Fishery Management Report No. 04-08

Recreational Fisheries in the Lower Cook Inlet Management Area, 2001-2004: Fisheries under Consideration by the Alaska Board of Fisheries 2004

by

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and

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October 2004

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

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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
milliliter	mL
millimeter	mm

Weights and measures (English)

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

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

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

General

Alaska Department of Fish and Game	ADF&G
Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
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
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
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	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
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.
minute (angular)	'
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
variance	
population	Var
sample	var

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MANAGEMENT OVERVIEW

This report provides information on fisheries under consideration by the Alaska Board of Fisheries in November 2004: (1) marine Chinook salmon recreational fisheries north of Bluff Point, (2) Cook Inlet marine Chinook salmon recreational fishery south of Bluff Point, (3) Lower Kenai Peninsula early-run Chinook salmon freshwater recreational fishery, (4) lower Peninsula Dolly Varden recreational fishery, (5) lower Peninsula steelhead trout recreational fishery, and (6) Homer Spit stocked salmon fishery. A brief overview of the area is also included.

MANAGEMENT AREA DESCRIPTION

The Kenai Peninsula Management Area (KPMA) was divided into northern and southern management areas in spring of 1997. The southern portion of the KPMA became what is now the Lower Cook Inlet Management Area (LCIMA) and is composed of all freshwater drainages of the Kenai Peninsula which flow into Cook Inlet south of the Kasilof River to Gore Point (Figure 1). On the west side of Cook Inlet the management area is composed of freshwater drainages which flow into Cook Inlet south of the latitude of the southern tip of Chisik Island and north of Cape Douglas. The management area includes marine waters in Cook Inlet south of a line from the Kasilof River to the southern tip of Chisik Island and north of the latitude of Cape Douglas and west from the longitude of Gore Point. The LCIMA is administered from the Homer office of the Alaska Department of Fish and Game. Nicky Szarzi, the Lower Cook Inlet Area Manager for Sport Fish Division, has been stationed in Homer since May 1997.

Public land managers in the LCIMA include the United States Fish and Wildlife Service (Kenai National Wildlife Refuge, Alaska Maritime National Wildlife Refuge), the Alaska Department of Natural Resources and the Kenai Peninsula Borough. The community of Homer also manages lands under its jurisdiction through zoning. The Cook Inlet Regional and Chugach Native corporations manage lands granted them under the Alaska Native Claims Settlement Act. Land is also in private ownership particularly near the major population centers and along major road systems.

Larger communities located within the LCIMA include Homer, Anchor Point, Ninilchik, Seldovia, Nanwalek and Port Graham. The management area is linked to the state's highway system via the Sterling Highway, which provides sport anglers access to many of the area's major fisheries. Remote areas of the LCIMA on the south side of Kachemak Bay and west side of Cook Inlet are accessed via aircraft or boat.

Regulations governing sport fisheries in these areas are found in the following three regulatory summaries: the Kenai Peninsula Area, the Cook Inlet-Resurrection Bay Saltwater Area, and 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 LCIMA includes portions of two areas for the purposes of participation and harvest reporting in the Statewide Harvest Survey (SWHS) of Mills (1979, 1980, 1981a, b, 1982-1994); Howe et al. (1995, 1996, 2001a-d); Walker et al. (2003); and Jennings et al. (2004, *In prep* a, b). These are: (1) the Kenai Peninsula (Area P) less the marine and freshwater fisheries south of the latitude of Kasilof River and east of the longitude of Gore Point, 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 between Cape Douglas and the southern tip of Chisik Island.

Management and research functions for the LCIMA recreational and personal use fisheries are the responsibility of the Homer area office of the Alaska Department of Fish and Game (ADF&G), Division of Sport Fish. The Division of Sport Fish staff stationed at Homer is composed of two area management biologists and assistants. Nicky Szarzi, and assistant area biologist Carol Kerkvliet, manage all marine and freshwater finfish and shellfish except groundfish. Scott Meyer and assistant Charlie Stock manage Lower Cook Inlet groundfish and conduct halibut and groundfish research region-wide. One seasonal fisheries biologist and approximately nine seasonal Fishery Technicians whose employment ranges from 2 to 11 months assist these staff. A program technician, Marnee Beverage, and one seasonal clerk, Carolyn Bunker, support the Homer staff.

FISHERIES RESOURCES

The LCIMA offers diverse fishing opportunities for recreational and personal use anglers. Anglers can target five species of North Pacific salmon (pink *Oncorhynchus gorbuscha,* coho *O. kisutch*, sockeye *O. nerka,* chum *O. keta* and Chinook *O. tshawytscha*). Fisheries for these species occur in fresh and salt water. The major salmon fisheries harvest Chinook and coho near shore in Central Cook Inlet and the adjacent freshwater tributaries. In Kachemak Bay, the Homer Spit Enhancement Lagoon is the focal point of salmon anglers. A popular fishery occurs on the area's anadromous and resident stocks of Dolly Varden *Salvelinus malma*. Steelhead/rainbow trout *O. mykiss* support popular catch-and-release sport fisheries. The LCIMA accounts for the largest annual landings of sport-caught halibut *Hippoglossus stenolepis* in Alaska.

The state's largest recreational razor clam *Siliqua patula* fisheries occur on the beaches of the central 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. The largest hardshell clam (little neck *Protothaca staminea* and butter clam *Saxidomus giganteus*) fishery in Southcentral Alaska occurs in Kachemak Bay. A Tanner crab *Chionoecetes bairdi* fishery was also prosecuted in Kachemak Bay until 2002 when it was closed due to low stock abundance. Shrimp *Pandalus spp*., King *Paralithodes camtschaticus*, Tanner and Dungeness crab *Cancer magister* fisheries are closed.

A small but growing fishery for coho salmon occurs on the west side of Cook Inlet. Western Cook Inlet also hosts small fisheries for chum salmon, halibut, razor clams and several species of clams.

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 has become increasingly complex as additional demands are placed on the resource by a growing population base and tourism industry. Social issues are becoming as prevalent as biological issues.

RECREATIONAL ANGLER EFFORT

Since 1977, recreational angler effort in the LCIMA has been estimated using the Statewide Harvest Survey (SWHS) (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b). The SWHS is a mail survey that 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 by location. It is not designed to provide estimates of participation directed towards a single species.

Beginning in 1990, the survey was modified to include estimations of catch (release plus harvest) by location. 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 LCIMA is based on estimates produced from the mail survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

Access to salt water and popular salmon streams, combined with close proximity to major population centers, attracts large numbers of anglers to the central and lower Kenai Peninsula. As a result, the LCIMA supports the third highest angler participation in Alaska. From 1977 through 2003, the LCIMA accounted for an average of 13.1% of the total statewide recreational angling participation. During 2003, participation approximated 262,300 angler-days in LCIMA waters (Table 1).

The SWHS records an increasing trend in effort from 1977-1995 (Table 1, Figure 2). Except in 2000, angling effort from 1996-2003 has stabilized closer to 1980 levels. This stabilization is attributed to full utilization of the popular freshwater salmon fisheries in the Ninilchik and Anchor rivers and Deep Creek, closure of Dungeness crab and shrimp fisheries, increased opportunities for saltwater fishing in other locations such as Seward, restrictions in saltwater adjacent to the shoreline north of Bluff Point to Ninilchik, and a decline statewide in sport fishing effort. The increase in 2000 may be attributable to the halibut fishery.

The Ninilchik River, Anchor River and Deep Creek support the largest freshwater fisheries in the area. Angling effort there is directed towards salmon, Dolly Varden and steelhead trout. Halibut, Chinook and coho salmon are the primary targets of anglers fishing salt waters of the central and southern Kenai Peninsula, where effort accounted for about 68% of the total recreational effort expended in the LCIMA from 1999-2003, or nearly 190,000 angler-days annually (Table 1). 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 and to a lesser degree in Kachemak Bay and the outer Gulf Coast.

Saltwater fisheries for shellfish accounted for an average of about 46,800 angler-days from 1981-2003, or about 17% of the area effort (Table 1). Shellfish harvesters accounted for about 15% of the total recreational effort expended in the area or approximately 41,680 angler-days from 1999-2003. Primarily razor clams, are harvested along the eastern beaches of the Kenai Peninsula. Hardshell clams are the predominant target in Kachemak Bay with the demise of the crab and shrimp fisheries.

RECREATIONAL HARVEST

More halibut are harvested in the LCIMA than any other fish species. Fifty percent of the statewide halibut harvest was taken in Cook Inlet in 2002. Annual halibut harvest estimates for the area increased steadily from 1977-1997 and were variable from 1998-2003 (Table 2). The average annual harvest from 1999-2003 was about 179,500 fish.

Chinook salmon predominate in the harvest of Pacific salmon species. Area Chinook harvest peaked in 1993, generally declined through 1998 and stabilized near the 1998 level at an average

of nearly 16,300 fish for 1999-2003 (Table 3). Nearly 80% were harvested in the marine waters of the area from 1999-2003; an average of 25% of the marine harvest from 1999-2003 was taken at locations where Chinook salmon are stocked. Approximately 21% of the area Chinook harvest was taken from Anchor River, Deep Creek and the Ninilchik River, which flow into Cook Inlet north of Bluff point and are the predominant freshwater sport fisheries in the management area. Few Chinook salmon are taken in western Cook Inlet.

Coho salmon are commonly taken in LCIMA waters. Harvests were stable throughout the first decade that estimates were available (Table 4). Stocked coho salmon from the Homer Spit contributed significantly to the area harvest beginning in 1989. Harvests from the Homer Spit and other locations in the area were significantly higher during the 1990s than previously. Most of the increased harvest was taken in salt water. The average annual harvest for 1999-2003 of nearly 34,500 fish is more than twice the long-term average. Relatively large harvests since 2001 are the result of good survival of Cook Inlet coho salmon stocks and additional fish being stocked at the Homer Spit in 2002 and 2003. Harvest from the Homer Spit stocking project is 32% of the 1999-2003 average harvest estimate. The streams north of Bluff Point, Anchor and Ninilchik rivers and Deep and Stariski creeks, supplied 21% of the area's coho salmon harvest on average from 1999-2003. The salt waters north of Bluff Point provided 11% of the harvest and 30% of the harvest was taken from the salt waters from Bluff Point south, not including the Homer Spit. A small but active coho salmon fishery occurs in the fresh and salt waters of West Cook Inlet.

Dolly Varden are a popular sport fish and are plentiful in many locations throughout the area. The relatively large harvests of the late 1970s to mid-1980s (Table 5) occurred primarily in the Anchor River and were not sustainable. More restrictive regulations implemented in 1990 provided for more sustainable harvests. The average annual harvest for 1977-2003 is approximately 9,600 while the recent 5-year average is almost 3,400 Dolly Varden. From 1999-2003 more than half were taken in the roadside streams of Cook Inlet north of Bluff Point; 28% were taken in the salt waters from Bluff Point south. Other finfish species harvested in smaller numbers in the LCIMA include rockfish, lingcod, smelt, pink and chum salmon, rainbow/steelhead trout, lake trout and kokanee.

Nearly a million razor clams were taken annually during the 1980s and into the 1990s from the beaches between Anchor Point and the Kasilof River (Table 6). A variety of shellfish species is harvested south of Bluff Point including razor clams. The relatively large razor clam harvests reported in the latter half of the 1980s are probably the result of combining sites in the SWHS that include locations north of Bluff Point. Currently, the shellfish harvest from Bluff Point south is dominated by hardshell clams (Table 7). An average of approximately 11,600 gallons of hardshell clams were harvested annually along the shoreline south of Bluff Point from 1999-2003. Previously popular fisheries for king, Tanner and Dungeness crab as well as shrimp are now closed because abundance of these species is too low to support harvests.

MARINE CHINOOK SALMON RECREATIONAL FISHERIES NORTH OF BLUFF POINT

BACKGROUND AND HISTORICAL PERSPECTIVE

The Cook Inlet marine fishery for Chinook salmon began in the early 1970s and remained fairly stable through the late 1980s (Nelson 1995). The fishery north of Bluff Point was historically 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 same stocks were targeted, there was spatial separation of anglers depending on the access point used.

