidal currents, changes in beach composition and/or topography, increased predation by sea otters, overexploitation, and disease.

In response, the waters of Sitka Sound were closed to the taking of razor clams in 1993, and in 1994, Sport Fish Division initiated annual surveys to monitor the abundance and size and age compositions of razor clams on Kamenoi Beach. Each year during minus tides in May or June, two people each dig for one hour throughout the known razor clam distribution. The number of clams dug is used as an index to identify long-term trends in abundance levels. All clams collected are measured for length and aged to identify successful reproduction and relative size and age composition.

On June 14, 1999, 111 clams were dug by 2 people in one hour, during a –5.0' tide and very little swell (Table 20). This represents the first increase observed in this index since surveys began in 1994, and abundance was comparable to that in 1996.

Numbers of age-2, age-3 and age-4 clams found in 1999 were larger than numbers of their cohorts (ages 1-3) found in 1998. This was also the case for age-2 and age-3 clams found in 1998. These trends suggest that moderately strong brood years may have occurred in 1995, 1996 and 1997 or that survival of young clams has improved since 1996/1997. Unseen during past surveys, one very dense concentration of 'shows' was observed in one small (100 ft^2) area near the –5' tide level during 1999. Some shells with puncture marks or other evidence of sea otter predation were observed on the beach as in past years, but large concentrations of the magnitude of those observed in 1997 were not found. To ensure continued recovery of this population, sport, personal use and subsistence fisheries remained closed to the taking of razor clams in 1999.

Table 20.–Razor clam indices for Kamenoi Beach, 1994–1999.

	Age									
Year	1	2	3	4	5	6	7	8	9	**Total**
1994	56	44	24	13	10	7	3	1		158
1995	22	43	38	10	9	2	7			131
1996	8	20	30	36	6	4	1	2	1	108
1997	1	4	61	19	5	4				94
1998	5	16	10	39	5	1				77
1999		21	25	42	20	3				111

JUNEAU/GLACIER BAY AREA

The Juneau management area includes all marine and fresh waters in the vicinity of Admiralty Island, Douglas Island, Northern Chichagof Island, Lynn Canal, and the immediate Juneau area (Figure 10). Included in this area is the Glacier Bay harvest area as reported in the Statewide Harvest Survey. The major Juneau area sport (or personal use) fisheries are in marine waters for chinook salmon, coho salmon, Pacific halibut, king crab, and Dungeness crab, and in fresh water for coho salmon, cutthroat trout, Dolly Varden, and steelhead. Sport Fish area management staff consists of one permanent Fishery Biologist III, Mark Schwan, and a Fishery Biologist II assistant, Brian Glynn.

Local Management and Research Programs

There were a variety of research and stock assessment programs conducted in the Juneau management area by divisional and other departmental staff in 1999. Almost all of these are ongoing programs designed to track the status of fish stocks and fisheries in order to adequately manage stocks for sustained yield and to meet quota and allocation requirements as established by the Alaska Board of Fisheries.

The Division of Sport Fish conducted full stock assessment programs on the Taku River for both chinook and coho salmon in 1999. These programs consisted of implanting juveniles of both species with coded wire tags as the fish migrated down river to the sea. Returning adult chinook and coho salmon were captured with one or two fish wheels at Canyon Island, and then these tagged fish were recovered during spawning ground surveys later in the season. This information, along with tag recoveries from common property fisheries, allow the department to estimate contribution to fisheries, the escapement, total return, and therefore exploitation. The Division of Commercial Fisheries conducted a similar coho salmon stock assessment program at the Berners River north of Juneau, and Commercial Fisheries personnel conducted king crab stock assessment surveys in the surrounding marine waters, with special emphasis in subdistrict 11A. National Marine Fisheries personnel and departmental staff worked cooperatively at the Auke Creek weir in conducting a multi-species stock assessment program on the fishes of Auke Creek and Auke Lake. Results of the Auke Creek investigations are summarized in an annual report prepared by the weir staff (Taylor and Lum *Unpublished*).

A few trout and char research projects were also conducted in the Juneau management area. As part of the Auke Creek investigations, cutthroat trout, Dolly Varden, and a few steelhead smolts were captured and counted at the weir as they left Auke Lake. The trout research staff continued work at Turner Lake in the Juneau management area aimed to assess the effects of our regulations and also determine what levels of harvest are sustainable, through a surplus production investigation.

JUNEAU/GLACIER BAY

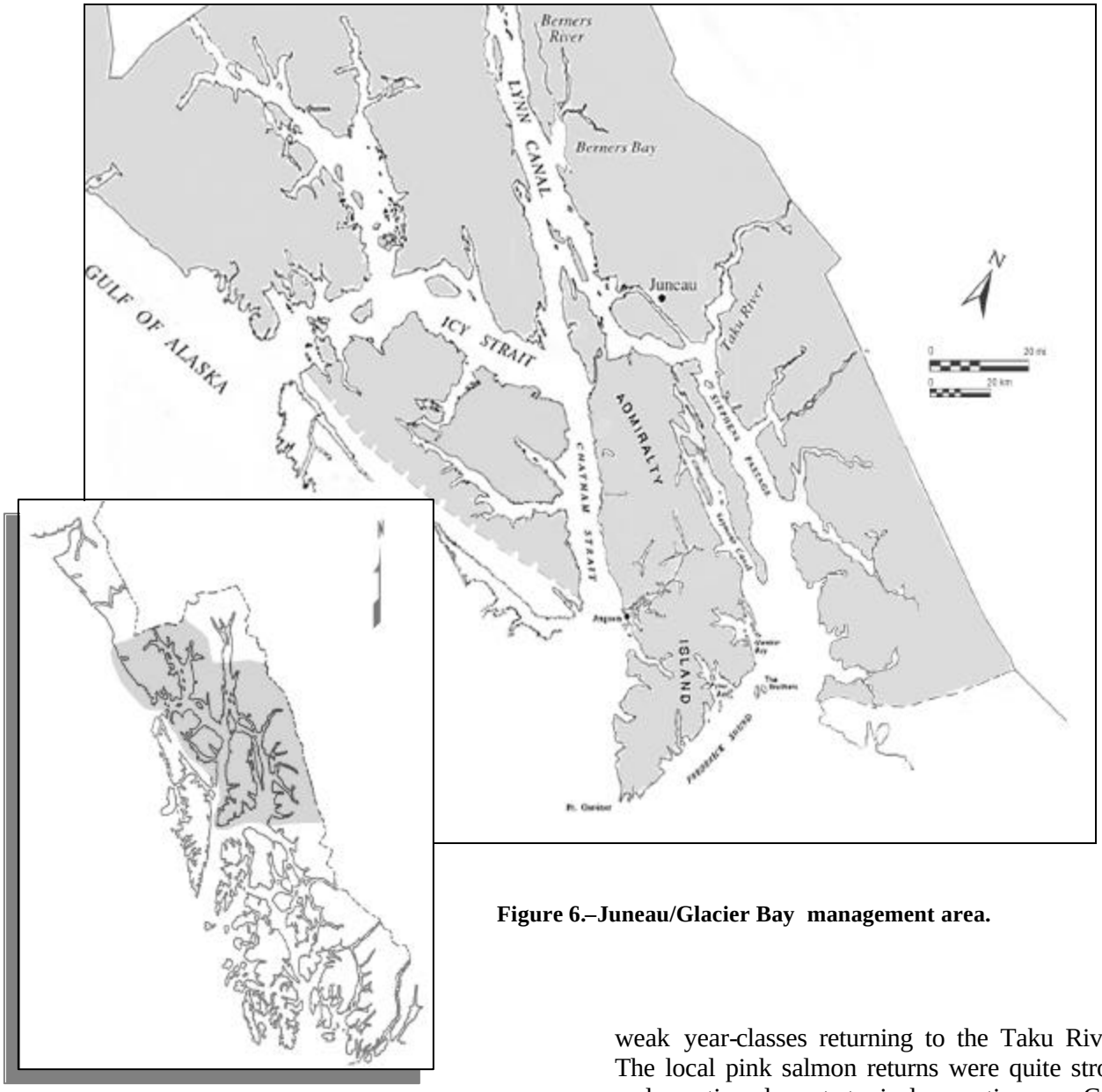

Figure 6.–Juneau/Glacier Bay management area.

The Juneau marine creel survey program again provided important inseason information concerning the local marine boat sport fishery. Dockside interviews were conducted from late April to late September. This program has gone through many iterations but is likely the longest running on-site marine creel program in Alaska. Spring chinook salmon fishing was very poor due to a couple of weak year-classes returning to the Taku River. The local pink salmon returns were quite strong and continued past typical run times. Coho fishing was slow to start but the fishery ended up being strong, with catch rates well above the 1998 rate and the recent 5-year average. Gastineau Hatchery coho salmon contributed nearly 20% of the local marine boat harvest. Estimates of effort, harvest, catch, and contributions of wild and hatchery stocks all appear in an annual FDS report covering harvest studies of selected marine sport fisheries (Hubartt et al. 2000).

Juneau management staff again conducted the Switzer Creek habitat and fish biology program for local 5th graders as part of the long-running Sea Week program. Six days were devoted to inform approximately 500 students on the fishery values of Switzer Creek and issues centered around habitat values and land management practices.

