Fishery Management Report No. 95-4

Area Management Report for the Recreational Fisheries of the Kenai Peninsula, 1994

by

Dave Nelson

July 1995

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

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SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The Kenai Peninsula Sport Fish Management Area (KPMA) is comprised of the following areas (Figure 1): (1) fresh waters of the Kenai Peninsula west of a line from Cape Puget to the west bank of the mouth of Ingram Creek, excluding Ingram Creek; (2) marine waters enclosed by a line from Gore Point to Cape Douglas on the south and the East and West Forelands of Cook Inlet on the north; and (3) freshwater drainages which flow into Cook Inlet, Kamishak Bay, and contiguous bays north of Cape Douglas and south of the West Foreland of Cook Inlet.

Land managers in the KPMA include the United States Forest Service (Chugach National Forest), United States Fish and Wildlife Service (Kenai National Wildlife Refuge) and the Alaska Department of Natural Resources. The communities of Kenai, Soldotna, Sterling and Homer also manage lands through zoning under their jurisdictions. The Cook Inlet Regional and Chugach Native Corporations also manage lands granted them under the Alaska Native Claims Settlement Act. Land is also under private ownership near the major population centers and along the major road systems.

Larger communities located within the KPMA include Kenai, Soldotna, Seward, and Homer. Smaller communities located in the management area include Hope, Anchor Point, Cooper Landing, Sterling, Clam Gulch, Halibut Cove, Seldovia and Ninilchik. The management area is linked to the state's highway system via the Sterling and Seward Highways which provide sport anglers access to many of the area's major fisheries. Remote areas of the KPMA can be accessed via wheel or float equipped aircraft, boat or walking.

Regulations governing sport fisheries in these areas are embodied in the following three regulatory areas: (1) the Kenai Peninsula Area, (2) the Cook Inlet-Resurrection Bay Saltwater Area, and (3) the Susitna-West Cook Inlet Area. The codified regulations for these regulatory areas are found in Chapters 56, 58 and 61, respectively, of the Alaska Administrative Code.

The KPMA includes portions of two areas for the purposes of participation and harvest reporting in the mail survey of Mills (1994). These are: (1) the Kenai Peninsula and Kenai River Area (Area P) less the marine fisheries from Cape Puget to Point Adam, and (2) that portion of the West Cook Inlet-West Susitna River Drainages Area (Area N) including all freshwater drainages which flow into Cook Inlet, Kamishak Bay, and contiguous bays between Cape Douglas and West Foreland.

Management and research functions for the KPMA recreational and personal use fisheries are the responsibility of the Soldotna area office of the Alaska Department of Fish and Game (ADF&G), Division of Sport Fish. The Division of Sport Fish staff stationed at Soldotna is comprised of one area management biologist (Dave Nelson), an assistant area management biologist (Dave Athons), two senior research biologists (Steve Hammarstrom and Terry Bendock), and several assistant research project leaders (Jay Carlon, Larry Larson, Mary King, Larry Marsh and Tim McKinley). These staff are assisted by approximately 25 seasonal technicians and biologists whose employment ranges from 2 to 11 months. The Soldotna staff is supported by a permanent Field Office Assistant (Roberta Eide) and one seasonal clerical position (Nancy Carver). A Fishery Biologist III (Nick Dudiak) is stationed in Homer. He functions as a

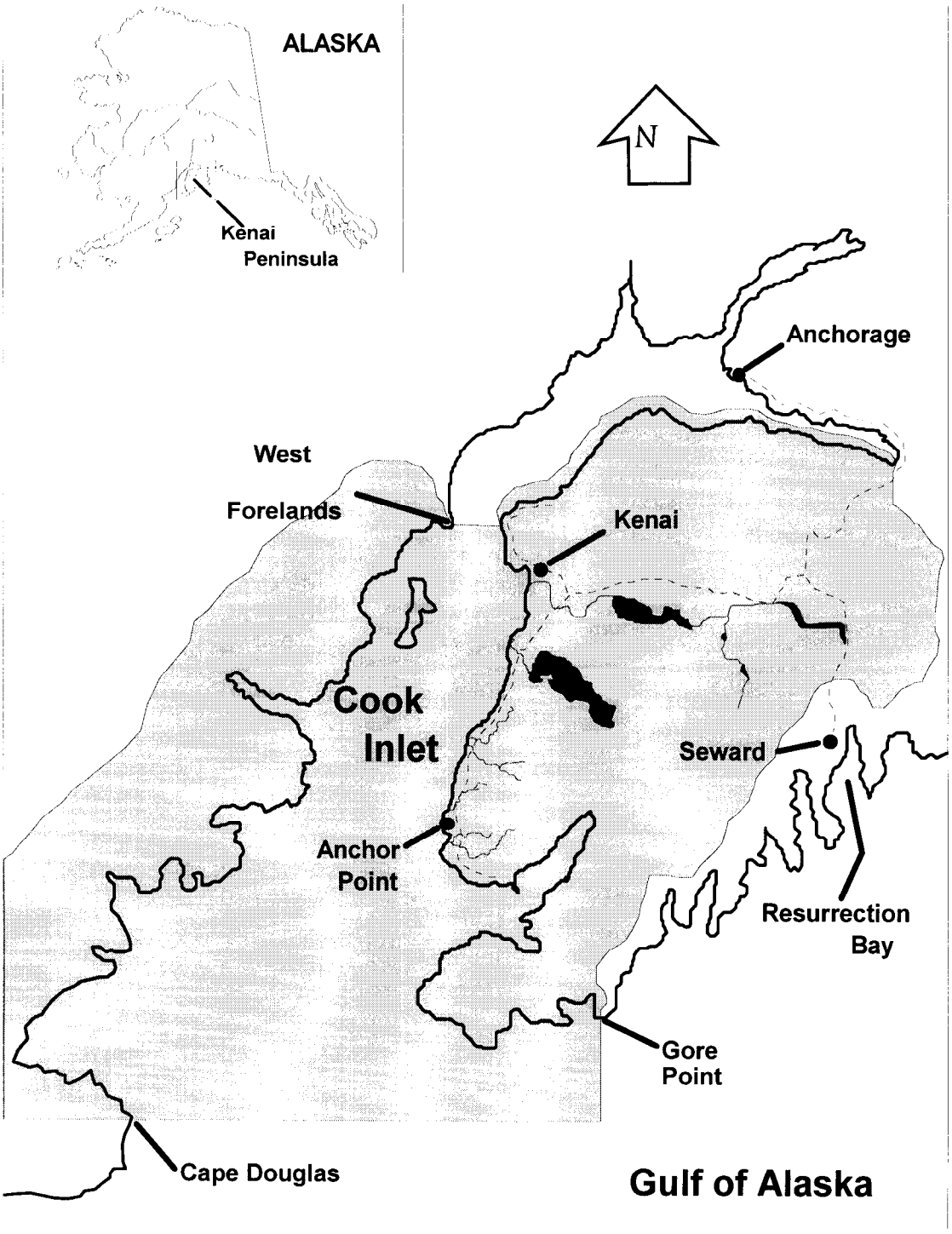

Figure 1.-The Kenai Peninsula Management Area (shaded) includes Cook Inlet south of the West Forelands, drainages on the west side of Cook Inlet south of the West Forelands to Cape Douglas, and all Kenai Peninsula drainages west of Gore Point.

management/research biologist with approximately 50% of his duties associated with sport fishing activities.

FISHERIES RESOURCES

The KPMA offers diverse fishing opportunities for recreational and personal use anglers. Anglers can target four species of North Pacific salmon (pink *Oncorhynchus gorbuscha*, coho *O. kisutch*, sockeye *O. nerka*, and chinook *O. tshawytscha*) in fresh and salt water. Anglers can also target salmon stocked into various landlocked lakes. Popular fisheries also occur on the area's anadromous stocks of Dolly Varden *Salvelinus malma*, steelhead trout *O. mykiss*, and smelt *Osmeridae,* and resident stocks of rainbow trout *O. mykiss* and lake trout *Salvelinus namaycush* also support popular sport fisheries. Less popular fisheries occur on resident stocks of Arctic grayling *Thymallus arcticus* and northern pike *Esox lucius*. In marine waters, anglers target halibut *Hippoglossus stenolepis*, rockfish *Sebastes*, lingcod *Ophiodon elongatus*, razor clams *Siliqua patula* and several species of hardshell clams. Anglers also target shrimp *Pandalidae* and Tanner *Chionoecetes bairdi*, and Dungeness *Cancer magister* crab in the lower portion of the management area.

Wild chinook salmon support major fisheries on the Anchor River, Deep Creek and Ninilchik River (lower Peninsula); in the marine waters of Cook Inlet adjacent to Whiskey Gulch and Deep Creek; and in the Kenai River which supports the largest recreational fishery for this species in Alaska. Stocked chinook salmon returns support fisheries at the Kasilof and Ninilchik rivers, the Homer Spit lagoon, the community of Seldovia, and Halibut Cove in Kachemak Bay.

Wild coho salmon returns support major fisheries on the aforementioned lower Peninsula streams and in the Kenai River which supports the largest recreational freshwater coho salmon fishery in Alaska. Numerous smaller streams, on both the east and west sides of Cook Inlet, support smaller sport fisheries for this species. Additional coho salmon fishing opportunity is provided by stocking landlocked Kenai Peninsula lakes.

The Russian River supports an early and late sockeye salmon return. These wild runs support one of the largest recreational fisheries for this species in Alaska. The Kenai River also supports a relatively new recreational sockeye salmon fishery. This fishery has expanded significantly in recent years. In years of high sockeye salmon abundance, the sport harvest of this species in the Kenai River exceeds that of the Russian River, elevating the Kenai River to Alaska's largest recreational sockeye salmon fishery.

The upper Kenai Peninsula also supports two personal use sockeye salmon dip net fisheries which occur on the Kenai and Kasilof rivers. These fisheries are opened by emergency order predicated on achieving escapement levels specified in management plans adopted by the Alaska Board of Fisheries.

Pink salmon return in large numbers to several streams during even-numbered years. The major fishery for this species occurs on the Kenai River wild stocks. Harvest in the Kenai River has increased during even-numbered years because of more liberal bag and possession limits (6 daily).

Chum salmon *O. keta* do not return to KPMA streams in significant numbers and do not support a sport fishery in the KPMA.

The state's largest personal use and recreational razor clam fisheries occur on the beaches of the upper Kenai Peninsula. The fisheries occur along a 50-mile area of beach between the Kasilof and Anchor rivers on the east side of Cook Inlet. A smaller fishery also occurs adjacent to Polly Creek and Crescent River on the west side of Cook Inlet.

Dolly Varden are found in most freshwater drainages of the upper Kenai Peninsula. This species supports major fisheries in the Anchor River, Deep Creek, Ninilchik River, Stariski Creek, and in the Kenai River. Numerous other smaller streams and lakes support this species, providing additional recreational angling opportunity at roadside as well as more remote locations.

Rainbow trout occur in numerous lakes and streams of the KPMA. Streams which support major rainbow trout fisheries are the Kenai River, Russian River (primarily a catch-and-release fishery by regulation), and the streams and lakes of the Swanson River and Moose River drainages. To provide additional fishing opportunity, landlocked lakes are also stocked with this species.

Steelhead trout provide recreational fishing opportunity in the Anchor River, Deep Creek, Ninilchik River, and Stariski Creek. Stocks are at low levels in these streams and only catch-and-release fishing for this species is currently permitted. A small stocked return of this species was established in Crooked Creek. This stocking program has been discontinued due to straying of stocked fish into the Kenai River. In 1995 and future years, steelhead trout production in Crooked Creek will be from natural production.

ALASKA BOARD OF FISHERIES PROCESS

Development of fishing regulations for the KPMA occurs within the established Alaska Board of Fisheries process. Public input concerning regulation changes and allocation issues is provided through direct testimony to the Board of Fisheries and through participation in local Fish and Game advisory committees. Advisory committees have been established throughout Alaska to assist the Boards of Fish and Game in evaluating fisheries and wildlife issues and proposed regulatory changes. Most active committees meet at least once each year, usually in the fall prior to the Board meetings. Staff from the Division of Sport Fish and other divisions are often invited to attend the committee meetings. In this way, advisory committee meetings allow for direct public interaction with staff involved with resource issues of local concern. Within the KPMA there are seven advisory committees: Cooper Landing, English Bay-Port Graham, Kenai-Soldotna, Seldovia, Central Peninsula, Homer and Seward. The area management biologist serves as liaison between the Boards Support Section and the Kenai-Soldotna, Central Peninsula, and Cooper Landing Advisory Committees.

The Board of Fisheries addresses KPMA fisheries on a 3-year cycle. Proposals regarding the KPMA finfish fisheries were last heard during the 1992 Board meetings and will again be heard during the 1995-1996 Board meetings.

MANAGEMENT PLANS AFFECTING FISHERIES

Upper Cook Inlet fisheries (commercial, sport, personal use and subsistence) have been the focus of intensive allocative issues for many years. These controversial issues have led the Board of Fisheries to establish management plans and policies to regulate and allocate the area's fisheries resources. These plans ensure for the sustained yield of fishery resources and establish allocation and management actions and guidelines for fisheries managers of the department.

Management plans germane to KPMA fisheries are:

1. Upper Cook Inlet Salmon Management Plan (5 AAC 21.363)

   This plan establishes allocation priorities for salmon returns to upper Cook Inlet streams. The plan was adopted by the Board as policy in 1977 and adopted as regulation in 1981.

2. Kenai River Early Run Chinook Salmon Management Plan (5 AAC 56.070)

   This plan establishes escapement objectives and management actions for Kenai River early-run chinook salmon. The plan was adopted by the Board in 1989.

3. Kenai River Late Run Chinook Salmon Management Plan (5 AAC 21.359)

   This plan establishes escapement objectives and management actions for Kenai River late-run chinook salmon. The plan was adopted by the Board in 1989.

4. Kenai River Sockeye Salmon Management Plan (5 AAC 21.360)

   This plan establishes escapement objectives and management actions and guidelines for the Kenai River sockeye salmon return. The plan was adopted in 1984.

5. Russian River Sockeye Salmon Management Plan (5 AAC 21.361)

   This plan establishes escapement objectives and management actions and guidelines for early and late-run Russian River sockeye salmon. The plan was adopted in 1988.

6. Kasilof River Sockeye Salmon Management Plan (5 AAC 21.365)

   This plan governs the harvest of sockeye salmon returning to the Kasilof River in excess of spawning escapement requirements. This plan was adopted by the Board in 1986.

7. Big River Sockeye Salmon Management Plan (5 AAC 21.368)

   The purpose of this plan is to authorize a commercial harvest of Big River sockeye salmon by gillnets in the Kustatan Subdistrict under a chinook salmon harvest quota of 1,000. When the incidental chinook salmon harvest reaches 1,000 fish, the targeted sockeye salmon fishery closes. This plan was adopted by the Board in 1989.

8. Cook Inlet & Copper River Basin Rainbow/Steelhead Trout Management Policy

   This management policy was adopted in 1986 to provide future Boards, fisheries managers, and the sport fishing public with: (1) management policies and implementation directives for area rainbow and steelhead trout fisheries, (2) a systematic approach to developing sport fishing regulations that includes a process for rational selection of waters for special management, and (3) recommended research objectives.

9. Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan (5 AAC 77.545)

   This plan provides for salmon dip net fisheries on the Kenai and Kasilof rivers, and China Poot, Fox and Fish creeks. It further provides for dip net fisheries on waters where hatchery produced fish are returning but no spawning grounds are available. This plan was in effect for the 1981 season and was adopted as regulation by the Board in 1982.

10. Central District Personal Use Sockeye Salmon Management Plan (5 AAC 77.547)

    This plan provides for a personal use set gillnet fishery in Cook Inlet near the terminus of the Kasilof River. The fishery opens June 21 and is managed for a harvest of 5,000 to 10,000 sockeye salmon. This plan was adopted in 1982.

11. Central and Northern District Personal Use Coho Salmon Management Plan (5 AAC 77.548)

    This plan provides for a set gillnet personal use fishery in Cook Inlet from the Kasilof River north to Point Possession. The fishery occurs the last 3 weekends in September and is managed for a harvest not to exceed 2,500 coho salmon. The plan was adopted as regulation in 1983.

12. Southern District Personal Use Coho Salmon Fishery Management Plan (5 AAC 77.546)

    The fishery this plan regulates predates statehood and has been conducted under both "subsistence" and "personal use" regulations. The current plan, adopted as a personal use regulation in 1993, provides for a set gillnet personal use fishery in Kachemak Bay. The fishery opens August 16 with two, 48-hour periods weekly. The fishery closes when harvest is projected to be 2,500-3,500 coho salmon.

13. Southern District Coho Salmon Subsistence Fishery Management Plan (5 AAC 01.591)

    This management plan provides for a subsistence fishery in lower Cook Inlet, primarily in the Kachemak Bay area. The target species is coho salmon. The fishery is closed when 2,500 to 3,500 coho salmon are harvested. In some years this fishery has replaced the personal use coho salmon fishery as provided for under 5 AAC 77.546.

14. Upper Cook Inlet Subsistence Salmon Management Plan (5 AAC 01.592)

    This management plan provides for a subsistence fishery in upper Cook Inlet. Regulations governing the fishery are complex and all five species of Pacific salmon are harvested in the fishery. Fishing begins in May and continues through September. Legal gear types are set gillnets in Cook Inlet and dip nets in the mouths of the Kenai and Kasilof rivers. In some years this fishery has replaced personal use fisheries as provided for under 5 AAC 77.547 and 5 AAC 77.548.

RECREATIONAL ANGLER EFFORT

Since 1977, recreational angler effort in the KPMA has been estimated using a mail survey (Mills 1979-1994). This survey estimates participation in sport fishing and the harvest of sport fish species. The survey is designed to provide estimates of participation measured in angler-days and the number of fish harvested on a site by site basis and, unfortunately, is not designed to provide estimates of participation directed towards a single species. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site by site basis. Harvest and catch are estimated for individual species. Additionally, creel surveys have been selectively used for fisheries that require more detailed information or inseason management and to validate the mail survey for fisheries of interest. The following summary of recreational angler effort in the KPMA is based on estimates for the mail survey (Mills 1979-1994).

Diverse recreational fishing opportunities, combined with ease of access and close proximity to major population centers, attract large numbers of anglers to the Kenai Peninsula. As a result, the KPMA supports the highest angler participation in Alaska. From 1977 through 1993, the KPMA has accounted for an average of 35% of the total statewide recreational angling participation. During 1993, participation approached 900,000 angler-days in KPMA waters (Table 1).

From 1977 through 1988, recreational angling effort increased from about 400,000 angler-days to about 875,000 angler-days (Figure 2). Since 1988, participation has stabilized, averaging about 845,000 angler-days (Table 1). Reasons for this stabilization during recent years include full utilization of many existing fish stocks and social issues such as crowding and access.

The Kenai River accounts for the largest recreational fishery in the KPMA. Over the past 5 years, this river has accounted for about 40% of the area's total recreational angling effort, or about 340,000 angler-days annually (Table 1). Most of this effort is expended by nonguided anglers fishing salmon and resident stocks of rainbow trout and Dolly Varden.

Other fresh waters of the Kenai Peninsula also support major fisheries. Of these, the Russian River supports the largest fishery, with most participation directed towards early- and late-run stocks of sockeye salmon. Other freshwater fisheries supporting significant participation include the Ninilchik, Anchor River and Deep Creek, streams of the lower Kenai Peninsula. Most of the angling effort in these streams is directed towards salmon, Dolly Varden and steelhead trout. The Kasilof River supports a major fishery for stocked chinook salmon.

Kenai Peninsula salt waters also support large fisheries. In combination, these saltwater fisheries account for about 25% of the total recreational effort expended by anglers over the past 5 years or about 209,000 angler-days annually (Table 1). A large percentage of this effort is directed towards halibut and chinook salmon. The halibut fishery occurs from Deep Creek south to the outer gulf coast. The chinook salmon fishery occurs from Deep Creek south to Bluff Point.

Shellfish, notably razor clams, are harvested along the eastern beaches of the Kenai Peninsula. Since 1977, saltwater fisheries for shellfish have accounted for an average of about 44,000 angler-days (Table 1), or about 5% of the total recreational effort expended by anglers fishing KPMA waters over the past 5 years.

Western Cook Inlet saltwater and freshwater fisheries and Kenai Peninsula personal use fisheries account for only a small percentage (less than 5%) of the total recreational fishing effort expended in the KPMA (Table 1).

OTHER USER GROUPS AFFECTING FISHERIES

Fisheries resources of the KPMA also support commercial, personal use, subsistence and scientific/educational fisheries. Commercial fisheries occur in both upper (UCI) and lower Cook Inlet (LCI). The demarcation point between these two commercial fishing regulatory areas is the latitude of Anchor Point.

LCI salmon resources support both setnet and seine commercial fisheries. The 1984 to 1993 average annual commercial harvest in LCI for both gear types is 1,165,945 salmon. On average, 1,436 are chinook, 244,595 sockeye, 12,809 coho, 831,720 pink and 75,386 chum salmon. Pink salmon are the primary commercial species in this regulatory area. Allocation of the resource between commercial and other user groups is not a major issue in LCI.

Table 1.-Angler-days of effort expended by recreational anglers fishing Kenai Peninsula Management Area waters, 1977-1993.

Year	West Cook Inlet Saltwater	West Cook Inlet Freshwater	Kenai Peninsula Saltwater Finfish	Kenai Peninsula Saltwater Shellfish	Kenai River	Other Kenai Peninsula Freshwater	Kenai Peninsula Dip net	Kenai Area Total	Percent of State	Alaska Total
1977			79,045	25,393	122,138	154,581		381,157	31.8	1,198,486
1978			93,807	29,750	164,264	180,322		468,143	36.4	1,286,063
1979			100,010	30,323	178,485	182,933		491,751	36.0	1,364,739
1980			89,065	31,494	171,803	188,508		480,870	32.3	1,488,962
1981			93,432	57,867	178,716	159,806		489,821	34.5	1,420,772
1982			91,033	48,826	231,948	172,483		544,290	33.5	1,623,090
1983	2,911	5,425	136,566	53,305	229,228	145,862	9,576	582,873	33.6	1,732,528
1984	4,549	4,182	127,635	55,208	270,422	169,006	7,227	638,229	34.2	1,866,837
1985	4,455	6,952	122,243	49,453	322,230	197,358	10,647	713,338	36.7	1,943,069
1986	5,977	4,471	143,160	55,241	335,051	221,521	15,856	781,277	37.7	2,071,412
1987	3,855	5,594	186,525	46,137	289,165	264,243	32,473	827,992	38.5	2,152,886
1988	6,042	5,520	183,254	44,304	374,259	224,972	37,304	875,655	37.9	2,311,291
1989	3,942	5,850	163,717	32,374	376,902	178,264	33,054	794,103	35.1	2,264,079
1990	4,499	5,970	218,622	39,769	342,662	224,553	2,184	838,259	34.0	2,463,284
1991	3,856	9,443	204,216	38,767	323,368	230,579	12,040	822,269	33.5	2,456,328
1992	3,950	6,867	225,442	60,513	332,573	241,743	12,131	883,219	34.8	2,540,374
1993	4,712	8,042	232,298	54,691	324,120	247,316	16,525	887,704	34.7	2,559,408
Mean	4,432	6,211	146,475	44,319	268,667	199,062	17,183	676,526	35.0	1,926,095

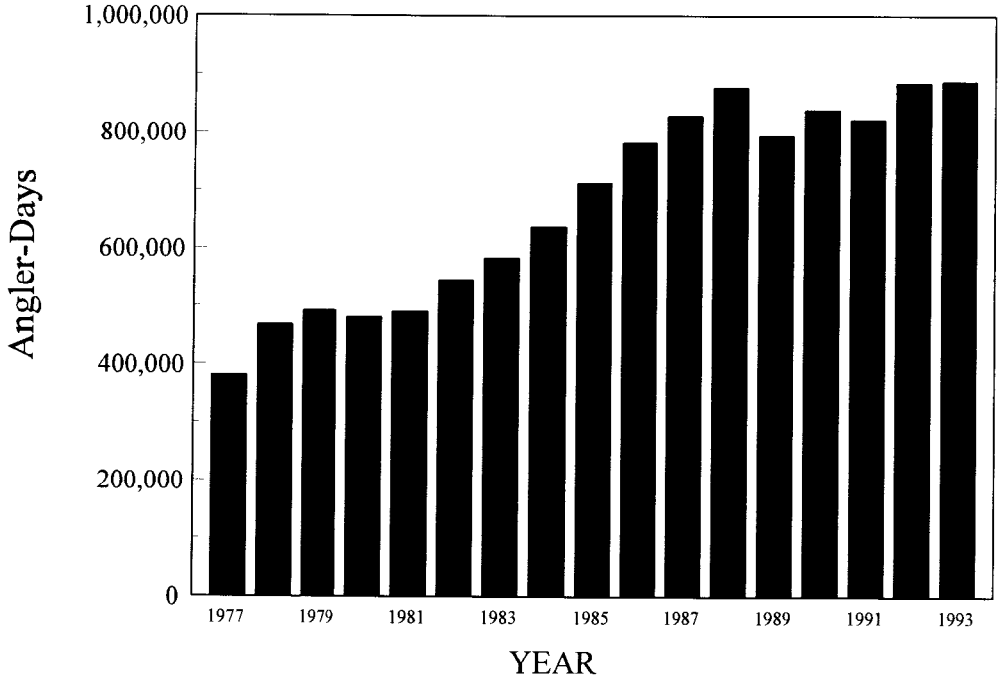

Figure 2.-Recreational angler participation in the Kenai Peninsula Management Area, 1977-1993.

UCI supports a set and drift gillnet commercial fishery. These fisheries are larger than the LCI commercial fishery in that the long term (1954-1994) average harvest is 4,019,214 salmon. This average is comprised of 20,582 chinook, 2,316,387 sockeye, 322,389 coho, 754,203 pink and 605,653 chum salmon. The primary target species in UCI is sockeye salmon.

Division of the salmon resource in UCI between sport and commercial interests is an ever-present allocative issue. Stocks of concern to both user groups at the present time are late-run Kenai River chinook salmon, late-run Kenai River sockeye salmon and early-run Kenai River coho salmon. Allocation and management of these resources are governed by management plans. Application of these management plans to these fisheries is addressed in the appropriate chapter of Section II.

In 1992 the Board of Fisheries designated Cook Inlet as a "nonsubsistence area." An exception was provided for subsistence fisheries to occur in areas adjacent to the villages of Tyonek in northern Cook Inlet and Port Graham and English Bay in Kachemak Bay. These are relatively small fisheries and resource allocation between subsistence and other resource users is not a major issue. In 1993 subsistence fishing did not occur in most areas of Cook Inlet. A 1994 Alaska Supreme Court ruling required the State to provide for a general Cook Inlet subsistence fishery. Subsistence fishing in Cook Inlet is a continuing contentious issue being addressed by the Courts.

Personal use and subsistence fisheries occur in both LCI and UCI. LCI supports a popular gillnet fishery targeting coho salmon in the Kachemak Bay area. Dip net personal use fisheries occur in China Poot and Fox creeks. Allocation of the resource between personal use and other user groups is not a major issue in these fisheries.

UCI in some years supports a June gillnet personal use fishery targeting Kasilof River sockeye salmon and a September gillnet fishery targeting late-run coho salmon. Personal use dip net fisheries occur at the mouths of the Kenai and Kasilof rivers. The two gillnet fisheries presently occur only if a subsistence fishery does not occur. The two dip net fisheries occur only when inriver abundance specified in the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan is achieved. Allocation issues between personal use and other resource users are frequent but usually less contentious than between sport and commercial user groups.

A scientific/educational permit has been issued to the Kenaitze Tribe each year since 1989. The permit allows the tribe to harvest salmon with a gillnet in the lower 5.5 miles of the Kenai River and adjacent Cook Inlet waters, establishes a season and sets allowable salmon harvest by species. The current quota in this fishery is 5,000 salmon. Although controversial at its inception, allocative issues surrounding this fishery have become less of a concern to other user groups in recent years.

A scientific/educational permit was issued for the first time to the Ninilchik Traditional Council in 1993. Terms of the permit were similar to the terms of the Kenaitze scientific/educational permit. The area open was in Cook Inlet from the Ninilchik Boat Harbor north for 1 mile. The harvest quota was 2,000 total salmon. There have been no allocative issues associated with this fishery.

ECONOMIC VALUE OF RECREATIONAL FISHERIES

The economic value of KPMA fisheries was estimated for the calendar year 1986 (Jones and Stokes 1987). Anglers fishing KPMA waters during 1986 expended an estimated $82 million (Table 2). Expenditures were about equally split between resident and nonresident anglers despite resident anglers expending more than four times as many angler-days of recreational fishing effort. Anglers were also asked to estimate their "net willingness to pay" (net WTP) to ensure for the continuation of these fisheries. Anglers estimated they would expend an additional $163 million to ensure for the continued availability of KPMA sport fisheries. Unlike actual expenditures, resident anglers expressed a much higher net WTP than did nonresident anglers.

Actual expenditures and WTP were also estimated for a select subset of KPMA fisheries. For example, recreational anglers fishing the Kenai River expended an estimated $38 million and expressed a net WTP of an additional $23 million for the continued availability of this sport fishery (Table 2). Most of the expenditures ($19 million) occurred during the early and late chinook salmon fisheries. Other fisheries for which angler expenditures were estimated include the Russian River early- and late-run sockeye salmon fisheries ($5 million), lower Kenai Peninsula fisheries ($6 million), Deep Creek marine fishery ($6 million), and the Kachemak Bay halibut fishery ($9 million).

MAJOR ONGOING RESEARCH ACTIVITIES

There are currently five major KPMA research programs. The first involves an annual stock assessment program of the early and late chinook salmon returns to the Kenai River. This program has two study components. First is a creel survey to estimate chinook salmon harvested during the early and late recreational chinook salmon fisheries as well as their age and size compositions. The second component is a sonar program to estimate the abundance of early- and late-run chinook salmon entering the Kenai River. These programs provide data which are used inseason to manage the resource to ensure that the Kenai River chinook management plans are adhered to and the escapement goals, as provided by the plans, are achieved annually. The data are also used to construct brood tables to assess spawner-recruit relationships and to evaluate escapement goals.

A second program involves assessment of the early and late sockeye salmon returns to the Russian River. This program also has two study components. The first component is a creel survey to assess the numbers of sockeye salmon harvested during the early- and late-run recreational sockeye salmon fisheries and to determine the age and size composition of the runs. The second component involves a weir to determine early- and late-run spawning escapement. These programs provide data which are used inseason to manage both runs and to ensure that the Russian River sockeye salmon management plans are adhered to and escapement goals achieved. The data are also used to construct brood tables to assess the accuracy of spawner-recruit relationships and to evaluate established escapement goals.

A third program involves an assessment of Kenai River coho salmon stocks. This program is relatively new and has the goal of providing data to define meaningful management objectives and strategies. The goal of the research is to reconstruct annual returns of coho salmon to the Kenai River. This requires accurate estimation of all major components of the annual returns including sport, commercial, subsistence, and personal use harvests and spawning escapements.

Table 2.-Economic value (thousands of dollars) of Kenai Peninsula Management Area (KPMA) recreational fisheries during 1986.

	Resident Anglers		Nonresident Anglers		All Anglers	
Fishery	Expenditures	Net WTP[a]	Expenditures	Net WTP	Expenditures	Net WTP
Kenai River						
Early-run chinook salmon fishing	4,186	4,038	6,148	2,916	10,334	6,954
Late-run chinook salmon fishing	3,184	2,477	5,142	2,444	8,326	4,921
Early-run coho salmon fishing	2,848	2,541	1,068	466	3,916	3,007
Late-run coho salmon fishing	2,020	1,645	2,619	1,139	4,639	2,784
Sockeye salmon fishing	1,613	1,711	2,571	418	4,184	2,129
Rainbow trout fishing	1,989	688	486	125	2,475	813
Other fishing	3,092	2,141	995	503	4,087	2,644
All sport fishing	18,932	15,241	19,029	8,011	37,961	23,252
Russian River						
Early-run sockeye salmon fishing	2,804	2,130	1,361	640	4,165	2,770
Late-run sockeye salmon fishing	480	211	566	267	1,046	478
Total	3,284	2,341	1,927	907	5,211	3,248
Lower Kenai Peninsula streams						
Chinook salmon fishing	1,338	503	797	207	2,135	710
Other fishing	2,213	1,467	1,566	289	3,779	1,756
All fishing	3,551	1,970	2,363	496	5,914	2,466
Deep Creek Marine						
Halibut fishing	1,840	2,357	2,192	269	4,032	2,626
Chinook salmon fishing	1,427	1,253	929	404	2,356	1,657
Total	3,267	3,610	3,121	673	6,388	4,283
Kachemak Bay						
Halibut fishing	5,818	5,364	2,902	2,709	8,720	8,073
Other fishing	7,411	111,061	9,902	10,204	17,313	121,265
TOTAL	42,263	139,587	39,244	23,000	81,507	162,587

From: Jones and Stokes 1987.

[a] Net willingness to pay.

The program presently has four study components. The first involves a project to mark juvenile salmon in the Kenai River for later recognition in the mixed stock commercial harvest. A second component is the Statewide Harvest Survey to assess the numbers of coho salmon harvested in the recreational fishery. A third component involves examining the mixed stock commercial harvest for Kenai River tags. The fourth and last component is a study to determine the feasibility of using sonar to estimate the abundance of coho salmon entering the Kenai River.

The fourth program involves assessment of Dolly Varden in Anchor River. This study is designed to characterize the length, age, and maturity structure of Dolly Varden harvested in the recreational fishery. A weir is used to enumerate Dolly Varden entering the river.

The fifth program is designed to provide information necessary to responsibly manage the mixed stock king salmon sport fishery which occurs in Cook Inlet between Deep Creek and Anchor River. An onsite creel survey provides early- and late-run harvest estimates. A comprehensive smolt tagging program is also being conducted in Deep Creek and the Kenai River; a proportion of all hatchery releases of king salmon smolt is tagged. Adult returns of tagged fish in future years will be determined by a sampling program in the marine fishery. A determination of the contribution of Cook Inlet stocks to the Deep Creek sport fishery will assist the Board of Fisheries and department in addressing allocative and biological issues associated with this expanding fishery.

MAJOR ISSUES

The major biological and social issues associated with KPMA recreational, commercial and personal use fisheries are summarized below.

1. King Crab: King crab stocks in lower Cook Inlet are currently depressed. No sport, commercial or personal use harvest of this species is currently permitted. Recovery of this stock is projected to take many years; a fishery will not occur in the foreseeable future.

2. Dungeness Crab: This species is at low levels of abundance in lower Cook Inlet. At present, the population is capable of supporting a limited harvest in a conservatively managed noncommercial fishery. The resource is not presently capable of supporting a commercial fishery which historically was the primary user of this resource.

3. Tanner Crab: Tanner crab are also at low levels of abundance in lower Cook Inlet. In most years, the resource is capable of supporting a conservatively regulated commercial and noncommercial fishery.

4. Hardshell Clams in Kachemak Bay: Quantitative data regarding this resource are minimal. However, concern has been expressed by some commercial and noncommercial users of the resource that hardshell clams have declined on beaches certified for commercial harvest. This issue is being addressed through conservative regulation of the commercial fishery.

5. Anchor River Dolly Varden: The number of Dolly Varden returning to the Anchor River has declined. The reason(s) for this decline is currently unknown, but may be linked to overharvest. In response to these declines, increasingly restrictive regulations and management strategies have been applied to this fishery in recent years.

6. Anchor River Steelhead Trout: During the late 1970s, this population was estimated to be about 4,000 fish. Presently, the population is estimated to be about 1,500 fish. The reason(s) for the decline in abundance is currently unknown, but may be related to inriver overharvest. In response to the decline, the fishery in the Anchor River and three other lower Kenai Peninsula streams (Stariski and Deep creeks and the Ninilchik River) has been restricted to catch-and-release fishing only. These actions have been implemented to restore this resource to former levels of abundance. Recent data suggest that the abundance of steelhead trout in these streams is beginning to gradually increase in response to these actions.

7. Marine Chinook Salmon Fishery: The fishery for chinook salmon in the marine waters of Cook Inlet adjacent to the lower Kenai Peninsula beaches of Deep Creek, Whiskey Gulch and Anchor River is one of the most rapidly expanding fisheries in the KPMA. Both early- and late-run chinook salmon stocks returning to various Cook Inlet streams are harvested. Unfortunately, it is currently not possible to estimate the stock-specific harvests of these chinook salmon. Rapid growth, coupled with the uncertainty regarding stock-specific harvests, has caused several allocative and conservation concerns to be raised.

   The allocative issues primarily focus on the early and late Kenai River chinook salmon returns. Some sport and commercial fishermen believe that "large" numbers of chinook salmon of Kenai River origin are being harvested in this fishery. Expansion of this fishery increases the probability that restrictions based on established management plans will be placed on the Kenai River fishery and/or marine commercial setnet fishery for resource conservation.

   The primary conservation issue, as viewed by the department, is associated with the early-run fishery. An increase in the early run, mixed stock marine sport harvest may be negatively impacting numbers of spawning chinook salmon in Anchor River and Deep Creek. If conservation is an issue, stock separation studies in the marine fishery will be required to determine if the contributions from Anchor River and Deep Creek are of a magnitude that would negatively impact the reproductive potential of the resource.

8. Kasilof River Steelhead Trout: Steelhead trout harvested in the Kasilof River and its major tributary, Crooked Creek, originate from the Crooked Creek Hatchery. These stocked fish support a small spring and fall fishery. In 1992, anecdotal information indicated that relatively "large" numbers of steelhead trout, presumed to be of Kasilof River origin, strayed into and were harvested in the Kenai River. These fish were harvested in areas known to be utilized by spawning Kenai River rainbow trout. Spawning of stocked steelhead trout with wild Kenai River rainbow trout could compromise the genetic integrity of Kenai River rainbow trout. Competition could also occur between rearing wild Kenai River coho and chinook salmon and rearing introduced steelhead.

   Because of the uncertainties associated with straying of stocked steelhead into the Kenai River, the last stocking of steelhead at Crooked Creek was spring 1992. The last significant return of stocked steelhead to their Crooked Creek release site will therefore

be fall 1994. Thereafter, minimal natural production is expected to occur. This production will probably be insufficient to support all but minimal sport fishing activity.

9. Kenai River Early Chinook Salmon: Kenai River early-run chinook salmon returns in 1990, 1991 and 1992 were well below the returns in the mid to late 1980s. Low returns during these 3 years required restrictive inseason action. Restricting the fishery for resource conservation was socially disruptive and reduced participation.

   The early-run return increased in 1993 and 1994; inseason restrictions to the fishery were not required. If returns again decline, management action will be required with the associated disruption to the fishery experienced by recreational anglers from 1990 through 1992.

10. Kenai River Late Run Chinook Salmon: Numbers of late-run chinook salmon returning to the Kenai River also declined in 1990, 1991 and 1992. These declines necessitated restrictive inseason management in each of these years to ensure that the spawning escapement goal mandated by the Kenai River late run management plan was achieved. Utilization of inseason management authority to restrict the fishery for resource conservation was socially disruptive and reduced participation.

    In 1993 and 1994 this run returned to former levels of abundance; inseason restrictions to the sport and commercial fisheries were not required. However, should future returns again decline, implementation of inseason management strategies will again be required which will be disruptive to the user groups.

    Also at issue is the harvest of late-run chinook salmon of Kenai River origin in the commercial setnet fishery on the eastside beaches of upper Cook Inlet. Although this fishery targets late-run sockeye salmon, the incidental harvest of late-run chinook salmon can, during some years, be significant. This is primarily an allocative and social issue; conservation can be assured given existing Board management plans.

11. Kenai River Sockeye Salmon: The recreational fishery for late-run sockeye salmon that occurs along the banks of the mainstem Kenai River is the most rapidly expanding sport fishery on the Kenai Peninsula. Late-run sockeye salmon returning to the Kenai River are primarily managed for commercial uses. The recreational harvest of late-run sockeye salmon is limited by the Kenai River Sockeye Salmon Management Plan. In recent years, the recreational fishery has demonstrated the capability to exceed the allocation prescribed in this management plan. The Board declined in 1992 to change or amend this management plan to accommodate the harvest potential of the recreational fishery.

    The recreational fishery was therefore restricted in 1993 through a reduction in bag/possession limit and a time closure to reduce harvest and comply with the allocative intent of the management plan. In 1994, Commissioner Rosier directed that the allocation in the current management plan be viewed as a guideline harvest level rather than a harvest cap. There was therefore no restriction in the 1994 fishery.

    This notwithstanding, there is a perception among many recreational anglers that their fishing opportunity is being restricted in favor of commercial uses. This is primarily an allocative and social issue; conservation can be ensured given existing Board management plans. The Board of Fisheries will address this issue in March 1995.

12. Kenai River Coho Salmon: Issues regarding Kenai River early and late-run coho salmon are both biological and allocative. Of biological concern to the department is the present inability to determine inriver abundance, total exploitation rate and the contribution of early-run coho salmon to the commercial fishery. The allocative issues focus on the division of the early-run harvestable surplus between commercial and sport user groups; and allocation of the late run between personal use, subsistence and sport users of the resource. The department has initiated a major research program to address the biological issues. However, results from this research will not be available for several years. In the interim, the allocative and biological concerns associated with the early- and late-run Kenai River coho salmon resource will continue to be an issue in the management of these fisheries.

13. Riparian Habitat Degradation: The degradation of riparian habitat is emerging as a major issue on the Kenai Peninsula. This degradation is being caused by development, boat wakes and/or the large number of anglers fishing from the stream banks. This is a major issue at Russian River where streamside habitat change has been effected by bank anglers and on the mainstem Kenai River where banks have been altered by boat wakes, residential and commercial development, and bank anglers. The loss of riparian habitat is viewed with concern by both the public and department as its loss may negatively affect the fisheries resources.

14. Congested Fisheries: Many recreational fisheries on the Kenai Peninsula are crowded to the degree that there is physically little if any space available for additional anglers. Participation in the KPMA's congested fisheries also may exceed or severely tax parking and camping areas as well as amenities such as sanitary facilities. Congested fisheries are considered aesthetically displeasing to many anglers and are becoming an issue of fishery management. Congested fisheries in the KPMA include the Russian River sockeye salmon fishery, Kenai River sockeye salmon fishery, Kenai River chinook salmon fishery, Kasilof River chinook salmon fishery, lower Peninsula chinook salmon fishery, the marine chinook salmon fishery and the chinook and coho salmon fishery which occurs in the Enhancement Lagoon on the Homer Spit.

15. Kachemak Bay Winter Chinook Salmon Fishery: This fishery began in the 1960s and harvests sexually immature chinook salmon. The fishery occurs in Kachemak Bay and is concentrated in the waters adjacent to Bluff Point. In recent years participation in this fishery has been increasing. Although immature chinook salmon are caught throughout the year, angler participation has increased during the winter months when opportunities to participate in other fisheries are minimal.

    Over the years, 76 tagged fish harvested in this fishery have been reported to the department. Of this total, all but one are of nonlocal origin; the majority (52) originated in British Columbia hatcheries. Whether or not Cook Inlet chinook salmon are harvested in this fishery can not be ascertained because until recently only a small percentage of chinook salmon released from Cook Inlet hatcheries were tagged; no wild fish were tagged prior to 1994.

    The department has virtually no data regarding this fishery, including harvest and participation estimates. Observations by staff suggest that harvest may currently

approximate 1,000 fish annually. This figure should be considered only an approximation which expresses magnitude. The fishery does not pose a known biological concern. However, its expansion may have allocative implications in that the harvest (excepting the 76 tagged fish) can not be apportioned by stream of origin.

16. Stocking of Anadromous Species in Open Systems: Stocking of anadromous species (primarily salmon) in open systems (drainages which ultimately enter salt water) in the KPMA has been a common practice for a number of years. Examples of this practice include but are not limited to stocking chinook and coho salmon and steelhead trout in Crooked Creek/Kasilof River, and chinook salmon in Ninilchik River, the Homer Spit, Halibut Cove Lagoon and Seldovia Harbor. Concerns have been expressed by staff and public that in some situations there has been an insufficient assessment of risks associated with stocking in open systems prior to implementing the stocking program. Risks to be assessed include but are not limited to the effect on wild anadromous fish (if present) at the origin of the release and the potential straying and effect of that straying on other wild stocks originating in streams in close proximity to the stocked release site.

17. Anadromous Stocking Evaluation: Concern has been expressed by staff and public that poststocking evaluation of anadromous releases in open systems has at times been inadequate. It has been suggested that stocking evaluation programs be conducted for all stocking programs. These evaluations would address the cost/benefit ratio, the effect of stocking on other species present at the stocking location, the contribution of the stocked fish to intercepting fisheries, the ability of the user groups to utilize all returning stocked fish and the possibility of excessively harvesting nontargeted wild fish in an effort to maximize benefit (harvest) from the stocking program.

18. Regulatory Complexity: A general concern of the angling public is that sport fishing regulations on the Kenai Peninsula are too complex for the average angler to readily comprehend. The complexity of these regulations is attributed to the efforts of the Board of Fisheries to provide a regulatory structure for the KPMA's fisheries to maximize opportunity while addressing the complex resource allocative issues associated with the area's salmon and trout resources.

19. Enforcement of Sport Fishing Regulations: Enforcement of sport fishing regulations is primarily the responsibility of the Fish and Wildlife Protection Division of the Department of Public Safety. The Division of Parks of the Department of Natural Resources and Sport Fish Division staff of the Department of Fish and Game also enforce regulations. Federal agencies also enforce state regulations on federal lands. However, especially during the peak of the fishing season, these enforcement efforts are generally viewed by the agencies involved and the public as being inadequate given the number of violations that are reported to occur. Inadequate enforcement of fishery regulations erodes the public's confidence in the department's ability to adequately manage and protect the fishery resources of the KPMA.

20. Increasing Guided Angler Harvest and Participation: Guided angler harvest and participation are increasing in KPMA's sport fisheries. Fisheries affected include the early- and late-run Kenai River chinook and coho salmon fisheries; the Kasilof River chinook salmon fishery; and the marine chinook salmon fishery and halibut fishery.

Nonguided anglers correctly contend that the guided angler (who in many cases is a nonresident) is more efficient due to the superior knowledge and equipment of the guide/charter operator. The guided angler is therefore taking an increasingly larger proportion of the harvestable surplus. This allocative issue is of concern to both guided and nonguided anglers in the KPMA.

21. Allocation of Pacific Halibut Between Chartered Sport Anglers and Commercial Users: The majority of Pacific halibut in the KPMA are harvested by commercial users. The harvest by sport charter operators has increased in recent years. It has been proposed by commercial users of the resource that the harvest by sport charter operators be "capped" to maintain the present proportionate distribution of the harvest between the two user groups. Allocation of the halibut resource is therefore of concern to both commercial and noncommercial user groups in the KPMA.

22. Interstate Transport of Sport Caught Salmon and Halibut: Nonresident tourists harvest large numbers of Kenai Peninsula salmon and halibut. Fisheries where this harvest is highly visible include the Kenai River sockeye salmon fishery, the marine chinook salmon fishery and the halibut fishery of central and lower Cook Inlet. This harvest is not unlawful as long as bag and possession limits are adhered to. However, some KPMA residents have expressed dissatisfaction with the lack of a regulation limiting the amount of salmon and halibut a nonresident tourist may legally export from the state. The perceived excessive harvest and transport of salmon and halibut by nonresident tourists in the KPMA is therefore an issue of concern.

SECTION II: FISHERIES OVERVIEW

Section II is a detailed summary of all fisheries in the Kenai Peninsula Management Area. For regulatory purposes, this management area is divided into the upper and lower Kenai Peninsula. The lower Peninsula is that area encompassing the marine waters south of Anchor Point east to Cape Puget, plus all fresh waters of the Kenai Peninsula draining into this area. The upper Kenai Peninsula includes all remaining fresh waters of the Kenai Peninsula, the marine waters from Anchor Point north to the East Forelands, the marine waters of the west side of Cook Inlet from Kamishak Bay north to the West Forelands and all fresh waters draining into this area.

The section begins with the upper Kenai Peninsula (Figure 3) and a listing of emergency orders required to manage the area's sport and personal use fisheries in 1994 (Table 3). Each fishery chapter is subdivided into sections which provide the reader with a listing of the fishery objectives, the inseason management approach, an historical perspective of the fishery and a review of recent Board of Fisheries actions. This section is followed by a review of recent fishery performance, the outlook for future years and a review of current issues relevant to the fishery. Each chapter concludes with the author's recommendations for future research and management.

COOK INLET MARINE EARLY-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

There is no Board of Fisheries management plan which specifically addresses this early-run mixed stock fishery. Fishery objectives adopted by the department are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that harvest in this fishery does not reduce the early-run chinook salmon spawning escapement in any Cook Inlet drainage or stream below specified levels.

Objective 3: To accurately apportion early- and late-run harvests.

Objective 4: To apportion the early- and late-run harvests to selected streams of origin.

INSEASON MANAGEMENT APPROACH

There has been no inseason management required in the history of this fishery. Inseason activity in 1994 was a creel survey to ascertain harvest.

HISTORICAL PERSPECTIVE

The Cook Inlet marine chinook salmon fishery was divided into two fisheries: (1) Whiskey Gulch/Anchor River Area Marine Recreational Fishery; and (2) Deep Creek Marine Recreational Chinook Salmon Fishery. The fishery was divided in this manner because during the early years (1970s) of the fishery, anglers concentrated their efforts around the access points of Anchor River/Whiskey Gulch and Deep Creek. Although the respective fisheries targeted the same stocks, there was spatial separation of anglers depending on the access point used.

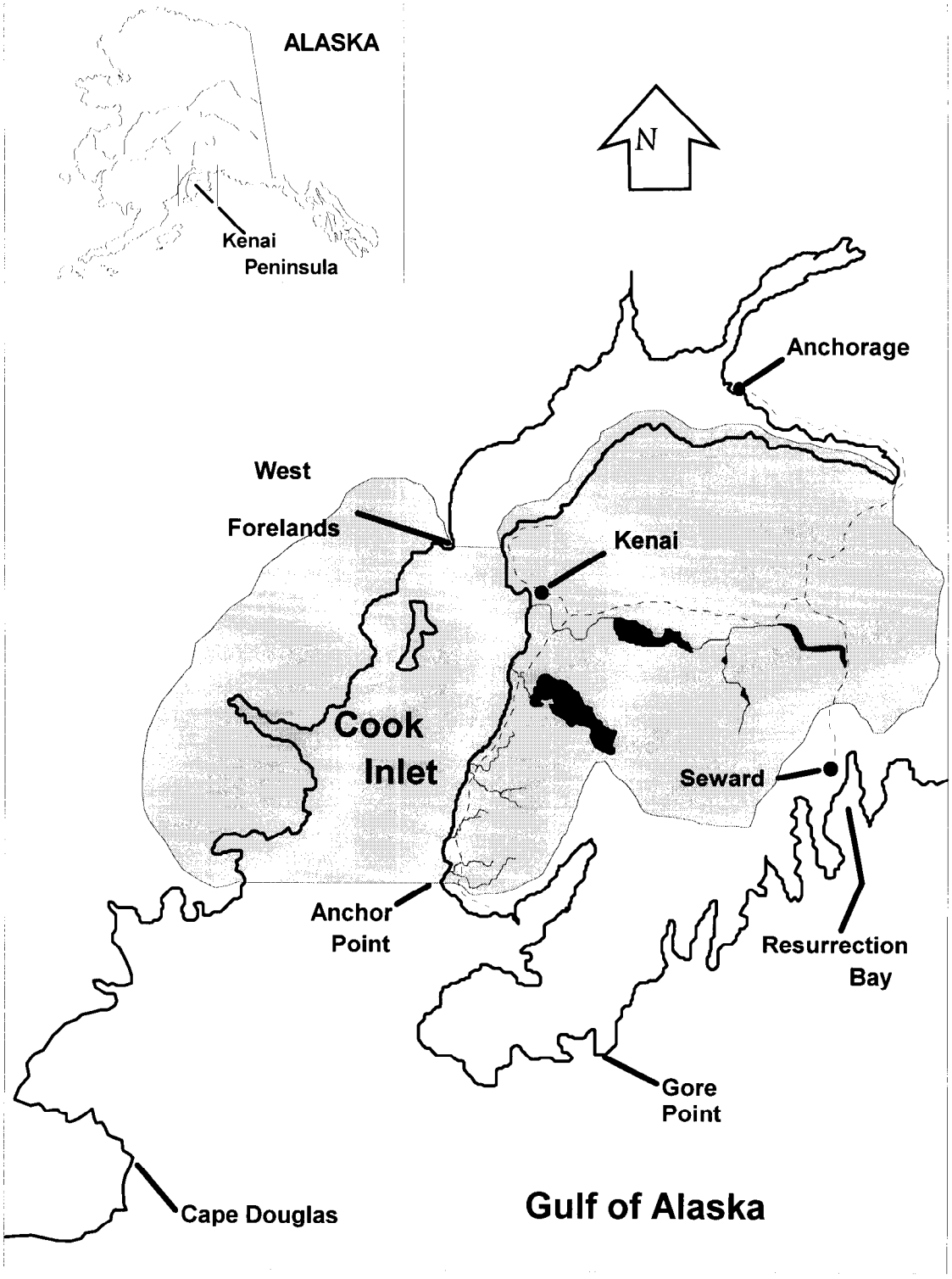

Figure 3.-The upper Kenai Peninsula Management Area (shaded) includes all fresh and saltwater fisheries north of Anchor Point.

Table 3.-Summary of upper Kenai Peninsula emergency orders, 1994.

Emergency Order Number	Effective Date	Action/Justification
2-RT-1-01-94	4-15-94 12:01 a.m.	Close Kenai Lake outlet to all fishing through June 10. Conserve rainbow trout.
2-KS-1-11-94	6-14-94 12:01 a.m.	Extend Ninilchik R. king salmon fishery through June 27. Surplus stocked king salmon.
2-KS-1-18-94	6-24-94 12:01 a.m.	Permit bait in Kenai River king salmon fishery. Early-run escapement goal projected. .
2-RS-1-19-94	6-30-94 12:00 noon	Open Russian River "Sanctuary." Early-run sockeye salmon escapement goal projected.
2-RS-1-27-94	7-22-94 12:00 noon	Open Kasilof personal use dip net fishery. Escapement goal of 150,000 to be exceeded.
2-KS-1-25-94	7-25-94 12:01 a.m.	Permit fishing from boats in Kenai River on Monday, July 25. Late-run king salmon escapement goal projected to be exceeded.
2-RS-1-30-94	8-1-94 12:01 a.m.	Extend Kenai River late-run king salmon fishery through Aug. 7 only downstream from Eagle Rock. Escapement goal exceeded.
2-KS-1-34-94	8-3-94 6:00 p.m.	Increase Kenai River sockeye salmon bag/ possession limit to six. Sonar count projected to exceed 700,000.

In recent years anglers have used larger boats, lodges have been built between Deep Creek and Anchor River/Whiskey Gulch and it has become generally known that chinook salmon may be harvested along the entire beach area (approximately 20 miles) between Anchor River and Deep Creek. Because anglers are no longer spatially segregated, it is now appropriate to view this area as supporting a single fishery.

Access to this fishery continues to occur primarily at the mouth of Anchor River and Deep Creek (Figure 4). Anchor River has no developed launching facilities, but launching of most boats at the river mouth is easily effectuated at high tide. The unstable beach precludes most anglers from launching or loading at any tide level. Deep Creek has a ramp at the river's mouth which can be utilized only at high tide. Launching at Deep Creek therefore occurs from both the ramp and a relatively stable beach. In recent years a commercial operator has provided a beach launching and take-out service at Deep Creek making it possible to use larger boats. Limited access is available at Whiskey Gulch. There is no developed launch; the steep beach gradient precludes launching of all but small boats. Purchase of property by ADF&G to provide public access here occurred in 1993. A private access road connects the aforementioned lodges to the Sterling Highway.

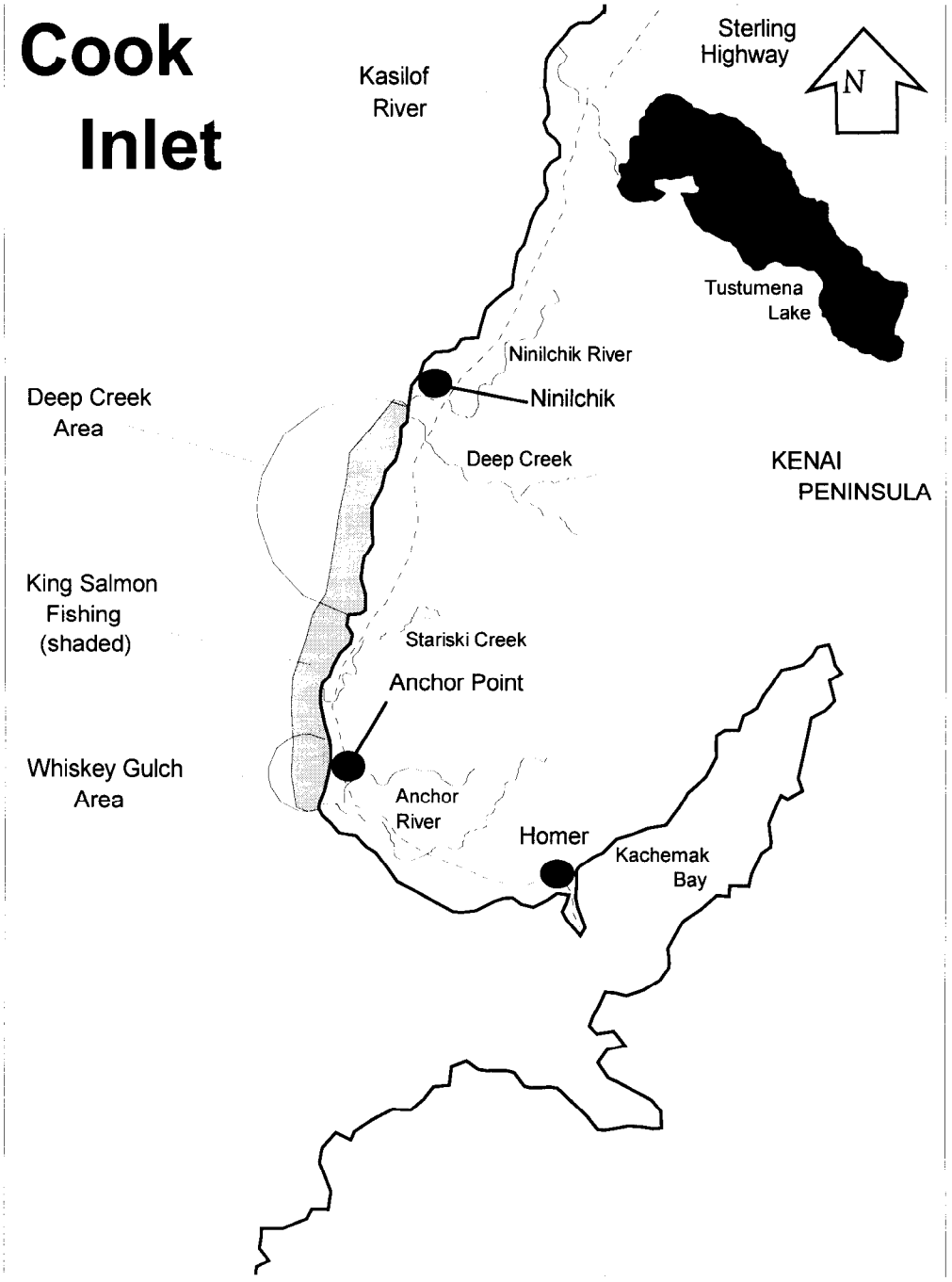

Figure 4.-The Cook Inlet marine early-run chinook salmon fishery.

This marine chinook salmon fishery began in the early 1970s. The department conducted a creel survey at the Deep Creek access from 1972-1986 and at the Anchor River/Whiskey Gulch access in 1986. Harvest from 1987-1993 has been determined by Statewide Harvest Survey. The onsite creel survey was terminated because: (1) the chinook salmon harvest here was relatively small in relation to other chinook salmon fisheries; (2) it is a mixed stock fishery which virtually precludes any inseason management actions; and (3) harvests here are a poor indicator of the magnitude of the return to upper Cook Inlet drainages and are therefore of limited value in predicting the return and/or success of the major inriver sport fisheries in the Kenai River, Kasilof River or northern Cook Inlet streams.

In 1994 a creel survey was again conducted at Deep Creek, Whiskey Gulch, and Anchor River, because of the rapid expansion of the fishery in recent years and a public perception that harvest in this fishery was decreasing harvest or contributing to restricted fisheries in other Cook Inlet drainages.

Historically, recreational harvests of chinook salmon have been dependent on local weather conditions. Limited boat launching facilities have restricted, and for the most part continue to restrict, the size of vessels that are used. As a result, adverse weather has, on occasions, restricted fishing to as little as 50% of the available time in which chinook salmon are present.

Early-run chinook salmon migrate through this area from late April through late June. Early-run (May and June) fish are believed (because of their close proximity) to originate in Anchor River, Stariski Creek, Ninilchik River, Deep Creek, Kenai River, Kasilof River and northern Cook Inlet drainages.

This recreational fishery is essentially the first harvest of the early run. Only commercial drift fishing is allowed south of Ninilchik; this fishery does not occur until late June and their chinook salmon harvest is minimal.

The Statewide Harvest Survey does not differentiate early- and late-run harvests. The historical harvest apportionment of 70% early run, 30% late run as determined by the 1972-1986 Deep Creek creel survey was used to develop some of the data in Table 4. The Statewide Harvest Survey determines participation by area, not by species. Participation in the Cook Inlet Marine chinook salmon fishery can therefore not be ascertained from this survey because a major sport halibut fishery occurs in the same area as the chinook salmon fishery. The 1994 creel survey estimated early- and late-run harvest and total participation in the combined king salmon and halibut fishery.

BOARD OF FISH ACTIONS

In 1990 the Board recognized that a public proposal to reduce the saltwater chinook salmon bag limit from its current 2 fish to 1 fish was an allocative rather than biological issue. However, since it is reasonable to assume that this fishery intercepts early- and late-run Kenai River chinook salmon and that these fully utilized stocks were at relatively low levels of abundance in 1989 and 1990, the Board reduced the bag and possession limit in this fishery. Beginning in 1991, the chinook salmon bag and possession limit in Cook Inlet north of Bluff Point was 1 chinook salmon of any size.

Table 4.-Historical summary of the Cook Inlet marine early-run chinook salmon sport fishery, 1972-1994.

	Deep Creek Area[a]				
Year	Harvest	Days Fished	Harvest/ Hour	Whiskey Gulch Area Harvest	Total Harvest
1972	1,000	2,357	0.119		
1973	519	5,245	0.028		
1974	500	3,810	0.037		
1975	540	3,370	0.061		
1976	5,495	12,268	0.101		
1977	4,617	18,803	0.069		
1978	2,669	14,413	0.059		
1979	3,088	13,352	0.053		
1980	521	8,065	0.017		
1981	2,363	11,601	0.051		
1982	2,497	14,514	0.056		
1983	1,000	21,707	0.011		
1984	2,386	14,694	0.040		
1985	5,087	22,118	0.058		
1986	3,106	24,393	0.027	446	3,552
1987	2,605			741	3,346
1988	2,872			1,128	4,000
1989	3,036			740	3,776
1990	3,153			1,273	4,426
1991	4,470			1,502	5,972
1992					5,579
1993					7,991
Mean	2,576	12,714	0	972	3,548
1994	4,404			1,173	5,577

[a] Deep Creek data 1972-1986 and 1994 from creel survey. All other data from Statewide Harvest Study which provides a seasonal total. Early-run harvest is apportioned as a percentage (70.5%) of seasonal total harvest based on historical creel survey data.

Further Board action in 1990 rescinded the requirement that Kenai Peninsula chinook salmon caught between April 1 and September 30 in all waters north of a line from Cape Douglas to Point Adam be recorded on a punch card. The punch card was replaced with a harvest record identical to the harvest record in use prior to 1990. As licenses were already printed without the harvest record, the 1991 harvest record was a stamp affixed to the back of the license. Rainbow/steelhead trout 20 inches or larger were also recorded here. Unlicensed anglers recorded their harvest on a special card.

The Board considered a number of proposals regarding this fishery at its November 1992 meeting. All proposed regulatory changes to this fishery failed to win Board approval. Regulation of the 1993 and 1994 fishery was identical to the 1992 season. The Board is next scheduled to consider regulatory changes to this fishery at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

Observation since 1991 indicates increased angler participation and harvest in this fishery. Increased participation is a reflection of large numbers of fish in the fishery, the displacement of anglers from the restricted Kenai River fishery to salt water, increased numbers of guides locating in the Deep Creek/Whiskey Gulch/Ninilchik area and increased utilization of the fishery by Kenai River guides on days when the Kenai River is closed to fishing from boats (Mondays from May through July; Sundays in July to guided anglers). High angler success rates as reported by the news media also attracted additional participants.

Total 1991 and 1992 harvest in this fishery was apportioned 70% early run, 30% late run as in prior years. Staff observation suggests that increased early-run participation in recent years may invalidate the proportionate harvest determined during the years a creel census was conducted. The 1991 estimate of 5,972 early-run fish and the 1992 estimate of 5,457 may be too low; the corresponding late-run estimates may be too high. Participation in this fishery cannot be determined; staff observation suggests it approached record levels during the 1991 through 1994 seasons. The 1993 fishery was conducted in a normal manner. Harvest was estimated at a record 7,991 early-run fish.

A creel survey was conducted in 1994. The primary purpose of this onsite survey was to estimate early-and late-run harvest and validate (or invalidate) the Statewide Harvest Survey data. The creel survey estimated a harvest of 5,577 early-run king salmon between Deep Creek and Anchor River. This is 75% of the season's harvest indicating the prior apportionment of 70% of the harvest to the early run may have been relatively accurate. Seasonal participation in all the area's fisheries (early- and late-run king salmon and the halibut fishery) was estimated at 62,292 days fished.

As noted, it is presently not possible to apportion the early-run king salmon harvest by contributing stocks. This part of the program will begin in 1996 when the first group of tagged fish (2-ocean) will contribute to the fishery.

OUTLOOK

Participation levels are expected to stabilize because parking at the popular Deep Creek Recreation Area is at or close to capacity. The Whiskey Gulch access is now in public ownership; use of the area may therefore increase. Increased use will equate to increased participation at Whiskey Gulch only if launching facilities are improved. It is anticipated this

may be effected through the use of tractors such as those that now operate at Deep Creek. Use of tractors to assist anglers launching at Anchor River would also increase participation.

Identification of stocks harvested in this fishery will not be possible until the late 1990s when results of a stock identification program are obtained. Inseason management of the fishery is not likely to occur until this determination is completed; the fishery will therefore continue to occur in an uninterrupted manner for the next several years.

Harvest is in large part a function of participation and numbers of fish present. If participation does not significantly increase and fish available for harvest approximate numbers present from 1991 through 1994, harvest in the next several years is expected to range from 5,000 to 7,000 early-run chinook salmon annually.

CURRENT ISSUES

No formal stock identification program has been conducted in this fishery. The assumption has been made that it is a mixed stock fishery harvesting early-run chinook salmon from four lower Kenai Peninsula streams (Anchor River, Deep Creek, Ninilchik River, Stariski Creek), Kasilof River, Kenai River and to a lesser degree northern Cook Inlet drainages. Local early-run stocks were at average to above average levels prior to 1991. Escapements in these streams declined in 1991; high turbid water precluded escapement surveys in 1992. Spawning escapements again increased to above average in 1993, declining to below average in 1994. Harvest of these stocks in the marine fishery will become an allocative issue if inriver returns display a long-term declining trend.

Early-run Kasilof River chinook salmon are stocked and return at relatively consistent levels.

Early-run Kenai River chinook salmon from 1990 through 1992 were below run strengths of the late 1980s. Numbers of these early-run fish increased in 1993 and 1994. This run supports an intense and conservatively regulated fishery in the Kenai River. As early-run Kenai River chinook salmon are fully utilized in the inriver fishery, there is concern by some members of the public that the marine early-run chinook salmon fishery is negatively impacting the early-run Kenai River fishery.