The Cook Inlet marine Chinook salmon recreational fishery has expanded in recent years, with the greatest angler effort occurring in waters adjacent to Deep Creek (Figure 3). Increased marketing by the sport fish guiding and tourism industries, availability of commercial boat launching services that accommodate larger vessels, development of sport fishing lodges along Cook Inlet beaches, and restrictions in the Kenai River fishery following implementation of the Kenai River Chinook Salmon Management Plan, resulted in growth in this fishery, most notably the guided segment. 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 near the mouths of Anchor River and Deep Creek (Figure 3). A commercial operator provides a beach launching and take-out service at Deep Creek making it possible to use larger boats and launch all boats at most tide stages. Deep Creek has a relatively stable beach where launching also occurs. Limited access is available at Whiskey Gulch. 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. Launching from the Whiskey Gulch beach is limited to small boats because of the steep gradient. Beginning in 1993, Sport Fish Division provided a garbage collection site and a portable toilet. No further improvements are currently planned. Sport Fish Division contracts with a private party to maintain the road that connects the recent purchase and beach to the Sterling Highway. Anchor River has two commercial tractor boat launching operations that provide service at any tide stage. Private launching at the river mouth occurs at high tide. The unstable beach precludes most private launching or loading of boats from the beach at most tide levels. Boats also launch in Homer to access the Anchor Point area.

Anglers generally troll near shore within a few hours of the high tide. Many anglers fish for halibut as well as Chinook salmon. Historically, angler effort has 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 limited fishing to as little as 30% of the days available to fish during the season.

This recreational fishery is essentially the first harvest of early-and late-run Chinook salmon in Cook Inlet. In the commercial fishery, only drift fishing is allowed south of Ninilchik. The commercial drift fishery does not occur until late June when interception of early-run Chinook salmon is minimal.

Information about harvest, catch, and fishing effort is available from department creel surveys conducted at the Deep Creek access from 1972-1986 and at the Anchor River/Whiskey Gulch access in 1986 (Hammarstrom 1974-1981; Hammarstrom and Larson 1982-1984, 1986; and Hammarstrom et al. 1985). The surveys showed that at Deep Creek, approximately 70% of the harvest took place during the early run, and 30% during the late run. This harvest ratio was later

applied to annual harvest estimates from the Statewide Harvest Survey (SWHS) to estimate early- and late-run harvests in years after the onsite creel survey was terminated (Tables 8 and 9).

Harvest from 1987-1993 was determined by the SWHS. Participation in the Cook Inlet Marine Chinook salmon fishery alone was not available because the SWHS estimates participation by location, not by species, and a major sport halibut fishery occurs in the same area as the Chinook salmon fishery. In 1994 and 1995, a creel survey was again conducted at Deep Creek, Whiskey Gulch, and Anchor River (McKinley 1995, 1996), to estimate early-and late-run harvest, total participation in the combined Chinook salmon and halibut fisheries, and verify the SWHS estimates. The study showed that 75% of the season's harvest occurred before June 23, similar to estimates from the earlier creel surveys. Estimates from the SWHS may be more accurate and complete than the creel survey estimates because of temporal, area and seasonal limitations to the creel census. Since 1996, the SWHS has generated separate estimates for the early (prior to and including June 24) and late (after June 24) runs.

Beginning in 1995, ADF&G required sport fishing guide businesses and guides to register. Guides fishing in salt water were required to enter their catches in a logbook beginning in 1998. Early-run Chinook harvests reported by guides from waters North of Bluff Point are similar to estimates of harvest from the SWHS (Howe et al. 2001c, 2001d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b) (Table 10).

Chinook salmon harvest increased steadily from 1990 through 1995 (Tables 8 and 9). The harvest of guided anglers in particular increased sharply (Table 11). The expansion of the fishery was the result of several factors including: 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 use of the fishery by Kenai River guides on days when the Kenai River is closed to fishing from boats. High angler success rates as reported by the news media also attracted additional participants.

In 1994 and 1995, a creel survey was again conducted at Deep Creek, Whiskey Gulch, and Anchor River (McKinley 1995, 1996), because of the rapid expansion of the fishery in recent years, and a public perception that harvest in this fishery was negatively impacting other Cook Inlet drainage fisheries. The primary purpose of this onsite survey was to estimate early- and late-run harvest and verify the SWHS data. The creel survey estimated early- and late-run harvest and total participation in the combined Chinook salmon and halibut fishery. The 1994 and 1995 creel estimate that 75% of the season's harvest occurred before June 23 compared favorably to estimates of 70.5% from the creel survey during 1972-1986. Estimates from the SWHS are thought to be more accurate and complete than the creel estimates because of temporal, area and seasonal limitations to the creel census. Since 1996, the SWHS has requested information from surveyed Central Cook Inlet marine anglers by two time periods: prior to and including June 24 (early run) and after June 24 (late run). This allows the SWHS to generate separate estimates for the early and late runs.

STOCK COMPOSITION

This fishery targets the mixture of Chinook salmon stocks found in Cook Inlet marine waters. Cook Inlet stocks with early run timing (late April through late June) include the small lower Kenai Peninsula drainages (Stariski Creek, Deep Creek, Anchor River, Ninilchik River), and larger drainages in upper and northern Cook Inlet (Kasilof, Kenai, and Susitna rivers). Cook

Inlet stocks with late run timing (late June through early August) include the Kenai River and, to a lesser extent, the Kasilof River and late-run hatchery releases into Cook Inlet tributaries.

From 1996-2002, a coded wire tag (CWT) recovery project was conducted to estimate stock composition of the Cook Inlet marine Chinook salmon harvest (McKinley 1999, Begich *In prep*, R. Begich, ADF&G Sport Fish, Homer, personal communication). This project monitored the Central Cook Inlet marine sport harvest for Chinook salmon that were tagged as smolt from Cook Inlet hatchery releases, and for wild Chinook salmon that were tagged as fingerlings or smolt in the Kenai River, Willow Creek, the Deshka River and Deep Creek. Stock composition and age and maturity of early-run Chinook harvested in the Cook Inlet marine fishery north of Bluff Point were determined.

The tag-recovery project was also conducted during the late run in 1997 and 1998 (Table 12). None of the tagged Cook Inlet stocks had all major age classes tagged in 1997. Tags were recovered from all three tagged late-run Cook Inlet stocks (Kenai River, Twin Falls and Homer Spit). Due to the small sample size, contribution estimates for the late-run in 1998 are biased. Tagged fish sampled from the harvest originated from the Homer Spit stocking project and non-local hatcheries.

Origin was determined for an average of 14.9% of the annual early-run harvest during the course of this study (Table 13). The first year when all age classes of Chinook stocks from Deep Creek and Cook Inlet hatcheries were tagged so complete contribution estimates for these stocks could be determined was 1998 (Table 13).

Tagged stocks of non-Cook Inlet origin account for an average of 9.2% of the early run harvest. Tagged Cook Inlet stocks account for an average of 7.1% of the marine harvest (Table 13). Contribution estimates for most Cook Inlet stocks are not possible due to the lack of marking programs for Cook Inlet wild stocks. Therefore, origin is known for an average of only 14.9% and composition of the unexplained harvest, comprising 85.1% of the total, cannot be apportioned exactly. However, composition of the unexplained harvest can be inferred from maturity estimates provided by measuring the gonadal development of harvested fish (Table 14).

Maturity sampling of coded wire tagged fish shows that the majority of Chinook salmon taken in the entire fishery are mature, spawning fish. This is also true in the nearshore fishery (within ¾ mile of shore). However, the majority of fish taken more than ¾ mile from shore are immature fish (non-spawners) (Table 14).

Maturity sampling of coded wire tagged fish has also shown that mature (spawning) fish taken in the fishery are mainly of Cook Inlet origin (Table 15). Immature (non-spawning) fish are mainly non-Cook Inlet origin. The fraction of mature fish in the coded wire tag sample can be inferred from the fraction of immature fish in Table 14. Assuming these same percentages apply to the unexplained harvest results, an estimated average of about 2,600 mature Chinook salmon were taken in the unexplained portion of the harvest each year since 1996 (Table 16). It is presumed that these fish are destined for Cook Inlet systems.

Although four LCIMA stocks (Anchor River, Deep Creek, Ninilchik River, and Stariski Creek) are in close proximity to the fishery, it is unlikely that a majority of this unexplained harvest of spawners is bound for these systems. All the major age classes of Chinook salmon returning to Deep Creek after 1997 contained a fraction of fish with coded wire tags. The estimated marine harvest of Deep Creek-origin Chinook salmon in the early run ranged from only 77 to 281 fish

between 1998 and 2000 (Table 13). Hatchery-reared Chinook stocked in the Ninilchik River are all marked. The estimated marine harvest of Ninilchik hatchery fish was less than 200 fish in all years. The lower contribution of the Ninilchik River after 1998 compared to 1996 or 1997 probably reflects the reduction in the number of fish stocked in the river beginning in 1995 (see the discussion of the Ninilchik River in report section "Lower Kenai Peninsula Early-run Chinook Salmon Freshwater Recreational Fishery"). The contribution of the three other wild LCIMA stocks (Anchor River, Stariski Creek, and Ninilchik River wild) is likely low. This leaves other Cook Inlet stocks to account for most of the marine harvest of mature fish.

Tag recovery and maturity data indicate that the high interception rate on Cook Inlet stocks is not focused on a few selected stocks. Rather, tag recovery data indicate that the origin of the harvest of mature fish is of a broader Cook Inlet distribution composed of numerous individual stocks, none of which make up a large component. By far the most abundant stocks in Cook Inlet are those returning to the Susitna River drainage, therefore we assume that their contribution to the Central Cook Inlet fishery is proportionate to their abundance in Cook Inlet.

The increasing incidence of a number of Southeast Alaska, British Columbia, and to a lesser extent Washington and Oregon stocks in the harvest indicates the presence and interception of non-Cook Inlet Chinook in the early-run marine fishery. We estimate that in 1998, nearly 1,000 Chinook from tagged stocks outside of Cook Inlet were harvested in the Central Cook Inlet early-run fishery (Table 13). All of these tagged stocks were from British Columbia. A harvest of similar magnitude of non-Cook Inlet origin fish was taken in 2001. Many immature fish with an adipose finclip but no CWT were sampled in 2002. These may be from Washington hatchery releases with finclips that were not tagged. Immature fish are feeding in the waters of Cook Inlet before returning to their natal streams to spawn and are commonly referred to as "feeders."

RECENT FISHERY PERFORMANCE

The 2001 early-run Chinook salmon harvest was below average despite unusually dry warm weather during June that allowed anglers many fishing days. Harvest of late-run Chinook salmon was also very low. Lack of Cook Inlet spawning fish was made up for by excellent fishing for feeders during summer 2001. The 2002 season was similar: sunny warm weather predominated from May through July allowing anglers many days on the water, harvests of early and late-run Chinook salmon were below average, but fishing for feeders was excellent. The sampling program to estimate harvest composition ended in 2002 and 2003 was the first time since 1993 that harvests in the early-run Chinook salmon marine recreational fishery from Bluff Point to Cape Ninilchik were not sampled. In 2003, excellent fishing in May for Chinook salmon off Bluff Point and north to Stariski Creek was reported by fishermen. It is likely most or all were feeders of non-Cook Inlet origin because it was early for Cook Inlet stocks to be returning. Fishing nearshore, from Bluff Point north to Deep Creek where resident Cook Inlet Chinook salmon commonly concentrate, was reported to be good during the early run. During the late run, fishing for Chinook in this area was reported as slow. The 2004 season was characterized by exceptionally mild weather and great fishing during both the early- and late-run. Anglers reported harvesting more large fish in the nearshore waters in late July, assumed to be late-run Chinook of Cook Inlet origin, than in the recent past.

MANAGEMENT OBJECTIVES

Early-run Marine Chinook Fishery

The Cook Inlet Marine Early-Run King Salmon Management Plan applies to the early-run mixed stock fishery north of Anchor Point. This plan, adopted in 1996, creates a rectangular special harvest area from Bluff Point north to Ninilchik (Figure 4). This area extends 1 mile seaward from the beach. From April 1 through June 30, within this special harvest area, guides cannot fish while guiding clients and an angler cannot fish for any species of fish for the remainder of the day after harvesting a Chinook salmon, but may fish outside the special harvest area.

Three conservation zones, closed to fishing for all species from April 1 through June 30, are located within this special harvest area. These zones extend 1 mile seaward and encompass the area from the mouth of the Ninilchik River to 2 miles south of Deep Creek, 1 mile on either side of Stariski Creek and 2 miles on either side of the mouth of the Anchor River.