Management Actions

Windfall Lake Sockeye Fishery

The Windfall Lake outlet stream and the Herbert River within 100 yards of the confluence of the Windfall Lake outlet stream and the Herbert River were closed to all sport fishing beginning on June 1, 1999 (E.O. 1-05-99). The outlet creek and confluence area were then opened to sport fishing on Wednesday and Saturday of each week in June. This area otherwise remained closed to all sport fishing until August 9, 1999. Additionally, Windfall Lake and all inlet streams were closed to sockeye salmon fishing through August 31, but remained open to fishing for other species (E.O. 1-06-99)

These actions were comparable to what had been implemented in 1998. The June openings once again allowed an opportunity for anglers to fish for sockeye salmon, but also provided necessary protection for sockeye salmon returning to the Windfall Lake drainage to spawn. The sport fishery had either been partially or completely closed since 1991, and escapements have often been well below the goal of a peak count of 1,000 fish in the spawning index area. However, escapements over the last several years had increased, and studies in 1997 indicated that peak counts of spawning sockeye in the index area are possibly a more conservative indicator of the actual escapement. Therefore, a limited fishery was allowed again. The peak count of spawning sockeye salmon in the index spawning survey area, 737 fish, indicated the escapement was adequate to meet conservation needs.

Chinook Salmon Terminal Harvest Area Management

On May 29, an emergency order (E.O. 1-08-99) was issued for a saltwater area around Juneau that allowed additional harvest of surplus hatchery-produced chinook salmon. The bag and possession limit in this saltwater area was two chinook salmon 28 inches or more in length and two chinook salmon less than 28 inches in length. These regulations remained in effect through August 31, 1999. The terminal area included all contiguous marine waters east of a line from Indian Point in Auke Bay to the tip of False Outer Point on the north end of Douglas Island and waters west of the Juneau-Douglas Bridge over Gastineau Channel.

On June 26, the department opened all freshwater drainages crossed by the Juneau City and Borough road system that were open to sport fishing, to chinook salmon fishing (E.O. 1-17-99). The bag and possession limit in these freshwater areas was the same as in the saltwater terminal area, two chinook salmon 28 inches or more in length and two chinook salmon less than 28 inches in length. These regulations remained in effect through September 30, 1999. Anglers were also permitted the following methods and means at Fish Creek Pond: use of bait, retention of chinook salmon hooked elsewhere than in the mouth, and use of fixed or weighted hooks and lures and multiple hooks with a gap between the point and shank larger than one-half inch.

Saltwater Closure Adjacent to Auke Creek

A small area of Auke Bay, immediately off the mouth of Auke Creek, was closed to all sport fishing from July 31 to September 15, 1999 (E.O. 1-26-99). The affected area was inside of a line extending from the Auke Bay Laboratory's boat dock south to the nearest of two white buoys marking the location of the laboratory's salt water intake pipe, then continuing to an identical second buoy, and finally extending to a departmental regulatory marker on the Fritz Cove shoreline. The two white buoys were easily seen.

This action was necessary to protect adult sockeye salmon returning to the Auke Lake system. The escapement of sockeye salmon to Auke Lake up to late July was less than 1,000 fish and was projected to be far short of the escapement goal of 5,000 fish. The 1996 and 1997 smolt out-migrations, which made up the primary age-classes returning as adults in 1999, were two of

the smaller smolt out-migrations on record. Although this area was already closed to retention of sockeye salmon, anglers were targeting returning hatchery chinook salmon and approximately 15% of the sockeye salmon seen at the weir up to the time the area was closed had snagging injuries that likely resulted in mortality prior to spawning. Moreover, some anglers were intentionally harvesting sockeye salmon. Since more chinook salmon would be milling at the mouth of Auke Creek, it was necessary to push the sport fishery away from the mouth of the creek. The resulting escapement totaled 1,571 adult sockeye salmon and 109 jack sockeye salmon.

Twin Lakes Stocking

The department contracts with Douglas Island Pink and Chum, Inc. (DIPAC) to annually stock Twin Lakes with 10,000 catchable chinook or coho salmon. This stocking supports Family Fishing Day and sport fishing at the lake throughout the year. In 1999, Sport Fish contracted a local marine freight operator to once again bring steelhead to Juneau for stocking in Twin Lakes. These fish were from the Little Port Walter hatchery operated by National Marine Fisheries Service (NMFS) and were surplus to their research needs.

King Crab Personal Use Fishery

The Commercial Fish Division manages the personal use (PU) shellfish fisheries in the Juneau area (king crab may not be retained under sport fishing regulations). A permit is required to take red king crab from district 11A. When the summer personal use king crab fishery reopened on July 1, 1999, the bag limit in 11A was again set at 2 crabs (the limit was 3 in adjacent northern waters). There was also a household annual limit for 11A of 10 king crabs per person or 20 crabs per household with 2 or more people. South of Juneau, Pybus Bay, on the south end of Admiralty Island, continued to be closed to personal use fishing. It was later opened, on October 19, about 3 weeks after the department announced there would be commercial fishing allowed in Pybus Bay. The Alaska Board of Fisheries in early 1999 adopted new regulations that increased the allocation of king crab to the personal use fishery in 11A by 5%, and directed that in years when no commercial fishery takes place, the remaining allowable harvest of king crab in 11A be reallocated to the personal use fishery. There was a commercial fishery in the fall of 1999, and the commercial harvest substantially exceeded the harvest allocation in 11A.

Escapement Surveys

Coho Salmon

Escapement of coho salmon to five streams along the Juneau road system was monitored by multiple foot surveys whereby the number of coho salmon are counted by walking along a given reach of stream. The five streams combined provide an index of stock strength in the Juneau area and are also utilized to supplement abundance estimates of coho escapement on a regional level.

Escapements, in general, were better in 1999 compared to recent years, but swollen streams from rain made surveys more difficult to complete. Three of the five index streams in the Juneau area had counts above the 1981–1998 average (Table 21). Below average counts continued for Jordan (below escapement goal) and Switzer Creeks, but Peterson and Steep creek escapements were up substantially. The recent trend of below-average escapements in Jordan, Petersen, Switzer and Steep creeks appears to be a result of low freshwater survival from a series of dry summers and winters. Poor marine survival may also have been a factor influencing returns during 1997 and 1998 when ocean temperatures were above normal. Habitat impact from residential and commercial development is likely a strong factor for reduced freshwater survival in Jordan Creek and Switzer Creek.

Steelhead

Peak counts of steelhead escapement in Peterson Creek on the Juneau road system and Pleasant Bay Creek in lower Seymour Canal were monitored in 1999 to provide an annual index of steelhead abundance. Because of the relatively low number of fish in a given steelhead population, these escapements are monitored through weekly “snorkel surveys” as opposed to

Table 21.–Average peak counts of coho salmon during foot surveys of Juneau area index systems for 1981–1998, in comparison to 1999 peak counts and escapement goals.

	Jordan Creek	Montana Creek	Peterson Creek	Steep Creek	Switzer Creek
1981–1998 average	241	906	278	258	91
1999 peak count	47	1,000	272	392	50
1999 % of average	20	104	98	156	55
Point esc. goal	150	450	200	150	50
Esc. goal range	75–200	200–500	100–350	100–300	25–75
1999 at goal?	No	Yes	Yes	Yes	Yes

the foot surveys used for monitoring coho escapements. In a snorkel survey, two observers count the number of steelhead seen while snorkeling along a given reach of stream.

Peterson Creek and Pleasant Bay Creek were selected as the best indicator streams in the Juneau area based primarily on the relatively short length of stream accessible to returning steelhead spawners. The barrier falls on each of these two streams limits the upstream migration of steelhead to a distance that can be surveyed in its entirety in only a few hours. Additionally, they are extremely popular among sport anglers as Peterson is easily accessed from the Juneau road system and Pleasant Bay provides a larger population of fish in a pristine setting.

Because snorkel surveys of Peterson and Pleasant Bay Creeks have only been conducted for the past few years, it is not possible to form an accurate assessment of the relative strength of their steelhead stocks. Moreover, continued high water during spring of 1999 made surveys more difficult and the results somewhat problematic. Our peak count of steelhead in Peterson Creek was 38, and 132 in Pleasant Bay Creek.

Access Projects

Aside from minor maintenance and waste management at existing sport fishing access sites, no new access projects were undertaken in the Juneau area in 1999. The majority of work consisted of researching future shoreline access improvement projects at Cowee Creek, Peterson Creek and Fish Creek. Saltwater launch ramp improvement projects were also initiated for the Amalga Harbor, Douglas Harbor and North Douglas launch ramp facilities.

Other Issues

Twin Lakes Water and Milfoil Management

There was no progress made toward settling long-standing concerns over operation of the water pipe that diverts Salmon Creek water into South Twin Lake, nor was there any resolution of the water rights issues. Because of a heavy snow pack and somewhat wetter spring, the lake level was much higher through the late spring and early summer than in 1998. The water pipe was opened by Juneau Parks and Recreation staff in April and May, but was subsequently closed for much of the summer and fall. As summer progressed, it became apparent that the gate valve connecting the south basin and Gastineau Channel was leaking more water than from a year earlier. Crude estimates put the flow at perhaps as much as 5 or 6 cubic feet per second. ADF&G had site inspections and subsequent meetings with Parks and Recreation staff and personnel from the Department of Transportation and Public Facilities (DOTPF). Plans began to form to repair the gate valve structure in 2000.