It is reasonable to assume chinook salmon destined for streams of Northern Cook Inlet, Kenai River and Kasilof River use the marine waters adjacent to these eastside beaches as a migratory corridor. They probably remain subject to capture in this fishery for a relatively brief period of time. Stocks of local origin are believed to stage or hold in these waters for a period of time prior to entering their natal stream and are available to anglers for a greater period of time than Northern Cook Inlet, Kenai and Kasilof River fish. Local stocks therefore are believed to contribute a greater percentage to the harvest than is indicated by their relative abundance. The abundant early-run Susitna drainage chinook salmon also migrate through this area. Their presence would further reduce the contribution of early-run chinook salmon of Kenai and Kasilof River origin to the harvest.

Ninilchik River has been stocked. The presumed harvest of stocked fish in the marine sport fishery also reduces the proportionate wild stock contribution of all streams to this fishery.

Public concern regarding the interception of early-run Kenai River chinook salmon in the Cook Inlet marine sport fishery is therefore at present more correctly an allocative than a biological issue. The marine fishery, however, has the potential to reduce wild stock returns to Anchor

River and Deep Creek in some years. This is a potential biological issue which will only be clearly defined through future research which identifies the marine sport harvest by stream of origin.

RECOMMENDED RESEARCH AND MANAGEMENT

There are allocative and potential biological issues associated with this fishery. The allocative issue is the perception that this fishery intercepts significant numbers of early-run Kenai River chinook salmon resulting in restrictions or decreased harvest rates in the Kenai River fishery. A potential conservation issue is the excessive harvest of Deep Creek and Anchor River wild stocks. This fishery, coupled with the inriver harvest in these streams, could negatively impact these wild stocks. It is therefore recommended that:

1. A creel survey be designed and implemented which estimates total early- and late-run harvest and participation in the marine chinook salmon fishery.
2. A stock separation program be designed and implemented to determine the proportionate contribution of each stock identified to the total harvest.
3. A methodology be investigated to more accurately assess the spawning escapement of early-run chinook salmon in Anchor River and Deep Creek.
4. Given that recommendation (3) is determined to be feasible and is implemented, optimum spawning escapement goals for wild stock chinook salmon in these streams should be established with appropriate management strategies to achieve these goals.

Recommendations one and two were implemented in 1994; recommendation three will be implemented in 1995 with testing of an experimental sonar counter in Deep Creek. Recommendation four is contingent on the ability of sonar counters to more accurately determine the spawning escapement.

LOWER KENAI PENINSULA EARLY-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

Anchor River and Deep Creek chinook salmon are wild fish; Ninilchik River chinook salmon are stocked fish with additional production from natural spawning. Separate department objectives have been established for Anchor River and Deep Creek wild stocks, and Ninilchik River stocked and naturally produced fish.

Fishery Objectives for Anchor River and Deep Creek are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield. This number is the Biological Escapement Goal or BEG, which is 850 for the Anchor River and 475 for Deep Creek.

Fishery Objectives for Ninilchik River are:

Objective 1: To ensure that 415-830 chinook salmon spawn naturally in the Ninilchik River annually.

Objective 2: To stock 200,000 chinook salmon smolts into the Ninilchik River which yield a 3% survival or 6,000 returning adults.

Objective 3: To ensure that the historical age and sex composition are not significantly altered by supplemental production.

Objective 4: To provide extended fishing opportunity for chinook salmon at the Ninilchik River during June which will provide 10,000 additional angler-days of participation by 1992.

Objective 5: To provide additional fishing opportunity for chinook salmon in the early-run Deep Creek marine fishery during May and June.

INSEASON MANAGEMENT APPROACH

The fishery occurs in late May and June when water conditions are too high and turbid to visually count fish in Anchor River and Deep Creek. Weirs, sonar counters and counting towers are costly and may not be effective due to high velocities and turbidity. The present management strategy is therefore to manage exclusively by regulation on Anchor River and Deep Creek. An experimental sonar counter will be installed in Deep Creek in 1995. Successful enumeration of chinook salmon by sonar may lead to a modification of this management strategy.

The present regulation with the most pronounced effect on harvest is the conservative season which is five consecutive 3-day weekends (Saturday, Sunday, Monday) beginning Memorial Day weekend. Area open to fishing is also conservative and reduces harvest in that the fishery occurs only in the lower 2 miles of the streams. Spawning escapement index surveys (post season) indicate that these and other regulations are sufficient to manage the Anchor River and Deep Creek fisheries for sustained yield.

The Ninilchik River fishery is supported by both naturally produced and stocked early-run chinook salmon. Since the inception of the stocking program, the inriver return has been increased from the historical average of about 1,500 to between 5,000 and 6,000. The harvestable surplus has been increased and there is opportunity to increase the recreational harvest and participation. This is effected by increasing the length of season by emergency order. The season is scheduled to occur for three consecutive 3-day weekends (9 total days). The stream usually begins to clear by the third weekend affording visual observation of fish which have migrated upstream from the area open to fishing. The fishery is managed for an escapement toward the upper end of the range, i.e. 830. Prior experience has shown that if not less than 500 fish are upstream from the fishery by the third weekend, the escapement goal will be achieved regardless of the amount of additional fishing time permitted.

An effective management strategy has therefore been to open the season to continuous daily fishing beginning on the Tuesday following the third and final scheduled weekend. The fishery then continues daily until the Monday of the fifth weekend of fishing on the Anchor River and Deep Creek. All three streams then close to chinook salmon fishing on the same day. This strategy extends the Ninilchik River fishery by 14 days.

A more conservative approach has been applied if stream conditions do not permit visual enumeration or visual enumeration indicates less than 500 fish upstream from the fishery at the conclusion of the third weekend. This is to delay an extension of the fishery to correspond with the fourth weekend on Anchor River and Deep Creek. The Ninilchik River fishery is opened for the fourth weekend and each day thereafter until its closure on the Monday of the fifth weekend. This extends the fishery an additional 10 days.

HISTORICAL PERSPECTIVE

Historically, the southern Kenai Peninsula streams of Anchor River, Deep Creek, and Ninilchik River (Figure 5) were the only Peninsula streams which supported a significant chinook salmon fishery. Harvest from these streams was controlled by allowable fishing time and area open to fishing. From 1978 through 1988, Anchor River and Deep Creek, from salt water upstream approximately 2 miles, were open to fishing during Memorial Day weekend and the next consecutive 3 weekends (weekends include Monday). Ninilchik River supported a smaller chinook salmon population than the two aforementioned streams. The fishery here therefore occurred for only three consecutive 3-day weekends in the lower 2 miles.

Chinook salmon returns to Anchor River and Deep Creek were above average through 1990. Angler effort on these streams has declined compared to the peak years of participation in the late 1970s. The Board therefore extended the fishery on these streams, adding a fifth consecutive 3-day weekend beginning in 1989. The season on Ninilchik River was unchanged as the number of chinook salmon here had not significantly increased. Water conditions on this stream are also generally less turbid than on the aforementioned two streams. Clear water increases angler efficiency and has resulted in a relatively high exploitation rate. Extension of the season on the Ninilchik River was therefore not justified at that time.

Hatchery smolt of Ninilchik River origin were stocked in Ninilchik River in 1988 and succeeding years. The first adult return (age class 1.3) was in 1991. A creel survey conducted during the three regularly scheduled weekends indicated high success rates. Observation indicated above average numbers of fish in the fishery. A fourth 3-day weekend (June 15, 16, 17) was added to the season by emergency order; a subsequent emergency order extended the fishery from Tuesday June 18 through Monday June 24. Total fishing time was therefore increased from the scheduled 9 days to 19 days. The 1992 and 1993 seasons were also extended because of high numbers of hatchery produced fish.

Rainbow/steelhead trout in prior years could be retained if caught during the chinook salmon fishery. Since 1989 retention of rainbow/steelhead trout has been prohibited on the Anchor River, Deep Creek, Ninilchik River and Stariski Creek because of low stock levels.

BOARD OF FISH ACTIONS

There were no regulatory changes adopted by the Board in 1990 or 1992 which affected this fishery.

RECENT FISHERY PERFORMANCE

The 1993 harvests in Anchor River and Deep Creek were 2,787 and 2,503 fish, respectively (Table 5). These harvests are above average for these streams. Spawning escapement surveys were also above average in 1993 (Table 5).

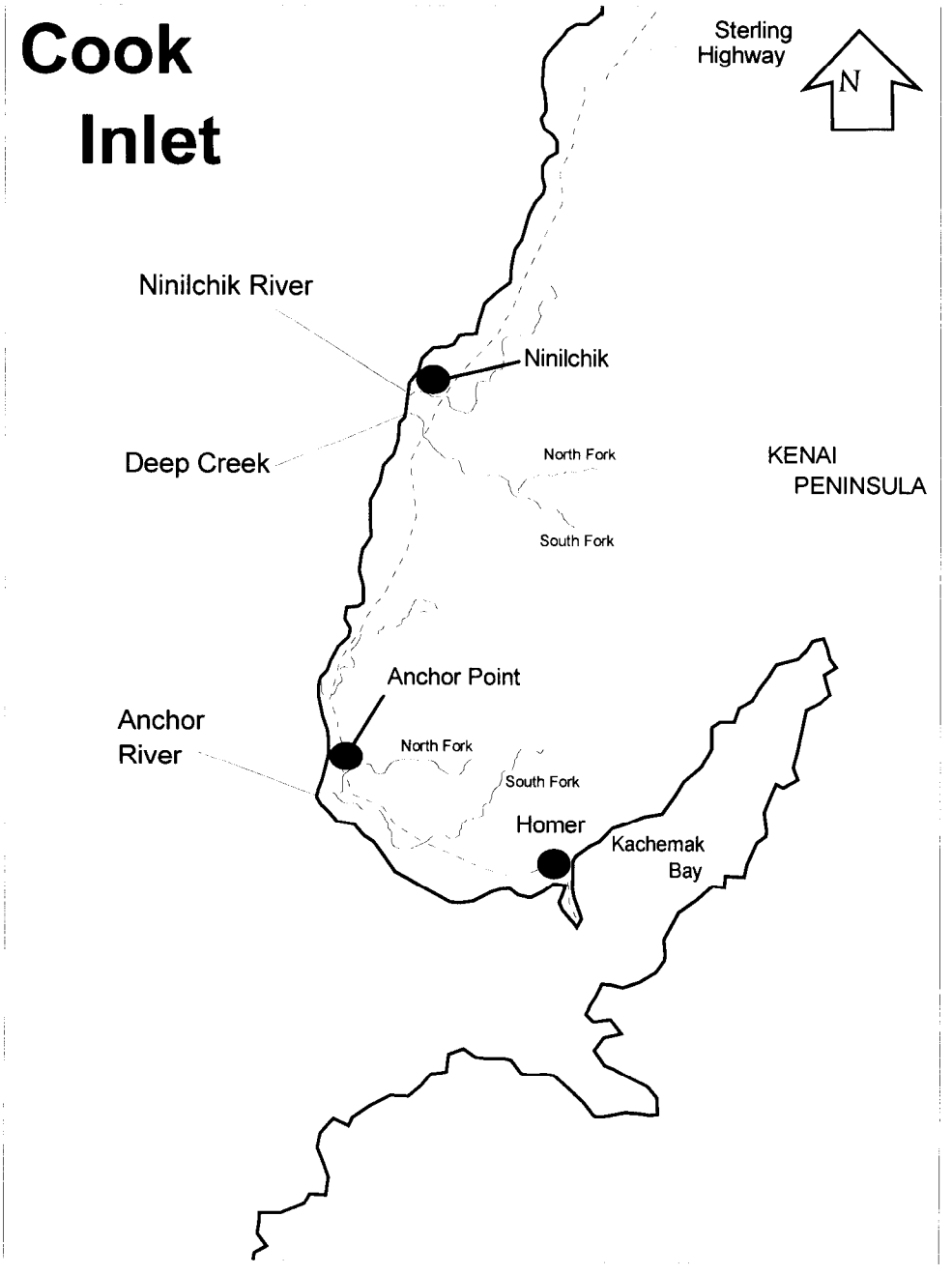

Figure 5.-Lower Kenai Peninsula chinook salmon streams of Anchor River, Deep Creek and Ninilchik River.

Table 5.-Historical harvest and escapement of chinook salmon for three southern Kenai Peninsula streams (Anchor River, Deep Creek, and Ninilchik River), 1966-1994.[a]

	Anchor River			Deep Creek			Ninilchik River			Total		
Year	Harvest	Escapement	%Harvest	Harvest	Escapement	%Harvest	Harvest	Escapement	%Harvest	Harvest	Escapement	Run
1966	290	1,330	18	50	540	8	200	670	23	540	2,540	3,080
1967	240	1,200	17	180	270	40	120	360	25	540	1,830	2,370
1968	250	530	32	160	200	44	210	450	32	620	1,180	1,800
1969	80	1,800	4	40	200	17	130	760	15	250	2,760	3,010
1970	170	1,850	8	60	...	...	280	...	...	510	1,850	2,360
1971	60	1,220	5	40	...	...	140	...	...	240	1,220	1,460
1972	180	1,890	9	140	530	21	170	1,360	11	490	3,780	4,270
1973	330	1,660	17	140	220	39	300	640	32	770	2,520	3,290
1974	440	1,000	31	290	740	28	350	510	41	1,080	2,250	3,330
1975	210	1,290	14	100	610	14	540	830	39	850	2,730	3,580
1976	830	3,080	21	220	1,680	12	630	1,180	35	1,680	5,940	7,620
1977	1,080	4,170	21	420	990	30	1,170	1,400	46	2,670	6,560	9,230
1978	2,110	2,410	47	800	1,010	44	1,440	990	59	4,360	4,410	8,770
1979	1,910	2,000	49	700	1,750	29	1,490	1,390	52	4,100	5,140	9,240
1980 [b]	600	660	48	180	480	27	720	720	50	1,500	1,860	3,360
1981 [b]	1,020	1,230	45	520	920	36	1,370	830	62	2,910	2,980	5,890
1982	650	1,540	30	720	2,670	21	1,080	1,430	43	2,450	5,640	8,090
1983	1,210	1,490	45	990	1,010	50	810	710	53	3,010	3,210	6,220
1984	870	1,170	43	620	380	62	540	600	47	2,030	2,150	4,180
1985	390	1,330	23	170	1,110	13	870	650	57	1,430	3,090	4,520
1986	1000	2,390	29	880	2,430	27	370	790	32	2,250	5,610	7,860
1987	720	4,350	14	580	1,670	26	1,090	600	64	2,390	6,620	9,010
1988	860	2,550	25	650	1,040	38	740	1,080	41	2,250	4,670	6,920
1989	560	1,060	35	750	650	54	520	400	57	1,830	2,110	3,940
1990	1460	2,630	36	620	1,310	32	590	840	41	2,670	4,780	7,450
1991	1,004	730	58	1,570	480	77	2,754	830	77	5,328	2,040	7,368
1992	1,491	[c]		1,132	[c]		4,896	[c]		7,519		
1993	2,787	2,256	55	2,503	1,305	66	5,610	2,400	70	10,900	5,961	16,861
Mean	810	1,810	29	540	970	34	1,040	900	44	2,550 [d]	3,690 [d]	6,050 [d]
1994 [e]		1,051			891			859			2,801	

[a] Harvest estimates for all three streams from 1966-1976 and for Ninilchik River 1992-1993 are from creel survey: all others are from the Statewide Harvest Study.

[b] Escapement counts considered minimal due to high turbid water during aerial escapement surveys.

[c] Aerial escapement counts not obtained due to high water.

[d] Excludes 1970 and 1971 data.

[e] Harvest information from Statewide Harvest Survey; not yet available.

Observations of the 1994 fishery suggest that harvests in both Anchor River and Deep Creek will be less than 1993 harvests. The final 1994 harvest estimate will be available from the Statewide Harvest Survey in fall 1995. The 1994 spawning escapement index survey revealed 1,051 fish in Anchor River; 891 in Deep Creek. These spawning escapements are below average for these streams.

Ninilchik River was creel surveyed in 1991, 1992 and 1993. The creel survey harvest estimate in 1991 was 5,053 fish. The harvest estimate obtained for that year by Statewide Harvest Survey was 2,754. Reason or reasons for these disparate estimates is not known. In 1992 the Statewide Harvest Survey and creel survey estimates were virtually identical, i.e. Statewide Harvest Survey estimate was 4,896; the creel survey estimate was 4,893.

In 1993 the Ninilchik River fishery occurred the first 3 weekends (9 days) as scheduled and was extended by emergency order for continuous fishing from June 15 through 28 (14 days). Total fishing time in 1993 was 23 days compared to 19 days during the 1992 season. The conclusion of the fishery coincided with the closure of the fishery on Deep Creek and Anchor River. The creel survey estimated a catch of 15,054 fish and harvest of 5,610. Effort was 51,213 hours. Harvest was 700 fish higher than in 1992; effort declined by 9,000 hours from 1992 estimates. The 1993 spawning escapement was 2,400, well above the historical average wild stock escapement of 830.

The 1994 Ninilchik River fishery occurred the first three weekends (9 days) as scheduled and was extended by emergency order for continuous fishing from June 14 through 27 (14 days). Total fishing time in both 1993 and 1994 was 23 days compared to 19 days in 1992. The conclusion of the fishery again coincided with the closure of the fishery on Deep Creek and Anchor River. No creel survey was conducted in 1994; harvest estimates for these streams will be available from the Statewide Harvest Survey in fall 1995. Spawning escapement was estimated at 891 fish; the fishery is managed to achieve an escapement approximating 830.

OUTLOOK

Spawning escapements have fluctuated in recent years in Anchor River and Deep Creek. If these escapements remain at average to above average levels, no change in the regulation of the chinook salmon fishery is anticipated. If spawning escapements begin to display a downward trend, restrictions to the inriver sport fishery will probably be required for resource conservation. The most probable restriction would be a reduction in the length of the season.

The stocking program at Ninilchik River will continue. However, smolt stocked will be reduced from approximately 200,000 to 50,000. Smolt will be stocked only in Ninilchik Harbor in the lower river. The intention is for stocked fish to remain in the lower river for harvest and for wild fish to migrate through the fishery and comprise the majority of the spawning escapement. Purpose of this programmatic change is to promote genetic diversity in the spawning population and increase the proportionate harvest of stocked fish.

This change in number of chinook salmon stocked and location of release will require future modification to management strategies. The reduction in stocking levels will occur in 1995. First return of adult fish (3-ocean) will be 1998. No change in management strategy is anticipated prior to the return from this first release in the Ninilchik Harbor. Reducing the number of smolt stocked will also require modification of Fishery Objectives 2 and 4.

CURRENT ISSUES

In the early 1970s the lower Peninsula chinook salmon fishery was the major chinook salmon fishery in Southcentral Alaska. The only other major chinook salmon fishery of consequence occurred in the marine waters adjacent to Deep Creek. In the late 1970s and early 1980s other chinook salmon fisheries developed on the Peninsula and in northern Cook Inlet. The lower Peninsula chinook salmon fishery is still a major fishery, but these more recently developed fisheries (Kenai River, Kasilof River, Homer Spit and Susitna drainage streams) are more important in terms of public perception, participation and harvest.

The lower Peninsula chinook salmon fishery is, for the most part, self-regulating through time and area restrictions. There has been no inseason restriction for stock conservation for at least 20 years; the fishery has been conservatively managed by regulation since the 1960s.

In general, angler harvest and the impact of the harvest on the total population is proportionate to run strength. Average to above average returns result in average to above average harvests and spawning escapements; below average returns result in below average harvests and less than average escapements.

Spawning escapement in 1991 in Anchor River and Deep Creek were the lowest recorded in recent years. Exploitation rate in the inriver fishery was a record high. Participation and harvest in the mixed stock intercepting marine troll fishery were also at record levels. This is not immediate cause for concern as these stocks historically fluctuate in abundance. However, future years' escapement, inriver harvest, harvest in the marine troll fishery and total return should be closely monitored to determine their cumulative effect on the reproductive potential of wild stock Anchor River and Deep Creek chinook salmon.

RECOMMENDED RESEARCH & MANAGEMENT

A possible biological concern is the overharvest of Anchor River and Deep Creek wild stocks. This potential concern has allocative connotations if future research indicates a significant percentage of the total return to these streams is being harvested in the intercepting mixed stock Cook Inlet marine sport fishery. Recommendations for future and continued research are therefore similar to recommendations for the Cook Inlet Early-Run Marine Chinook Salmon Fishery.

1. A creel survey will be designed and implemented which estimates total early- and late-run harvest and participation in the marine chinook salmon fishery. The first year of this survey will be 1995; it will continue at least through 1996.

2. A stock separation program will be designed and implemented to determine the proportionate contribution of each stock identified to the total harvest. Tagging of wild and hatchery produced chinook salmon smolt is continuing; recovery of tagged fish in the marine fishery will commence in 1996.

3. A methodology will be investigated to accurately assess the spawning escapement of early-run chinook salmon in Anchor River and Deep Creek. An experimental sonar counter will be installed on Deep Creek in 1995.

4. Given that recommendation (3) is successfully implemented, optimum spawning escapement goals for wild stock chinook salmon in these streams should be established with appropriate management strategies to achieve these goals.

KASILOF RIVER EARLY-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

The Kasilof River early-run chinook salmon fishery is supported primarily by stocked chinook salmon of Crooked Creek Hatchery origin supplemented by limited natural production. The fishery objectives are:

Objective 1: To produce a return of an additional 8,000 early-run adult chinook salmon to Kasilof River, while ensuring a minimum of 700 chinook salmon spawn naturally in Crooked Creek upstream from the hatchery.

Objective 2: To generate approximately 35,000 angler-days of annual sport fishing opportunity directed at stocked chinook salmon in the Kasilof River.

Objective 3: To annually stock 210,000 chinook salmon smolts in Crooked Creek.

Observation and data indicate that all objectives are being achieved. Total return in recent years has approximated or exceeded 8,000 fish (Table 6) with an additional but unknown number spawning downstream from the hatchery. The fishery has been continuous without inseason interruption. Participation of 35,000 angler-days was exceeded in that total participation in Kasilof River sport fisheries exceeded 57,000 days fished in 1993. About 90% of this river's fishery participation is assumed to occur during the early-run chinook salmon fishery.

INSEASON MANAGEMENT APPROACH

This fishery is supported primarily by stocked fish; no inseason regulation of the fishery has been required. Inseason management activity has been limited to a relative determination of angler success through observation and contact with anglers. This information is used in conveying the general status of the fishery to the news media and public.

HISTORICAL PERSPECTIVE

The recreational fishery for early-run chinook salmon in the Kasilof River occurs from late May through early July. The early run is almost all hatchery-reared fish that return to Crooked Creek, a tributary to the Kasilof River, approximately 6 miles upstream from Cook Inlet (Figure 6).

In the late 1970s and early 1980s virtually all fishing was from the shore of the Kasilof River in the one-half mile immediately downstream from its confluence with Crooked Creek. In recent years an increasing number of drift boats have been employed in the fishery. Timing of the early run precedes the commercial set gillnet fishery on the east side of Cook Inlet. There is, however, a personal use gillnet fishery that occurs in late June at the mouth of the Kasilof River. This fishery harvests primarily sockeye salmon returning to Tustumena Lake. Each year small numbers of chinook salmon of Crooked Creek origin are also caught here. In 1984, 165 chinook salmon were reported; 1985, 193; 1986, 168; 1987, 184; 1988, 118; 1989, 186; 1990, 129; and 129 in 1991. This fishery did not occur in 1992. Harvest in 1993 was 47.

Table 6.-Historical summary of Kasilof River drainage early-run chinook salmon fishery,[a] 1978-1994.

Year	Kasilof River[b] Harvest		Crooked Creek Egg Take	Crooked Creek Escapement	Sold to Processors	Total Run	Catch Per[c] Hour
		Percent		Number	Number	Number	
1978	251	5.1	202	4,513		4,966	0.038
1979	283	7.4	181	3,363		3,827	0.040
1980	310	12.0	167	2,115		2,592	0.019
1981	1,242	30.0	49	2,855		4,146	0.061
1982	2,316	39.8	244	3,259		5,819	0.088
1983	2,853	39.9	496	3,809		7,158	0.044
1984	3,964	52.1	437	3,213		7,614	0.062
1985	2,986	51.5	291	2,521		5,798	0.044
1986	7,071	67.0	317	3,161		10,549	0.073
1987	4,461	54.5	324	3,400		8,185	0.071
1988	4,953	56.6	321	700	2,775	8,749	0.086
1989	3,767	55.6	263	750	1,998	6,778	0.099
1990	2,852	55.6	379	771	1,125	5,127	0.098
1991	5,055	71.5	258	700	1,055	7,068	[d]
1992	6,049	65.3	267	750	2,196	9,262	[d]
1993	9,724	87.9	376	848	113	11,061	[d]
Mean	3,634	47.0	286	2,296	1,544	6,794	0.051
1994			134	640	1,016		[d]

[a] One-ocean jacks not included.

[b] Data obtained from Statewide Harvest Study. Includes an unknown small number of late-run fish.

[c] Data obtained from FRED Division Kasilof River creel survey.

[d] No survey conducted.

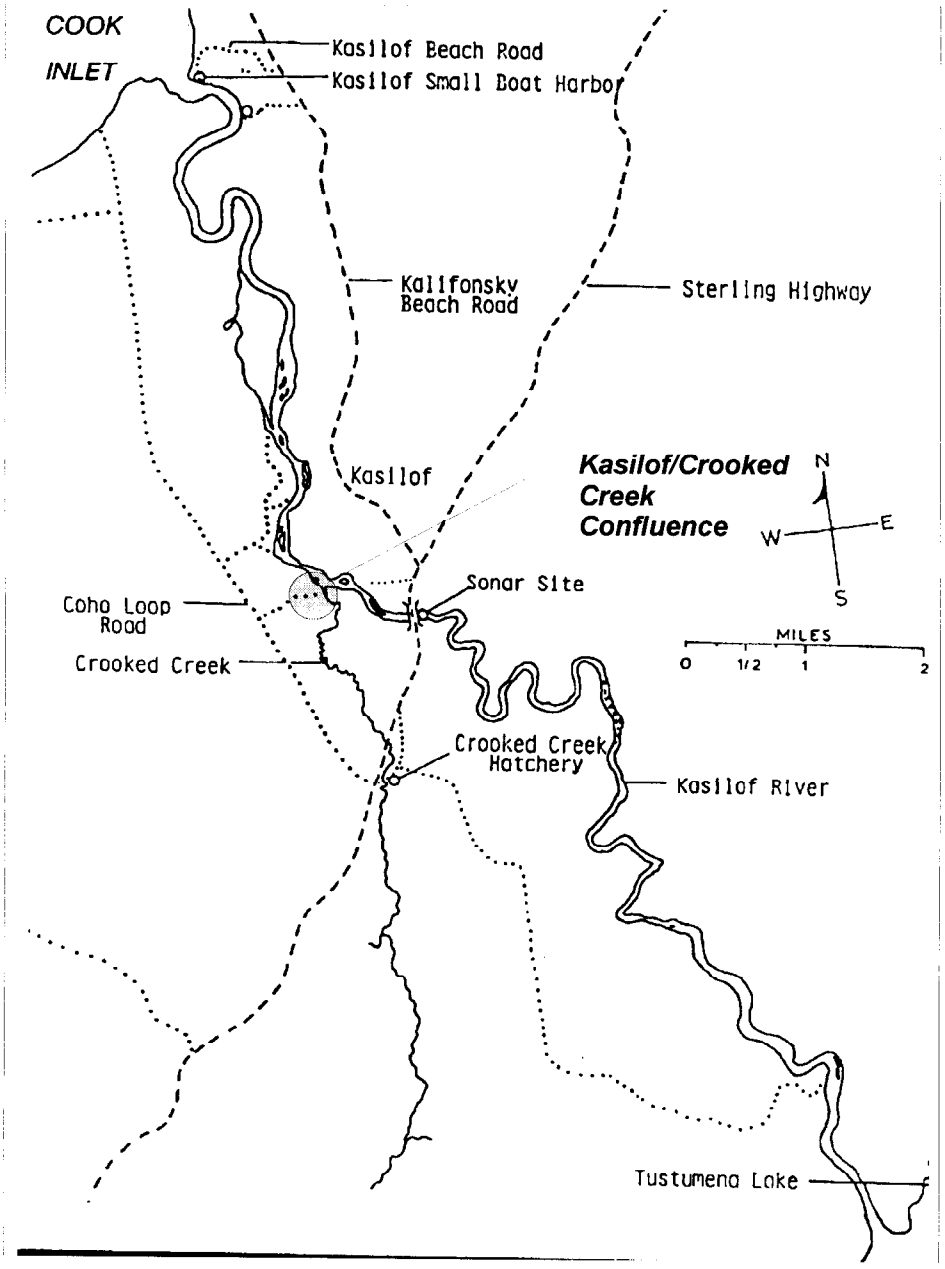

Figure 6.-Kasilof River early-run chinook salmon fishery.

BOARD OF FISH ACTIONS

There were no regulatory changes to this sport fishery in 1990 or 1992. The Board will again accept proposals regarding this fishery in 1995.

RECENT FISHERY PERFORMANCE

Harvest of early-run chinook salmon from the Kasilof River was 9,724 in 1993, the most recent estimate available from the Statewide Harvest Survey (Table 6). Harvest was apportioned 59% to bank anglers, and 41% to boat anglers. Natural spawning escapement upstream from the hatchery was 848 fish. An additional 376 fish were required for brood stock, and 113 were sold to processors. Total return was estimated at 11,061, the highest return recorded in this fishery.

Harvest estimates for the 1994 season will not be available until fall 1995. The 1994 season occurred in a normal manner with a continuing increase in the number of drift boats employed in the fishery. The 1994 egg-take requirement was 134 fish; escapement above the weir was 640 with an additional 1,016 early-run chinook salmon (primarily 1-ocean) sold to processors. An unknown number of chinook salmon spawned in Crooked Creek downstream from the weir.

OUTLOOK

Total annual return of stocked early-run chinook salmon to this fishery has been relatively consistent. Future adult returns are projected to mirror historic returns.

CURRENT ISSUES

The Crooked Creek Hatchery is currently operated by the Cook Inlet Aquaculture Association. This Association also produces sockeye salmon for stocking in Kenai Peninsula drainages. Fish culturists for the Association would prefer that no natural chinook salmon spawning occur above the hatchery. Spawning upstream from the facility increases the chance of disease being introduced into the hatchery from spawning fish with negative connotations for their sockeye salmon program. This issue is expected to be resolved prior to the 1995 field season.

A secondary issue is the increasing efficiency of the sport fishery. In recent years the number of adult fish surviving the fishery and returning to the hatchery has declined. In 1994 the number returning was less than the number of adult fish required for the natural spawning escapement and the egg take. Inseason management of the fishery may be required to ensure that both brood stock and natural spawning requirements are achieved if the circumstances that happened in 1994 continue and it is determined that natural spawning will continue to be provided for upstream from the hatchery.

In the early years of the fishery social issues were related to limited parking, habitat degradation and congestion. The parking issue was resolved when the state purchased and enlarged the parking lot. Additional improvements (graveled paths and sanitary facilities) were also added. These amenities are administered by the Division of Parks. The addition of these improvements decreased habitat degradation and provided a more aesthetically pleasing experience. The recent purchase of land downstream from the confluence of Crooked Creek and Kasilof River will alleviate, but not totally eliminate, stream bank congestion. Crowded conditions on the stream will still continue to be part of the fishery. Chinook salmon concentrate in the half mile below the confluence of Crooked Creek and Kasilof River. Anglers direct their efforts here as this area offers the highest probability of success.

RECOMMENDED RESEARCH & MANAGEMENT

No program specific research or changes in management activity are required at this time.

KENAI RIVER EARLY-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

Management of this fishery is governed by the Kenai River Early Chinook Salmon Management Plan. This plan was adopted by the Board of Fisheries in 1988 and implemented during the 1989 season. **The primary objective of management as outlined in the plan is to achieve an optimum spawning escapement of 9,000 early-run chinook salmon**. The plan outlines management options the department may implement at given projected escapement levels to assure the optimum escapement is achieved.

If the projected escapement is less than 5,300, the sport fishery is closed to fishing for chinook salmon. At a projected escapement of 5,300 to 9,000, terminal tackle is restricted to unbaited single-hook artificial lures. The fishery reverts to a "trophy fishery" in that only chinook salmon 52 inches or larger may be retained. Time and/or area may also be restricted at this projected escapement level. If the projected escapement exceeds 9,000, bait is permitted in the fishery with standard terminal tackle.

Since implementation of the plan in 1989, the primary management objective (spawning escapement of 9,000) has been achieved in 4 of 6 years. In the years in which it was not achieved, spawning escapement was 8,500-9,000.

INSEASON MANAGEMENT APPROACH

The primary objective of inseason management is to achieve the optimum spawning escapement goal of 9,000 fish. Achievement of this objective requires a knowledge of the number of early-run chinook salmon entering the river; an estimate of inseason harvest; and the ability to project the final inriver return, harvest and spawning escapement.

Number of fish entering the river is estimated by sonar counter. The counter is installed May 16; the early run ends by regulation June 30. Counts are generated daily. The count for a given day is available to management staff by the afternoon of the following day.

Harvest is estimated by onsite creel survey. The survey usually begins about May 15 or as soon as water levels rise sufficiently to permit anglers and department staff to utilize boats on the river downstream from Soldotna. The early-run survey concludes June 30. Harvest estimates are usually generated on a weekly basis; daily estimates are required if a management action is imminent.

The final spawning escapement is projected inseason using a run timing model. This estimate is the projected inriver return minus the projected harvest (including chinook salmon mortality associated with catch-and-release fishing). In most years, an accurate projection can not be made prior to June 10. However, in years of an exceptionally strong or weak return, this projection can be made earlier in the fishery.

If the projected spawning escapement is above 9,000 fish, the use of bait is permitted in the fishery. If the spawning escapement is projected at 5,300 to 9,000, the fishery is restricted until

the optimum escapement of 9,000 may be projected. The restriction used to date and provided for in the management plan is to revert to a "trophy fishery." During this time terminal tackle is limited to single-hook artificial lures; only chinook salmon 52 inches in length or larger may be retained. If the projected escapement is less than 5,300, the fishery is closed for resource conservation. Total closure of this fishery has not been required to date.

This is one of the largest and most controversial fisheries in Alaska. Interaction with the user groups affected by management decisions is critical to the successful implementation of any inseason management action. Accurate dissemination of information regarding the fisheries status is imperative and considered by this author to be the key to a successful management program.

The Soldotna office has two recorded message phones. One phone provides a general weekly fishing forecast; the other a brief summary of spawning escapements and weir and sonar counts for major Kenai Peninsula fisheries. A brief summary of this fishery's status is provided daily on this latter message phone. This message phone may receive over 300 calls daily during the peak of the fishery. This not only affords the public reliable access to information, but also increases the efficiency of the Soldotna staff by freeing them from the routine duty of repetitively providing information to anglers who contact the office staff regarding the fishery's status.

Public interaction is also achieved through formal news releases and requests for information from the news media. News releases and requests from the news media are given a priority because they provide a public forum to disseminate information regarding the fishery's status and the management plan which regulates the fishery.

Restrictive management actions in this fishery are socially disruptive. This disruption can be mitigated by apprising the public of probable restrictions to the fishery through the aforementioned use of the recorded message phone and news media contacts. Formal announcements regarding emergency orders which change the management of the fishery should be issued as soon as the decision is made, preferably at least 24 hours before a given action occurs.

HISTORICAL PERSPECTIVE

The Kenai River chinook salmon fishery began in the early 1970s when methods were introduced, adopted from the Pacific Northwest, that allowed the harvest of chinook salmon from this glacially turbid river. Bouncing bright terminal tackle, either with or without bait, at river velocity was initially the preferred fishing technique. Gradually other methods such as "jet planing" and "back-bouncing" proved quite successful in certain water conditions.

Chinook salmon return to the Kenai River in two distinct runs, early and late. The first run usually begins arriving in harvestable numbers by mid-May, peaks in mid-June, and has passed through the majority of the fishery by late June. Late-run fish are present in July and early August. Most of the early run spawn in the Killey and Funny rivers; late-run fish are primarily mainstem spawners.

Because of its popularity and the magnitude of the chinook salmon runs which support it, the fishery is restrictively regulated. Chinook salmon fishing is limited to a 50-mile area downstream from Skilak Lake (Figure 7). The season is January 1 through July 31. For

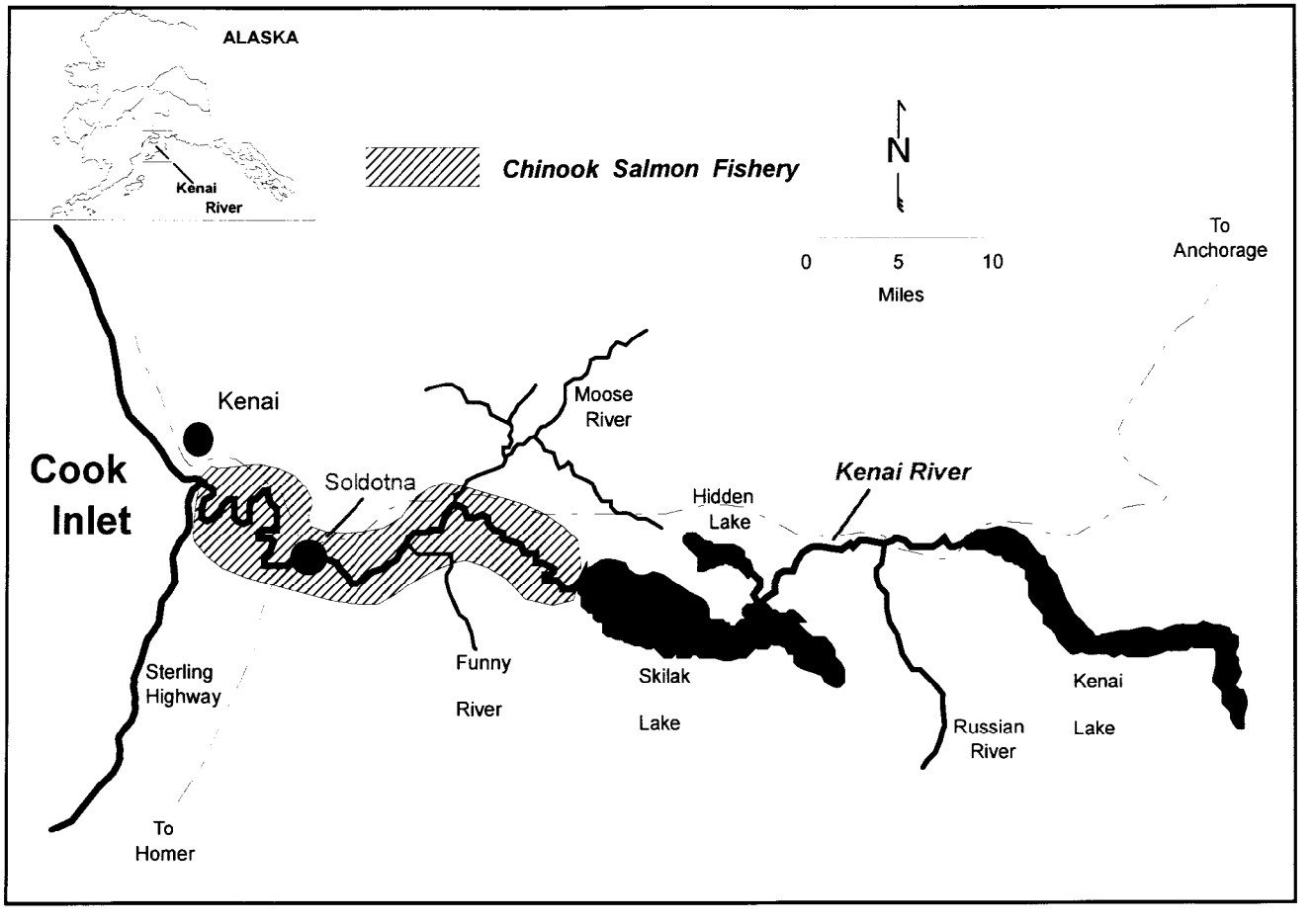

Figure 7.-Schematic diagram of the Kenai River drainage. Chinook salmon fishing occurs downstream from Skilak Lake.

regulatory purposes the early run ends June 30. The daily bag and possession limit is 1 chinook salmon 16 inches or greater in length. The seasonal limit is 2 fish. The majority of the harvest is taken using boats. After retaining a chinook salmon, an angler is prohibited from fishing from a boat in the Kenai River downstream from Skilak Lake for the remainder of that day.

The Kenai River chinook salmon fishery supports a commercial guiding industry. Since 1982 guides have been required to register with the state. Guided anglers are more restrictively regulated than nonguided anglers because their efficiency is generally two to three times higher than nonguided anglers and for social concerns involving allocation of the harvest between guided and nonguided user groups.

The majority of the area open to chinook salmon fishing is managed as a State Park by the Department of Natural Resources. In 1986 this agency reduced the maximum size of outboard motors used on the river to 50 horsepower. In 1987 the maximum horsepower was further reduced to 35. The reduction to smaller outboards has generally been favorably received by the angling public. There is no evidence to indicate that use of smaller motors has reduced angler efficiency.

Under current Board of Fisheries policy, the early run has been allocated almost exclusively to recreational anglers; an unknown number of early-run fish are intercepted in the Cook Inlet marine sport fishery prior to their entry into the Kenai River fishery.

The department's management and research activities directed toward this fishery began in 1974 with the initiation of a creel survey to determine angler harvest, effort and success rates. In 1984, a tag and recapture program was initiated to estimate the population of late-run chinook salmon entering the river. In 1985, the program was expanded to include an estimate of early-run fish. This tagging project utilized drift gillnets to capture chinook salmon in the lower Kenai River. Tagged chinook salmon were recovered in the sport fishery through the creel survey. The tagging program provided inseason catch-per-unit-effort (CPUE) data and a postseason estimate of early and late-run abundance.

In 1984, the department implemented an experimental sonar program to enumerate these stocks. The sonar counter utilizes dual beam technology to separate and enumerate less abundant chinook salmon from the numerically superior sockeye salmon in two ways. First, the gear electronically filters small fish targets (sockeye salmon size fish and smaller) by establishing a threshold of target strength to estimate the abundance of large fish targets. Second, chinook salmon migrate almost exclusively in the offshore portion of the river; the nearshore areas, where most of the sockeye salmon are found, are not ensonified. Estimates of abundance were first realized from the sonar counter in 1987; sonar counts have been used for inseason management of the fishery since 1988.

In 1988 the Board of Fisheries adopted a management plan for the early run. This plan established minimum (5,300) and optimum (9,000) escapement goals, identified management actions to be taken at given escapement levels and directed that the fishery initially be prosecuted without bait to reduce angler efficiency. Bait is permitted when the optimum escapement goal is projected.

During the 1989 early-run fishery bait was not allowed from May 16-31. The harvest rate was 0.021 chinook salmon per hour. From June 1 through June 10 bait was allowed and the harvest

rate increased to 0.063, then declined to 0.019 when bait was again prohibited (June 10-19). Harvest rate increased to 0.030 after June 19 when bait was again permitted.

Predicated on the 1989 data, we conclude that the use of bait more than doubles angler efficiency during the early run. The use of bait was prohibited during all of the 1990, 1991 and 1992 early-run fishery and was permitted during the latter part of the 1993 and 1994 seasons.

BOARD OF FISH ACTIONS

The Board changed several provisions of the Early Run Kenai River Chinook Salmon Management Plan in 1990. If catch-and-release is required for conservation during the early-run fishery, the department may now allow retention of chinook salmon 52 inches or larger.

The Board also adopted a regulation which permits an angler, after retaining a chinook salmon 16 inches or larger from that area of the river downstream from Skilak Lake, to fish from a boat upstream from Skilak Lake the same day. The regulation prohibiting an angler from fishing from a boat for any species on the same day in the Kenai River downstream from Skilak Lake after retaining a chinook salmon 16 inches or larger remains in effect.

The Board did not change the Kenai River Early Chinook Salmon Management Plan at its November 1992 meeting. It did, however, adopt as regulation a department sponsored proposal closing the area at the confluences of Slikok Creek and Funny River with the Kenai to all chinook salmon fishing from January 1 through July 14. Chinook salmon "hold" for a period of time at the confluences of these tributaries and required increased protection to facilitate their migration into the spawning streams. The intent of the regulation is to increase spawning escapement in these tributaries. This regulation may also negate the necessity of more stringent restrictions if the optimum spawning escapement goal is not projected, i.e. closure to all chinook salmon fishing in that area upstream from Slikok Creek through July 14 as occurred in 1992.

RECENT FISHERY PERFORMANCE

In 1994 the sonar counter was operational May 16; the creel survey May 17. The fishery opened without the use of bait as it has since 1989. Sonar count through June 22 was 13,039. The population model was projecting an inriver return of about 17,000 and a spawning escapement of over 11,000. An emergency order was therefore issued permitting the use of bait commencing June 24. The 1994 fishery therefore occurred without restriction for the second time since 1989.

Total early-run chinook salmon return to the river was 18,570 in 1994 (Table 7). Harvest was 5,634 with an additional 128 fish estimated to have perished due to catch-and-release fishing practices. Fifty-six fish were harvested in the Kenaitze Educational Fishery and Cook Inlet subsistence fishery. Spawning escapement was 12,752, 42% above the optimum spawning escapement goal of 9,000.

Average harvest per unit effort was 0.032, equating to one king salmon harvested for every 31.3 hours fished (Table 8).

Kenai River guides are required to register with the Division of Parks. In 1994, 257 guides registered (Table 9). Number of guides registering increased for the first time since 1990 when a record 310 registered.

Table 7.-Summary of early-run Kenai River chinook salmon population data, 1985-1994.

Year	Deep Creek Marine Harvest	Eastside Set Net Harvest	Drift Gill Net Harvest	Commercial Personal Use	Subsistence [a]	Kenai River Sport Harvest	Hook and Release Mortality	Escapement	Total Return
1985	Unknown	Closed	Closed			7,971		8,001	15,972
1986	Unknown	Closed	Closed			7,561	292	19,227	27,080
1987	Unknown	Closed	Closed			13,281	374	11,988	25,643
1988	Unknown	Closed	Closed			12,747	377	7,756	20,880
1989	Unknown	Closed	Closed		73	7,256	169	10,567	18,065
1990	Unknown	Closed	Closed		40	1,735	285	8,745	10,805
1991	Unknown	Closed	Closed		2	891	113	9,925	10,931
1992	Unknown	Closed	Closed		73	1,365	164	8,558	10,160
1993	Unknown	Closed	Closed		118	7,727	219	11,975	20,039
1994	Unknown	Closed	Closed		56	5,634	128	12,752	18,570

[a] Includes harvest in Kenaitze educational gillnet fishery

Table 8.-Historical summary of harvest, angler effort and harvest rate, early-run Kenai River chinook salmon fishery, 1974-1994.

Year	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1974	1,685	11,275	41,098	0.041
1975	615	15,047	55,909	0.011
1976	1,554	16,430	64,750	0.024
1977	2,173	35,479	112,007	0.019
1978	1,542	19,568	96,624	0.016
1979	2,661	39,665	139,154	0.019
1980	1,946	32,365	123,019	0.016
1981	4,525	28,335	120,881	0.037
1982	5,466	45,723	166,334	0.033
1983	6,360	42,716	169,997	0.037
1984	4,956	50,455	201,821	0.025
1985	7,971	47,394	184,836	0.043
1986	7,561	50,608	183,901	0.041
1987	13,281	52,716	216,816	0.061
1988	12,747	52,890	259,901	0.049
1989	7,256	58,218	234,527	0.031
1990	1,735	28,845	123,149	0.024 [a]
1991	891	10,518	47,599	0.031 [a]
1992	1,365	11,615	54,330	0.043 [a]
1993	7,727	34,301	153,899	0.050
Mean	4,701	34,208	137,528	0.033
1994	5,634	37,628	173,842	0.032

[a] Harvest per hour only for periods open to retention of chinook salmon.

Table 9.-Historical summary of Kenai River guide registration program, 1982-1994.

Year	Businesses Registered	Guides Registered [a]	Vessels Registered		
			Powered	Drift	Total
1982	125	207			179
1983	123	198			185
1984	115	214			199
1985	107	160	131	40	171
1986	130	187	138	60	198
1987	145	222	154	77	231
1988	162	252	180	79	259
1989	202	292	225	101	326
1990	230	310	229	126	355
1991	176	290	198	112	310
1992	194	238	251	134	385
1993	191	222	169	127	296
1994	[b]	257	182	157	339

Data provided by Division of Parks and Outdoor Recreation.

[a] Fishing guides only.

[b] Data not available.

Historically, the efficiency of guided anglers was approximately three times greater than the efficiency of nonguided anglers (Table 10). This relative efficiency has been declining for the last 4 years as the nonguided angler efficiency has increased. Guided anglers were 2.2 times more efficient than nonguided anglers in 1991; 1.4 times as efficient in 1992, and 2.4 times more efficient in 1993. In 1994, the guided angler was 2.5 times more efficient than the nonguided angler.

OUTLOOK

Regulatory changes to Kenai Peninsula sport finfish fisheries will be considered by the Board in fall 1995. Basic regulation of the fishery will therefore be unchanged during the 1995 season. The primary objective of management will continue to be to achieve the desired spawning escapement of 9,000.

Management strategies to achieve the optimum spawning escapement goal are contained in the management plan for this fishery. Whether or not these strategies are implemented inseason is dependent on the number of early-run chinook salmon returning to the Kenai River. In years of low return, no departure from prior management strategies is anticipated. In years when the return is sufficient to provide for the spawning escapement and harvest, inseason management (with the possible exception of allowing the use of bait) will probably not be required. The 1995 return is forecast to approximate 16,000. If this return is realized, liberalization of the 1995 fishery will probably occur.

CURRENT ISSUES

Adoption of the Early Run Chinook Salmon Management Plan was imperative to the biological management of this fishery. The plan established escapement goals and identified management strategies to achieve these goals. Formalized identification of objectives and strategies to achieve these objectives removed much of the subjectivity from the management of this fishery.

Regulations governing the early-run Kenai River chinook salmon fishery are numerous and complex. Many of these regulations are related to allocative and social rather than biological issues and reflect the Board of Fisheries' desire to provide recreational opportunity for inriver user groups, i.e. both guided and nonguided anglers.

Restrictive regulations regarding guided anglers initially served a dual purpose: (1) they reduced harvest and were a management tool to conserve the resource; (2) the regulation addressed the social issue of competition between guided and nonguided anglers, allocating additional time to less efficient nonguided anglers. These regulations were adopted by the Board prior to the adoption of the Early Run Kenai River Chinook Salmon Management Plan in 1988 and the development of the sonar counter as a management tool in 1987.

The fishery is presently managed on achieving established escapement goals. The sonar counter now permits an inseason determination of whether or not these escapement goals will be achieved. The hourly restrictions which presently apply to guided anglers and the prohibition on Monday fishing for all anglers can therefore no longer be justified by citing biological concerns. Social concerns, however, remain an issue in the orderly development of this fishery. These issues relate to competition between guided and nonguided anglers for the harvestable surplus and, in some years, the increased probability of inseason restrictions for stock conservation.

Table 10.-Summary of guided vs. non-guided angler harvest, effort, and success rate, early-run Kenai River chinook salmon fishery, 1981-1994.

	HARVEST								EFFORT				
	Guided			Non-Guided			Total		Guided (Hours)		Non-Guided (Hours)		Total (Hours)
Year	Number	%	HPUE [a]	Number	%	HPUE [a]	Number	HPUE [a]	Number	%	Number	%	Number
1981	2,247	49.7	0.080	2,278	50.3	0.025	4,525	0.037	28,044	23.2	92,837	76.8	120,881
1982	2,464	45.1	0.083	3,002	54.9	0.022	5,466	0.033	29,774	17.9	136,560	82.1	166,334
1983	4,086	64.2	0.084	2,274	35.8	0.019	6,360	0.037	48,789	28.7	121,208	71.3	169,997
1984	2,560	51.7	0.053	2,396	48.3	0.016	4,956	0.025	48,235	23.9	153,586	76.1	201,821
1985	4,780	60.0	0.082	3,191	40.0	0.025	7,971	0.043	58,593	31.7	126,243	68.3	184,836
1986	3,986	52.7	0.081	3,575	47.3	0.027	7,561	0.041	49,033	26.7	134,868	73.3	183,901
1987	6,382	48.1	0.114	6,899	51.9	0.043	13,281	0.061	55,977	25.8	160,839	74.2	216,816
1988	6,956	54.6	0.089	5,791	45.4	0.032	12,747	0.049	78,465	30.2	181,436	69.8	259,901
1989	5,304	73.1	0.052	1,952	26.9	0.015	7,256	0.031	102,245	43.6	132,282	56.4	234,527
1990	1,368	78.8	0.038 [b]	367	21.2	0.010	1,735	0.024 [b]	65,960	53.6	57,189	46.4	123,149
1991	593	66.6	0.043 [b]	298	33.4	0.020	891	0.031 [b]	23,279	48.9	24,320	51.1	47,599
1992	712	52.2	0.052 [b]	653	47.8	0.036	1,365	0.043 [b]	26,113	48.1	28,217	51.9	54,330
1993	4,585	59.3	0.079	3,142	40.7	0.033	7,727	0.050	58,393	37.9	95,506	62.1	153,899
Mean	3,540	58.1	0.071	2,755	41.9	0.025	6,295	0.039	51,762	33.9	111,161	66.1	162,922
1994	3,818	67.8	0.048	1,816	32.2	0.019	5,634	0.032	80,002	46.0	93,840	54.0	173,842

[a] Harvest per hour

[b] Harvest per hour only for periods open to retention of chinook salmon.

These inseason restrictions are disruptive to guided anglers, nonguided anglers and businesses that derive income from this fishery.

RECOMMENDED RESEARCH & MANAGEMENT

This fishery's research and management activities are interrelated. Research is required for both inseason management decisions and postseason evaluation of management actions and the current regulatory regime. Current research employs sonar to estimate inriver abundance. A creel survey provides inseason and postseason estimates of harvest, catch and angler participation. Combining data from these programs permits inseason projection of total return and spawning escapement. These data are the basis for inseason management decisions.

Inseason management decisions are predicated on projected escapement levels. Action taken at a given escapement projection is mandated by the Kenai River Early Chinook Salmon Management Plan. An active management program employing formal news releases and two recorded message phones apprise the public of the fishery's status.

The continuation and proposed expansion of the above research and management programs is mandatory in order for the department to meet its constitutional mandate of sustained yield.

In recent years an inseason creel survey from the Moose River upstream to Skilak Lake has not been conducted. Harvest in this area had been relatively consistent and recent years' harvests in this area have been estimated from historical harvest data. This estimated harvest has been added to the documented harvest in the lower river to determine total estimated early-run harvest. This estimate is used to develop the early-run management strategy for the fishery.

Observation, however, indicates that participation and harvest in this area is increasing. This increase is of concern to management because the increased harvest, if not taken into account when managing the fishery, could in some years depress the spawning escapement below the optimum level. Some anglers are also concerned that the harvest from this area is comprised of sexually maturing fish.

The area of concern is the approximately 3-mile area near the confluence of the Kenai and Killey rivers. The fishery here begins to develop in late June and is complete by mid-July. Many fish harvested are in spawning coloration and are assumed to be "staging" in the area prior to entering the Killey River where the majority of early-run spawning occurs.

In years when the escapement goal is exceeded by several thousand fish, harvest of these fish is not a biological issue as the escapement goal will be achieved despite an increased harvest. However, in years when the escapement goal is minimally exceeded, an undocumented increase in harvest here could depress the spawning escapement below optimum levels. In all years, harvest here will be viewed unfavorably by some anglers due to the condition of the fish, i.e. assuming spawning coloration.

It is therefore recommended that the creel survey be reinstated between the Moose River and Skilak Lake to quantify increased harvest in this area of the river. When baseline data are established for this segment of the fishery, the creel survey could be discontinued until such time as change in participation and harvest is again observed.

The issue of harvesting sexually maturing fish is a social issue and should be addressed by the Board of Fisheries. The public will have the opportunity to submit proposed regulatory changes to be considered at the 1995 Board meeting.

The Upper Cook Inlet Salmon Management Plan directs that salmon stocks which migrate through Cook Inlet prior to July 1 be managed primarily for recreational uses. Allocation of early-run Kenai River chinook salmon is therefore not an allocative issue between sport and commercial user groups.

The known first harvest of early-run Kenai River chinook salmon occurs in the Cook Inlet marine sport fishery adjacent to the beaches between Anchor Point and Deep Creek. This is a mixed stock fishery harvesting seven different stocks comprised of both wild and stocked fish including early-run Kenai River chinook salmon. The contribution of this stock to the total marine harvest is not known.

Some anglers contend interception of early-run Kenai River chinook salmon in the marine fishery results in early restrictions to the inriver chinook salmon fishery. This issue received considerable attention at the 1992 Board of Fisheries meeting and will continue to be an issue until the harvest in the marine sport fishery can be apportioned by stream of origin. A stock separation program has been initiated; initial information from the study will be available in 1996, and a final analysis of stock composition will be available in 1998.

RUSSIAN RIVER EARLY-RUN SOCKEYE SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

Management of this fishery is governed by the Russian River Sockeye Salmon Management Plan. The objective of this plan is to ensure an adequate escapement, as determined by the department, of sockeye salmon into the Russian River system and to provide management guidelines to the department in an effort to preclude allocation conflicts between various users of this resource. The plan established spawning escapement goals for both early and late runs. The early-run goal is 16,000 sockeye salmon. This goal has been achieved or exceeded in all but one year since the Plan was adopted in 1978 (Table 11). **Achievement of this goal is the primary management objective for this fishery**.

INSEASON MANAGEMENT APPROACH

This fishery is managed by escapement counted at a weir at the outlet of lower Russian Lake and by creel survey data. In years of low abundance, the escapement is achieved through inseason regulation of the sport fishery. Because of the intensity of the sport fishery, restrictive inseason management is usually a total closure until the spawning escapement is projected to be achieved.

Run strength is ascertained by examining three indicators: weir counts, harvest rates and visual enumeration of fish. Weir counts are the primary indicator. Historical data provide the percentage of the run which is expected to have passed the weir by a given date. A determination of run strength can generally be made a few days prior to the mid-point (July 4) of the early run. In some years fish have been late or have held in the Kenai River. Weir counts must therefore be evaluated in relation to harvest rates (HPUE) in the sport fishery. Harvest rates of below 0.10

Table 11.-Historical summary of escapement, harvest, angler effort, and harvest rate, Russian River early-run sockeye salmon, 1963-1994.

Year	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Spawning Escapement	Local Return
1963	5,710	Unknown		3,670	14,380	18,050
1964	3,980	13,600	0.261	3,550	12,700	16,250
1965	7,750	37,710	0.266	10,030	21,510	31,540
1966	11,970	63,080	0.237	14,950	16,660	31,610
1967	11,460	62,960	0.115	7,240	13,710	20,950
1968	11,780	66,540	0.104	6,920	9,120	16,040
1969	12,290	61,790	0.095	5,870	5,000	10,870
1970	9,700	48,730	0.118	5,750	5,450	11,200
1971	6,250	33,060	0.085	2,810	2,650	5,460
1972	12,340	52,500	0.096	5,040	9,270	14,310
1973	15,220	70,950	0.095	6,740	13,120	19,860
1974	11,090	61,330	0.105	6,440	13,160	19,600
1975	5,210	20,590	0.068	1,400	5,650	7,050
1976	8,930	28,910	0.117	3,380	14,735	18,115
1977	38,200	138,580	0.147	20,400	16,060	36,460
1978	51,910	196,590	0.192	37,720	34,240	71,960
1979	25,670	96,300	0.087	8,400	19,750	28,150
1980	31,430	130,820	0.208	27,220	28,620	55,840
1981	24,780	103,130	0.104	10,720	21,140	31,860
1982	39,000	163,140	0.211	34,500	56,110	90,610
1983	18,560	78,550	0.106	8,360	21,270	29,630
1984	29,230	144,680	0.248	35,880	28,900	64,780
1985	16,140	75,000	0.164	12,300	30,610	42,910
1986	29,850	126,720	0.277	35,100	36,340	71,440
1987	80,360	319,820	0.482	154,200	61,510	215,710
1988	46,600	186,390	0.294	54,780	50,410	105,190
1989	20,800	79,660	0.142	11,290	15,340 [a]	26,630
1990	44,740	178,970	0.169	30,215	26,720 [b]	56,935
1991	64,651	255,854	0.256	65,390	32,389 [c]	97,779
1992	37,484	143,937	0.212	30,512	37,117	67,629
1993	34,602	134,949	0.276	37,261	39,857	77,118
Mean	24,760	102,410	0.178	22,520	23,020	45,530
1994	42,422	178,173	0.275	48,923	44,872	93,795

[a] Includes 60 fish used to test brood source for disease.

[b] Includes 1,572 fish used as brood source for stocking in Resurrection Bay.

[c] Includes 729 fish used as brood source for stocking in Resurrection Bay.

fish per hour subjectively indicate few fish in the Kenai River, 0.10 to 0.20 suggest moderate numbers, and harvest rates exceeding 0.20 fish per hour are usually indicative of large numbers of fish in the Kenai River. Weir counts and harvest rate data are supplemented by onsite enumeration of the numbers of fish present in the sanctuary area, lower Russian River, the falls area and the area between the falls and the weir (Figure 8). Evaluation of data and visual enumeration then permit a determination as to whether or not the escapement goal can be achieved without inseason restrictions to the sport fishery.

Early-run sockeye salmon have been at high levels in recent years and the fishery has been liberalized inseason rather than restricted. Liberalization is defined as opening the 700 yard "sanctuary" area at the confluence of the Kenai and Russian rivers to fishing. This area is opened when an analysis of weir counts, harvest rates and visual enumeration indicate the escapement goal of 16,000 will be achieved.

The area is opened by emergency order. A noon opening is preferable because experience has shown that an opening at this time can be effected in an orderly manner. Late evening, midnight or early morning openings of the "sanctuary" area are avoided. Opening during the hours of darkness is not desirable because of the large numbers of people competing for limited space.

HISTORICAL PERSPECTIVE

Russian River is a clearwater tributary to the Kenai River near the community of Cooper Landing on the Kenai Peninsula approximately 100 miles south of Anchorage (Figure 9). Lands bordering the stream are federally managed. Public access is at the Kenai National Wildlife Refuge campground at the river's confluence with the Kenai River. Additional access is provided at the Chugach National Forest campground on the Russian River (Figure 8).

The drainage supports one of the largest returns of sockeye salmon to upper Cook Inlet waters and one of the largest freshwater sport fisheries for sockeye salmon in Alaska. In addition, coho, chinook and pink salmon spawn in the system as do resident populations of Dolly Varden and rainbow trout. The drainage is closed to fishing for chinook salmon but supports fisheries for the other species.

Sockeye salmon return to the Russian River during two distinct time periods. An early run arrives at the confluence of the Kenai and Russian rivers in early June. Because of their run timing, these early-run fish are not presently harvested in the upper Cook Inlet commercial fishery. The primary harvest of these fish is therefore in the inriver sport fishery. Early-run fish typically congregate at the confluence of the Russian and Kenai River for about 2 weeks before moving into the Russian River to spawn in the upper reaches of the drainage. A late run, part of the larger late run of upper Cook Inlet sockeye salmon, arrives at the confluence area in mid-July and typically migrates directly into the Russian River.

The sport fishery for both early- and late-run sockeye salmon occurs in the lower 3 miles of the Russian River and in the Kenai River downstream for about 1 mile from its confluence with the Russian River (Figure 8). Average early-run harvest is approximately 22,000 fish; angler effort averages about 102,000 angler-hours (Table 11). At times, more than 1,000 anglers simultaneously fish the open 4 mile section of the river. The two public campgrounds managed by federal agencies are routinely filled to capacity and unable to meet public demand for camping and parking.

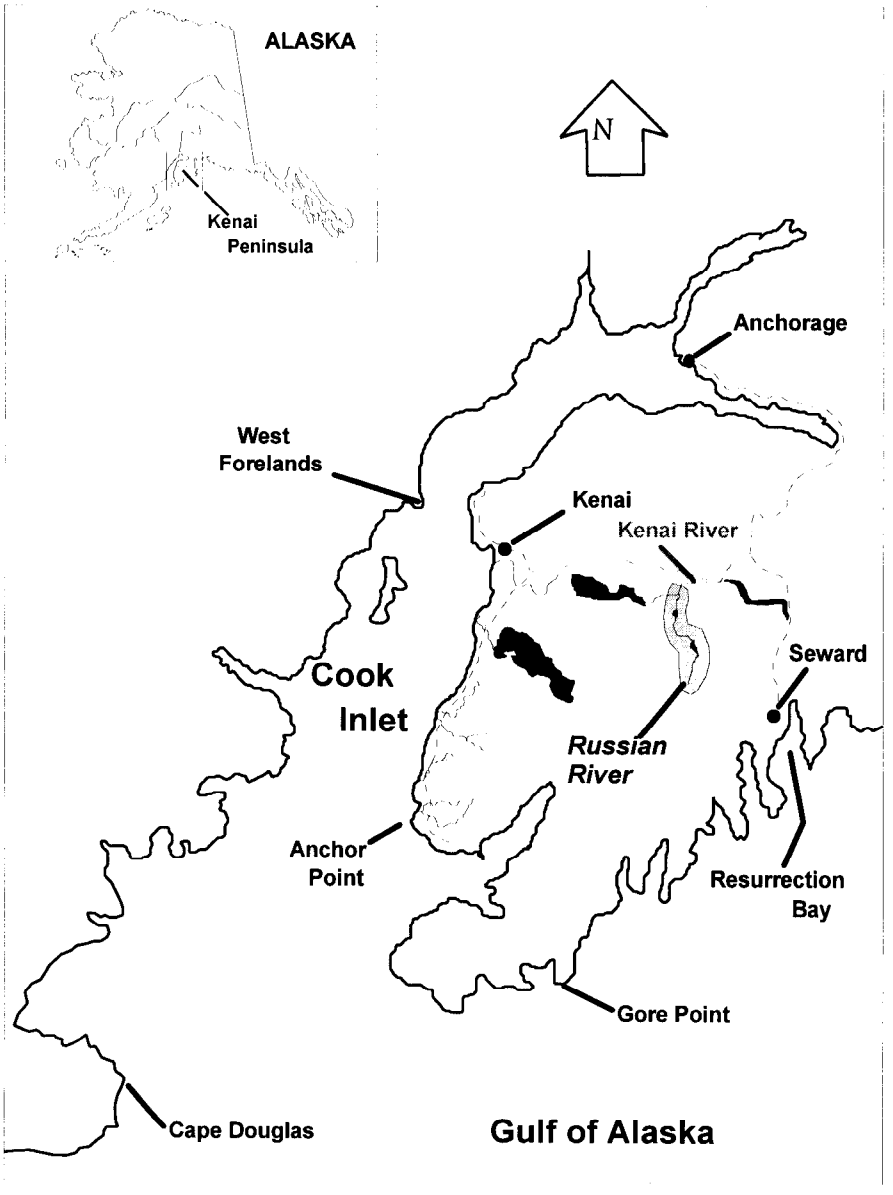

Figure 8.-Location of the Russian River on the Kenai Peninsula, Alaska.

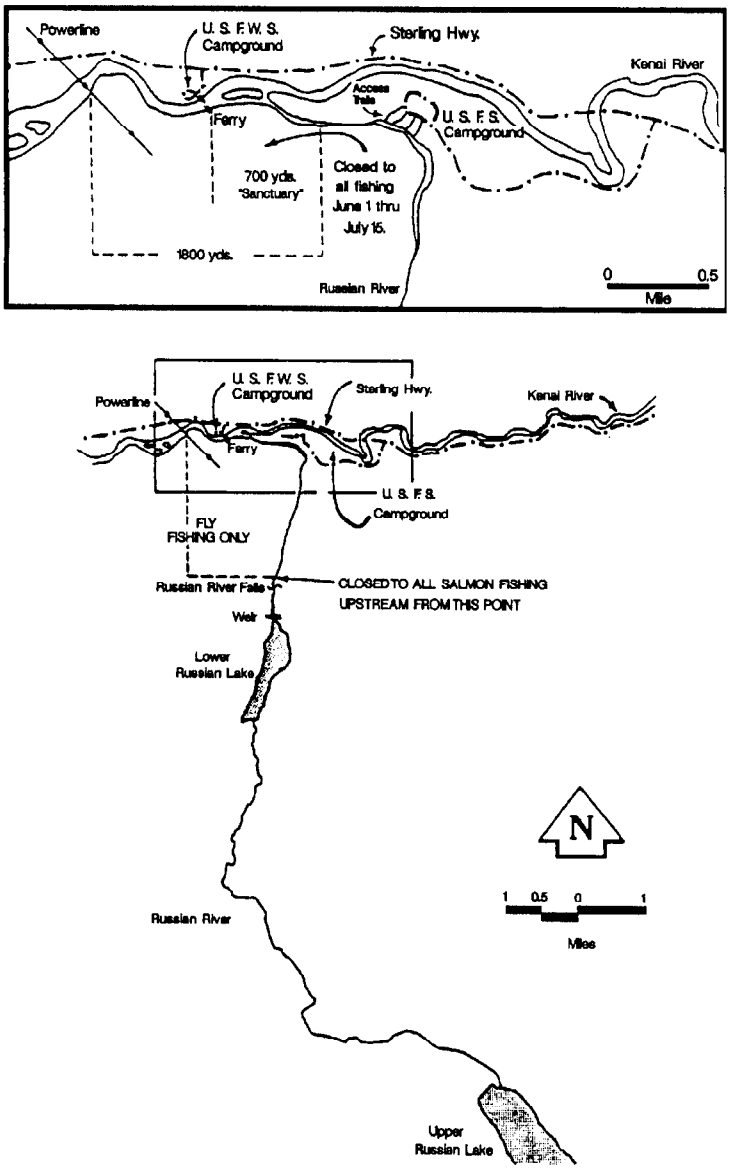

Figure 9.-The Russian River drainage.