A harvest guideline of 8,000 Chinook salmon governs the fishery from April 1 to June 30. If this guideline is exceeded the plan calls for an unspecified restriction of the fishery prior to the following season to ensure compliance with the guideline harvest level. The harvest reported in the SWHS is the fishery performance measure.

Late-run Deep Creek/Anchor Point Marine Chinook Salmon Fishery

Management of the Cook Inlet marine late-run Chinook salmon recreational fishery north of Bluff Point is addressed in the Board-adopted Kenai River Late-Run King Salmon Management Plan because it is assumed that a portion of the harvest is late-run Chinook salmon of Kenai River origin. This plan was amended in 1990 to address the harvest of late-run Kenai River Chinook salmon in the marine fishery. The plan was further amended in 1999.

In referencing the marine fishery, the plan stated that if the spawning escapement in the Kenai River is projected to be less than 15,000 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). In 1999, the point was changed to a projected escapement of 17,800 late-run Chinook.

To date, the projected escapement to the Kenai River has never been less than 17,800; restrictions to the marine fishery have not been required since the plan was amended by the Board in 1990 and 1999. This notwithstanding, the primary goal of management is to follow the provisions of the Kenai River Late-Run King Salmon Management Plan as they apply to this fishery.

Fishery objectives adopted by the department for the Central Cook Inlet marine Chinook fishery are:

Objective 1: Manage for a level of angler participation that results in a harvest in the early run fishery (during April 1 through June 30) that approximates 8,000 Chinook salmon.

Objective 2: Ensure, through appropriate management and research programs, that harvest in these fisheries does not reduce the Chinook salmon spawning escapement in any drainage or stream below specified levels.

There has been no inseason management required in the history of these fisheries.

BOARD OF FISHERIES ACTIONS

In 1990, the Board recognized that a public proposal to reduce the saltwater Chinook salmon bag limit from its current two fish to one fish was an allocative rather than biological issue. However, since it was reasonable to assume that this fishery intercepts some 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 limits in the saltwater fishery. Beginning in 1991, the bag and possession limits in Cook Inlet north of Bluff Point have been one Chinook salmon of any size.

Additional 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 printed on the back of the sport fishing license, identical to the harvest record in use prior to 1990. Unlicensed anglers record their harvest on a separate harvest card.

The Kenai River Late-Run King Salmon Management Plan was amended to close the late-run Chinook salmon marine fishery in addition to the recreational fisheries in the Kenai River 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). In 1999, the minimum goal was changed to an inriver goal of 17,800.

The Board considered a number of proposals regarding this fishery at its November 1992 meeting. None of the proposed regulatory changes were approved. The Board adopted a "housekeeping" proposal that clearly established the Chinook salmon daily bag and possession limits south of Bluff Point as two fish, and north of Bluff Point one fish daily or in possession. This corrected an administrative oversight that erroneously limited the bag and possession limits in Resurrection Bay to one fish.

The Board adopted the Upper Cook Inlet Marine Early-Run King Salmon Management Plan, described earlier in this report, at its 1996 meeting.

Numerous proposals seeking to change portions of the Cook Inlet Marine Early-Run King Salmon Management Plan came before the Board during its meeting in February 1999. The minimum inriver escapement goal for late-run Kenai River Chinook salmon was raised to 17,800. The Board voted to create the North Gulf Coast (NGC) Chinook Salmon Task Force and deferred consideration of the proposals for LCIMA marine Chinook fisheries along with other proposals which involved commercial and recreational fisheries in NGC waters on non-local Chinook stocks. North Gulf coast waters were defined to be north of Yakutat to and including Kodiak waters. Public proposals regarding LCIMA marine Chinook fisheries which were deferred sought to: (1) reduce the current Chinook salmon conservation zone (closed area) at the saltwater terminus of the Anchor River from within 2 miles north and south and 1 mile seaward of the river mouth to within 1 1/2 miles north and south and a half mile seaward from the river mouth; (2) decrease the size of the Special Harvest Zone by moving its southern boundary from Bluff Point to 2 miles south of the Anchor River mouth; (3) eliminate the harvest guideline of 8,000 Chinook; (4) end the regulations contained in the Upper Cook Inlet Marine Early-Run King Salmon Management Plan on June 26 instead of July 1; (5) limit the conservation zones to the 1 mile radius at the saltwater terminus of each lower Peninsula stream; and (6) amend the Plan to allow unguided anglers who are over 60 years of age to harvest two Chinook salmon per

day and be able to continue to fish for halibut or any other species in the special management zones described in the plan.

The NGC Chinook Salmon Task Force members were to be appointed by the Board of Fisheries (BOF) in the spring of 2001 from among stakeholders in marine Chinook fisheries. This did not occur due to budgetary constraints. The deferred proposals were considered at the BOF meetings during the fall of 2001 along with recent proposals for changing the Cook Inlet marine salmon fisheries.

The BOF supported the Department position to preserve the Cook Inlet Marine Early-Run King Salmon Management Plan in its current form because it stabilized marine harvests and protects local stocks from greater exploitation.

OUTLOOK

Infrastructure supporting the Central Cook Inlet marine Chinook salmon fishery continues to develop. More guide businesses are evident along the road system adjacent to the fishery particularly in the Ninilchik area, the use of larger-sized (26 to 28 ft) boats has increased, additional private fishing lodges and recreational cabins are being built, and private access roads to the beach are also on the increase. Improvements to the Whiskey Gulch Road have augmented its use. Homer is a potential source for increased use of the area. A fleet of approximately 50 boats currently accesses the fishery north of Bluff Point from Homer; many are charter operators who primarily target halibut but offer Chinook salmon fishing as an alternative.

Early-run harvests have stabilized well below the harvest guideline of 8,000 Chinook salmon. Increased participation and harvest are likely to occur as more facilities are developed adjacent to the fishery. Restriction of the halibut fishery could shift more angler effort towards Chinook salmon in marine waters. Achievement of the harvest guideline is possible under these scenarios.

CURRENT ISSUES

Lower Kenai Peninsula stocks are believed to stage or hold along eastside beaches prior to entering spawning streams and may be available to anglers longer than upper Peninsula or northern Cook Inlet stocks. Conservation zones around the mouths of local streams may protect Lower Cook Inlet (LCI stocks). The contribution of local stocks to the marine harvest before the current saltwater regulations were implemented in 1996 is unknown. The impact of the regulations on escapement to the Ninilchik River, Deep Creek and the Anchor River is not apparent from fishery data (see Lower Kenai Peninsula freshwater Chinook sections below). Therefore the effect of repealing the current regulations is unknown.

Some users are concerned that the marine early-run Chinook salmon fishery may impact the early-run Kenai River fishery. Although data are limited, ADF&G does not believe that Kenai River stocks dominate the harvest.

RECOMMENDED RESEARCH AND MANAGEMENT

A concern is the impact modification of current saltwater regulations could have on escapement to local streams. Freshwater escapement enumeration programs for the Anchor and Ninilchik rivers should be maintained and the assessment methods for Deep Creek Chinook escapements should be improved to establish more accurate spawning escapement goals for these wild stocks, along with management strategies to achieve these goals. A cautious incremental approach should be taken in changing the current saltwater and freshwater regulatory structure.

COOK INLET MARINE CHINOOK SALMON RECREATIONAL FISHERY SOUTH OF BLUFF POINT

HISTORICAL PERSPECTIVE AND RECENT FISHERY PERFORMANCE

A fishery for Chinook salmon has occurred for many years south of Bluff Point. The Chinook salmon fishery is difficult to characterize because anglers reporting their harvest in the SWHS often generalize their fishing location, and because the survey does not estimate effort by species. Participation and harvests in the area have generally increased. Coded wire tags recovered from the sport harvest indicate a mixture of stocks is present in the fishery including hatchery stocks returning to Seldovia Bay, Halibut Cove Lagoon, and the Homer Spit Enhancement Lagoon, wild and hatchery stocks returning to Cook Inlet tributaries farther north, and a mixture of stocks of non-Cook Inlet origin. Effort is concentrated during the summer months, but a fishery occurs outside the summer months on immature non-spawning, feeding Chinook salmon.

Anglers are known to have harvested immature "feeder" Chinook salmon in the off-season during the 1960s or earlier. Growing interest in harvesting these fish during the fall and winter, when mature salmon are not present, led the BOF to adopt a proposal in 1988 to allow the harvest of Chinook salmon unrestricted by a yearly limit or harvest recording requirement during October 1 to March 31. Indications of continued growth in the fishery prompted the BOF, in 2001, to again require winter harvests be included in the five Chinook salmon annual limit. The action was rescinded by the BOF in 2002 but a harvest guideline was implemented to slow growth of the fishery.

Effort and harvest directly attributable to fishing for Chinook during this time of year are unknown but are thought to be relatively small. Harvests by guides and guided anglers reported in charter logbooks for all Cook Inlet marine waters during September through March ranged from 40 in 1998 to 473 in 2003 (Table 17). Most of this harvest takes place near or south of Bluff Point. Participation in the winter Chinook salmon fishery has increased slightly in recent years and that increase is also reflected in harvests reported in charter logbooks. An overall increase has occurred in the number of contestants in a March derby targeting Chinook salmon since inception of the derby in 1994, from 179 to approximately 700. A second derby was inaugurated during fall 1997 and occurred again during 1998, 2000, 2001 and 2004.

Limited formal sampling of the Chinook salmon harvest for coded wire tags, age, length, sex and sexual maturity occurred prior to May or after July from 1994 through 1996. Department personnel also sampled Chinook salmon harvested during the salmon derbies each year since 1994. Numerous voluntary returns of Chinook heads, thought to contain coded wire tags because of the missing adipose fin of the fish, have been returned by anglers independent of department surveys. Only one tagged Chinook of Cook Inlet origin has been recovered from any source during August through March. However, relatively few Chinook stocks of Cook Inlet origin have been tagged and relatively few individual Cook Inlet fish received tags compared to the diversity of hatchery stocks outside of Cook Inlet that are the focus of extensive tagging programs. The relatively small number of tagged Cook Inlet stocks may account for the lack of immature Cook Inlet recoveries in the winter fishery but it is likely that the winter stocks are largely composed of nonlocal stocks because of the lack of coded wire tagged Cook Inlet fish recovered from the fishery.

Sampling Chinook salmon harvested south of Bluff Point was part of the formal tag recovery program conducted from 1997 through 2002 in the marine waters of the LCIMA. Sampling occurred when early (May through June 23) and late (June 24 through mid July) Cook Inlet Chinook salmon are thought to be present in LCIMA marine waters. Both runs were sampled in 1997 and 1998. Late run sampling was discontinued after 1998 but early run sampling continued through 2002 (Table 18). Tagged fish of non-Cook Inlet origin were all from hatcheries in British Columbia, Washington, and Oregon.

Sexually immature Chinook salmon were more predominant in the harvest south of Bluff Point than to the north (Tables 14, 19).

MANAGEMENT OBJECTIVES

Historically, no inseason management of this fishery occurred. The Lower Cook Inlet Winter Salt Water King Salmon Sport Fishery Management Plan was established by the BOF in fall of 2002 and implemented in early winter of 2002. The plan contains a sport harvest guideline of 3,000 Chinook salmon for the waters of the LCIMA south of Bluff Point from October 1 through March 31 and stipulates the harvest will be estimated annually with the SWHS. The SWHS questionnaire was modified to provide the estimates of winter harvest beginning in 2002. The 2002 and 2003 estimates of winter harvest are 1,769 and 2,051, respectively (Jennings et al. *In prep* a, b). Any restriction of this fishery necessitated by exceeding the harvest guideline would likely be based on data from previous seasons as no inseason information is available. Formal sampling of the summer Chinook fishery south of Bluff Point has ended but staff will continue to encourage anglers to voluntarily return Chinook with CWTs and will sample winter fishing derby catches for CWTs and biological information as time permits.