Considerable time was again devoted toward learning more about milfoil *Myriophyllum* sp. identification, environmental tolerances, and control, management, and eradication. It was first necessary to identify which species of milfoil is in Twin Lakes. A native milfoil, *M. sibiricum*,

found throughout much of northern North America, is very difficult to separate from a more invasive species, the non-native, Eurasian milfoil *M. spicatum.* This issue was finally resolved when an expert from the state of Washington came to Juneau in late August to examine the milfoil in Twin Lakes. The conclusion was that the plant was the native water milfoil *M. sibiricum.* Although not usually so invasive, the plant likely has grown to excess in the lakes because of nutrient loading from adjacent residential areas. ADF&G and the CBJ began considering less radical treatments, but nothing was decided. There was some discussion that if the gate valve was fixed in 2000, and if this required drawing down the lake, then perhaps it would be a good time to do some mechanical removals of milfoil from shoreline areas.

Chinook Salmon Broodstock Development at Gastineau Hatchery

The current fish genetics policy states that a particular stock of salmon cannot be used at more than three production hatcheries in the region. Gastineau Hatchery has been trying to change its chinook salmon stock from Andrew Creek because it is used at too many other hatcheries in Southeast Alaska. An alternative stock from King Salmon River has been under development for some time, however, for a variety of reasons, the King Salmon River stock no longer was deemed a viable stock for brood development. Rather than work toward an exemption from the genetic policy, hatchery and departmental personnel began to consider the Tahini River chinook salmon stock, which is being used in enhancement projects in the Haines and Skagway areas.

The people of Skagway, DIPAC, and departmental staff cooperated to develop a plan to place Tahini River chinook salmon eggs taken from adult chinook salmon returning to Burro Creek and Pullen Creek near Skagway into Gastineau Hatchery for rearing and subsequent release as smolts back in the Skagway area. The first 100,000 chinook salmon alevins were transported to Juneau in December, 1998 and held through 1999, with their release planned for the spring of 2000 at Pullen Creek. The plan is to develop a return of chinook salmon to the Skagway area sufficient to provide enough eggs for the Gastineau hatchery of Tahini stock, as well as enhance the chinook salmon fishery in the Skagway area. In the interim, no eggs will be taken from chinook salmon returning to the Gastineau Hatchery, because of problems in separating Andrew Creek and King Salmon River fish. During this transition period, fertilized eggs will be obtained from Crystal Lake hatchery near Petersburg for stocking in Juneau. In 1999, only 30,000 eggs from Skagway chinook returns were transported to Gastineau Hatchery. If the number of eggs obtained from chinook adults returning to the hatcheries in the Skagway area remains low, a future eggtake from wild-stock Tahini River chinook salmon might be necessary.

Auke Lake Dolly Varden and Cutthroat Trout

The outmigration of sea-run Dolly Varden and cutthroat trout from Auke Lake continued to decline, but it is hard to assess what is causing these repeated declines. Potential causes include reduced local production or production in the Auke Lake system, increased mortality while in Auke Lake, reduced marine survival, increased incidental harvest or bycatch in a local commercial fishery, annual variability in over-wintering site selection, and/or increased angler-induced mortality. The fact that recent trends appear nearly identical for Dolly Varden and cutthroat trout is interesting. Perhaps the record high outmigrations in 1995, 1996, and 1997 reflected optimum conditions for survival. It is interesting to note that the 1999 outmigration of Dolly Varden, although substantially below those three high years, was basically identical to the outmigration first measured in 1970 and again in 1981. Those two years represented radically different assumed abundance levels for local Dolly Varden. Therefore, we might be making too much out of recent declines, and this drop may reflect factors that might be difficult or impossible to affect through realistic management actions.

Increasing Guided Sport Fishing Effort at Remote Streams and Lakes

Owing to reports of increasing guided sport fishing effort and harvest at Mud Bay on Chichagof Island, we asked the USFS Hoonah Ranger District if they would be willing to request

guides to report fishing activity by their clients. The Juneau District has been asking guides they permit to do so but more guides are permitted out of the Hoonah office, and Mud Bay is in the Hoonah District. Sport Fish staff developed a form for the Forest Service to provide to the guides, although the Forest Service made this a voluntary reporting activity. The resulting reported activity was therefore not complete, but definitely showed that certain guides were using the Mud Bay repeatedly throughout the summer season. The Hoonah staff told us that they will be making this reporting mandatory for the year 2000. This will be very helpful, as complaints about increased guided sport fishing have come in for other remote areas in the Juneau management area, including Pavlof Lake and Neka River on Chichagof Island.

Sweetheart Creek Sockeye Salmon

The 1999 return of sockeye salmon to Sweetheart Creek was down from recent years. This sockeye salmon return was still the result of prior fry stocking in Sweetheart Lake by ADF&G when it ran Snettisham Hatchery. Since there are not many personal use or sport fishing opportunities for sockeye salmon near Juneau, this fishery continued to be very popular. The 1999 personal-use harvest was 1,668 sockeye salmon and there were 190 personal use permits issued for the fishery (personal communication from Commercial Fisheries staff, Alaska Department of Fish and Game, Juneau).

HAINES/SKAGWAY AREA

The Haines/Skagway management area includes all waters from Point Sherman to the Canadian border, including Lynn Canal and all drainages entering it (Figure 11). The major fisheries in the area are in salt water for chinook salmon and Pacific halibut and in fresh water for cutthroat trout, Dolly Varden, coho, sockeye, and pink salmon. There are two major drainages supporting substantial sport fisheries in the Haines area: the Chilkoot and Chilkat rivers. The Skagway area has limited fisheries resources and relies more on hatchery production to provide sport fishing opportunities. Permanent Sport Fish management staff consists of one Fishery Biologist III, Randolph Ericksen, stationed in Haines.

Local Management and Research Programs

Chinook Salmon

The Chilkat River is considered the third or fourth largest producer of chinook salmon in Southeast Alaska (Pahlke 1997). A spring sport fishery in Chilkat Inlet near Haines targets mature chinook salmon returning to the Chilkat River. A creel survey has been used to estimate effort and chinook harvest in this fishery since 1984. Historically, this fishery harvested up to 1,700 chinook salmon annually (Table 22). From 1981 through 1992, the escapement was monitored through survey counts on clearwater tributaries to the Chilkat River as an index of abundance. Restrictive management of the fishery began in 1987 when high harvests of chinook salmon in the sport fishery coincided with low numbers of fish observed in spawning tributaries. The restrictions culminated with a closure of the spring fishery in 1991 and 1992.

Mark-recapture experiments have been used to estimate the abundance of large chinook salmon entering the Chilkat River since 1991. Inriver abundance of large chinook salmon has varied between 2,271 and 8,100 fish (Table 22). These studies showed that escapements were higher than expected and the fishery was reopened in 1993. Since then, the estimated harvest of chinook salmon in the spring fishery has leveled out at around 300 fish (Table 22) despite liberalized harvest regulations. It is unclear whether the high harvests observed during the mid-1980s were the result of higher effort, larger returns of chinook salmon to the Chilkat River, or both. The 1999 effort, catch, and harvest of Chilkat River chinook salmon were the lowest on record.

Management of Chilkat River chinook salmon has been largely passive in recent years. For example, Chilkat Inlet off the mouth of the river is closed to sport fishing April 15 to July 15 by regulation. However, our goal is to take more active management in the future. Beginning in 1998, we started forecasting the return of large chinook salmon to Lynn Canal based on the previous year's sibling return (e.g., the return of age 1.3 fish in 1997 is used to forecast the return of age 1.4 fish in 1998). The 1999 pre-season