In 1993 the Sport Fish Division of the Alaska Department of Fish and Game purchased property adjoining Fish and Wildlife Service lands at the confluence of the Kenai and Russian rivers. The 4.4 acre property, formerly the site of the privately owned Sportsmen's Lodge, was purchased for $375,000 primarily with Federal Dingell-Johnson (D-J) funds. The primary reason for the purchase was to provide a launching and take-out area for boat anglers utilizing the Kenai River. A secondary benefit of the purchase was to provide 50 to 75 additional parking places for anglers fishing sockeye salmon at the confluence of the Kenai and Russian rivers. Purchase of the property has, to a degree, alleviated the previously inadequate parking in this area during peak days of the fishery.

As angler effort has increased, the regulations governing the sport fishery have by necessity become more restrictive. As early as 1965 the use of treble hooks was prohibited in an effort to reduce snagging. In 1966 terminal gear was limited to flies and the area was designated fly-fishing-only. In 1967 the Board of Fisheries required that only fish hooked in the head, mouth or gills could be retained and, in 1969, this regulation was extended to include all fresh waters of the Kenai Peninsula. In 1973 the regulation was further amended and required that fish hooked elsewhere than in the mouth be released immediately.

Currently, the sport fishery is restricted to terminal tackle consisting of a single-hook, unweighted fly with a maximum hook gap of 3/8 in. This measure was implemented to reduce angler efficiency and provide a measure of protection to the vulnerable fish as they near spawning destinations. To protect holding fish, a portion of the confluence area (termed the "sanctuary") is closed to sport fishing until the early-run escapement is projected to be met. The drainage is closed to salmon fishing upstream of the lower 3 miles to allow fish to migrate unimpeded to spawning destinations.

BOARD OF FISH ACTIONS

The early-run Russian River spawning escapement goal of 9,000 was established by the department in the early 1970s as a minimum goal. This was incorporated by the Board into the Russian River Sockeye Salmon Management Plan in 1978. The minimum spawning escapement goal was based on the maximum availability of spawning habitat in upper Russian Creek, the only known area of early-run spawning at that time. At that time, this was the best methodology available for determining the escapement goal because insufficient stock productivity data were available.

Analysis of 19 years of spawner to recruit data indicated production could be optimized by increasing the spawning escapement goal to 16,000. This department sponsored proposal was adopted by the Board and incorporated into the management plan in 1990.

At its fall 1992 meeting the Board closed the Kenai River from the outlet of Kenai Lake downstream to the upper Killey River (excluding Skilak Lake) to all fishing from April 15 through June 10. Russian River downstream from Lower Russian Lake was closed for the same period. Purpose of the closure was to provide total protection to spawning rainbow trout.

This closure mandated that fishing for sockeye salmon in Russian River and at the confluence of the Russian and Kenai rivers could not begin until June 11. As sockeye salmon rarely are present in this area prior to June 11, this regulation had an insignificant effect on the 1993 and 1994 early-run sockeye salmon fishery.

Regulatory changes to this fishery will next be considered by the Board at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

The 1994 early run of sockeye salmon again arrived at the confluence of the Kenai and Russian rivers about June 11. Water velocities through Russian River falls were above average during part of the early run; the fish pass was required to facilitate migration. The spawning escapement goal of 16,000 was projected June 29. An emergency order, effective 12:00 noon, June 30, opened the 700 yard sanctuary area to fishing. Opening this area increased angler opportunity, harvest, and success.

The early run concluded in late July. Spawning escapement and harvest of early-run fish were estimated to be 44,872 and 48,923, respectively. The 1994 spawning escapement is above the historical mean escapement (23,020) and established goal of 16,000. Harvest was also above the historical average of 22,520. Angler success rate of one sockeye salmon harvested per 3.6 hours of fishing also exceeded the historical early-run success rate (Table 11).

OUTLOOK

Early-run Russian River sockeye salmon returns have been at high levels since the late 1970s. There are no data to indicate numbers of returning fish will decline in the foreseeable future.

The parent year for the 1995 return is 1989. Spawning escapement that year was below average (15,340). This below average escapement is expected to produce a return of about 45,000 fish. A return of this magnitude should preclude restrictions to the fishery.

No change in management strategy is therefore anticipated in 1995. If the spawning escapement is projected, the 700 yard "sanctuary" area will be opened. If the desired escapement can not be projected, the fishery will be restricted. Because of high levels of participation and efficiency in this fishery, inseason restrictions for conservation would probably be total closure of the Russian/Kenai River fly-fishing-only area.

CURRENT ISSUES

There are no biological issues associated with this fishery. Social issues focus on congestion and riparian habitat degradation. There is no evidence indicating angler-caused habitat alteration has affected the productivity of either the Kenai or Russian River. Lands affected are in federal ownership; the United States Forest Service and Fish and Wildlife Service are evaluating this issue.

RECOMMENDED RESEARCH & MANAGEMENT

Early-run Russian River sockeye salmon are at high levels of abundance; spawning escapement goals have been consistently achieved. Angler opportunity and harvest have been maximized. No change in research or management strategy is required at this time.

COOK INLET MARINE LATE-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

Management of the Cook Inlet marine late-run chinook salmon recreational fishery is addressed in the Board-adopted Kenai River Late Chinook Salmon Management Plan because it is assumed

that late-run chinook salmon of Kenai River origin are harvested in this fishery. This plan was amended in 1990 to address the harvest of late-run Kenai River chinook salmon in the marine fishery.

In referencing the marine fishery the plan states that if the spawning escapement in the Kenai River is projected to be less than 15,500 late-run chinook salmon, the department shall close the recreational fisheries in the Kenai River and in the salt waters of Cook Inlet north of the latitude of Bluff Point to the taking of chinook salmon ("north of the latitude of Bluff Point" is specifically referring to the marine late-run chinook salmon fishery which occurs from Bluff Point north to Deep Creek, an area of about 25 linear miles).

Closure of the late-run chinook marine fishery would therefore only occur if numbers of late-run spawning chinook salmon in the Kenai River were projected to be less than the minimum goal for this drainage (15,500). To date, the projected escapement to the Kenai River has never been less than 15,500; restrictions to the marine fishery have not been required since the plan was amended by the Board in 1988. This notwithstanding, the primary goal of management is to follow the provisions of the Kenai River Late Chinook Salmon Management Plan as they apply to this fishery.

Additional fishery objectives adopted by the department are:

Objective l: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that harvest in this fishery does not reduce the late-run chinook salmon spawning escapement in any Cook Inlet drainage or stream below specified levels.

INSEASON MANAGEMENT APPROACH

Inseason management from 1972-1986 was an onsite survey to determine harvest and participation; from 1987-1993 relative changes in participation were determined from observation. In 1994 an onsite creel survey was again conducted.

HISTORICAL PERSPECTIVE

The Cook Inlet marine chinook salmon fishery had been divided into two fisheries: (1) Whiskey Gulch/Anchor River Area marine recreational chinook salmon fishery, and (2) Deep Creek marine recreational chinook salmon fishery. The fishery was divided in this manner because during the early years (1970s) of the fishery anglers concentrated their efforts around the access points of Anchor River/Whiskey Gulch and Deep Creek (Figure 10). Although the respective fisheries targeted the same stocks, there was spatial separation of the fishery participants depending on the access point used.

In recent years anglers have used larger boats, lodges have been built between Deep Creek and Anchor River/Whiskey Gulch and it has become generally known that chinook salmon may be harvested along the entire beach area (approximately 20 miles) between Anchor River and Deep Creek. Because anglers are no longer spatially segregated, this area is now considered a single fishery.

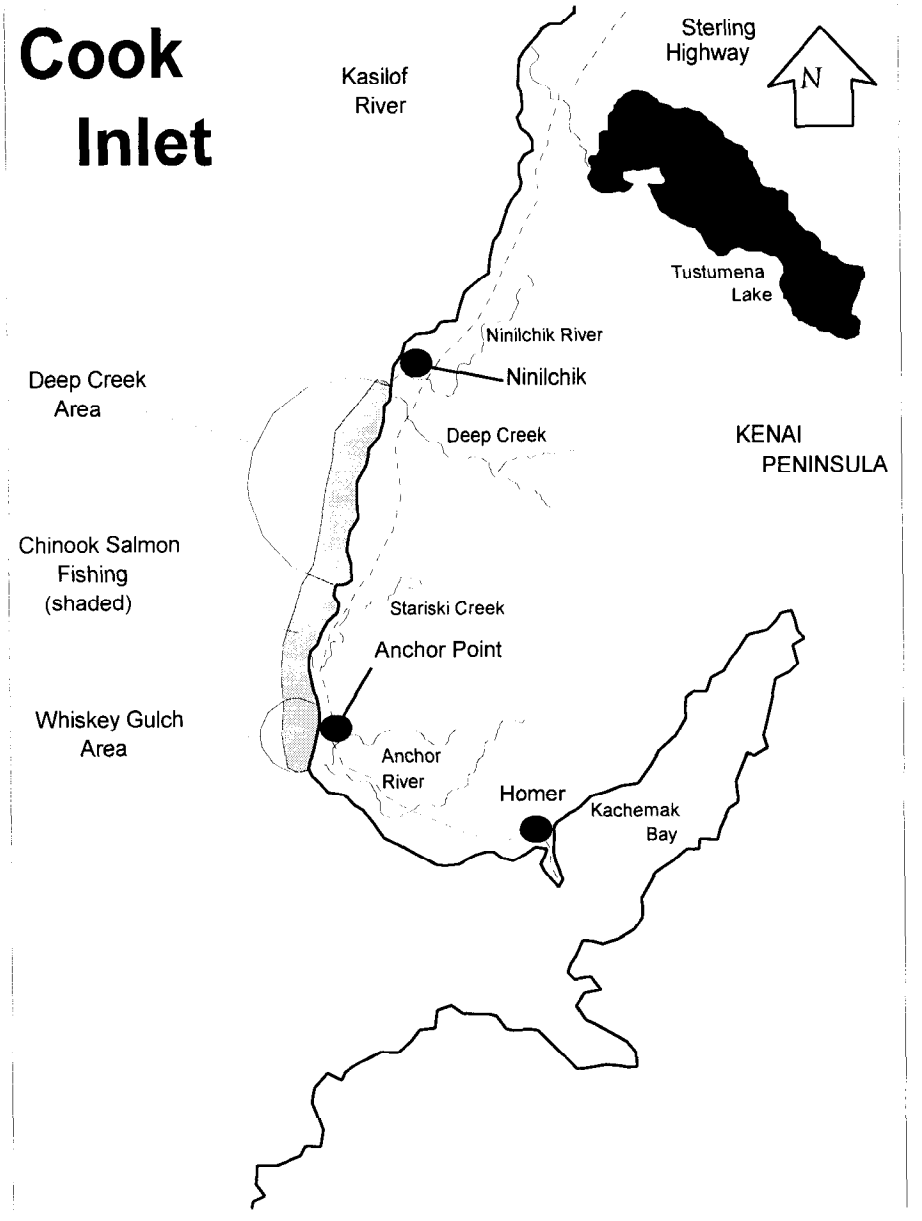

Figure 10.-The Cook Inlet marine late-run chinook salmon fishery.

Access to this fishery is through both private and public lands. Private roads access the three lodges built in recent years between Deep and Stariski creeks. Public access continues to occur primarily at the mouth of Anchor River, Deep Creek and Whiskey Gulch.

Anchor River has no developed launching facilities. A few boats launch from the beach which is unstable; most launch from an unimproved site approximately 200 yards upstream from Cook Inlet on Anchor River. Deep Creek has a ramp at the river's mouth which can be utilized only at high tide. Boats launch here and from the beach adjacent to the Department of Natural Resources campground. In recent years a commercial operator has provided a launching and take-out service utilizing tractors which makes it possible to use larger boats.

Access to Cook Inlet via Whiskey Gulch had previously been through private property. In 1993 the Sport Fish Division of the Alaska Department of Fish and Game purchased 24 acres to provide public access to this popular area at a cost of $281,000. Launching from the Whiskey Gulch beach is limited to small boats because of the steep gradient. In 1993 the Sport Fish Division provided a garbage collection site and a portable sanitary facility. No further improvements are currently planned; the Sport Fish Division will negotiate with the Department of Transportation to maintain the road which connects the recent purchase and beach to the Sterling Highway.

This marine chinook salmon fishery began in the early 1970s. The department conducted a creel survey at the Deep Creek access from 1972-1986 and at the Anchor River/Whiskey Gulch access in 1986. Harvest in 1987 and subsequent years has been determined by Statewide Harvest Survey. The onsite creel survey was terminated because the late-run chinook salmon harvest at that time was relatively small in relation to other chinook salmon fisheries. The onsite creel survey was reinstated in 1994 in response to increased harvest and participation and the public perception that those increases had the potential to influence management of the Cook Inlet commercial and Kenai River sport fisheries.

Historically, recreational harvests of chinook salmon have been dependent on local weather conditions. Limited boat launching facilities have restricted, and for the most part continue to restrict, the size of vessels that are used. As a result, adverse weather has, on occasions, restricted fishing to as little as 50% of the available time in which chinook salmon are present.

Late-run chinook salmon migrate through this area from late June through early August. Run timing indicates that the majority are of Kenai River origin with a small but unquantifiable component originating in Kasilof River.

The recreational fishery here is essentially the first harvest of the late run. Only commercial drift fishing is allowed south of Ninilchik; the chinook salmon harvest is minimal. The Statewide Harvest Survey does not differentiate between harvest of early and late-run chinook salmon. The historical apportionment of 70% early run, 30% late run as determined by the 1972-1986 Deep Creek creel survey was used to develop some of the data in Table 12. The Statewide Harvest Survey determines participation by area, not by species. Participation in the late-run Cook Inlet marine chinook salmon fishery can therefore not be ascertained because a major sport halibut fishery occurs in the same area as does the early and late-run chinook salmon fishery.

Table 12.-Historical summary of the Cook Inlet marine late-run chinook salmon sport fishery, 1972-1994

	Deep Creek Area [a]				
Year	Harvest	Days Fished	Harvest/ Hour	Whiskey Gulch Harvest	Total Harvest
1972	1,250	1,253	0.272		
1973	491	2,795	0.050		
1974	100	1,280	0.034		
1975	345	4,680	0.031		
1976	1,382	6,365	0.057		
1977	366	6,938	0.017		
1978	2,693	9,402	0.081		
1979	1,164	8,728	0.034		
1980	747	9,104	0.021		
1981	170	3,325	0.018		
1982	1,173	9,252	0.033		
1983	1,707	10,640	0.045		
1984	835	11,895	0.019		
1985	1,731	13,422	0.027		
1986	676	9,421	0.017	187	863
1987	1,090			310	1,400
1988	1,202			472	1,674
1989	1,270			310	1,580
1990	1,319			533	1,852
1991	1,871			629	2,500
1992					2,334
1993					3,344
Mean	1,079	7,233	0.050	407	1,486
1994	1,337			532	1,869

[a] Deep Creek data 1972-1986 and 1994 from creel survey. All other data from Statewide Harvest Survey which provides a seasonal total. Late-run harvest is apportioned as a percentage (29.5%) of seasonal total harvest based on historical creel survey data.

BOARD OF FISH ACTIONS

At its 1990 meeting, the Board recognized that a public proposal to reduce the saltwater chinook salmon bag limit from its current 2 to 1 fish was more correctly an allocative than a biological issue. However, since this fishery does intercept early- and late-run Kenai River chinook salmon and these fully utilized stocks were at relatively low levels of abundance in 1989 and 1990, the Board reduced the bag and possession limit in this fishery. Beginning in 1991, the chinook salmon bag and possession limit in Cook Inlet north of Bluff Point was 1 chinook salmon of any size.

Further Board action in 1990 rescinded the requirement that Kenai Peninsula chinook salmon caught between April 1 and September 30 in all waters north of a line from Cape Douglas to Point Adam be recorded on a punch card. The punch card was replaced with a harvest record identical to the harvest record in use prior to 1990. Because licenses were already printed without the harvest record, the 1991 harvest record was a stamp affixed to the back of the license. Rainbow/steelhead trout 20 inches or larger were also recorded here. Unlicensed anglers recorded their harvest on a special card.

The Board also amended the Kenai River Late Run Chinook Salmon Management Plan in 1990. A provision of the amendment was that if the projected late-run Kenai River chinook salmon spawning escapement was less than the minimum (15,500), the saltwater chinook salmon sport fishery in Cook Inlet north of the latitude of Bluff Point would be closed. This action would close the late-run marine chinook salmon fishery between Ninilchik and Anchor rivers, including the area from Anchor River south to Bluff Point. To date, implementation of this provision has not been required.

This fishery was reviewed by the Board at its November 1992 meeting. There were no regulatory changes which affect the prosecution of this fishery. The Board adopted a "housekeeping" proposal which clearly established the chinook salmon daily bag and possession limit south of Bluff Point as 2 fish; north of Bluff Point, 1 fish daily or in possession. This was to correct an administrative oversight which erroneously limited the bag/possession limit in Resurrection Bay to 1 fish.

The Board will next address this fishery at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

Harvest in 1992 was estimated from the Statewide Harvest Survey. The survey's early- and late-run chinook salmon harvest estimate for this fishery was 7,819. Predicated on creel survey data from 1972-1986, harvest was again apportioned 70% early run, 30% late run. Estimated 1992 late-run harvest was 2,334 chinook salmon (Table 12).

The 1993 fishery was prosecuted in a normal manner. The harvest estimate for 1993 was a record high of 3,344 chinook salmon.

The 1994 fishery was also prosecuted in a normal manner. A creel survey was conducted during the early- and late-run chinook salmon fishery. Estimated harvest in the Deep Creek area was 1,337; in the Whiskey Gulch/Anchor Point area, 532. Total harvest of 1,869 is within historic ranges. The late-run harvest was 25% of the total harvest. This suggests apportioning 30% of total harvest determined from Statewide Harvest Survey to the late run during years an onsite survey was not conducted may approximate the true apportionment between early and late runs.

Total effort in the chinook salmon fisheries (early and late runs) and the halibut fishery was 62,292 days fished. Due to the design of the SWHS, participation cannot be apportioned between fisheries.

OUTLOOK

Participation levels are expected to stabilize in the near-term, and moderately increase in the long-term. Present participation is in part predicated on angler success rates. High success rates, as were reported in 1993, increase participation; lower success rates as reported by anglers in 1994 tend to reduce participation. This trend is partly mitigated by increased use of the area by guided anglers who usually fish regardless of success rates reported by other anglers. Crowding in the fishery is not an issue during the late-run fishery because participation is appreciably less than during the early-run fishery.

Based on run timing, the majority of late-run fish harvested here are of Kenai River origin. The 1995 projection for this drainage is for total production approximating 60,000-70,000. A return of this magnitude should provide a reasonable harvest opportunity in this marine fishery in 1995.

In 1993, 100,000 late-run chinook salmon smolt of Kasilof River origin were stocked at Twin Falls. Twin Falls is about 2.5 miles south of Deep Creek. The purpose of the stocking program was to provide additional late-run chinook salmon for harvest in this fishery. The first adult (3-ocean) return from this stocking will be 1996. A review of this program in 1994 resulted in its termination. Concern that these stocked fish would stray into adjacent streams superseded increasing opportunity in this fishery.

CURRENT ISSUES

Late-run chinook salmon harvested in this fishery are primarily of Kenai River origin. This stock was at below average levels of abundance from 1989 through 1992. The marine sport harvest of these fish in lower Peninsula waters approximates 1,000-2,500 fish annually (Table 12). This is less than 6% of the 1989 through 1992 average total annual return to the Kenai River.

Public concern regarding the interception of late-run chinook salmon in the Cook Inlet marine sport fishery is an allocative, not a biological issue. This marine interception fishery has minimal impact on the Kenai River late-run fishery at present harvest and participation levels.

RECOMMENDED RESEARCH & MANAGEMENT

The allocative issue associated with this fishery is the interception of late-run Kenai River chinook salmon. The concern expressed is that this interception contributes to inseason restrictions to the Kenai River sport fishery. Restrictions to this fishery could result in restrictions to the Cook Inlet commercial fishery if the projected escapement were below 19,000, and total closure to the setnet fishery if escapement was less than 15,500. Harvest in the late-run marine sport fishery is therefore of concern to both sport and commercial user groups. This concern was articulated at the November 1992 Board meeting. The issue will not be resolved until accurate harvest estimates are available from the fishery.

The creel survey initiated in 1994 and continuing in 1995 will provide this information to the Board of Fisheries. In future years the creel survey should be integrated with the stock separation program recommended in the section "Cook Inlet Marine Chinook Salmon Early Run Recreational Fishery."

KENAI RIVER LATE-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

Objectives for this fishery are articulated in the Kenai River Late Run Chinook Salmon Management Plan. This plan was adopted by the Board of Fisheries in 1988; amendments were added in 1990. Objectives in the plan address both biological and allocative issues. **The primary fishery objective is to achieve an optimum spawning escapement of 22,300 late-run chinook salmon into the Kenai River**.

INSEASON MANAGEMENT APPROACH

The primary objective of inseason management is to achieve the optimum spawning escapement goal of 22,300 fish. Achievement of this objective requires a knowledge of the number of late-run chinook salmon entering the river; an estimate of the inseason harvest; and the ability to project the final inriver return, harvest and spawning escapement.

The number of fish entering the river is estimated by sonar counter. Late-run counts begin July l and terminate approximately August 10. Counts are generated daily; the count for a given day is available to management staff by the afternoon of the following day. If counts are required earlier, this request is conveyed to the sonar staff who can, by adjusting schedules, provide counts by the morning of the day following the count.

Harvest is estimated by onsite creel survey. The late-run survey begins July 1 and is continuous until the end of the fishery. The fishery closes by regulation July 31; although length of the fishery may be adjusted by emergency order predicated on the magnitude of the inriver return. Harvest estimates are usually generated weekly; daily estimates are required if an inseason management action is imminent.

The final spawning escapement is projected inseason using a run timing model. This estimate is the projected inriver return determined by sonar counter minus the projected harvest determined by creel survey. The projected harvest includes estimated mortality associated with catch-and-release fishing practices. In most years, an accurate projection can not be made prior to July 20. However, in years of an exceptionally strong or weak return, this projection can be made earlier in the fishery.

Application of management strategies to this fishery may affect sport or sport and commercial fisheries. Management actions the department is mandated to initiate at specified projected spawning escapement levels are:

1. If the projected spawning escapement level is less than 15,500 chinook salmon, the department shall:

   (A) close the recreational fisheries in the Kenai River and in the salt waters of Cook Inlet north of the latitude of Bluff Point to the taking of chinook salmon;

   (B) close the commercial drift gillnet fishery in the Central District within 3 miles of the Kenai Peninsula shoreline; and

   (C) close the commercial set gillnet fishery in the Upper Subdistrict of the Central District.

2. If the projected spawning escapement level is between 15,500 and 22,300 chinook salmon, the department shall restrict the taking of chinook salmon in the Kenai River recreational fishery as necessary to achieve the optimum escapement. To achieve this the department may:

   (A) reduce time or area;

   (B) reduce the bag/possession limit to zero; or

   (C) restrict terminal gear to artificial lures; or

   (D) permit only the retention of chinook salmon 52 inches in length or greater.

3. If the projected spawning escapement is between 15,500 and 19,000 salmon the department shall restrict the commercial fisheries as follows:

   (A) within 3 miles of the Kenai Peninsula shoreline the department shall limit the commercial drift gillnet fishery to regular periods;

   (B) the department shall limit the commercial set gillnet fishery in the upper subdistrict of the Central district to regular periods (Monday and Friday);

   (C) however, if the inriver sonar count is projected to exceed 700,000 sockeye salmon then the drift gillnet fishery and the set gillnet fishery will not be restricted to conserve Kenai River chinook salmon unless the projected chinook salmon spawning escapement is less than 15,500.

This is one of the largest and most controversial fisheries in Alaska. Interaction with the user groups affected by management decisions is critical to the successful implementation of any inseason management action.

The Soldotna office has two recorded message phones. One phone provides a general weekly fishing forecast; the other a brief summary of spawning escapements, weir and sonar counts for major Kenai Peninsula fisheries. It is on this latter message phone that a brief summary of this fishery's status is provided daily. This message phone may receive over 300 calls daily during the peak of the fishery. This phone not only affords the public reliable access to information, but also increases the efficiency of the Soldotna staff by freeing them from the routine duty of repetitively providing information to anglers who contact the office staff regarding the fishery's status.

Public interaction is also achieved through formal news releases and requests for information from the news media. News releases and requests from the news media are given a priority in that they provide a public forum to disseminate information regarding the fishery's status, the management plan which regulates the fishery and possible pending inseason management actions.

Restrictive management actions in this fishery are socially disruptive. This disruption can be partially mitigated by apprising the public of probable restrictions to the fishery through the aforementioned use of the recorded message phone and news media contacts. Formal announcements regarding emergency orders which change the management of the fishery should be issued as soon as the decision is made, preferably at least 24 hours before a given action occurs.

HISTORICAL PERSPECTIVE

The Kenai River chinook salmon fishery is a relatively new fishery which began in the early 1970s. At this time methods were introduced, adopted from the Pacific Northwest, that successfully harvested chinook salmon from this glacially turbid river. Bouncing bright terminal tackle, either with or without bait, at river velocity was initially the preferred fishing technique. Gradually other methods such as "jet planing" and "back-bouncing" proved quite successful in certain water conditions. However, "drifting" is still the most popular method employed to harvest Kenai River chinook salmon.

Chinook salmon return to the Kenai River in two distinct runs, early and late. The early run is present from mid-May through June. Late-run fish appear in early July, peak in late July, and are still entering the system in early August. Research indicates that most of the early run spawns in two tributaries, the Killey and Funny rivers; late-run fish are primarily mainstem spawners.

Because of its popularity and the magnitude of the chinook salmon runs which support it, the fishery is restrictively regulated. Chinook salmon fishing is limited to a 50 mile area downstream from Skilak Lake (Figure 11). The season is January 1 through July 31. For regulatory purposes the late run begins July 1. The daily bag and possession limit is 1 chinook salmon 16 inches or greater in length; and a seasonal (April 1-September 30) limit of 2 fish. The majority of the harvest is taken using boats. After retaining a chinook salmon, an angler is prohibited from fishing from a boat in the Kenai River downstream from Skilak Lake for the remainder of that day.

The Kenai River chinook salmon fishery supports a commercial guiding industry. Since 1982 guides have been required to register with the state. Guided anglers are more restrictively regulated than nonguided anglers because their efficiency is generally two to three times higher than nonguided anglers and for social concerns involving allocation of the harvest between guided and nonguided user groups.

The majority of the area open to chinook salmon fishing is managed as a State Park by the Department of Natural Resources. In 1986 this agency reduced the maximum size of outboard motors used on the river to 50 horsepower. In 1987 the maximum horsepower was further reduced to 35. The reduction to smaller outboards has generally been favorably received by the angling public. There is no evidence to indicate use of smaller motors has reduced angler efficiency.

Late-run fish are harvested by both commercial and sport user groups. Division of the late-run catch between these user groups has generated appreciable allocative controversy. Commercial interests and the department maintain that sockeye salmon stocks cannot be adequately harvested by eastside beach setnet fishermen without an incidental harvest of late-run chinook salmon. Recreational interests contend that since the "incidental" commercial chinook salmon harvest has in some years been approximately twice the inriver sport catch, the allocation of late-run Kenai River chinook salmon is neither fair nor equitable.

The department's management and research activities directed toward this fishery began in 1974 with the initiation of a creel survey to determine angler harvest, effort and success rates. In 1984, a tag and recapture program was initiated to estimate the abundance of late-run chinook salmon entering the river. In 1985, the program was expanded to include an estimate of early-run fish.

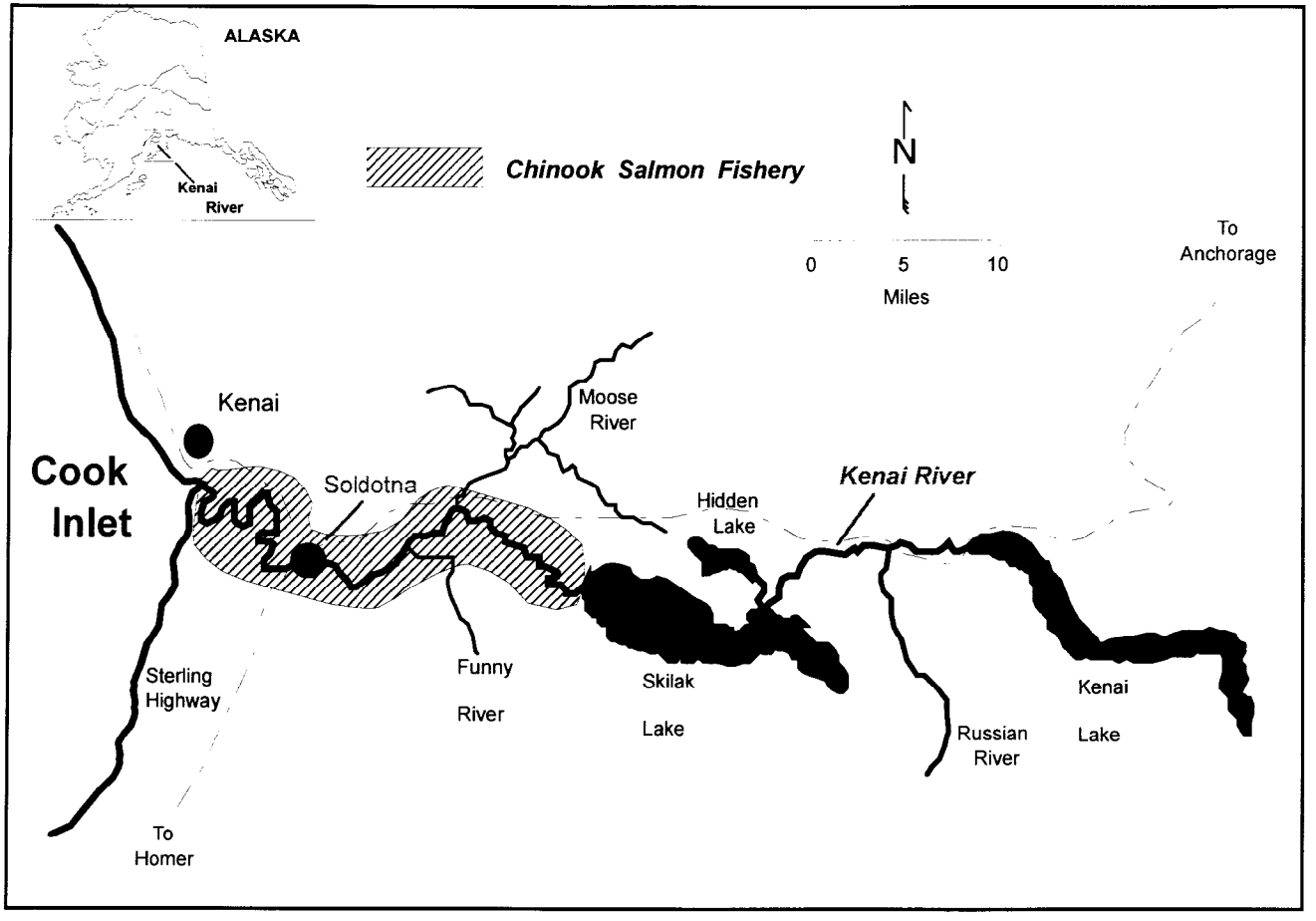

Figure 11.-Schematic diagram of the Kenai River drainage. Chinook salmon fishing occurs downstream from Skilak Lake.

This tagging project utilized drift gillnets to capture chinook salmon in the lower Kenai River. Tagged chinook salmon were recovered in the sport fishery through the creel survey. The tagging program provided inseason catch-per-unit-effort (CPUE) data and a postseason estimate of early and late-run abundance.

In 1984 the department implemented an experimental sonar program to enumerate these stocks. The sonar counter utilizes dual beam technology to separate and enumerate less abundant chinook salmon from the numerically superior sockeye salmon in two ways. First, the gear electronically filters small fish targets (sockeye salmon size fish and smaller) by establishing a threshold of target strength to estimate the abundance of large fish targets. Second, chinook salmon almost exclusively migrate in the offshore portion of the river, and the nearshore areas, where most of the sockeye are found, are not ensonified. Estimates of abundance were first realized from the sonar counter in 1987; sonar counts have been used for inseason management of the fishery since 1988.

In 1988 the Board of Fisheries adopted a management plan for the late run. This plan established minimum (15,500) and optimum (22,300) escapement goals, and identified management actions to be taken at given escapement levels. The management plan ensures biological management of the resource and addresses the nontargeted interception of late-run Kenai River chinook salmon in the Cook Inlet commercial fishery.

BOARD OF FISH ACTIONS

In 1990 the Board changed several provisions contained in the Late Run Kenai River Chinook Salmon Management Plan. If catch-and-release is required for conservation during the late-run fishery, the department may now allow retention of chinook salmon 52 inches or larger. The Board also directed that if the late-run spawning escapement is projected to be between 15,500 and 19,000, the commercial set gillnet and commercial drift gillnet fisheries within 3 miles of the Kenai Peninsula shoreline be limited to not more than the regularly scheduled periods on Monday and Friday. However, if the sockeye salmon sonar count in the Kenai River is projected to exceed 700,000, then additional commercial openings could occur as long as the projected chinook salmon escapement remained above 15,500. Additionally, the closed waters at the mouth of the Kenai River would not be opened to commercial fishing, regardless of the sockeye salmon escapement, if the projected chinook salmon escapement is less than 22,300.

The Board also adopted a regulation which permits an angler, after retaining a chinook salmon 16 inches or larger from that area of the river downstream from Skilak Lake, to fish from a boat upstream from Skilak Lake the same day. The regulation prohibiting an angler from fishing from a boat for any species on the same day in the Kenai River downstream from Skilak Lake after retaining a chinook salmon 16 inches or larger remains in effect.

The Board considered numerous regulatory changes to this fishery at its November 1992 meeting. All proposals directly relating to this fishery failed to win Board support and were rejected. The Board did, however, clarify the conditions under which the chinook salmon fishery could be extended past its regular closure date of July 31. The fishery could be extended, at the discretion of the department, if the optimum spawning escapement of 22,300 was assured.

The Board will next consider regulatory changes to this fishery at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

The 1994 fishery began July 1 with bait permitted. Through July 24, 35,779 chinook salmon had been enumerated by the department sonar counter. The spawning escapement goal (22,300) was projected to be exceeded. Chinook salmon fishing was permitted by emergency order on Monday, July 25. The fishery was further liberalized by extending the open season for an additional 7 days (through August 7). The fishery from August 1-7 was limited to the lower 11.25 miles of river downstream from Eagle Rock. The area upstream from Eagle Rock closed as scheduled on July 31 to afford total protection to chinook salmon which begin to spawn there in early August.

Late-run harvest was 14,388 fish in 1994; historical average harvest is 7,381. Angler effort was 354,778 hours which was above the historical average and was the second highest effort in this fishery (Table 13). Nonguided harvest rate was 0.032 (one fish/31 hours fished); guided angler harvest rate was 0.060 (one fish/17 hours fished). The combined guided and nonguided harvest rate of 0.041 is one of the highest recorded in this fishery (Table 14). Guided anglers were 1.8 times more efficient than nonguided anglers. Guided anglers harvested 6,628 late-run fish (46.1%); nonguided anglers, 7,760 (53.9%). Guided effort was 31.0% of the total; nonguided angler effort 69.0%.

The reported late-run chinook salmon harvest from the eastside Kenai Peninsula commercial set gillnet fishery was 15,885; the commercial drift gillnet fishery reported a harvest of 459. Commercial fishermen reported an additional 13 chinook salmon retained for personal use. An estimated 392 were harvested in the subsistence fishery, 344 perished as a result of catch-and-release fishing; 1,869 were harvested in the marine recreational fishery. Spawning escapement was 38,549; total return was 71,899 (Table 15). An estimated 85.1% of the late run entered the river in July; 14.8% in August (Table 16).

OUTLOOK

Regulatory changes to Kenai Peninsula sport finfish fisheries will not be considered by the Board until January 1996. Basic regulation of the fishery will therefore be unchanged during the 1995 season. The primary objective of management will continue to be to achieve an optimum spawning escapement of 22,300 late-run chinook salmon.

Management strategies to achieve the optimum spawning escapement goal are contained in the management plan for this fishery. Whether or not these strategies are implemented inseason is dependent on the number of late-run chinook salmon returning to the Kenai River. In years of low return, no departure from prior management strategies as contained in the management plan is anticipated. In years when the return is sufficient to provide for the spawning escapement and harvest, inseason management will probably not be required. The preseason 1995 forecast is for a return approximating 74,000. If this return is realized, restrictions to the sport and commercial fisheries for chinook salmon conservation are not anticipated.

CURRENT ISSUES

Adoption of the Late Run Chinook Salmon Management Plan was imperative to the biological management of this fishery. The plan established escapement goals and identified management strategies to achieve these goals. Formalized identification of objectives and strategies removed much of the subjectivity from the management of this fishery.

Table 13.-Historical summary of harvest, angler effort and harvest rate, late-run Kenai River chinook salmon fishery, 1974-1994.

Year	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1974	3,225	12,335	87,162	0.037
1975	2,355	14,943	53,523	0.044
1976	5,353	28,030	114,795	0.047
1977	5,148	47,539	135,082	0.038
1978	5,578	60,636	212,217	0.026
1979	4,634	58,895	205,887	0.023
1980	3,608	38,260	154,435	0.023
1981	5,285	29,906	149,296	0.035
1982	4,810	43,366	197,775	0.024
1983	9,174	56,295	248,519	0.037
1984	7,376	77,462	348,579	0.021
1985	8,055	73,613	294,453	0.027
1986	9,004	75,092	244,440	0.037
1987	12,327	66,403	310,840	0.040
1988	17,512	85,282	361,759	0.048
1989	9,127	71,110	329,051	0.028
1990	6,247	67,101	291,966	0.022 [a]
1991	6,849	48,604	229,999	0.030
1992	6,680	40,649	187,415	0.039 [a]
1993	15,279	59,434	293,908	0.052
Mean	7,381	52,748	222,555	0.034
1994	14,388	71,931	354,778	0.041

[a] Harvest per hour only for periods open to retention of chinook salmon.

Table 14.-Summary of guided vs. nonguided angler harvest, effort, and success rate, late-run Kenai River chinook salmon fishery, 1981-1994.

	HARVEST								EFFORT				
	Guided			Non-Guided			Total		Guided (Hours)		Non-Guided (Hours)		Total (Hours)
Year	Number	%	HPUE[a]	Number	%	HPUE[a]	Number	HPUE[a]	Number	%	Number	%	Number
1981	2,530	47.9	0.069	2,755	52.1	0.024	5,285	0.035	36,727	24.6	112,569	75.4	149,296
1982	2,397	49.8	0.047	2,413	50.2	0.016	4,810	0.024	50,828	25.7	146,947	74.3	197,775
1983	5,110	55.7	0.100	4,064	44.3	0.021	9,174	0.037	51,195	20.6	197,324	79.4	248,519
1984	2,928	39.7	0.064	4,448	60.3	0.015	7,376	0.021	45,664	13.1	302,915	86.9	348,579
1985	3,045	37.8	0.066	5,010	62.2	0.020	8,055	0.027	45,936	15.6	248,517	84.4	294,453
1986	3,546	39.4	0.067	5,458	60.6	0.028	9,004	0.037	52,843	21.6	191,597	78.4	244,440
1987	5,966	48.4	0.075	6,361	51.6	0.027	12,327	0.040	79,329	25.5	231,511	74.5	310,840
1988	9,409	53.7	0.099	8,103	46.3	0.030	17,512	0.048	95,181	26.3	266,578	73.7	361,759
1989	5,328	58.4	0.054	3,799	41.6	0.016	9,127	0.028	97,966	29.8	231,085	70.2	329,051
1990	3,808	61.0	0.038 [b]	2,439	39.0	0.013 [b]	6,247	0.022 [b]	101,223	34.7	190,743	65.3	291,966
1991	3,864	56.4	0.047	2,985	43.6	0.020	6,849	0.030	82,706	36.0	147,293	64.0	229,999
1992	4,176	62.5	0.064 [b]	2,504	37.5	0.024 [b]	6,680	0.039 [b]	75,324	40.2	112,091	59.8	187,415
1993	7,866	51.5	0.085	7,413	48.5	0.037	15,279	0.052	92,213	31.4	201,695	68.6	293,908
Mean	4,613	50.9	0.067	4,442	49.1	0.023	9,056	0.034	69,780	26.5	198,528	73.5	268,308
1994	6,628	46.1	0.060	7,760	53.9	0.032	14,388	0.041	110,049	31.0	244,729	69.0	354,778

[a] Harvest per hour

[b] Harvest per hour only for periods open to retention of chinook salmon.

Table 15.-Summary of late-run Kenai River chinook salmon population data, 1985-1994.

Year	Deep Creek [a] Marine Harvest	Eastside Set Net Harvest	Drift Gill Net Harvest	Commercial Personal Use	Other Personal Use [b]	Kenai River Sport Harvest	Hook and Release Mortality	Escapement	Total Return
1984	835	5,805	448			7,376		31,796	46,260
1985	1,731	17,723	1,891			8,055		21,708	51,108
1986	863	19,810	1,834			9,004	522	48,037	80,070
1987	1,400	20,588	4,552			12,237	368	35,518	74,663
1988	1,674	12,870	2,217			17,512	472	34,024	68,769
1989	1,580	10,919	0 [c]	4	22	9,127	327	19,581	41,560
1990	1,852	4,139	621	91	13	6,247	141	27,086	40,190
1991	2,500	4,891	241	130	288	6,849	103	27,662	42,664
1992	2,334	10,718	543	50	402	6,680	308	23,326	44,361
1993	3,344	14,002	751	129	27	15,279	363	34,032	67,927
1994	1,869 [d]	15,885	459	13	392	14,388	344	38,549	71,899

[a] Determined by Statewide Harvest Study. Includes Cook Inlet from Anchor Point to Ninilchik.

[b] Kenaitze educational gillnet fishery and subsistence fishery in 1991, 1992, and 1994.

[c] No commercial drift net fishery conducted in 1989 (*Exxon Valdez* oil spill).

[d] Determined by creel survey.

Table 16.-Summary of the number of chinook salmon entering the Kenai River in July and August, 1986-1994.

Year	Enumeration Method	July		August		Total
		Number	Percent	Number	Percent	
1986	Tag/Rec [a]	47,757	83.0	9,806	17.0	57,563
1987	Sonar	42,657	88.6	5,466	11.4	48,123
1988	Sonar	40,145	77.2	11,863	22.8	52,008
1989	Sonar	27,930	96.2	1,005	3.5	29,035
1990	Sonar	26,194	78.3	7,280	21.7	33,474
1991	Sonar	30,392	87.8	4,222	12.2	34,614
1992	Sonar	23,972	79.1	6,342	20.9	30,314
1993	Sonar	43,705	88.0	5,969	12.0	49,674
1994	Sonar	46,904	88.0	6,377	12.0	53,281
Mean		36,628	85.1	6,481	14.8	43,110

[a] Tag and Recovery.

Regulations governing the late-run Kenai River chinook salmon fishery are numerous and complex. Many of these regulations are related to allocative and social rather than biological issues and reflect the Board of Fisheries' desire to provide recreational opportunity for inriver user groups, i.e. both guided and nonguided anglers.

Restrictive regulations regarding guided anglers initially served a dual purpose: (1) they reduced harvest and were a management tool to conserve the resource, and (2) the regulation addressed the social issue of competition between guided and nonguided anglers, allocating additional time to less efficient nonguided anglers. These regulations were adopted by the Board prior to the adoption of the Late Run Kenai River Chinook Salmon Management Plan in 1988 and the development of the sonar counter as a management tool in 1987.

The fishery is presently managed on achieving the optimum escapement goal. The sonar counter now permits an inseason determination of whether or not this escapement goal will be achieved. The hourly and daily restrictions which presently apply to guided anglers and the prohibition on Monday fishing for all anglers can therefore no longer be justified by citing biological concerns. Social concerns, however, remain an issue in the orderly development of this fishery. These issues relate to competition between guided and nonguided anglers for the harvestable surplus and, in some years, the increased probability of inseason restrictions for stock conservation if fishery regulations are liberalized through Board action. These inseason restrictions are disruptive to guided anglers, nonguided anglers and businesses that derive income from this fishery.

The Late Run Chinook Salmon Management Plan directs the sport fishery to bear the burden of conservation if the spawning escapement is projected to be between 15,500 and 22,300. This occurred in 1990 resulting in a restricted sport fishery from July 27 through 31. Some sport fishermen viewed this as unfair and believed the burden of conservation should be shared between the sport and commercial fishermen at this escapement level. The Board addressed this issue at its 1990 meeting and the commercial fishery, in given situations, will be restricted if the projected escapement is 15,500 to 19,000. However, allocation of the late-run Kenai River chinook salmon resource between sport and commercial user groups continues to be a major issue in this fishery.

RECOMMENDED RESEARCH & MANAGEMENT

The late-run Cook Inlet marine sport fishery, the Cook Inlet commercial set and drift gillnet fisheries, and the Kenai River sport fishery are the primary harvesters of late-run Kenai River chinook salmon. Restrictions in the Kenai River sport fishery may trigger restrictions in the Cook Inlet commercial fisheries and marine sport fishery. In an extreme situation (less than 15,500 spawning escapement projected) all fisheries harvesting late-run Kenai River chinook salmon could be closed. The negative social and economic impacts would be felt by all user groups should this occur.

The marine late-run chinook salmon sport fishery harvests less than 6% of the total late run of Kenai River chinook salmon. This estimate is derived from creel survey data collected prior to 1987, the 1994 creel survey and Statewide Harvest Survey data. Observation indicates that participation in this fishery is increasing; the nature of the fishery is changing, employing larger boats and more sophisticated angling techniques. The present method of estimating harvest in this fishery may be correct, but requires validation.

It is therefore recommended that the creel survey be continued during the late-run marine chinook salmon fishery. The survey will continue to estimate harvest between Anchor Point and Deep Creek, i.e. the entire fishery. The creel survey will not only provide fisheries specific data, but will satisfy some representatives of sport and commercial fishing groups who maintain that the marine sport harvest in years a creel survey was not conducted was far in excess of the department's current estimate.

KENAI RIVER LATE-RUN SOCKEYE SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

Objectives for this fishery are contained in the Kenai River Sockeye Salmon Management Plan (5 AAC 21.360). Achievement of these objectives is the responsibility of the Commercial Fisheries Management and Development Division (CFMD) and Sport Fish Division. The CFMD is responsible for managing the Cook Inlet commercial fishery to attain a sockeye salmon sonar count in the Kenai River of 400,000 to 700,000.

The Sport Fish Division manages the inriver sport fishery. **The primary objective is to limit the harvest upstream of the sonar counter to a guideline harvest of 10% of the sonar count when that count is between 400,000 and 700,000.** The plan also provides several restrictive management options to achieve this objective. The plan further provides that if the sonar count is less than 400,000 the inriver sport fishery will be closed; in excess of 700,000 the guideline harvest level does not apply and the bag/possession limit is increased to 6 fish.

INSEASON MANAGEMENT APPROACH

Prior to 1994 there had been no inseason creel survey of this fishery. A creel survey was conducted downstream from the Soldotna Bridge in 1994. Data upon which to manage the fishery inseason is derived from sonar counts. A postseason estimate of harvest is provided by the Statewide Harvest Survey.

In recent years the fishery has demonstrated that it can harvest up to 16.8% of the sonar count when the count ranges from 400,000 to 700,000. Harvesting in excess of 10% is contrary to the management plan. The task of management in 1993 was therefore to craft a strategy which would reduce harvest to within the guideline harvest level while minimizing disruption to the largest sport sockeye salmon fishery in Alaska.

The strategy adopted was to reduce both the bag/possession limit and the time sockeye salmon could be harvested. The bag/possession limit was reduced to 2 fish; sockeye salmon fishing was prohibited each day from 11:00 p.m. to 6:00 a.m. These restrictions were effected with department emergency order authority for the 1993 season. The emergency order was issued preseason (June 22, 1993) and became effective July 1, 1993.

In 1994 Department of Fish and Game Commissioner Rosier determined that the provision of the management plan directing the department to restrict the sport harvest to less than 10% at a sonar count of 400,000 to 700,000 should be viewed as a guideline harvest level rather than a harvest cap. The 1994 fishery was therefore conducted with no reduction in bag/possession limit or fishing time. The Board is scheduled to review Kenai River sockeye salmon allocation in March

1995. The issue regarding the 10% harvest cap/guideline harvest level should be resolved prior to the 1995 season.

The management plan directs the bag/possession limit be increased to 6 sockeye salmon if the sonar count is projected to exceed 700,000. The projection is the responsibility of the CFMD. When that division projects that the upper range of the sonar count goal will be achieved, the Sport Fish Division issues an emergency order increasing the bag and possession limit to 6 sockeye salmon.

HISTORICAL PERSPECTIVE

The Kenai River originates at Kenai Lake near the community of Cooper Landing and terminates in Cook Inlet adjacent to the city of Kenai. The river is glacial and approximately 82 miles in length. It is paralleled for much of its length by the state's road system making it the most accessible of Alaska's major salmon producing streams (Figure 12).

Historically, snagging has been the harvest method for taking sockeye (red) salmon in the Kenai River. It was traditionally held that this species would not strike a lure or accept bait and that nonsnagging techniques could not be employed to harvest these fish. When the number of anglers was relatively small, snagging posed neither a biological nor a social problem. However, as the population of Southcentral Alaska grew and the Kenai River sport fishery increased in popularity, anglers began to oppose the practice as an unethical harvest method. Antisnagging measures, first pioneered at the Russian River, culminated in 1975 with the Board promulgating Alaska's present freshwater antisnagging regulation. In 1979 snagging was prohibited in salt water within a 1-mile radius of the Kenai River mouth and in 1984 all snagging in salt water north of Anchor Point was similarly prohibited.

Because snagging was no longer a legal harvest method in either fresh or salt water, anglers began to experiment with alternate terminal tackle in an attempt to legally harvest sockeye salmon in the Kenai River. Their initial efforts were moderately successful with annual harvests averaging 23,580 sockeye salmon from 1977 through 1981 (Tables 17 and 18).

Between 1982 and 1985 the average harvest increased to 48,600. This dramatic increase is attributed to the use of coho flies as terminal gear with the flies being drifted along the bank similar to the technique used for a number of years at Russian River. The belief that sockeye salmon could not be harvested with conventional tackle was gradually dispelled and this innovative technique prompted additional anglers to seek this species. This, coupled with relatively clear water in 1982 and 1983, is responsible in part for the increased harvest. The harvest was further influenced by the magnitude of the return in these years which averaged approximately 570,000 fish. A return of only 344,600 reduced the 1984 sport harvest. Harvests from 1985-1992 ranged from 55,000-277,230; correlating to the inriver return (Table 17).

The fishery is characterized by: (1) requiring large numbers of sockeye salmon to be present to provide acceptable harvest rates; (2) being of short duration, usually from July 16 to August 5, or approximately 20 days; (3) having water clarity affect angler success, i.e. turbid water decreases efficiency and clear water increases catch rates; and (4) the Kenai River being a multi-species fishery in July and August with only a percentage of the total angler effort directed toward sockeye salmon, irrespective of run strength or fishing conditions.

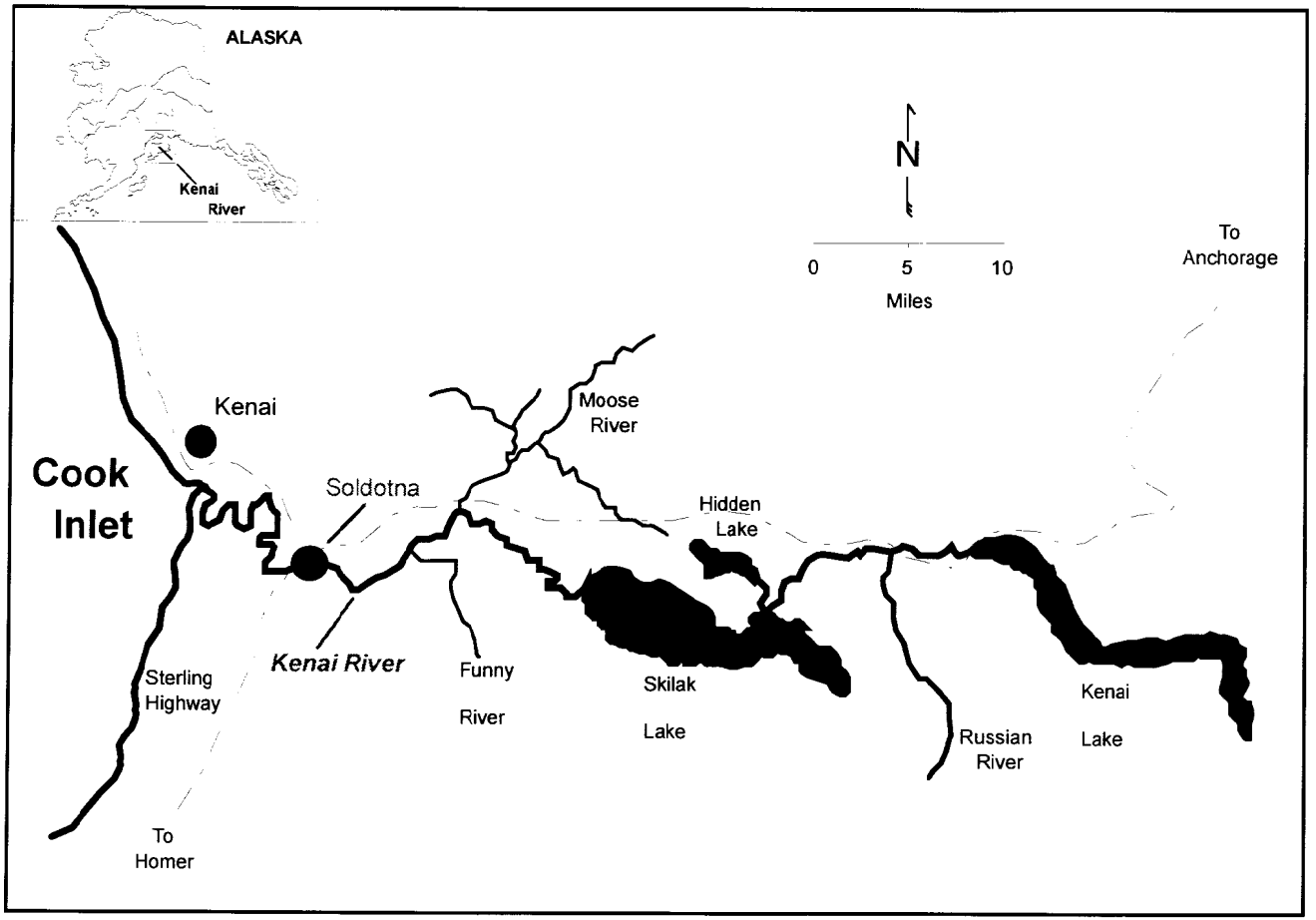

Figure 12.-Schematic diagram of the Kenai River drainage. The sockeye salmon fishery occurs from Cook Inlet to Kenai Lake.

Table 17.-Kenai River sockeye salmon escapements and sport harvest, 1977-1994.

Year	Total Kenai River Effort [b] (Angler Days)	Kenai River Escapement	Sport Harvest [a] Above Sonar	Percent [c]	Below Sonar	Total
1977	122,140	708,000				23,200
1978	164,260	398,900				33,600
1979	178,480	285,000				16,900
1980	171,800	464,000				24,500
1981	178,720	407,600	14,450	3.5	5,270	19,720
1982	231,950	619,800	38,400	6.2	11,710	50,110
1983	229,230	630,300	48,310	7.7	22,960	71,270
1984	248,790	344,600	11,160	3.2	4,130	15,290
1985	294,610	502,800	40,440	8.0	14,560	55,000
1986	300,320	501,200	47,920	9.6	19,350	67,270
1987	261,510	1,596,900	148,300	9.3	82,460	230,760
1988	338,540	1,021,500	91,770	9.0	46,660	138,430
1989	376,900	1,598,000	165,340	10.3	111,890	277,230
1990	342,660	659,500	87,580	13.3	33,210	120,790
1991	323,368	645,000	108,235	16.8	53,266	161,501
1992	279,918	994,800	161,957	16.3	80,535	242,492
1993	261,320	813,617	90,306	11.1	46,873	137,179
Mean	253,210	717,150	81,090	9.6	40,990	99,130
1994		1,003,446	120,000 [d]	12.0 [d]	52,000 [d]	172,000 [d]

[a] Sport harvest data from Statewide Harvest Survey.

[b] Angler effort directed toward all species. Data from Statewide Harvest Survey.

[c] Percent of the sockeye salmon enumerated by sonar harvested upstream from the sonar site at river mile 20.4.

[d] Preliminary data.

Table 18.-Kenai River recreational harvest of sockeye salmon by river section as determined by Statewide Harvest Survey, 1981-1993.

	Cook Inlet to Soldotna Bridge		Soldotna Bridge to Moose River		Moose River to Skilak Lake		Skilak Lake to Kenai Lake	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1981	5,270	26.8	5,330	27.1	4,260	21.6	4,840	24.6
1982	11,700	23.4	14,830	29.6	12,140	24.2	11,430	22.8
1983	22,970	32.2	22,460	31.5	15,190	21.3	10,680	15.0
1984	4,420	28.2	2,180	13.9	2,300	14.6	6,800	43.3
1985	14,940	26.1	13,020	22.8	13,300	23.2	15,950	27.9
1986	21,180	29.3	13,850	19.1	13,530	18.7	23,840	32.9
1987	85,020	35.4	65,840	27.4	39,300	16.4	50,030	20.8
1988	49,630	32.5	43,490	28.5	29,180	19.1	30,450	19.9
1989	111,890	40.4	90,550	32.7	45,850	16.5	28,940	10.4
1990	33,210	27.5	37,210	30.8	22,080	18.3	28,290	23.4
1991	53,266	33.0	56,050	34.7	24,741	15.3	27,444	17.0
1992	80,535	33.2	85,942	35.4	40,617	16.7	35,398	14.6
Mean	41,170	30.6	37,560	27.8	21,870	18.8	22,840	22.7
1993	46,873	34.2	41,466	30.2	18,724	13.6	30,116	22.0

BOARD OF FISH ACTIONS

The Kenai River Sockeye Salmon Management Plan was not changed by the Board in 1990. At the November 1992 meeting, the Board considered a number of proposals ranging from additional restrictions to liberalization of the plan by increasing the inriver sport allocation. The Board rejected all proposals; the plan as written was not changed.

The Board did, however, reiterate the intent language of the plan. The Sport Fish Division is to manage for a guideline harvest level upstream from the sonar counter of 10% when the sonar count is 400,000 to 700,000. Given the expansion of the fishery in recent years, the conservative action outlined in the plan had to be implemented in 1993 to comply with Board intent. As noted, the 1994 fishery was prosecuted in a normal manner.

This fishery's contentious allocative issues prompted Board of Fisheries Chair, Kay Andrews, to appoint representatives of commercial, sport and subsistence user groups to a Kenai River Sockeye Salmon Task Force. The original mission of the task force as envisioned by the Board on April 18, 1994 was to prepare a revised draft of 5 AAC 21.360 "The Kenai River Sockeye Salmon Management Plan." The task force was also to consider the allocation strategy and regulations which govern the Kenai River Personal Use Dip Net Fishery.

On November 15, 1994 the task force received additional instructions from the current Chairman, Larry Engel. Chairman Engel directed the task force devote special attention to the management of the sport fishery. The Board asked for recommendations on how to implement the vision of a predictable, uninterrupted sport fishery with a bag limit of three fish. Specifics requested by Chairman Engel included a statement explaining what was wrong with the existing plan, a recommended sonar count goal and strategies for minimizing the degradation of river bank habitat that results from the foot traffic that occurs during the late-run sport fishery.

The task force held nine meetings in 1994. Members were unable to develop a consensus position on most issues. As of this writing, a department facilitator will probably summarize the task force's efforts at the March 1995 meeting. Individual task force members may present their own recommendations to the Board; the public is also expected to have the opportunity to address the Board regarding the Kenai River Sockeye Salmon Management Plan and the plan governing the personal use dip net fishery at the mouth of the Kenai River.

RECENT FISHERY PERFORMANCE

The 1993 season began in a normal manner; cumulative sonar count was less than 15,000 fish through July 13. For the 4-day period July 14-17, counts exceeded 60,000 daily. For the remainder of the run (sonar was removed August 14) daily counts exceeded 25,000 fish on only 3 days.

This entry pattern, coupled with staff observation which suggested sockeye salmon moved upstream at an atypically rapid rate, limited what many anglers considered "good" fishing in the lower Kenai River to the 4-day period when counts exceeded 60,000 daily. Thereafter, numerous complaints were received regarding perceived numbers of fish in the river. Complainants were also critical of the Upper Cook Inlet Salmon Management Plan which allocates the majority of the Kenai River's sockeye salmon harvestable surplus to the commercial fishery.

The sonar count was projected to exceed 700,000 on August 4. In conformance with the Kenai River Sockeye Salmon Management Plan, the bag/possession limit was increased to 6 fish; the

restriction on fishing for sockeye salmon from 11:00 p.m.-6:00 a.m. was rescinded. This liberalization had minimal affect on the season's harvest because the fishery, in all but the upper areas of the river, was concluded by early August.

The preliminary 1993 harvest estimate was 128,000 sockeye salmon; final harvest estimate from the Statewide Harvest Survey was 137,179. This harvest is apportioned 81,090 upstream from the sonar counter and 40,990 downstream.

Prior to the 1994 season Commissioner Rosier determined that the 10% harvest when the sonar count was 400,000 to 700,000 should be viewed as a guideline harvest level rather than a harvest cap. The 1994 season therefore began with the standard three fish bag limit and no restriction on the hours sockeye salmon could be harvested.

Harvestable numbers of fish began to enter the river on July 16. Daily sonar counts ranged from 30,000 to 55,000 through July 26. This provided 11 consecutive days of "good" fishing in the lower Kenai River. From July 27 through July 30 daily counts declined to less than 10,000 fish. Many anglers left the lower river during this period assuming the run was over. On August 1 the daily count was 55,000 increasing to the season high count of 95,500 on August 2. Over 500,000 sockeye salmon were enumerated in August. On August 3, the bag/possession limit was increased to six sockeye salmon by emergency order as it was projected that the maximum desired sonar count (700,000) would be exceeded. The final sonar count was 1,003,446. Final harvest for the 1994 season will be estimated by Statewide Harvest Survey with results available in fall 1995. The preliminary estimate is 172,000; 120,000 above the Soldotna Bridge and 52,000 below the bridge. The estimate of 12% of the sonar count harvested is low relative to the historical average because over 50% of the sockeye salmon entered the river in August when angler effort in this fishery was declining.

In 1994 a creel survey was conducted downstream from the Soldotna Bridge from July 1 through August 15. The survey was stratified into two areas: (1) downstream of the sonar counter to Cook Inlet (approximately 19 river miles), and (2) between the sonar counter and Soldotna Bridge (approximately 2 river miles). Estimates of effort and harvest in the two areas are virtually identical. Effort and harvest in the downstream section was 53,844 angler hours, 11,624 sockeye salmon; in the upper section, 63,204 angler hours, 11,772 sockeye salmon.

Historical Statewide Harvest Survey data indicate that 30% of the total harvest is taken downstream from the Soldotna Bridge. Total harvest for the river would therefore approximate 78,000 fish. Total harvest (determined by Statewide Harvest Survey) has not been less than 137,000 since 1986. Further analyses of both creel and Statewide Harvest Survey data are recommended this winter.

A fishery survey was conducted upstream from the Soldotna Bridge from July 15 through August 15. Preliminary results of the bag limit analyses and demographic survey are:

Bag Limit Analyses:

No. Harvested	Proportion of Anglers
0	62%
1	14%
2	7%
3	17%

Demographics:

Residency	Proportion of Anglers
Kenai Peninsula	17%
Alaska	36%
U.S.	42%
International	3%

OUTLOOK

The CFMD forecasts sockeye salmon production from the Kenai River to be a total return of 2.3 million in 1995. The total return to upper Cook Inlet is projected at 3.9 million sockeye salmon; with a commercial harvest of 2.7 million. If realized, this harvest would approximate 50% of the 1985-1994 average commercial harvest.

The Cook Inlet commercial fishery will continue to be managed to ensure that the Kenai River return is within the desired range. Projected relatively low production from the Kenai River therefore does not equate to less than the desired number of fish in the inriver return.

Management of the 1995 inriver sport fishery will again be predicated on the assumption that the inriver return will be within the desired sonar count range. Additional management strategies will depend on action taken by the Board of Fisheries at its March 1995 meeting.

CURRENT ISSUES

Management of this fishery is governed by the Kenai River Sockeye Salmon Management Plan. Prior to the 1989 season, the plan directed the department to permit a sport harvest not to exceed 6% of the sonar count when the count was 400,000-700,000 sockeye salmon. In 1988 the Board increased the allowable harvest at this escapement level to 10%. This fishery is one of the most rapidly expanding fisheries in Alaska; it has the demonstrated ability to exceed the 10% harvest level.

At its fall 1992 meeting the Board did not change the allocation of Kenai River sockeye salmon between sport and commercial user groups. This necessitated the inseason restriction to the 1993 sport fishery outlined in "Recent Fishery Performance."

This restriction affected a large number of anglers and exacerbated the allocation issue between sport and commercial user groups. Resolution of this issue can only be effected by Board of Fisheries action and would require this Board amend the Kenai River Sockeye Salmon Management Plan and possibly the Upper Cook Inlet Salmon Management Plan. The Board will consider allocation of the Kenai River sockeye salmon resource in March 1995. Action taken by the Board at that meeting will be in effect for the 1995 season.

A secondary issue is streambank degradation caused by large numbers of anglers concentrated in confined areas during this brief but intense fishery. Bank and riparian habitat degradation is an issue of biological concern. It is also an allocative issue in that opponents of an expanding sport fishery cite habitat loss to support their position. This issue will also be discussed by the Board in March 1995.

RECOMMENDED RESEARCH & MANAGEMENT

An evaluation of the Kenai River sockeye salmon spawning escapement goal is currently in progress; both the Sport and CFMD are participating in this process.

RUSSIAN RIVER LATE-RUN SOCKEYE SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

Management objectives for this fishery are detailed in the Russian River Sockeye Salmon Management Plan (5 AAC 21.361). The primary management objective is to achieve a minimum late-run spawning escapement through Russian River weir of 30,000 sockeye salmon. This objective has been consistently achieved each year since 1977.

INSEASON MANAGEMENT APPROACH

This fishery is managed by escapement counted at a weir located at the outlet of Lower Russian Lake and by creel survey data. In years of low abundance, the escapement is achieved through inseason regulation of the sport fishery. Because of the intensity of the sport fishery, inseason management is usually a total closure until the spawning escapement is projected to be achieved.