BOARD OF FISHERIES ACTIONS

The BOF rescinded the seasonal bag limit and reporting requirement during October 1 to March 31 in 1988. No further Board action was focused on this fishery until the meeting of 1998, when consideration of a public proposal to reinstate a seasonal limit and reporting requirement during November to April was postponed to the 2001 meeting pending consideration by the North Gulf Coast Chinook Salmon Task Force. This task force was not convened and this proposal was taken up at the BOF meeting in fall 2001. The BOF established an annual limit of five Chinook salmon based on their concerns that, although the harvest was small, it focused on mixed stocks, many of unknown origin, and there were no regulations in place to cap the harvest. Public opposition to the decision prompted the BOF to establish a Local Area Management Plan (LAMP) task force of interested members of the public during the spring of 2002 to propose an alternate regulation that would slow growth in the fishery. The BOF restricted winter marine Chinook fisheries in the Resurrection Bay and Kodiak areas at its fall 2001 meeting and sparked similar public opposition among users in Lower Cook Inlet. LAMP task forces were appointed by the BOF in those two areas also with the mission similar to the Lower Cook Inlet group: to slow growth of winter Chinook fisheries. The separate task force proposals from the three regions, including Cook Inlet's, were considered and passed by the Board during its October work session in 2002. The Cook Inlet plan was implemented during the winter of 2002.

OUTLOOK

Boat anglers fishing the marine waters south of Bluff Point catch primarily immature Chinook salmon throughout the year. Immature fish offer opportunity both as a primary target and as an alternative when other fisheries are poor. Although regulated by a yearly limit of five during

April through September, no seasonal bag limit is in place during the rest of the year. Additional opportunity is afforded throughout the year by the daily bag and possession limits south of Bluff Point, which are two Chinook salmon. Although inclement weather during non-summer months may affect fishing opportunity, it has not stemmed a gradual increase in participation during the winter. Participation and harvests are expected to continue to increase throughout the year in the fishery south of Bluff Point.

CURRENT ISSUES

The SWHS and charter logbooks are providing new and helpful information in quantifying the harvest and harvest trends in the summer and winter months. The charter logbooks document a stable harvest during the summer and an increase in the harvest during the winter. Winter harvests reported for the first time in the SWHS in 2002 and 2003 are below the harvest guideline of 3,000, indicating that this fishery doesn't threaten stock viability. Non-local feeding Chinook salmon from many stocks dominate both the summer and winter harvests south of Bluff Point, therefore the fishery does not pose a threat to conservation of Cook Inlet stocks or visiting non-local stocks. The potential harvest of stocks that are listed as endangered under the Endangered Species Act is possible but the likelihood of impacting those stocks is remote.

RECOMMENDED RESEARCH AND MANAGEMENT

The continuation of the charter logbook program, assessment of the harvest with the SWHS, department sampling of winter derby harvest, and voluntary returns of coded wire tags will provide the information needed to monitor the fishery.

LOWER KENAI PENINSULA EARLY-RUN CHINOOK SALMON FRESHWATER RECREATIONAL FISHERY

BACKGROUND AND HISTORICAL PERSPECTIVE

In the early 1970s, the Anchor River, Deep Creek, and Ninilchik River were the major Chinook salmon fisheries 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 fisheries are still major fisheries; but more recently developed fisheries in the Kenai and Kasilof rivers, the Homer Spit, and Susitna River drainage streams now have more participation and harvest. The average participation declined slightly while the harvest increased in Anchor River and Deep Creek during the 1990s. Participation and harvest increased in the Ninilchik River, with return of the first major year class of stocked fish in 1991 (Tables 20-22).

Harvest from the Anchor River, Deep Creek, and Ninilchik River (Figure 3) 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 three weekends (weekends include Monday). Ninilchik River supported a smaller Chinook salmon population than the other two streams and the fishery there was open for only three consecutive 3-day weekends in the lower 2 miles.

The water level and water clarity in the Anchor River and Deep Creek are variable due to their length, relatively steep gradient and drainage morphology that includes 1,000-foot cutbanks of loose substrate. Harvest success is related to the water depth, flow rate and clarity during fishery openings. Typical spring conditions find both rivers high and muddy for the first Chinook

fishery opening and generally flow will subside and clarity improve during the second Chinook fishery opening. Water conditions on the Ninilchik River are generally less turbid than on the other two streams. The clear water increases angler efficiency and has resulted in a relatively high exploitation rate on Ninilchik Chinook salmon.

Anchor River and Deep Creek

Annual aerial index counts of Chinook salmon returns to Anchor River and Deep Creek from 1976 through 1989 averaged 1,700 and 700, respectively (Table 23). In the late 1980s, angler effort appeared to be declining (Tables 20 and 21). The Board therefore extended the fishery on these streams, adding a fifth consecutive 3-day weekend beginning in 1989.

The Chinook salmon sport harvest from the Anchor River and Deep Creek increased substantially after 1991 following the extension of the fishing season in these streams (Tables 20, 21, and 23). A general increase in the harvest from these tributaries continued through 1993. Harvests declined in 1994 and again in 1995 but remained well above pre-1990 levels.

Substantial changes of the regulations governing Deep Creek and the Anchor River and the adjacent marine fishery occurred in 1996, partially as a result of recent below average escapement counts to these two streams. The marine fishery from Bluff Point north to Ninilchik was restricted. The Chinook salmon fishery in Deep Creek was reduced from five weekends to three, and the combined seasonal bag limit in Deep Creek and the Anchor River was reduced from five to two Chinook salmon 16 inches or larger. In both the Anchor River and Deep Creek, an angler could no longer fish for the remainder of the day after harvesting a Chinook salmon. The spawning areas of Anchor River, Deep Creek, Stariski Creek and the Ninilchik River were closed to all fishing until August 1 to protect spawning Chinook salmon from catch-and-release mortality.

Estimates of sport harvests of Chinook salmon from the Anchor River in 1996 and thereafter were similar to the 1995 harvest. A general decline in participation in the Anchor River fishery has continued since angler effort was first assessed in 1977. Deep Creek harvests declined by over 20% in 1996 from 1995 estimates (Tables 20, 21, and 23) and have remained fairly stable at levels seen in the 1980s and participation is slightly less than in the 1980s.

During 1997, fishing success was enhanced because water levels were unusually low and water clarity was unusually high during much of the fishery that year. In 1998 through 2000 more typical conditions of high muddy water occurred during some or all of the fishery openings. Szarzi and Begich (2004) contains a more detailed overview of fishery conditions in the Anchor River and Deep Creek during 1997 through 2000.

A wild salmon tagging project was started in Deep Creek in 1994 because of its proximity to the marine fishery, and concern about overharvest of this relatively small stock in the marine fishery. Juvenile Chinook salmon were marked through 1997 and coho salmon were marked during 1995 through 1997 and again beginning in 2001 (Table 24). In 1996, returning adult Chinook salmon were captured using nets in Deep Creek. Those missing their adipose fin were sacrificed to determine their stream of origin and to estimate the total number of their cohort that had outmigrated with them as smolt. A weir was operated in Deep Creek starting in 1997 with the goal of estimating total smolt outmigration and marine survival (Table 25). Chinook were found to have escaped upstream of the weir undetected in 1997 and a netting project upstream was used to estimate the number of Chinook salmon that passed the weir without being counted (King and Breakfield 1999). After 1997, high water prevented installation of the weir until the adult

spawning migration was underway. Netting upstream of the weir (1998) and aerial surveys from fixed-wing aircraft (1999) were used with poor success to estimate the upstream escapement prior to weir installation. Netting was conducted in 2000 to estimate the proportion of CWT fish in the river prior to weir installation. Szarzi and Begich (2004) contains a more detailed overview of salmon research in Deep Creek from 1996 through 2000.

Deep Creek netting and weir operations included sampling to detect straying. In 1996, Chinook salmon of Ninilchik River hatchery release origin comprised an estimated 14.1% of the 360 fish netted from Deep Creek. This prompted a change in stocking location from the Ninilchik harbor to a location upstream in the Ninilchik River to reduce straying of Chinook salmon from the Ninilchik River. Approximately 3% or 51 of the Chinook salmon counted at the weir were estimated to be of Ninilchik River hatchery origin in 1997 (King and Breakfield 1999). In 1998, 1.2% of the migration enumerated at the weir or six fish were of Ninilchik hatchery origin (King and Breakfield 2002). The proportion of Ninilchik River hatchery Chinook was estimated to be 2.0% of the fish that passed through the weir or 46 fish in 1999 (Begich 2002). One Deshka River Chinook salmon was recovered at the Deep Creek weir in 1999. Contribution of Ninilchik River hatchery Chinook salmon was 53 fish or 4.0% of the return examined for marks in 2000. One Chinook salmon recovery from the netting portion of the study was identified as originating from stockings at Seldovia Harbor in 2000.

Ninilchik River

The BOF has not liberalized the fisheries on Ninilchik River because the number of Chinook salmon counted during annual aerial spawning surveys has not significantly increased (Table 23).

From 1988-1994, annual releases of hatchery-reared smolt of Ninilchik River origin in the Ninilchik River ranged from 88,000 to 247,000 (Appendix A1). Stocking levels were reduced in 1995 to about 50,000. Augmentation of the return with hatchery-reared fish provided the opportunity to increase recreational harvest and participation. From 1991 when the first adults (age class 1.3) returned from stocking until the effect of reduced stocking levels was first realized in 1997, harvest in the inriver sport fishery increased from the 1977-1990 average of 1,000 fish to 3,500 fish (1991-1996 average), while escapement index counts averaged approximately 490 fish (Table 23). Increased fishing opportunity was provided by increasing the length of the season by emergency order. The fishery is open by regulation for three, 3-day weekends beginning with Memorial Day weekend at the end of May. From 1991 through 1995 the season was extended by emergency orders, which generally opened the fishery beginning on Saturday of the fourth weekend and extended the open fishing period through the following Monday. A more conservative approach was applied if stream conditions did not permit visual escapement enumeration or if visual enumeration indicated less than 500 fish upstream from the fishery at the conclusion of the third weekend.

Creel surveys were conducted during the 1991 through 1993 seasons to monitor the fishery and to estimate the contribution of hatchery fish to the harvest (Table 26) (Boyle and Alexandersdottir 1992, Boyle et al. 1993, Balland et al. 1994). Approximately 20% of released hatchery fish were tagged with coded wire tags. Recovery of those tags in the fishery provided the estimate of hatchery contribution. No creel survey was conducted in 1994, but hatchery contribution to the fishery was monitored by examining the harvest for fish missing the adipose fin (Marsh 1995).

Concern about unsustainable harvests of wild Chinook salmon in the Ninilchik River, negative hatchery-wild smolt interactions, straying of hatchery fish and use of hatchery-produced fish during Chinook salmon egg takes resulted in a reduction in stocking levels from approximately 180,000 Chinook salmon smolt to 50,000 in 1995. The percentage of tagged hatchery smolt was increased from approximately 20% to 100% (Appendix A1).

The Ninilchik River was opened for an additional 14 days in 1995. The opening was based on counts made by foot upstream of the fishery following the third weekend opening. Water conditions precluded aerial and ground counts in 1995 but escapement to the system was judged to be adequate based on the number of Chinook that were allowed upstream of the egg-take weir in place in July.

The Ninilchik River was opened an additional 10 days after the regularly-scheduled openings in 1996 (Appendix B1), based on foot survey counts upstream from the fishery following the regular fishery openings. The season was not extended during 1997-2000 because fewer than 100 Chinook salmon were counted upstream of the fishery after the regulatory openings in 1997 through 1999 and 225 were counted in 2000. The decline in the number of Chinook salmon seen upstream of the fishery after 1996 is probably a result of the reduction in the number of stocked Chinook salmon after 1995. Counts of Chinook salmon that were passed upstream of the Ninilchik River weir operated during July egg collection operations (after some unknown proportion of the Chinook escapement had passed upstream of the weir site) have numbered between 500 and 1,000 since 1994. The proportion of hatchery-produced Chinook salmon handled at the weir has varied between 19% and 47% of the total handled (unpublished data, located at Homer office of ADF&G, Sport Fish).

The weir was operated throughout the Chinook salmon escapement beginning in 1999 to estimate the magnitude and run timing of wild and hatchery stocks returning to the river (Table 27). Only 7% of the total number of fished that passed the weir had done so by the end of June (Appendix C1). The midpoint escapement through the weir occurred on July 13 for the wild stock compared to July 24 for the hatchery fish. A total of 1,644 wild and 641 hatchery fish were counted at the weir. Of those, 42 missing their adipose fins were sacrificed to determine their stream of origin, and 94 were killed to provide progeny for stocking. The total escapement to the spawning grounds of both hatchery and wild Chinook was 2,149. All CWT fish sampled at the weir were of Ninilchik origin.