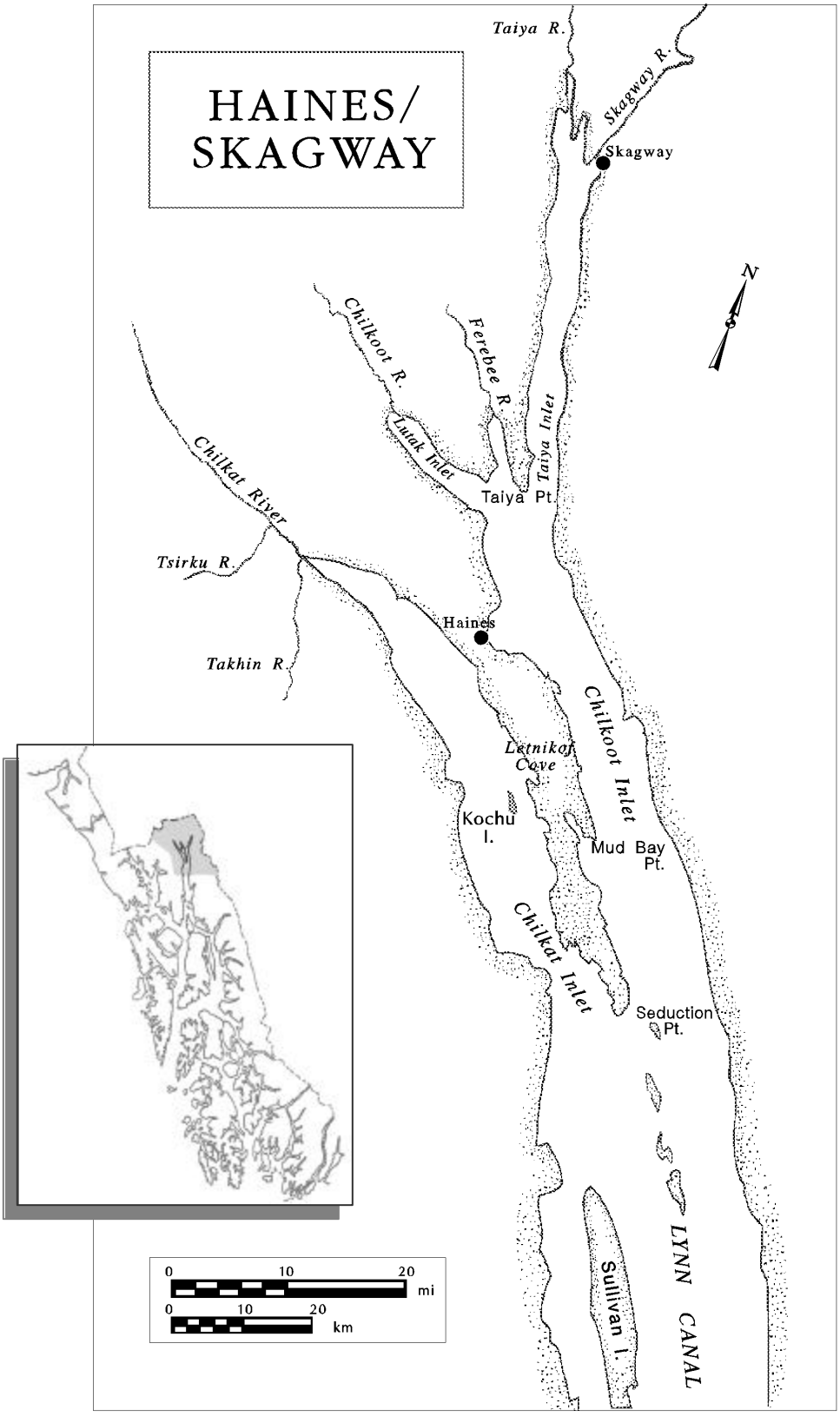

Figure 11.–Haines/Skagway management area.

Table 22.–Estimated angler effort, catch and harvest of large (≥28 in.) chinook salmon in the spring Haines marine boat sport fishery, 1984–1999, and abundance of large (≥age 1.3) chinook salmon entering the Chilkat River, 1991–1999. Data through 1998 from tables in Ericksen (1999a); 1999 data from Ericksen (2000a).

Year	Salmon hrs-effort	SE	Chinook salmon				CPUE[a]	Inriver abundance[b]	SE
			Catch	SE	Harvest	SE			
1984	9,855	[c]	1,072	[c]	1,072	[c]	0.109		
1985	20,582	[c]	1,705	[c]	1,696	[c]	0.083		
1986	32,533	[c]	1,659	[c]	1,638	[c]	0.051		
1987	22,848	2,191	1,094	189	1,094	189	0.048		
1988	32,723	3,476	505	103	481	101	0.015		
1989	9,363	922	237	42	235	42	0.025		
1990	11,972	1,169	248	60	241	57	0.021		
1991			Fishery closed					5,897	1,005
1992			Fishery closed					5,284	949
1993	9,069	1,479	349	63	314	55	0.038	4,472	851
1994	7,682	597	269	41	220	32	0.035	6,795	1,057
1995	8,606	483	255	42	228	41	0.030	3,790	805
1996	9,596	866	367	43	354	41	0.038	4,920	751
1997	8,758	697	381	46	381	46	0.044	8,100	1,193
1998	7,546	747	222	60	215	56	0.029	3,675	565
1999	6,097	734	184	24	184	20	0.030	2,271	408
1984–90 avg.	19,982		931		922		0.050		
1993–99 avg.	8,193		290		271		0.035	4,860	
1984–99 avg.	14,088		611		597		0.043	5,023	

[a] Catch of large (≥28") chinook salmon per salmon hour of effort.

[b] Abundance of large (≥age 1.3) chinook salmon entering the Chilkat River. No estimates available prior to 1991.

[c] No variances available for 1984–1986.

forecast (2,505, SE = 431) was nearly identical to the post-season estimate (2,470, SE = 408) of the return. If this forecasting method continues to prove reliable, in future years, we plan to develop a management plan for Chilkat River chinook salmon that includes sport, commercial, and subsistence fisheries.

The Burro Creek (operated by Burro Creek Farms) and Jerry Myers (operated by the Skagway High School) hatcheries have been releasing chinook salmon smolts in the Skagway area for a number of years (Table 23). These releases were increased, beginning in 1992, under an agreement with the Hidden Falls hatchery (operated by NSRAA). Hidden Falls was allowed to discon-tinue use of the Tahini River brood stock under the condition that the remaining brood be released in Taiya Inlet near Skagway. As a result, the number of hatchery chinook salmon returning to the Skagway area has increased in recent years.

A growing charter boat industry targeting these hatchery fish has taken advantage of increases in the number of cruise ship passengers arriving in Skagway. Presently, no funding is allocated to sampling chinook salmon in the Skagway harvest for CWTs. However, during 1999, one person traveled to Skagway on a weekly basis as time allowed to sample for CWTs. During 1999, 6% (SE = 4%) of the small and 25% (SE = 13%) of the large chinook salmon sampled were missing adipose fins (Table 24).

Table 23.–Number of hatchery chinook salmon smolts released in the Skagway area by brood year and facility, 1987–1999.

Facility	Brood year	Date released	Number of smolt released
Jerry Myers	85	6/16/87	6,060
Jerry Myers	86	6/10/88	4,659
Jerry Myers	87	6/10/89	1,730
Jerry Myers	88	6/8/90	6,431
Jerry Myers	89	6/19/91	7,152
Jerry Myers	90	6/10/92	11,905
Hidden Falls	90	5/20/92	30,223
Jerry Myers	91	6/11/93	12,859
Hidden Falls	91	5/22/93	56,415
Burro Creek	91	6/3/93	8,572
Jerry Myers	92	6/11/94	1,650
Hidden Falls	92	5/20/94	38,789
Burro Creek	92	6/5/94	8,749
Jerry Myers	93	6/10/95	5,595
Burro Creek	93	6/10/95	1,903
Jerry Myers	94	5/24/96	1,507
Burro Creek	94	6/15/96	34,895
Burro Creek	95	6/21/97	12,815
Jerry Myers	96	6/10/98	8,631
Burro Creek	96	6/14/98	15,956
Jerry Myers	97	5/31/99	1,856

Table 24.–Number of small and large chinook salmon sampled for missing adipose fins at the Skagway Boat Harbor during 1999.

	Examined for ad-clips		Ad-clipped	
Date	Small	Large	Small	Large
6/17	0	3	0	0
6/23	5	0	0	0
6/29	4	1	0	1
7/07	5	1	0	1
7/14	11	5	0	1
7/21	2	0	0	0
7/28	5	2	2	0
Total	32	12	2	3

Coho Salmon

The Chilkat River supports one of the largest freshwater sport fisheries for coho salmon in the Southeast region, with annual harvests averaging about 1,000 coho salmon (Mills 1979-94, Howe et al. 1995, 1996, 2001a, 2001b, 2001c). This system also contributes a significant number of coho salmon to commercial troll, gillnet and seine fisheries in northern Southeast Alaska. Research conducted during the 1980s on coho salmon stocks in Lynn Canal, suggest that these stocks are subjected to very high (over 85%) exploitation rates (Elliott and Kuntz 1988, Shaul et al. 1991). We initiated a program to coded wire tag coho salmon smolt in the Chilkat River in 1999. During the spring of 1999, we tagged 26,000 coho smolt in the drainage. These fish will return as adults during the fall of 2000. We will combine CWT data from coho salmon harvested in various fisheries throughout Southeast Alaska with sampling of adults in Chilkat River fish wheels to estimate harvest in 2000 and smolt abundance in 1999.

The current management program for Chilkat River coho salmon relies on postseason monitoring of escapements by an "index system" where survey counts are conducted on four streams: Clear Creek, Spring Creek, Tahini River, and Kelsall River (Table 25). The number of adult coho spawners are counted in one day during peak spawning. These index counts appear to reflect abundance trends in the Chilkat drainage given comparisons with two years of mark-recapture estimates (Table 25). However, these index counts represent only 3.8% of the total escapement in the drainage, making them a relatively poor management tool.

Peak survey counts of coho salmon to the Chilkat River in 1999 were slightly below the long-term average, but better than during the past three years (Table 25). However, high water caused us to abort survey counts later in the season. Thus, coho salmon escapement in 1999 may have been somewhat greater than the counts suggest.