Run strength is ascertained by examining three indicators: weir counts, harvest rates, and visual enumeration of fish. Weir counts are the primary indicator. Historical data provide the percentage of the run which is expected to have passed the weir by a given date. A determination of run strength can generally be made a few days prior to the mid-point (August 4) of the late run. In some years fish have been late or have held in the Kenai River. Weir counts must therefore be evaluated in relation to harvest rates (HPUE) in the sport fishery. Harvest rates of below 0.10 fish per hour subjectively indicate few fish in the Kenai River, 0.10 to 0.20 suggest moderate numbers, and harvest rates exceeding 0.20 fish per hour are usually indicative of large numbers of fish in the Kenai River. Weir counts and harvest rate data are supplemented by onsite enumeration of the numbers of fish present in the lower Russian River, the falls area and the area between the falls and the weir (Figure 13). Evaluation of data and observations then permit a determination as to whether or not the escapement goal can be achieved without inseason restrictions to the sport fishery.

HISTORICAL PERSPECTIVE

Russian River is a clearwater tributary to the Kenai River near the community of Cooper Landing on the Kenai Peninsula approximately 100 miles south of Anchorage (Figure 14). Lands bordering the stream are federally managed, with public access provided at the Kenai National Wildlife Refuge campground at the river's confluence with the Kenai River and at the Chugach National Forest campground on the Russian River (Figure 13).

The drainage supports one of the largest returns of sockeye salmon to upper Cook Inlet waters and one of the largest freshwater sport fisheries for sockeye salmon in Alaska. In addition, coho, chinook and pink salmon spawn in the system as do resident populations of Dolly Varden and rainbow trout. The drainage is closed to fishing for chinook salmon but supports fisheries for the other species.

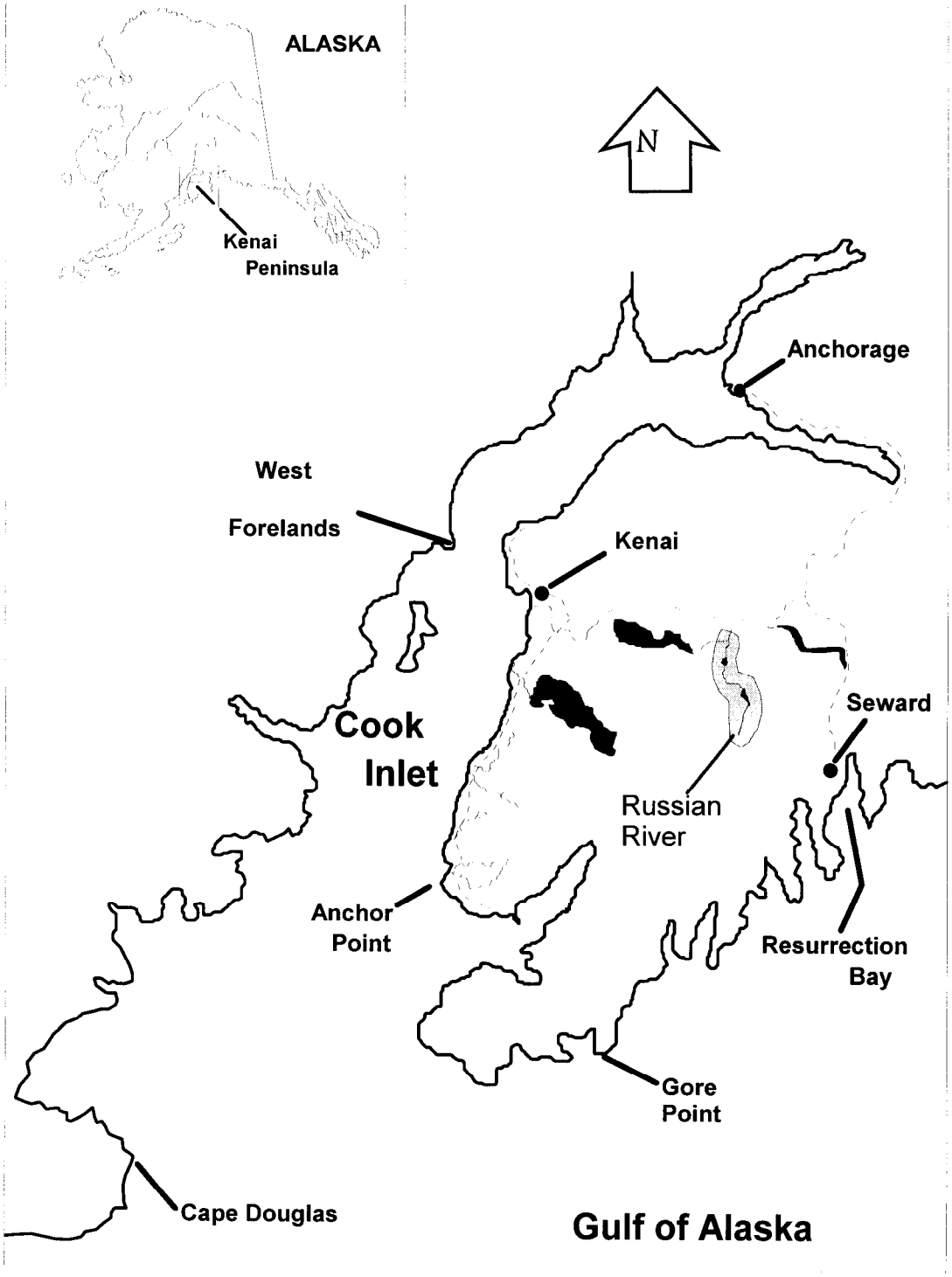

Figure 13.-Location of the Russian River on the Kenai Peninsula, Alaska.

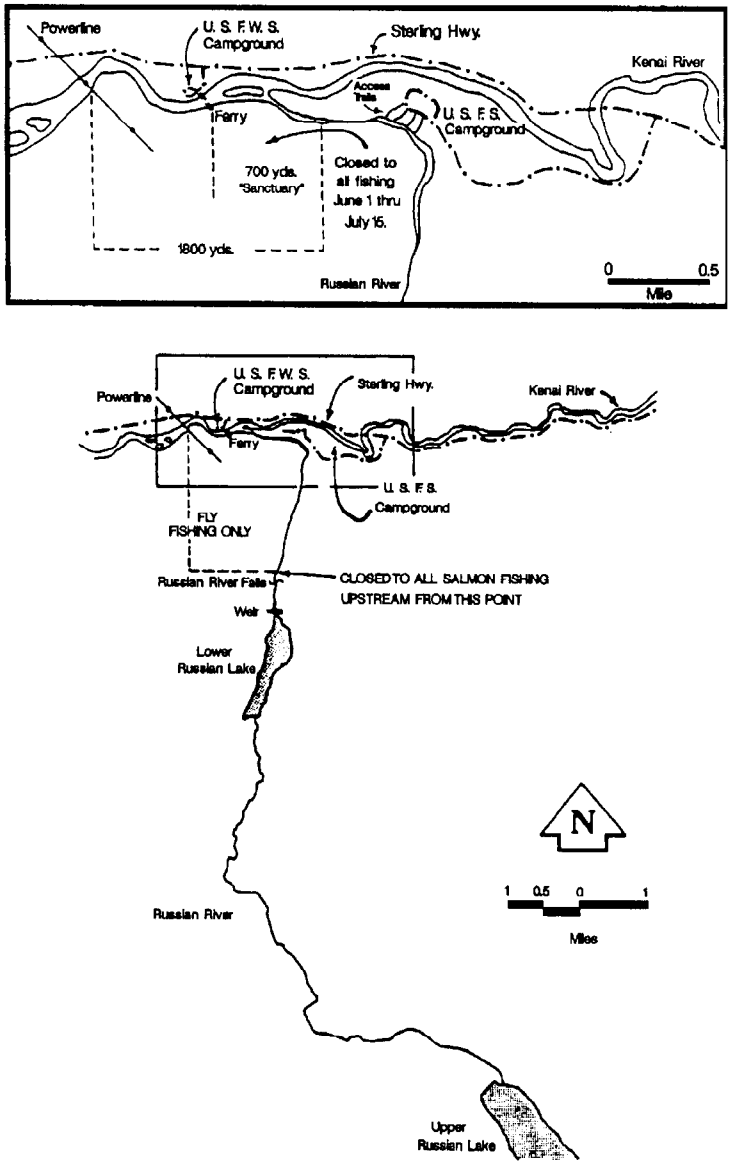

Figure 14.-The Russian River drainage.

Sockeye salmon return to the Russian River during two distinct time periods. An early run arrives at the confluence of the Kenai and Russian rivers in early June. The late run, part of the larger late-run return of upper Cook Inlet sockeye salmon, arrives at the confluence area in mid-July and typically migrates directly into the Russian River. This run has two discrete components: one which spawns in the upper reaches of the drainage (above-weir spawners) and one which spawns in the lower river reaches (below-weir spawners). The component which spawns in the lower river reaches is more closely related to the mainstem Kenai River sockeye salmon stock than to the above-weir component. Typically, the spawning escapement of the late run exceeds that of the early run. For the most part, spawning locations used by the late run are distinct from locations used by the early run. Because of their run timing, late-run sockeye salmon are harvested by a combination of commercial, sport, and personal use user groups.

The sport fishery for both early and late-run sockeye salmon occurs in the lower 3 miles of the Russian River and in the Kenai River downstream for about 1 mile from its confluence with the Russian River (Figure 13). Both runs support intense sport fisheries. At times, more than 1,000 anglers simultaneously fish this section of the river. The two public campgrounds managed by federal agencies are routinely filled to capacity and unable to meet public demand for camping and parking.

In 1993 the Sport Fish Division purchased property adjoining Fish and Wildlife Service lands at the confluence of the Kenai and Russian rivers. The 4.4 acre property, formerly the site of the privately owned Sportsmen's Lodge, was purchased for $375,000, primarily with Federal D-J funds. The primary reason for the purchase was to provide a launching and takeout area for boat anglers utilizing the Kenai River. A secondary benefit of the purchase was to provide 50 to 75 additional parking places for anglers fishing sockeye salmon at the confluence of the Kenai and Russian rivers. Purchase of the property has, to a degree, alleviated the previously inadequate parking in this area during peak days of the fishery.

As angler effort has increased, the regulations governing the sport fishery have by necessity become more restrictive. As early as 1965 the use of treble hooks was prohibited in an effort to reduce snagging. In 1966 terminal gear was limited to flies and the area was designated fly-fishing-only. In 1967 the Board of Fisheries required that only fish hooked in the head, mouth or gills could be retained and, in 1969, this regulation was extended to include all fresh waters of the Kenai Peninsula. In 1973 the regulation was further amended and required that fish hooked elsewhere than in the mouth be released immediately.

Currently, the sport fishery is restricted to terminal tackle consisting of a single-hook, unweighted fly with a maximum hook gap of 3/8 in. This measure was implemented to reduce angler efficiency and provide a measure of protection to the vulnerable fish as they near spawning destinations. To protect holding fish, a portion of the confluence area (termed the sanctuary) is closed to sport fishing until the early-run escapement is projected to be met. The late run's migration through this area is more rapid and this increased protection is not required. The drainage is closed to salmon fishing upstream of the lower 3 miles to allow fish to migrate unimpeded to spawning destinations.

BOARD OF FISH ACTIONS

There were no regulatory changes to this fishery at the 1990 or 1992 Board meetings. The Board will next consider regulatory changes to this fishery in January 1996.

RECENT FISHERY PERFORMANCE

The 1994 late run entered the fishery at the confluence of the Russian and Kenai rivers in late July. The fishery was prosecuted in a normal manner through the close of the season on August 20. Anglers expended 91,192 hours of effort to harvest 26,375 late-run sockeye salmon; harvest rate was one fish per 3.5 hours fished. These data are above the historical average for this fishery (Table 19).

Spawning escapement above the weir was 122,277; below the weir, 15,366. Total late-run return was 164,018. This total was 16.3% of the sockeye salmon that entered the Kenai River drainage in 1994. Total Russian River return was one of the highest recorded for this drainage (Table 20). Of the fish enumerated at the weir, 5.5% or 6,730 were 1-ocean fish (jacks). This is below average for this age class (Table 21).

CURRENT ISSUES

There are no biological issues associated with this fishery. Social issues focus on congestion and riparian habitat degradation. There is no evidence indicating angler-caused habitat alteration has affected the productivity of either the Kenai or Russian River. Lands affected are in federal ownership; both the United States Forest Service and Fish and Wildlife Service are evaluating this issue.

RECOMMENDED RESEARCH & MANAGEMENT

Late-run Russian River sockeye salmon are at high levels of abundance; spawning escapement goals have been consistently achieved and angler opportunity and harvest maximized. No change in research or management strategy is required at this time.

LOWER PENINSULA EARLY-RUN COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Harvest estimates on the four lower Kenai Peninsula streams (Anchor River, Deep Creek, Ninilchik River and Stariski Creek) are from the Statewide Harvest Survey. With allowances for annual fluctuation, harvest in this fishery is assumed to be proportionate to numbers of fish present. Harvest data therefore indicate, with allowances for annual variation in the relationship of harvest to abundance, that the coho salmon populations in the aforementioned streams are stable or increasing and that the second fishery objective is being achieved.

Inseason regulatory changes to the fishery are not required at current population levels; the fishery is presently managed inseason by existing regulations.

Table 19.-Historical summary of angler effort, harvest rate, harvest and escapement; Russian River late-run sockeye salmon, 1963-1994.

Year	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Escapement Above Weir	Escapement Below Weir	Local Return
1963	2,170	Unknown		1,390	51,120	Unknown	52,510
1964	1,350	5,070	0.483	2,450	46,930	Unknown	49,380
1965	1,970	8,280	0.261	2,160	21,820	Unknown	23,980
1966	6,310	28,700	0.254	7,290	34,430	Unknown	41,720
1967	5,500	29,490	0.194	5,720	49,480	Unknown	55,200
1968	5,500	28,250	0.206	5,820	48,880	4,200	58,900
1969	2,640	12,230	0.094	1,150	28,870	1,100	31,120
1970	1,000	2,240	0.268	600	26,200	220	27,020
1971	8,870	37,390	0.287	10,730	54,420	10,000	75,150
1972	13,360	55,920	0.287	16,050	79,115	6,000	101,165
1973	15,470	81,930	0.109	8,930	25,070	6,680	40,680
1974	10,030	45,210	0.188	8,500	24,900	2,210	35,610
1975	11,300	52,770	0.159	8,390	31,960	690	41,040
1976	17,380	74,000	0.185	13,700	31,940	3,470	49,110
1977	31,310	140,780	0.195	27,440	21,360	17,090	65,890
1978	17,950	98,830	0.248	24,530	34,340	18,330	77,200
1979	29,330	124,010	0.216	26,840	87,850	3,920	118,610
1980	24,900	117,100	0.286	33,500	83,980	3,220	120,700
1981	26,250	109,250	0.217	23,720	44,520	4,160	72,400
1982	12,480	59,130	0.175	10,320	30,800	45,000	86,120
1983	13,300	66,650	0.240	16,000	33,730	44,000	93,730
1984	20,320	94,850	0.232	21,970	92,660	3,000	117,630
1985	34,630	159,160	0.367	58,410	136,970	8,650	204,030
1986	22,400	89,780	0.343	30,810	40,280	15,230	86,320
1987	32,650	132,570	0.306	40,580	53,930	76,530	171,040
1988	25,430	94,840	0.206	19,540	42,480	30,360	92,380
1989	39,770	154,510	0.357	55,210	138,380	28,480	222,070
1990	39,970	159,890	0.351	56,180	83,430	11,760	151,370
1991	21,090	78,849	0.399	31,450	78,180	22,270	131,900
1992	23,015	87,918	0.297	26,101	63,478	4,980	94,559
1993	23,491	96,312	0.278	26,772	99,259	12,258	138,289
Mean	17,460	75,030	0.256	20,070	55,510	12,380	87,960
1994	21,712	91,192	0.289	26,375	122,277	15,366	164,018

Table 20.-Kenai River sockeye salmon sonar counts, local late-run Russian River sockeye salmon return and percent of the Kenai River sockeye salmon escapement to enter Russian River, 1968-1994.

Year	Kenai River Sockeye Salmon Sonar Count	Late-Run Russian River Local Return[a]	Percent Kenai Escapement to Russian River
1968	88,000	58,900	66.9
1969	53,000	31,120	58.7
1970	73,000	27,020	37.0
1971 [b]		75,160	
1972	318,000	101,165	31.8
1973	367,000	40,680	11.1
1974	161,000	35,610	22.1
1975	142,000	41,040	28.9
1976	380,000	49,110	12.9
1977	708,000	65,890	9.3
1978	399,000	77,200	19.3
1979	285,000	118,610	41.6
1980	464,000	120,700	26.0
1981	408,000	72,400	17.7
1982	620,000	86,120	13.9
1983	630,000	93,730	14.9
1984	345,000	117,630	34.1
1985	503,000	204,030	40.6
1986	501,000	86,320	17.2
1987	1,597,000	171,040	10.7
1988	1,021,500	92,380	9.0
1989	1,600,000	222,070	13.9
1990	659,500	151,370	23.0
1991	645,000	131,890	20.4
1992	994,760	94,559	9.5
1993	813,617	138,289	17.0
Mean	551,060	96,310	24.3
1994	1,003,446	164,018	16.3

[a] Late-run Russian River local return includes escapement above and below the weir plus sport harvest.

[b] Sonar data from 1971 not available due to equipment malfunction.

Table 21.-Late-run Russian River sockeye salmon harvest, escapement, and returning jacks, 1969-1994.

Year	Sport Harvest	Above Weir Escapement	Number of Jacks	Percent of Escapement
1969	1,150	28,870	352	1.2
1970	600	26,200	2,542	9.7
1971	10,730	54,420	1,429	2.6
1972	16,050	79,115	160	0.2
1973	8,930	25,070	332	1.3
1974	8,500	24,900	1,008	4.0
1975	8,390	31,960	1,788	5.6
1976	13,700	31,940	1,204	3.8
1977	27,440	21,360	537	2.5
1978	24,530	34,340	2,874	8.4
1979	26,840	87,850	1,476	1.7
1980	33,500	83,980	1,533	1.8
1981	23,720	44,520	2,634	5.9
1982	10,320	30,800	1,777	5.8
1983	16,000	33,730	4,360	12.9
1984	21,970	92,660	3,450	3.7
1985	58,410	136,970	1,905	1.4
1986	30,810	40,280	1,812	4.5
1987	40,580	53,930	332	0.6
1988	19,540	42,480	12,589	29.6
1989	55,210	138,380	13,721	9.9
1990	52,980	83,430	6,713	8.0
1991	31,450	78,180	5,196	6.6
1992	26,101	63,478	4,213	6.6
1993	26,772	99,259	34,536	34.8
Mean	23,770	58,720	4,340	6.9
1994	26,375	122,277	6,730	5.5

HISTORICAL PERSPECTIVE

The lower Peninsula early-run coho salmon fishery occurs on the Anchor River, Deep Creek, Ninilchik River and Stariski Creek (Figure 15). The area open to coho salmon fishing on Deep Creek and Ninilchik River is the lower 2 miles as posted; on Anchor River fishing is permitted upstream to the junction of the north and south forks (about 2 miles); on Stariski Creek, coho salmon may be taken from salt water upstream to the Sterling Highway Bridge (approximately 1 mile). These streams do not support late-run coho salmon.

Spawning occurs in the upstream areas of these streams. No spawning escapement counts have been conducted except at the weir in Anchor River from 1987-1989. Counts at Anchor River in these years were 2,409 in 1987; 2,766 in 1988; 20,168 in 1989.

Harvests in the aforementioned streams have been determined by Statewide Harvest Survey since 1977; in some years a creel survey was conducted on Anchor River. For comparative purposes, harvest estimates for all species in Tables 22 through 25 were determined by Statewide Harvest Survey.

Anchor River supports the largest harvest of coho salmon, averaging 2,339 fish annually. Average harvests in Deep Creek, Ninilchik River and Stariski Creek are 1,040, 470, and 198, respectively. Predicated on harvest data, the populations in these lower streams are maintaining themselves at a relatively high level and support a relatively stable recreational fishery.

Prior to 1989, there was no inseason management of the lower Peninsula coho salmon fishery. In 1989 an exceptionally large return to Anchor River resulted in an emergency order opening an additional 5 miles of stream in the south fork to coho salmon fishing. This additional area was open from September 2-10. Opening this additional area did not significantly increase harvest. This management strategy is therefore unlikely to be used in future years.

BOARD OF FISH ACTIONS

In 1990 the Board adopted a proposal submitted by the Steelhead Planning Team to permit bait through August 31 in the four lower Peninsula streams. There were no regulatory changes adopted by the Board at the November 1992 meeting. The majority of the 1991 and 1992 coho salmon fishery was therefore prosecuted with bait. This fishery will next be reviewed by the Board at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

The 1993 harvest estimates as determined by Statewide Harvest Survey were 4,003 coho salmon from the Anchor River, 845 from the Ninilchik River, 1,722 from Deep Creek, and 392 coho salmon from Stariski Creek. These harvests are above the historical averages in all streams and are record highs in Anchor and Ninilchik rivers. These data confirm staff observation from the 1993 season.

The 1994 fishery was prosecuted in a normal manner with the majority of angler participation occurring the latter half of August and in early September. Observation suggests that harvests in all streams will be above average. Stream conditions were low and clear during the fishery. Coho salmon were therefore difficult to catch. Successful anglers fished the relatively brief period immediately after sunrise and just prior to darkness.

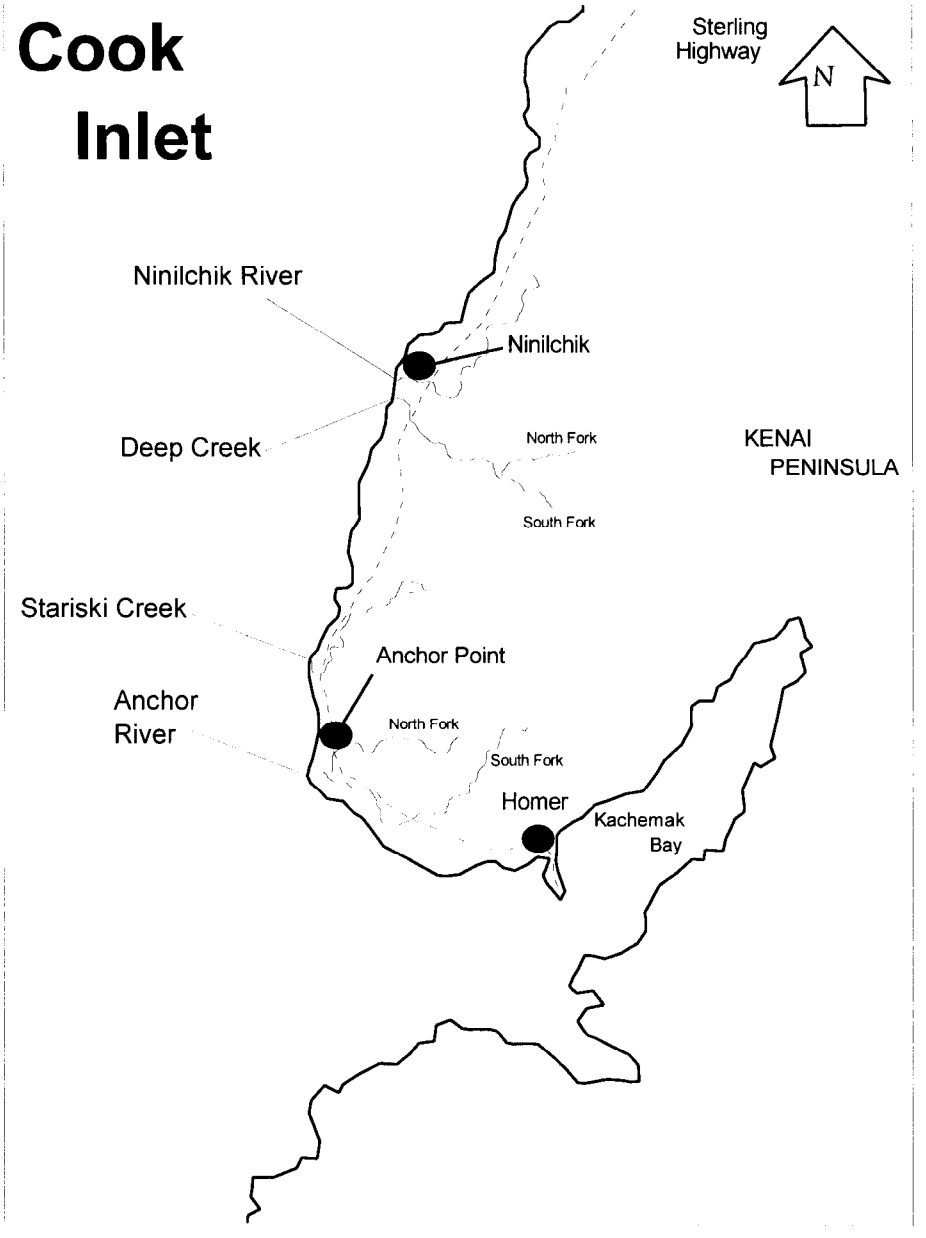

Figure 15.-Lower Kenai Peninsula coho salmon streams of Anchor River, Deep Creek, Ninilchik River, and Stariski Creek.

Table 22.-Angler participation and harvest of chinook, coho, and pink salmon; Dolly Varden, rainbow trout and steelhead trout, Anchor River, 1977-1993.

	HARVEST [a]							
Year	Chinook Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout	Total Harvest	Days Fished
1977	1,077	1,339	27	9,222	1,027	1,072	13,764	31,515
1978	2,109	1,559	139	17,357	551	1,754	23,469	42,671
1979	1,913	4,006	18	21,364	1,000	782	29,083	44,220
1980	605	2,649	339	10,948	345	841	15,727	33,272
1981	1,015	2,949	11	15,271	151	777	20,174	34,257
1982	650	2,379	161	10,375	147	551	14,263	24,709
1983	1,206	1,395	252	17,277	504	1,101	21,735	28,881
1984	873	1,135	249	5,599	224	761	8,841	26,919
1985	386	2,239	124	7,716	52	423	10,940	31,715
1986	1,001	1,021	136	3,914	138	382	6,592	34,938
1987	725	2,010	54	2,735	181	462	6,167	39,045
1988	862	2,219	109	2,746	36	164	6,136	24,356
1989	562	2,635	115	1,476	95 [b]	1,971 [b]	4,788	19,145
1990	1,460	2,782	163	2,821	406 [b]	1,572 [b]	7,226	28,829
1991	1,004	3,169	125	1,409	846 [b]	1,503 [b]	5,707	22,187
1992	1,491	2,267	92	2,532	206 [b]	2,514 [b]	6,382	24,028
1993	2,787	4,003	98	1,031	835 [b]	3,321 [b]	7,919	29,338
Mean	1,160	2,339	130	7,870	397	1,174	12,289	30,590

[a] All harvest data are from Statewide Harvest Survey.

[b] Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Table 23.-Angler participation and harvest of chinook, coho, and pink salmon; Dolly Varden, rainbow trout and steelhead trout, Ninilchik River, 1977-1993.

	HARVEST [a]							
Year	Chinook Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout	Total Harvest	Days Fished
1977	1,168	122	0	424	170	60	1,944	11,350
1978	1,445	88	46	1,003	217	90	2,889	14,173
1979	1,493	200	0	2,390	382	127	4,592	18,282
1980	723	321	260	853	91	290	2,538	19,706
1981	1,372	432	0	875	162	302	3,143	14,184
1982	1,079	241	10	514	52	127	2,023	11,806
1983	808	210	42	199	31	126	1,416	9,458
1984	536	549	150	524	50	87	1,896	10,122
1985	871	697	0	87	451	50	2,156	10,213
1986	368	336	13	505	199	76	1,497	9,250
1987	1,088	924	108	507	199	92	2,918	13,329
1988	739	709	36	655	218	54	2,411	12,533
1989	521	379	216	39	20 [b]	485 [b]	1,155	9,997
1990	593	368	12	116	31 [b]	146 [b]	1,089	8,323
1991	2,754 [c]	789	116	222	178 [b]	334 [b]	3,881	19,640
1992	4,896 [c]	785	37	131	348 [b]	660 [b]	5,849	27,816
1993	4,235 [c]	845	0	29	56 [b]	386 [b]	5,109	20,466
Mean	1,452	470	62	534	168	205	2,736	14,156

[a] All harvest data are from Statewide Harvest Survey.

[b] Rainbow/steelhead trout caught and released. Retention of this species prohibited.

[c] Enhanced run.

Table 24.-Angler participation and harvest of chinook, coho, and pink salmon; Dolly Varden, rainbow trout and steelhead trout, Deep Creek, 1977-1993.

	HARVEST [a]							
Year	Chinook Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout	Total Harvest	Days Fished
1977	425	306	109	1,330	300	269	2,739	11,399
1978	804	1,383	294	3,046	127	371	6,025	13,872
1979	703	362	9	2,027	118	145	3,364	12,560
1980	182	478	321	1,028	97	139	2,245	8,796
1981	518	464	11	1,382	108	140	2,623	10,127
1982	723	366	293	1,247	52	187	2,868	12,149
1983	986	545	42	1,112	189	126	3,000	13,505
1984	624	1,197	112	973	87	224	3,217	15,760
1985	174	2,301	37	850	104	75	3,541	19,802
1986	879	588	52	306	612	76	2,513	17,354
1987	580	1,050	18	72	54	31	1,805	16,734
1988	654	1,528	72	219	200	91	2,764	12,115
1989	752	2,254	28	333	209 [b]	200 [b]	3,367	13,414
1990	1,317	1,111	35	708	458 [b]	833 [b]	3,171	23,567
1991	1,570	1,290	50	287	115 [b]	310 [b]	3,197	17,048
1992	1,132	737	46	401	111 [b]	629 [b]	2,316	15,226
1993	2,503	1,722	81	145	214 [b]	1,234 [b]	4,451	19,535
Mean	854	1,040	95	910	186	299	3,130	14,880

[a] All harvest data are from Statewide Harvest Survey.

[b] Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Table 25.-Angler participation and harvest of chinook, coho, and pink salmon; Dolly Varden, rainbow trout and steelhead trout, Stariski Creek, 1977-1993.

	HARVEST [a]							
Year	Chinook [b] Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout	Total Harvest	Days Fished
1977		133	26	461	170	124	914	1,442
1978		201	15	1,012	90	262	1,580	3,662
1979		275	0	2,027	118	118	2,538	1,965
1980		155	0	327	26	79	587	1,499
1981		410	0	875	32	86	1,403	1,080
1982		119	0	348	0	59	526	1,023
1983		251	0	283	0	42	576	877
1984		0	0	499	0	137	636	519
1985		25	0	0	0	50	75	1,422
1986		187	0	183	0	31	401	1,162
1987		127	0	199	0	62	388	1,612
1988		146	0	182	0	18	346	804
1989		396	0	0	10 [c]	0 [c]	396	1,533
1990		169	0	167	0 [c]	104 [c]	336	935
1991		280	0	65	0 [c]	12 [c]	345	1,143
1992		97	0	8	0 [c]	70 [c]	105	523
1993		392	0	67	0 [c]	31 [c]	459	813
Mean		198	2	394	26	76	683	1,295

[a] All harvest data are from Statewide Harvest Survey.

[b] Stariski Creek closed to fishing for chinook salmon.

[c] Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Staff observations and observations from a number of reliable anglers are available for three streams. These observations suggest there were large numbers of coho salmon in Anchor River. Reports of lesser numbers of fish were received from anglers fishing Deep Creek and Ninilchik River. Observations are not available for Stariski Creek.

OUTLOOK

With allowances for annual variation, this fishery's coho salmon stocks are stable and support a stable fishery. No change in the status of this fishery is anticipated in the near future.

CURRENT ISSUES

There are no biological or management issues associated with the lower Peninsula coho salmon fishery. Returns in recent years are subjectively determined to be at or above average in most streams.

Social concerns in 1989 and 1990 focused on the prohibition of bait after August 14. There was concern in the community of Anchor Point that prohibiting bait in this fishery tended to depress angler participation despite the 1989 and 1990 above average returns, i.e. anglers who historically fished here with bait relocated to other fisheries where bait was legal terminal gear. This concern was addressed by the Board in 1990; bait may now be used through August 31.

A secondary social concern to some Anchor River anglers is the placement of Anchor River weir. Their concern is that the weir slows the upstream migration of fish (primarily coho salmon). Once this species passes through the structure, anglers contend that their migrational rate accelerates and these salmon move rapidly into either the Anchor River's north or south fork. Since salmon fishing is permitted only downstream from the north and south forks, the criticism is that the present placement of the weir has reduced the productive coho salmon fishing area by about 50%.

Staff observation indicates anglers now tend to fish downstream from the weir. Weir placement, however, has not negatively affected the harvest (Table 22).

The Anchor River weir's primary purpose is to enumerate Dolly Varden. In 1990 and 1991 it was removed August 15, prior to the peak of the coho salmon fishery. It was therefore not an issue in these years. In 1992 it was used to enumerate steelhead trout and was operational through October 1; in 1993 and 1994 it was again used to enumerate Dolly Varden and was removed August 15. It is the subjective determination of the staff that public acceptance of the weir and the need for the structure as a management tool is increasing.

RECOMMENDED RESEARCH & MANAGEMENT

The lower Peninsula coho salmon fishery is stable, subject to annual variability in stock abundance characteristic of all anadromous fish populations. No research or management activities directed toward this fishery are recommended at this time.

KASILOF RIVER/CROOKED CREEK EARLY-RUN COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVES

This fishery is not specifically addressed in a Board adopted management plan.

The fishery is supported by wild stocks originating in Tustumena Lake tributaries; by spawning fish both below and above the Crooked Creek Hatchery; and by stocked coho salmon originating from the Crooked Creek Hatchery. Objectives for the stocked component of the fishery are:

Objective 1: To ensure that 1,250 coho salmon annually spawn in Crooked Creek upstream from the Crooked Creek Hatchery.

Objective 2: To provide additional fishing opportunity at Kasilof River during August which will provide about 2,500 additional days of angler participation.

Objective 3: To stock 75,000 coho salmon smolt into Crooked Creek which yield a 5% survival or 3,750 returning adults, about 2,500 of which are available for harvest in the sport fishery.

Objectives for the wild Tustumena and naturally spawning coho salmon in Crooked Creek are:

Objective l: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

This fishery occurs in the mainstem Kasilof River and Crooked Creek. Wild and stocked early-run coho salmon contribute to the harvest. A formal program to evaluate the proportionate contribution of these three stocks to the fishery has not been conducted. Predicated on staff observation and conversations with anglers, naturally produced and stocked fish are primarily targeted; wild stocks are harvested secondarily to these fish.

The spawning escapement goal upstream from the hatchery was established in 1991 and has consistently been achieved No spawning escapement goal has been established for fish which spawn downstream from the hatchery. Brood stock requirements at the hatchery have been consistently achieved. The wild stock harvest in Tustumena Lake is several hundred fish. The harvest of these wild fish in Kasilof River is not known, but is assumed to be small compared to the harvest of hatchery and naturally produced fish. There is therefore no conservation issue associated with Tustumena Lake wild stock coho salmon.

Inseason management of this fishery has never been required; management is effected through existing regulations.

HISTORICAL PERSPECTIVE

The Kasilof River and its major tributary, Crooked Creek, support early-run coho salmon (Figure 16). Limited data are available regarding the Kasilof River run. It is known that this run contributes to the Cook Inlet commercial fishery, has run timing similar to early-run Kenai River coho (late July-August) and spawns in tributaries to Tustumena Lake. A small sport fishery targeting this run occurs at the mouths of these tributary streams. A limited harvest of these fish also occurs in the mainstem Kasilof River sport fishery which is experiencing an increase in participation.

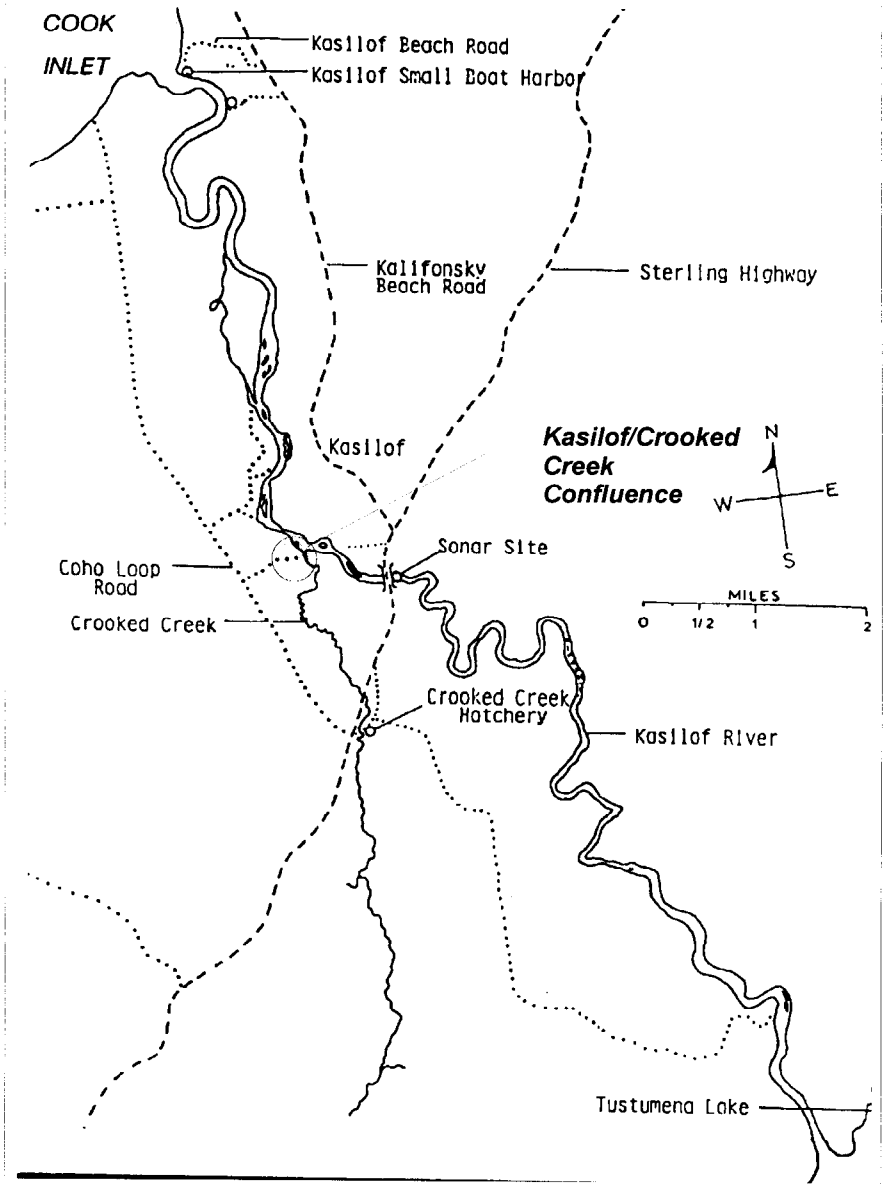

Figure 16.-Kasilof River early-run coho salmon fishery.

The Kasilof River harvest from 1981-1983 was estimated at 325-409 (Table 26). It is assumed the majority of fishing effort was at the confluence of the Kasilof River and Crooked Creek and that these wild fish were of both Kasilof River and Crooked Creek origin. In 1984 harvest increased to 1,085.

The first stocked return to Crooked Creek Hatchery was in 1985. In that year harvest was estimated at 560 in the Kasilof River. In 1986, harvest was estimated to be 1,783 coho salmon from the Kasilof River and 497 from Crooked Creek. Harvest has shown a gradual increase since 1986. The highest harvest to date, 4,222 fish in Kasilof River and 1,952 fish in Crooked Creek was recorded in 1989 (Table 26). In 1990 harvest declined to 1,590 in Kasilof River, 486 in Crooked Creek. Total 1991 harvest of 5,071 was the second highest recorded in the fishery. The 1992 harvest of 3,587 was within the historical range for this fishery.

BOARD OF FISH ACTIONS

There were no regulatory changes to this fishery at the 1990 Board of Fisheries meeting. In 1992 the use of bait was liberalized.

The coho salmon and steelhead trout fisheries in both the Kasilof River and Crooked Creek are primarily supported by stocked fish. There is no conservation issue associated with these fisheries. The Board determined that the use of bait could be permitted to increase the harvest of the stocked species. The Board at its November 1992 meeting therefore adopted a public proposal with staff support. The new regulation permits the use of bait in the Kasilof River and Crooked Creek at any time the streams are open to fishing. Prior to this action, bait was prohibited in Crooked Creek/Kasilof River after September 15.

RECENT FISHERY PERFORMANCE

The 1993 estimated total return to Crooked Creek Hatchery was about 5,200; natural spawning escapement was 1,250. No fish were used as brood stock. Harvest was estimated at 4,823. Of the fish harvested, 258 were taken in Tustumena Lake; 3,698 in Kasilof River and the remaining 867 in Crooked Creek (Table 26). The Kasilof River harvest was apportioned 67% to bank anglers and 33% to boat-based fishermen. Guided anglers harvested 13% of the Kasilof River harvest and nonguided anglers harvested the remaining 87%.

Harvest estimates are not available for the 1994 season. Staff observation indicates the 1994 fishery occurred normally. Observation and information provided by staff and knowledgeable anglers suggest a return and fishery similar to 1993.

OUTLOOK

On July l, 1993 the state-operated Crooked Creek Hatchery was transferred to the Cook Inlet Aquaculture Association. At that time the decision was made to discontinue the coho salmon stocking program at Crooked Creek. The decision was predicated on cost and program prioritization given the remaining space in state hatcheries.

Cook Inlet Aquaculture was paid by the state to take coho salmon eggs in the fall of 1993. These eggs were incubated at the Crooked Creek Hatchery and will be released into Crooked Creek as l-check smolt in spring 1995. They will return as adults in late summer/fall 1996. This return will be the last stocked return to this location.

Table 26.-Historical summary of the Kasilof River and Crooked Creek coho salmon fishery, 1981-1994.

Year	Harvest [a] Tustumena Lake	Kasilof River	Crooked Creek	Total	Brood-stock	Crooked [b] Creek Escapement	Sold to Processors	Approximate [c] Enhanced Return
1981		335						
1982		325						
1983		409						
1984		1,085						
1985		560						
1986 [d]		1,783	497	2,280	515	3,667		5,571
1987	36	3,785			143	531	1,764 [e]	4,331
1988	200	2,928	291	3,419	212	212	2,204	4,383
1989	111	4,222	1,952	6,285	177	1,250	3,162	8,652
1990	236	1,590	486	2,312	185	317	1,368 [e]	3,151
1991	52	4,754	265	5,071	180	1,293	2,582	6,697
1992	32	3,304	251	3,587	130	1,558	0	3,591
1993	258	3,698	867	4,823	185	1,250	1,050	5,201
Mean	132	2,214	658	3,968	216	1,260	1,733	5,197
1994					0 [f]	1,303	250	

[a] All harvest estimates from Statewide Harvest Survey.

[b] Upstream from hatchery.

[c] Assumes 50% of Kasilof River harvest is of Crooked Creek hatchery origin.

[d] First year of hatchery returns.

[e] Killed and/or given away to public.

[f] No egg take conducted.

The fishery will continue to be supported by wild stock fish of Tustumena Lake origin and from naturally spawning fish in Crooked Creek. The fishery will therefore continue to occur, probably with reduced levels of participation due to fewer harvestable coho salmon available.

CURRENT ISSUES

Because this fishery currently targets primarily hatchery produced fish, inseason management is not likely to be required. There are no major social or biological issues associated with this fishery at this time. The public has been informed of the termination of the coho salmon fishery through the news media.

RESEARCH & MANAGEMENT

The Kasilof/Crooked Creek coho salmon fishery is a mixed stock fishery. Wild fish, fish originating from natural spawning and stocked fish are harvested here. Without a formal evaluation program, it is not possible to accurately apportion the harvest among the aforementioned stocks. Evaluation of the hatchery program and affect of the fishery on wild stocks of Tustumena Lake tributary origin is therefore subjective. At present, the subjective determination is that the hatchery program is meeting its formal objectives; at present harvest and participation levels the fishery is not negatively impacting the wild stocks.

The effect on the fishery of terminating the stocking program can not be definitely known at this time. It is reasonable to assume that angler participation may decline after 1996 when stocked fish would not be present and fewer total fish would be available for harvest. The fishery may then revert to prestocking harvest and participation levels, both of which were minimal.

If harvest and participation do not decline in the poststocking fishery, the potential exists to negatively impact wild Tustumena Lake stocks. There is little information regarding stocks which spawn in streams tributary to Tustumena Lake. Additional harvest of these stocks in the Kasilof River may require research to identify relative abundance.

KENAI RIVER EARLY-RUN COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

Early-run Kenai River coho salmon are addressed in the Upper Cook Inlet Salmon Management Plan. This Board adopted management plan directs the department to minimize the harvest of this species in the Cook Inlet commercial salmon fishery. There is no management plan which addresses the inriver sport fishery.

Department objectives for this fishery are:

Objective l: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

There presently is no cost effective methodology available to enumerate the inriver coho salmon return; an escapement goal has not been established for this stock. Inseason management is therefore effected through current regulations.

Prior to 1994, a creel survey conducted downstream from the Sterling Highway Bridge in Soldotna provided inseason harvest, harvest/unit effort and angler participation estimates. These data were used postseason to track the relative status of the fishery on an annual basis. Given that harvest is approximately proportionate to coho salmon abundance, numbers of early-run Kenai River coho salmon (with allowances for annual variation) appear relatively stable.

There was no onsite creel survey in 1994. Harvest will be estimated from the Statewide Harvest Survey in 1994 and future years.

HISTORICAL PERSPECTIVE

When the chinook salmon season terminates July 31, anglers immediately direct their efforts towards coho salmon. Coho anglers fish from anchored boats or from shore as compared to the mobile or drift fishery directed at chinook salmon. This fishery occurs from the river's mouth upstream to Kenai Lake (Figure 17).

Coho salmon return to the Kenai River in two runs. Early-run fish begin entering the system in late July and are present through early September. Late-run fish begin to enter the river in late August, peak in September and continue to enter the river at reduced levels until December. The majority of the early and late-run harvest occurs downstream from Skilak Lake from early August through early October.

Historically, the early run is the larger of the two. These fish are also harvested by the mixed stock commercial drift gillnet and setnet fisheries. From 1966 through 1993 the average commercial harvest from the eastside beaches setnet fishery has been approximately 45,580 early-run coho salmon; an unknown percentage are of Kenai River origin. The department determined harvest and effort by creel survey from 1976 to 1993. The general harvest and effort trend is indicative of a relatively stable fishery with these two parameters subjectively related to magnitude of the annual inriver return (Table 27).

BOARD OF FISH ACTIONS

There were no regulatory changes to this fishery at the 1990 Board of Fisheries meeting. In 1992 the Board prohibited fishing for any species of fish in the Kenai River after taking the daily bag/possession limit of 3 coho salmon greater than 16 inches in length. The purpose of this regulation was to curtail the increasingly prevalent illegal practice of fishing for a "boat limit." This regulation will have a minimal effect on anglers who have abided by existing regulations. Catch and release is permitted prior to retention of the third coho salmon. An angler desiring to fish for species other than coho salmon on the same day would simply fish the alternate species first, then fish for coho salmon or retain only 2 coho salmon prior to fishing the alternate species.

The Board will next consider regulatory changes to this fishery in January 1996.

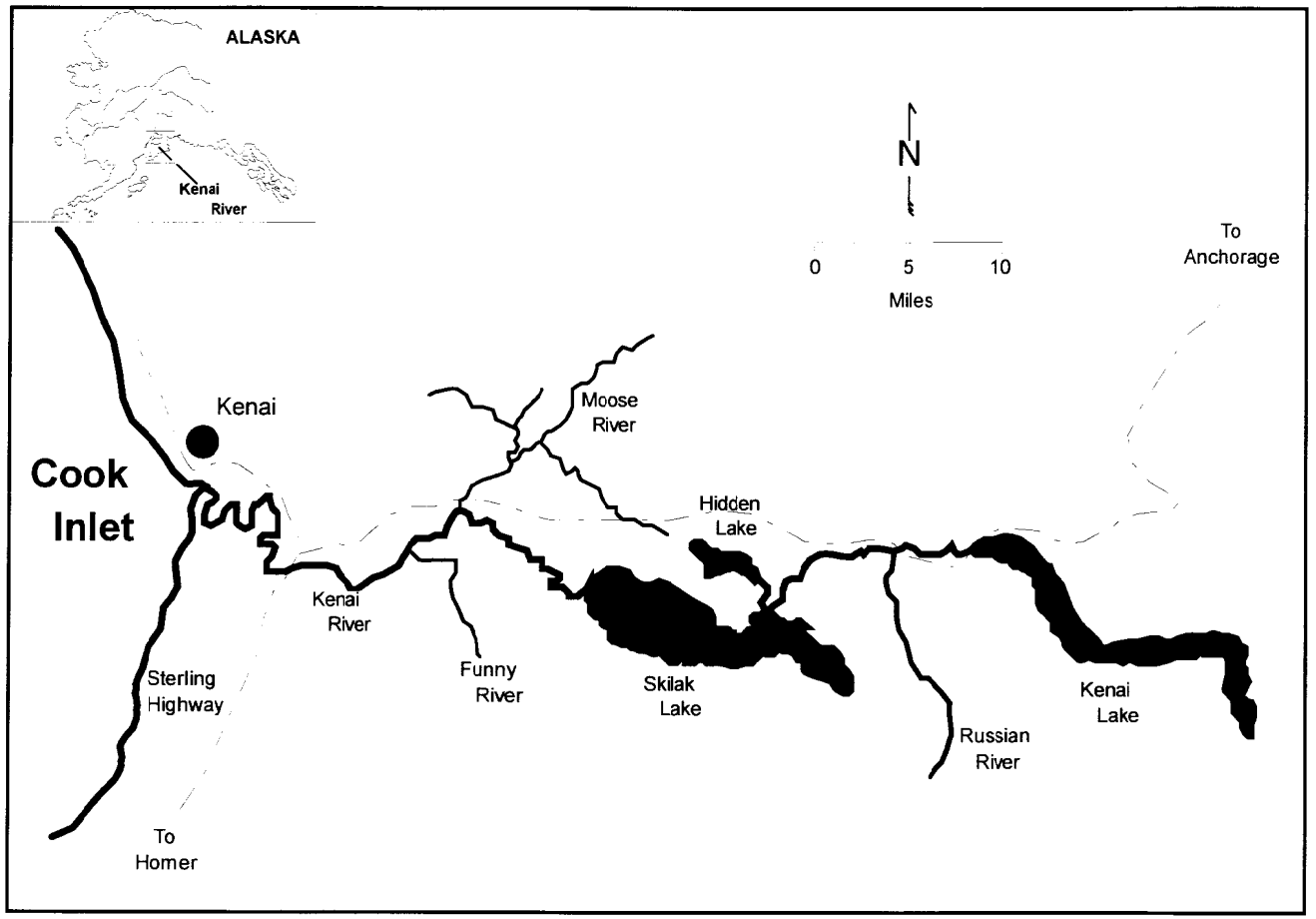

Figure 17.-Schematic diagram of the Kenai River drainage.

Table 27.-Historical summary of harvest, angler effort and harvest rate in the Kenai River early-run coho salmon fishery, downstream of the Soldotna Bridge, 1986-1993.

Year	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1986	26,375	43,765	162,804	0.162
1987	15,348	26,301	104,942	0.146
1988	22,398	37,417	156,405	0.143
1989	24,278	33,850	141,155	0.172
1990	26,789	51,816	216,074	0.124
1991	41,660	45,030	161,208	0.258
1992	20,817	40,919	176,554	0.118
Mean	25,381	39,871	159,877	0.161
1993	21,628	24,577	101,176	0.214

RECENT FISHERY PERFORMANCE

Creel survey data available for 1986-1993 indicate that the majority of the harvest and participation occurs downstream of the Sterling Highway bridge. Fishery data in Table 27 reflect fishery performance only in this section of the river.

Estimated 1993 sport harvest was 21,628 early-run coho salmon; estimated effort was 101,176 hours (Table 27). Harvest/hour was 0.214 fish. Harvest was below average and is a reflection of angler effort which was also below average. Angler success rate is the second highest in the last 8 years. The reason for a decline in angler effort is not known.

The eastside beach commercial harvest of mixed stock early-run coho salmon was 43,075. This harvest is below the historical average of 45,677 for this fishery.

No creel survey was conducted in 1994. The survey was discontinued because the information collected has never been utilized for inseason management. Harvest estimates will be obtained from the Statewide Harvest Survey with 1994 data available in fall 1995. Early-run abundance in the Kenai River, based on observation and contact with anglers, was at best, average. This is in part attributable to the above average harvest in the commercial setnet fishery.

Harvest in the eastside beach commercial setnet fishery was 67,007. This is well above the average annual harvest of about 45,000. Early-run Kenai coho salmon were subject to intense commercial fishing pressure during most of their migration along the eastside beaches due to the late run timing of Kenai River sockeye. Late sockeye salmon run timing resulted in additional commercial fishing periods in late July and August. These additional periods corresponded to early coho salmon run timing and resulted in the above average harvest of coho salmon.

OUTLOOK

Regulatory changes to this fishery will not be considered by the Board of Fisheries until January 1996. Inseason regulation of the fishery is not likely to occur as there is no enumeration of the inriver return and a spawning escapement goal has not been established for this run. No change in the management of the fishery is anticipated in the immediate future; insufficient data are available to forecast future returns.

Creel survey data for the 1992-1993 seasons indicate angler effort in this fishery has declined from 1991, which was highest recorded to date. Harvest rates in these 2 years were average to above average. The decline in participation is therefore not a function of low success rates. The reason for this decline is not known. Several more years of participation data would be required to determine if a trend develops or if reduced participation the last 2 years was a function of annual variability in the fishery. This information will not be available from the Statewide Harvest Survey, which estimates participation for the Kenai River, not for specific fisheries.

CURRENT ISSUES

Current management issues, listed below, are both biological and allocative:

1. Although it is assumed high, the contribution of early-run Kenai River coho salmon to the commercial fishery is not known.
2. There is presently no methodology capable of enumerating early-run Kenai River coho salmon.

3. Since early-run coho salmon cannot presently be enumerated in the Kenai River, an escapement goal has not been established.
4. A management plan has not been established for this stock; to date there has been no inseason management of the sport fishery.

At issue is also the division of the harvestable surplus between commercial and sport fishermen. This allocation issue will be exacerbated as angler effort increases. To date, the department has not had sufficient data to present to the Board to address this issue. The Sport Fish Division, however, is currently examining the feasibility of estimating inriver abundance and determining the contribution of early-run Kenai River coho salmon to the commercial fishery.

RECOMMENDED RESEARCH & MANAGEMENT

A comprehensive juvenile coho salmon tagging program has been initiated in the Kenai River drainage. This is part of a larger Cook Inlet program which includes the tagging of hatchery smolt in northern Cook Inlet. The purpose of the program is to ascertain the proportionate contribution of northern Cook Inlet stocked and wild Kenai River coho salmon to the commercial fishery. Contingent on successful implementation of all program segments specific to Kenai River early-run coho salmon, total production of this stock will be known. This knowledge will facilitate establishing escapement goals for this resource. It is further envisioned this information will be used to develop a management plan for this run through the Board of Fisheries regulatory process. This plan will address both the biological and allocative issues associated with management of this resource. It is recommended that these programs continue.

The Statewide Harvest Survey estimates the coho salmon harvest for all areas of the Kenai River. However, this study does not differentiate early and late-run harvest for any species. If the study is to have greater value in determining harvest for a given run, the estimation methodology must be refined to reflect harvest in temporal increments rather than for the entire season. This would increase the value of the Statewide Harvest Survey in all areas which support early- and late-run chinook, sockeye and coho salmon fisheries.

KENAI RIVER LATE-RUN COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

There presently is no cost-effective methodology available to enumerate the inriver late-run coho salmon return; an escapement goal has not been established for this stock. Inseason management is therefore effected through current regulations.

Prior to 1994, a creel survey conducted downstream from the Sterling Highway Bridge in Soldotna provided inseason harvest, harvest/unit effort and angler participation estimates. These data were used postseason to track the relative status of the fishery on an annual basis. Given that harvest is approximately proportionate to coho salmon abundance, numbers of late-run Kenai River coho salmon (with allowances for annual variation) appear relatively stable.

There was no onsite creel survey in 1994. Harvest in 1994 and future years will be estimated by Statewide Harvest Survey.

HISTORICAL PERSPECTIVE

Coho salmon return to the Kenai River in two runs. Early-run fish begin entering the system in late July and are present through early September. Late-run fish begin to enter the river in late August, peak in mid-September and continue to enter the river at reduced levels until December. The majority of the early- and late-run harvest occurs downstream from Skilak Lake from early August through early October (Figure 18).

The late-run coho salmon fishery has been creel surveyed since 1976. The general trend in harvest and effort reflects an expanding fishery from 1987 through 1991. Both harvest and effort declined in 1992. Subjectively, harvest and participation are proportionate to the magnitude of the inriver return (Table 28).

A fall subsistence fishery, located along the east side Kenai Peninsula beach, also harvests late-run coho salmon. The exact nature and magnitude of the fishery has varied through the 1980s and 1990s, reflecting the controversial nature of the fishery and legal actions concerning the fishery. Prior to 1978 the fall subsistence fishery harvested less than 500 late-run coho salmon. In 1981 a court-ordered noncommercial fishery harvested 12,713 late-run fish. In 1983 the personal use fishery harvested 712 fish while in 1984, 2,261 fish were harvested in this fishery. A judicial ruling in the spring of 1985 (Madison vs. State of Alaska) resulted in the re-implementation of a subsistence fishery which harvested 11,265 fish from this stock. In 1986 the Alaska Legislature altered the "Subsistence Law" which negated a subsistence fishery but did allow a personal use fishery. The quota for this fishery was 2,500 late-run coho salmon. Harvest from 1986 through 1991 ranged from 2,213 to 2,703. In 1992 the personal use fishery was again replaced by a subsistence fishery. Harvest in that year cannot be apportioned to stream of origin. In 1993 a personal use fishery, similar to the 1986-1991 fisheries again occurred. Harvest was 1,168. In 1994 a subsistence fishery again occurred; harvest cannot be apportioned to stream of origin.

BOARD OF FISH ACTIONS

There were no regulatory changes to this fishery at the 1990 Board of Fisheries meeting. In 1992 the Board prohibited fishing for any species of fish in the Kenai River after taking the limit of 3 coho salmon 16 inches or greater in length. Purpose of this regulation was to curtail the increasingly prevalent illegal practice in this fishery of fishing for a "boat limit." This regulation will have a minimal effect on anglers who have abided by existing regulations. Catch and release is permitted prior to retention of the third coho salmon. An angler desiring to fish for species other than coho salmon on the same day would simply fish the alternate species first, then fish for coho salmon or retain only 2 coho salmon prior to fishing the alternate species.

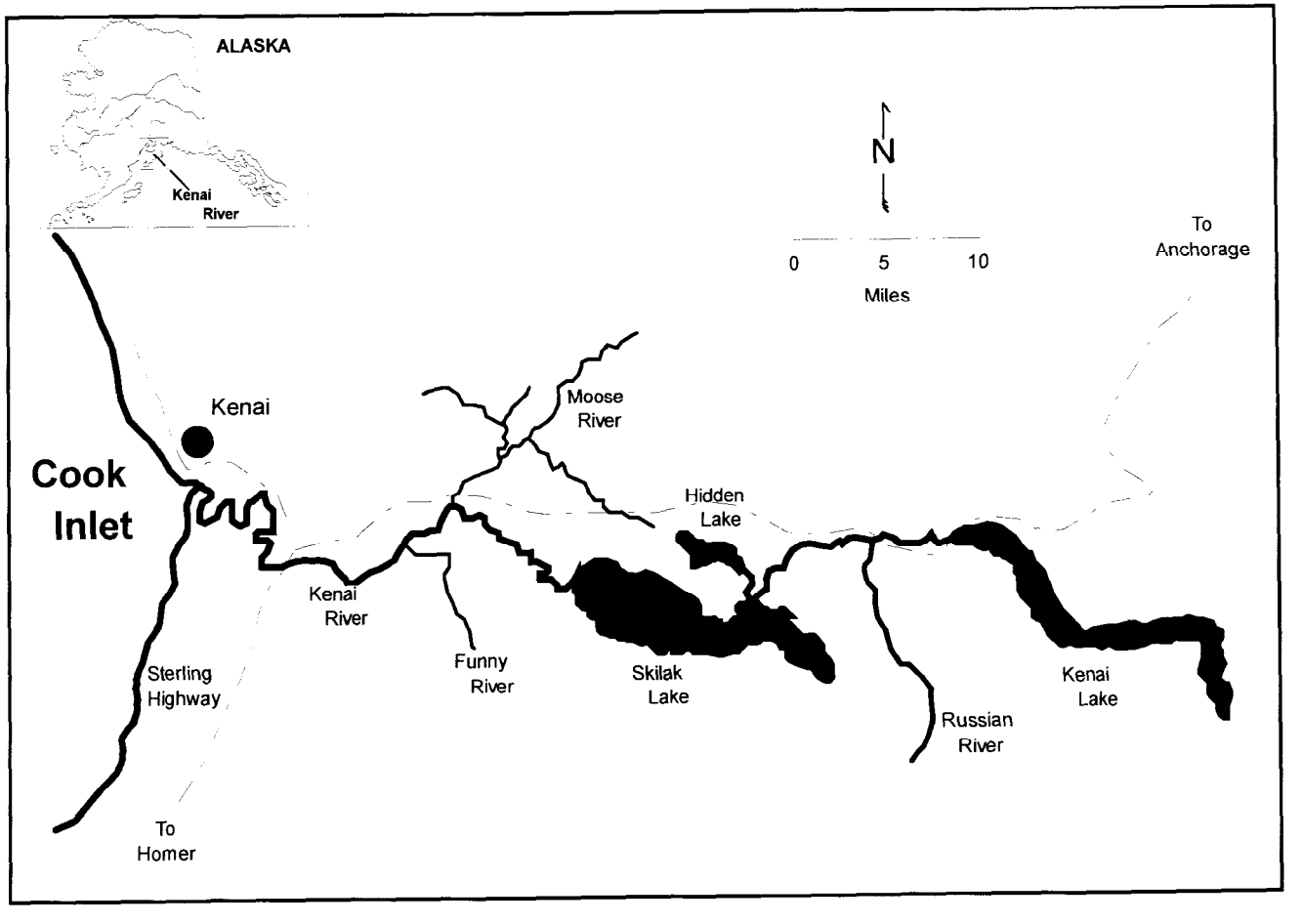

Figure 18.-Schematic diagram of the Kenai River drainage.

Table 28.-Historical summary of harvest, angler effort and harvest rate in the Kenai River late-run coho salmon fishery, downstream of the Soldotna Bridge, 1986-1993.

Year	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1986	12,631	21,002	78,127	0.162
1987	6,774	13,035	52,141	0.130
1988	9,434	21,154	88,423	0.107
1989	13,125	15,909	66,342	0.198
1990	15,849	23,415	97,639	0.162
1991	23,340	22,611	80,947	0.288
1992	12,794	13,510	65,520	0.195
Mean	13,421	18,662	75,591	0.177
1993	7,444	9,973	46,342	0.161

RECENT FISHERY PERFORMANCE

Creel survey data available for 1986-1993 indicate that the majority of the harvest and participation occurs downstream of the Sterling Highway bridge. Fishery data in Table 28 reflect fishery performance only in this section of the river.

Estimated 1993 sport harvest as determined by creel survey was 7,444 late-run coho salmon; estimated effort was 46,342 angler hours (Table 28). Harvest/hour was 0.161 fish. Low harvest/unit effort is assumed to be a function of coho salmon abundance and is also related to high and turbid water conditions which were present throughout most of the fishery.

These data are all below average for this fishery and, despite less than ideal water conditions, are indicative of what is assumed to be a below average return. The decline in angler effort is partly related to the relatively low harvest rate. At this time the low return is assumed to reflect annual variation in run strength and is not viewed as a general decline in late-run coho salmon abundance.

No creel survey was conducted in 1994. The survey was discontinued because the information collected has never been utilized for inseason management. Harvest estimates will be obtained from the Statewide Harvest Survey; 1994 data will be available in fall 1995. Late-run abundance in the Kenai River, based on observation and contact with anglers, was average.

Late-run coho salmon were harvested in the Cook Inlet subsistence fishery. Data are not available at this time to quantify that harvest. Late-run Kenai River coho salmon are not subject to commercial harvest. The personal use gillnet fishery occurred during the last 3 weekends of September. Harvest was estimated at 1,168. This low harvest is also suggestive of below average run strength.

OUTLOOK

Regulatory changes to this fishery will not be considered by the Board of Fish until January 1996. Inseason regulation of the fishery is not likely to occur as there is no enumeration of the inriver return and a spawning escapement goal has not been established for this run. No change in the management of the fishery is anticipated in the immediate future; insufficient data are available to forecast future returns.

Observation suggests that angler participation in the fishery is correlated with angler success rates. As success rates increase and anglers experience "good fishing," participation increases. The converse is also true. This general relationship between success rate and participation is expected to continue. However, the long-term trend is projected to be for a gradual increase in angler participation independent of fishing success.

CURRENT ISSUES

There is public concern regarding the status and allocation of this resource. Although the late Kenai River coho salmon stock is not subject to a directed commercial exploitation, it is subject to either a subsistence or personal use fishery. Allocation of this resource is therefore an issue as some sport fishermen contend that inriver success rates decline following a subsistence or personal use fishing period.

Biological considerations are:

1. Present methodologies do not permit enumeration of this stock in the Kenai River.

2. Escapement goals have not been established.
3. A management plan for this resource has not been developed; there is no inseason management of the sport fishery.

RECOMMENDED RESEARCH & MANAGEMENT

A comprehensive juvenile coho salmon tagging program has been initiated in the Kenai River drainage. This is part of a larger Cook Inlet program which includes the tagging of hatchery smolt in northern Cook Inlet. Purpose of the program is to ascertain the proportionate contribution of northern Cook Inlet stocked and wild Kenai River coho salmon to the commercial and personal use fisheries. Contingent on successful implementation of all program segments specific to Kenai River late-run coho salmon, total production of this stock will be known. This knowledge will facilitate establishing escapement goals for this resource. It is further envisioned this information will be used to develop a management plan for this run through the Board of Fisheries regulatory process. This plan will address both the biological and allocative issues associated with management of this resource. It is recommended that the present programs continue.

The Statewide Harvest Survey estimates harvest for the entire river. However, this survey does not differentiate early and late-run harvest for any species. If the survey is to have value in determining harvest for a given run, the estimation methodology must be refined to reflect harvest in temporal increments rather than for the entire season. This would increase the value of the Statewide Harvest Survey in all areas which support early and late-run chinook, sockeye and coho salmon fisheries.

It is recommended that a coho salmon season in the Kenai River be established as June 15 through December 31. This season would protect spawning late-run fish and would minimally reduce the opportunity to harvest coho salmon. Observation indicates that late-run coho salmon spawn at the outlet of Kenai and Skilak lakes. No other spawning areas have been identified. Spawning is believed to occur from January through April. Increasing numbers of anglers are fishing during this time of year in these spawning areas. Harvesting and/or repetitive catch-and-release of these spawning fish reduces the reproductive potential of the population and could depress adult returns below levels necessary to sustain the present inriver fishery. Given the limited biological information regarding late-run coho salmon, a conservative management strategy is appropriate.

LOWER PENINSULA DOLLY VARDEN RECREATIONAL FISHERY WITH EMPHASIS ON ANCHOR RIVER

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Numbers of Anchor River Dolly Varden have been declining since the early 1980s. It is assumed this trend is mirrored in the other lower Peninsula streams of Stariski and Deep creeks, and Ninilchik River. This trend has been quantified by weir counts on Anchor River and through harvest estimates reported in the Statewide Harvest Survey.

In 1991 the bag/possession limit on the four lower Peninsula streams was reduced from 5 to 2 fish. It was anticipated that this action would reduce total harvest and aid in the recovery of this declining resource. Harvest was reduced; annual returns have been variable.

Anchor River Dolly Varden are enumerated at a weir; there is no enumeration on the remaining three streams. A minimum weir count by a specific date, the absence of which would trigger restrictive inseason management action, has not been identified on this stream. Furthermore, the characteristic of the fishery (occurring primarily downstream from the weir) and the migratory behavior of Dolly Varden tend to reduce the effect of inseason time or area closures for resource conservation.