During 2000, run timing of wild and hatchery fish through the weir was nearly identical to 1999. Chinook salmon of hatchery origin were 34% of the weir count compared to 28% in 1999. Chinook salmon sacrificed to determine stock origins and provide for future stocking totaled 249. The total spawning escapement was 2,238. One CWT fish was from the ADF&G, Crooked Creek enhancement program, a tributary of the Kasilof River, the remaining were from the Ninilchik River.

The overall proportion of hatchery fish in the sport harvest in 2000, estimated from sampling the fishery downstream of the Sterling Highway Bridge, was 49%. The proportions varied from 45% to 53% but were not significantly different. The average hatchery contribution to the fishery in 2000 was similar to the average percent of hatchery-reared Chinook salmon sampled in the fishery during the creel survey in 1993 (Balland et al. 1994). Hatchery contribution estimates from creel surveys in 1991 and 1992 were 77% and 57%, respectively (Boyle and

Alexandersdottir 1992, Boyle et al. 1993). The duration of the fishery was longer in 1991 through 1993 than during 2000 or 2001.

RECENT FISHERY PERFORMANCE

Anchor River and Deep Creek

Sport effort and harvests of Chinook salmon from the Anchor River and Deep Creek were relatively stable during 2001 through 2003. Angler effort ranged between 17,500 and 19,200 angler days on the Anchor River and 8,000 to 9,000 angler days on Deep Creek. Anchor River harvests varied between approximately 900 and 1,000 Chinook salmon during that period and Deep Creek harvests were between 500 and 800 fish.

The Anchor River and Deep Creek were high and muddy throughout most of the first three open weekends in 2001. Anglers reported fair fishing in the muddy waters of the Anchor River but fish were difficult to bring to shore in the strong currents. Once the water cleared fishing improved and was reported as fair. Virtually no one fished in Deep Creek until June 10, the last day of the regulatory openings. Deep Creek was opened by emergency order (Appendix B1) for an additional 3-day weekend June 16 through June 18. Participation was low and fishing was reported as fair.

In November 2001, the BOF reduced the number of Chinook salmon fishing openings from five to four on the recommendation of the department because of the frequency of aerial escapement counts falling below the SEG range (see "Escapements" and "Board of Fish Actions" pertaining to these fisheries). The reduction of fishery openings to four in the Anchor River became effective in time for the 2002 fishing season. In 2002, the Anchor River and Deep Creek were high and muddy for the first weekend. Water clarity improved in the Anchor River during the first weekend, which contributed to better fishing conditions as the opening progressed. At Deep Creek muddy water and fast currents persisted through the first opening. Water clarity continued to improve and Anchor River and Deep Creek were at normal seasonal levels and water clarity was good during the third weekend opener. Deep Creek was weired only during the coho salmon return beginning in 2002 (see "Lower Peninsula Coho Salmon Fishery").

Two floods occurred in the fall of 2002, both of magnitudes in excess of any event recorded or known in the previous 100 years. The first flood occurred as the result of heavy rainfalls during October 22 and October 23; the second followed heavy rains on November 22. The channels of the lower 50% of the Anchor River and 90% of Deep Creek were heavily eroded, and extensive rechannelization of both rivers occurred based on post-flood surveys of the drainages. Additionally, flood waters washed out or damaged bridges, culverts and roads throughout the LCIMA.

Due to minimal spring snow melt run-off, Anchor River anglers enjoyed good water conditions throughout the four weekend-only Chinook salmon fishery in 2003. Anglers had to prospect to find fish because the flood had altered the river and old fishing holes were changed or no longer existed. During 2003, an instream Chinook salmon escapement monitoring program was initiated. The program consisted of enumerating upstream migrating Chinook salmon with Dual frequency identification sonar (DIDSON) and sampling the escapement for age, sex, and size composition by beach seining holes twice weekly upstream of the sonar site. The netting program commenced on May 21 and continued through July 10, while the sonar was operated continuously from May 30 through July 9. Net catches exceeded expectations as 777 Chinook salmon were captured and sampled for biological data. The sonar counts were adjusted to

account for periods the sonar was not operational and to account for multi-species presence from June 28 through July 9 (fish under approximately 676 mm were not included in count totals). The estimated count of the Chinook salmon passage was 8,678 fish (Appendix C2).

Water was lower than normal in Deep Creek throughout the 2003 Chinook salmon fishery. Water conditions were less than ideal, however, as dark water, presumably caused by silt deposition from the 2002 fall floods, prevailed during the first and second weekends allowing only 1 day of fair Chinook salmon fishing during the second weekend opening. Conditions improved as the water cleared and by the third and final regulatory opener on the weekend of June 7, fishing was reported to be good to excellent. The catch of Chinook salmon smolt in the screw trap operated in Deep Creek for coho salmon was 6,252 compared to previous average annual catches of 10,898 smolt. Low water and poor flows may have contributed to the low Chinook salmon smolt catch (see "Lower Peninsula Early-run Freshwater Coho Salmon Recreational Fishery – Recent Fishery Performance" for a discussion of coho salmon tagging results).

Spring, summer and fall of 2004 were unusually mild and dry. Spring run-off subsided quickly and Anchor River water was relatively clear and low compared to average conditions on the first weekend opening and continued dropping and clearing during the remaining openings. Fishing was reported as good to excellent throughout the Chinook salmon fishery.

The DIDSON was installed and operational at the Anchor River May 15, 2004 (Appendix C3). On June 9 when river levels lowered, a complete resistance board-floating weir was installed to continue escapement monitoring. The floating weir was removed September 13. Based on DIDSON and weir counts, the escapement of king salmon in the Anchor River was approximately 11,885. An emergency order (Appendix B1) was issued on June 21, 2004 extending the Chinook salmon fishery for another 3-day weekend (Saturday, June 26 through Monday, June 28) after approximately 7,000 Chinook salmon were estimated to have passed upstream of the Anchor River sonar/weir site.

In addition to the mainstem sonar/weir, the Kachemak Bay Research Reserve operated a resistance board weir on the North Fork Anchor River from May 18 to September 15, funded by the Exxon Valdez Oil Spill Global Ecosystem Monitoring Program (EVOS GEM) (Appendix C4). Included with escapement monitoring at the North Fork weir, samples of juvenile fish, invertebrates and streamside vegetation were collected for analysis of marine-derived nutrients (MDN) throughout the salmon migration period at stations located along the North Fork. The study will determine if adult salmon abundance can be indexed with marine derived carbon, nitrogen and sulfur transported by adult salmon and taken up by freshwater vegetation and vertebrate and invertebrate residents. The North Fork weir count was approximately 16% (n = 1,919) of the mainstem count. The weir may be operated in 2005 and 2006, contingent on funding allocation.

In 2004, Deep Creek was slightly more occluded than the Anchor River initially, but still fishable. Water clarity improved throughout the course of the fishery. Fishing was reported as poor during the first weekend despite relatively favorable water conditions but improved thereafter.

Ninilchik River

Success of anglers fishing early-run Chinook salmon in the Ninilchik River in 2001 was not as good as in 2000. The overall proportion of hatchery fish observed in the 2001 sport harvest

during the three weekend-only fishing periods was 48% and varied from 42% to 58%. These proportions were not significantly different among weekends. High incidence of hatchery fish in the harvest and ample numbers of fish in the lower river between the weir and the area open to fishing justified an extension of the sport fishery. Consequently, an emergency order opened the Ninilchik to include a fourth weekend, June 16 through June 18 (Appendix B1). The estimated hatchery-stock contribution to the fourth weekend's harvest increased to 62%, and was significantly different from weekends one through three.

A total of 2,086 Chinook salmon were counted at the weir during 2001 (Table 27). The return was comprised of 32% hatchery-reared fish. Accounting for removal for stocking and sampling for strays, the spawning escapement totaled 1,746 fish of which 1,204 were wild fish. The midpoint of immigration of wild fish was July 13 compared to July 21 for hatchery-produced fish (Appendix C1).

Egg takes were conducted on three occasions during July 2001. Eggs were collected from 105 ripe Chinook at the weir site; they were taken from wild fish only. On July 10, eggs from 7 females were collected; 56 females on July 17; and 42 females on July 25. In addition, 105 wild males were live-spawned when possible.

In 2001, approximately 55,000 Chinook smolt were released into the Ninilchik River at the Brody Bridge on June 2 (Appendix A1).

Anglers fishing on Ninilchik River during the first opening in 2002 reported good fishing during the early morning hours and poor success in the afternoons and evenings. Big crowds fished the Ninilchik during the second weekend and fishing was best downstream of the Sterling Highway Bridge. Excellent fishing was reported during the third weekend of the Chinook salmon fishery. Department personnel sampled the sport harvest downstream of the Sterling Highway Bridge for hatchery fish during the third weekend of the fishery only. The proportion of hatchery fish observed in the 2002 sport harvest during the third weekend was 22% and varied from 15% to 26%. The low incidence of hatchery fish in the harvest during the third weekend was unusual. The fishery was opened by emergency order for a fourth weekend downstream of the Sterling Highway Bridge for the harvest of hatchery fish only. Few anglers fished.

The escapement upstream of the Ninilchik River weir after egg take and CWT removals was 1,340 wild fish and 395 hatchery-produced Chinook salmon in 2002 (Table 27). The median date of weir immigration was July 17 for wild fish and July 24 for hatchery fish (Appendix C1). Two hundred and seventeen coded wire tags were decoded from 226 Chinook salmon that were sacrificed at the weir; 212 originated from Ninilchik River hatchery stockings and five originated from the Crooked Creek enhancement program.

Seven egg takes were conducted during July and early August 2002, and a total of 176 wild and 55 hatchery females were sacrificed and spawned. On June 14, nearly 55,000 Chinook salmon smolt were stocked in the Ninilchik River at the Brody Road Bridge (Appendix A1). The flooding in the fall of 2002 produced high water on the Ninilchik River but did not cause major erosion or rechannelization.

Chinook salmon were reported in the Ninilchik River small boat harbor several days prior to the first weekend of the fishery in 2003. During the second and third weekend openings upstream anglers had low catches while anglers fishing downstream of the Sterling Highway Bridge were more successful. Department personnel sampled the sport harvest downstream of the Sterling

Highway Bridge for hatchery fish during the third weekend of the fishery only; the contribution was 32%. The fishery was extended for an additional 17 days to harvest surplus hatchery fish beginning June 14 downstream of the Sterling Highway Bridge; harvest was only allowed for adipose finclipped fish (Appendix B1). Sampling of the sport harvest over 2 weekends during the extension indicated that fishing was poor, consequently, no estimate of the fraction of hatchery to wild fish in the harvest during the extended fishing period is available because of inadequate sample size.

Reports of the earlier than normal return of Chinook salmon to Ninilchik River in 2003 were corroborated by counts of Chinook salmon obtained at the department weir. Over 100 Chinook salmon had passed through the weir by June 1, a record cumulative total count for that date (Appendix C1). After egg takes and CWT removals, escapement was 1,127 wild fish and 336 hatchery-produced from May 16 through August 5. Median date of weir immigration was July 4 for wild fish and July 16 for hatchery fish in 2003.

Eggs were collected from 151 ripe Chinook salmon at the weir site. Egg takes were conducted during three occasions in July as well as on August 1. Although wild fish predominated, an additional 20 hatchery fish were sacrificed to meet hatchery needs. On July 17, eggs from 10 females were collected; 45 females on July 22; 55 females on July 29; and 41 females on August 1. In addition, 151 males were spawned. When possible, the males were live-spawned and released.

Approximately 50,000 hatchery-reared Chinook salmon smolt of Ninilchik origin were released into the Ninilchik River at the Brody Bridge on June 12, 2003 (Appendix A1).

In 2004, the fishery was open continuously for hatchery-produced Chinook salmon beginning Memorial Day weekend, but wild fish could only be retained on the three regulatory 3-day weekends. The entire regulatory fishing area for salmon was open from the mouth upstream 2 miles to the department regulatory marker. To allow recognition of hatchery Chinook by enforcement and department staff, anglers could not dismember harvested Chinook until fish were removed from the fishing area. The 2004 regulatory weekend Chinook salmon fishery was reported to be fair to poor with generally low catch rates except during early morning hours. Participation observed during the weekday hatchery-fish-only periods was low and catch rates were reported to be fair.