Sockeye Salmon

The Chilkoot Lake and River sport fishery is one of the largest freshwater sport fisheries in South-

Table 25.–Peak counts of coho salmon during surveys of four index streams to the Chilkat River, 1987–1999, and mark-recapture estimates of escapement, 1990 and 1998.

Year	Peak survey counts					Mark-recap. estimate	SE	Ratio
	Spring Creek	Kelsall River	Tahini River	Clear Creek	Combined			
1987	84	184	696	23	987			
1988	83	152	539	35	809			
1989	48	182	981	134	1,345			
1990	79	328	2,448	150	3,005	80,700	9,984	0.0372
1991	176	392	1,707	135	2,410			
1992	174	266	1,077	700	2,217			
1993	95	115	947	460	1,617			
1994	398	440	4,419	381	5,638			
1995	253	178	1,029	177	1,637			
1996	180	157	381	290	1,008			
1997	204	129	643	250	1,226			
1998	264	262	638	275	1,439	37,132 [a]	7,432	0.0388
1999	324	202	930	195	1,651			
Average	182	23-	1,264	247	1,922	58,916		0.0380

[a] 1998 mark-recapture estimate from Ericksen (1999b).

east Alaska. Sockeye salmon returning to the Chilkoot River drainage support important sport, commercial, and subsistence fisheries in the area. CF Division monitors the escapement of sockeye salmon into the drainage using a weir. Weir counts have been below the escapement goal (total goal range = 52,500–91,500) for the past 7 years (Figure 12). Although the sport fishery typically harvests fewer than 1,000 sockeye salmon per year, it has been very popular with residents and visitors to the area.

Pink Salmon

The escapements of pink salmon into the Chilkoot River during 1998 and 1999 were the highest on record (Figure 13). The large escapements are primarily a result of restrictive management of the Lynn Canal commercial gillnet fishery to protect Chilkoot sockeye salmon. We are currently working to establish an escapement range for Chilkoot pink salmon so that we can liberalize bag and possession limits when escapements warrant.

Dolly Varden

The Chilkoot Lake and River sport fishery maintains the largest harvest of Dolly Varden in the region. This harvest peaked in 1985 at over 14,000 Dolly Varden and steadily declined until 1994 (Figure 14, Mills 1977-1994, Howe et al. 1995, 1996, 2001a, 2001b, 2001c), suggesting the population might have been overexploited. As a result of this decline, the bag limit in the drainage was reduced from 10 to 2 per day in 1994. Since 1994, the harvest has leveled out at about 1,400 Dolly Varden per year (Figure 14). Because of the importance of the Chilkoot Dolly Varden sport fishery, research was conducted on the population during 1997 and 1998. During the winter of 1997-1998, we estimated that 109,152 (SE = 21,065) Dolly Varden $\geq$220 mm FL over-wintered in Chilkoot Lake (Ericksen 2000b). A per-recruit analysis of the population indicated that at similar population levels, the harvest should not exceed 7,000 fish annually (Ericksen 2000b). Thus, current harvest levels are well within acceptable limits.

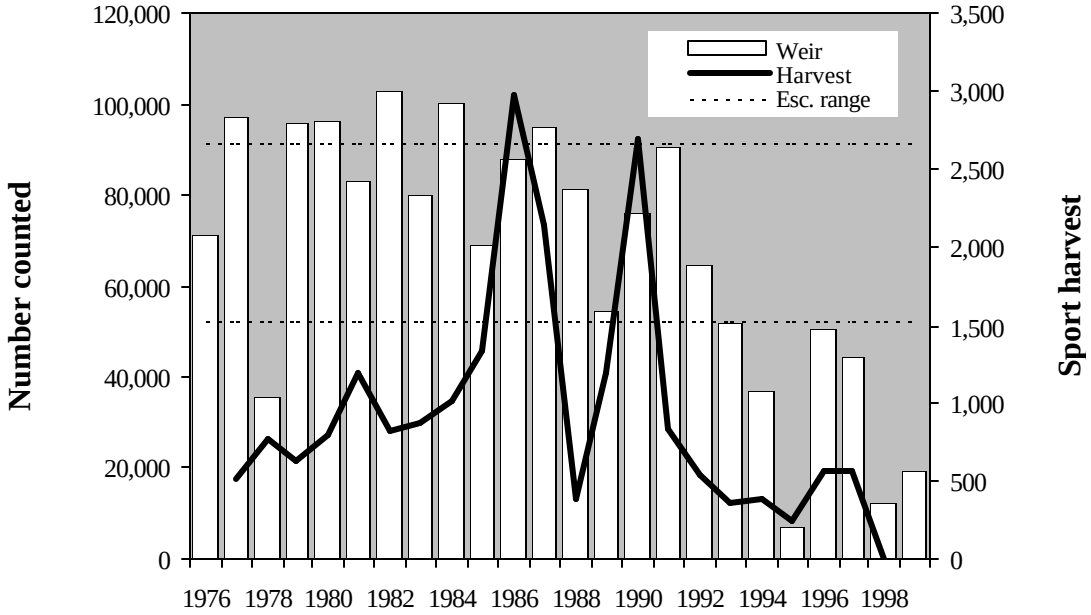

Figure 12.–Number of sockeye salmon counted through the Chilkoot River weir (1976–1999) and total harvest in the Chilkoot River/Lake sport fishery (1977–1998).

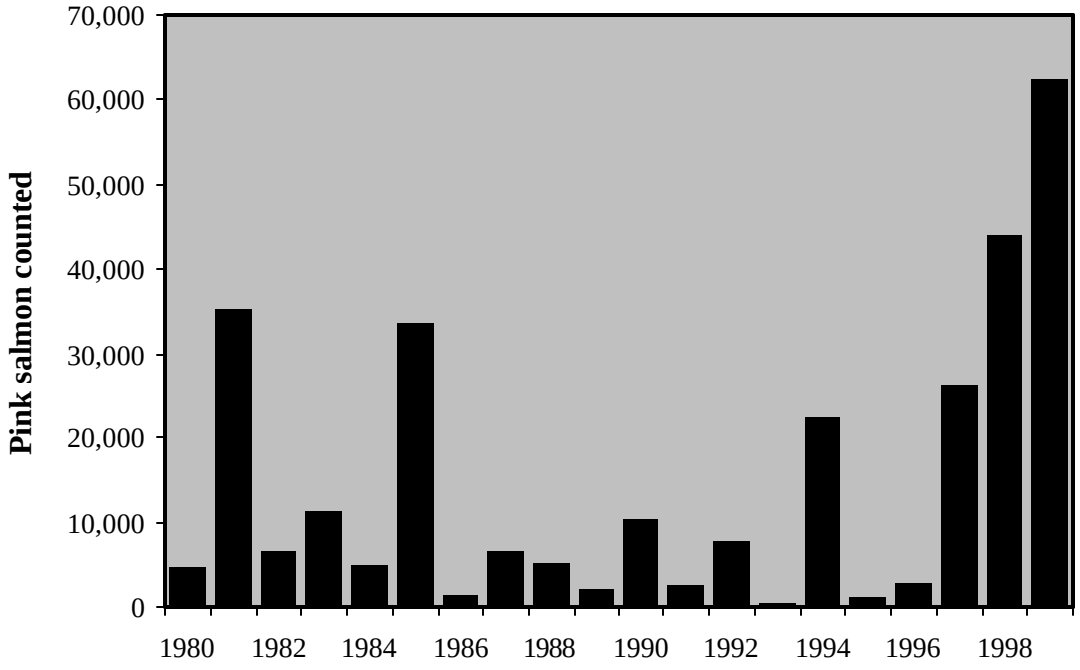

Figure 13.–Number of pink salmon counted through the Chilkoot River weir (1980–1999).