Inseason management of this fishery is therefore unlikely to occur unless there is early inseason detection of a precipitous decline in Anchor River weir counts. The nature of the fishery better suits it to management through Board adopted regulation than by inseason department emergency order. Recommendations for future management action are addressed in the section "Recommended Research & Management."

HISTORICAL PERSPECTIVE

The Anchor River (Figure 19) is the most heavily fished of the lower Kenai Peninsula streams, averaging 30,590 angler-days of participation for all species each year. Although the stream's reputation for excellent angling is generally attributed to its populations of chinook salmon, silver salmon and steelhead trout, Dolly Varden have historically contributed the most fish to the angler's creel.

Peak harvest of Dolly Varden in the Anchor River occurred in 1979 when 21,364 Dolly Varden were harvested. Harvests to present have exhibited a downward trend (Table 29). A decline from a harvest of 21,364 in 1979 to a harvest of 2,653 in 1987 led to the design of a research project to study this resource.

The primary means for determining the status of the population is a weir. In 1987 the structure was installed July 3 and removed September 10. It was located about 1.0 mile upstream from Cook Inlet. During this time period 19,062 Dolly Varden were enumerated of which 3,200 were tagged (16.8% of the return). The purpose of the tagging here and in other lower Peninsula streams included in the study area (Figure 19) was to determine migratory habits of this species. Other species counted through the weir were: 2,408 coho salmon; 2,020 pink salmon; 300 chinook salmon and 137 steelhead trout. It is assumed the majority of the Dolly Varden, coho salmon and pink salmon were enumerated. The majority of the chinook salmon entered the river prior to July 3 and a high percentage of the steelhead population is known to enter the stream after the weir was removed. Dolly Varden were captured by seine and tagged in Deep Creek and Ninilchik River in 1987.

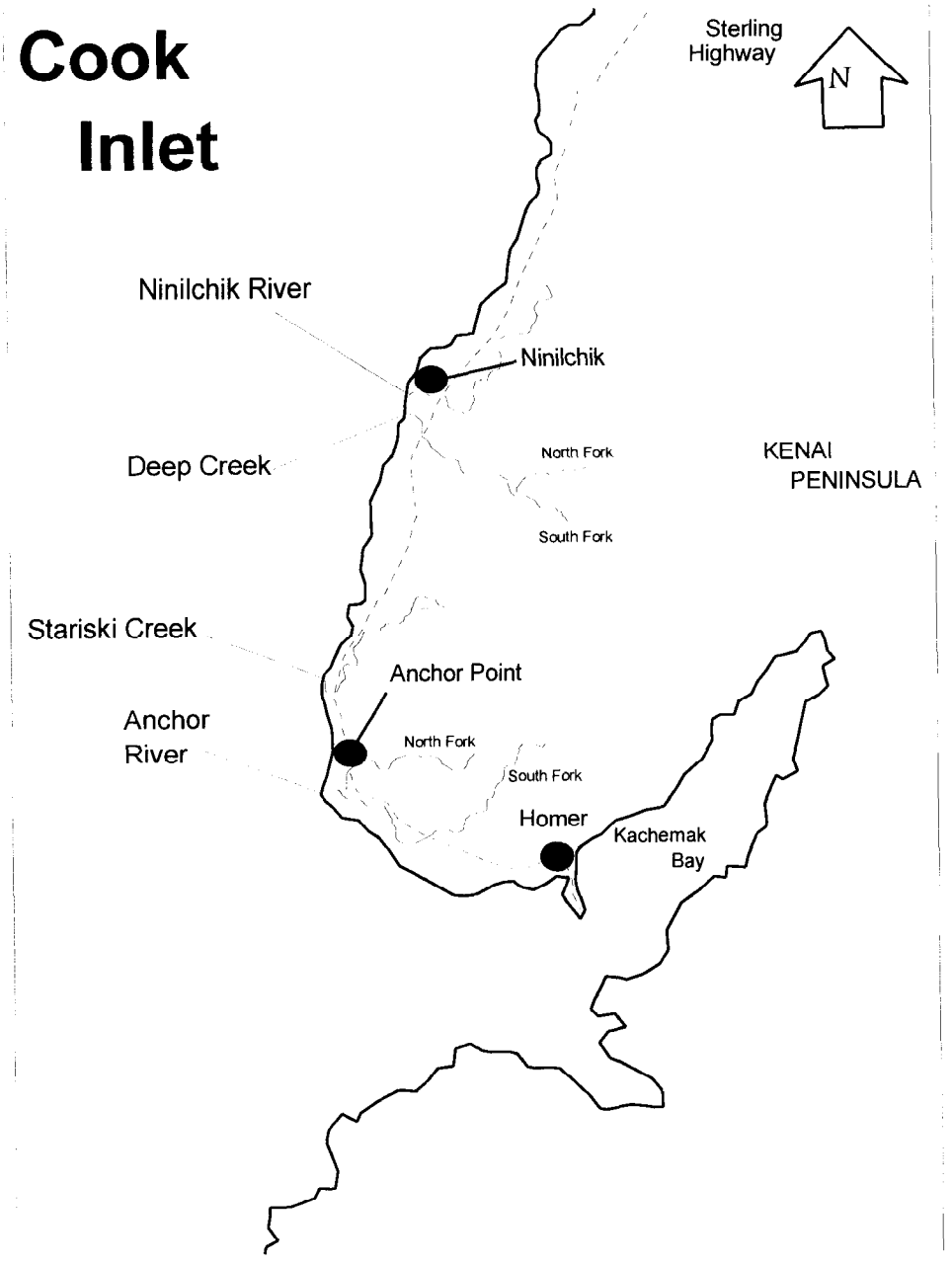

Figure 19.-The Anchor River Dolly Varden fishery area includes Anchor River, Deep Creek and Ninilchik River.

Table 29.-Estimated participation[a] (angler-days) and harvest of Dolly Varden (DV), steelhead trout (SH), and coho salmon (SS) on Anchor River, Stariski Creek, Deep Creek, and Ninilchik River, 1977-1993.

	Anchor River				Stariski Creek				Deep Creek				Ninilchik River			
	Angler	Harvest			Angler	Harvest			Angler	Harvest			Angler	Harvest		
Year	Days	DV	SH	SS	Days	DV	SH	SS	Days	DV	SH	SS	Days	DV	SH	SS
1977	31,515	9,222	1,072	1,339	1,442	461	124	133	11,399	1,330	269	306	11,350	424	60	122
1978	42,671	17,357	1,460 [b]	1,559	3,662	1,012	262	201	13,872	3,046	371	1,383	14,173	1,003	90	88
1979	44,220	21,364	610 [b]	2,870	1,965	2,027	118	275	12,560	2,027	145	362	18,282	2,390	127	200
1980	33,272	10,948	830 [b]	2,649	1,499	327	79	155	8,796	1,028	139	478	19,706	853	290	321
1981	34,257	15,271	570 [b]	2,949	1,080	875	86	410	10,127	1,382	140	464	14,184	875	302	432
1982	24,709	10,375	370 [b]	2,379	1,023	348	59	119	12,149	1,247	187	366	11,806	514	127	241
1983	28,881	17,277	430 [b]	1,395	877	283	42	251	13,505	1,112	126	545	9,458	199	126	210
1984	26,919	5,559	300 [b]	1,135	519	499	137	0	15,760	973	224	1,197	10,122	524	87	549
1985	31,715	7,716	180 [b]	2,239	1,422	0	50	25	19,802	850	75	2,301	10,213	87	50	697
1986	34,938	3,914	382	1,021	1,162	183	31	187	17,354	306	76	588	9,250	505	76	336
1987	39,045	2,653 [b]	181 [b]	2,230 [b]	1,612	199	62	127	16,734	72	31	1,050	13,329	507	92	924
1988	24,356	2,915 [b]	102 [b]	943 [b]	804	182	18	146	12,115	219	91	1,528	12,533	655	54	709
1989 [c]	19,145	1,140 [b]	764 [b]	1,863 [b]	1,533	0	0	396	13,414	333	200	2,254	9,977	39	485	397
1990 [c]	28,829	2,226 [bd]	1,572	2,782	935	167	104	169	23,667	706	833	1,111	8,323	115	146	368
1991 [c]	22,187	1,520 [b]	1,503	3,169	1,143	65	12	280	17,048	287	310	1,290	19,640	222	334	789
1992 [c]	24,028	2,532	2,514	2,267	523	8	70	97	15,226	401	629	737	27,816	131	660	785
1993 [c]	29,338	1,031	3,321	4,003	813	67	31	392	19,535	145	1,234	1,722	20,466	29	386	845
Mean	30,590	7,825	951	2,164	1,295	394	76	198	14,886	910	299	1,040	14,155	534	205	471

[a] Participation is for all species including rainbow trout, pink salmon and chinook salmon.

[b] Determined by creel survey. All other harvest and angler participation data are from the Statewide Harvest Survey.

[c] Beginning in 1989, steelhead/rainbow trout may not be retained or possessed. Estimates are fish caught and released.

[d] 1990 Dolly Varden season 1 July-7 August. Closed by E. O. after 7 August.

In 1988 the Anchor River weir was operational July 4. It was to remain in place until November 15 or until rendered inoperable by stream conditions. The scope of the project was therefore expanded to include enumeration of steelhead trout. Through October 13, 14,935 Dolly Varden were enumerated. Of this total, 3,003 were tagged. Other species counted through the weir were 245 chinook salmon, 777 pink salmon, 30 sockeye salmon, 858 steelhead trout and 2,778 coho salmon.

In 1988 tagging was again conducted at Ninilchik River. Capture method was by weir which was in place from July 11 through August 12. The weir captured 1,139 Dolly Varden of which 776 were tagged.

The bacterial fish disease, furunculosis, was observed in the Dolly Varden population in Anchor River in 1987-1988 and Ninilchik River in 1988. This disease occurs naturally. However, fish most affected were those subjected to stress (tagging, hook-and-release, and predatory wounds) during relatively warm water conditions. Stress due to tagging was minimized by reducing tagging goals from 25% to 10% in 1989 and altering the tagging methodology. Approximately 7% of the total Dolly Varden population observed at the Anchor River weir site was affected with this disease.

The Anchor River weir was again operational July 4, 1990; through August 6, 9,437 Dolly Varden had been enumerated. This was the lowest number of fish to be enumerated by this date since the weir became a research and management tool in 1987. Creel census data for July indicated a harvest of 1,904 Dolly Varden; angler effort was 7,362 hours. The Dolly Varden fishery on the four lower Peninsula streams of Anchor River, Deep Creek, Ninilchik River and Stariski Creek was therefore closed for the remainder of the season on August 8.

Anchor River Weir was removed on August 16. Through August 15, 10,427 Dolly Varden were enumerated. Counts through this date in 1987, 1988 and 1989 were 17,774, 14,516, and 10,692. The number of fish to pass the weir in 1990 therefore declined for the fourth consecutive year.

Total return, however, of Anchor River Dolly Varden increased in 1990. Total annual return in 1987 was estimated at 21,027; 1988, 17,091; 1989, 12,127 and in 1990, 12,653. Total return in 1990 increased by an estimated 526 fish compared to 1989. The number of fish to pass the weir in 1990 therefore declined as a direct result of an increased sport harvest, the majority of which occurred downstream from the weir. The closure on August 8 reduced the potential harvest by 25%-30% and was instrumental in ensuring that the number of Dolly Varden to reach the spawning grounds did not further decline.

Anchor River weir and creel survey were operational July 4, 1991. Daily passage rates were below 300 fish through July 21. Cumulative weir count on July 23 was 1,142, the lowest recorded since program inception in 1987. On July 25, passage rate accelerated to 1,601 fish, remaining at over 1,000 fish daily through August 1. The timing of the 1991 return was therefore the latest recorded.

The weir was removed on August 16 when daily passage rate had declined to less than 20 fish. Cumulative count was 18,002, the highest count recorded. Due to high water, the weir was not operational on August 2 and 3. As this was during the migratory peak, total Dolly Varden to migrate upstream may have exceeded 20,000.

The creel survey estimated a catch of 5,995; harvest, 1,520 (Table 29). Retention rate was 25.3%. Angler effort was estimated at 25,533 hours. Harvest approximated 1990 harvest of 1,904; effort significantly increased from 1990 estimates (7,362 hours) as in 1990 the fishery was closed by emergency order on August 8 for resource conservation.

This fishery was not creel surveyed in 1992. In 1992 Anchor River weir was operational July 4; it was removed October 1. Purpose of operating the weir after the Dolly Varden migration was to enumerate steelhead trout.

Through August 15, 8,896 Dolly Varden were enumerated at the weir; 10,051 were counted prior to removal of the structure. This is the lowest number of Dolly Varden enumerated since the inception of this program in 1987.

Harvest in 1992 was 2,532. An emergency order was not issued to reduce this harvest. This action was not deemed necessary because the bag limit reduction to 2 fish curtailed harvest, few anglers were targeting Dolly Varden because of low success rates (determined by staff observation) and those Dolly Varden in Anchor River migrated rapidly upstream which removed them from the most heavily fished area of the river in a relatively short period of time. Restricting the fishery by emergency order would have required total closure; the disruption to the fishery would not have justified the virtually insignificant increase in the spawning population.

BOARD OF FISH ACTIONS

The Board adopted a staff proposal in 1990 to reduce the Dolly Varden daily bag and possession limit from 5 to 2 fish. The purpose of the regulation was to reduce harvest because of the continuing decline in the numbers of Dolly Varden in lower Peninsula streams.

Proposals adopted by the Board at its 1990 meeting were not signed by the Lt. Governor until June 20, becoming effective July 21. To conform to Board intent and conserve a heretofore declining resource, an emergency order was issued, effective July 1, reducing the Dolly Varden bag and possession limit in this fishery to 2.

The Board also adopted a proposal liberalizing the period of time bait could be used in these streams. In 1990 bait was prohibited after August 15; beginning in 1991 bait could be used through August 31. This regulatory change had minimal effect on the Dolly Varden fishery as most of these fish are harvested in July and early August. It did increase angler efficiency in the coho salmon fishery in late August.

The Board did not alter regulation of this fishery at its November 1992 meeting. This fishery will next be reviewed by the Board at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

Anchor River weir was operational from July l through August 15, 1993. The weir count was 8,262 Dolly Varden. This is the lowest number enumerated since the research program was initiated in 1987. Harvest was estimated by Statewide Harvest Survey to be 1,031 Dolly Varden. This is the lowest harvest in the history of the fishery.

As in 1992, management action was not initiated inseason to conserve the Dolly Varden resource. By the time a low return was identified, the majority of the fish had migrated upstream which removed them from the most heavily fished area of the river. Restricting the fishery by

emergency order would have required total closure; the disruption to the fishery would not have justified the small increase in the spawning population. As in prior years, Dolly Varden were not enumerated in the three remaining lower Peninsula streams. It is assumed abundance in these streams mirrored abundance in Anchor River during the current season.

In 1994 the weir was again operational July 1 through August 15; 17,259 Dolly Varden were enumerated. This is one of the highest counts since the inception of the program. Estimates of harvest will be available from the Statewide Harvest Survey in fall 1995.

OUTLOOK

Returns of Anchor River Dolly Varden have fluctuated from approximately 8,000 to 20,000 fish since 1987. Future annual returns are expected to be within this range. Harvests have displayed a decline from a high of over 21,000 in 1979 to less than 1,000 in 1993. Harvest is expected to stabilize at 1,000 to 3,000 fish annually. The fishery has become gradually more restrictive with a reduction from a 10 fish bag/possession limit in the 1970s to a 2 fish bag/possession limit in the 1990s. No liberalization of this conservative bag limit is envisioned in the immediate future. For the reasons stated in the section "Inseason Management Approach" inseason management of this fishery will occur only if dramatic declines or increases in numbers of Dolly Varden are documented.

CURRENT ISSUES

The primary issue in this fishery is the variable annual returns of Dolly Varden to the Anchor River.

RECOMMENDED RESEARCH & MANAGEMENT

The weir on Anchor River should remain as part of the research program until such time as the population stabilizes or increases.

It is further recommended that research address overwintering areas for Dolly Varden in lower Cook Inlet. This research would focus on identifying the areas and determining if conditions in these areas (either natural or caused by human activity) are contributing to the decline of the lower Peninsula Dolly Varden resource.

KENAI RIVER RAINBOW TROUT FISHERY

FISHERY OBJECTIVE

Objectives for this fishery were developed from and are contained in the "Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy" (CIRTMP). This policy was adopted by the Board of Fisheries in 1986 for Cook Inlet waters, and was amended in 1988 to include the Copper River Basin.

The CIRTMP provides for two policies to achieve different objectives. Policy I is Conservative Yield Management which addresses the department's responsibility to manage the resource for sustained yield. The majority of trout populations in Cook Inlet are managed under this policy, including Skilak Lake and the Kenai River downstream from Skilak Lake.

Policy II provides a diversity of sport fishing opportunities for wild and hatchery rainbow/steelhead trout through establishment of special management areas by regulation. These

management areas may be designated as catch-and-release, trophy or high yield. In 1988 the upper Kenai River was selected by the Board for "Trophy Management" status.

In conformance with the "Trophy Management" designation, only trout 20 inches or larger could be retained, terminal tackle was restricted to single-hook artificial lures throughout the year. Bag and possession limit was 1 trout.

In the fall of 1990, the Board again reviewed this fishery. A public proposal was adopted increasing the minimum retention length in this special management area to 24 inches. At the department's request, the Trophy Trout Management Area in the Kenai River drainage was extended to include the waters of Skilak Lake within a one-half mile radius of the Kenai River inlet. In 1992 the Board again addressed and then increased the minimum retention length, raising it to 30 inches.

Fishery objectives for the upper Kenai River "Trophy Trout Area" are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To manage this area of the river as a "Trophy Trout Area" affording anglers the opportunity to fish for and harvest trout of not less than 30 inches.

Fishery objectives for the remainder of the river are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the trout population does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

This fishery is restrictively regulated; no conservation issue has been identified in the "Trophy Management Area" or that area downstream from Skilak Lake. Management of the fishery inseason is therefore effected by existing regulation.

HISTORICAL PERSPECTIVE

The Kenai River is the most heavily utilized river for freshwater sport fishing in Alaska. Although most of the anglers participate in the river's salmon fisheries, the Kenai River also supports a major rainbow trout fishery with catches ranging from 8,720 to 62,152 annually.

Increasing public concern for the rainbow trout resource and a paucity of biological and fishery data prompted the Alaska Board of Fisheries to adopt increasingly restrictive regulations, as outlined below:

1959-1964 Season: Areawide spring closure from April 1 to about May 26.

Daily bag limit: Combined trout/char/grayling/salmon under 16": 10/day, only 2 over 20 inches.

1965-1977 Season: Kenai River changes to no closed season.

1978	Daily bag limit: (Areawide) Combined trout/char/grayling/salmon under 16": 10/day, only 1 over 20 inches.
1979	Yearly bag limit: (Areawide) Harvest record required for rainbow/steelhead trout over 20 inches - 2/year.
1980-81	Yearly bag limit: (Areawide) Increased to 5 rainbow/steelhead trout over 20 inches.
	Gear restriction: (Kenai River) In flowing waters upstream from the Moose River to Kenai Lake only single-hook, artificial lures allowed from January 1 to May 31.
1982-83	Season: (Kenai River) Spring closure from January 1 to June 14 (excludes Skilak Lake).
	Daily bag limit: (Areawide) Changed to 5 rainbow trout with only 1 over 20 inches.
1984-86	Season: (Kenai River) Spring and fall closure from November 1 to June 14 (includes Skilak Lake).
	Daily bag limit: (Kenai River) Changed to 3/day, only 1 over 20 inches.
	Yearly bag limit: (Areawide) Rainbow/steelhead trout over 20 inches - Changed to 2/year.
	Gear restriction: (Kenai River) In addition to spring single-hook, artificial lure restriction, only artificial lures may be used between Skilak and Kenai lakes from January 1 to December 31.
1987-88	Season: (Kenai River) Spring and fall closure from November 1 through June 14 (includes Skilak Lake).
	Daily bag limit: (Kenai River) Reduced to 2/day; 1 daily over 20 inches.
	Yearly bag limit: (Areawide) Rainbow/steelhead trout over 20 inches - remained at 2/year.
	Gear restriction: (Kenai River) Artificial lures only upstream from Skilak to Kenai Lake. Single hook restriction repealed. No bait permitted in Skilak Lake and in the Kenai River downstream to Moose River from November 1 through May 31.
1989-1990	Area between Skilak and Kenai lakes designated a "Trophy Trout" area. Only trout 20 inches or larger could be retained. Susitna-West Cook Inlet seasonal limit remained at 2 trout over 20 inches. Terminal tackle in upper Kenai River limited to single-hook artificial lures.
1991	Trophy trout area extended to include half mile radius of Skilak Lake inlet. Minimum length of trophy trout increased to 24 inches.

1992 Length at which a trout in the Trophy Trout Area could be retained increased to 30 inches. The bag/possession limit for trout in Skilak Lake and the Kenai River downstream from Skilak Lake was reduced to 1 fish. The Trophy Trout Area was closed to all fishing from April 15 through June 10.

In 1986 the Alaska Department of Fish and Game, in conjunction with the School of Fisheries and Ocean Sciences of the University of Alaska, Juneau, initiated a study of Kenai River rainbow trout. The long-term goal of the study was to compile population and fishery databases for use in formulation of a drainage-wide management strategy for Kenai River rainbow trout.

The 1986 pilot study had two major components: (1) a creel survey, and (2) a tag and recapture program designed to estimate the trout population in study area 004 (Figure 20). The population in this 3.5 mile section of the river was estimated at 3,650 trout more than 6 inches in length. It was further estimated that harvest was minimal, about 2.4% of the population. Hook-and-release was a common angling practice as the creel census revealed that anglers retained a low percentage of the trout caught.

In 1987 the study was expanded to include two additional sections of the river, 002 and 003 (Figure 20). Using electrofishing techniques, a mark/recapture program was conducted to estimate rainbow trout populations in these areas. The population estimate of rainbow trout in 1987 in section 002 was 610; in section 003, 2,200; and in 004, 4,950. Exploitation rate, determined from angler returns of tags, ranged from 2.4% to 10.7% of the population with the lowest exploitation rate occurring in section 004, probably due to more restrictive regulations in this section.

There has been no further research directed toward Kenai River rainbow trout since completion of this study.

BOARD OF FISH ACTIONS

In 1992 the Board increased the minimum retention length to 30 inches in the Trophy Trout Management Area. This regulation was developed by amending a proposal which requested the designation of the area be changed to Catch-and-Release. The Board also adopted a proposal prohibiting all fishing in the Trophy Trout Area from April 15 through June 10. This closure also included that area of the Kenai River from the outlet of Skilak Lake downstream to the upper Killey River. This regulation was adopted to preclude the unlawful practice of catch-and-release fishing prior to the opening of the trout season on June 15.

The Board also closed Jean Lake and Hidden Lake creeks to all fishing from April 15 through June 14 and extended the prohibition on all fishing in lower Russian River downstream from the outlet of lower Russian Lake through June 10. Purpose of adopting these department sponsored proposals was to increase protection to rainbow trout during the spring spawning period.

The Board also adopted a public proposal to conserve the trout resource in the remainder of the river. The bag/possession limit from Cook Inlet upstream to and including Skilak Lake was reduced to 1 trout daily of any size. The seasonal limit of 2 trout over 20 inches continues to apply. This proposal was in response to the public's observation that both harvest and participation in the trout fishery were increasing, especially when the river's salmon fisheries were restricted for resource conservation. The department supported this conservative management approach even though a resource conservation issue had not been formally identified.

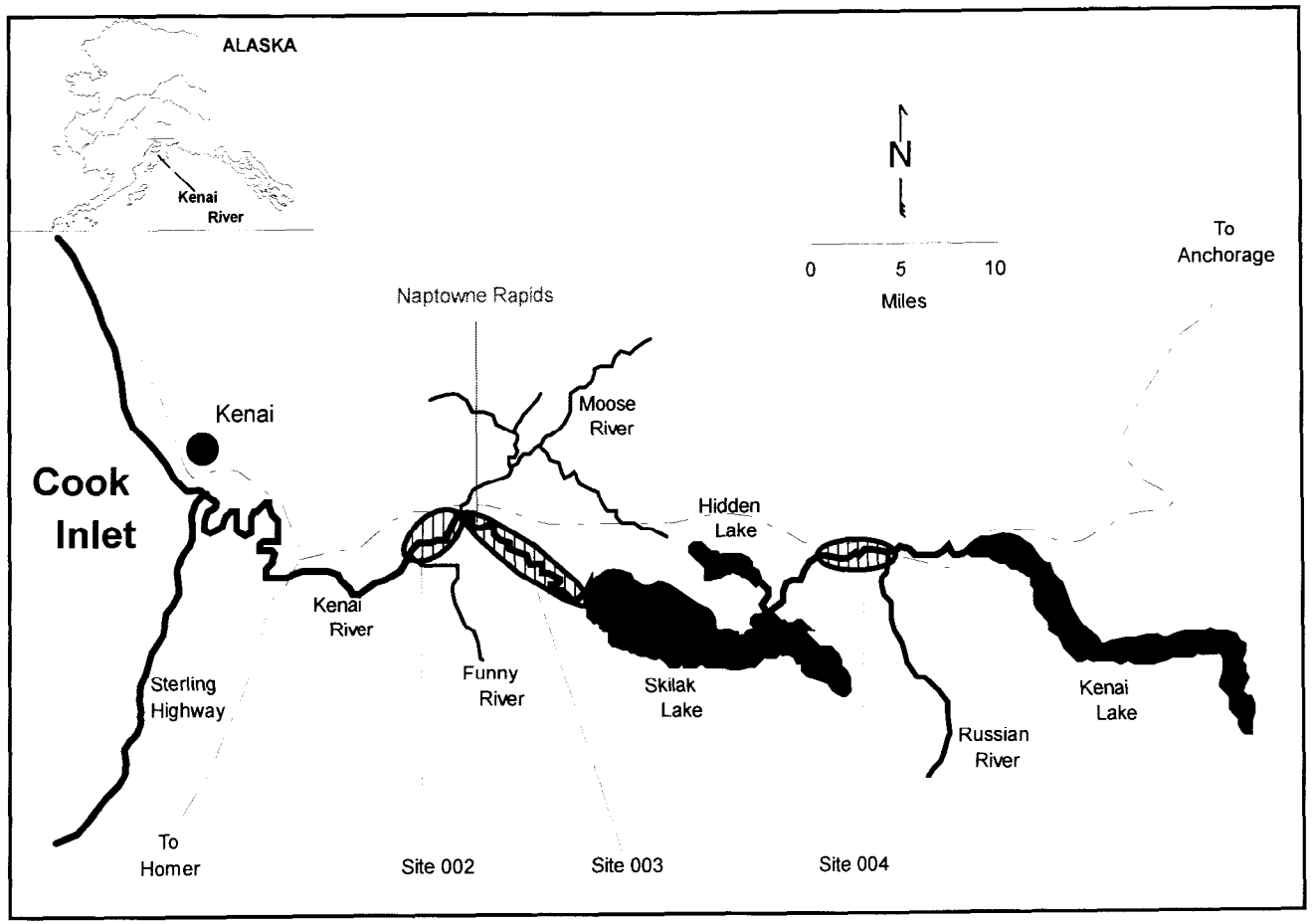

Figure 20.-Schematic diagram of the Kenai River drainage and rainbow trout study sites. Research was conducted in 1986 in site 004, expanding to include sites 002 and 003 in 1987.

RECENT FISHERY PERFORMANCE

Catch and harvest of rainbow trout in this fishery is determined by Statewide Harvest Survey. Most recent data are from the 1993 fishery. Total catch for all river sections was a record 62,152; harvest 2,574. Retention rate for all river sections averaged 4.1%. This low retention rate indicates anglers are continuing to voluntarily adopt a catch-and-release philosophy in this fishery.

Catch in the "Trophy Trout Area" of the upper Kenai River was a record 37,775; harvest 192 and retention rate, 0.5%. Low harvest and retention rate are attributed to the increased minimum size at retention from 24 to 30 inches in this area of the river beginning in 1993. Harvest, catch and retention rate for all river sections are summarized in Table 30.

Participation in the Kenai River rainbow trout fishery can not be quantified because the Statewide Harvest Survey estimates participation by area fished (in this case the entire Kenai River) and not by fishery. Staff observation, information provided by knowledgeable anglers and observation by other agency staff (U.S. Forest Service and Fish and Wildlife Service) all subjectively conclude increased participation in the fishery. The most notable increase in participation was in the "Trophy Trout Area" followed by the upstream area of the river which is that area downstream from Skilak Lake to Naptowne Rapids.

OUTLOOK

The "Trophy Trout Area" is restrictively regulated. Annual harvests are minimal in this area and resource conservation is not an issue. The area has a reputation for providing opportunity to catch-and-release large numbers of trout with the possibility of retaining a trophy-sized fish. The fishery's reputation will undoubtedly attract additional participants. Increasing participation is expected to moderately increase the harvest of fish 30 inches in length or larger, and significantly increase the numbers of smaller trout caught and released.

No conservation issue has been identified for the trout resource of Skilak Lake or the river downstream from this lake. The bag limit reduction to 1 trout (effective in 1993) in this area should ensure the resource continues to be effectively managed for sustained yield. Participation in this fishery is expected to increase due to a general increased interest in Peninsula trout. Catch will increase proportionate to increased participation. Harvest in the immediate future is expected to stabilize or decline because of the conservative bag/possession limit.

CURRENT ISSUES

Issues prior to 1992 Board action were the illegal spring catch-and-release fishery in the Trophy Trout Management Area, increasing harvest and handling of trout in the Trophy Trout Management Area, and the unknown status of the rainbow trout population in the remainder of the Kenai River. These issues were addressed by the Board.

Observation indicates some rainbow trout of Kenai River origin overwinter in Kenai Lake. In spring, these fish concentrate at the outlet of Kenai Lake upstream from the Sterling Highway Bridge in Cooper Landing prior to migrating downstream into the river. Recently, an increasing number of anglers have been harvesting trout in this area in early spring. An emergency order was therefore issued in spring 1994 closing the area within a half mile upstream from the bridge to all fishing from April 15 through June 10. This emergency order will be reissued in spring

Table 30.-Kenai River rainbow trout, number caught vs. number retained by river section as determined by Statewide Harvest Survey, 1984-1993.

	Downstream Section			Midstream Section			Upstream Section			Skilak Lake to Kenai Lake			Kenai River Total		
Year	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained
1984	3,460	710	20.5	2,910	1,250	43.0	5,110	580	11.4	4,200	930	22.1	15,680	3,470	22.1
1985	3,400	880	25.9	2,650	850	32.1	5,410	1,500	27.7	3,520	710	20.2	14,980	3,940	26.3
1986	2,570	620	24.1	2,380	170	7.1	1,750	900	51.4	2,020	730	36.1	8,720	2,420	27.8
1987	2,220	520	23.4	3,450	670	19.4	6,430	630	9.8	3,870	360	9.3	15,970	2,180	13.7
1988	2,780	290	10.4	1,560	220	14.1	5,880	1,060	18.0	7,580	560	7.4	17,800	2,130	12.0
1989	2,020	480	23.8	2,230	350	15.7	6,470	830	12.8	6,870	250	3.6	17,590	1,910	10.9
1990	2,620	510	19.5	3,570	940	26.3	5,370	940	17.5	12,000	1,150	9.6	23,560	3,540	15.0
1991	3,672	516	14.1	3,844	1,123	29.2	7,930	940	11.9	18,108	740	4.1	33,554	3,319	9.9
1992	4,448	427	9.6	3,879	411	10.6	15,127	736	4.9	28,702	403	1.4	52,156	1,977	3.8
Mean	3,020	550	19.0	2,940	660	21.9	6,610	900	18.4	9,650	650	12.7	22,220	2,770	15.7
1993	6,190	1,149	18.6	5,556	580	10.4	12,651	653	5.2	37,775	192	0.5	62,152	2,574	4.1

1995 and a department proposal requesting the Board of Fisheries close this area by regulation will be considered in January 1996.

Regulations in the Trophy Trout Area have become increasingly restrictive. Harvest is declining and catch is at record levels. There is mortality associated with catch-and-release fishing. As the number of fish caught increases so do the numbers of fish which perish as a result of this angling practice. Assuming a 5% constant mortality for caught-and-released trout, mortality in 1986 was 831; in 1990, 1,750 and in 1993, 2,080. This increased mortality is not believed to be a conservation issue, however, managers should be aware of this increase in formulating future management strategies for the Trophy Trout Area.

Participation in the upper Kenai River Trophy Trout fishery is not known. It is desirable to provide these data to the Board of Fisheries to assist them in their deliberations regarding changes in regulation of this fishery. It was assumed approximate participation estimates could be obtained by subtracting participation estimates from the sockeye salmon fishery at the confluence of the Kenai and Russian rivers from the total participation in the upper Kenai River as determined from the Statewide Harvest Survey. However, this method provided a negative estimate in most years for participation in the trout fishery. Either the estimated participation at the confluence of the Kenai/Russian River was erroneously high or the estimate of total participation in the upper Kenai River from the Harvest Survey is too low. This lack of information regarding participation in the Trophy Trout Fishery is an issue in that the participation trend in the fishery cannot be ascertained nor can the number of anglers affected by regulatory changes in the area be conveyed to the Board of Fisheries.

The most recent biological data regarding the trout population in the Trophy Trout Area were obtained in 1987. Since that study, regulation of the fishery has changed, harvest has declined, catch has increased, trout mortality has increased and participation has also presumably increased. Based on reports from knowledgeable anglers and staff observation, there is no conservation issue associated with the fishery. However, this assumption cannot be verified by application of 6-year old data. A lack of current biological data is therefore an issue in the management of this expanding fishery.

RECOMMENDED RESEARCH & MANAGEMENT

Management will continue to engage in public informational and educational activities to apprise the public of the fisheries status and to promote lawful and ethical fishing practices.

It is recommended that a research program again be directed toward trout in the upper Kenai River. The program objective would be to collect relevant biological data to characterize the trout population with emphasis on determining the current population level and the exploitation rate that population can sustain. Consideration should also be given to conducting an onsite creel survey to determine participation in this unique trophy trout fishery.

LOWER PENINSULA STEELHEAD TROUT RECREATIONAL FISHERY

FISHERY OBJECTIVE

Wild steelhead trout on the Kenai Peninsula are limited to the Anchor River, Stariski Creek, Ninilchik River and Deep Creek. Steelhead abundance in these streams declined through the

1980s. In 1989 the Kenai Peninsula Steelhead Planning Team was convened and charged with recommending management objectives for the resource and the fishery it supports. These objectives are:

Objective 1: To manage the resource so that it increases to former levels of abundance.

Objective 2: In that steelhead trout stocks in lower Kenai Peninsula streams are at relatively low levels of abundance, it will be the objective of management to conservatively regulate the fishery. Conservative regulation at this time will be by permitting a catch-and-release fishery only.

Objective 3: When a harvestable surplus of steelhead trout is identified, the resource will be managed to permit a limited harvest.

Objective 4: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

INSEASON MANAGEMENT APPROACH

This fishery is conservatively regulated as a catch-and-release only fishery. This conservative regulation, in all but extreme circumstances, precludes the necessity for inseason management. Management of the fishery inseason is therefore affected by existing regulations.

HISTORICAL PERSPECTIVE

The southern Kenai Peninsula steelhead trout sport fishery occurs on Anchor River, Deep Creek, Stariski Creek and Ninilchik River (Figure 21). These roadside streams are transected by the Sterling Highway in their lower reaches. The southern Peninsula streams support only a fall run of steelhead trout. The fall run begins to enter the river in mid-August with the peak occurring in late September. Available data suggest the run is essentially over by mid-November. The Anchor River receives the most sport fishing effort and has supported an average harvest (1978-1988) of 500 fish. Deep Creek is the next most popular stream with an average (1977-1988) harvest of 160, followed by the Ninilchik River (average harvest 120) and Stariski Creek (average harvest 90) (Table 31).

Regulations governing this fishery have become increasingly restrictive. In 1977 the bag and possession limit was 2 steelhead trout daily. The season was closed from May 1 to June 30. By 1984 the bag and possession limit had been reduced to 1 fish daily, a seasonal limit of 2 fish was imposed and a harvest record required. The season has gradually been reduced and beginning in 1984 fishing was permitted only from July 1 through December 31. From 1984 through 1988 bait was prohibited after September 15. On October 7, 1988 the Anchor River steelhead trout fishery was closed by emergency order for resource conservation.

In 1989 retention of steelhead trout in lower Peninsula streams was prohibited; only catch-and-release fishing was permitted. Bait was prohibited in the fishery after August 15 to reduce efficiency and injury to fish that had been caught and released.

During the years that retention of steelhead trout was permitted (prior to 1989), anglers gradually adopted a voluntary catch-and-release philosophy. In 1978, creel census data revealed 65% of the fish landed were retained. Retention continued to be voluntarily reduced in subsequent years.

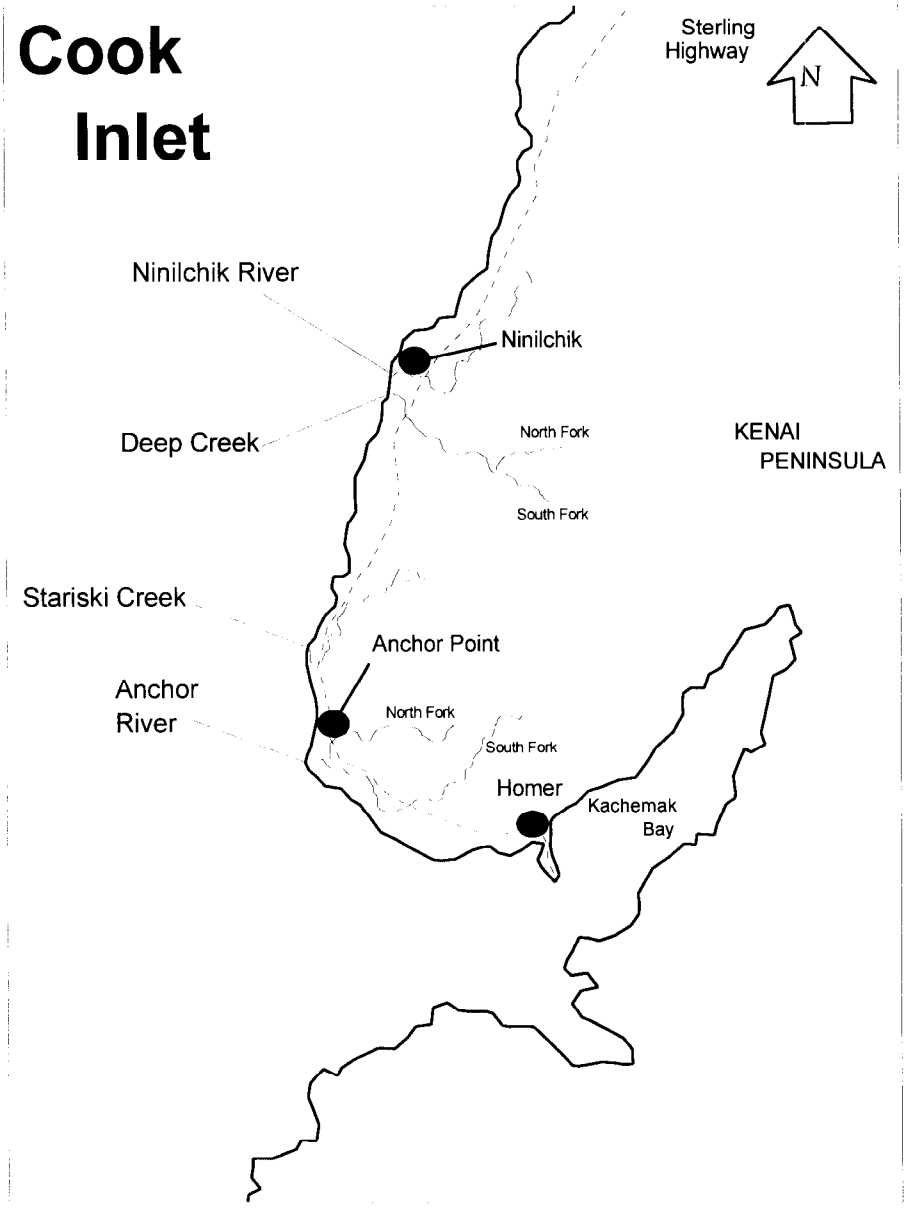

Figure 21.-Lower Kenai Peninsula steelhead trout streams.

Table 31.-Recreational harvest estimates of steelhead trout in four lower Kenai Peninsula streams, 1977-1993.

	Creel Survey	Statewide Harvest Study				
Year	Anchor River	Anchor River	Stariski Creek	Ninilchik River	Deep Creek	Total Harvest
1977		1,070	120	60	270	1,520
1978	1,460	1,750	260	90	370	2,470
1979	610	780	120	130	150	1,180
1980	830	840	80	290	140	1,350
1981	570	780	90	300	140	1,310
1982	370	550	60	130	190	930
1983	430	1,100	40	130	130	1,400
1984	300	760	140	90	220	1,210
1985	180	420	50	50	80	600
1986		380	30	80	80	570
1987	181	462	60	90	30	642
1988	102	164	20	50	90	324
1989 [a]	764	1,971	0	490	200	2,661
1990 [a]	[b]	1,572	100	150	830	2,652
1991 [a]	[b]	1,503	12	334	310	2,159
1992 [a]	[b]	2,514	70	660	629	3,873
Mean	530	1,040	80	200	240	1,560
1993 [a]	[b]	3,321	31	386	1,234	4,972

[a] In 1989 and succeeding years this fishery was restricted to catch-and-release only. Data reflects fish caught and released. There was no legal harvest.

[b] No creel survey conducted.

In 1984 it was estimated that 38.4% of rainbow/steelhead trout were retained; in 1986, 40%; 1987, 23% and in 1988 prior to the emergency closure, the retention rate was 29%. Although the department does not have data on the retention rate in the other streams, it is assumed the retention rate on these streams mirrored the trend on Anchor River.

Southern Peninsula steelhead trout have been investigated by resource management agencies since the 1950s (Table 32). Research has focused on Anchor River since this stream has been most popular with the recreational angler and was assumed to support the largest trout population.

The United States Fish and Wildlife Service (USFWS) operated a weir on Anchor River in 1954 and 1957. The weir was located 1.25 miles upstream from Cook Inlet in 1954; in the north and south forks in 1957. Weir counts for these years are incomplete because high water rendered the weir inoperable during certain times. Also, it is now known that part of the population overwinters below the 1957 weir sites. The USFWS also conducted a creel census of the steelhead trout fishery in 1954 and 1957.

In 1960 the Sport Fish Division of the Alaska Department of Fish and Game conducted its first creel census of the steelhead trout fishery on Anchor River. This census program was again conducted in 1968, 1978-1985, and 1987-1989. Population estimates of steelhead trout were made through tag-and-recapture programs in 1978, 1980, 1983 and 1984. In 1988 and 1989 the population was estimated by weir, located approximately 1 mile from the mouth of Anchor River.

Harvest estimates for Alaska's fisheries have been generated by a Statewide Harvest Survey since 1977. On the southern Kenai Peninsula, estimates from this study have been used to determine annual steelhead harvests from 1977-1988 and catches from 1989 to present on Stariski Creek, Ninilchik River and Deep Creek. At Anchor River, onsite creel censuses provide the most accurate data. Creel census data have therefore been used for all years except 1977, 1986, and 1990-1994 when no census was conducted. In these years, data from the Statewide Harvest Survey provided the harvest or catch estimate.

In 1987 the Sport Fish Division began a formal study of Anchor River Dolly Varden. The study was initiated in response to dramatic declines in the annual return of this species to Anchor River. A weir was constructed and installed in conjunction with this research investigation. Primary purpose of the weir was to enumerate and capture Dolly Varden. Enumeration of other species, including steelhead, during the period the weir was operational was a secondary benefit derived from this program.

The weir was installed July 4, 1987. It was removed September 11. Because the steelhead migration begins in late August and continues through October, a population estimate was not obtained that year. In 1988 the weir was operational July 5 and was removed October 14. High water during the fall rendered the structure inoperable for several days. By extrapolating for the period the weir was inoperable and adding this number to the harvest determined by creel survey, the 1988 Anchor River population was estimated to be about 1,200 steelhead. Because prior data indicated that the population had declined from an estimated 4,100 in 1978, and because the creel survey indicated that more than 50% (Table 33) of the Anchor River steelhead trout were handled by sport fishermen, the steelhead fishery was closed for stock conservation October 7.

Table 32.-Historical summary of the Anchor River rainbow/steelhead trout database, 1954-1994.

Year	Period Covered in Census	Effort (Man-Days)	Steelhead Estimates Harvest	Steelhead Estimates Total Run	Source of Data
1954	5/29-10/23	3,000	247	511	Allin (1954)
1957	5/01-10/15	5,800	50	600	Allin (1957)
1960	5/07-10/02	5,300	400		Dunn (1961)
1968	7/06-10/19	3,045	102		McHenry (1969)
1977	Entire Year	31,515	1,027		Mills (1979)
1978	Entire Year	42,761	1,754		Mills (1980)
				4,132	Wallis & Hammarstrom (1979)
1979	Entire Year	44,220	782		Mills (1981a)
1980	Entire Year	33,272	841		Mills (1981b);
				2,388	Wallis & Balland (1982)
1981	Entire Year	34,257	777		Mills (1982)
1982	Entire Year	24,709	551		Mills (1983); Wallis & Balland (1984)
1983	Entire Year	28,881	1,101		Mills (1984)
	8/14-10/30	23,823	433	1,762	Wallis & Hammarstrom (1984)
1984	Entire Season		761		Mills (1985)
	May-June		50		Est. Balland (1985)
	8/13-11/4	7,610	305		Balland (1985)
	Total		355	1,361	Balland (1985)
1985	Entire Season		420		Mills (1986)
1986	Entire Season		380		Mills (1987)
1987	Entire Season		462		Mills (1988)
	7/1-10/31	29,924	181		Larson & Balland (1988)
1988	Entire Season	24,356	164		Mills (1989)
	7/1-11/13	20,234	102		Larson & Balland (1988)
	7/3-10/5			878	Weir Count
	7/1-11/13			1,200	Est. Larson & Balland (1988)
1989	Entire Season	19,145			Mills (1990)
	7/1-11/6			769	Weir Count
	7/1-11/15			1,200	Est. Larson (1989)
1992	7/1-10/7			1,500	Weir Count
1993	No creel survey conducted; population estimate not obtained.				
1994	No creel survey conducted; population estimate not obtained.				

Table 33.-Rainbow/steelhead trout fisheries data, Anchor River, 1987-1993. [a]

Year	Percent of Return Handled	Harvest	Catch	Harvest/ Hour	Catch/ Hour	Estimated Population
1987	71	181	924	0.0176	0.0391	1,300
1988	75	102	904	0.0052	0.0462	1,200
1989	64	[b]	764		0.0370	1,200
1990 [c]		[b]	1,572			
1991 [c]		[b]	1,503			
1992		[b]	2,514			1,500
1993 [c]		[b]	3,321			

[a] Data from creel survey, 1987-1989; from Statewide Harvest Survey, 1990 to present.

[b] No retention in 1989 and succeeding years.

[c] No population estimate made.

In 1989 the population was again estimated by weir to approximate 1,200; this species was not enumerated by weir in 1990 or 1991 and no population estimate was made. In 1992 the weir was operational July 4 through October 1; 1,261 steelhead were enumerated.

In 1981 a program was initiated to determine the feasibility of enhancing the steelhead trout returns to the Anchor River. Following the first successful egg take in 1981, 19 males and 25 females were taken in 1982. In 1983, 1984 and 1985 the number was reduced to 10 of each sex. In 1986 eggs were taken from 10 males and 13 females. No egg takes occurred after 1986. Incubation and rearing to smolt occurred in Southcentral Alaska's Division of Fisheries Rehabilitation and Enhancement (FRED) hatcheries. No fish were returned to the Anchor River from the hatchery and the program has been discontinued.

BOARD OF FISH ACTIONS

In 1990 the Board adopted the proposal submitted by the Steelhead Planning Team. In 1991, bait was permitted in the four southern Peninsula streams through August 31. The Board also adopted a proposal prohibiting the retention of rainbow/steelhead trout in Cook Inlet north of a line from Cape Douglas to Point Adam. This proposal was adopted for regulatory consistency and for resource conservation in that rainbow/steelhead trout may not be retained in the fresh waters of the southern Peninsula.

No proposals were submitted pertaining to this fishery in 1992. The Board will next consider regulatory changes to this fishery at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

In 1992 Anchor River weir was operational July 4 through October l. The first steelhead trout was enumerated July 30; total weir count was 1,261. This count approximates estimates for 1988 and 1989 but is well below the 1978 estimate of 4,100.

Harvest and catch estimates for the four lower Peninsula streams are summarized in Table 31. Catch in Anchor River in 1992 was 2,514 steelhead trout; in Stariski Creek, 70; in Ninilchik River, 660; and in Deep Creek, 629. Anchor River and Ninilchik River catches are the highest since mandatory catch-and-release fishing began in 1989; Stariski Creek and Deep Creek catches are above average. Staff observation of the fishery suggests increased catch is proportionate to both increased numbers of fish present in all streams and to increased angler participation.

The 1993 fishery occurred in a normal manner. The Dolly Varden weir was removed August 15; no enumeration of steelhead trout occurred. No creel survey was conducted in 1993; and catch estimates were again obtained from the Statewide Harvest Survey. This survey indicated a catch of 3,321 steelhead trout in Anchor River; 386 in Ninilchik River; 1,234 in Deep Creek, and 31 in Stariski Creek. Catches in Anchor River and Deep Creek are record highs for this fishery.

OUTLOOK

With allowances for annual variation, limited weir data suggest that the steelhead trout population in the lower Peninsula streams is stable or moderately increasing. In that no significant change in population abundance is expected in the immediate future, management of the fishery is also expected to remain unchanged, i.e. catch-and-release fishing will remain mandatory.

There is increasing interest in trout fishing on the Kenai Peninsula. Participation in this fishery is therefore expected to increase moderately over the next few years. Increased participation in the fishery also reflects an increasing acceptance of catch-and-release trout fishing on the Kenai Peninsula.

CURRENT ISSUES

Available data indicate that the steelhead trout population in lower Peninsula streams has declined from the high level of the late 1970s. At this time reasons for the decline are not definitely known. Possible reasons are: (1) an overharvest of this species in the late 1970s; (2) either short or long-term freshwater environmental changes, possibly associated with flooding of lower Peninsula streams; (3) changes in the marine environment; and (4) a combination of the above.

The stocks, however, appear to have now stabilized and never declined to a point where enhancement through the addition of hatchery-reared smolts was necessary to retain the biological integrity or reproductive potential of the population. Most steelhead trout are 6-year fish. It therefore will be 1995 before the effects of the current conservative wild stock management (catch-and-release) can be evaluated.

Users of this sport fishing resource had philosophical differences regarding appropriate remedial action to address declining steelhead trout stocks. Some individuals and organized groups favored the present conservative wild stock management with no stocking. In general, catch-and-release fishing is not viewed disfavorably by this group. At the opposite end of the philosophical spectrum were individuals and groups who favored increasing the numbers of fish available to the recreational angler through stocking. The controversy regarding enhancement as opposed to wild stock management focused on the most popular stream, Anchor River.

There was a need to develop a management plan for the steelhead trout resources of the southern Peninsula. Norval Netsch, former Director of the Sport Fish Division, selected eight groups concerned with the management of this resource to aid in the planning process. Each organization selected one representative to serve on a planning team. The objective of this Steelhead Trout Planning Team was to review available information and recommend management options and objectives for the department's consideration and action. The Planning Team held five meetings in the winter of 1989-1990.

The Planning Team recommended the Anchor River and the three other lower Kenai Peninsula streams continue to be managed to maintain a wild steelhead fishery. To achieve this, the fishery should continue to be managed as a catch-and-release fishery in the immediate future. Stocking should not occur unless stocks decline to a point where natural recovery is unlikely. For the Anchor River, the Team recommended stocking be initiated only if the actual counts of steelhead through the weir declined to less than 500 fish or the total estimated escapement is less than 700. The goal of a stocking program, if initiated, would be to produce a return of 2,000-3,000 steelhead to this drainage. The Planning Team further recommended that when the estimated Anchor River population reaches 2,500, either through stocking or an increase in wild stocks, that a harvest be allowed.

The Planning Team also considered the use of bait during the coho salmon and steelhead trout fishery. It was noted that prohibiting bait during the coho salmon fishery reduced the efficiency of anglers targeting this species. Data presented by the department to the Team indicated about

64.0% of the coho salmon had passed Anchor River weir by September 1, and 96.3% by September 15. On average, only 21.4% of the steelhead pass the weir by September 1 and 49.7% by September 15.

Regulation of the fishery prior to 1989 permitted bait to be used in these lower streams through September 15. Regulation in 1989 and 1990 permitted bait through August 14. It was the Planning Team's recommendation, following an extensive review of available data, that the steelhead trout resource could still be afforded the required protection and angler satisfaction/efficiency increased in the coho salmon fishery if bait were permitted in the lower streams through August 31. If bait were permitted through this date, only 21.4% of the steelhead run would be subject to capture by bait. Anglers would be afforded the opportunity to fish the peak of the coho salmon run (August 15-31) with bait. The Planning Team submitted a proposal in 1990 for the Board's consideration which permits the use of bait through August 31. This proposal was adopted as regulation and was in effect during 1991 and subsequent seasons.

The department concurred with the recommendations of the Kenai Peninsula Steelhead Planning Team and adoption of their proposal by the Board. The recommendations of this Team were in keeping with the Sport Fish Division's twofold mission of managing wild stocks on a sustained yield basis while maintaining a diversity of recreational opportunity.

It is the subjective judgment of the management staff that increasing numbers of participants in this fishery favor continued conservative wild stock management, i.e. continued catch-and-release with no stocking program. Although stocking remains an option, it is becoming less of an issue in the management of this fishery especially in view of recent moderate increases in abundance.

RECOMMENDED RESEARCH & MANAGEMENT

There are currently no ongoing research projects associated with lower Peninsula steelhead trout. The Anchor River weir will again enumerate this species in 1995 to determine the inriver return. Management activities will continue to be of an informational and educational nature to apprise the public of the fishery and foster legal and ethical fishing practices. Emphasis will be placed on informing anglers of the least injurious method to "play" and release steelhead trout.

A kiosk, partially funded with Sport Fish Division funds as part of the "Partnership Program," is in the final phase of construction on Anchor River. The kiosk provides information to the public relevant to all fisheries resources of the Anchor River.

No additional research or management activities are recommended at this time.

KASILOF RIVER/CROOKED CREEK STEELHEAD RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To produce through supplemental hatchery production an additional 1,000 returning steelhead trout of which about 900 would be available in Kasilof River and Crooked Creek for harvest. (This objective was rescinded in spring 1993).

Objective 2: To provide 2,000 angler-days of additional fishing opportunity at the Kasilof River and Crooked Creek for this species.

Evaluation of these objectives are in part subjective since no creel survey is conducted; the Statewide Harvest Survey estimates participation by water body, not by species or fishery. Observation of the fishery suggests that although participation has increased in recent years, it is less than 2,000 days annually. Total return in 1992 and 1993 were the first years the production objective was achieved.

Stocked steelhead trout originating in Crooked Creek strayed into the Kenai River. Because of concern that these hatchery fish would negatively impact wild stock Kenai River trout and salmon production, the Crooked Creek steelhead stocking program was terminated in 1993.

Steelhead trout smolt were last stocked in spring 1992. These fish will return as adults in fall 1994, and be available for harvest in fall 1994 and spring 1995. Steelhead trout harvested in this fishery after that date will be the progeny of natural production. At that time the objectives for this fishery should be amended to reflect the absence of hatchery fish.

INSEASON MANAGEMENT APPROACH

This fishery is supported by hatchery fish and those fish produced from natural spawning which occurs upstream from Crooked Creek Hatchery. Sufficient steelhead trout have returned annually to provide for hatchery egg-take requirements and inseason management of the fishery has not occurred. Management of the fishery inseason is therefore effected by existing regulations.

HISTORICAL PERSPECTIVE

The mainstem Kasilof River is not known to support steelhead trout. Crooked Creek, tributary to the Kasilof River, historically supported a small, wild run (Figure 22). Too few fish were present to support a viable fishery; total wild returns to this stream were estimated at not more than several hundred fish. To provide additional recreational opportunity, a steelhead stocking program was initiated here in the early 1980s.

The first return of stocked steelhead to Crooked Creek occurred in late fall of 1986. Observation of the fishery indicated these fish did not immediately enter Crooked Creek, but overwintered in the Kasilof River. Observation further indicated a very small fall harvest with additional fish being harvested in early spring prior to their spawning migration into Crooked Creek. A total of 142 fish returned to the hatchery in spring of 1987, 228 in 1988, 420 in 1989, and 236 in 1990. Harvest as determined by Statewide Harvest Survey was 92 in 1986, 185 in 1987, 36 in 1988, 48 in 1989, and 145 in 1990. Estimated harvest in 1991 was 12; catch 179. Although harvest is relatively small, the fishery is important to recreational anglers in that: (1) it is the only stream where the retention of steelhead is permitted on the Peninsula, and (2) it is one of the few areas anglers can fish for trout in a stream in early spring.

The Statewide Harvest Survey estimated the 1992 harvest at 520; catch, 1,746. These data are the sum of the spring and fall fisheries. This is the highest harvest and catch reported in the history of the fishery.

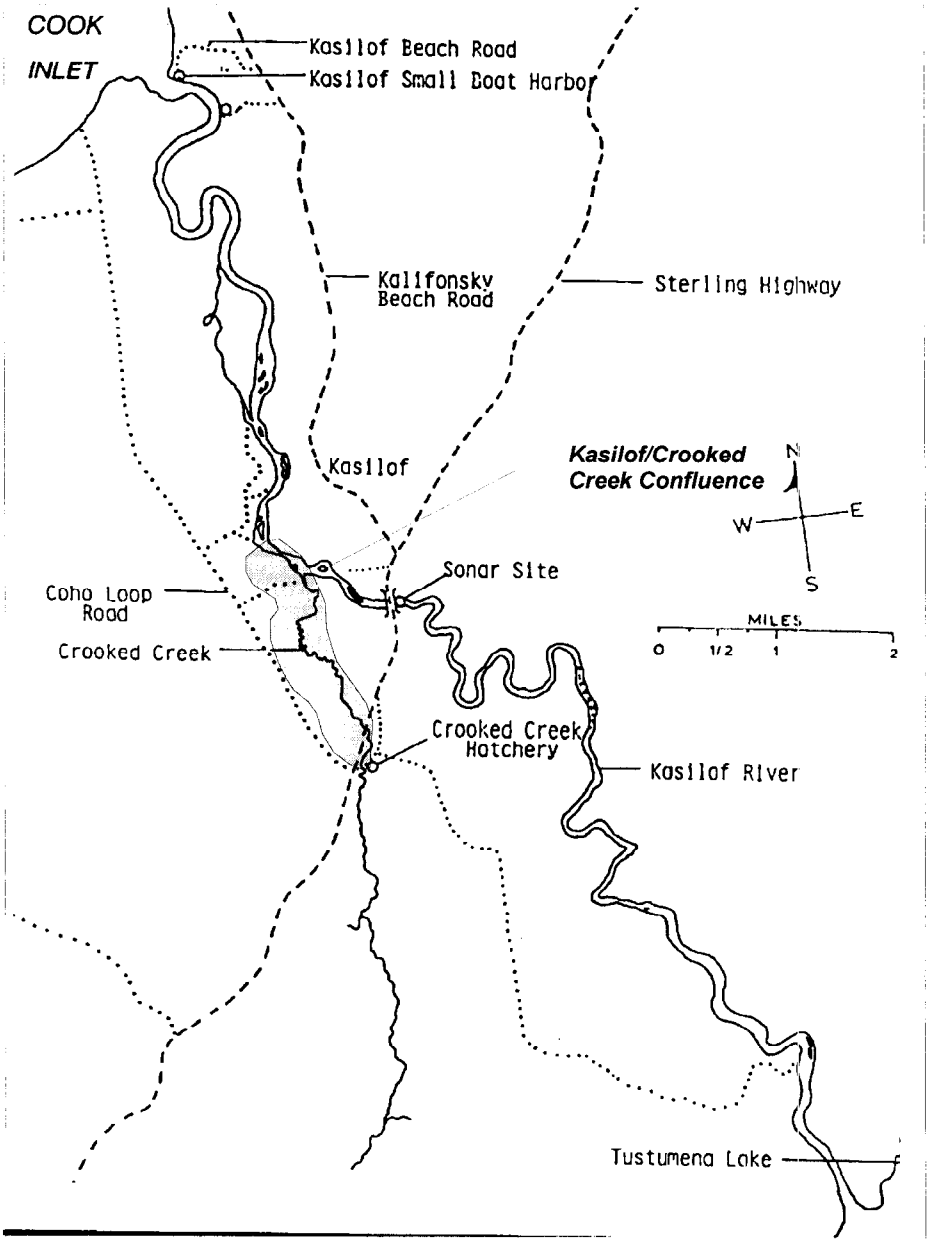

Figure 22.-Kasilof River/Crooked Creek steelhead trout fishery.

In the spring of 1992, 805 steelhead trout returned to the hatchery; 787 were passed upstream to spawn naturally. Twelve females and six males were used as brood stock. The majority of the return to the hatchery was the smaller 1-ocean fish. This is the highest return to the hatchery since the first adult return to the facility in 1987. This return of 1-ocean fish correctly forecast a record return in 1993 (see "Recent Fishery Performance").

BOARD OF FISH ACTIONS

In 1990 the Board adopted a proposal liberalizing this fishery in Crooked Creek. Beginning in 1991, Crooked Creek from its confluence with the Kasilof River upstream to the Johnson Lake Road opened to fishing for all species from January 1 through May 31 and again from August 1 through December 31. Prior to this Board action, Crooked Creek was open only from August 1 through December 31. Permitting spring fishing in the lower area of this stream increases the harvest of stocked steelhead returning to Crooked Creek Hatchery. The closure in June and July continues to protect migrating and spawning chinook salmon.

The season upstream from Johnson Lake Road was unchanged by the Board. Fishing is permitted here only from August 1 through December 31. The closure here from January 1 through July 31 remains in effect to protect spawning rainbow trout and chinook salmon.

At its November 1992 meeting, the Board adopted a public proposal with staff support which liberalized the use of bait in this stocked fishery. As no conservation issue is present and increased harvest is a management objective, the Board permitted the use of bait in both the Kasilof River and Crooked Creek at any time the streams are open to fishing. Prior to this action, bait was prohibited in Crooked Creek/Kasilof River after September 15.

RECENT FISHERY PERFORMANCE

In spring 1993, 2,960 steelhead trout returned to the hatchery with an additional 200 spawning below the weir. This is the highest return in the history of the fishery surpassing the spring 1992 return by more than 2,000 fish. Harvest was estimated at a record 2,065; catch a record 6,862.

In spring 1994, 511 steelhead trout returned to the hatchery. Observation indicates the 1994 catch and harvest will be less than 1993 estimates. These estimates will again be obtained from the Statewide Harvest Survey available in fall 1995.

OUTLOOK

Hatchery produced steelhead trout will continue to dominate this fishery through spring 1995. Returns in the fall of 1995 and thereafter will be the progeny of naturally spawned fish. Although these returns will be larger than wild stock production (several hundred fish) prior to the stocking program, they are not expected to be of the magnitude of the hatchery produced return. It is anticipated that harvest, catch and participation will decline in this fishery in the late 1990s in response to fewer fish being available for harvest.

CURRENT ISSUES

Hatchery steelhead originating at Crooked Creek have strayed into and been caught in the Kenai River since the inception of the program. This is documented by the voluntary return of tagged fish by anglers. The number of straying fish has always been relatively small; harvest of these fish was always reported from the lower river in the area of Beaver Creek. It was not known if these fish would remain in the Kenai River or "back out" and ultimately return to Crooked Creek.

In 1992 the number of steelhead reported in the Kenai River significantly increased. The staff examined eight different tagged steelhead that were brought into the office by anglers. These fish were caught from the river's confluence with Beaver Creek (RM 10) up to the outlet of Skilak Lake (RM 50). There were unconfirmed reports of another 64 steelhead caught in the same vicinity between September and November. Steelhead were reported abundant enough in some areas that anglers were targeting them rather than coho salmon. Most of the steelhead caught were reported released. Straying and the impact of straying on Kenai River wild rainbow trout was therefore an issue in the continuation and management of this fishery.

It was determined that the risk to Kenai River wild salmon and trout outweighed the negatives (a decrease in participation, harvest and catch) associated with discontinuing steelhead trout stocking in Crooked Creek. Discontinuing the stocking program has addressed the major issue associated with this fishery.

RECOMMENDED RESEARCH & MANAGEMENT

No research activity associated with this fishery is recommended at this time. The challenge to management will be to devise a strategy for maximizing angler opportunity to be derived from a relatively small number of naturally produced steelhead. To accomplish this it is recommended that regulatory proposals be submitted to the Board of Fisheries requesting that the Kasilof River/Crooked Creek steelhead trout fishery be managed as a catch-and-release fishery. Companion proposals would prohibit all fishing in Crooked Creek in spring (this was regulation prior to the stocking program) and that the steelhead trout fishery be prosecuted without bait. These regulatory changes should maximize angler opportunity so that maximum benefit can be derived from a limited resource.

KENAI PENINSULA RAZOR CLAM RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the population does not decline below the level necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Research and management programs conducted annually since the mid 1960s indicate this is the most stable major Kenai Peninsula recreational fishery. Inseason management actions have not been required to date; there is minimal fluctuation in annual harvest and participation. Management of the fishery inseason is therefore effected by current regulation. In 1994 a possession limit was adopted for the fishery which is the first significant regulatory change in more than 20 years.

HISTORICAL PERSPECTIVE

The Kenai Peninsula razor clam sport fishery is confined primarily to a 50 mile area on the east side of Cook Inlet between the Kasilof River on the north and the Anchor River to the south (Figure 23).

Current regulations provide for no closed season, a daily bag limit of the first 60 clams dug and beginning in 1994, a possession limit of three daily bag limits. These regulations are further supplemented by natural restrictions. Although there is no closed season, winter weather conditions preclude digging from October through February. Razor clams may be dug on any minus tide, however, tides lower than -2.0 feet on the northern beaches and -3.0 on the southern beaches are preferred. On the northern beaches these tides occur about 65 days annually while on the more southern beaches the average number of days this species is available to the sport digger declines to about 35.

Stock status on these beaches is determined by an annual sampling program on five beach areas, and an informal creel survey conducted at the beaches of Clam Gulch and Ninilchik. The sampling program provides the department with age class composition data, the mean length of clams available to the sport digger, as well as determining spawning success and recruitment of younger age classes to the fishery. It also provides a population estimate of the popular Clam Gulch and Ninilchik beaches. The creel survey provides harvest-per-unit-effort (HPUE) data. An estimate of total harvest is obtained from the Statewide Harvest Survey.

In 1988 a major research project was directed toward this resource. The research was contracted to the University of Alaska, Juneau. The field work was performed by a graduate student and assistants from 1988 through 1990 and was continued by area staff in 1991 and 1992. Research is designed to provide an estimate of the razor clam density on selected eastside Kenai Peninsula beaches.

RECENT BOARD OF FISHERIES ACTION

The Board reviewed regulation of this fishery at its March 1994 meeting. At that time the Board adopted as regulation a possession limit of three daily bag limits or 180 razor clams. Purpose of adopting a possession limit was to be better able to enforce the bag limit. Without a possession limit, once a digger left the beach he could claim any clams over his daily bag limit (60) were dug on a previous day. A possession limit of 180 razor clams is therefore a tool to complement existing regulations rather than a conservation measure.

RECENT FISHERY PERFORMANCE

Harvest and participation is determined by Statewide Harvest Survey. Average participation in the last 5 years has approximated 36,000 days; harvest has averaged about 1.0 million razor clams. In 1993 participation increased to 54,691 days with a corresponding harvest of 960,170 razor clams. The harvest estimate is reasonable based on past fishery performance; the participation estimate appears too high in that the average number of clams/digger/trip would be only 17 rather than the consistent average in prior years of about 35. Additional evidence that the participation estimate is too high is obtained from that year's onsite creel survey. This survey, conducted at Clam Gulch, estimated HPUE of 39.0 which is reasonable given prior years' information.