The Ninilchik weir operated from May 31 through August 5, 2004. Similar to 2003, the salmon arrived early at the weir; nearly 35% of the migration was through the weir by June 30 (Appendix C1). Half of the upstream migration of wild fish had occurred by July 4 and half of the hatchery produced return by July 21. Upstream releases consisted of 1,867 Chinook salmon; 1,393 wild fish and 474 hatchery fish (Table 27). The proportion of hatchery and wild fish counted at the weir was not impacted significantly by opening the fishery continuously to taking hatchery fish (Table 27).

Eggs were taken from a total of 126 wild fish during four egg takes conducted in July 2004. On May 12, approximately 50,000 Chinook salmon smolt bearing coded wire tags were stocked into the Ninilchik River at the Brody Road Bridge (Appendix A1).

Escapements

Chinook salmon escapement to the Lower Peninsula streams has been assessed since 1962. Prior to 1974, fixed-wing aircraft were used in tandem with foot surveys. After 1973, helicopters were

used in concert with foot surveys. The escapement to these streams was indexed by counting salmon from the air along a standard section of each river where the majority of spawning was thought to occur and counting a standard subsection by foot. If the ground count was higher than the aerial count for that subsection, the aerial count for the whole stream was expanded by the difference between the aerial and ground counts in the subsection. If the aerial count was higher for the subsection, the aerial count of the entire stream was used as the escapement index. Ground surveys were discontinued after 1995 as a cost savings because trends in ground counts mirrored trends in aerial counts and because ground counts added an additional source of variability in estimating the true escapement to the Lower Peninsula streams. Since the ground surveys were discontinued, only aerial counts have been used to index escapement.

Chinook salmon biological escapement goals (BEGs) of 950 for Deep Creek, 1,790 for the Anchor River and 830 for the Ninilchik River were adopted in 1993. These goals were an average of the annual expanded estimates from aerial and foot survey index counts conducted from 1966 to 1969 and 1972 to 1991. The expanded escapement index count of the Anchor River of 1,051 Chinook salmon was below the goal in 1994. Poor water conditions prevented making either ground or aerial counts for the Anchor River in 1995. The expanded index counts of escapement to Deep Creek were 891 in 1994 and 374 in 1995, both below the BEG.

Since the ground counts of Chinook salmon were discontinued in 1996, aerial counts alone have been used to index spawning escapement. In 1998, the BEGs for the Anchor River, Deep Creek and the Ninilchik River were rescaled based on historical aerial survey counts alone and the relationship of the aerial survey counts to sport fishing harvests. The escapement levels that achieve sustainable harvests could not be estimated precisely so they were approximated. For each stream, the median value of counts taken within a 2-week period at the end of July and first week in August in all years since helicopters were used exclusively to conduct surveys was determined. Use of the median value as a BEG implies that escapements are less than that value half the time, so a range of values around the median was chosen as the BEG. The upper end of the range was the value that 20% of the historical aerial counts were above. The lower end of the range was chosen by examining the relationship between aerial escapement counts and harvest, and determining what aerial escapement level was sustained during years of large harvests prior to the 1990s. This lower end of the range was the escapement value that 40% of the historical aerial counts were below. The median aerial count in the Anchor River was 1,211 and the BEG was set within the range of 1,050 to 2,200 Chinook salmon. For Deep Creek the median aerial count was 550 and the BEG was set between 400 and 950 Chinook. The median aerial count was 550 in the Ninilchik River and the BEG was set within the range of 500 to 900 Chinook salmon.

Escapement goals for salmon stocks in Cook Inlet were reevaluated in 2001 after adoption of the Sustainable Fisheries and Escapement Goal policies into regulation by the BOF in 2000. A set of standard criteria was developed to set escapement goal ranges for stocks where total returns cannot be enumerated, based on the performance of salmon stock dynamics where total returns are known. The 25^{th} to 75^{th} percentiles of annual 1976-2000 helicopter aerial escapement counts at Deep Creek and Anchor River were established as the new sustainable escapement goal (SEG) ranges for those streams. The actual escapement goal range values for the Anchor River or Deep Creek are now set at 750-1,500 and 350-800, respectively.

Aerial escapement counts to the Ninilchik are generally considered too poor to base management decisions upon. The correlation between total weir counts and aerial counts is uncertain. The

trend in weir counts is similar to the trend in aerial counts but the relative magnitude of the two sources is variable. Aerial survey counts of the Ninilchik River in 1999 and 2000 and 2001 (Table 23) were 17%, 26%, and 13%, respectively, of the number of fish counted at the weir by the dates the aerial surveys were flown (Table 27). The escapement was enumerated at the weir only for the limited period required to collect Chinook salmon eggs prior to 1999, but included the period July 8 through July 24 each year. In 1999 through 2001 the weir was in place for the entire run. Approximately 50% of the total wild run was counted during July 8-24 in 1999 through 2001.

The SEG for the Ninilchik River is based on the return of wild fish, indexed by the passage of wild fish through the weir during July 8-24. All hatchery-produced fish are now coded wire tagged. Recovery of these tags at the weir allows separate enumeration of wild and hatchery-produced fish. In 2001, the lower end of the Ninilchik River Chinook salmon SEG range was established as the 15th percentile of the 1994 through 2000 estimates of wild Chinook salmon passage through the weir during July 8-24. The upper end of the range was set at the maximum observed wild Chinook salmon escapement through the weir during July 8-24 from 1994 through 2000 (Table 28). This approach established an SEG range of 400 to 850 wild Chinook salmon.

Anchor River aerial escapement index counts since 1994 have been at the low end of or below the SEG range (Table 23), while harvests have generally been above average levels. In 1998 through 2000, aerial counts improved but were still at the low end of the SEG. The index count in 2001 was the third lowest on record.

The department initiated a sonar project in 2003 to assess Chinook salmon escapement. In conjunction to the sonar, a partial weir was used to funnel king salmon past the sonar beam. The sonar/weir site was installed upstream of the fishery and just downstream of the confluence of the North and South forks of the Anchor River. Based on counts from the sonar (between May 30 to July 9), at least 8,678 Chinook salmon were estimated to have migrated upstream in the Anchor River during the count period. The count represents a minimum estimate for several reasons: (1) counting was initiated well into the migration, (2) species discrimination is not yet reliable with DIDSON and the estimate represents the net upstream count after downstream migrating fish including rainbow/steelhead trout are subtracted, and (3) fish smaller than the largest sized Dolly Varden captured during upstream netting were culled from the counts. This size overlapped the minimum size of 2-ocean Chinook captured during netting.

In 2004, Chinook salmon escapement on the Anchor River was estimated using a sonar and partial weir from May 15 to June 9. On June 9 when river levels lowered, a complete resistance board-floating weir was installed to continue escapement monitoring. The floating weir was removed September 13. Based on DIDSON and weir counts, the escapement of Chinook salmon in the Anchor River was approximately 11,885. DIDSON counts were minimum counts because downstream migrating fish including steelhead were subtracted from upstream counts. No culling of fish from the sonar was necessary in 2004 because the sonar was replaced with a full weir well before the migration of other species such as Dolly Varden and pink salmon.

The sonar and weir provide a much more accurate estimate of escapement than aerial surveys. The sonar and weir project will be a long-term program, allowing the department to estimate freshwater exploitation annually and monitor trends in exploitation and escapement. Therefore use of the SEG to manage the fishery will be discarded and the fishery will be monitored based on exploitation rate, until a biological escapement goal (BEG) can be estimated based on stock-

recruit data. Aerial survey counts of the Anchor River will continue in an attempt to relate current escapement counts to historic escapement levels.

Aerial index counts of Chinook salmon escapement to Deep Creek have been within or above the SEG range since 1998 (Table 23). This increase coincides with the influence of fishing restrictions and with years of high turbid water during some or all of the fishery openings. We are currently unable to determine the actual escapement to Deep Creek or the maximum harvest level that will maintain escapement levels. Weir counts in 1997 and 1999 are likely the closest to the actual escapement. Instream exploitation rates estimated from those counts were 41% and 24%, respectively, and are likely maximum estimates because escapement is underestimated. The number of spawners in 1997 and 1999 was at or above the level thought to achieve stable long-term production in Chinook salmon populations (McBride et al. 1989). Our inability to fully enumerate the Chinook salmon return to Deep Creek with the weir has precluded evaluation of aerial index counts. The current level of exploitation is likely to be sustainable, assuming weir counts represent minimum escapement levels.

The counts of Chinook salmon through the Ninilchik River weir during July 8 through July 24 were within the SEG range in all years from 1994-2004, except 1997 and 2003. It is likely that the early arrival of Chinook salmon to the Ninilchik River resulted in the SEG not being met in 2003 and barely met in 2004. Wild and hatchery Chinook salmon escapement to the Ninilchik River was successfully censused at the weir in 1999 through 2004. The wild stock exploitation instream was 37% in 1999 and 35% in 2000. The number of wild Chinook salmon that spawned is above the level thought to produce long-term sustainable production in Chinook populations (McBride et al. 1989). With only 3 years of weir counts available for comparison (Table 27), their correlation to aerial counts is uncertain. Due to variability in the aerial counts caused by poor water clarity, aerial counts were suspended because it was unlikely that their relationship to actual escapement could be determined. Future escapement will continue to be indexed by weir counts from July 8 through July 24**.** A harvestable surplus of hatchery-reared Chinook is available in the Ninilchik River.

MANAGEMENT OBJECTIVES

Separate department objectives have been established for Anchor River and Deep Creek wild stocks, and Ninilchik River naturally-produced fish.

Objectives for Anchor River are:

Objective 1: In the short term, identify an exploitation rate through appropriate management and research programs that ensures the population does not decline below levels necessary to ensure sustained yield.

Objective 2: Determine a Biological Escapement Goal that maintains the population at a level to ensure sustained yield.

Objective for Deep Creek is:

Objective 1: Ensure, through appropriate management and research programs, that the spawning escapement index does not decline below levels necessary to ensure sustained yield. This number is the Sustainable Escapement Goal or SEG, which is 350-800 for Deep Creek.

Objectives for Ninilchik River are:

Objective 1: Ensure that 400-850 Chinook salmon spawn naturally in the Ninilchik River annually.

Objective 2: Stock 50,000 Chinook salmon smolt into the Ninilchik River, which yield a 3% survival or 1,500 returning adults.

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

Objective 4: Provide approximately 2,500 additional angler-days of participation for Chinook salmon at the Ninilchik River during June.

Anchor River and Deep Creek are managed by regulation because the fishery occurs in late May and June when water conditions are often too high and turbid to visually count fish in these streams. The Ninilchik River fishery may be extended by emergency order based on counts made by foot upstream.

BOARD OF FISHERIES ACTIONS

There were no regulatory changes adopted by the Board in 1990 or 1992 that affected these fisheries.

Substantial changes to the regulations governing Deep Creek and the Anchor River occurred in 1996. The Chinook fishery in Deep Creek itself was reduced from five weekends to three and the combined seasonal bag limit in Deep Creek and the Anchor River was reduced from five to two Chinook salmon 16 inches or larger. In both the Anchor River and Deep Creek, an angler could no longer fish for the remainder of the day after harvesting a Chinook salmon. The spawning areas of Anchor River, Deep Creek, Stariski Creek and the Ninilchik River were closed to all fishing until August 1 to protect spawning Chinook salmon from catch-and-release mortality.

During the BOF meeting in February of 1999, in response to the guidelines established in the Sustainable Salmon Fisheries Policy (5 AAC 39.222), the BOF designated Anchor River Chinook salmon as a stock of "management concern" defined in the policy as "a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG, BEG, OEG, or other specified management objectives for the fishery" (5 AAC 39.222 (f) (21)). The decision was based on a general observed decline in escapement index with six of 12 escapement indices measured since 1989 (1989-2001) below the current SEG range of 750 to 1,500 fish and escapements in 4 of the last 6 consecutive years (1996-2001) below the current SEG range. The regulatory fishery openings were reduced from five to four 3-day weekends.

Members of the public proposed to the BOF in 2001 to increase the number of weekends Deep Creek and the Ninilchik River are open to fishing. The Department did not support these proposals and the Board of Fisheries agreed.