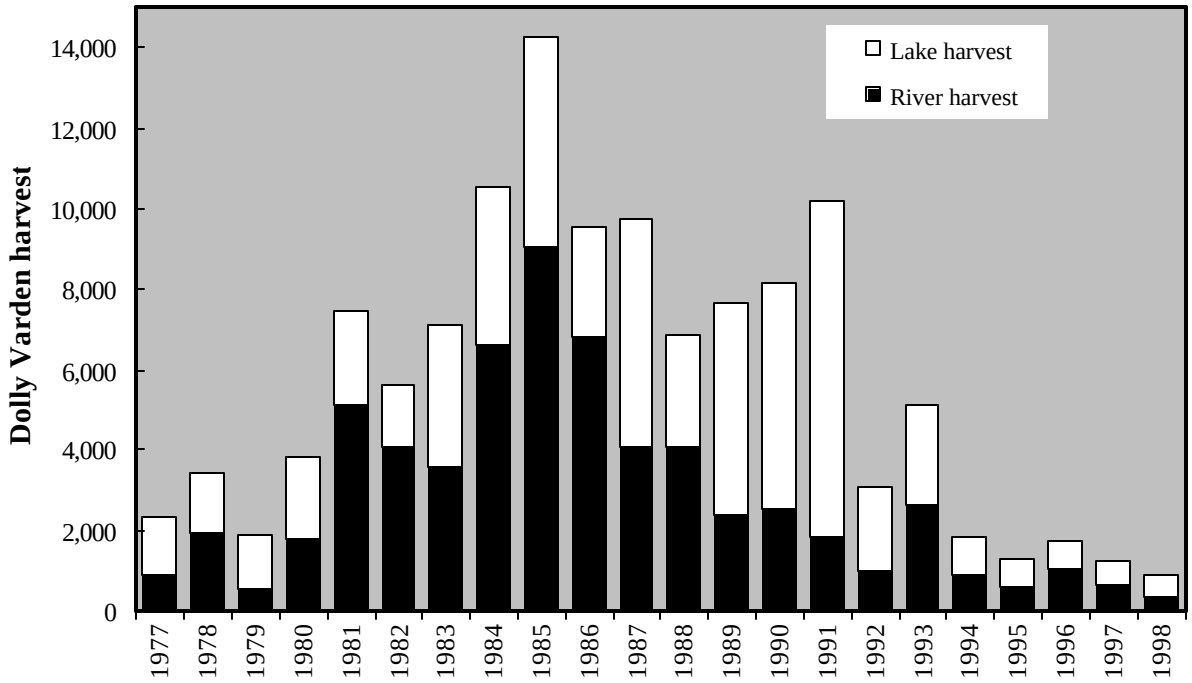

Figure 14.–Harvest of Dolly Varden in the Chilkoot River/Lake sport fishery, 1977–1998.

Management Actions

Skagway Chinook Salmon Terminal Harvest Area Management

Two emergency orders were issued during 1999 related to sport fishing for hatchery chinook salmon returning to the Skagway Area. The first established chinook salmon bag and possession limits in two freshwater areas, and the second liberalized bag and possession limits for chinook salmon and closed small areas to sport fishing to allow sufficient numbers of chinook salmon to escape for broodstock needs.

The Skagway River and Pullen Creek above the Jerry Myers hatchery weir were opened to chinook salmon fishing by emergency order (E.O. 1-9-99) on June 11, 1999. In addition, anglers fishing in Taiya Inlet north of the latitude of Taiya Point were allowed to keep small chinook salmon (E.O. 1-10-99). The bag and possession limit in Taiya Inlet and Pullen Creek was 2 chinook salmon 28 inches or more in length, and 2 chinook salmon <28 inches in length. In the Skagway River, anglers were allowed to keep 4 chinook salmon 28 inches or more in length and 4 chinook salmon <28 inches in length. These areas were opened to allow harvest of surplus hatchery-produced chinook salmon released at Burro Creek, Pullen Creek, and the Skagway Boat Harbor. Hatchery-produced chinook salmon returning to Pullen Creek were expected to exceed broodstock needs at local hatcheries. Chinook salmon in excess of hatchery needs were passed upstream of the weir where they were available for harvest. The limits were higher in the Skagway River because the river does not support a chinook salmon population and hatchery chinook salmon have been straying there from production areas. While most of the chinook harvest in Skagway occurs in salt water, a small number are taken in fresh water each year. The majority of the freshwater harvest occurs in Pullen Creek rather than the Skagway River because of the relative clarity of the water and accessibility.

Chinook salmon returning to Pullen Creek must migrate into the stream through a culvert accessible only during high tide. Hatchery fish must therefore mill in salt water off the mouth of the stream until a sufficient high tide allows them to pass through the culvert. A similar situation occurs at the mouth of Burro Creek where fish mill in salt water before migrating upstream. These fish are vulnerable to sport fishing in these areas. To ensure that enough chinook salmon entered Pullen Creek and Burro Creek for brood stock needs, the area of Taiya Inlet north of a line extending from a department marker on the Broadway Dock to a department marker on the ore terminal dock, and the area enclosed in a 1,500-ft radius around the mouth of Burro Creek, were closed to sport fishing by emergency order (E.O. 1-10-99) from June 11 through August 31, 1999.

Extension of the Chilkat Inlet Area Chinook Salmon Closure

The sport fishing closure for chinook salmon in Chilkat Inlet was extended through July 23rd to protect mature chinook salmon returning to spawn in the Chilkat River (E.O. 1-21-99). Sport fishery catch data and information collected in the lower Chilkat River indicated that the return of chinook salmon was weak and about one week later than normal. This information confirmed our forecast that the return of chinook salmon to the Chilkat River would be the lowest on record. In addition, we received numerous reports by subsistence fishers in Chilkat Inlet that indicated chinook salmon were holding in salt water later than normal.

Chilkoot Drainage Sockeye Closures

Three emergency orders were issued during 1999 related to sport fishing for sockeye salmon in the Chilkoot drainage. The first closed the Chilkoot sport fishery to retention of sockeye salmon effective June 17 through September 15 (E.O. 1-13-99). A total of 160 sockeye salmon had been counted through the Chilkoot River weir by June 15. This was well below the 10-year average of 2,340 sockeye salmon by that date. Conservative restrictions were also implemented on the commercial fishery to protect sockeye returning to this drainage. At that time, the early return of sockeye salmon to the Chilkoot Lake and River was projected to be well below the early run escapement goal of 16,500–31,500. Commercial catches of Chilkoot sockeye in the drift gill net fishery in Lynn Canal confirmed that the return of Chilkoot sockeye was weak, and additional restrictions were implemented on that fishery to protect sockeye salmon returning to the drainage. To boost escapement into the drainage, anglers fishing Chilkoot Lake and River were not allowed to retain sockeye salmon.

The second emergency order closed sockeye salmon spawning areas to sport fishing effective July 16 through September 15 (E.O. 1-22-99). By July 13, 3,946 sockeye salmon had been counted through the Chilkoot River weir, well below the 10-year average of 15,764 sockeye salmon by that date. Therefore, all streams flowing into Chilkoot Lake and designated sockeye salmon spawning areas in the lake were closed to sport fishing to reduce incidental catch and release mortality. The measures in these emergency orders were later extended through October 15 (E.O. 1-29-99) to further protect spawning sockeye salmon in the drainage.

Chilkat Lake Sockeye Limit Increase

The sport fishing bag and possession limit for sockeye salmon in the Chilkat Lake drainage was increased on September 16 (E.O 1-30-99) when we projected the escapement of sockeye salmon would exceed 120,000 fish. This exceeded the upper limit of the escapement range (52,000–106,000) established by the department. The Alaska Board of Fisheries has authorized the department to use its emergency order authority to increase sport fish bag and possession limits when total escapement of a species of anadromous fish is projected to exceed the upper limit of its escapement range. Thus, the limit of sockeye salmon was increased to 12 per day and 24 in possession in Chilkat Lake and all inlet and outlet streams of Chilkat Lake down to the confluence with the Tsirku River.

Access Projects

There were no active projects in the area. However, discussions continued with the City of Haines regarding the Portage Cove boat launch and with Division of Parks regarding improvements to the Chilkat State Park boat launch.

Other Issues

Land Use

Work proceeded on the Haines Highway realignment project. Construction of the first phase (Muncaster Creek to Little Boulder Creek) continued through 1999. Meanwhile, the second phase of the project (Little Boulder Creek to the border) was initiated. In addition, work on the Skagway Airport expansion continued through 1999. All of these projects impacted fish habitat and required extensive mitigation work. The culvert at the end of Pullen Creek in Skagway was enlarged and partially day-lighted to improve fish passage as part of the mitigation package for the airport work.

Two hydropower projects near Skagway were active during 1999. Goat Lake Hydro went into operation in December of 1997 and planning and design continued on the Otter (Kasidaya) Creek Hydro. Goat Lake was stocked with grayling in 1994 and 1995. These fish have survived and successfully spawned. It is unclear how the spring drawdown will affect future spawning success of the grayling. ADF&G requested that Alaska Power and Telephone (AP&T) conduct studies to determine whether grayling can access the spawning stream during the spring drawdown period. On July 13, 1999, staff traveled to Goat Lake with AP&T personnel to look for grayling. The lake had been drawn down but had refilled to about 10–15 ft below normal capacity. No grayling were observed in the main inlet stream, and it did not appear they could access it at this level. Three adult grayling were captured with a variable mesh gillnet in the lake off the main inlet stream and several hundred yearling fish were observed in shallow coves of the lake. AP&T agreed to conduct another survey in 2000 to determine if there are any yearling grayling in the lake. If yearling grayling are found it proves that adult grayling were able to spawn in 1999 despite the drawdown. Kasidaya Creek is a high gradient, glacial stream that flows directly into Taiya Inlet. Fish habitat is limited to the intertidal reaches of the stream.

Skagway Chinook Enhancement

Skagway residents are actively pursuing ways to increase the number of chinook salmon released in their area. With the conclusion of releases of Hidden Falls fish and the imminent sale and/or closure of the Burro Creek Hatchery, another rearing facility is needed to continue smolt releases in the area. Douglas Island Pink and Chum, Inc. (DIPAC) is currently working with the city of Skagway to cooperatively develop the Tahini River broodstock for potential use in Skagway and at the Gastineau facility. DIPAC is also working with the city of Skagway on plans to construct and operate a new facility located on the mouth of Pullen Creek. The facility would replace the existing Jerry Myers Hatchery and be available to Skagway High School students to continue their hatchery curriculum. The hatchery would recover their costs by charging tourists for hatchery tours. DIPAC was holding about 90,000 chinook fry (1998 brood year) and 33,000 chinook eggs (1999 brood year) in 1999 for release in the Skagway area.