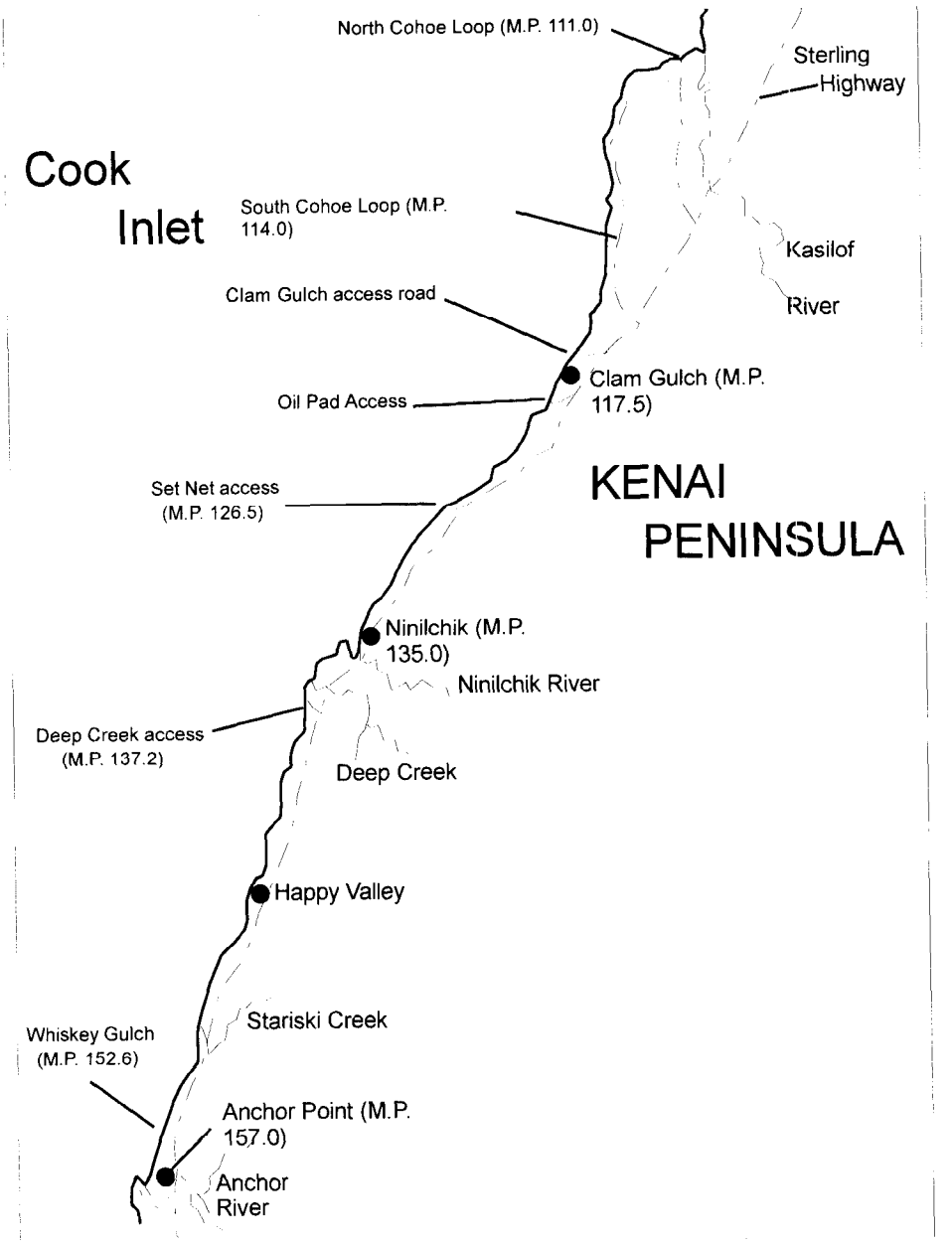

Figure 23.-Eastside Kenai Peninsula razor clam beaches.

Activities in 1994 included the continuation of the creel survey at Clam Gulch to ascertain digger HPUE, aerial surveys to determine digger distribution, and sampling from selected beach sites for a determination of average length of clams available to the digger. Harvest per unit effort in 1994 was 39.2 clams/digger/trip which is one of the highest success rates recorded and virtually identical to 1992 and 1993 success rates (Table 34). Digger distribution was similar to 1993 and continues to show that fishery participants are favoring the southern beach area of Ninilchik as opposed to the northern beaches of Clam Gulch and Cohoe (Table 35). Average length of razor clams sampled at Clam Gulch and Coho Oil Pad Beaches was less than the historical average; average lengths from Set Net Access, Deep Creek and Ninilchik Beaches were greater than the historical average length (Table 36).

OUTLOOK

This is the most stable major Kenai Peninsula recreational fishery. With allowances for annual variation, the general trend is projected to be for moderate increases in participation and harvest; digger success rates are expected to remain relatively constant. Razor clam abundance is not expected to significantly change.

No significant change in the department's management or research program is anticipated.

CURRENT ISSUES

Since 1980 the department sampling program has indicated recruitment on all beaches to be at high levels. Although recruitment of younger age classes to the fishery does reduce average size of clams available, it also indicates the stocks are stable. Digger distribution is now more wide spread than it was during the 1970s when Clam Gulch was the focal point of the fishery. Digger emphasis now occurs at the more southern beaches of Ninilchik and Deep Creek. The research program conducted in conjunction with the University of Alaska, Juneau indicates the exploitation rate at Clam Gulch is well below maximum allowable exploitation rates for this resource as was the 1991 exploitation rate at Ninilchik Beach.

There are no biological concerns regarding this fishery. Social concern is limited to access to the beaches. At this time, public access is located at Cohoe, Clam Gulch, Ninilchik, and Deep Creek. Despite the increased use of four-wheel drive and other all-terrain vehicles, diggers tend to concentrate around access points. Additional access points would more evenly distribute digger effort. This would reduce congestion and provide access to razor clam beaches which presently receive minimal usage. Additional access would therefore benefit both the user group and the resource as harvest would occur over a larger area, reducing impact to the population near access points.

RECOMMENDED RESEARCH & MANAGEMENT

A formal sampling program on the aforementioned beaches will continue as will the informal creel survey conducted at Clam Gulch. Aerial surveys will also continue to determine trends in digger distribution. The population estimation program at Ninilchik will be discontinued pending evaluation of 1992 data indicating exploitation rates are within the limits of sustained yield on this beach.

Management will continue to focus on informal information and education programs to apprise the public of the fishery's status; production of a pamphlet addressing both the biological and social issues relevant to this fishery will also continue.

Table 34.-Razor clam harvest, participation and success rates on all eastside Kenai Peninsula beaches,[a] 1969-1994.

Year	Clams/Digger Clam Gulch	Clams/Digger Ninilchik	Participation (Digger-Days)	Harvest	Clams/Digger All Beaches (SWHS)
1969	31.3		12,200	375,800	30.8
1970	29.6		11,370	314,650	27.7
1971	29.5		6,800	187,760	27.6
1972	34.1		15,400	437,530	28.4
1973	36.1		23,770	682,600	28.7
1974	34.6		27,410	872,450	31.8
1975	38.1		24,260	896,080	36.9
1976	35.0		29,320	939,000	32.0
1977	34.8		25,393	871,247	34.3
1978	30.0		29,750	896,667	30.1
1979	29.2		30,323	966,677	31.9
1980	26.6		31,494	771,603	24.5
1981	28.9		31,298	829,436	26.5
1982	30.1		31,954	963,994	30.2
1983	31.2		31,470	978,720	31.1
1984	34.9		29,880	1,044,307	35.0
1985	34.3		31,195	1,068,340	34.2
1986	34.8		32,507	1,124,728	34.6
1987	38.3	33.4	25,427	979,020	38.5
1988	32.4	30.4	30,905	1,171,308	37.9
1989	25.9	22.5	22,658	832,155	36.7
1990	37.5	13.2 [b]	29,427	950,974	32.3
1991	36.9		31,899	1,166,787	36.6
1992	39.9		44,335	1,174,240	26.5
1993	39.0		54,691	960,170	17.6
Mean	33.3	24.9	27,805	858,250	31
1994	39.2		[c]	[c]	

[a] Clams per digger reflects harvest rates as determined by onsite creel survey on specific beaches. Harvest and participation were determined by creel survey through 1976 and by the Statewide Harvest Study since that time.

[b] Success rate based on only two surveys.

[c] Determined by Statewide Harvest Survey. Results not available until 1995.

Table 35.-Distribution, by mean percent, of eastside beach Kenai Peninsula recreational, razor clam diggers as determined by aerial survey, 1971-1994.

		Beach Area					
Year	No. of surveys	Cohoe	Clam Gulch	Oil Pad	Ninilchik	Happy Valley	Whiskey Gulch
1971	2	1.2	52.3	7.6	10.7	22.6	5.6
1972	2	5.7	46.6	3.5	13.2	23.5	7.5
1973	2	10.3	36.8	5.7	16.1	25.1	6.0
1974	2	6.9	54.0	12.6	4.5	16.7	5.3
1975	3	9.5	58.8	11.4	6.6	12.6	1.1
1976	3	7.1	59.3	10.9	9.0	11.0	2.7
1977	3	4.1	66.1	10.5	10.7	5.8	2.8
1978	9	3.3	69.2	9.6	6.4	8.0	3.5
1979	8	4.6	71.4	6.8	6.9	8.8	1.5
1980	8	3.5	59.9	7.3	10.4	14.8	4.1
1981	9	2.9	52.8	11.1	9.6	17.7	5.9
1982	6	1.9	39.4	8.7	10.9	29.2	9.9
1983	6	2.8	39.4	10.4	12.8	24.4	10.2
1984	6	1.6	39.9	17.0	17.6	17.5	6.4
1985	5	1.5	30.2	15.1	26.8	21.8	4.6
1986	4	1.7	21.5	18.2	30.1	22.6	5.9
1987	3	0.3	19.1	11.6	45.8	16.7	6.5
1988	3	1.3	22.6	4.2	46.1	19.4	6.4
1989	11	0.4	26.5	11.1	46.4	10.5	5.1
1990	12	0.7	33.0	15.2	40.1	8.5	2.5
1991	10	1.1	31.2	14.8	41.5	9.9	1.5
1992	13	0.6	25.9	11.0	54.2	7.3	1.0
1993	13	0.4	24.2	11.2	56.5	6.7	1.0
Mean	6	3.2	42.6	10.7	23.2	15.7	4.7
1994	13	0.5	21.3	9.8	60.5	6.5	1.4

Table 36.-Average length (mm) of razor clams sampled from eastside Cook Inlet beaches, 1969-1994.

Year	Cohoe	Clam Gulch	Oil Pad Access	Set Net Access	Ninilchik	Deep Creek
1969	104.5	121.0	110.8			
1970		118.2	109.6			
1971		113.6	109.9			
1972		113.5	114.5	132.2		136.9
1973		115.5	117.5			
1974		124.3	127.0	126.0	143.1	126.0
1975		126.2	125.8			
1976	107.9	125.3	123.0			124.6
1977		124.5	129.3		151.3	
1978		127.1	124.2		153.7	
1979		127.3	122.6			
1980		122.6	114.3		118.2	
1981	93.3	111.3	113.8	116.3		126.1
1982	101.0	112.3	114.8	115.8	127.3	129.1
1983	99.9	106.9	113.5	102.1	99.7	115.0
1984	98.0	112.4	114.9	114.7	104.4	118.0
1985	98.4	115.5	116.9	107.5	115.1	
1986	88.6	113.0	113.4	115.4	134.1	141.2
1987	92.1	112.4	110.7	119.5	137.2	146.2
1988 [a]						
1989	97.3	116.8	114.2	109.5	138.1	133.5
1990	90.2	108.9	108.4	120.7	118.1	
1991	102.1	116.6	125.8	112.7	128.9	
1992	95.5	115.2	122.8	119.3	131.0	
1993	100.7	111.0	114.6	118.7	134.4	
Mean	97.8	117.1	117.2	116.5	129.0	129.7
1994	94.6	100.3	115.1	124.4	133.5	140.8

[a] Samples not obtained in 1988.

No additional research activities are recommended at this time.

KASILOF RIVER PERSONAL USE DIP NET FISHERY

FISHERY OBJECTIVE

Regulation and management of this fishery are governed by the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan. This plan mandates that this dip net fishery be opened when it is projected that at least 150,000 sockeye salmon will enter the Kasilof River. If this number can not be projected, the fishery does not occur.

The Fishery Objective is therefore to implement the provisions of the Board adopted management plan by opening the fishery at the designated projected sonar count.

INSEASON MANAGEMENT APPROACH

Management of this fishery is the joint responsibility of the Commercial Fisheries Management and Development Division (CFMD) and Sport Fish Division. The CFMD is responsible for operation of the Kasilof River sonar counter which enumerates sockeye salmon entering the river, and for projecting if and when 150,000 fish will be enumerated. When this number is projected it is the Sport Fish Division's responsibility to open the fishery by emergency order.

HISTORICAL PERSPECTIVE

In the spring of 1981, the Alaska Board of Fisheries adopted a Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan. It was the intent of the Board to provide for salmon dip net fisheries in the waters of Cook Inlet, allowing Alaska residents an opportunity to harvest sockeye salmon for their personal consumptive needs. To prevent disruption to existing fisheries, personal use dip net fisheries do not open until the department determines that specific escapement goals have been met and/or subsistence, commercial, and other sport users have had, or will have, reasonable opportunity to harvest fish in excess of spawning requirements. From 1981 through 1988 the Kasilof River dip net fishery (Figure 24) was open approximately 2-3 weeks each year from mid-July through early August. The popularity of this fishery increased annually with record levels of both harvest and effort occurring in 1986. Participants in the fishery include local residents as well as residents from other areas in Southcentral Alaska.

While sockeye salmon are the target species in the fishery, small numbers of silver and pink salmon are also caught and retained. Fishing takes place from both banks of the Kasilof River as well as from small boats. The majority of the effort occurs along the north bank of the river where there is good road access, parking spaces and, prior to 1988, a public boat launch.

Typically, catch rates are highest during the period approximately 2.5 hours before and after high tide; however, during the peak of large runs, sockeye salmon are harvested at virtually all tide levels.

In 1981 and 1982 harvest and angler participation were determined by creel census. Because dip net fishermen harvest sockeye salmon which are surplus to the spawning escapement and the fishery is managed by the numbers of salmon enumerated by sonar counter, the creel census has been reduced to a monitoring program. Primary purpose of this program is to advise dip net fishermen regarding the inseason status of the fishery. Harvest and estimates of angler participation are determined by the Statewide Harvest Survey.

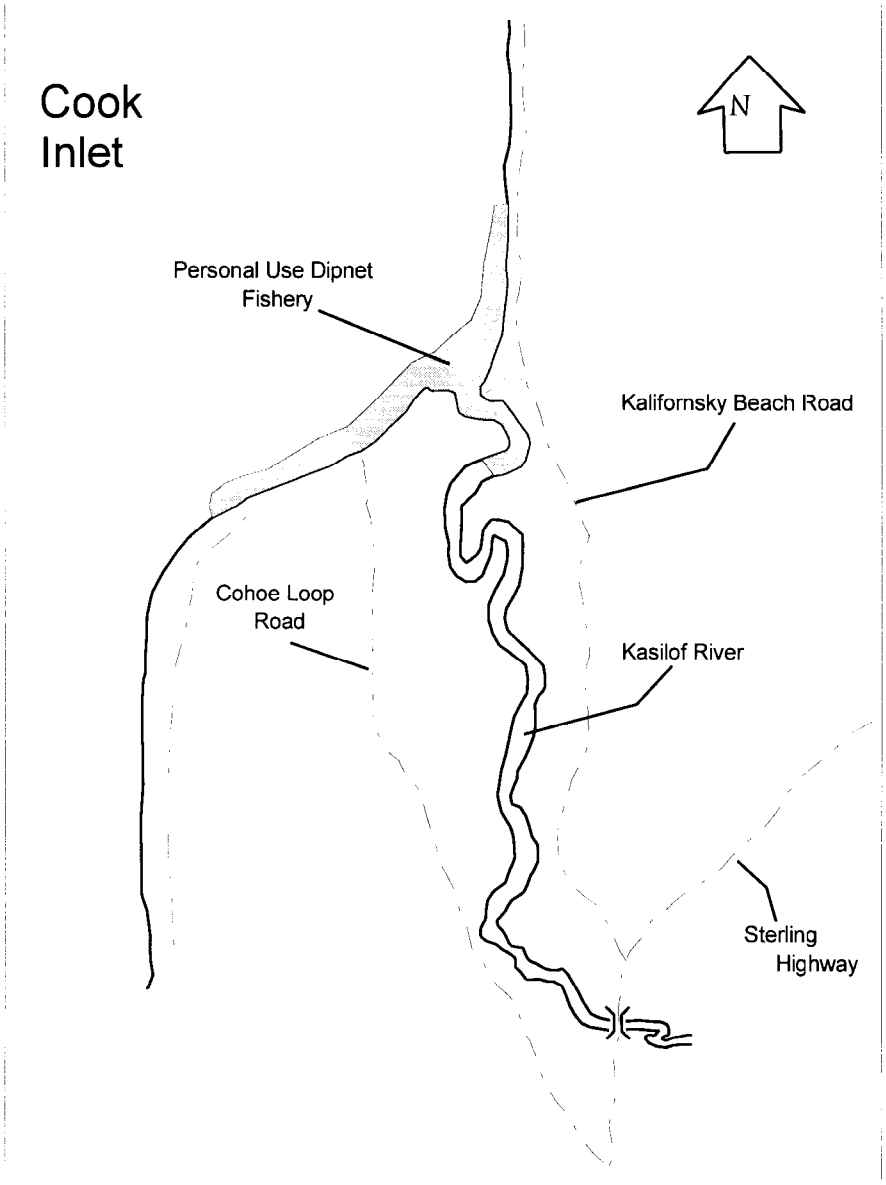

Figure 24.-The Kasilof River personal use sockeye salmon dip net fishery.

Average harvest and angler participation from 1981 through 1988 have been 14,120 sockeye salmon and 7,170 days fished, respectively. Dip netters have harvested an average of 13.5% of the sockeye salmon entering the Kasilof River during that period of time the season was open. Of the total number of sockeye salmon to enter the river in a given season, this personal use fishery harvests 1% to 14%, averaging 5.3%. In years when the fishery is open, approximately 44% of the sockeye salmon to enter the river are available to personal use dip net fishermen (Table 37).

Current regulations governing this fishery are:

1. The fishery is opened by emergency order when the department can project a spawning escapement of 150,000 sockeye salmon.
2. Only residents possessing a valid sport fishing license or residents exempt from licensing may participate in the fishery.
3. Chinook salmon may not be possessed and, if caught, must be immediately released.
4. The daily bag and possession limit are 6 salmon not in addition to other sport caught fish.
5. A dip net is defined as a bag shaped net supported on all sides by a rigid frame. The maximum straight line distance between any two points on the net frame as measured through the net opening may not exceed 5 feet. The depth of the bag must be at least one half the greatest straight line distance as measured through the net opening. No portion of the bag may be constructed of webbing which exceeds a stretched measurement of 4.5 inches. The frame must be attached to a single rigid handle and is operated by hand. (This definition was approved by the Board in spring of 1988.)
6. The area open to fishing is in Cook Inlet at the mouth of the Kasilof River within ADF&G regulatory markers and upstream for a distance of 1 mile in the river (Figure 24).

BOARD OF FISH ACTIONS

In 1990 the Board established a subsistence set and dip net fishery for upper Cook Inlet. The dip net fishery occurs in the mouths of the Kenai and Kasilof rivers. Days and times subsistence dip netting occurred was provided for in regulation. The area open to subsistence dip netting in these rivers was identical to the area where personal use dip netting occurs when the latter fishery is open. The Board determined that subsistence and personal use dip netting would not occur concurrently. They therefore amended the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan to state that when the personal use fishery occurs in either the Kenai or Kasilof rivers, it (personal use) will be closed at 12:01 a.m. on those days that the subsistence fishery occurs, re-opening again at 12:01 a.m. the following day.

The Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan was further amended as it pertains to the Kasilof River. The escapement goal which "triggers" the opening of the personal use dip net fishery here was raised from the minimum goal of 150,000, to the maximum escapement goal of 250,000. However, during years when the subsistence dip net fishery does not occur, the fishery will open as in prior years when the minimum sockeye salmon escapement goal of 150,000 can be projected.

The above regulatory changes were in effect during the 1991 and 1992 seasons.

Table 37.-Kasilof River personal use dip net fishery summary, 1981-1994.

Year	Date and Time Opened	Date and Time Closed	Total Days	Sockeye Salmon Available During Dip Net Fishery [a]	Harvest	% of Available Sockeye Salmon Harvested	Total Sockeye Salmon Escapement	Percent of Escapement Harvested	% of Escapement Available to Fishery	Participation (Days Fished)
1981 [b]	7/4 12:00	7/31 24:00	27.50	122,080	10,300	8.4	256,630	4.0	47.6	5,370
1982 [b]	7/21 12:00	8/5 24:00	15.50	36,930	1,800	4.9	180,240	1.0	20.5	2,580
1983	7/15 24:00	8/5 24:00	21.00	96,500	11,120	11.5	210,270	5.3	45.9	4,420
1984	7/16 12:00	8/5 24:00	20.50	126,930	12,770	10.1	231,690	5.5	54.8	5,960
1985	7/15 18:00	8/5 24:00	21.25	363,590	16,280	4.5	505,050	3.2	72.0	9,260
1986	7/15 06:00	8/5 24:00	21.75	138,500	38,670	27.9	275,960	14.0	50.2	13,930
1987 [c]	7/10 12:00	8/5 24:00	25.50	135,560	18,450	13.6	249,250	7.4	54.4	8,910
1988	7/22 18:00	8/5 24:00	14.25	12,950	3,550	27.4	200,000	1.8	6.5	6,930
1989	No Fishery						157,739			
1990	No Fishery						144,140			
1991	No Fishery						238,000			
1992	No Fishery						183,178			
1993	No Fishery						150,329			
Mean			20.91	129,130	14,120	13.5	229,420	5.3	44.0	7,170
1994	7/22 12:00	8/5 23:59	10.50 [d]	31,364	[e]	[e]	204,525	[e]	[e]	[e]

[a] Total number of fish passing sonar counters during fishery, plus harvest.

[b] Harvest and participation during first 2 years of fishery are field estimates. Starting in 1983, estimates are from Statewide Harvest Survey.

[c] The fishery was closed from 6:00 a.m. 7/14-6:00 p.m. 7/15 as a precautionary measure due to possible oil contamination.

[d] Personal use fishery closed on days the subsistence dip net fishery was open. Total days reflects actual time open to personal use fishing.

[e] Determined by Statewide Harvest Survey. Results not available until 1995.

The Board, at its November 1992 meeting, adopted no regulatory changes specific to this fishery. They did, however, determine that most of the Kenai Peninsula, including the Kasilof River, was a nonsubsistence fishing zone. In 1993 there was no subsistence fishery here. The Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan states that if the subsistence fishery does not occur, the number which "triggers" the opening of the Kasilof River personal use dip net fishery declines from 250,000 to 150,000. The lower number therefore applied to the 1993 season.

RECENT FISHERY PERFORMANCE

In 1992 the subsistence fishery was prosecuted in a normal manner. The "trigger point" for the personal use fishery remained at 250,000. Sockeye salmon return to the river was 138,178. The personal use fishery therefore did not occur for the fourth consecutive year.

There was no subsistence fishery in 1993; the "trigger point" for the opening of the personal use fishery reverted to the minimum projected sonar count of 150,000. Final sonar count was 152,230. The minimum sonar count (150,000) could not be projected with assurance until August l. By this late date there were insufficient sockeye salmon entering the river to prosecute a successful dip net fishery; the fishery did not occur for the fifth consecutive year.

In October 1993, Superior Court Judge Dana Fabe found unconstitutional the provision in the 1992 state subsistence law that directs the Boards of Fish and Game to designate “nonsubsistence areas” where dependence on subsistence is not a principle characteristic of the economy, culture and way of life. Prior to this decision the Boards of Fish and Game had designated five nonsubsistence zones, one of which was the Kenai Peninsula. A Supreme Court order originally suspended the lower court ruling of Judge Fabe. However, on April 11, 1994 the Supreme Court reversed their earlier decision. This reversal by the Supreme Court required a 1994 subsistence fishery in Cook Inlet as determined by the Board of Fisheries in an April 28 conference call.

Since there was insufficient time for a formal Board meeting prior to the season, the Board determined that the Commissioner should exercise his emergency regulatory authority to adopt regulations for the 1994 fishery. It was determined by the Board that this fishery mirror the 1992 subsistence fishery.

Emergency regulations were subsequently adopted providing for the 1994 Cook Inlet subsistence fishery. Regulations were also adopted for the Kenai Peninsula personal use salmon fisheries as personal use regulations are in part contingent on subsistence regulations, i.e. a change in subsistence regulations changes some personal use regulations.

It is this author’s interpretation of events that it was the intent of the department to adopt personal use regulations for the Kasilof River dip net fishery which were identical to 1992 regulations for this fishery. In the Kasilof River the sonar count “trigger” which opened the personal use fishery in 1992 was 250,000. The department adopted a “trigger” of 150,000 for the 1994 fishery. This author believes that this number was adopted as an administrative error and that to mirror the 1992 Kasilof River personal use dip net fishery regulations the fishery should have opened at 250,000 which is the upper rather than the lower end of the escapement goal range.

This notwithstanding, a sonar count of 150,000 was the “trigger” which would open the Kasilof River personal use dip net fishery in 1994. A sonar count of 150,000 was assured the morning of

July 22; the personal use dip net fishery was opened at 12:00 noon and continued through August 5. As this fishery could not occur on days subsistence dip netting occurred, the fishery was restricted to July 22, 24, 25, 26, 28, 29 and 31 and August 1, 2, 4 and 5. Total fishing time was 10.5 days (Table 37).

Harvest and participation estimates will be obtained from the Statewide Harvest Survey. Data will be available in fall 1995.

OUTLOOK

The Board will next review this fishery at its January 1996 meeting. Regulation of the 1995 fishery will therefore be identical to 1994, i.e. the "trigger point" to open the fishery will remain at 150,000 projected sockeye salmon. This is the minimum goal for this river; as the department is mandated to manage for not less than this goal, there is a high probability this fishery will occur again in 1995.

CURRENT ISSUES

In 1987 the Kasilof River dock and adjacent lands on the north side of the river at its mouth reverted to private ownership. Public use of the launching ramp and surrounding property were, however, not restricted in that year. Following the 1987 season the property owner announced his intention to restrict access in 1988. An agreement was reached, however, between the state and land owner which established a public corridor from the road to the mouth of the river. Foot access to the preferred dip netting area on the north bank was therefore not a problem in 1988 and should not be an issue in succeeding years.

In the late 1980s the use of small boats increased in this fishery. Dip netters hold the net beside the boat and drift with the current. Staff observation indicates this method is more efficient than dip netting from the bank. Boats were launched from a small ramp. In 1988 the ramp was closed to public use. Although some dip netters launched from the beach, the closure of the ramp reduced the boats employed in this fishery in 1988. Lack of a launching site will continue to be a social issue associated with this fishery when the fishery occurs.

This fishery is very popular with Alaska residents. Many dip netters, however, are not aware of the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan and believe the fishery should occur on an annual basis. Public perception regarding Board intent is therefore an issue in years when the fishery does not occur.

Although there was some dissatisfaction voiced by personal use fishermen in 1989 because the fishery did not occur, this dissatisfaction was partially mitigated because the personal use fishery on the Kenai River was opened. In 1990 and 1991 neither the Kasilof nor Kenai River dip net fisheries opened because the escapement goals mandated by the management plan were not achieved. Public dissatisfaction with the management plan increased. Many individuals who contacted the Anchorage Regional or Soldotna Area office believed that the dip net fishery on both rivers should occur annually and that personal use should receive the same consideration as sport and commercial users when the Board allocates this resource.

In 1992 the Kenai River personal use fishery occurred; the Kasilof River personal use fishery did not. Public dissatisfaction with the continued closure of the Kasilof River fishery was mitigated in that a subsistence dip net fishery also occurred in both the Kenai and Kasilof rivers.

The continued closure of the Kasilof River dip net fishery was not an allocative issue in 1993. This was due to the opening of the Kenai River dip net fishery at an early (July 17) date. This opening again mitigated public concern regarding allocation of Kasilof River sockeye salmon between commercial and personal use fishermen.

The regulation prohibiting personal use dip netting from occurring on days that a subsistence dip net fishery occurs is very confusing to the public and may result in unintentional violations. This was an issue in the management of the 1994 fishery and will continue to be an issue until it is addressed by the Board of Fisheries.

RECOMMENDED RESEARCH & MANAGEMENT

There is a high probability this fishery will occur in 1995. The fishery will be opened by emergency order when the sonar count of 150,000 is projected. It is recommended the fishery be monitored to apprise participants regarding its inseason status. No research activities are recommended at this time; Kasilof River sockeye salmon research is the responsibility of the CFMD.

It is recommended that the department apprise the Board of the possible administrative error which lowered the "trigger" which opens the fishery at 150,000. The board should also be apprised of the confusion resulting from prohibiting the personal use fishery from occurring on the same day as the subsistence fishery.

KENAI RIVER SOCKEYE SALMON DIP NET FISHERY

FISHERY OBJECTIVE

Regulation and management of this fishery is governed by the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan. This plan currently mandates that this dip net fishery be opened when it is projected that not less than 700,000 sockeye salmon will enter the Kenai River. If this number can not be projected, the fishery does not occur.

The Fishery Objective is therefore to implement the provisions of the Board adopted management plan by opening the fishery at the designated projected sonar count of 700,000 sockeye salmon.

INSEASON MANAGEMENT APPROACH

Management of this fishery is the joint responsibility of the Commercial Fisheries Management and Development Division (CFMD) and Sport Fish Division. The CFMD is responsible for operation of the Kenai River sonar counter which enumerates sockeye salmon entering the river, and for projecting if and when 400,000 fish will be enumerated.

In years when 700,000 sockeye salmon are projected to enter the river, the Sport Fish Division is responsible for opening the fishery by department emergency order. This division apprises the public of the fisheries status and is responsible for fishery data collection and analysis.

HISTORICAL PERSPECTIVE

Prior to 1989, the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan stated that a personal use dip net fishery for sockeye salmon may occur on the Kenai River after an escapement of 500,000 fish was projected. As with other personal use dip net fisheries, only Alaska residents may participate. A sport fishing license is required. The daily bag and

possession limit is 6 sockeye salmon which are not in addition to other marine and freshwater sport fishing limits. Legal gear is confined to a dip net which was redefined by the Board in 1988. Regulations restrict the fishery to the lower section of the river downstream from the Warren Ames Bridge (Figure 25).

Prior to 1987, the Kenai River dip net fishery occurred only in 1982 and 1983. Fisheries in both years resulted in insignificant harvests (Table 38). Reasons for these low harvests were a combination of unperfected angler technique, relatively clear water and relatively small numbers of fish present.

In 1987 the dip net fishery opened at 12 noon, July 23. The fishery was continuous for 13.5 days, closing August 5. Total sockeye salmon escapement to the Kenai River was a record 1.6 million fish. The 1987 dip net fishery was monitored by creel survey. This survey estimated a harvest of approximately 20,000 fish. The creel survey was conducted at high tide periods because concentrated angler effort was anticipated to occur at these times. However, during the peak of the fishery, dip netting was successfully conducted 24 hours a day, indicating that the creel survey was an inaccurate measurement of the harvest. The harvest of 24,090 fish as estimated by Statewide Harvest Survey is the more accurate estimate. It was therefore determined that future Kenai River dip net fisheries would be monitored as opposed to surveyed. Primary purpose of the monitoring program is to provide information to the public regarding the inseason status of the fishery.

In 1988 the fishery opened on July 22. Harvest as estimated by Statewide Harvest Survey was 16,880.

In fall 1988 the Board amended the Cook Inlet Personal Use Salmon Dip Net Fisheries Management Plan increasing the escapement level which "triggered" the Kenai River fishery from 500,000 to 700,000. In 1989 an escapement of 700,000 was projected July 20; the dip net fishery was opened July 21. Harvest was estimated at a record 48,980 sockeye salmon; participation, 31,310 days. Total 1989 escapement was 1,598,000, closely approximating the record 1987 escapement of 1,600,000 (Table 38).

Escapements in 1990 and 1991 were less than 700,000; this personal use fishery did not occur. The fishery did occur in 1992, 1993 and 1994. In 1992 and 1994 it was opened when a sonar count of 700,000 sockeye salmon was assured; that number was reduced to 400,000 in 1993 as a subsistence fishery did not occur that year.

BOARD OF FISH ACTIONS

In 1990 the Board established a subsistence set and dip net fishery for upper Cook Inlet. The dip net fishery occurs in the mouths of the Kenai and Kasilof rivers. Days and times subsistence dip netting occurs are provided for in regulation. The area open to subsistence dip netting in these rivers was identical to the area where personal use dip netting occurs when the latter fishery is open. The Board determined that subsistence and personal use dip netting would not occur concurrently. They therefore amended the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan to state that when the personal use fishery occurs in either the Kenai or Kasilof rivers, it (personal use) will be closed at 12:01 a.m. on those days that the subsistence fishery occurs, re-opening again at 12:01 a.m. the following day.

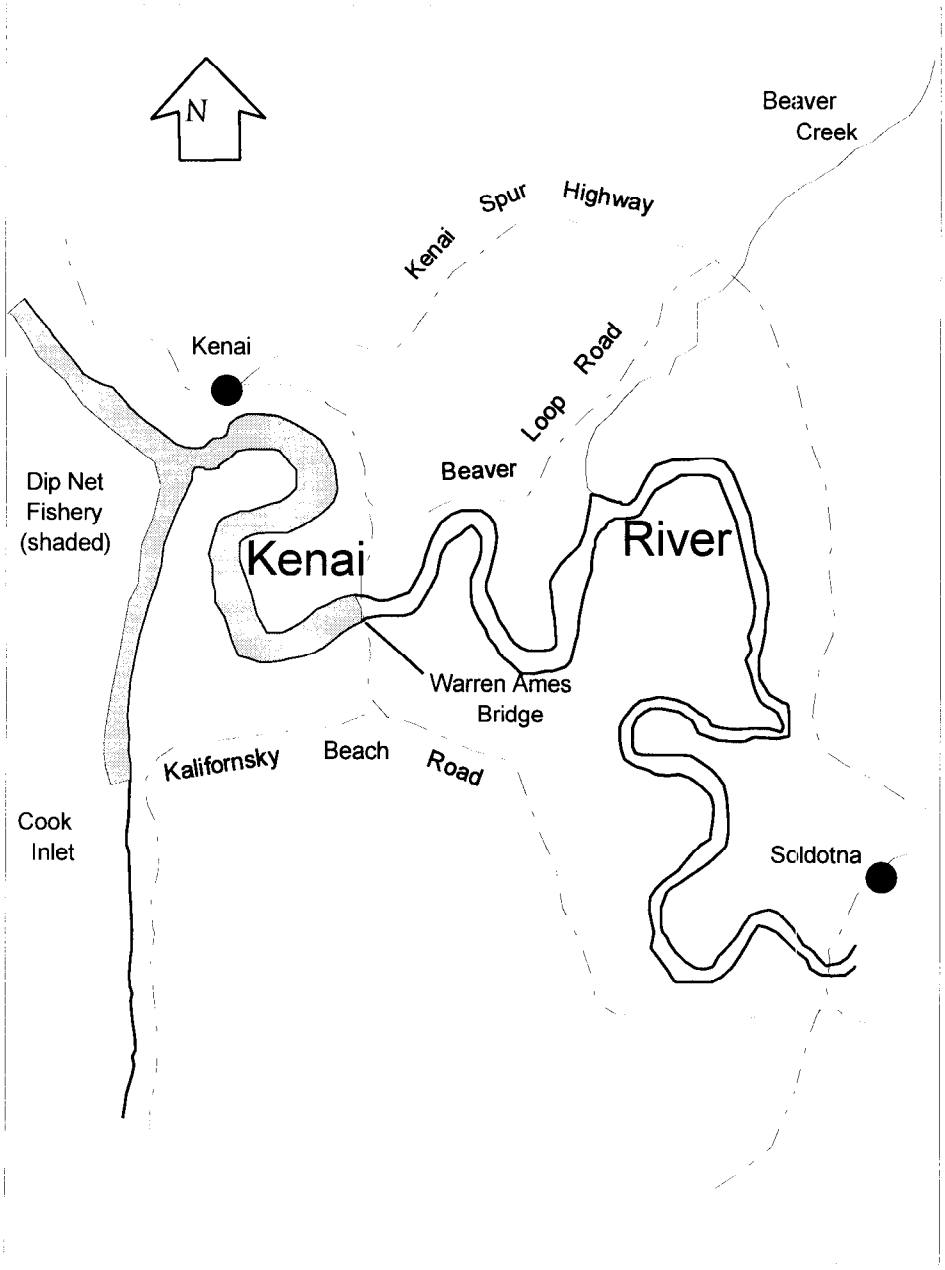

Figure 25.-The Kenai River sockeye salmon dip net fishery.

Table 38.-Kenai River personal use dip net fishery summary, 1981-1994.

Year	Date and Time Opened	Date and Time Closed	Total Days	Fish Available During Dip Net Fishery [a]	Harvest	% of Available Fish Harvested	Total Sockeye Salmon Escapement	Percent of Escapement Harvested	% of Escapement Available to Fishery	Participation (Days Fished)
1981 [b]				No fishery			407,600			
1982 [b]	7/26 18:00	8/ 5 24:00	9.25	Insignificant			619,800	Insignificant		
1983	7/20 18:00	8/ 5 24:00	15.25	Insignificant			630,000	Insignificant		
1984				No fishery			344,570			
1985				No fishery			502,800			
1986				No fishery			501,160			
1987	7/23 12:00	8/ 5 24:00	13.50	755,500	24,090	3.2	1,600,000	1.5	47.2	22,550
1988	7/22 18:00	8/ 5 24:00	14.25	260,000	16,880	6.5	1,000,000	1.7	26.0	29,010
1989	7/21 00:01	8/ 5 24:00	15.0	812,800	48,980	6.0	1,598,000	3.1	50.9	31,310
1990	No Fishery						659,520			
1991	No Fishery						647,597			
1992 [c]	7/27 12:00	8/5 24:00	6.5	144,756	12,189	8.4	994,760	1.2	14.6	10,371
1993	7/17 14:00	7/31 24:00	14.4	392,477	34,059	8.7	813,617	4.2	48.2	14,896
Mean			12.59	215,050	27,240	6.6	793,800	2.3	37.4	21,627
1994	No Fishery						1,004,214			

[a] Total number of fish passing sonar counters during fishery, plus harvest.

[b] Harvest and participation during first 2 years of fishery are field estimates. Starting in 1983, data are from Statewide Harvest Survey.

[c] Fishery closed on Wednesday and Saturday due to subsistence fishery.

The Board, at its November 1992 meeting, determined that the majority of the Kenai Peninsula, including the Kenai River, was a nonsubsistence fishing zone. Subsistence fishing regulations adopted by the Board in 1990 were repealed. A subsistence fishery was not provided for in 1993.

In 1993, to partially mitigate the repeal of the subsistence set and dip net fishery, the Board reduced the number of sockeye salmon required to "trigger" the opening of the personal use dip net fishery from 700,000 to 400,000.

RECENT FISHERY PERFORMANCE

On July 17, 1993 it was projected the sonar count would exceed 400,000. The fishery was opened by emergency order at 2:00 p.m. Harvest was estimated by Statewide Harvest Survey to be 34,059 sockeye salmon; participation was 14,896 days fished (Table 38).

In October 1993, Superior Court Judge Dana Fabe found unconstitutional the provision in the 1992 state subsistence law that directs the Boards of Fish and Game to designate "nonsubsistence areas" where dependence on subsistence is not a principle characteristic of the economy, culture and way of life. Prior to this decision the Boards of Fish and Game had designated five nonsubsistence zones, one of which was the Kenai Peninsula. A Supreme Court order originally suspended the lower court ruling of Judge Fabe. However, on April 11, 1994 the Supreme Court reversed their earlier decision. This reversal by the Supreme Court required a 1994 subsistence fishery in Cook Inlet as determined by the Board of Fisheries in an April 28 conference call.

Since there was insufficient time for a formal Board meeting prior to the season, the Board determined that the Commissioner should exercise his emergency regulatory authority to adopt regulations for the 1994 fishery. It was determined by the Board that this fishery mirror the 1992 subsistence fishery.

Emergency regulations were subsequently adopted providing for the 1994 Cook Inlet subsistence fishery. Regulations were also adopted for the Kenai Peninsula personal use salmon fisheries as personal use regulations are in part contingent on subsistence regulations, i.e. a change in subsistence regulations changes some personal use regulations.

In the Kenai River the sonar count "trigger" which opened the dip net personal use fishery in 1992 was 700,000. The department adopted this number by emergency regulation for the 1994 season.

At its 1992 meeting the Board determined that coho salmon begin to enter the Kenai River in significant numbers by August. This Board then directed that since early-run Kenai River coho salmon are a fully allocated resource, that the sockeye salmon directed dip net fishery not continue past July 31 regardless of the number of sockeye salmon entering the river.

In 1994 the latter portion of the sockeye salmon return to the Kenai River was exceptionally late. By July 31 it could not be projected that the sonar count would exceed 700,000. The personal use fishery did not occur this season despite a final sonar count of 1,004,214.

OUTLOOK

The Board of Fisheries agreed to review allocation issues relevant to this fishery "out of sequence." The fishery, originally scheduled for review in January 1996, will be on the Board's March 1995 agenda. Action taken at this meeting will determine the manner in which this fishery is conducted in 1995.

CURRENT ISSUES

Interest in this dip net fishery continues to increase. It is this author's opinion that the general public has a poor understanding of the Board's philosophy regarding this fishery and are uninformed regarding the Upper Cook Inlet Salmon Management Plan which allocates the majority of the late-run Kenai River sockeye salmon to commercial users. Many personal use dip net fishermen expect this fishery to occur each year.

Board action in 1992 lowered the "trigger point" at which this fishery opens from a projected 700,000 sonar count to a projected count of 400,000. This lower number increases the probability that this fishery would occur and partially mitigated public concern regarding their opportunity to harvest Kenai River sockeye salmon with dip nets in 1993. This notwithstanding, allocation of the sockeye salmon resource between commercial and personal use fishermen remained an issue in the management of this fishery.

In 1994 a subsistence fishery occurred; the personal use fishery would open only if a sonar count of 700,000 was assured prior to July 31. The increased “trigger” in the fishery and late sockeye salmon run timing precluded the opening of the fishery, further exacerbating the allocative issues.

The Kenai River personal use dip net fishery and inriver sport fishery are closely related. Increased allocation to either fishery decreases the allocation to the commercial fishery. In 1994 the Board of Fisheries appointed a task force to review the allocation issues and suggest changes to the Kenai River Sockeye Salmon Management Plan. The task force, comprised of sport and commercial users, was unable to reach consensus on re-allocation to either noncommercial fishery.

The Board was not scheduled to address Kenai River sockeye salmon allocation until January 1996. However, it has agreed to address the issue “out of sequence” at its March 1995 meeting. Action taken at this meeting could remove some of the uncertainty regarding management of this fishery.

The regulation prohibiting personal use dip netting from occurring on days that a subsistence dip net fishery occurs is very confusing to the public and may result in unintentional violations. This was an issue in the management of the 1994 fishery and will continue to be an issue until it is addressed by the Board of Fisheries.

RECOMMENDED RESEARCH & MANAGEMENT

There is a high probability this fishery will occur in 1995. If this eventuates, it is recommended the fishery be monitored to apprise participants regarding its inseason status. No research activities are recommended at this time; Kenai River sockeye salmon research is the responsibility of the Commercial Fisheries Management and Development Division.

SWANSON RIVER COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the population does not decline below the level necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

There are currently no active research programs associated with this fishery. Harvest is ascertained from the Statewide Harvest Survey. With allowances for annual variation, notably in 1988-1989, this survey indicates a stable fishery. A stable fishery equates to a relatively stable population with sufficient numbers of coho salmon in the spawning escapement to ensure the fishery continues to be managed for sustained yield. Management of the fishery inseason is therefore effected by regulation.

Because of limited access, this fishery is self-limiting. In years of high abundance, large numbers of coho salmon will be harvested in the lower river. The converse will be true during years of low abundance. Once through the lower river, the fish are subject to capture only by anglers who utilize a canoe to float the Swanson River and/or canoe route. Identified spawning areas are the mainstem Swanson River and the tributary streams connecting the numerous lakes to the river. Observation indicates that coho salmon mature very rapidly on entering these tributary streams and are no longer desirable to the majority of anglers. The primary tributary accessible by road is Sucker Creek which flows through a culvert beneath Swan Lake Road. This small stream has been closed to salmon fishing since 1989.

HISTORICAL PERSPECTIVE

The Swanson River is tributary to Cook Inlet, entering salt water approximately 30 miles north of the Kenai River. It is approximately 46 miles in length. The river transects the Swanson River oil field and virtually all land bordering the river is in federal ownership, administered by the Kenai National Wildlife Refuge. The river downstream from the oil field for about 10 miles is meandering with grass-covered banks. The remaining 10 miles to salt water is characterized by increasing gradient and numerous large rocks in midstream. The upper section of the river (oil field upstream to its headwaters) is characterized by broad stretches of muskeg and swamp which border the slow flowing main channel. Very little gravel is found in this section of stream.

The river drains numerous lakes, many of which are interconnected by small streams. These lakes are all contained within the Kenai National Wildlife Refuge. Forty of these lakes form the Swanson River Canoe Route which is administered by the Refuge. This canoe route is about 36 miles in length and may be increased by an additional 46 miles if the canoeist opts to traverse the Swanson River downstream to the Kenai Spur Road. Access to the canoe route is at about Mile 12 of the Swan Lake Road. This road is reached via Swanson River Road which intersects the Sterling Highway at Mile 83.4.

Initial surveys of this stream were conducted by the Sport Fish Division in the 1960s. In 1967 and possibly 1968, a weir was installed in the river in the area of the oil field to capture coho salmon for egg-take purposes. Three tributary streams (Airport Creek, Canoe Creek and Sucker Creek) were established as index count areas for coho salmon in the 1960s. Counts in these streams were discontinued in the mid-1970s. Swanson River has also served as a source for

rainbow trout eggs, the progeny of which are used in the Sport Fish Division's lake stocking program.

The Swanson River supports coho, sockeye, chinook and pink salmon; rainbow trout, Dolly Varden, longnose suckers *Catostomus catostomus* and stickleback *Gasterosteus aculeatus*. Relative numbers of these species, notably salmon, were not known prior to 1988. In 1988 the Fish and Wildlife Service installed a weir in the lower river. Installation was May 21; high water rendered the structure inoperable September 26. This weir enumerated 23,514 coho salmon, 1,542 sockeye salmon, 5 chinook salmon, 72 pink salmon, 15 rainbow trout and 3 Dolly Varden. Coho salmon began entering the stream the latter part of July, the migration peaked in mid to late August and continued through September. Sockeye salmon entered the stream in late June, peaked in late July and the run was essentially complete by mid-August. The small number of chinook salmon were enumerated in late June with the pink salmon migration occurring in August.

The weir was also operational in 1989, being installed July 28 and rendered inoperable by high water on August 27. That year 20,841 coho salmon were counted; weir records do not indicate that other species passed through the structure.

Based on this information, chinook salmon are early-run fish and sockeye salmon late run. There is only one run of pink salmon. Coho salmon are believed to be early-run fish, although a migration into late September is somewhat atypical for early-run Peninsula coho salmon, as in the Kenai River and other streams the early run is usually complete by early September. The late-run timing in 1988 may in part be attributed to what is considered to be a relatively large return of this species as large returns tend to begin earlier and end later than average or low returns.

Swanson River coho salmon in some years support a relatively large sport fishery. Harvest data are available from the Statewide Harvest Survey since 1983. In 1983 and 1984 the survey indicated a harvest occurred only in the Swanson River; from 1985 through 1987, only in the canoe route. In 1989 the public became aware of what was considered above average coho salmon returns to this stream. Most fishing occurred in the lower section of river where it is transected by the Kenai Spur Highway at Mile 38.6. This is approximately 0.5 mile upstream from Cook Inlet. Total harvest in 1988 from the Swanson River drainage was 6,149; in 1989, 6,506. Thereafter harvests declined (Table 39).

BOARD OF FISH ACTIONS

There were no Board actions affecting this fishery in 1990 or 1992. The Board will next review this fishery in January 1996.

RECENT FISHERY PERFORMANCE

This fishery is not monitored or creel surveyed. Conversations with the public suggested that the 1990 through 1992 returns were less than occurred in either 1988 or 1989. As in the preceding years it is assumed that the majority of the harvest continues to occur in the lower section of river in close proximity to the Kenai Spur Highway. Limited access precludes a significant harvest in the upstream areas with the exception of those individuals utilizing a canoe in the Swanson River and/or the canoe route. Harvest ranged from 892 to 3,487 coho salmon from 1990 to 1993 (Table 39).

Table 39.-Coho salmon harvest in Swanson River; Swanson River and Swan Lake Canoe Routes, 1983-1993.

Year	Swanson River	Swanson River/ Swan Lake Canoe Routes	Total Swanson River Drainage
1983	525		525
1984	1,484		1,484
1985		187	187
1986		969	969
1987		1,485	1,485
1988	5,603	546	6,149
1989	6,379	127	6,506
1990	1,501	0	1,501
1991	811	81	892
1992	1,984	49	2,033
Mean	2,612	431	2,173
1993	3,477	10	3,487

The 1994 season was prosecuted in a normal manner. The harvest for this season will be ascertained from the Statewide Harvest Survey with results available in fall 1995.

OUTLOOK

These early-run coho salmon contribute to the Cook Inlet commercial and Swanson River inriver sport fisheries. The prosecution of these fisheries is not expected to significantly change in the immediate future. Numbers of coho salmon returning to Swanson River should therefore, with allowances for annual variation in abundance, remain relatively constant.

Access to the sport fishery is primarily in the lower Swanson River. In effect, this is a lower river intercept fishery in that little fishing activity occurs in the upstream areas. This is not expected to change as no additional road access is planned for the upper river areas.

Harvest in this fishery is proportionate to abundance as demonstrated by the 1988-1989 record harvest which corresponded to weir counts of over 20,000 coho salmon. Given that abundance remains below the record returns of the late 1980s and approximates "average" returns, future annual harvests are expected to range from 2,000-4,000 fish.

CURRENT ISSUES

There are no major issues associated with this fishery.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended at this time.

SWANSON RIVER; SWANSON RIVER AND SWAN LAKE CANOE ROUTES RAINBOW TROUT FISHERY

FISHERY OBJECTIVE

Objectives for this wild trout fishery are defined in the Board adopted Cook Inlet & Copper River Basin Rainbow/Steelhead Trout Management Policy. **This fishery is managed under Policy I. Policy I directs that this rainbow trout resource be managed under a conservative yield philosophy and that management practices do not alter the historic size and age composition or stock levels of the population. Consistent with this policy**, total protection is given the resource through a spring spawning closure; bag and possession limits are a conservative 5 trout only 1 of which may be 20 inches in length or greater.

INSEASON MANAGEMENT APPROACH

There are currently no active research programs associated with this fishery. Harvest is estimated from the Statewide Harvest Survey. With allowances for annual variation, this survey indicates a stable fishery. A stable fishery equates to a stable population with sufficient numbers of trout in the spawning population to ensure the fishery continues to be managed for sustained yield. Management of the fishery inseason is therefore effected by regulation.

HISTORICAL PERSPECTIVE

The Swanson River Canoe Route links more than 40 lakes with 46 miles of the Swanson River. All lakes of the canoe route are tributary to the Swanson River which flows into Cook Inlet about

30 miles north of the Kenai River. Access to the canoe route is via the Swanson River Road and Swan Lake Road.

The Swan Lake Canoe Route is also reached via the above road system. This route is located south of Swan Lake Road with the majority of the 30 lakes of this canoe route being tributary to Moose River. Lands bordering both canoe routes are in federal ownership, administered by the Kenai National Wildlife Refuge. The lands and the canoe routes are further designated as "wilderness areas" and outboard motors and/or aircraft are not permitted on waters of these routes.

Both canoe routes support wild populations of rainbow trout and Dolly Varden. With the exception of limited research relating to Dolly Varden, Sport Fish Division research in the area has been confined to basic lake surveys in the 1960s and early 1970s. Harvest has been determined since 1977 by Statewide Harvest Survey (Table 40).

Harvest estimates from 1977 through 1983 were combined for the two canoe routes and the Swanson River. Total rainbow trout harvest through 1983 was relatively consistent, ranging between 4,000 and 6,900 trout. An estimate in 1984 was made only for the Swanson River rainbow trout harvest (3,490). In 1985 and 1986, harvest for the canoe routes, including Swanson River, was about 6,200 fish, very similar to the 1980-1983 estimates. Harvests have declined since 1986, reaching a low of 2,600 in 1989, increasing again in the early 1990s.

Participation prior to 1986 was less than 10,000 angler-days. From 1986-1992 it has ranged from 10,980-16,970 angler-days. In the last 5 years it has stabilized at 10,000-11,000 days fished annually.

Regulation of this fishery has been unchanged since 1983. In that year individual bag and possession limits were established for the various species. In these canoe routes, including the Swanson River, the bag and possession limit was established at 5 trout, only 1 of which could be 20 inches or greater in length. Bait may be used in this fishery throughout the open season. There is no closed season in the lakes of the canoe route. In all flowing waters, including those small tributaries between the lakes, the season is restricted to June 15 through April 14. The remaining 2 months of the year are closed to rainbow trout fishing in streams to protect spawning fish.

BOARD OF FISH ACTIONS

There were no regulatory changes adopted affecting this fishery at either the 1990 or 1992 Board meeting. The Board will next review this fishery at its January 1996 meeting.

RECENT FISHERY PERFORMANCE

This fishery is not surveyed or monitored. Harvest and participation is estimated from the Statewide Harvest Survey (Table 40). Total harvest for 1993 was within the historic range; estimates for the 1994 season will be available in fall 1995. No negative public comments were received by the area office during the 1992 or 1993 seasons.

OUTLOOK

Observation indicates increasing interest in Kenai Peninsula rainbow trout fisheries. Although the reason(s) for this increased interest is not definitely known, it may be in response to the

Table 40.-Swanson River; Swanson River and Swan Lake Canoe Routes rainbow trout (RT) and Dolly Varden (DV) fisheries data, 1977-1993.

Year	Swanson River Harvest RT	Swanson River Harvest DV	Swanson River Canoe Route Harvest RT	Swanson River Canoe Route Harvest DV	Swan Lake Canoe Route Harvest RT	Swan Lake Canoe Route Harvest DV	Total Harvest RT	Total Harvest DV	Total[a] Participation Angler-days
1977							5,860	1,090	6,380
1978							4,390	1,160	5,770
1979							4,010	450	5,780
1980							6,900	1,300	6,700
1981							6,180	1,110	5,240
1982							6,440	1,150	6,330
1983							6,700	2,970	9,140
1984	3,490	320							
1985			3,070[b]	280[b]	3,160	450	6,230	730	7,060
1986			4,940[b]	370[b]	1,250	350	6,190	720	13,440
1987			1,940[b]	240[b]	2,260	890	4,200	1,130	12,330
1988	930	40	1,370	210	1,310	220	3,610	470	16,970
1989	550	90	1,190	90	860	160	2,600	340	11,240
1990	1,520	40	1,510	270	1,720	350	4,750	660	10,980
1991	1,118	131	1,233	104	1,703	183	4,054	418	11,259
1992	1,100	16	2,462	418	2,699	98	6,261	532	11,228
Mean	1,451	106	2,214	248	1,870	338	5,225	949	9,323
1993	424	88	1,588	419	1,608	331	3,620	838	10,840

[a] All species

[b] Includes Swanson River harvest.

increasingly crowded salmon fisheries. Some anglers consider Kenai Peninsula salmon fisheries too congested and no longer participate in them, preferring the less crowded rainbow trout fisheries such as those that occur in the Swanson River area. Participation and harvest in this fishery is therefore expected to display moderate annual increases. No change in the status of the rainbow trout resource is anticipated and there should be no negative impacts related to increased participation in this fishery.

CURRENT ISSUES

There are no issues associated with this fishery.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

KASILOF RIVER LATE-RUN CHINOOK SALMON FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives adopted for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the chinook salmon population does not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

There has been no inseason management in the history of this fishery. Management is effected through existing regulations. These regulations are conservative, permitting a harvest of late-run Kasilof River chinook salmon only downstream from the Sterling Highway Bridge.

HISTORICAL PERSPECTIVE

Limited information is available regarding this resource or the fishery it supports. Run timing is believed to be similar to that of late-run Kenai River chinook salmon, i.e. July and early August. Spawning area is believed in large part to be confined to that area from the Sterling Highway Bridge upstream to Tustumena Lake with an unknown proportion of the spawning population concentrated in the "slackwater" area at the outlet of Tustumena Lake. Here, late-run spawning fish are captured and provide the brood stock for the department's late-run chinook salmon stocking program in other Kenai Peninsula waters. No hatchery produced fish have been returned to Kasilof River; a population estimate of late-run Kasilof River chinook salmon has not been made.

Given that run timing and migratory behavior of late-run Kasilof River chinook salmon mirrors late-run Kenai River chinook salmon, both populations contribute to the late-run Cook Inlet marine sport fishery and to the Cook Inlet commercial fishery. The proportionate contribution of Kasilof River chinook salmon to these fisheries is not known.

The inriver Kasilof River sport fishery is limited by regulation to January 1 through July 31. During the early run (late May through June) the river is open in its entirety to chinook salmon

fishing. During the July late-run fishery, the area upstream from the Sterling Highway bridge is closed to chinook salmon fishing to protect fish on the spawning grounds. The early run is harvested by both bank and boat-based anglers; observation indicates the late run is harvested primarily by anglers employing drift boats. Kasilof River is too shallow to be readily negotiated with conventional power boats; small numbers of air and jet driven boats have been observed.

Harvest estimates for the early and late-run Kasilof River fishery are determined from the Statewide Harvest Survey. This study does not differentiate between early- and late-run fisheries; the proportionate contribution of early- and late-run fish to the total harvest is not known.

BOARD OF FISH ACTIONS

In 1992 the Board considered two public proposals to liberalize the late-run fishery: (1) to open the fishery in July upstream from the Sterling Highway Bridge, and (2) to extend the chinook salmon season through mid-August. Both proposals were rejected. Justification was the assumed small size of the population and the lack of information regarding the population's biological characteristics.

RECENT FISHERY PERFORMANCE

The fishery was neither creel surveyed nor monitored. Comments from the angling public indicated participation by drift boat based anglers continues to increase. Success rates were subjectively reported as similar to prior years.

OUTLOOK

Kenai Peninsula July chinook salmon fisheries are limited to the marine waters of Cook Inlet, and the Kenai and Kasilof rivers. The Kenai River supports the greatest participation. In years when the Kenai River is restricted for resource conservation, some of the displaced participants will fish the Kasilof River.

Participation is therefore expected to increase in this fishery, especially during years in which the Kenai River late-run fishery is restricted for resource conservation.

CURRENT ISSUES

A late-run chinook salmon population of unknown size is supporting an expanding inriver sport fishery and contributing to a marine sport and commercial interception fishery. Although there are no identified conservation concerns at this time, there is the potential to overharvest this resource.

RECOMMENDED RESEARCH & MANAGEMENT

It is suggested the department initiate a study of this population. Objectives of research would include estimating population size, identifying spawning areas, validating run timing and migratory assumptions described above and apportioning total Kasilof River harvest between early and late runs. Until such time as this study is complete, it is recommended that no liberalization of the fishery occur.

NORTHERN PIKE RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan; northern pike are an illegally introduced species on the Kenai Peninsula. The department adopted objective for this fishery is:

Objective 1: To provide the opportunity for angler participation to continue at present or increased levels.

INSEASON MANAGEMENT APPROACH

There has been no inseason management in the history of this fishery. Management is effected through existing regulations. Regulations are liberal because northern pike were illegally introduced into Kenai Peninsula waters and compete with resident trout and salmon species.

HISTORICAL PERSPECTIVE

Northern pike are not indigenous to the Kenai Peninsula. This species was illegally introduced into Derk's Lake, tributary to Soldotna Creek, in the mid-1970s. From this initial introduction they rapidly spread through the remainder of the drainage, including East and West Mackey lakes, Soldotna Creek and Soldotna (Sevena) Lake.

Pike is a predator species and reports from anglers indicated that as the number of pike in the drainage increased, numbers of rainbow trout and Dolly Varden declined. Soldotna Lake, prior to the introduction of pike, was reputed to support one of the most viable rainbow trout populations on the Peninsula. This lake's reputation as a trout producer declined steadily in the 1980s as pike became the dominant species.

There was considerable public and department concern that pike would become established in the mainstem Kenai River, negatively impacting this river's salmon and trout populations. Although small numbers of pike have been caught here (Table 41), there is no evidence to date that pike are reproducing in the mainstem Kenai River and negative impacts to the river's salmon and trout cannot be documented. Pike have, however, used the Kenai River as a migratory corridor.

In spring 1986 a weir was established on the east fork of the Moose River in conjunction with a rainbow trout study. One pike was known to have passed through the structure. Information from the Statewide Harvest Survey also indicates that anglers have harvested small numbers of pike in the inriver lakes (Afonasi, Imeri, Watson, Equmen, Peterson, Kelly and Hikers lakes) of this drainage. Harvests of pike are too small to be assigned to specific lakes (Table 41).

Northern pike were also illegally introduced into three unnamed lakes about 6 miles south of Soldotna in the early to mid-1980s. These lakes are accessed via Tote Road and it is assumed the pike were introduced by local residents. These lakes are landlocked.

Although there is some local interest in pike fishing, this species supports a minor if not insignificant sport fishery. The best pike fishing is in the Mackeys and Soldotna lakes. These lakes are almost entirely bordered by private land and access is limited. Some fishing by local residents, including spear fishing during the winter months, occurs throughout the year. Pike harvested in the east fork of the Moose River are probably caught incidental to rainbow trout and Dolly Varden. Total pike harvest on the Peninsula averages about 100 fish annually.

Table 41.-Kenai Peninsula northern pike harvest as determined by Statewide Harvest Survey, 1981-1993.

Year	Lakes	Kenai River	Total
1981	30		30
1982	100		100
1983	290		290
1984	190		190
1985	50	70	120
1986	0	0	0
1987	0	10	10
1988	40	0	40
1989	50	20	70
1990	30	10	40
1991	86	0	86
1992	239	0	239
Mean	92	14	101
1993	216	26	242

BOARD OF FISH ACTIONS

There were no regulations adopted affecting this species at either the 1990 or 1992 Board meetings.

RECENT FISHERY PERFORMANCE

Harvest estimates for 1993 indicate a Kenai Peninsula northern pike harvest of 242. This estimate is within the historical range (Table 41).

OUTLOOK

No change in stock status or harvest is anticipated in the immediate future. Northern pike immigration into new waters within the Kenai Peninsula drainage is slow; reproduction in waters other than Soldotna Creek drainage also appears limited. Angler participation in this fishery is limited and is expected to remain at low levels. Limited participation is attributed to limited public access in the Soldotna Creek drainage and the availability of alternate fisheries.

CURRENT ISSUES

As pike are not indigenous to the Peninsula and prey on native game species, their presence on the Kenai Peninsula is viewed negatively by the department and the majority of the angling public. When these fish were confined to Derk's and Mackeys lakes, there were tentative plans to eradicate them with rotenone. Before this plan could be implemented, they had spread throughout the Soldotna Creek drainage. Because this drainage is extensive and tributary to the Kenai River, chemical eradication was no longer feasible. Because they are now present in the mainstem Kenai River and are believed to have established a reproducing population in the east fork of the Moose River, eradication or control of the species in the Kenai River drainage is no longer possible.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

LAKE TROUT RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives adopted for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the lake trout population does not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

There has been no inseason management in the history of this fishery. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Lake trout are indigenous to a number of Kenai Peninsula lakes and have been introduced into one lake. Natural populations occur in glacial Tustumena, Skilak, Kenai and Upper and Lower

Trail lakes. Clearwater lakes naturally supporting this species include Hidden, Juneau, Swan, and possibly Trout lakes. Swan Lake is tributary to the Chickaloon River; Juneau and Trout lakes are tributary to the Kenai River via Juneau Creek. Crescent Lake (located on the west side of Cook Inlet) also supports this species.

In 1970, 204 lake trout were captured by gillnet in Skilak Lake and transported by Sport Fish Division personnel to Upper Summit Lake. In 1988 several lake trout were captured in Upper Summit Lake by gillnet. The small size of most of these fish and the presence of a larger adipose clipped fish indicated fish of the original stocking were still present and that reproduction had occurred. There is, however, no confirmation that anglers have successfully harvested lake trout from Upper Summit Lake.

Lake trout are harvested in Trail River, Kenai River and Kasilof River. Observation indicates the majority of the river harvest occurs at the inlets and outlets of the inriver lakes. These fisheries occur primarily in spring and fall. During the summer months it is assumed this species inhabits the deeper areas of lakes with a relatively small percentage of the population remaining in the shallower waters adjacent to the lake inlet or outlet. A harvest of this species is known to occur at the outlet of Crescent Lake (west side of Cook Inlet) throughout the open water period.

Research directed toward this species has been confined to Hidden Lake. In 1987, 435 fish were captured by gillnet to determine the population's age class composition. Weights and lengths of sampled fish are on file at the Soldotna Department of Fish and Game office. Harvest information is obtained annually from the Statewide Harvest Survey (Table 42).

BOARD OF FISH ACTIONS

There were no regulatory changes to this fishery considered at the 1990 or 1992 Board meetings. This fishery will next be reviewed in January 1996.

RECENT FISHERY PERFORMANCE

Total 1993 harvest was 3,862 lake trout with 1,449 lake trout from Hidden Lake. Harvests of lake trout in 7 of 8 locations were within historic ranges except for Kenai Lake. The harvest here of 816 indicates some expansion in this fishery (Table 42).

OUTLOOK

Salmon fisheries on the Kenai Peninsula are becoming increasingly congested. Anglers are expected to seek alternate fisheries which provide opportunities to catch or harvest rainbow trout, Dolly Varden and lake trout.

It is projected that participation and harvest will increase moderately in this fishery. These increases should not negatively impact the lake trout resource, with the possible exception of Hidden Lake, because this species is not fully utilized by Kenai Peninsula recreational anglers.

CURRENT ISSUES

With the exception of Hidden Lake, there are no issues associated with this fishery. Interest in harvesting lake trout in Hidden Lake is increasing even though harvest estimates are stable. Spring fishing participation is increasing, and eventually the expanding harvest will negatively impact this population of long lived, slow growing fish.

Table 42.-Kenai Peninsula lake trout harvest as determined by Statewide Harvest Survey, 1977-1993.

Year	Kenai River	Kasilof River	Other Rivers	Hidden Lake	Skilak Lake	Tustumena Lake	Kenai Lake	Other Lakes	Total
1977	250		540	1,540				1,350	3,680
1978	520		60	850				1,680	3,110
1979	410		540	1,110				1,550	3,610
1980	110		160	1,860				1,430	3,560
1981	720	150	160	1,070				1,260	3,360
1982	630	40	10	2,120				1,540	4,340
1983	650	0	0	1,440				1,330	3,420
1984	540	30	0	1,050				810	2,430
1985	950	40	40	1,400				290	2,720
1986	970	90	0	3,760				1,420	6,240
1987	320	140	0	1,050	710	180		850	3,250
1988	890	150	90	1,180	550	470		600	3,930
1989	290	50	250	620 [a]	90	50	100	510	1,960
1990	260	90	0	1,260	260	270	170	260	2,570
1991	497	80	0	1,494	363	162	485	362	3,443
1992	448	371	23	995	455	231	185	670	3,378
Mean	528	103	117	1,425	405	227		995	3,438
1993	335	71	57	1,449	233	92	816	809	3,862

[a] Access restricted due to campground construction.

RECOMMENDED RESEARCH & MANAGEMENT

The current bag/possession limit at Hidden Lake is a liberal 2 lake trout over 20 inches, and 10 under 20 inches. It is recommended that this bag limit be reduced. The present liberal bag limit does not conform with management strategies for lake trout elsewhere in the state. This could lead to overharvest of the lake trout resource in future years. A suggested limit is 3 lake trout only 1 of which may exceed 20 inches.