CURRENT ISSUES

The Anchor River sonar and weir have been found to provide a much more accurate estimate of the escapement than the aerial surveys. Based on sonar counts and the annual harvest estimate for 2002 and 2003 of approximately 1,000 Chinook salmon each year, the instream exploitation of Chinook salmon was likely approximately 10%.

During the most recent 5 years (1997–2001) when the Anchor River was open for five periods, the average annual instream harvest of Chinook salmon was 1,275 and did not exceed 2,000 Chinook salmon. The 2005 outlook for Anchor River Chinook salmon escapement is expected to be similar to the 2003 return based on a 5-year average (2000-2004) escapement index of 685. Projecting a liberal annual harvest of 2,000 Chinook salmon in 2003 and 2004, the resulting exploitation rate would have been approximately 19% and 14%, respectively. This level is well below sustainable exploitation rates for Chinook salmon; therefore, restoration of the fifth 3-day weekend is justified. The Anchor River Chinook salmon assessment program is new, however, and the relationship of escapement levels estimated with sonar and weir to the historic escapement is unknown. Further liberalization of the fishery is not recommended until more sonar/weir escapement data are collected and the impact of the 2002 flood is assessed. If future escapements are maintained, a cautious incremental approach should be taken in changing the current regulatory structure.

The relationship between aerial indices and actual escapements to Deep Creek has yet to be resolved but some inferences can be made from the weir data. Although complete enumeration of Chinook salmon escapement at the Deep Creek weir was not possible, counts in 1999 and 2000 indicate that the lower boundary of the SEG may approximate escapements that provide sustainable yields in years of average water conditions. Regulation of the Deep Creek fishery appears successful. Deep Creek escapements have rebounded to within the SEG range and, while weir counts do not completely enumerate escapement, return rates compare favorably to levels thought to be sustainable in other Chinook salmon populations.

The harvest at Deep Creek has stabilized at a level that coincides with escapement indices in the range that is thought to be sustainable. Since 1997, escapement indices within or above the goal range have coincided with water conditions that allowed one to two weekends of "good" fishing. When water conditions are so poor that virtually no fishing can occur, the fishery can be extended by emergency order as in 2001.

Total counts of wild Chinook salmon through Ninilchik weir during 1999 through 2004 are stable (Table 27) indicating that index based on counts July 8-24 should sustain future production. If the trend of early Chinook salmon migrations that occurred 2003 and 2004 is a long-term phenomenon, trends in the index weir counts may not reflect true escapements in the future. The final season of Ninilchik weir operations to census escapement is 2005. Periodic census of the Chinook salmon escapement to the Ninilchik River may be necessary to evaluate index weir counts.

The department has concerns about the long-term impact of the hatchery stocking program on wild stocks in the Ninilchik River. Wild Chinook salmon escapement peaks nearly 10 days prior to the peak of the hatchery return, indicating that enhancement has influenced run-timing characteristics of the overall population. The proportion of hatchery-reared Chinook salmon handled at the weir in the Ninilchik is variable but has been in excess of 25% in 5 of the past 6 years. The effect of hatchery-reared Chinook salmon spawning naturally in the Ninilchik River on the long-term viability of wild Chinook is unknown. Opening the Ninilchik River to the harvest of hatchery fish for increasing periods of time from 2002 through 2004 does not appear to have decreased their incidence above the fishery at the weir. The presence of hatchery-reared fish does supplement the harvest and allow the sustainable harvest of wild fish under current regulations.

RECOMMENDED RESEARCH AND MANAGEMENT

Estimating the actual escapement to the lower Peninsula streams is a priority. Relating escapement to escapement indices is important. Recommendations for future and continued research are:

1. Continue operation of sonar and weir and collection of biological information in the Anchor River to determine sustainable exploitation rates and a Biological Escapement Goal (BEG).
2. Seek funding to estimate Chinook salmon smolt production from the Anchor River.
3. Continue indexing spawning escapement in Deep Creek and seek funding to census escapement.
4. Index Chinook escapement to the Ninilchik River with the egg take weir and periodically census escapement to verify Sustainable Escapement Goal (SEG) range.
5. Given that (1) and (2) are achieved, spawning escapement goals for wild stock Chinook salmon in these streams should be established and/or refined with appropriate management strategies to achieve these goals.

LOWER PENINSULA DOLLY VARDEN RECREATIONAL FISHERY WITH EMPHASIS ON ROADSIDE TRIBUTARIES

HISTORICAL PERSPECTIVE

Dolly Varden are the most common, widely distributed, and complex sport fish of the LCIMA. They spawn during autumn and overwinter in numerous drainages. Adults that survive spawning return to Cook Inlet during spring and forage before returning to fresh water during mid-summer. Adults exhibit intertributary spawning as well as overwintering behavior, i.e. a fish may spawn and overwinter in Anchor River one year and spawn and overwinter in another freshwater system the next year. Juveniles smolt and migrate to Cook Inlet to forage and often return to a different drainage during mid-summer, where they remain to overwinter. This prolonged freshwater residence makes them available to sport anglers throughout much of the year.

Historically, Dolly Varden contributed the most fish to LCIMA sport fish harvests. Daily bag limits were 20 fish from 1960-1968, 10 fish from 1969–1983 and 5 fish between 1984 and 1990. Peak harvest typically occurs during July to mid-August. This period coincides with the return of Dolly Varden to fresh water and is between returns of Chinook salmon and coho salmon. Incidental harvest of Dolly Varden occurs in the Cook Inlet marine recreational Chinook salmon fishery during June through early July and in nearly all freshwater salmon sport fisheries of the LCIMA. Hence, Dolly Varden are important to the LCIMA because they add diversity to the fishing experience by being available concurrent to fisheries for other species and provide directed sport fishing opportunity when other opportunity is unavailable.

Historically the Anchor River supported the largest Dolly Varden fishery with other roadside systems including Deep Creek, Ninilchik River and Stariski Creek also supporting fisheries. Declines in harvest at Anchor River from 21,364 fish in 1979 to just 2,735 in 1987 were mirrored by declines in harvest at the other streams (Table 29). Declines in harvest were assumed to reflect declines in abundance. In 1987, a study was initiated in the Anchor River to: (1) assess abundance by counting fish at a weir, (2) identify overwintering areas through tagging and recapture, and (3) determine the age structure of the population. Weir counts of Dolly Varden at the Anchor River ranged from 19,062 in 1987 to 8,262 in 1992 (Table 30).

Based on the study, immediate stock concerns were best served by controlling harvests targeting individual spawning stocks, and by protecting overwintering populations. Furthermore, due to the multifaceted life history behavior of the species, it was thought that low inriver abundance could result from numerous out-of-system factors. Management goals therefore focused on reversing the decline of Dolly Varden returning to the Anchor River, maintaining fishing opportunities for Dolly Varden, and meshing regulations for Dolly Varden with concurrent fisheries for other species. Consequently, the Board adopted a department proposal in the 1990 Board cycle reducing the Dolly Varden bag and possession limit from five to two fish.

RECENT FISHERY PERFORMANCE

From 2001-2003, the total sport harvest of Dolly Varden from LCIMA roadside streams ranged from 1,158-2,131 fish; catch ranged from 14,624-28,960 fish (Table 29). In 2003, Anchor River accounted for 63% (18,305 fish) of the harvest followed by Deep Creek 34% (9,703 fish), Ninilchik River 3% (952 fish); none were reported caught in Stariski Creek. Dolly Varden harvest in these fisheries has stabilized since 1990 as compared to harvest prior to 1990. For instance, harvest at Anchor River has averaged 1,568 fish and ranged from 2,821 to 662 fish, while harvests from 1977 through 1989 averaged 9,689 and ranged from 21,364 to 1,476 fish. Trends in catch have been more variable and are assumed to be proportionate to run strength.

The salmon weir operated in 2004 on the Anchor River allowed many Dolly Varden to pass uncounted. A sonar documented many smaller Dolly Varden passing through the weir while the gate was closed. Dolly Varden escaping through the weir were not counted with the sonar unit. Dolly Varden that entered the live box of the weir were counted. July 20-23 during the peak migration, the entry gate and live trap was left open at night and Dolly Varden were counted with sonar as they passed upstream out of the livebox. A total count of 7,846 Dolly Varden were counted at the weir and with sonar (Appendix C3). This obviously is a minimum count of Dolly Varden passage at the Anchor River in 2004.

MANAGEMENT OBJECTIVES

This fishery is not specifically addressed in a regulatory management plan but is managed by regulation of methods, means, time and area. Criteria for establishing special management areas for Dolly Varden on the Kenai Peninsula (5 AAC 56.014) were adopted in 1999. Special Dolly Varden fisheries have not been created in the LCIMA to date.

BOARD OF FISHERIES ACTIONS

In 1990, the Board adopted the staff proposal to reduce the bag and possession limit from five to two fish on LCI roadside tributaries. This proposal was adopted in interest of stock conservation and for regulatory consistency for concurrent seasons for other species. At the 1999 meeting the Board adopted criteria for establishing special management areas for Dolly Varden. The criteria provide guidance for evaluating proposals directed at diversifying Dolly Varden sport fishing opportunities on the Kenai Peninsula. Similar criteria were adopted for West Cook Inlet. No proposals specifically addressed this fishery in 2001.

CURRENT ISSUES

Catch and harvest estimates indicate that the LCIMA roadside Dolly Varden fishery is now primarily a catch-and-release fishery. Catch may be an indicator of run strength, and if so, indicates fluctuations in annual run size with no declining trend. The portion of the run handled by anglers at the Anchor River is likely high, as the 2000 catch estimate of over 20,000 fish

approximates the highest weir count at Anchor River for this species. Catch-and-release mortality of Dolly Varden in LCIMA tributaries is not known. Production of roadside stocks is probably commensurate with the existing habitat. Overexploitation is not likely under current regulations. Dolly Varden in Southeast and Kodiak, Alaska show an affinity to overwinter in freshwater systems containing lakes. Tributaries of the LCIMA with headwater lakes that are in relatively close proximity to roadside Dolly Varden populations are few and include Packers Lake, English Bay Lakes and Tustumena Lake. It is not known to what extent local roadside stocks use these systems for spawning and overwintering. The extent of the coastal distribution of Dolly Varden originating in local roadside tributaries remains unknown.

RECOMMENDED RESEARCH AND MANAGEMENT

There are currently no ongoing research projects associated with LCIMA Dolly Varden. It is recommended that future research identify Dolly Varden distribution and overwintering areas to ensure that the areawide management framework maintains a sustainable Dolly Varden roadside fishery.

LOWER PENINSULA STEELHEAD TROUT RECREATIONAL FISHERY

HISTORICAL PERSPECTIVE

Four roadside tributaries of the LCIMA support steelhead trout fisheries: these are the Anchor River, Deep Creek, Stariski Creek and Ninilchik River, of which the Anchor River supports the largest fishery. Studies of steelhead in LCIMA have been limited to the Anchor River. Thus, information on life history characteristics of Anchor River steelhead serve as an example of life history behavior typical of all LCIMA stocks. Area steelhead stocks are exclusively defined as fall-run fish that enter fresh water from August to November, spawn from April to May and emigrate after spawning during May and June (Larson and Balland 1989, van Hulle 1985, ADF&G 1990). The Anchor River stock is composed annually of about 19% repeat spawners, supports runs of approximately 1,500 adults, and is known as the largest single run in the LCIMA (Larson and Balland 1989, ADFG 1990, Larson 1993). The numbers of steelhead returning to Stariski Creek, Deep Creek, or Ninilchik River are not known.

LCIMA steelhead fisheries are currently managed as catch-and-release fisheries. Retention of steelhead trout is prohibited and fish may not be removed from the water prior to release. Only unbaited, single hook, artificial lures are allowed September 1 through December 31. Other restrictions control allowable fishing time and area open to fishing. During the Chinook salmon season, Deep Creek, Anchor and Ninilchik rivers are open to fishing from salt water to approximately 2 miles upstream only, on weekends only, beginning Saturday of Memorial Day weekend (weekends include Monday). The Anchor River is open for four consecutive weekends, Deep Creek and Ninilchik River are open for three consecutive weekends. Fishing the lower sections of each stream resumes July 1. Stariski Creek has no Chinook salmon fishery and the lower section does not open to fishing until July 1. The entire drainage of each stream is open to fishing from August 1 through December 31.