YAKUTAT AREA

The Yakutat management area includes all waters of Alaska draining into the Gulf of Alaska from Cape Suckling to Cape Fairweather (Figure 15). The major fisheries of the Yakutat area are in salt water for Pacific halibut, coho salmon, and chinook salmon, and in fresh water for steelhead, chinook salmon, coho salmon, and sockeye salmon. Permanent Sport Fish management staff consists of one Fishery Biologist III, Robert Johnson, stationed in Yakutat.

Local Management and Research Programs

Yakutat Marine Catch Sampling and Situk River Creel

The Yakutat area supports growing recreational fisheries in marine and fresh waters, for a variety of salmonid and bottomfish species. Marine boat fishery effort nearly doubled from 1993 to 1997. Coho salmon harvests in marine waters more than tripled from 1,500 fish in 1993 to 5,200 fish in 1997. Additionally, lingcod and rockfish harvests doubled from 1993 to 1999, and Pacific halibut harvests increased approximately 60% from the 1990 to 1993 harvest average. As the number of anglers and harvest increase, stock composition, harvest timing and other population parameters require assessment. Accordingly, a catch sampler monitored the marine boat fishery at the Yakutat boat harbor and recorded 2,474 angler trip interviews during 1999. As a result, 153 chinook salmon, 3,588 coho salmon, 817 lingcod, and 2,406 halibut were sampled—over one-half of the estimated total Yakutat marine sport harvest of Pacific halibut and lingcod—and 28 coded wire tagged salmon were recovered. Another technician interviewed anglers from the Situk River chinook salmon fishery which resulted in an estimated sport harvest of 1,046 large (≥28" in length) chinook salmon. Scale samples were also collected from chinook salmon harvested in the Situk fishery.

Situk River Steelhead Escapement Monitoring

The Situk River produces the largest run of steelhead in Southeast Alaska. Recent steelhead runs have varied between about 5,800 and 9,200 fish. This is the largest known spring run of steelhead in Alaska; however, Karluk River in Southwest Alaska supports a fall steelhead population of similar magnitude. Low steelhead numbers in 1991 and 1992 in the Situk River helped prompt conservation concerns that resulted in regional regulations to reduce harvests to a minimum (i.e., artificial unbaited lures only, with only one fish ≥36" in total length per day, and two per season).

Steelhead abundance is currently monitored by counting emigrant adults (kelts) at a weir and by counting adults in float surveys. Weir kelt counts from 1994 through 1999 suggest an overall improved run strength. The Situk steelhead population attracts a substantial number of anglers. During 1999, it was estimated that more than 14,000 steelhead were caught in the Situk River and 82 of these fish were harvested. Between May 9 and August 6, 1999, 9,204 steelhead were counted as they emigrated downstream through a weir located 1.2 miles upstream of the Lower Landing on the Situk River. This count was an increase of 59% in the steelhead escapement from 1998 and was the highest count since the early 1950s. The peak of emigration occurred June 9, when 1,362 steelhead were counted downstream through the weir.

High water conditions during the spring of 1999 prevented any total river float counts (Situk Lake downstream to the Lower Landing) for spawning steelhead, and only two float surveys of the lower (Nine Mile Bridge to the Lower Landing) Situk River were conducted. The highest float survey index count occurred on June 9 when 3,778 steelhead were counted in the lower river (41% of total weir count), during fair to good conditions. In general, fish were concentrated within the lower river from the weir (about river mile 1.2) upstream to river mile 4.4.

Alsek River Chinook Salmon Project

Chinook salmon returning to the Alsek River in 1999 were tagged with spaghetti tags to estimate population size (Pahlke and Etherton. 2001). The estimate of chinook salmon escapement in 1999 for the Alsek drainage was 11,600 large (>660 mm mid-eye to fork length) fish, up from 4,600

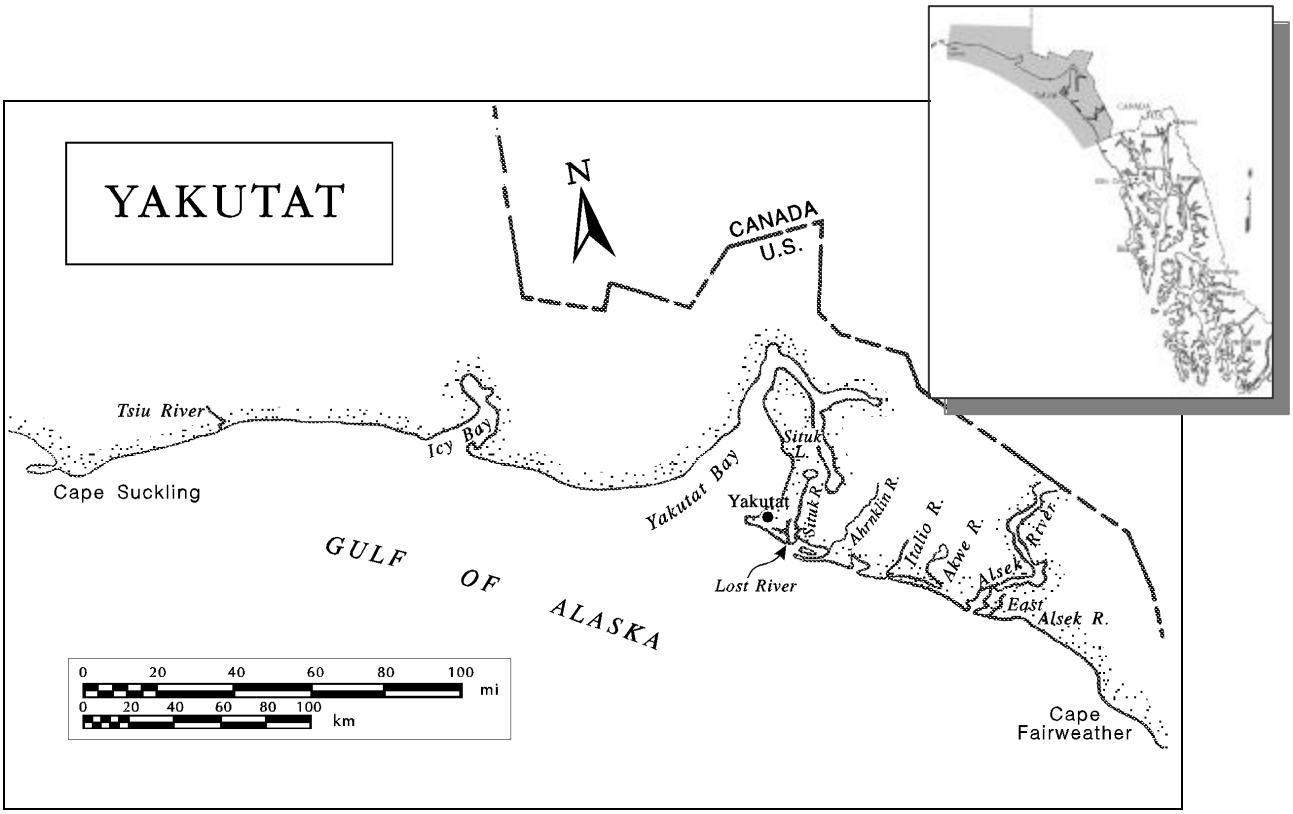

Figure 15.–Yakutat management area.

estimated in 1998. The Klukshu River weir in Canada was shown to be a valid index of chinook salmon escapement.

Management Actions

Situk River Chinook Salmon Management

The Situk River is managed for a chinook salmon escapement of 450 to 750 large fish with a mid-point of 600 large (age 3-ocean or older) chinook salmon as the goal. Returns are highest when escapements are between 600 and 1,100 large spawners, and returns are lower when escapements are above or below that range; the magnitude of reduction depends on how far away.

Managers projected that the 1999 Situk River chinook salmon escapement goal would exceed 750 large fish due in part to excellent ocean survival rates. The bag limit in the Situk River for chinook salmon ≥16 inches in length was therefore set at two fish per day and two in possession on June 9, 1999 (E.O. 1-11-99). The chinook salmon fishery was monitored with a sampling program to estimate chinook salmon harvest and age at length in the sport fishery.

After several weeks of monitoring inseason escapement, managers determined that the 1999 chinook salmon escapement goal would exceed 1,000 large fish. In order to harvest the chinook salmon surplus above and beyond the escapement goal while providing protection for upstream resident rainbow trout stocks, use of bait was allowed downstream from the Middle Situk Airstrip from June 28 through August 15, when coho salmon were expected to begin returning (E.O. 1-18-99). The final 1999 Situk River chinook salmon escapement was 2,011 large fish.

Situk River Sockeye Salmon Management

The Situk River is managed for a mid-range escapement goal of 50,000 sockeye salmon, and managers projected that the escapement goal would be achieved. The weir escapement tracked within the range required to reach the

escapement goal, and there were no restrictions to the sport fishery. The final Situk River sockeye escapement for 1999 was 61,544 fish.