CRESCENT LAKE FISHERY

(West Side Cook Inlet)

FISHERY OBJECTIVE

This fishery is not specifically addressed by a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the resident and anadromous fish populations of Crescent Lake do not decline below the level necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management has not been required in this fishery. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Crescent Lake is a large, 3,650 surface acre (about twice the size of Hidden Lake), glacial lake on the west side of Cook Inlet. The lake is drained by Crescent River which enters Cook Inlet immediately north of Tuxedni Bay. Lake elevation is about 600 feet (Figure 26). Lands surrounding the lake are in federal ownership (Lake Clark National Park).

Crescent River supports populations of chinook, sockeye, coho, pink and chum salmon in addition to anadromous Dolly Varden. Resident lake species are lake trout and Dolly Varden. Rainbow trout are not known to inhabit the drainage.

A recreational fishing lodge is located adjacent to the outlet. The lodge is privately owned and has been on the lake since, and probably prior to, 1979. In 1988 and 1989 the owner of the lodge expressed concern regarding increased usage of the lake outlet and upper river area by anglers transported to the lake by air taxi operators. He believes increased usage is adversely impacting the Dolly Varden population.

In 1989, sockeye salmon were observed at the outlet by department personnel on August 15. These were mature fish and were not being harvested. "Bright" fish are reportedly available earlier in the season. Spawning sockeye were also observed in small tributaries which constitute the lake's headwaters. Anglers at the lake outlet were targeting Dolly Varden and lake trout.

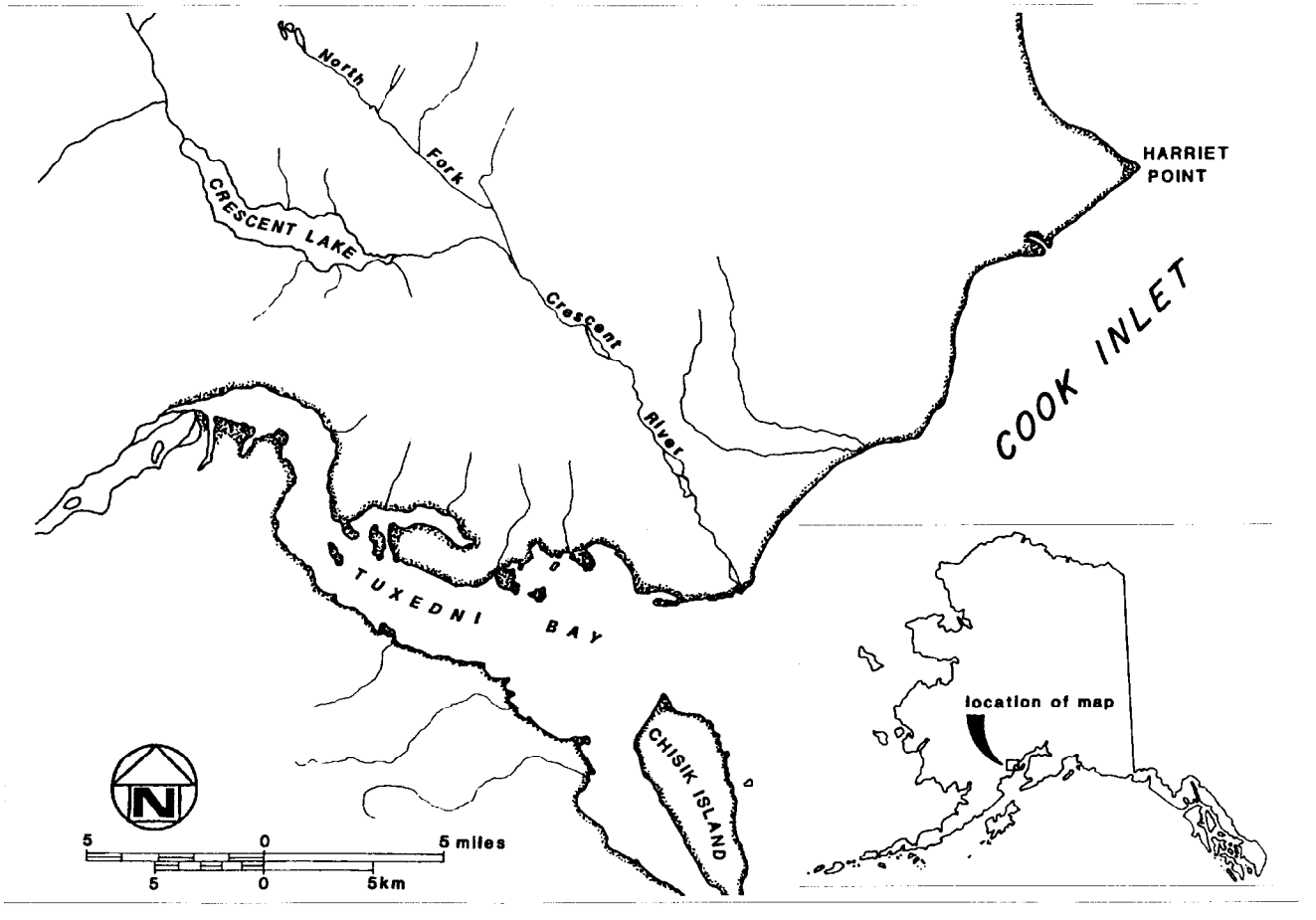

Figure 26.-The Crescent Lake drainage.

BOARD OF FISH ACTIONS

In 1990 the Board rejected a proposal requesting a restrictive bag and possession limit for this fishery. It was the Board's determination that the issue addressed by the proposal was social rather than biological and that restrictions to the fishery were not required at this time. The Board was not requested to address this fishery in 1992.

RECENT FISHERY PERFORMANCE

The fishery occurs at the lake outlet and for a distance of about 1.5 miles downstream. This section of the river may be fished from boats or rafts. Downstream from this area the stream narrows, forming a rapids. Boats do not travel downstream from the rapids. This 1.5 mile area is smaller in size, but comparable topographically to the outlet of Skilak Lake.

The fishery was not observed in 1991, 1992 or 1993; no negative comments were received by the area office regarding the fishery. The Statewide Harvest Survey does not estimate harvest in this fishery because of the small number of respondents who fished Crescent Lake.

OUTLOOK

Kenai Peninsula salmon and trout fisheries are becoming increasingly congested. These congested fisheries are undesirable to some participants. These displaced anglers are aware that less crowded fishing opportunities are available on the west side of Cook Inlet. It is therefore projected that participation in the Crescent Lake and other west side Cook Inlet fisheries will increase as anglers seek less crowded alternative recreational fishing opportunities.

Given the relatively large size of Crescent Lake and the relatively small area in which the fishery occurs, it is not anticipated that increased participation and harvest in this fishery will negatively affect anadromous or resident fish stocks.

CURRENT ISSUES

Crescent Lake is receiving increasing sport fishing effort. Air taxi operators from Soldotna, Kenai and Anchorage fly clients to the lake. Increased angler participation has increased the harvest of both Dolly Varden and lake trout. The increased harvest is perceived by some members of the angling public as a resource conservation issue. The perceived conservation issue is exacerbated by philosophical differences of user groups. Clients of the lodge reportedly practice catch-and-release fishing; anglers that fly in to the lake are reportedly more harvest oriented.

It is unlikely that there is a resource conservation issue associated with this lake. Given the size of the lake, it is not reasonable to assume the entire lake's populations of Dolly Varden and lake trout are being negatively affected. A decline in abundance of these species in selected areas of the lake outlet may be occurring over time. Numbers of fish would decline throughout the season, being replaced by fish migrating from the lake the following spring to this preferred area.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

KENAI RIVER DOLLY VARDEN FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the Kenai River Dolly Varden population does not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management has not been required in this fishery. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Dolly Varden are harvested in all areas of the Kenai River. The season is January 1 through December 31, except in the upper area of the river where all fishing is prohibited from April 15 through June 10. Prior to 1984 the bag and possession limit was 10 Dolly Varden of any size. Beginning in 1984, this limit was reduced to 5 Dolly Varden of any size. This applied to all Kenai Peninsula waters. Harvest and catch of this species is determined by the Statewide Harvest Study. Harvests from 1984-1990 ranged from 5,775-31,407 (Table 43).

The Kenai River is assumed to support both a resident and anadromous Dolly Varden population. Only limited biological information is available regarding both populations. Resident fish are believed to inhabit the entire river, including both Skilak and Kenai lakes. Seasonal movements of these resident fish are not known, but it is assumed that a percentage of the stream-residing fish overwinter in Skilak and Kenai lakes. The anadromous population is believed to enter the Kenai River in July and it is assumed that a percentage of this population also overwinters in Skilak Lake and probably Kenai Lake. The outmigration occurs in April and May. The harvest estimate presented in Table 43 does not differentiate between resident and anadromous populations.

BOARD OF FISH ACTIONS

At its 1990 meeting the Board agreed with observations and comments of the public that the Dolly Varden harvest in the "Trophy Trout" area of the river (that area between Kenai and Skilak lakes) was probably increasing and would continue to increase concurrent with increasing angler effort. Although the Board recognized that a conservation issue could not be identified at that time, it chose a conservative management approach and reduced the Dolly Varden bag and possession limit in the "Trophy Trout" area to 2 daily, only 1 of which may be 24 inches or larger. There was no seasonal limit placed on the harvest of these large Dolly Varden; regulation of this species in other areas of the river was unchanged.

Table 43.-Kenai River Dolly Varden harvest and catch by river section as determined by Statewide Harvest Survey, 1984-1993.

	Harvest									Catch								
	Downstream Section		Midstream Section		Upstream Section		Skilak Lake to Kenai Lake		Total	Downstream Section		Midstream Section		Upstream Section		Skilak Lake to Kenai Lake		Total
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
1984	7,506	23.9	1,966	6.3	11,211	35.7	10,724	34.1	31,407									
1985	7,560	28.8	3,277	12.5	8,930	34.0	6,468	24.7	26,235									
1986	1,249	21.6	771	13.4	1,928	33.4	1,827	31.6	5,775									
1987	2,429	31.8	1,671	21.9	2,139	28.0	1,391	18.2	7,630									
1988	3,531	32.2	1,266	11.5	3,527	32.1	2,653	24.2	10,977									
1989	3,414	33.9	1,371	13.6	3,649	36.3	1,630	16.2	10,064									
1990	2,738	22.9	2,424	20.2	2,741	22.9	4,079	34.0	11,982	7,795	22.5	5,094	14.7	7,537	21.8	14,151	40.9	34,577
1991	4,211	29.0	3,285	22.6	4,268	29.4	2,740	18.9	14,504	10,665	15.5	8,116	11.8	19,363	28.2	30,601	44.5	68,745
1992	3,777	26.1	2,516	17.4	4,900	33.9	3,269	22.6	14,462	11,822	15.0	5,899	7.5	26,348	33.4	34,754	44.1	78,823
Mean	4,050	27.8	2,060	15.5	4,810	31.7	3,860	25.0	14,780	10,090	17.7	6,370	11.3	17,750	27.8	26,500	43.2	60,720
1993	4,599	36.2	1,539	12.1	3,503	27.6	3,057	24.1	12,698	13,019	17.1	6,079	8.0	20,778	27.2	36,451	47.8	76,327

In 1992 the Board adopted a public proposal with staff support which reduced the Dolly Varden bag/possession limit in the remainder of the Kenai River, including Skilak Lake to 2 daily and in possession. No size limit was requested or applied by the Board in adopting this proposal.

RECENT FISHERY PERFORMANCE

This fishery is not creel surveyed or monitored. Harvest estimates are derived from the Statewide Harvest Survey. Estimates in Table 43 reflect a fishery with a peak harvest in 1984 (31,407). The significant decline in 1986-1987 harvests is attributed to the more restrictive bag limit (five fish) and adoption of a voluntary catch-and-release philosophy. Harvests since 1988 have stabilized at 10,000-15,000 Dolly Varden. Harvest in 1993 was 12,698; catch, 76,327. Retention rate was therefore a relatively low 17%.

OUTLOOK

There is a general increased interest in Kenai Peninsula rainbow trout and Dolly Varden fisheries. In the Kenai River the target species is more often rainbow trout than Dolly Varden, with Dolly Varden being harvested incidental to rainbow trout. As participation in rainbow trout fisheries increases, the Dolly Varden harvest will also increase. The outlook for this fishery is therefore for increasing annual harvests. Annual increases in harvest are expected to be relatively small due to conservative regulation of the fishery, especially between Kenai and Skilak lakes.

CURRENT ISSUES

Although no conservation issue has been identified in this fishery, there has been some concern articulated by both staff and public regarding the rapid expansion of this fishery and its effect on the Kenai River Dolly Varden resource. This concern was partially addressed in action taken by the Board in 1990. However, some fishery participants are still concerned about the status of the resource.

RECOMMENDED RESEARCH & MANAGEMENT

It is recommended that research address the status of the Kenai River Dolly Varden population. Emphasis should be placed on ascertaining the size of the population and its biological characteristics. Seasonal movements of this species should be ascertained and a determination made as to whether or not both anadromous and resident fish inhabit the Kenai River drainage. Initial research should focus on that area of the river between Kenai and Skilak lakes as this area is experiencing a rapid growth in angler participation.

KENAI RIVER PINK SALMON FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the Kenai River pink salmon spawning population does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management has not been required in this fishery. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Pink salmon in waters of the Kenai Peninsula are generally considered a commercial species. Commercial drift gillnet harvest from 1966-1993 averaged 275,382 fish; eastside Kenai Peninsula set gillnet catches for this period averaged 231,108 fish. This species is abundant only on even years; the commercial harvest originates primarily in the Kenai and Susitna River drainages.

Small numbers of pink salmon return to the southern Peninsula streams of Anchor River, Stariski Creek, Deep Creek and Ninilchik River. They are harvested here incidental to Dolly Varden and coho salmon. Typical annual harvests are less than 500 fish from these four streams. A nontargeted pink salmon fishery also occurs in Kasilof River with an annual harvest in recent years of less than 200.

The majority of Kenai Peninsula pink salmon are harvested in the Kenai River. As with the commercial fishery, the Kenai River sport harvest is significant only on even years (Table 44).

Table 44.-Sport harvest of pink salmon in the Kenai River, 1977- 1993.

Year	Number	Year	Number
1977	163	1986	19,924
1978	26,579	1987	941
1979	127	1988	15,777
1980	18,580	1989	1,421
1981	86	1990	27,185
1982	25,572	1991	2,416
1983	1,825	1992	10,029
1984	28,560	1993	1,003
1985	1,306		

Pink salmon mature rapidly on entering fresh water and are readily caught with artificial lures. These fish are therefore popular with juvenile anglers and tourists; the majority of the harvest occurs in the lower river. In 1989 the bag and possession limit in the Kenai River was increased to 6 fish; in other Kenai Peninsula drainages it remained an aggregate of 3 sockeye, coho or pink salmon 16 inches or greater in length.

BOARD OF FISH ACTIONS

There were no changes in the regulation of this fishery adopted at either the 1990 or 1992 meetings. The Board will next review this fishery in January 1996.

RECENT FISHERY PERFORMANCE

Few pink salmon return to the Kenai River in "odd numbered years;" relatively large numbers return in "even-numbered years." Pink salmon were therefore abundant in 1992. Estimated

harvest, however, was a low 10,029 (Table 44). This is the lowest "even-numbered year" harvest in the history of the fishery.

The Statewide Harvest Survey estimated that the 1992 Kenai River pink salmon catch was 74,000 fish. Decreased harvest is therefore a function of retention rate in the fishery rather than catch rate or numbers of pink salmon available to the angler. The reason for this low retention rate in 1992 is not known.

Relatively small numbers of pink salmon were available to anglers in 1993. Harvest was 1,003 fish; catch 3,001 fish.

OUTLOOK

Pink salmon mature rapidly on entering the Kenai River and are not desirable to many, especially local, anglers. The fishery is therefore most popular with juvenile anglers and tourists.

The fishery has not exhibited significant growth since data became available in 1977. Liberalization of the fishery in 1989 did not increase the harvest or popularity of this species among Kenai River sport fishermen. The outlook is therefore for a continuation of a stable fishery with a significant harvest occurring only on "even-numbered years."

CURRENT ISSUES

Commercial harvest data indicate a stable population; there are no biological or allocative concerns regarding Kenai Peninsula pink salmon.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

WEST SIDE COOK INLET EARLY-RUN COHO SALMON (Kustatan River, Polly Creek, Silver Salmon Creek)

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that west side Cook Inlet early-run coho salmon spawning populations do not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

With the exception of the Silver Salmon Creek fishery in 1987, inseason management of west side Cook Inlet early-run coho salmon fisheries has not been required. Management is effected through existing Board adopted regulations.

HISTORICAL PERSPECTIVE

The Kustatan River, Polly Creek and Silver Salmon Creek are west side Cook Inlet tributaries (Figure 27). These streams support an increasingly popular early-run coho salmon fishery. Run timing is usually earlier here than in Kenai Peninsula streams; early-run coho salmon are present from as early as mid-July through August.

Kustatan River is the largest of the three streams located immediately south of the West Forelands. This turbid stream also supports what are believed to be relatively small populations of sockeye, chinook and pink salmon, Dolly Varden and rainbow trout. Recreational anglers access the river by wheel and float plane landing in the lower river, small lakes adjacent to the river, at unimproved landing strips and on gravel bars. Small numbers of anglers access the river by boat. Fishing occurs adjacent to aircraft landing areas. The most popular area is the confluence of the river and a clearwater slough approximately 3 miles upstream from Cook Inlet. Several commercial operators have established camps here with small boats available for clients to use.

Harvest and participation estimates for the Kustatan River coho salmon fishery are available for most years since 1984 (Table 45).

Polly Creek is a clearwater stream tributary to Cook Inlet about 4 miles north of Tuxedni Bay. The stream also supports runs of pink and chum salmon, and Dolly Varden. Access is via wheel aircraft which land on the beach or on a private airstrip adjacent to the beach. The majority of angler activity is confined to the lower mile of stream; some lands adjacent to the stream are in private ownership and permanent residences are located here.

Observation indicates Polly Creek supported the most popular westside coho salmon fishery in the 1970s. In the 1980s and 1990s angler attention has been focused on Kustatan River to the north and Silver Salmon Creek to the south. Harvest estimates from the Statewide Harvest Survey are not available for Polly Creek in most years due to small sample size. Estimated harvest in 1992 was 332 coho salmon; participation, 747 days fished.

Silver Salmon Creek is located on the west side of Cook Inlet approximately midway between Tuxedni and Chinitna bays. The stream originates in Silver Salmon Lake. Total length of the stream is approximately 1.5 miles. In the intertidal area, the stream's maximum width is about 200 feet. Above the intertidal area, width decreases to 30-50 feet. Average depth in this area is 2-3 feet depending on rainfall and seasonal variation.

The stream has been a popular area with some Anchorage and Kenai Peninsula anglers for a number of years. Access to the area is via aircraft which land on the beach. These anglers generally fish the intertidal area of the stream. There are several private residences in the area and one commercial facility, Silver Salmon Creek Lodge. Local residents, in large part, also limit their fishing activity to the lower area of the stream. In the mid-1980s float planes began to land on Silver Salmon Lake. Generally, anglers that arrived via float plane fished the outlet of the lake.

In the spring of 1987, a petition to the Board of Fisheries was received from the owner of the Silver Salmon Creek Lodge. The petition was signed by 43 individuals and requested a sport

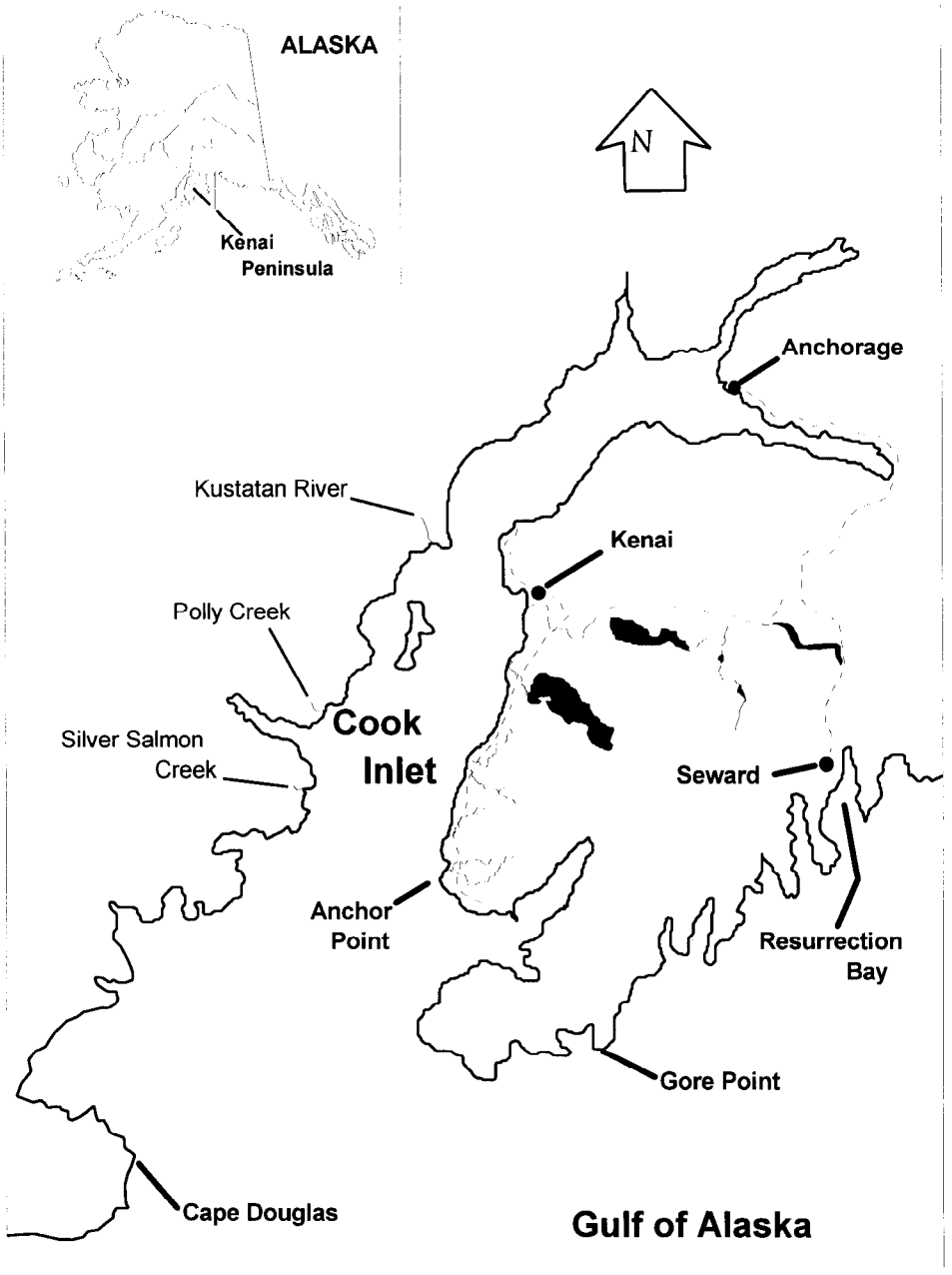

Figure 27.-Westside Cook Inlet drainages of Kustatan River, Polly Creek, and Silver Salmon Creek.

Table 45.-Harvest and participation for the Kustatan River coho salmon sport fishery, 1984-1993.

Year	Coho Salmon Harvest	Participation (Days)
1984	1,656	1,673
1985		
1986	3,239	2,737
1987	5,723	3,622
1988	6,221	3,674
1989	5,413	3,522
1990	4,584	3,724
1991	5,768	6,674
1992	4,494	4,150
1993	6,457	5,403

fishing closure above the main channel. Justification for the request was increased sport fishing activity on the spawning grounds and loss of spawning area due to natural stream rechannelization.

Silver Salmon Creek was observed by division regional and area staff on May 27. The decision to close the upper one-half mile to salmon fishing was made at that time. Justification was the reduction in spawning area which resulted from stream rechannelization in addition to the increased recreational use of the area. The emergency closure was issued June 8. This closure was supported by the National Park Service which viewed float plane landings on Silver Salmon Lake as disruptive to swans which utilized this area.

The emergency closure precluded fishing at the outlet of the lake. This was the area most heavily fished by those who accessed the area by float plane. Float planes continued to land on the lake. Anglers then walked approximately one-half mile downstream and fished the intertidal area.

Four surveys of Silver Salmon Creek were made in 1987. An aerial and ground survey was conducted September 25. About 50 fish were actively spawning and an estimated 1,000-1,500 fish were still schooled at the outlet of the lake.

In 1988 Sport Fish staff decided that Silver Salmon Creek coho salmon should be managed inseason based on the number of fish returning to the drainage. The emergency closure which prohibited fishing at the outlet of Silver Salmon Lake downstream for a distance of about one-half mile was not reissued. It was decided that if 500 coho salmon were not observed at the lake outlet by the first week of September with an additional 1,000 coho salmon present by late September, that restrictions to the fishery may be required. The primary user of the lake outlet (Kalgin Island Lodge) and Silver Salmon Creek Lodge, whose clients fish the lower river, were notified via mail of this management strategy.

Four aerial surveys of the stream were again flown. Based on experience acquired in 1987, foot surveys cannot be effectively employed to enumerate salmon in this drainage. All surveys were conducted by experienced observers. The final survey revealed 800-1,200 coho salmon present at the lake outlet.

In 1988 the Board closed the Silver Salmon Creek drainage upstream from the treeline to all salmon fishing. Fishing for other species, primarily Dolly Varden, continued to be permitted throughout the drainage. This action changed the prosecution of this fishery in 1989 in that those anglers who accessed the area via float plane were no longer able to harvest salmon at the lake outlet.

Harvest of coho salmon from Silver Salmon Creek ranged from 302 to 1,872 fish from 1983-1993 (Table 46).

Table 46.-Harvest and participation for the Silver Salmon Creek coho salmon sport fishery, 1983-1993.

Year	Coho Salmon Harvest	Participation
1983	1,872	
1984	661	
1985		
1986	302	
1987	706	
1988		
1989	735	1,285
1990	320	915
1991	1,120	1,112
1992	494	597
1993	853	1,080

BOARD OF FISH ACTIONS

There were no regulatory changes adopted by the Board for this fishery at their 1990 or 1992 meetings.

RECENT FISHERY PERFORMANCE

Harvest and participation estimates are provided by the Statewide Harvest Survey. Harvest of coho salmon on Kustatan River was a record high of 6,457 in 1993 (Table 45). The estimated harvest of 853 coho salmon for Silver Salmon Creek in 1993 is within the historic range. The harvest of 332 coho salmon and participation of 747 days fished in 1992 are the only data available for Polly Creek. Harvest estimates for the 1994 season will be available in fall 1995.

No spawning escapement surveys were attempted in either Polly or Silver Salmon creeks in 1994. Participation in these creek's fisheries is believed similar to recent years. No public complaints were received this season regarding the status of the westside Cook Inlet coho salmon resource. The public, however, continued to bring to the department's attention the increased participation in the Kustatan River, notably at the confluence of the river with the small clearwater slough approximately 3 miles upstream from Cook Inlet.

Blacksand Creek, tributary to Kustatan River, was reported by long time fishery participants to be a major spawning area in this drainage. An aerial survey of the upper Kustatan River was flown on September 24, 1993 to observe the area. Between 300 and 500 coho salmon were observed. The percentage of the total spawning population that this count represents is unknown.

OUTLOOK

Because of increases in participation in Kenai Peninsula salmon fisheries, some anglers are finding them too congested and are seeking less crowded recreational fisheries. The westside Cook Inlet coho salmon fishery is viewed by some of these anglers as a viable alternative. Participation in the coho salmon fishery at Kustatan River, Polly Creek and Silver Salmon Creek is therefore expected to increase.

CURRENT ISSUES

No resource conservation issue has been identified in the aforementioned rivers. Of concern to some members of the public who have fished Kustatan River for a number of years is the increased usage in recent years by "new anglers," including increased participation by guided and chartered anglers. Most public concern is focused on the concentrated participation occurring in the clearwater slough approximately 3 miles upstream from Cook Inlet. At this time it is not known if the slough is a spawning area, holding area for coho salmon migrating to spawning grounds upstream or a combination thereof.

Given the size of the Kustatan drainage, it is unlikely the present annual sport harvest of less than 7,000 coho salmon poses a conservation issue. If the heavily fished slough is a spawning area, sport anglers may be capable of negatively impacting the reproductive potential of fish utilizing this area.

RECOMMENDED RESEARCH & MANAGEMENT

The department has no biological information regarding the stock status of Kustatan River coho salmon. The sport harvest here is expected to continue to increase. Although increasing harvest is not presently assumed to be a conservation issue, this assumption is not fact. The challenge to the department is therefore to develop a cost effective program to assess the status of Kustatan River coho salmon.

BIG RIVER LAKE/WOLVERINE CREEK EARLY-RUN SOCKEYE SALMON FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the Wolverine Lake early-run sockeye salmon spawning population does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management of this fishery has not been required to date. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Big River is a large generally clearwater westside drainage tributary to Cook Inlet about 8 miles south of the West Forelands. The river supports populations of sockeye, chinook, coho and pink salmon, Dolly Varden and rainbow trout. The drainage is believed to support both an early and late sockeye salmon run.

Cook Inlet Aquaculture Association operated a weir on Wolverine Creek in 1982 and 1983. The weir was installed June 22 and was removed August 9, 1982. Total sockeye salmon enumerated was 32,950; 59% had passed the structure by July 3 with a peak passage of 3,356 on June 28. In 1983 the weir was operational June 10, and was removed August 6. Total sockeye salmon enumerated was 18,189; 68% were enumerated by July 3 and peak day of passage (1,485) was June 22.

These fish spawn in Wolverine Lake which is drained by Wolverine Creek. Wolverine Creek is tributary to Big River Lake which is in large part considered the headwaters of Big River. Big River Lake is about 10 miles from Cook Inlet. Access to the lake is via float plane. The sockeye salmon sport fishery occurs adjacent to the mouth of Wolverine Creek in Big River Lake beginning in mid-June and continuing through July.

In 1982 Cook Inlet Aquaculture personnel staffing the Wolverine Creek weir observed 123 aircraft, one helicopter and three boats which transported 396 anglers to the fishery. Assuming limit catches of 3 sockeye salmon per angler, harvest that year was a maximum of 1,188 sockeye salmon or about 3.5% of the return destined for Wolverine Lake spawning grounds. In 1983 weir staff observed 196 aircraft, two canoes and five boats which transported 624 anglers to the mouth of Wolverine Creek. Assuming limit catches, the 1983 sport harvest was a maximum of 1,872 sockeye salmon or about 9.3% of the Wolverine Lake return.

Current harvest and participation data in this fishery are derived from the Statewide Harvest Survey and are available only for 1990 and 1993; sample size was too small in other years to generate an estimate. Harvest in 1990 was estimated at 437 sockeye salmon; participation, 370 days fished. Catch was estimated at 1,044 sockeye salmon. Given the observations of 1982-1983 and the increasing popularity of the fishery, the 1990 estimates are believed conservative.

In 1988 a public proposal was adopted by the Board establishing Wolverine Creek, including Big River Lake within a 500 yard radius of the mouth of Wolverine Creek, as a fly-fishing-only area from June 1 through July 31. The regulation was adopted to reduce the incidence of both intentional and unintentional snagging which had become a social issue in this fishery.

BOARD OF FISH ACTIONS

There were no regulatory changes adopted for this sport fishery at either the 1990 or 1992 meetings. In 1992, however, changes were adopted for the Big River Sockeye Salmon Management Plan which governs the prosecution of the commercial fishery in Cook Inlet which targets this stock. The commercial season opening date was changed from May 25 to June 1; the closed area at the mouth of Big River was expanded and the fishery would be closed when 1,000 chinook salmon are estimated to have been harvested. The net effect of these regulations may reduce the commercial harvest of Wolverine Creek early-run sockeye salmon.

RECENT FISHERY PERFORMANCE

An insufficient number of responses was received from fishery participants to generate 1991 or 1992 harvest and participation estimates from the Statewide Harvest Survey. Estimated harvest in 1993 was 976 sockeye salmon; catch, 2,364 and participation, 535 days fished.

Dan (retired Division of Wildlife Conservation Regional Supervisor) and Karen Timm resided at Big River Lake during the 1991 and 1992 seasons. Their observations were that in both years from June 20 to July 25, an average of eight planes/day arrived and departed from the lakes. In August the daily average declined to 1.25. Assuming about three anglers/plane, they estimated 1,070 to 1,140 anglers fished the area these years. They further estimated each angler caught five salmon (daily bag limit is 3; possession limit 6) and estimated total harvest at 5,350 to 5,700 in both years. Of this total, 585 to 625 were coho salmon, the remainder sockeye salmon. These observers further estimated the 1991 sockeye salmon numbers were 40%-50% of the number (33,000) enumerated in 1982 and in 1992 only about 30%-40% of the 1991 number were present. Applying this estimate, return in 1991 would have approximated 15,000; in 1992, 5,000.

No harvest estimates or observations are available for the 1993 or 1994 seasons.

OUTLOOK

Because of increasing participation in many Kenai Peninsula salmon fisheries, some anglers are finding them too congested and are seeking less crowded recreational fisheries. The west side Big River Lake early-run sockeye salmon fishery is viewed by some of these anglers as a viable alternative. Similarly, there has been increased interest by commercial air charter operators in promoting participation in the more remote sport fisheries on the west side of Cook Inlet. Participation in this fishery is therefore expected to continue to increase.

CURRENT ISSUES

There are two issues regarding this fishery: (1) the possible decline in the Wolverine Lake sockeye salmon spawning population, and (2) the illegal snag fishery which has been reported by fishery participants.

Spawning escapement data for this fishery are limited to weir counts in 1982 and 1983; abundance estimates thereafter are limited to observation (see Historical Perspective). The population status (stable, increasing or decreasing) can therefore not be definitively ascertained. A real decline in abundance is a potential issue in the biological management of this fishery. A perceived decline by the user group is also a management issue.

The attempt by the Board in 1988 to establish a "Russian River type" fishery here, by designating the mouth area as fly-fishing-only, has not been successful. Sockeye salmon at Russian River are oriented to the current in close proximity to the bank. The fly is not retrieved but drifted at river velocity. There is virtually no current at the outlet of Wolverine Creek; sockeye salmon are swimming randomly and not necessarily oriented to the limited current. Terminal tackle (artificial fly) cannot drift but must be retrieved. The character of fish behavior here and the lack of flowing water leads to unintentional snagging as the fly is retrieved. Failure to catch fish legally when many fish are present fosters the retention of illegally hooked fish by some of the fishery participants.

RECOMMENDED RESEARCH & MANAGEMENT

Of concern to management is the possible decline in the sockeye salmon population and the illegal practice of snagging. It is recommended that aerial surveys be conducted in 1995 to ascertain the relative magnitude of the return. If the return appears to be significantly less than enumerated in 1982, a formal enumeration program (weir) for the 1996 season should be considered. This program should be coordinated with the CFMD because the commercial fishery is the primary harvester of this stock.

The issue of unlawful snagging should be referred to Fish and Wildlife Protection with a request that routine contacts with anglers utilizing the fishery be increased.

KENAITZE TRIBAL AND NINILCHIK TRADITIONAL COUNCIL EDUCATIONAL FISHERIES

FISHERY OBJECTIVE

These are Federal Court ordered fisheries the regulation of which was developed by consent preliminary injunction. Terms of the injunction were incorporated into the Educational Permit. The objective of the fishery is to implement the provisions of the permit. These provisions are described in "Recent Fishery Performance."

INSEASON MANAGEMENT APPROACH

Inseason management of the fisheries is effected by terms of the Educational Permit.

HISTORICAL PERSPECTIVE

The 1989 Kenaitze educational fishery resulted from extensive legislation and litigation related to both state and federal interpretation of "subsistence." An abbreviated chronology of events culminating in the educational fishery are:

1. In 1971 the Alaska Native Claims Settlement Act, in exchange for $962.5 million and 46 million acres, extinguished aboriginal hunting and fishing rights.
2. In 1978 Alaska passed legislation providing for a subsistence priority in allocating fish and game resources.
3. Alaska National Interest Lands Conservation Act (ANILCA) was enacted in 1980. This act provided that "the taking on public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes." "Subsistence uses" were defined as "the customary and traditional uses by rural Alaska residents of wild, renewable resources." ANILCA did not define rural.
4. ANILCA provided for the continued state management of fish and wildlife resources on federal lands if the state subsistence law mirrored the subsistence provision of ANILCA.
5. In December 1980 the Board of Fisheries established ten criteria to identify "customary and traditional uses" of Cook Inlet salmon stocks. In the spring of 1981, the Board applied these criteria to Cook Inlet which virtually eliminated subsistence fishing there. This action lead directly to "Madison vs. Alaska Department of Fish and Game" in 1985 which challenged rural priority.

6. In the spring of 1982 the Joint Boards adopted what became known as the "eight criteria regulation." The eight criteria were modeled after the Cook Inlet ten criteria developed a year earlier by the Board of Fisheries. This joint Board action limited the subsistence priority to "rural Alaska residents."
7. In May 1982, the Secretary of the Interior certified that the state was in compliance with ANILCA.
8. In 1985 the Alaska Supreme Court found the action of the Boards inconsistent with state law (Madison vs. Alaska Department of Fish and Game). This decision held that subsistence uses of fish and game could not be solely for rural residents.
9. Following the "Madison decision," the Secretary of the Interior notified the state that it was no longer in compliance with ANILCA.
10. In 1986 the Alaska Legislature amended the state subsistence statute to limit subsistence to rural residents and provided a definition of "rural." The term was defined as "a community or area of the state in which the noncommercial, customary and traditional use of fish or game for personal or family consumption is a principle characteristic of the economy or of the community or area."
11. With the passage of the 1986 subsistence statute, Alaska was again in compliance with ANILCA.
12. A letter from Assistant Secretary of the Interior, William Horn (November 7, 1986), stated that under the original state subsistence statute (1978) the Kenai Peninsula was a rural area and qualified for the subsistence priority; 1986 state legislation precluded most of the Kenai Peninsula from the definition of rural and hence from the subsistence priority.
13. In 1986 the Kenaitze Tribe in federal district court contended that the state's definition of "rural" in which the noncommercial use of fish or game is a "principle characteristic of the economy" is not consistent with the term "rural" as used by Congress in enacting ANILCA. This tribe argued that the Kenai Peninsula was rural.
14. Initially, the U.S. District Court found Alaska's definition of rural consistent with ANILCA and denied the Kenaitze request for a preliminary injunction.
15. In 1989 the Ninth Circuit Court reversed the District Court ruling and held that Alaska's definition of rural was not consistent with "rural" as used in ANILCA. This court held the Kenai Peninsula to be a rural area under ANILCA and remanded the case back to the District Court with instructions to this court to issue a preliminary injunction granting a subsistence fishery to the Kenaitze Tribe.
16. In 1993 the Ninilchik Traditional Council joined the Kenaitze suit; an educational permit was negotiated with the council.

BOARD OF FISH ACTIONS

The Board has not addressed this fishery. Establishment of the fishery was directed by Federal Court; regulations have been developed by the department in cooperative negotiations with the Kenaitze Tribe and Ninilchik Traditional Council.

RECENT FISHERY PERFORMANCE

The Kenaitze Tribal fishery has occurred each year since 1989; permit stipulations in 1994 were:

1. The salmon season was May 28 to September 1, and September 16 through September 30. Smelt and hooligan season was June 1 through November 30.
2. Maximum gillnet mesh was 8.5 inches. If the chinook salmon quota was achieved, mesh size would then be reduced to 6.0 inches for the remainder of the season.
3. Harvest quota was 5,000 salmon, no more than 300 of which could be chinook salmon (the chinook salmon quota was 600 in 1989 and 1990).
   a. If 300 chinook salmon or 1,000 sockeye salmon were taken prior to July 1, salmon fishing would terminate and not resume until July 1;
   b. If the chinook salmon quota was achieved, any chinook salmon caught had to be released.
4. No more than 500 coho salmon could be taken after September 15.
5. Area in which fishing was permitted was identical to prior years, i.e. approximately the lower 5 miles of the Kenai River, including Cook Inlet immediately adjacent to the mouth of the Kenai River.
6. Salmon harvested had to be marked by removing both lobes of the caudal fin.

The Sport Fish Division again provided the Tribe with a form for harvest reporting. Daily harvests were provided to the department upon request.

Seasonal harvest as reported by the Tribe in 1994 was:

Early-run chinook salmon	56
Late-run chinook salmon	1
Early-run sockeye salmon	436
Late-run sockeye salmon	1,471
Early-run coho salmon	346
Late-run coho salmon	483
Pink salmon	134
Total salmon	2,927

A summary of the 1994 fishery was received from the Kenaitze tribe and is on file in the Soldotna office.

Total salmon harvest ranged from 2,156 to 4,973 from 1989-1993. The 1994 harvest was therefore the second lowest recorded in the 6-year history of the fishery (Table 47).

Table 47.-Salmon harvest for the Kenaitze Tribal educational permit, 1989-1994.

Year	Number	Year	Number
1989	4,121	1992	3,987
1990	4,973	1993	2,156
1991	4,948	1994	2,927

The Ninilchik Traditional Council educational permit was patterned after the Kenaitze educational permit. This permit was issued for a second time in 1994. Permit stipulations in 1994 were:

1. The salmon season was May 28 through August 31, and September 16 to September 30, 1994.
2. Salmon could be taken only by a single set gillnet not exceeding 10 fathoms in length, 45 meshes in depth and a maximum of 6 inches in mesh size.
3. Fishing area was limited to the waters of Cook Inlet between a point 100 yards north of the Ninilchik boat harbor entrance and the latitude of a marker located approximately 1 statute mile north of the Ninilchik boat harbor entrance and extending one-fourth statute mile offshore from mean low water.
4. Harvest quota was 2,000 salmon, no more than 250 of which could be coho salmon and no more than 50 could be chinook salmon taken prior to July 21. The department would authorize the taking of an additional 50 chinook salmon after July 21 provided the projected spawning escapement of chinook salmon in the Kenai River exceeded 22,300. After July 20 chinook salmon could not be taken if the projected spawning escapement to the Kenai River was below 22,300 or there were restrictions to either the Kenai River chinook salmon sport or Cook Inlet commercial fishery.
5. Salmon harvested under the terms of this permit were required to have both lobes of the caudal fin removed.
6. As with the Kenaitze fishery, the Council was required to report their harvest to the department when requested; a summary of the season was required to be submitted to the department 10 days after the close of the season.

Total harvest as reported by the Council was:

Early-run sockeye salmon	3
Early-run chinook salmon	7
Late-run chinook salmon	0
Late-run sockeye salmon	159
Early-run coho salmon	119
Late-run coho salmon	0
Pink salmon	16
Total salmon	304

As of this writing no formal season summary has been received from the Ninilchik Traditional Council as required under terms of the permit.

OUTLOOK

These are Federal Court ordered fisheries; their annual occurrence is dependent on negotiation of a consent preliminary injunction and the issuance of an educational permit in compliance with the injunction. The injunction is directly related to Alaska's subsistence issue. The issue of subsistence has yet to be resolved and is still before the courts. Given the fluidity and volatility

of the subsistence issue, it is not possible to predict whether or not these fisheries will again occur in 1995.

CURRENT ISSUES

The Kenaitze Educational Fishery is a court mandated fishery which harvests salmon of Kenai River origin. The harvest of chinook salmon is minimal and has an insignificant effect on the inriver sport fishery. The coho and sockeye salmon harvests are also relatively small in relation to numbers of fish present.

There was some negative public reaction to this fishery in 1989. Negative public comment was prevalent during the early weeks of the 1990 season, abating as the season progressed. Comments focused on the exclusion of non-Kenaitze participants in the fishery and the perceived negative effect this fishery would have on the inriver sport fisheries. Visible public dissatisfaction with this fishery was minimal in 1991 and thereafter.

This was the second year of the Ninilchik Traditional Council Educational Fishery. In 1994, harvest was minimal and the fishery occurred after the large local sport fisheries for chinook salmon were concluded. These factors mitigated negative public reaction; no complaints regarding the fishery were received by the Soldotna area office in either year.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activity specific to this fishery is recommended.

UPPER COOK INLET SUBSISTENCE SALMON FISHERY

FISHERY OBJECTIVES

This fishery is mandated to occur in Cook Inlet through judicial ruling. The objective of management is to prosecute the fishery in accordance with these judicial rulings and regulations adopted by the Board of Fisheries.

INSEASON MANAGEMENT

By Alaska Statute, subsistence is the priority use of fish and wildlife. All other fisheries (sport, personal use; commercial) must be restricted prior to restricting subsistence fisheries. Given that legal considerations in managing this fishery are met, inseason restrictions to the fishery in future years are not anticipated.

HISTORICAL PERSPECTIVE

In 1989 Alaska's Supreme Court in its "McDowell Decision" ruled that all Alaska residents are subsistence users. This decision was in large part the "catalyst" for the Board of Fisheries to address formulation of a subsistence salmon fishery at its 1990 fall meeting. The Board further altered provisions of the Kasilof River personal use set gillnet fishery, Kasilof River dip net fishery and the fall Central and Northern District personal use gillnet fishery to minimize the affect of this new subsistence fishery on Central and Northern District salmon stocks.

Regulation of the 1991 fishery was complex, permitting both set gillnetting in most of Cook Inlet and dip netting in the mouths of the Kenai and Kasilof rivers. The set gillnet area was further divided into five sub-areas; not all sub-areas were open to subsistence fishing on the same date. The west side of Cook Inlet (except Tyonek area) was scheduled for 17, 12-hour (8:00 a.m.-8:00 p.m.) periods; the east side beach from 1 mile north of Ninilchik to the "Blanchard Line,"

17, 12-hour periods; from the "Blanchard Line" north to Boulder Point, 16, 12-hour periods; and from Boulder Point north to Point Possession, 17, 12-hour periods. The Tyonek subarea regulations were established by prior Board action at 31, 12-hour periods (time varied by month). The dip net fishery in the Kenai and Kasilof rivers was scheduled for 33, 12-hour periods.

All areas were open on given periods from May through September except Tyonek and the "Blanchard Line" north to Boulder Point subdistricts. The Tyonek subdistrict had two periods in October; no fishing was to occur from the "Blanchard Line" north to Boulder Point in June.

The fishery was open to all Alaska residents. Participants were required to obtain a permit from the department prior to fishing.

Regulation of the 1992 fishery was identical to 1991.

A section of the 1992 state subsistence law directed the Boards of Fish and Game to designate areas of the state as “subsistence” or “nonsubsistence” areas. The joint Boards of Fish and Game subsequently defined five nonsubsistence areas to include the Cook Inlet/Kenai Peninsula area. There was therefore no subsistence fishery in Cook Inlet in 1993. It was replaced by personal use fisheries.

In October, 1993 the Superior Court ruled unconstitutional the provision in the 1992 state subsistence law that directed the Boards to designate “subsistence” and “nonsubsistence” areas. The Supreme Court initially issued a stay of the ruling, then reversed itself on April 11, 1994, allowing the Superior Court ruling to stand. This mandated that a subsistence fishery again occur in 1994.

In a teleconference on April 28, 1994, the Boards of Fish and Game directed the Commissioner to adopt emergency regulations which would allow prosecution of a 1994 subsistence fishery in Cook Inlet. The emergency regulations were subsequently adopted as permanent regulations and established a subsistence fishery in Cook Inlet which was regulated similarly to the 1992 fishery.

RECENT BOARD OF FISH ACTIONS

Regulations adopted in 1990 governing this fishery were extensive and complex. They were summarized in a previous report (Nelson 1993).

In response to new subsistence legislation, the Board at its November 1992 meeting designated most of the Kenai Peninsula as a nonsubsistence zone. The exception was the area around the village of Tyonek and in Kachemak Bay in the English Bay and Port Graham village area. Most Cook Inlet subsistence regulations were repealed by the Board. With the aforementioned exceptions, there was no subsistence fishery in Cook Inlet in 1993. Legal issues and Board action in spring 1994 have been discussed in “Historical Perspective.” The Board will not consider regulatory changes to this fishery in January 1996.

RECENT FISHERY PERFORMANCE

Regulation of the 1991 fishery was complicated by: (1) Regulations adopted by the Board in 1990 that did not become effective until July 21, 1991; and (2) Superior Court decisions which initially delayed and ultimately invalidated this fishery. The chronology of the regulatory/judicial process was:

1. Commissioner Rosier implemented the upper Cook Inlet subsistence fishing regulations by emergency regulation on May 20.

2. The first subsistence period occurred as scheduled on May 25.

3. The Superior Court ruled the emergency regulation issued by Commissioner Rosier was invalid as of May 30. Subsistence periods scheduled for June and part of July were canceled.

4. The second subsistence period occurred July 24 after the regulations became effective on July 21 through the normal administrative process.

5. On July 24 a Temporary Restraining Order (TRO) was issued by the Superior Court enjoining the Department from prosecuting the subsistence fishery until the resource could sustain a commercial fishery. The July 27 subsistence period did not occur.

6. Spawning escapement goals for the Central District were projected on July 29; the regularly scheduled commercial period occurred on that date. The season's third subsistence period occurred in the Central District July 31; this fishery in the Northern District did not occur as Susitna River sockeye salmon escapement goals were not projected.

7. All regularly scheduled subsistence periods were held August 7.

8. The Superior Court invalidated the Upper Cook Inlet Subsistence Salmon Management Plan on August 9. Only subsistence dip net fishing was scheduled August 10. This fishery was prosecuted as the time between receiving the Superior Court ruling and the opening of the fishery was insufficient to notify fishery participants of the fishery's invalidation.

A total of 7,065 permits were issued for this fishery; 5,302 were returned. Five fishing periods actually occurred; not all areas were open each of these periods. Total harvest, excluding the Tyonek subdistrict, as determined from returned permits was 38,435 salmon. This harvest was comprised of 550 chinook, 32,230 sockeye, 3,520 coho, 537 pink and 1,598 chum salmon. Participants reported 10,677 salmon were taken in the Kenai River dip net fishery; 922 in Kasilof River. Harvest by gear type was about 70% gillnet; 30% dip net.

Only the first period on May 25 targeted early-run chinook and sockeye salmon. Total harvest during this period was 1,300, which included 230 chinook and 1,039 sockeye salmon. Only early-run coho salmon were harvested. Over 80% of the harvest was comprised of late-run sockeye salmon. Numbers of participants varied by area and period. Peak participation occurred July 24 in the Kenai River dip net fishery when 797 permits were fished.

The 1992 fishery was prosecuted without interruption. Total permits issued were 9,500 of which 4,182 (44%) were returned. Of those returning permits, 1,387 reported participating in the dip net fishery; 1,646 in the setnet fishery. The remaining permit returns indicated they did not participate in the fishery; returning their permit only to comply with regulation which required the permits return by October 12, 1992.

Total harvest was 61,523 salmon; 41,697 were harvested by set gillnet and 19,826 by dip net. Harvest was comprised of 46,419 sockeye; 10,320 coho; 1,827 chum; 1,818 pink and 1,139 chinook salmon. Approximately 73% of the harvest was from the Central District of Cook Inlet, the remainder from the Northern District. The most popular and productive dip net fishery was Kenai River with a harvest of 19,826. Kasilof River dip net harvest was 1,281.

Fishing time, areas, and bag limits in 1994 were identical to 1992. Total permits issued was 10,127; 4,900 (48.4%) have been returned to date. Reported harvest was 1,501 chinook, 53,333 sockeye, 2,975 pink and 1,729 chum salmon. Total harvest of 71,719 is apportioned 29% to the Kenai and Kasilof dip net fishery; 71% to the setnet fishery. Total permits issued increased by about 7% compared to 1992; total harvest by 17%.

CURRENT ISSUES

Court action in 1991 regarding this subsistence fishery affected management of sport fisheries. The temporary restraining order issued by the Superior Court on July 24, 1991 determined that the subsistence fishery must be closed until such time as spawning escapement levels of sockeye salmon permitted prosecution of the Cook Inlet commercial fishery. As subsistence use of the resource is priority use by State law, all sockeye salmon sport fisheries in Cook Inlet, including the State's largest sport fisheries in the Kenai and Russian rivers, were closed. This closure was from 7:00 a.m. July 26 through 6:59 a.m. July 28 in Cook Inlet south of Boulder Point. Streams in northern Cook Inlet remained closed for an additional period of time. This closure was based solely on a judicial decision and was not for resource conservation.

The 1992 and 1994 fisheries were not disrupted by judicial rulings or conservation concerns. There were no major social issues associated with their management.

RECOMMENDED RESEARCH AND MANAGEMENT ACTIVITIES

No research or management activities specific to this fishery are recommended.

SECTION III: LOWER COOK INLET

Prior to 1992, the lower Cook Inlet management area encompassed the marine waters south of Anchor Point including the Outer Gulf Coast, Resurrection Bay and the fresh waters of the Kenai Peninsula tributary to these marine waters. In 1992 the boundaries of the management area were changed to facilitate Sport Fish Division management and research activities.

The Kenai Peninsula lower Cook Inlet management area now has been reduced to the marine waters south of Anchor Point, the west side of Cook Inlet south to approximately Cape Douglas and the Outer Gulf Coast east to Gore Point (Figure 28). All waters east of Gore Point, including Resurrection Bay and freshwater drainages to this area, have been assigned to the Prince William Sound management area.

The 1991-1994 management information for Resurrection Bay and adjacent waters is addressed primarily in the Prince William Sound Annual Management Report. This Kenai Peninsula Annual Management Report addresses only the recently defined lower Cook Inlet-Kenai Peninsula management area. However, a discussion of the halibut fishery also addresses the harvest in upper Cook Inlet north of Anchor Point and in Resurrection Bay in the interest of consistency in the halibut fishery database. Shellfish data for Resurrection Bay are also presented and discussed.

There are no major freshwater sport fisheries in lower Cook Inlet. Marine fisheries target halibut; chinook, coho, sockeye and pink salmon; Dungeness and Tanner crab, and several species of clams. Halibut support the area's largest fishery; the major salmon fisheries harvest stocked fish in Kachemak Bay (Figure 29). Homer Spit (Figure 30) Enhancement Lagoon is the focal point of these fisheries.

Fisheries of lower Cook Inlet provide recreation for local residents, Alaska residents and a growing number of nonresidents. Fishing-directed tourism is a major segment of the economic base of the lower Cook Inlet area. Management of these fisheries will become increasingly complex as additional demands are placed on the resource by a growing population base and tourism industry. Social issues will be as prevalent as biological issues. Five emergency orders were issued in 1994 in the management of lower Cook Inlet area fisheries (Table 48).

Lower Cook Inlet is managed from the Soldotna area office. In Homer a Fishery Biologist III is funded by both the Sport Fish and CFMD divisions. This individual serves as assistant to the Sport Fish Division area biologist in Soldotna.

KENAI PENINSULA HALIBUT RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan; management of the halibut resource is the responsibility of the International Pacific Halibut Commission. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

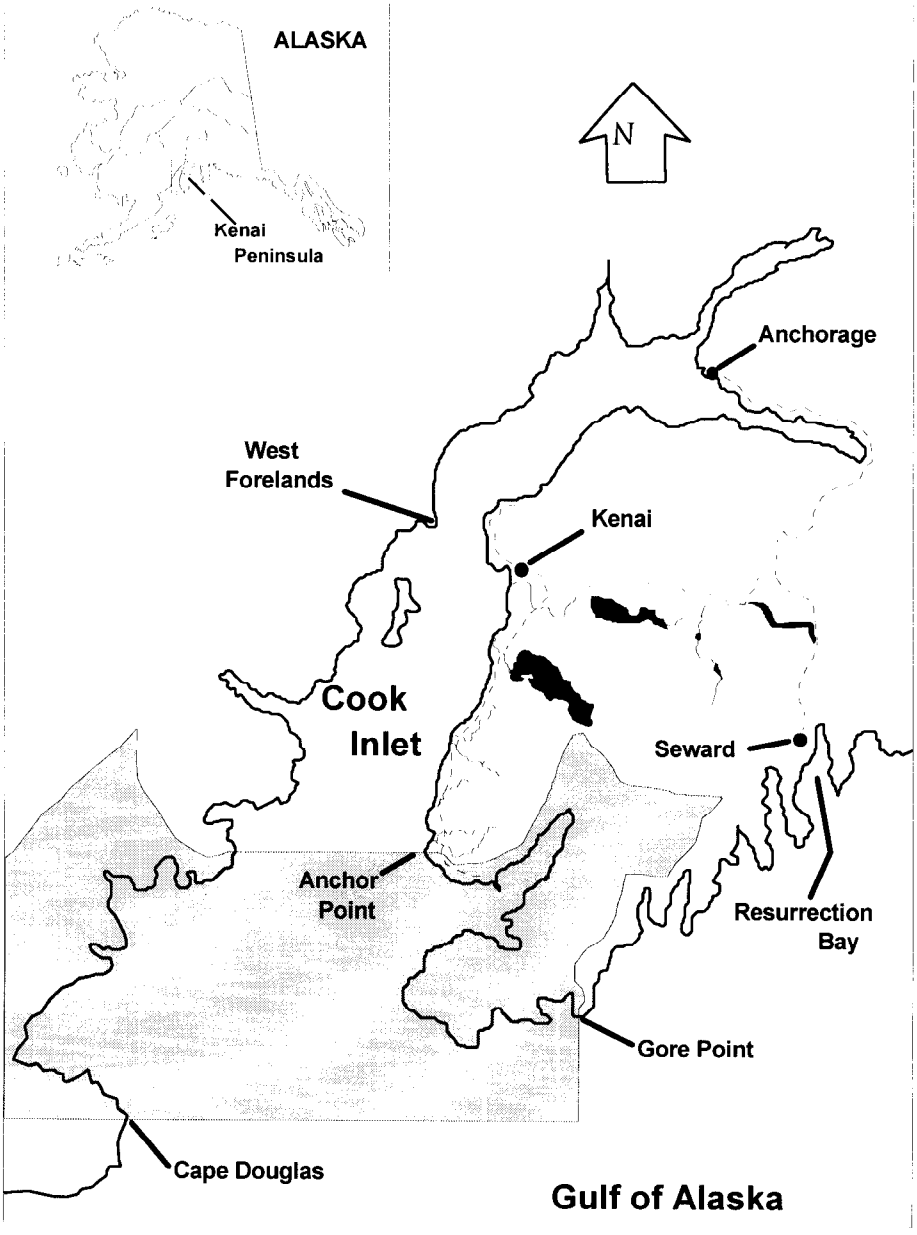

Figure 28.-The lower Kenai Peninsula Management Area (shaded) includes saltwater and all freshwater drainages south of Anchor Point and north of a line from Cape Douglas to Gore Point.

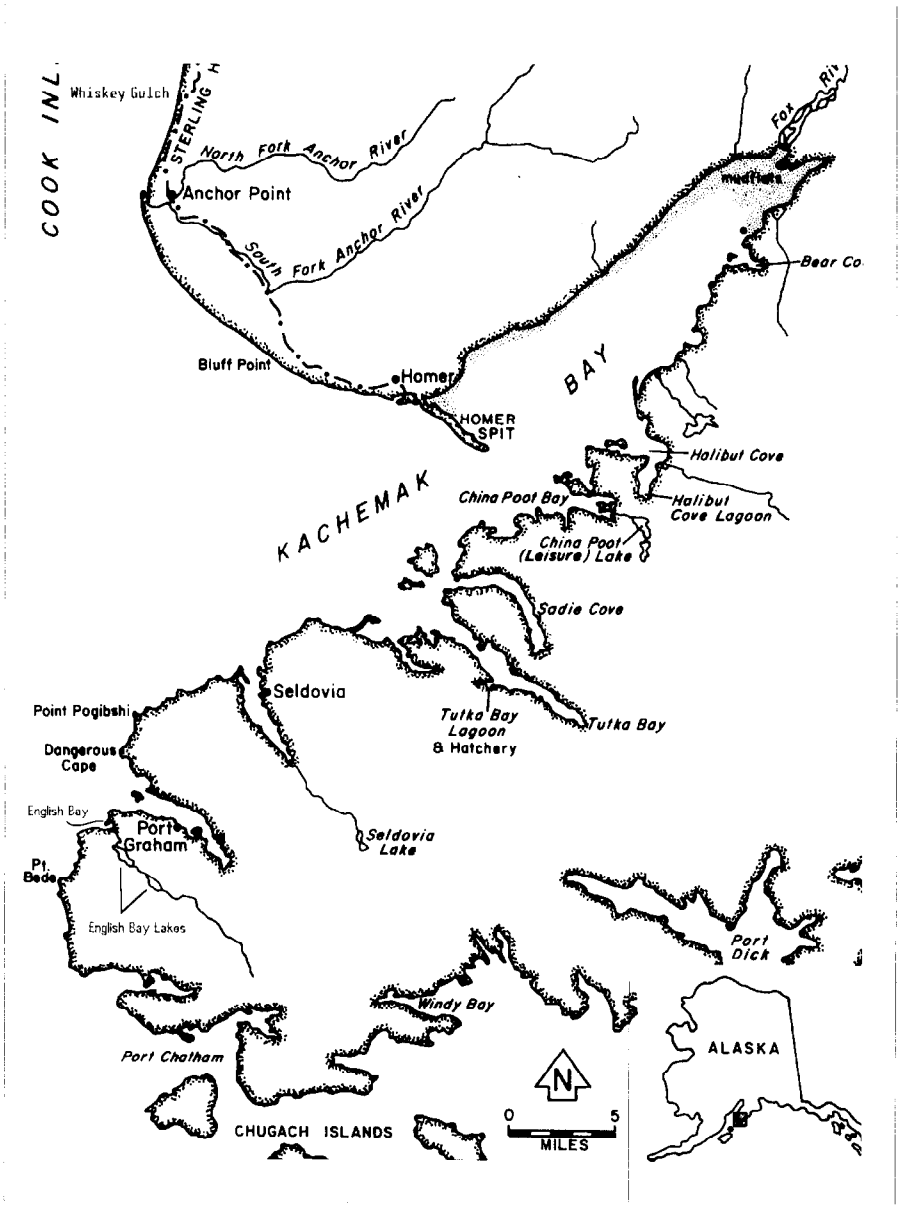

Figure 29.-Lower Cook Inlet and Kachemak Bay, Alaska.

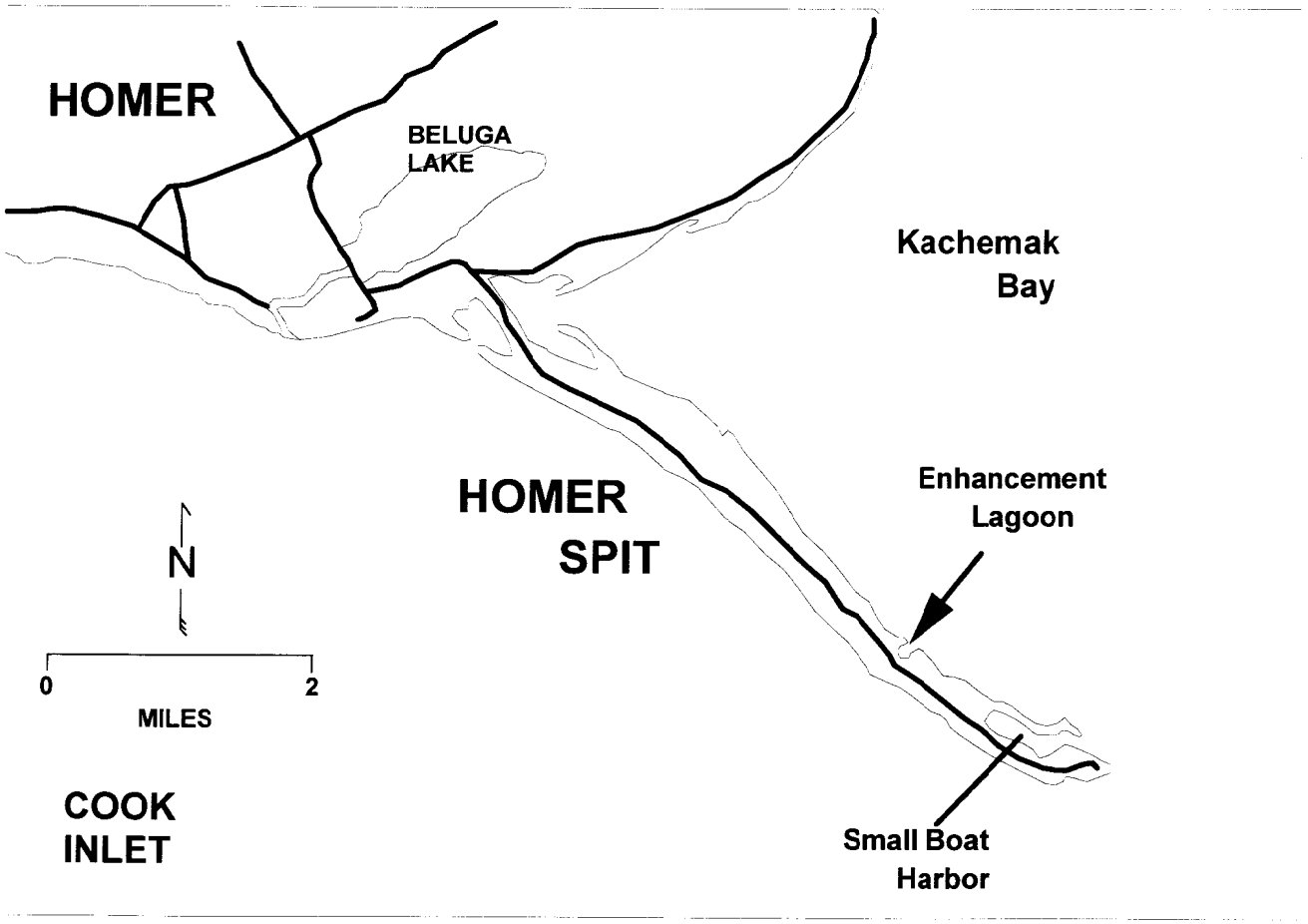

Figure 30.-Map of Homer Spit and Enhancement Lagoon.

Table 48.-Summary of lower Kenai Peninsula emergency orders, 1994.

Emergency Order Number	Effective Date and Time	Action/Justification
2-RS-1-09-94	6-06-94 6:00 a.m.	Closed English Bay River drainage to all sport fishing. Conservation of sockeye salmon.
2-SS-1-16-94	6-24-94 12:00 noon	Permit snagging on Homer Spit through July 1. Surplus stocked chinook salmon.
2-RS-1-31-94	8-01-94 12:00 noon	Extend China Poot dip net fishery through Aug. 7. Surplus sockeye salmon available.
2-SS-1-39-94	8-20-94 6:00 a.m.	Close coho salmon fishery in northern part of Kachemak Bay. Conform with LCI Subsistence Fishery Management Plan.
2-SS-1-41-94	9-14-94 12:00 noon	Permit snagging on Homer Spit through October 31. Surplus stocked coho salmon.

Objective 2: To assist the International Pacific Halibut Commission in formulating management strategies which ensure the halibut resource does not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management of this fishery has not been required to date. Management is effected through existing regulations.

HISTORICAL PERSPECTIVE

Marine waters in the Kenai Peninsula Management Area account for over 50% of the recreational harvests of halibut in Alaska. This fishery occurs in three primary areas: Kachemak Bay, Cook Inlet and the outer Gulf Coast. The Kachemak Bay/Cook Inlet fishery is based primarily in Homer. Anglers employing charter boats harvest about 62% of the total harvest; nonchartered anglers 38%. Homer has a developed harbor which permits both chartered and nonchartered fishermen to use relatively large vessels. These boats are capable of fishing Kachemak Bay, the outer areas of lower Cook Inlet and the Outer Gulf Coast. The number of charter boats currently based in Homer is not definitely known. The staff estimates that number at 125 to 150.

A small boat fishery for halibut originates near Deep Creek, Anchor River, and Whiskey Gulch in upper Cook Inlet. Deep Creek has a developed campground and a boat launch which can be used only at high tide. A commercial operation also launches and retrieves boats at all tide levels with tractors. Whiskey Gulch and Anchor River have no developed launching facilities. Lack of

suitable launching sites limits the size of boats used here. Consequently, most fishing occurs within 5 miles of shore for small boats. Charter boat activity which originates at Deep Creek and Whiskey Gulch/Anchor River is increasing. In recent years there has also been increased activity from operators based in the Soldotna area who guide for halibut secondary to chinook salmon in the Kenai River or marine waters. Because of restraints placed on launching, charter and noncharter boats are of similar size. Most boats are open and do not exceed 25 feet in length with a trend for the increasing use of larger boats. The majority of the catch here is taken by nonchartered anglers; a trend toward an increasing harvest by charter anglers is emerging.