Surveys

Besides the above discussion of steelhead escapement surveys conducted on the Situk River, no other escapement surveys were attempted in 1999.

Access Projects

A trail from the Situk River Lower Landing area upstream around new private property was completed with assistance from the U.S. Forest Service. Improved Yakutat boat harbor launching and toilet facilities still top the access priority list and are still pending.

Other Issues

The Local Area Management Plan for Pacific halibut continues to be developed by a number of local user groups for submission to the Board of Fisheries. A revision of the Situk River Management Plan is in the works with the U. S. Forest Service, Yakutat Tlingit Tribe, and the City and Borough of Yakutat participating.

LITERATURE CITED

Alaska Department of Fish and Game (ADF&G). *Unpublished*. FY2000 regional management report for Southeast Alaska sport fisheries. Unpublished report. Located at: Alaska Department of Fish and Game, Division of Sport Fish, Juneau.

Beers, D. E. 1999. Production of coho salmon from Slippery Creek, 1997–1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-46, Anchorage.

Bernard, D. R., S. A. McPherson, K. A. Pahlke, and P. Etherton. 2000. Optimal production of chinook salmon from the Stikine River. Alaska Department of Fish and Game, Fishery Manuscript No. 00-1, Anchorage.

Brookover, T. E., P. A. Hansen, and T. Tydingco. *In press*. Smolt production and adult harvest of coho salmon from the Nakwasina River in Southeast Alaska, 1998-1999. Alaska Department of Fish and Game, Fishery Data Series No. 01-xx, Anchorage.

Brookover, T. E., P. A. Hansen, and T. A. Tydingco. 2000. Population status of brook trout at Green Lake, Southeast Alaska, 1999. Alaska Department of Fish and Game, Fishery Data Series No. 00-23, Anchorage.

Der Hovanisian, J. A. and R. P. Marshall. 1995. Abundance and size of cutthroat trout at Baranof Lake, Southeast Alaska, 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-27, Anchorage.

Elliott, S. T. and K. J. Kuntz. 1988. A study of coho salmon in Southeast Alaska: Chilkat Lake, Chilkoot Lake, Yehring Creek, and Vallenar Creek. Alaska Department of Fish and Game, Fishery Data Series No. 62, Juneau.

Ericksen, R. P. 1999a. Sport fishing effort, catch, and harvest, fishery contributions, and inriver abundance of Chilkat River chinook salmon near Haines, Alaska in 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-19, Anchorage.

Ericksen, R. P. 1999b. Abundance of coho salmon in the Chilkat River in 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-29, Anchorage.

Ericksen, R. P. 2000a. Sport fishing effort, catch, and harvest, and inriver abundance of Chilkat River chinook salmon near Haines, Alaska in 1999. Alaska Department of Fish and Game, Fishery Data Series No. 00-28, Anchorage.

Ericksen, R. P. 2000b. Stock assessment of Dolly Varden in the Chilkoot Lake drainage, 1997-1998. Alaska Department of Fish and Game, Fishery Data Series No. 00-14, Anchorage.

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, A. E. Bingham, 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.

Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001a. Revised Edition: Harvest, catch and participation in Alaska sport fisheries during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-29(revised), Anchorage.

Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001b. Revised Edition: Harvest, catch and participation in Alaska sport fisheries during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-25(revised), Anchorage.

Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001c. Revised Edition: Participation, catch and harvest in Alaska sport fisheries during 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-41(revised), Anchorage.

Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001d. Participation, catch, and harvest in Alaska sport fisheries during 1999. Alaska Department of Fish and Game, Fishery Data Series No. 01-08, Anchorage.

Hubartt, D. J., A. E. Bingham, and B. J. Frenette. 2000. Harvest estimates for selected marine sport fisheries in Southeast Alaska during 1999. Alaska Department of Fish and Game, Fishery Data Series No. 00-17, Anchorage.

Jaenicke, M. J., and B. J. Frenette. *Unpublished*. Summary data from the sport fishery for Pacific halibut in the IPHC Area 2C portion of Southeast Alaska, 1999. Located at: Alaska Department of Fish and Game, Division of Sport Fish, Juneau.

Johnson, R. E. and J. D. Jones. 1998. Southeast Alaska steelhead studies, 1997: Situk River weir and surveys of index streams. Alaska Department of Fish and Game, Fishery Data Series No. 98-45, Anchorage.

Jones, J. D. 1994. Harvest surveys at U.S. Forest Service public use cabins in Southeast Alaska, 1993 Alaska Department of Fish and Game, Fishery Data Series No. 94-39, Anchorage.

Mills, M. J. 1979. Alaska statewide sport fish harvest studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1978-1979, Project F-9-11, 20 (SW-I-A), Juneau.

Mills, M. J. 1980. Alaska statewide sport fish harvest studies. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1979-1980, Project F-9-12, 21 (SW-I-A), Juneau.

Mills, M. J. 1981a. Alaska statewide sport fish harvest studies (1979). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1980-1981, Project F-9-13, 22 (SW-I-A), Juneau.

Mills, M. J. 1981b. Alaska statewide sport fish harvest studies (1980). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1980-1981. Project F-9-13, 22 (SW-I-A), Juneau.

Mills, M. J. 1982. Alaska statewide sport fish harvest studies (1981). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1981-1982, Project F-9-14, 23 (SW-I-A), Juneau.

Mills, M. J. 1983. Alaska statewide sport fish harvest studies (1982). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1982-1983, Project F-9-15, 24 (SW-I-A), Juneau.

Mills, M. J. 1984. Alaska statewide sport fish harvest studies (1983). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1983-1984, Project F-9-16, 25 (SW-I-A), Juneau.

Mills, M. J. 1985. Alaska statewide sport fish harvest studies (1984). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1984-1985, Project F-9-17, 26 (SW-I-A), Juneau.

Mills, M. J. 1986. Alaska statewide sport fish harvest studies (1985). Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Annual Performance Report, 1985-1986, Project F-10-1, 27 (RT-2), Juneau.

Mills, M. J. 1987. Alaska statewide sport fisheries harvest report (1986). Alaska Department of Fish and Game, Fishery Data Series No 2, Anchorage.

Mills, M. J. 1988. Alaska statewide sport fisheries harvest report (1987). Alaska Department of Fish and Game, Fishery Data Series No. 52, Anchorage.

Mills, M. J. 1989. Alaska statewide sport fisheries harvest report (1988). Alaska Department of Fish and Game, Fishery Data Series No. 122, Anchorage.

Mills, M. J. 1990. Harvest and participation in Alaska sport fisheries during 1989. Alaska Department of Fish and Game, Fishery Data Series No. 90-44, Anchorage.

Mills, M. J. 1991. Harvest, catch, and participation in Alaska sport fisheries during 1990. Alaska Department of Fish and Game, Fishery Data Series No. 91-58, Anchorage.

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

Mills, M. J. 1993. Harvest, catch, and participation in Alaska sport fisheries during 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-40, Anchorage.

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.

Pahlke, K. A. 1997. Escapements of chinook salmon in Southeast Alaska and transboundary rivers in 1996. Alaska Department of Fish and Game, Division of Sport Fish, Fisheries Data Series No. 97-33, Anchorage.

Pahlke, K. A. and P. Etherton. 200l. Abundance of the chinook salmon escapement on the Alsek River, 1999. Alaska Department of Fish and Game, Division of Sport Fish, Fishery Data Series, No. 01-11, Anchorage.

Schmidt, A. E. 1982. Inventory of high quality recreational fishing waters in Southeast Alaska. Alaska Department of Fish and Ga me. Federal Aid in Fish Restoration, Annual Performance Report, 1981-1982, Project F-9-14, 23 (G-I-R).

Schmidt, A. E. 1986. Status of selected coho salmon stocks in Southeastern Alaska. Alaska Department of Fish and Game. Federal Aid in Fish Restoration, Project F-10-1, 27.

Schmidt, A. E. 1987. Coho salmon studies in Southeast Alaska. Alaska Department of Fish and Game, Fishery Data Series No. 18, Juneau.

Shaul, L. D., P. L. Gray, and J. F. Koerner. 1991. Coded wire tag estimates of abundance, harvest, and survival rates of selected coho salmon stocks in Southeast Alaska, 1981-1986. Alaska Department of Fish and Game, Fishery Research Bulletin No. 91-05.

Suchanek, P. M., S. H. Hoffman, R. E. Chadwick, D. E. Beers, T. E. Brookover, M. W. Schwan, R. P. Ericksen, R. E. Johnson, B. J. Glynn, and R. W. Bentz. 2001. Area management report for the sport fisheries of Southeast Alaska, 1998. Alaska Department of Fish and Game, Fishery Management Report No. 01-10, Anchorage.

Taylor, S. G. and J. L. Lum. *Unpublished*. Annual report Auke Creek weir 1999, operations and fish counts. Located at: National Marine Fisheries Service, Auke Bay Laboratory, Juneau, Alaska.

Yanusz, R. J. 1997. Status of sea-run cutthroat trout, sea-run Dolly Varden, and steelhead populations at Sitkoh Creek, Southeast Alaska, during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-23, Anchorage.