By regulation, the halibut season occurs from February 1 through December 31. Due to weather constraints, the majority of the halibut caught in Kenai Peninsula waters is taken from late April through early September.

Halibut harvests are estimated from the Statewide Harvest Survey (Table 49). Total harvest in 1977 was 15,171 fish including the Resurrection Bay area. Annual harvests have increased each year; the 1993 estimated harvest was 185,431. This harvest was weighted slightly (53.5%) in favor of charter anglers. The trend is for an increasing percentage of the annual harvest to be taken by anglers employing charter operators (Table 50).

BOARD OF FISH ACTIONS

This fishery is managed by the International Pacific Halibut Commission and regulated by the North Pacific Fisheries Management Council. Regulations adopted by this agency are automatically adopted as state regulation. There has been no recent change in the management of this fishery.

RECENT FISHERY PERFORMANCE

Harvest in 1993 was estimated to be 185,431 halibut. Lower Cook Inlet harvest was 94,071; central Cook Inlet, 67,659; Resurrection Bay area, 23,701. Charter anglers harvested over 60% of the total in lower Cook Inlet; noncharter anglers dominated in central Cook Inlet taking about 56% of the harvest in this area. In the Resurrection Bay area about 47% of the harvest was taken by charter anglers; 53% by noncharter anglers. Combining all waters indicates 53.5% of the harvest was taken by anglers employing charter boats; 46.5% by noncharter anglers. The trend is for an increase in the percentage of the total harvest taken by chartered anglers (Table 50).

This trend is most evident in central Cook Inlet where the percentage of the harvest taken by charter anglers increased from only 2.7% in 1986 to over 44% in 1993. This harvest reallocation reflects increased use of the Deep Creek area by charter operators. Observation and data indicate that these charter operators are targeting both chinook salmon and halibut. A similar but less dramatic trend in lower Cook Inlet is evident, where the percentage of the total halibut harvest by chartered anglers increased about 10% between 1986 and 1993. A similar increase in the percent of harvest taken by charter anglers is also evident in Resurrection Bay (Table 50).

OUTLOOK

Halibut harvests in Kenai Peninsula waters increased in 1993. A moderate increase in harvest is anticipated in the next few years. Distribution of the harvest between charter and nonchartered anglers is expected to continue to change with charter anglers harvesting an increasing proportion of the total. This shift in harvest pattern is expected to continue to occur in all areas with the

Table 49.-Historical recreational boat harvest of Pacific halibut in Kenai Peninsula waters, 1977-1993.

Year	Lower Cook Inlet [a]	Central Cook Inlet [b]	Resurrection Bay [c]	Total
1977	9,416	4,050	1,705	15,171
1978	20,756	4,821	2,723	28,300
1979	20,479	6,518	2,902	29,899
1980	21,808	8,177	3,017	33,002
1981	29,294	9,427	3,443	42,164
1982	28,851	10,681	2,954	42,486
1983	36,623	23,503	2,619	62,745
1984	37,747	23,455	3,267	64,469
1985	41,450	21,198	5,934	68,582
1986	44,250	39,831	10,398	94,479
1987	45,707	31,855	7,171	84,733
1988	93,878	42,182	11,696	147,756
1989	76,606	49,087	7,251	132,944
1990	93,941	52,912	9,500	156,353
1991	89,998	57,072	13,818	160,888
1992	81,451	60,659	18,595	160,705
Mean	48,266	27,839	6,687	82,792
1993	94,071	67,659	23,701	185,431

Harvest estimates from the Statewide Harvest Survey.

[a] Waters of Cook Inlet south of Anchor Point including Kachemak Bay and Gulf waters west of Gore Point.

[b] Waters of Cook Inlet north of Anchor Point.

[c] Includes Gulf Coast waters between Gore Point and Cape Puget.

Table 50.-Recreational harvest of Pacific halibut, by percent, charter vs. noncharter boats in the marine waters of the Kenai Peninsula, 1986-1993.

	Lower Cook Inlet Area [a]			Central Cook Inlet Area [b]			Resurrection Bay Area [c]			All Kenai Peninsula Waters		
Year	Total Harvest	% Charter	% Non-Charter	Total Harvest	% Charter	% Non-Charter	Total Harvest	% Charter	% Non-Charter	Total Harvest	% Charter	% Non-Charter
1986	44,250	50.4	49.6	39,831	2.7	97.3	10,398	41.9	58.1	94,479	29.4	70.6
1987	45,707	50.2	49.8	31,855	3.7	96.3	7,171	37.9	62.1	84,733	31.7	68.3
1988	93,878	51.9	48.1	42,182	5.6	94.4	11,696	37.0	63.0	147,756	37.5	62.5
1989	76,606	60.2	39.8	49,087	5.7	94.3	7,251	35.7	64.3	132,944	38.8	61.2
1990	93,941	65.0	35.0	52,912	9.3	90.7	9,500	43.3	56.7	156,353	44.8	55.2
1991	89,998	67.6	32.4	57,072	17.9	82.1	13,818	54.9	45.1	160,888	48.9	51.1
1992	81,451	60.2	39.8	60,659	40.6	59.4	18,595	51.3	48.7	160,705	51.7	48.3
1993	94,071	61.7	38.3	67,659	44.4	55.6	23,701	47.1	52.9	185,431	53.5	46.5

[a] Cook Inlet waters south of Anchor Point including Kachemak Bay and Gulf Coast waters west of Gore Point.

[b] Cook Inlet waters north of Anchor Point.

[c] Gulf Coast waters between Gore Point and Cape Puget.

most significant reapportionment occurring in central Cook Inlet as increasing numbers of charter operators utilize the area's chinook salmon and halibut resources.

CURRENT ISSUES

Halibut provide a valuable recreational fishery and are economically important to coastal Kenai Peninsula communities. The following observations are pertinent to the management of this resource.

1. Moderate annual increases in harvest are anticipated.
2. The proportionate harvest by chartered anglers is increasing.
3. Private boats generally tend to fish the nearshore waters and charter boats the offshore waters.
4. Conversations with both private and charter boat operators indicate a concern for the status of local stocks. In all major areas fished, boats are traveling greater distances offshore to locate harvestable numbers of halibut of acceptable size to their clients.
5. It has been proposed to the North Pacific Fishery Management Council that the charter harvest be "capped" at current levels. This is an allocative issue affecting charter boat and commercial fishermen. If the expansion and/or harvest of charter boat operators is restricted, this will negatively impact the harvest opportunity of anglers who employ charter boat services.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

HOMER SPIT EARLY-RUN STOCKED CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To stock 210,000 early-run chinook salmon smolt in the Homer Spit Enhancement Lagoon to produce 6,300 returning adults all of which are available for harvest in the recreational fishery.

Objective 2: To manage the fishery to achieve insofar as possible a 100% harvest of early-run stocked chinook salmon.

INSEASON MANAGEMENT APPROACH

Because this is a stocked terminal harvest fishery, resource conservation is not a management issue. At issue is the harvest technique of snagging versus nonsnagging and the management objective to obtain as close to a 100% harvest of these stocked fish as is reasonably possible. The Board addressed these issues in 1988; implementation of their action was first effected in 1989.

The Board determined that nonsnagging techniques would be employed to harvest these stocked chinook salmon as long as these fish could reasonably be expected to accept bait and lures. The

Board further determined that the fishery would always be prosecuted with nonsnagging techniques prior to June 23. After June 23, **if** fish remained in the fishery and **if** it was the department's determination that they could no longer be harvested with nonsnagging techniques, **then** the department could permit snagging by emergency order for the length of time necessary to harvest the fish remaining in the Homer Spit Enhancement Lagoon.

In recent years it has been determined by staff observation that there have been surplus fish available on June 24 and that these fish are no longer "on the bite." Snagging has therefore been permitted by department emergency order beginning on this date and ending in early July. By early July most surplus early-run chinook salmon have been harvested; the fishery reverts to nonsnagging techniques as the stocked run of pink salmon (late-run chinook salmon after 1993) begin to enter the Enhancement Lagoon.

HISTORICAL PERSPECTIVE

The Homer Spit, located near the southern tip of the Kenai Peninsula, is the site of a stocking program involving early-run chinook and coho salmon smolt, pink salmon fry releases (1987-1992) and since 1992, late-run chinook salmon smolt. The major goal of the program is to meet the summer demand for more sport fishing opportunities along the Kenai Peninsula road system.

Anglers first benefited from the early-run chinook salmon stocking program in 1985 when approximately 350 to 400 chinook salmon "jacks" (1-ocean fish) returned to the site where 80,000 smolt were released in 1984. In 1986, an estimated 1,000, 1-ocean fish (jacks) returned from the 1985 release of 152,000 and 300, 2-ocean fish (8 to 17 lb) returned from the 1984 release. A major fishery developed in 1987 when an estimated 1,032 chinook salmon were harvested. Annual harvests from 1988 through 1994 have ranged from 1,523 to 5,839. The majority of the return is harvested by recreational anglers; this is a terminal harvest fishery. Salmon returning here will not naturally reproduce because there is no spawning area available.

When this program was first initiated, chinook salmon smolt were artificially imprinted to a chemical at the Elmendorf Hatchery. This same chemical was dispensed from several drip stations anchored along the Spit to attract imprinted adult chinook salmon returning from previous years' releases. The majority of the returning chinook salmon, however, imprinted to a small inlet on the Spit where they were held in pens prior to release. As no fresh water is present, the fish apparently imprint to some unique characteristic of the inlet salt water and the use of drip stations was discontinued. This inlet has become known as the Homer Spit Enhancement Lagoon; most of the effort directed toward stocked chinook, coho and pink salmon occurs here.

The success and popularity of this fishery resulted from the team efforts of the Alaska Department of Fish and Game, the City of Homer, and the South Peninsula Sportsmen's Association. These three groups were co-recipients of the American League of Anglers and Boaters Sport Fish Management Award for best project in the nation for 1990.

BOARD OF FISH ACTIONS

There were no sport fishing regulatory changes adopted for this fishery at either the 1990 or 1992 Board meetings.

RECENT FISHERY PERFORMANCE

The early chinook salmon harvest in 1993 was 4,997 fish (Table 51). Snagging along the Homer Spit was opened by emergency order effective at noon on June 24 to harvest chinook salmon which were not being harvested by nonsnagging methods. Snagging was allowed as a harvest method through July 2.

Preliminary 1994 harvest estimate is 3,300 early-run chinook salmon. Snagging was permitted by emergency order from noon, June 24 through July 1 to increase angler efficiency and harvest fish which could not be harvested by nonsnagging techniques.

Early-run chinook salmon were seined from the Enhancement Lagoon in 1994. These fish will be the brood source for stocking back to the Enhancement Lagoon, Crooked Creek and other early-run chinook salmon stocking sites in the Cook Inlet area. It is envisioned that the Enhancement Lagoon will replace Crooked Creek as the brood source for this stock.

OUTLOOK

This is an extremely popular stocked terminal harvest area fishery. No change is anticipated in the number of early-run chinook salmon smolt stocked nor in the numbers of adult fish returning. Management of the fishery has not changed since 1989; no change in management strategy is anticipated in the near future.

CURRENT ISSUES

Because the salmon fisheries on the Homer Spit are stocked terminal fisheries, a total harvest of all returning fish is desirable. There are therefore no biological management issues associated with this fishery.

Prior to 1989, snagging was permitted throughout Kachemak Bay east of a line from Anchor Point to Point Pogibshi after June 15. A conflict arose between fishermen who wished to harvest salmon by nonsnagging methods in the Enhancement Lagoon and those who wished to snag. The 1989 snagging regulation enacted by the Board protects chinook salmon from snagging while they are susceptible to being caught using conventional angling methods but allows a snag fishery when chinook salmon can no longer be caught by nonsnagging methods. Snagging is permitted for an abbreviated period of time, permitting the harvest of surplus fish. After this harvest is achieved, snagging is again prohibited.

The public has been supportive of the Board's harvest strategy employed on the Homer Spit. Public compliance with emergency orders has been excellent.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended.

HOMER SPIT STOCKED LATE-RUN CHINOOK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Table 51.-Harvest and angler participation directed toward enhanced early-run chinook, pink, and coho salmon stocks in the Homer Spit fishery, 1987-1994.

				Total	
Year	Chinook Salmon Harvest	Pink Salmon Harvest [a]	Coho Salmon Harvest	Days Fished	Harvest
1987	1,032				1,032
1988	5,839	2,164		20,000	8,003
1989	2,422	4,508	1,954	16,000	8,884
1990	2,222	937	2,277	37,910	5,436
1991	1,523	742	4,891	14,383	7,156
1992	1,685	879	1,627	12,196	4,191
1993	4,997	1,836	5,823	28,290	12,656
Mean	2,817	1,844	3,314	21,463	6,765
1994 [b]	3,300		7,000		10,300

[a] Stocking program discontinued; last return was in 1993.

[b] Preliminary data; final harvest and effort estimates not available until summer 1995.

Objective 1: To stock approximately 105,000 late-run chinook salmon annually which will produce an adult return of about 3,000 fish all of which will be available for harvest in the recreational fishery.

Objective 2: To manage the fishery to achieve insofar as is practical a 100% harvest of these stocked chinook salmon.

A pink salmon stocking program occurred from 1987-1992. It was replaced with the late-run chinook salmon stocking program in 1992.

INSEASON MANAGEMENT APPROACH

This is a stocked terminal harvest fishery; resource conservation is not an issue. At issue is the harvest technique of snagging versus nonsnagging and the management objective to obtain as close to a 100% harvest of these fish as is practical. The Board addressed these issues in 1988; implementation of their action was first effected in 1989.

The Board determined that insofar as possible, nonsnagging techniques would be employed to harvest the three species of salmon returning to the Enhancement Lagoon. The Board further determined that fish in the Enhancement Lagoon prior to June 23 (early-run chinook salmon) would always be harvested by nonsnagging methods. After June 23, **if** fish remained in the fishery and **if** it was the department's determination that they could no longer be harvested by nonsnagging methods, **then** the department could permit snagging by emergency order for the length of time necessary to harvest the remaining surplus.

Late-run 1-ocean chinook salmon returned to the Enhancement Lagoon in 1993; 2-ocean fish in 1994. Only several hundred of these late-run fish returned annually; to date snagging has not been required to harvest these fish.

HISTORICAL PERSPECTIVE

The Homer Spit, located near the southern tip of the Kenai Peninsula, is the site of a chinook, coho and pink salmon stocking program. Early-run chinook salmon have returned each year since 1987, coho salmon since 1989 and pink salmon from 1988 through 1993. The pink salmon stocking program was replaced with late-run chinook salmon in 1992; small numbers (several hundred) of 1- and 2-ocean late-run chinook salmon returned in 1993 and 1994. This species replaced pink salmon because chinook salmon are a more desirable sport species than pink salmon. The brood stock for this program is late-run Kasilof River chinook salmon.

The success and popularity of the Enhancement Lagoon's chinook, pink and coho salmon fisheries resulted from the combined efforts of the Department of Fish and Game, the City of Homer, and the South Peninsula Sportsmen's Association. These three groups were co-recipients of the American League of Anglers and Boaters Sport Fish Management Award for best project in the nation for 1990.

BOARD OF FISH ACTIONS

There were no sport fishing regulatory changes adopted for this fishery in 1990 or 1992.

RECENT FISHERY PERFORMANCE

One-ocean chinook salmon returned in 1993; 2-ocean fish in 1994. As expected, not more than several hundred of these fish returned each year. Run timing was the month of July. The

majority of these fish were harvested by nonsnagging techniques; snagging was not permitted in either year because the remaining harvestable surplus was insignificant.

OUTLOOK

Approximately 100,000 late-run chinook salmon smolt of Kasilof River origin were stocked annually in the Enhancement Lagoon from 1992-1994. This species replaces pink salmon. The last return of pink salmon was in 1993. Beginning in 1994, 2-ocean late-run chinook salmon were available to anglers; the first full complement of age classes will return in 1996. The introduction of late-run chinook salmon will have a positive effect on the total program because virtually all anglers regard chinook salmon as a more desirable recreational species than pink salmon.

CURRENT ISSUES

Because the salmon fisheries on the Homer Spit are stocked terminal fisheries, a total harvest of all returning fish is desirable. There are therefore no biological management issues associated with this fishery. The social concern associated with harvest method (snagging versus nonsnagging) was addressed by the Board in 1988 and is no longer an issue in the management of this fishery. The replacement of the pink salmon stocking program with the stocking of late-run chinook salmon has been viewed positively by fishery participants and is not an issue of concern.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended other than the monitoring program which is already in place.

HOMER SPIT STOCKED EARLY-RUN COHO SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To annually stock 120,000 coho smolt in the Homer Spit Enhancement Lagoon which will return approximately 6,000 adult fish all of which are available for harvest in the recreational fishery.

Objective 2: To manage the fishery to achieve insofar as is practical a 100% harvest of early-run stocked coho salmon.

INSEASON MANAGEMENT APPROACH

This is a stocked terminal harvest fishery; resource conservation is not an issue. At issue is the harvest technique of snagging versus nonsnagging and the management objective to obtain as close to a 100% harvest of these fish as is practical. The Board addressed these issues in 1988; implementation of their action was first effected in 1989.

The Board determined that insofar as possible, nonsnagging techniques would be employed to harvest the three species of salmon returning to the Enhancement Lagoon. The Board further determined that fish in the Enhancement Lagoon prior to June 23 (early-run chinook salmon) would always be harvested by nonsnagging methods. After June 23, **if** fish remained in the

fishery and **if** it was the department's determination that they could no longer be harvested by nonsnagging methods, **then** the department could permit snagging by emergency order for the length of time necessary to harvest the remaining surplus.

Staff observation has indicated that these stocked coho salmon begin to sexually mature and will no longer accept lures or bait in mid-September. Snagging is then permitted by department emergency order until the completion of the run. This is usually mid-October; however, it may extend through late October and the emergency order should be written to expire October 31.

HISTORICAL PERSPECTIVE

The Homer Spit, located near the southern tip of the Kenai Peninsula, is the site of an early- and late-run chinook and coho salmon stocking program. The primary goal of the program is to meet the summer demand for more sport fishing opportunities along the Kenai Peninsula road system.

Coho salmon were stocked in the Enhancement Lagoon in 1988; the first adult return was in 1989. Harvest ranged from 1,627 to 5,823 between 1989 and 1993 (Table 51).

Coho salmon return to the Homer Spit Enhancement Lagoon from early August through late October. This is a terminal harvest area; returning coho salmon will not spawn naturally as no spawning area is available.

The chinook and coho salmon fisheries developed through this stocking program have been very successful and have created a major recreational fishery where none previously existed. The success and popularity of this fishery are a result of the coordinated efforts of the Department of Fish and Game, City of Homer and the South Peninsula Sportsmen's Association. These three groups were co-recipients of the American League of Anglers and Boaters Sport Fish Management Award for best project in the nation for 1990.

BOARD OF FISH ACTIONS

There were no sport fishing regulatory changes adopted for this fishery in 1990 or 1992.

RECENT FISHERY PERFORMANCE

The 1993 coho salmon sport harvest was estimated at 5,823 (Table 51). This is the highest harvest in the 5-year history of this fishery.

Snagging in 1993 was permitted by emergency order in the Enhancement Lagoon and adjacent waters from noon September 22 through October 15 to harvest coho salmon which were sexually maturing and would no longer accept lures or bait. A second emergency order was issued October 14 extending snagging through October 31 because a harvestable surplus remained on October 15.

The 1994 recreational fishery was prosecuted in a normal manner. Preliminary harvest estimate is 7,000 fish. The estimate will be finalized in fall 1995 when estimates for the 1994 season are available from the Statewide Harvest Survey.

An emergency order opened the Enhancement Lagoon and adjacent waters to snagging to harvest fish which could not be taken by nonsnagging techniques at noon, September 14. The emergency order expired October 31.

The lower Cook Inlet subsistence fishery occurred in 1994. This fishery opened August 16. Total fishing time allowed was 72 hours; 286 permits were issued for the fishery. This is the lowest number of permits issued since 1978. The fishery was again managed for a guideline harvest of 2,500-3,500 coho salmon. Preliminary harvest estimate as ascertained from returned permits is 1,118 pink, 76 sockeye, 18 chum, 66 chinook and 3,878 coho salmon. An unknown number of these were stocked fish of Enhancement Lagoon origin.

OUTLOOK

This is an extremely popular stocked terminal harvest area fishery. No change is anticipated in the number of early-run coho salmon smolt stocked nor in the numbers of adult fish returning. Management of the fishery has not changed since 1989; no change in management strategy is anticipated in the near future.

CURRENT ISSUES

Because the salmon fisheries on the Homer Spit are stocked terminal fisheries, a total harvest of all returning fish is desirable. There are no biological management issues associated with this fishery.

Prior to 1989, snagging was permitted throughout Kachemak Bay east of a line from Anchor Point to Point Pogibshi after June 15. A conflict arose between fishermen who wished to harvest salmon by nonsnagging methods and those who wished to snag. The regulation enacted by the Board which became effective during the 1989 season (snagging permitted only after June 23 by emergency order to harvest fish which could not be harvested by nonsnagging techniques) resulted in protecting the three salmon species from snagging while they are "on the bite" while allowing for a snag fishery which is socially more acceptable when they can no longer be caught by nonsnagging methods.

The public has been generally supportive of the Board's harvest strategy employed on the Homer Spit. Public compliance with emergency orders has been excellent; there are no major social issues associated with this recreational fishery.

Stocked coho salmon returning to the Homer Spit are intercepted in the fall personal use/subsistence gillnet fishery. The contribution of these stocked Homer Spit coho salmon to the total personal use/subsistence harvest is not known. Reports from anglers and staff observation indicates angler success rates in the Enhancement Lagoon decrease when the gillnet fishery occurs. At this time this issue does not affect the inseason management of either the sport or personal use/subsistence fishery.

The subsistence/personal use gillnet fishery is also supported by stocked salmon originating from fry stocking in Caribou Lake. This stocking program is scheduled to be discontinued. If this occurs the fall gillnet fishery will be supported only by wild stocks and stocked fish of Enhancement Lagoon origin.

The Homer management staff believes that if the Caribou Lake stocking is discontinued, the gillnet fishery will occur over a longer temporal period and harvest increasing numbers of stocked fish returning to the Enhancement Lagoon. This will reduce the sport harvest of Enhancement Lagoon coho salmon. This is not desirable because these fish are produced with Federal Dingell-Johnson funds that may be used for the purpose of enhancing harvest in recreational fisheries only.

This issue is scheduled for staff review in spring 1995.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended other than the monitoring program which is already in place.

HALIBUT COVE LAGOON EARLY-RUN CHINOOK SALMON FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To annually stock 105,000 early-run chinook salmon smolt in Halibut Cove Lagoon which will return approximately 3,000 adult fish all of which are available for harvest in the Halibut Cove recreational fishery.

Objective 2: To manage the fishery to achieve insofar as is practical a 100% harvest of early-run stocked coho salmon.

INSEASON MANAGEMENT APPROACH

This is a stocked terminal harvest fishery; resource conservation is not an issue. Inseason management is effected by current regulation adopted by the Board in 1988 and first implemented in 1989. Snagging is prohibited in this fishery prior to June 24. On this date this practice becomes a legal harvest method for the remainder of the calendar year. This management strategy ensures that a percentage of the harvest is taken with nonsnagging techniques. It further ensures that insofar as is practical virtually all fish returning to Halibut Cove Lagoon are harvested (Objective 2).

HISTORICAL PERSPECTIVE

The Halibut Cove Lagoon Saltwater Rearing Facility, established in 1973 by the former Fisheries Rehabilitation, Enhancement and Development Division (FRED) of the Alaska Department of Fish and Game, is located approximately 10 miles across Kachemak Bay from the Homer Spit. During the early years of development, all five species of Pacific salmon were reared experimentally for varying periods of time. Recent emphasis has been on chinook salmon.

Access to the fishery is via boat. Chinook salmon begin to return here in late May; the migration is complete by mid July. Snagging is permitted by regulation after June 23. After this date the fish are maturing and angler efficiency using nonsnagging techniques is reduced. Halibut Cove is a terminal harvest area; there is no natural production due to the absence of spawning area. Sport harvest from 1984 through 1993 has ranged from 110 to 2,911 chinook salmon, averaging 1,159 fish annually (Table 52).

This stocked return is subject to a commercial setnet interception fishery outside the lagoon on the Bay's south side. Additional Halibut Cove Lagoon chinook salmon are harvested by a commercial seine fishery targeting stocked pink salmon. This fishery occurs adjacent to and within the Lagoon in early July after many of the chinook salmon have begun to sexually mature.

Table 52.-Summary of chinook salmon harvests from Halibut Cove, Kachemak Bay, 1984-1994.

Year	Sport Harvest	Commercial Harvest	Total Return
1984	412	200	612
1985	[a]	300	
1986	110	350	460
1987	905	500	1,405
1988	2,911	1,350	4,261
1989	1,317	1,420	2,737
1990	1,220	810	2,030
1991	945	420	1,365
1992	890	1,034	1,924
1993	1,718	1,200	2,918
Mean	1,159	758	1,968
1994 [b]	2,000	500	2,500

[a] No data.

[b] Preliminary data.

The commercial set and seine fishery harvest of Halibut Cove chinook salmon ranged from 200 to 1,420 averaging 758 fish annually from 1984 through 1993. The average commercial harvest is 38% of Halibut Cove chinook salmon production; the sport harvest 62% of total production.

BOARD OF FISH ACTIONS

There were no regulatory changes affecting this fishery in 1990.

The Board reviewed two public proposals at its November 1992 meeting which would have reduced the interception of Halibut Cove chinook salmon in the commercial set and seine fisheries. After lengthy deliberation, the Board rejected these proposals. Rationale was that all user groups should have the opportunity to harvest these stocked fish even though the project was designed to primarily provide early-run chinook salmon for the recreational fishery.

RECENT FISHERY PERFORMANCE

The 1993 sport harvest is estimated to be 1,718 with a commercial harvest of 1,200 (Table 52). Commercial interception accounted for 41% of the total return. Prosecution of the 1993 fishery was without incident.

The preliminary 1994 sport harvest estimate of 2,000 chinook salmon was determined by staff observation. Commercial harvest of 500 chinook salmon was determined by fish ticket returns. Total 1994 return is estimated to be about 2,500. Final estimates for this fishery will be made when the 1994 sport harvest estimate is available from the Statewide Harvest Survey in fall 1995.

OUTLOOK

No change in stocking level or smolt to adult survival rate is anticipated. Review of the regulations and management of the intercepting commercial setnet and seine fishery will not occur until 1995. Regulation and management of the sport fishery will also be subject to review at that time. No significant change in harvest or harvest strategies related to this fishery is anticipated in 1995; angler participation levels are expected to remain relatively constant.

CURRENT ISSUES

This is a stocked terminal harvest fishery. There are no biological concerns associated with its management. Although not a consideration in managing this fishery, the incidental commercial chinook salmon harvest is of concern to some recreational anglers. Because the Board did not alter the management of the fishery, harvest of stocked Halibut Cove chinook salmon in the commercial fishery will continue to be an allocative issue. Failure to resolve the allocative issue compromises the department's ability to achieve Objective 1 in its entirety in that all chinook salmon produced are not available to the recreational angler.

RECOMMENDED RESEARCH & MANAGEMENT

No research or management activities specific to this fishery are recommended other than the continuation of the monitoring program which is currently in place.

LOWER COOK INLET SHELLFISH FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To ensure, through appropriate management and research programs, that the populations of king, Dungeness and Tanner crabs and shrimp return to historic levels of abundance and that other shellfish populations in lower Cook Inlet do not decline below the levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

To date, inseason management of lower Cook Inlet shrimp and clams has been effected by regulations adopted by the Board of Fisheries; department emergency orders have not been required to manage these species in the noncommercial (sport and personal use) fisheries.

Inseason management of the noncommercial Tanner crab fishery has been both by Board adopted regulation and department emergency order. Regulations adopted by the Board at its January 1993 meeting now protect this species during its molting season. This regulation, at the current population level, should be adequate to conserve the resource and preclude the necessity of managing the fishery through department emergency order.

The noncommercial king crab fishery will occur only if the season is opened by department emergency order. Given the depressed status of this species, inseason management of king crab is not likely to occur in the near future.

The Dungeness crab population is presently at low levels of abundance. The commercial fishery, the primary harvester of the resource, will not occur until the population level increases. Sufficient numbers of this species are deemed present to prosecute a noncommercial fishery. The season is presently established annually by department emergency order to protect Dungeness crab during the molting period. This period is identical to the season established to protect Tanner crab. The noncommercial season will be addressed by the Board at its March 1995 meeting. Adoption of a department proposal establishing the Dungeness crab season coincidental to the Tanner crab season should preclude future management of this fishery by department emergency order.

HISTORICAL PERSPECTIVE

The marine waters of lower Cook Inlet support commercial and noncommercial (sport and personal use) fisheries for crab, clams and shrimp. Commercial harvest data for Dungeness crab are available since 1961, Tanner crab since 1968 and clams since 1986. Noncommercial harvest data are available from the Statewide Harvest Survey with data collection beginning in 1981.

Lower Cook Inlet is divided into five commercial fishing regulatory districts: Southern, Kamishak, Barren Island, Outer and Eastern. The Southern District encompasses the waters of the eastern lower Cook Inlet including all of Kachemak Bay and the waters adjacent to the Communities of Seldovia, English Bay and Port Graham. The Eastern District includes all Resurrection Bay and adjacent waters. The Statewide Harvest Survey estimates the noncommercial harvest for Kachemak and Resurrection bays. These data are comparable to the commercial fishing regulatory areas of the Southern and Eastern districts. The noncommercial harvest in the remaining three commercial fishing regulatory areas is insignificant.

The commercial fishery is the primary harvester of Dungeness crab with an historical average harvest in the Southern District of about 612,000 (Table 53) pounds equating to about 290,000 crab annually. The noncommercial fishery's average annual harvest is about 21,000 (Table 54) or less than 10% of the total harvest. This species is presently at low levels of abundance and a commercial fishery has not targeted Dungeness crab since a harvest of 29,000 pounds occurred in 1990 (Table 53). The noncommercial fishery in 1991 was closed for resource conservation; this fishery did occur in 1992, 1993 and 1994; it was the sole harvester of the resource in those years (Table 54).

The commercial fishery is also the primary harvester of Tanner crab. Average annual harvest in the Southern District (Kachemak Bay area) approximates 1.2 million pounds or about 480,000 crab (Table 55). Average noncommercial harvest is about 4,400 crab (Table 54). The commercial fishery has therefore historically taken about 99% of the average annual harvestable surplus. This species is also at low levels of abundance. Both the commercial and noncommercial fisheries were closed in 1989 and 1990 for resource conservation; a limited commercial and a conservatively regulated noncommercial fishery were prosecuted from 1991 through 1994. The commercial fishery accounted for 99% of the harvest in 1991, 97% in 1992, and 96% in 1993.

In 1981, 6,180 king crab were harvested in the noncommercial fishery. Annual harvests declined thereafter to a low of 62 in 1984. This fishery and the commercial king crab fishery have been closed since 1985 because of low stock levels in all areas of the lower Kenai Peninsula.

The commercial hardshell clam fishery targets primarily Pacific littlenecks, with harvests of butter clams and cockles in some years. The fishery occurs on Kachemak Bay beaches in areas approved for commercial digging by the Department of Environmental Conservation. Harvest is reported in pounds; a permit is required prior to commercial digging. Harvest is by hand, usually rake or shovel. Harvest was relatively stable from 1986-1989 ranging from 14,449 to 19,840 pounds. In 1990 harvest increased to 35,744 pounds (Table 56). Two to nine permits were issued from 1986-1989, increasing to 19 in 1990, and to 33 in 1992. Thirty-one permits were issued in 1994. The hardshell clam harvest is not restricted by season, but is primarily prosecuted during low tides. Minimum size for commercial harvest is 1.5 inches for Pacific littleneck and 2.5 inches for butter clams.

The noncommercial hardshell clam fishery harvests seven clam species; the majority of the harvest is believed to be comprised of Pacific littlenecks, butter clams, and cockles. As with the commercial fishery, the majority of the harvest occurs during low tide series with harvest method by hand, rake or shovel.

Harvest as determined by Statewide Harvest Survey is reported in "gallons of clams." Approximately 120 Pacific littleneck clams comprise a gallon weighing about 8.5 pounds. Harvest of all "hardshell clams" from 1981-1985 ranged from 7,352-15,148 gallons; from 1986-1993, 8,350 to 25,213 gallons (Table 54).

Participation in the noncommercial shellfish fishery cannot be assigned to species and is reported as total participation directed toward the harvest of Dungeness and Tanner crab, shrimp and clams. Participation peaked in 1981 at 25,391 days and ranged from 12,314 to 23,288 from 1982 through 1988. In 1989, 1990 and 1991 participation declined to less than 10,000 days annually,

Table 53.-Commercial Dungeness crab harvest by year, Cook Inlet Management Area, 1961-1994.

Year	Southern District Harvest (lbs)	Other Districts Harvest (lbs)	Total Harvest (lbs)	No. of Vessels	No. of Landings
1961	193,683	0	193,683		
1962	530,770	0	530,770		
1963	1,665,599	11,605	1,677,204		
1964	417,005	6,036	423,041		
1965	74,211	0	74,211		
1966	12,523	117,037	129,560		
1967	7,168	0	7,168		
1968	484,452	3,407	487,859		
1969	49,894	0	49,894		
1970	209,819	0	209,819		
1971	97,161	0	97,161		
1972	38,930	0	38,930		
1973	308,777	1,271	310,048		
1974	718,729	2,514	721,243	38	619
1975	361,893	922	362,815	34	402
1976	118,903	395	119,298	19	123
1977	74,195	510	74,705	18	94
1978	1,212,571	3,208	1,215,779	49	668
1979	2,130,963	0	2,130,963	72	1,485
1980	1,875,281	0	1,875,281	54	1,183
1981	1,850,977	0	1,850,977	88	2,047
1982	818,380	505	818,885	108	2,310
1983	746,585	834	747,419	71	1,194
1984	799,638	570	800,208	102	1,687
1985	1,389,891	12,511	1,402,402	106	1,768
1986	550,968	12,894	563,862	83	1,069
1987	761,423	21,753	783,176	100	1,377
1988	677,334	41,941	719,275	84	1,305
1989	170,266	7,798	178,064	43	455
1990 [a]	28,938 [b]	564	29,502	23	112
1991	[c]	0 [d]		0	0
1992	[c]	[e]	[e]	[e]	[e]
1993	[c]	[e]	[e]	[e]	[e]
Mean	612,564	7,944	620,773	61	994
1994	[c]	[e]	[e]	[e]	[e]

[a] Southern district season set by regulation: west of Homer Spit opens June 1; east of Homer Spit opens by emergency order on or after June 1 when softshell percentage is 10% or less; entire district closes November 1 by regulation.

[b] East of Homer Spit opened June 29, closed August 8, by E. O.; west of Homer Spit opened June 1 by regulation, closed September 7 by E. O.; closures due to low stock conditions.

[c] Fishery closed by emergency order.

[d] Fishery open: no harvest reported.

[e] Harvest confidential: Alaska statute does not allow publication when catch is from three or fewer vessels.

Table 54.-Kachemak Bay and lower Cook Inlet shellfish sport and personal use fishery harvest and participation, 1981-1993.

Year	Participation [a]	King Crab	Dungeness Crab	Tanner Crab	Shrimp [b]	Clams [b]	Razor Clams	Other Shellfish
1981	25,391	6,178	22,928	4,320	7,117	8,132		38,560
1982	15,712	1,981	9,956	4,234	5,009	5,135		1,782
1983	17,096	409	14,130	3,053	3,577	15,148		10
1984	23,288	62	14,403	2,282	2,392	7,931	20,259	349
1985	13,213	[c]	26,582	3,329	3,087	7,352	9,030	2,930
1986	21,668	[c]	34,217	7,926	4,771	20,212	34,268	128
1987	19,028	[c]	49,001	8,988	7,757	16,129	25,055	8,157
1988	12,314	[c]	31,700	4,424	2,090	25,213	14,140	2,660
1989	8,314	[c]	9,632	[c]	1,142	15,169	13,813	10,874
1990	9,301	[c]	6,840	[d]	1,957	10,268	20,601	10,284
1991	6,667	[c]	[c]	1,142	613	10,476	5,109	1,513
1992	15,469	[c]	9,910	3,938	1,547	9,907	9,627	13,273
Mean	15,622	2,158	20,845	4,364	3,422	12,589	16,878	7,543
1993	13,534	[c]	15,178	9,186	656	8,350	3,647	7,995

[a] Days fished.

[b] Gallons of shrimp and clams.

[c] Fishery Closed.

[d] Fishery open 9/21-10/21; no harvest reported.

Table 55.-Historical commercial Tanner crab catch (pounds) and effort by district in the Cook Inlet Management Area (H), 1968-1994.

Season	Southern	Vessels	Kamishak/ Barren Is.	Vessels	Outer/ Eastern	Vessels	Central	Vessels	Total Catch
1968-69	1,388,282		12,398		816				1,401,496
1969-70	1,147,154		71,196		104,191				1,322,541
1970-71	1,046,803		541,212		3,000				1,591,015
1971-72	2,462,956		974,962		804,765				4,242,683
1972-73	2,935,662		3,361,023		1,266,023				7,562,708
1973-74	1,387,535		4,689,251		1,891,021				7,967,807
1974-75	967,762		2,150,462		656,660				3,774,884
1975-76	1,339,245		3,281,084	17	850,964				5,471,293
1776-77	2,009,633	35	1,765,926	24	824,520				4,600,079
1977-78	2,806,568	55	2,077,092	28	502,049				5,385,709
1978-79	2,323,420	75	2,713,339	27	694,728				5,731,487
1979-80	1,134,940	68	3,338,623	24	595,645				5,069,208
1980-81	1,047,630	46	1,757,331	20	463,201				3,268,162
1981-82	548,529	41	1,286,332	18	524,897	9			2,359,758
1982-83	584,908	48	1693794	20	682,919	20			2,961,621
1983-84	996,763	45	1,373,674	17	443,384	14			2,813,821
1984-85	1,229,298	83	1,535,547	19	259,083	7			3,023,928
1985-86	1,164,261	103	1,288,711	24	177,041	5			2,630,013
1987	1,077,379	87	1,111,339	21	251,174	13	7,771	2	2,447,663
1988	944,763	127	417,182	24	168,969	23	8,396	3	1,539,310
1989	CLOSED		CLOSED		CLOSED		CLOSED		
1990	CLOSED		422,037	7	CLOSED		CLOSED		422,037
1991	271,379	68	266,106	8	CLOSED		CLOSED		537,485
1992	354,868	107	CLOSED		44,400	16	CLOSED		399,268
1993	534,003	136	CLOSED		CLOSED		CLOSED		534,003
Mean	1,188,150	75	1,445,145	20	448,378	13	2,310	3	3,210,749
1994	284,676	110	CLOSED		CLOSED		CLOSED		284,676

Table 56.-Historical commercial harvest of Cook Inlet hardshell clams (pounds), 1986-1994.

Year	No. Of Permits	No. Of Landings	Pacific Littlenecks	Butter Clams	Cockles	Total Pounds
1986	5	18	17,303	0	0	17,303
1987	8	69	12,214	206	2,347	14,767
1988	2	32	14,449	0	0	14,449
1989	9	41	2,584	13,675 [a]	3,581 [b]	19,840
1990	19	62	35,744	0	0	35,744
1991	15	78	38,734	0	0	38,734
1992	21	117	54,631	0	0	54,631
1993	33	159	63,676	0	0	63,676
1994	31	107	44,291	0	0	44,291

[a] Includes 13,348 pounds sold as otter food as a result of *Exxon Valdez* oil spill.

[b] Includes 1,981 pounds sold as otter food as a result of *Exxon Valdez* oil spill.

the lowest levels recorded in the fishery. Participation in 1992 increased to 15,469 days declining to 13,534 days in 1993.

Participation in this fishery correlates with the opportunity to harvest Dungeness and Tanner crab. During the years these fisheries occurred, participation was relatively high; during years they did not occur, participation was relatively low.

Participation in the Resurrection Bay shellfish noncommercial fishery is relatively small averaging 946 days from 1981-1992. Participation since 1990 has been less than 500 days. Average annual harvest (1981-1992) has been 70 king crab, 135 Dungeness crab, 387 Tanner crab, 32 gallons of shrimp and 967 gallons of hardshell clams (Table 57). In 1989 the king and Tanner crab fisheries were closed for resource conservation. The king crab fishery has not re-opened. A Dungeness crab fishery occurred in 1989 and 1990, was closed in 1991 and re-opened from 1992 through 1994. The Tanner crab fishery was closed in 1990; an abbreviated season occurred in 1991 and a season was prosecuted by regulation from 1992 through 1994.

BOARD OF FISH ACTIONS

Personal use regulations previously adopted by the Board in 5 AAC 77.010 required a valid resident Alaska sport fishing license for taking finfish for personal use and a valid Alaska sport fishing license for shellfish. In 1986 the legislature adopted a definition of personal use which is now statute. This statute defined personal use fishing as "the taking, fishing for or possession of finfish, shellfish or other fishery resources, by Alaska residents for personal use..." As Alaska statutes supersede Board regulations, nonresidents could not participate in personal use shellfish fisheries. Since sport fishing regulations were not applicable to the noncommercial harvest of shellfish, nonresidents could not harvest shellfish for their personal use.

It was not the intent of the Board that nonresidents be disqualified from this fishery. In the fall of 1989 the board therefore adopted sport fishing regulations for Cook Inlet shellfish which were identical to existing personal use regulations. Nonresidents thereafter participated under sport fishing regulations; residents under either sport or personal use regulations. The Board adopted a regulation whereby bag/possession limits under sport regulations could not be added to the bag/possession limits allowed by personal use regulations and vice versa.

The above regulatory changes were administrative and did not affect the prosecution of the fishery.

The Board addressed regulation of lower Cook Inlet noncommercial shellfish at its March 1990 meeting. Regulatory changes affecting this fishery were:

1. Established a Dungeness crab season of June 15 through December 31.
2. Reduced the Dungeness crab daily bag and possession limit from 20 to 5.
3. Established a minimum size of 6.5 inches in carapace width for Dungeness crab.
4. Established legal harvest methods in the noncommercial crab fishery as pots, ring nets, diving gear, hooked or hookless hand lines or by hand.

At its January 1993 meeting the Board adopted four department proposals addressing the personal use and sport regulation of Tanner and king crab fisheries in lower Cook Inlet. Male

Table 57.-Resurrection Bay shellfish sport and personal use fishery harvest and participation, 1981-1993.

Year	Participation [a]	King Crab	Dungeness Crab	Tanner Crab	Shrimp [b]	Hardshell Clams [b]	Other Shellfish
1981	1,150	50	170	140	60	160	0
1982	680	170	310	420	0	400	230
1983	1,050	50	0	2,100	60	340	21
1984	1,220	10	10	0	50	7,430	0
1985		[c]	No Data				
1986	2,040	[c]	200	30	100	50	0
1987		[c]	No Data				
1988		[c]	No Data				
1989	440	[c]	260	[c]	0	14	0
1990	1,000	[c]	80	[c]	0	50	0
1991	472	[c]	[c]	0	0	228	0
1992	463	[c]	49	22	22	32	0
Mean	946	70	135	387	32	967	28
1993	342	[c]	22	0	52	11	0

[a] Days fished.

[b] Gallons of shrimp and clams.

[c] Fishery closed.

Tanner crab may be taken only from July 15 through March 15 except that in Kachemak Bay east of a line from Anchor Point to Point Pogibshi male Tanner crab may only be taken from July 15 through December 31 and again from January 15 or the beginning of the commercial Tanner crab season (whichever is later) through March 15.

The Board repealed the current sport and personal use king crab season (June 15-March 15). This season was replaced with a regulation stating that a sport and personal use king crab fishery could occur only during periods established by emergency order. Given the depressed status of this stock, it is unlikely a sport or personal use fishery for this species will occur in the immediate future.

In spring 1994 the Board adopted four staff proposals affecting the noncommercial littleneck clam and butterclam fisheries. The Board established a minimum size for noncommercial littleneck clams as 1.5 inches; a bag/possession limit of 700. These regulations are liberal enough that they will have little or no effect on the daily harvest by noncommercial users. However, they are restrictions in a previously unregulated fishery which were requested by the department as an aid to enforcing commercial harvesting regulations regarding area and minimum sizes of the aforementioned clam species.

Enforcement of commercial clam minimum sizes and area closures are difficult since commercial violators can simply state they are engaging in the noncommercial fishery thereby eliminating the applicability of commercial regulations. Establishing a liberal bag and possession limit for the noncommercial harvest will not meaningfully reduce the noncommercial harvester's ability to harvest clams. On the other hand, the bag and possession limit will not be large enough to make it worthwhile for a commercial harvester to take clams from commercially closed beaches under the guise of participating in the noncommercial fishery.

RECENT FISHERY PERFORMANCE

King crab commercial and noncommercial fisheries have been closed since 1985 for resource conservation.

The commercial Dungeness crab fishery in the Southern District was closed by emergency order from 1991 through 1994 for resource conservation predicated on data from preseason surveys.

The 1992 and 1993 noncommercial Dungeness crab fishery was opened concurrently with the Tanner crab noncommercial fishery. Dungeness crab could be harvested in all waters of the Cook Inlet-Resurrection Bay saltwater regulatory area from July 15 through March 15, except in that area east of a line from Anchor Point to Point Pogibshi, i.e. Kachemak Bay. This area closed on January 1 and re-opened January 16 (the beginning of the commercial Tanner crab season) and remained open through March 15. The 1992 harvest was 9,910 crab; the 1993 harvest, 15,178. The 1994 season was similar to 1993 with harvest estimates available in fall 1995.

There was no commercial Tanner crab fishery in 1990. A limited opening in the Southern District in January 1991 harvested 271,379 pounds equating to approximately 108,530 crab. This is the lowest harvest recorded in this fishery. Participation was 68 boats, the lowest since the 1983-84 fishery. This fishery remained closed for the third consecutive year in the Outer and Eastern Districts. A limited opening in January 1992 in the Southern District harvested 354,868 pounds; 107 vessels participated. A similar opening in January 1993 harvested 534,003 pounds;

136 vessels participated. The January 1994 harvest was 284,676. The fishery was closed in 1995 for resource conservation.

The noncommercial Tanner crab fishery was opened by emergency order from 12:00 noon September 21 through October 31, 1990. Area open was all waters east of a line from Anchor Point to Point Bede. All remaining waters of the Cook Inlet-Resurrection Bay regulatory area remained closed. No harvest was reported in this fishery; participation was assumed minimal due to the late opening. The 1991 season was established by emergency order as August 1 through October 31. Harvest was 1,142 crab (Table 54). The 1992 season was established by emergency order as July 15 through December 31 and from the opening of the commercial season (about January 15) through March 15, 1993. Harvest was 3,938. The 1993 season was identical to 1992; harvest was 9,184 crab. This is the highest harvest in the history of the fishery. The 1994 season occurred in a normal manner. Harvest estimates will be available in fall 1995.

Twenty-one permits were issued to commercially harvest hardshell clams in 1992; 33 in 1993 and 31 in 1994. The reported harvest was 54,631 pounds of Pacific little-neck clams in 1992; 63,676 pounds in 1993 and 44,291 in 1994 (Table 56). No other species of hardshell clams were reported harvested.

The noncommercial hardshell clam fishery, unlike the crab fisheries, has been uninterrupted by emergency orders for resource conservation. Data in Table 54 show a general reduction in harvest since 1988.

OUTLOOK

King crab stocks remain at low levels; no harvest is anticipated in the foreseeable future.

Shrimp continue to be at low levels of abundance and are expected to support a 1994 harvest in the noncommercial fishery similar to recent years.

Dungeness crab stocks are assessed annually. It appears unlikely, however, that a harvestable surplus which would support a commercial fishery will be identified in 1995. It is anticipated that the population will continue to support the relatively small noncommercial fishery; this fishery is scheduled to occur in 1995 with a season identical to 1994.

Tanner crab stocks in the Southern District are again at low levels of abundance. It is not known if this resource will support a commercial fishery in January 1996. The 1995 noncommercial Tanner crab season will be identical to the 1994 season.

The commercial hardshell clam harvest is expected to stabilize at about 60,000 pounds in 1995; the noncommercial harvest is also expected to remain relatively stable. Although not quantified by data, observation suggests populations of Pacific littleneck clams have declined on several of the commercially certified beaches. If this is a correct assessment of the population status, commercial harvest in future years may be restricted for resource conservation.

CURRENT ISSUES

Issues associated with the Dungeness and Tanner crab fisheries are both biological and allocative. Closely related to the biological concern for the resource is a determination of management strategies designed to restore both Dungeness and Tanner crab to higher levels of abundance.

The biological and allocative issues regarding Tanner crab were addressed by the Board in January 1993. The department now has clear direction regarding regulation of the fishery; the user groups were given the opportunity to participate in the regulatory process. A similar approach was applied to the management and regulation of the commercial and noncommercial Dungeness fishery at the March 1994 Board meeting.

The commercial hardshell clam fishery in Kachemak Bay was stabilized by Board action in March 1994. Concern has been expressed by users of this resource that selected beaches are being overharvested. Department data supports this concern and commercial harvesting on Chugachik Island and an area in Bear Cove have been closed by emergency order.

RECOMMENDED RESEARCH & MANAGEMENT

Research relevant to the Tanner and Dungeness crab resource is conducted by the CFMD staff stationed in the Homer office. The status of the noncommercial fishery is provided to the public via news releases from the Soldotna office. No change in this division of responsibility is recommended.

Research relevant to the hardshell clam resource is also conducted by CFMD staff in Homer. However, the noncommercial fishery is the primary user of the resource. In 1994 a pilot program was initiated by the Sport Fish Division to collect basic biological information regarding littleneck clams from the beaches of Sadie Cove. It is recommended that this activity be continued.

In January 1993 the Board addressed regulation of the king and Tanner crab fisheries; in spring 1994 regulation of Dungeness crab and hardshell clams. Regulations adopted by the Board removed much of the uncertainty regarding management strategies to be employed in these fisheries. No additional regulatory changes to the noncommercial shellfish fisheries of lower Cook Inlet are recommended at this time.

CHINA POOT BAY SOCKEYE SALMON FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed in a Board adopted management plan. Department objectives for this fishery are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To continue stocking sockeye salmon fry in Leisure Lake at levels which optimize adult production.

INSEASON MANAGEMENT APPROACH

Sockeye salmon returning to China Poot Creek are progeny of fry stocked in Leisure Lake; resource conservation is not a consideration in managing the noncommercial sport and personal use fisheries.

The personal use season is established by regulation as July 1 through July 31. In some years, sockeye salmon continue to enter China Poot Creek after the close of the season. Harvest of these fish is effected by extending the fishery by emergency order through early August. The

decision to extend the season is determined by index counts of sockeye salmon present in the stream in late July.

HISTORICAL PERSPECTIVE

Leisure Lake, also known as China Poot Lake, is located directly across Kachemak Bay from the Homer Spit. The lake is used experimentally as a rearing system for hatchery produced sockeye salmon fry. The major goal of the Leisure Lake project is to determine fry stocking densities which produce optimum adult returns. Lake fertilization has been recently initiated to increase salmon production. Adults returning to Leisure Lake have represented as much as 49% of the lower Cook Inlet commercial sockeye salmon harvest; they are subject to sport and personal use harvest as well.

Due to the presence of barrier falls upstream from the intertidal area of China Poot Creek, the adult sockeye salmon returning to Leisure Lake are harvested in a terminal fishery. The terminal harvest area has provided excellent opportunities for anglers and dipnetters. The fishery occurs along 200 yards of China Poot Creek between the intertidal area and the barrier falls and along an expanse of intertidal mud flats in China Poot Bay. Current regulations provide for a personal use dip net fishery in China Poot Creek during the month of July. Extended openings for personal use dip netting were held by department emergency order in August of 1983, 1984, 1985, 1989, and 1994 to more fully harvest the adults that had entered China Poot Creek.

BOARD OF FISH ACTIONS

There were no regulatory changes adopted for this fishery at either the 1990 or 1992 Board meetings.

RECENT FISHERY PERFORMANCE

Total 1993 harvest is estimated to be 72,116 sockeye salmon; 4,428 in the noncommercial sport and personal use fisheries and 67,688 in the commercial fishery (Table 58). Harvests in the noncommercial fishery are above average and below average in the commercial fishery.

Preliminary 1994 estimates are a commercial harvest of 29,000 sockeye salmon and a noncommercial harvest approximating 9,000. The final noncommercial harvest estimate will be determined by Statewide Harvest Survey with results available in fall 1995. Total return approximating 38,000 sockeye salmon is the lowest return since 1987.

OUTLOOK

Annual production from the stocking of Leisure Lake is expected to remain relatively constant. No change in the prosecution of the fisheries harvesting this stock nor in the regulations governing the fisheries is anticipated.

CURRENT ISSUES

Virtually all of the sport and personal use fishing takes place on property owned by the Seldovia Native Association. This land was included in a parcel which was being offered for sale to the State of Alaska for inclusion in Kachemak Bay State Park. When this purchase was not approved by the Legislature, the Association initially planned to prohibit trespass. An agreement for the 1990 season was reached between the department, Seldovia Native Association, and the Kachemak Bay Heritage Land Trust. The Land Trust is a nonprofit group interested in

Table 58.-Summary of sockeye salmon harvest, China Poot Bay (Leisure Lake), 1983-1994.

Year	Non-Commercial [a] Harvest	Commercial Harvest	Total Return
1983	5,486	84,020	89,506
1984	1,794	114,360	116,154
1985	796	61,500	62,296
1986	1,815	18,530	20,345
1987	1,267	21,500	22,767
1988	1,910	91,500	93,410
1989	5,433	79,700	85,133
1990	5,903	49,590	55,493
1991	1,796	96,038	97,834
1992	3,546	82,500	86,046
1993	4,428	67,688	72,116
Mean	3,107	69,721	72,827
1994 [b]	9,000	29,000	38,000

[a] Sport and personal use harvests combined.

[b] Preliminary data.

preserving natural areas and easements in Kachemak Bay. Land Trust members sold voluntary seasonal use permits for a $5 fee with proceeds being earmarked for access purchase.

In 1991 and 1992 it was reported that anglers fished from private property even though the property was "posted." In 1993 the lands adjacent to the creek were purchased by the state; access to the fishery is no longer an issue.

The China Poot Bay sport and personal use sockeye salmon fishery is a stocked terminal harvest fishery. There are no biological concerns associated with its management.

RECOMMENDED RESEARCH & MANAGEMENT

No Sport Fish Division research specific to this fishery is recommended.

In some years surplus sockeye salmon remain in China Poot Creek after the July 31 closure. Emergency orders have been issued to harvest these fish. Emergency orders can be confusing to the public; extending the season by regulation is the preferred management strategy. It is recommended a proposal be submitted to the Board extending the season through August 7. Extending the fishery by 7 days would maximize the opportunity to harvest stocked sockeye salmon and would minimally impact wild pink salmon which spawn in China Poot Creek.

TUTKA BAY LAGOON PINK SALMON RECREATIONAL FISHERY

FISHERY OBJECTIVE

This fishery is not specifically addressed by Board adopted management plan. The department objective for this fishery is:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

INSEASON MANAGEMENT

The majority of the pink salmon harvested in this fishery originate in Tutka Hatchery; resource conservation has not been an issue in management of the fishery. There has, however, been a closure of all intercepting fisheries during a year of low return to ensure sufficient numbers of fish were present to provide for the hatchery egg take.

HISTORICAL PERSPECTIVE

Tutka Bay Lagoon is located across Kachemak Bay approximately 9 miles south of Homer Spit. A pink salmon hatchery is located at this site which is currently operated by the Cook Inlet Aquaculture Association. The Lagoon is only accessible through a narrow intertidal channel during the high tide period. Pink salmon enter Tutka Lagoon and "stage" for several weeks prior to moving into a small stream to spawn. This staging period in the small, 35 acre lake-like lagoon offers an excellent opportunity to effectively sport fish for these 3 to 5 lb salmon. As many as 40 boats and 150 anglers have been observed fishing in the small lagoon over a single high tide period.

The recreational fishery occurs in July. The preferred terminal tackle is small artificial lures, using medium to ultralight gear.

Commercial harvests from 1978 to 1989 averaged over 400,000 fish. In 1987, due to low stock levels, both the commercial and sport fisheries were closed by emergency order. The 1990 return was also below projections; commercial harvest was 37,426 fish. The corresponding sport harvest was 1,074 pink salmon.

BOARD OF FISH ACTIONS

There were no regulatory changes adopted for this fishery by the Board at either its 1990 or 1992 meetings.

RECENT FISHERY PERFORMANCE

The 1991 sport harvest was 1,784 fish; participation 1,685 days fished. The commercial fishery was restrictively regulated; harvest in this fishery was 14,691, the lowest annual harvest in the history of the hatchery. Cook Inlet Aquaculture Association harvested 101,837 for cost recovery. An additional 103,100 pink salmon provided for the hatchery egg take requirement.

In 1992 anglers expended 854 days to harvest an estimated 1,136 pink salmon. Total return to the hatchery was estimated at 471,290 fish. The commercial fishery harvested 373,540 of these fish. Sport harvest is therefore insignificant in relation to the total return and the percentage of that return harvested by the commercial fishery.

The 1993 total return was estimated at 670,472 pink salmon. Participation in the sport fishery was 1,554 days fished and 783 pink salmon harvested. Data for the current season (1994) will be available in fall 1995.

OUTLOOK

Cook Inlet Aquaculture Association will continue to operate Tutka Hatchery. Production from the hatchery is not expected to significantly deviate from present levels. With allowances for annual variability, no significant change is anticipated in the sport fishery's pink salmon harvest or level of angler participation.

CURRENT ISSUES

There are currently no major biological, allocative or social issues associated with this sport fishery.

RECOMMENDED RESEARCH & MANAGEMENT

No Sport Fish Division research or management activities specific to this fishery are recommended.

OTHER KACHEMAK BAY STOCKED SALMON FISHERIES

FISHERY OBJECTIVE

The Seldovia Bay stocked chinook salmon fishery and the mixed stock coho salmon fishery on the north side of Kachemak Bay are not specifically addressed in Board adopted management plans. Department objectives for these fisheries are:

Objective 1: To provide the opportunity for angler participation to occur at a level commensurate with the ability of the fisheries resource and associated habitat to support that level of use.

Objective 2: To annually stock 105,000 early-run chinook salmon in Seldovia Harbor to produce approximately 3,000 adult fish all of which are available for harvest in the recreational fishery.

Objective 3: To annually stock approximately 150,000 coho salmon fingerling in Caribou Lake.

INSEASON MANAGEMENT APPROACH

These are stocked terminal harvest fisheries; resource conservation is not an issue in their management. To date there has been no inseason management required.

SELDOVIA BAY CHINOOK SALMON FISHERY

Seldovia is located approximately 15 miles southwest of the Homer Spit across Kachemak Bay. Chinook salmon smolt were released in 1987 to create a new sport fishery. The release site was in the Seldovia Harbor where a small stream provides a freshwater imprinting source.

Local anglers and tourists first benefited from this program with the return of approximately 800 chinook salmon "jacks" (1-ocean age) in 1988. An estimated 900 chinook salmon returned to Seldovia Bay in 1989. This return consisted of both "jacks" and 2-ocean fish which have attained a size from 8 to 17 pounds. In 1990, the larger 3-ocean fish returned from the initial smolt release in 1987. The total return was estimated at 1,000 fish of which approximately 50% were from the older age class. The full complement of ocean age classes returned in 1991. Estimated harvest from the Statewide Harvest Survey was 24 fish; this estimate is believed to be conservative.

This is a stocked terminal harvest fishery. Support for this fishery from the local community is strong although numerous concerns have been voiced over snagging violations prior to the June 24 regulatory opening for this harvest method.

SELDOVIA BAY COHO SALMON FISHERY

Coho salmon fingerlings have been planted in Seldovia Lake since 1984 to supplement a small natural return to Seldovia River. Adults returning to this system are unable to enter Seldovia Lake due to a barrier falls below the lake's outlet. These coho salmon are available to boat anglers and personal use fishermen in Seldovia Bay and to shore anglers along the Seldovia River. Estimated returns generally range from 500-1,200 fish. This is a stocked terminal harvest fishery. There are no biological concerns associated with its management. Harvest from the Statewide Harvest Survey in 1991 was 36 coho salmon. This estimate is conservative as it estimates only the saltwater harvest and excludes harvest in Seldovia River.

Seldovia Lake was last stocked with 51,000 fingerlings in 1991. The program has been discontinued due to low numbers of returning adults.

NORTH SIDE KACHEMAK BAY COHO SALMON FISHERY

Coho salmon returning to streams which drain into the upper end of Kachemak Bay migrate close to shore adjacent to the Homer Spit and up the north side of the bay. Recreational shore and boat anglers have historically targeted these fish in the area of Mud Bay which is located inside and at the north end of the spit.

Caribou Lake, located approximately 20 miles northeast of Homer, is tributary to Kachemak Bay via Fox Creek. Fox Creek did not have a coho salmon run prior to the initiation of fingerling plants in Caribou Lake in 1984. While these fish are available to beach and boat anglers in the

Mud Bay fishery, they are believed to be harvested primarily by personal use set gillnet fishermen. Estimated Caribou Lake returns have ranged from 3,000-4,000 fish.

Caribou Lake stocks mix with wild stocks bound for systems (primarily Fox River) at the head of Kachemak Bay. These mixed stocks are targeted by both personal use and sport fishermen. It is believed that stocking has stimulated increased participation in the setnet personal use fishery with the effect on the wild stocks being unknown. The increased harvest and effort in this personal use fishery is generally felt to have reduced sport angler success rates in the historic coho salmon sport fishery in Mud Bay, following the August 15 opening of the personal use fishery.

BOARD OF FISH ACTIONS

In 1990 the Board established a fall subsistence coho salmon fishery in Kachemak Bay. This fishery was projected to harvest both wild and stocked fish. The subsistence fishery had a quota of 2,500 to 3,500 coho salmon. It was the determination of the Board that this was the maximum harvest that the wild Fox River stocks could sustain. As the harvestable wild stock surplus was projected to be taken in the subsistence fishery, the Board closed the Fox River drainage to coho salmon sport fishing. When the subsistence fishery achieved its quota, coho salmon sport fishing and all commercial salmon fishing was to close north of a line from a department marker at Fritz Creek east to a department marker at the west entrance to Aurora Lagoon. This closure was designed to provide total protection to the remaining Fox River coho salmon.

The Board further established a personal use dip net fishery in Fox Creek. This location provides a terminal harvest area for stocked coho salmon originating as fingerlings in Caribou Lake. Access to the lake is precluded by a barrier falls; Fox Creek has virtually no spawning or rearing area. The Board established the season as August 16 through December 31.

At its November 1992 meeting the Board repealed regulations providing for a fall gillnet subsistence fishery targeting Kachemak Bay coho salmon. This fishery was replaced by a personal use fishery, the regulation of which was virtually identical to the repealed subsistence fishery. Personal use does not have priority over other resource users. The Board then adopted a public proposal with staff support which reopened the Fox River sport coho salmon fishery.

Following the closure of the 1993 personal use fishery, the Alaska Superior Court ruled that the Board's division of areas into "subsistence" and "nonsubsistence" was unconstitutional. The Alaska Supreme Court subsequently issued a stay of this ruling, but in April of 1994 the Alaska Supreme Court ended its stay of the Superior Court ruling. This rendered all nonsubsistence areas previously established by the Board unconstitutional and voided the lower Cook Inlet Personal Use Fishery adopted by the Board in 1992.

The Board responded to this court action by directing Commissioner Rosier to adopt emergency regulations establishing subsistence fisheries in both upper and lower Cook Inlet in 1994. The 1994 lower Cook Inlet fishery was prosecuted as a subsistence fishery. Regulation of the fishery was identical to the 1992 season.

RECENT FISHERY PERFORMANCE

Estimated harvest for 1991 from the Statewide Harvest Survey in the Seldovia Bay stocked chinook salmon fishery was 24 fish. This estimate is conservative based on staff observation.

Sample size was too small in 1992 to estimate harvest or participation in this fishery from the SWHS.

The coho salmon sport fishery which occurs on the north side of Kachemak Bay in the Mud Bay area adjacent to the Homer Spit is a mixed stock fishery. It is reasonable to assume that stocked coho salmon from the Homer Spit Enhancement Lagoon, stocked Caribou Lake fish and wild coho salmon of Fox River origin are harvested here. The number of responses from this fishery is too small to estimate harvest and participation from the SWHS.

The personal use dip net fishery in Fox Creek first occurred in 1991. Harvest was estimated by Statewide Harvest Survey at 404 coho salmon. In 1992 harvest was estimated at 437 coho salmon; participation, 235 days. The 1993 estimated harvest was 45 coho salmon and 65 days fished. Staff observation suggests these estimates are conservative.

OUTLOOK

Stocking levels for early-run chinook salmon smolt in Seldovia Harbor are expected to remain constant. With allowances for annual variation, adult returns to this terminal harvest area should also remain relatively constant. Wild stock production from Fox River appears relatively stable.

Coho salmon fry stocked in Caribou Lake in 1994 were produced by Cook Inlet Aquaculture Association. This association has discontinued this program. The last return of adult stocked coho salmon to Caribou Lake will be fall 1996. Sport anglers derive little direct benefit from this stocking program. If these benefits are lost, sport harvest of coho salmon in Kachemak Bay will decline.

The subsistence gillnet fishery harvests wild and stocked Homer Spit and Caribou Lake coho salmon. Currently the quota in this fishery is achieved in 3 to 4 days and the fishery closes. When the fishery occurs, success rates in the Enhancement Lagoon sport fishery dramatically decrease. If Caribou Lake stocked fish did not contribute to the subsistence fishery, it is assumed that fishery could occur over a 2 to 3 week period prior to harvesting the quota. Success rates in the Enhancement Lagoon would therefore be reduced for a greater length of time as would total harvest. Sport anglers would fail to reap maximum benefit from this stocking program.

Fox River at the head of Kachemak Bay is the major producer of wild coho salmon. The river is remote and access is difficult. The drainage has a history of illegal fishing activity targeting coho salmon.

Stocked Caribou Lake coho salmon return to Fox Creek. This is a terminal harvest area which supports a personal use dip net fishery. It is believed that harvest in this personal use fishery reduces the illegal harvest on wild Fox River stocks. If the Caribou Lake stocking program were discontinued, the level of the illegal harvest in Fox River could increase. This would reduce the number of coho salmon available to both sport, commercial and personal use fishermen.

Termination of the Caribou Lake fry stocking program therefore has negative ramifications for recreational anglers even though sport anglers benefit only indirectly from the program. This program will be reviewed in spring 1994 to determine if it is an appropriate stocking program for the Sport Fish Division to adopt. Adoption of the program will be dependent on hatchery space, funding, a determination of whether or not Federal D-J funds can be used to raise fish caught in subsistence fisheries, and the ranking of this project compared to other Cook Inlet area present and proposed programs.

CURRENT ISSUES

Issues, which primarily focused on the uncertainty regarding subsistence fishing in Kachemak Bay, were addressed by department emergency regulation in 1994. There are no biological issues associated with either the Seldovia chinook salmon or the North Side Kachemak Bay coho salmon recreational fisheries.

RECOMMENDED RESEARCH & MANAGEMENT

No Sport Fish Division research or management activities specific to this fishery are recommended.

LITERATURE CITED

Jones & Stokes Associates, Inc. 1987. Southcentral Alaska sport fishing economic study. Final research report. November 1987. (JSA86-0413.) Sacramento, CA. Prepared for Alaska Department of Fish and Game, Sport Fish Division, Research and Technical Services Section, Anchorage, AK.

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-1-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-1-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-1-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-1-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-1-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-1-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, Juneau.

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

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

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. 91-5, 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.

LITERATURE CITED (Continued)

Mills, M. J. 1993. Harvest, catch, and participation in Alaska sport fisheries during 1992. Alaska Department of Fish and Game, Fishery Data Series No. 93-42, 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.

Nelson, D. C. 1993. 1992 area management report for the recreational fisheries of the Kenai Peninsula. Alaska Department of Fish and Game, Division of Sport Fish. Soldotna.