The conservative regulatory framework for LCIMA steelhead evolved over a period of nearly two decades during which angler participation and harvest in the steelhead fishery were generally increasing and numbers of returning steelhead enumerated each fall at a weir in place at the Anchor River were declining. In 1977 the bag and possession limit was two steelhead trout daily. The season was closed from May 1 to June 30. By 1984 the bag and possession

limit was reduced to one fish daily, a seasonal limit of two fish was imposed and a harvest record required. Beginning in 1984, fishing was open 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 because the number of steelhead counted through the weir was insufficient to support an inriver fishery. The current regulatory scheme became effective beginning in the 1989 season.

RECENT FISHERY PERFORMANCE

According to the most recent catch data, implementation of the catch-and-release regulation has served to maintain and possibly increase steelhead abundance in LCIMA roadside tributaries. According to the SWHS, the annual catch of steelhead on LCIMA streams has increased under current regulations (Table 31). Beginning in 1989 the annual estimated steelhead catch in the Anchor River has exceeded the average annual stock size, thought to approximate 1,500 fish. Furthermore, the estimated annual catch of steelhead at the Anchor River has been more than twice the approximate stock size since 1996 with the 2000 catch estimate of 8,722 fish nearly six times the approximate stock size. These estimates indicate that the number of steelhead in the run has likely increased and that anglers handle a large portion of the run. Furthermore, estimates may also indicate that a large fraction of the population is being exposed to multiple hooking. Catches in the other systems have also increased. At Deep Creek and Ninilchik River, where stock size is believed to be smaller than the Anchor River, the estimated catch also indicates a large portion of the runs is caught and released by anglers. In general, hooking induced mortality can occur directly from a hook wound or indirectly through a hook injury, stress and induced diseases. Delayed hooking mortality estimates for steelhead provided in Reingold (1975), Caverhill (1977), Pettit (1977), and Hooten (1987) were estimated in the range of 0% to 6%. However, these studies were not based on multiple hooking. Taking into account the current regulations that complement mandatory catch-and-release, particularly the unbaited single hook and prohibition of removal from the water prior to release, there is little reason to suspect that mortality is considerably higher for LCIMA steelhead.

Beginning in 2002, the Ninilchik River weir was also used to capture and enumerate post-spawn steelhead emigrating to the ocean. The steelhead assessment is a cooperative project between the U.S. Geological Survey of Alaska and the Division of Sport Fish. In 2002, 449 steelhead were counted at the weir; 82 were surgically implanted with either an acoustic or archival tag. In 2003, a total of 416 steelhead were captured, of which a total of 80 were implanted with either an acoustic or archival tag. A Passive Integrated Transponder (PIT) tag was implanted at the time of surgery to enhance the recovery of tagged steelhead. None of the 82 steelhead equipped with tags in 2002 were recovered in 2003. Several of both types of tags were recovered from 418 emigrating steelhead counted in 2004. The emigrating steelhead counts for 1999, 2000 and 2001 are 335, 278 and 293, respectively and averaged 364 fish from 1999 through 2004.

MANAGEMENT OBJECTIVES

This fishery is not specifically addressed in a regulatory management plan. The criteria for establishing special management areas for trout (5 AAC 75.013) were adopted in 1998.

Department objectives for this fishery are:

Objective 1: With allowance for natural variation, to manage the resource so annual stock size remains at levels of abundance that provides a catch-and-release steelhead trout fishery.

Objective 2: Considering that steelhead trout stocks in lower Kenai Peninsula streams were at low levels of abundance due to harvest permitted under a conservative yield management philosophy, management will continue to regulate these streams as catch-and-release only fisheries.

BOARD OF FISHERIES ACTIONS

In 1990, the Board adopted a proposal submitted by the Steelhead Planning Team to permit bait use in the four southern Peninsula streams through August 31. The proposal was implemented in 1991. 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 in 1990. 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 had been submitted pertaining to this fishery until 2001 when the BOF adopted a department proposal clarifying that steelhead/rainbow trout could not be removed from the water at any time.

CURRENT ISSUES

Available data indicating declining steelhead trout populations in LCIMA streams during the 1980s and early 1990s created an interest in steelhead stock conservation and generated interest in steelhead sport fishing. A conservative, no harvest approach continues to receive broad public support. Consequently, the autumn steelhead sport fishery has grown into an extremely popular fishery on the Lower Kenai Peninsula. Members of the public have voiced concerns about this fishery. Biological concerns include the impact catch-and-release fishing has upon the steelhead resource and riparian habitat. Social concerns include growth in both the guided and unguided segment of this fishery, and conflicts between users with differing fishing values and ethics.

RECOMMENDED RESEARCH AND MANAGEMENT

There are currently no ongoing research projects associated with lower Peninsula steelhead trout. Popularity of this fishery favors catch-and-release management. Assessment to determine abundance and estimate catch-and-release hooking mortality is recommended.

HOMER SPIT RECREATIONAL FISHERY

HISTORICAL PERSPECTIVE AND RECENT FISHERY PERFORMANCE

The Homer Spit, located in Kachemak Bay (Figure 5), is the site of an ongoing stocking program of early-run Chinook and coho salmon smolt. Fish are stocked at a small inlet on the Spit, formally called the Enhancement Lagoon but commonly known as the "Fishing Hole," and most of the sport fishing effort on these stocked fish occurs here. The major goal of the program is to meet the summer demand for more sport fishing opportunities along the Kenai Peninsula road system. 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.

The success of this fishery resulted from the combined efforts of the department, the City of Homer, and the South Peninsula Sportsmen's Association to promote the idea, improve the Lagoon itself, implement the fishery and promote the fishery. These three entities were co-recipients of the American League of Anglers and Boaters Sport Fish Management Award for best project in the nation for 1990.

Early-run Chinook salmon have been stocked in the Lagoon since 1984 (Table 32). Coho salmon with Lower Cook Inlet run timing were stocked from 1988 through 2001. An earlier-returning stock of coho salmon of northern Cook Inlet origin was first stocked in 2001. Pink salmon fry releases began in 1987 and ended in 1992. Late-run Chinook salmon smolt were stocked from 1992 through 2002 by the department. Since 2002, business, local government and private donors have paid Cook Inlet Aquaculture Association (CIAA) to stock late-run coho salmon because department hatcheries lack the capacity to supply the fish.

Regulations prohibit snagging while salmon can be caught using conventional angling methods, but allow a snag fishery by emergency order when salmon become sexually mature and can not be caught by non-snagging methods. Snagging is permitted for a short time, permitting the harvest of surplus fish, after which snagging is again prohibited.

Early-run Chinook Salmon

Harvests of early-run Chinook salmon begin about May 9. The peak of the return occurs in mid-June, and the snag opening near the end of June signals the end of the fishery.

From 1984 until 1993, the brood stock for the early-run came from Crooked Creek, a tributary to the Kasilof River. Between 1993 and 1999, adults were collected from the Enhancement Lagoon and spawned in the hatchery to produce the smolt stocked in the Homer Spit. Since 2000, Chinook salmon from the Ninilchik River have been artificially spawned and reared to produce the early run to the Homer Spit.

Anglers first reported benefit from the early-run Chinook salmon stocking program in 1986 when approximately 300 2-ocean Chinook salmon were harvested from the return of 88,000 smolt released in 1984. The first significant harvest of stocked fish occurred in 1987 when 833 Chinook salmon were taken from shore (Table 33). Annual shore harvests from 1988 through 2003 have ranged from 1,406 to 5,821. The contribution to the harvest of anglers fishing from boats near the Spit shoreline is difficult to assess because anglers are imprecise about reporting their harvest location, but it may approach 1,000 fish in some years. An unusual number of 1-ocean or “jack” Chinook salmon were sighted in the fishery in 2001 by anglers and confirmed by random observations of the return by department staff; there was no sampling program to verify the sightings.

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 the Enhancement Lagoon 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, therefore the use of drip stations was discontinued.

Through 1994, snagging was permitted beginning on June 24. Dates when the regulatory area near the Homer Spit was opened to snagging have been more variable since 1994. Snagging dates are determined by staff observations that surplus fish are available and that these fish are no longer "on the bite." Snagging ends in early July when most surplus early-run Chinook salmon have been harvested and brood stock collection needs are met. The fishery reverts to non-snagging techniques after the run has all been harvested.

The yearly harvest of Chinook salmon taken prior to June 25 (early run) and the number taken after June 24 (late run) was estimated separately with the SWHS starting in 1996 (Table 33). The separate estimates are misleading, however, because the snag opening for early-run Chinook salmon has usually fallen on June 24 and the fishery continued for several days after June 24, therefore, many early-run fish are harvested during this opening after the demarcation between the two runs.

Late-run Chinook Salmon

The original brood stock for the late run was Kasilof River Chinook salmon; brood stock was collected from adults returning to the Homer Spit from 1994 through 1998. The program was discontinued in 1999 when insufficient numbers of sexually mature adults were available for egg takes. Anglers first benefited from the late-run Chinook salmon stocking program in 1993 when Chinook salmon "jacks" (1-ocean fish) were harvested. Only a few hundred of these fish returned for the first 2 years. The full complement of age classes has returned since 1995. Run timing is the month of July and early August. The harvest of late-run Chinook was first estimated separately from the early-run harvest in 1996 (Table 33). The estimates have ranged from 3,555 to 284. The stocking program may have contributed as many as 450 Chinook to the harvest from boats fishing near shore during these years. Recreational anglers harvest the majority of the return.

Anglers reported excellent fishing for Chinook salmon in the Enhancement Lagoon through 1998. During 1999, the return was weak and anglers reported poor fishing. Fishing for late-run Chinook salmon in 2000 was also poor. The majority of late-run Chinook salmon were harvested by non-snagging techniques. Snagging has not been permitted since the inception of the stocking project because the harvestable surplus of Chinook salmon has been small and the beginning of the stocked coho salmon run overlaps with the end of the Chinook salmon run.

Gillnet harvests of Chinook salmon increased until 1998. These were predominantly enhanced late-run Chinook salmon, as no known wild late-run Chinook stocks return to Kachemak Bay. Fewer than 100 Chinook salmon were taken annually in the Kachemak Bay personal use gillnet fishery from 2001-2004 (Table 34).

Although angling was reported to be excellent in 1998, insufficient brood stock was available to meet the goals of the stocking program. In 1999, almost no sexually mature Chinook salmon were found when the Enhancement Lagoon was seined to collect brood stock and none were transferred to the hatchery for spawning. As a result, the program was discontinued after 1999. The reason for the decline in the number of returning late-run Chinook salmon is unknown.

Coho Salmon

Coho salmon were first stocked in the Enhancement Lagoon in 1988 (Table 32) producing the first adult return in 1989. The source of the brood stock was Bear Lake, in the Salmon Creek drainage about 10 miles north of Seward. Stocked coho salmon from this stock begin to arrive at the Enhancement Lagoon around the first of August and the run peaks during the third or fourth week in August. The fish begin to sexually mature in mid-September and will no longer accept lures or bait. Coho salmon are generally available at the site until mid-October. The stock is thought to have a slightly earlier run timing than wild coho salmon returning to lower Cook Inlet tributaries.

The annual harvest by shore anglers ranged from 1,109 to 9,060 during 1989 through 2000 (Table 33). An unknown portion of the 500 to 1,500 coho salmon taken annually from boats

fishing near the Homer Spit during this period was likely of hatchery origin from the Enhancement Lagoon or the Caribou Lake stocking project which supplemented fisheries through 1996.

Anglers reported extended periods of excellent fishing in all years from 1995 through 2004, except in 1999. In 1999, the run appeared to be about 2 weeks late and below average in magnitude. The return in 2001 was reported to have been the "best fishing ever" by many anglers.

The year 2001 was the last stocking of coho salmon of Bear Lake origin reared by department hatcheries and the first time coho salmon of an earlier run timing stock from Ship Creek in Anchorage were released in the Enhancement Lagoon. The Ship Creek coho stock will return closer to the peak tourist season and therefore provide more angler opportunity. Fundraising during the winter of 2001-2002 and 2002-2003 accumulated enough money to purchase late-run coho salmon of Bear Lake origin from CIAA. During 2002 through 2004, both early and late coho salmon runs will return to the Enhancement Lagoon. Fundraising efforts are underway to purchase coho salmon to stock in 2005 that would return in 2006. Beginning in 2001, angler counts were conducted at regular intervals in the vicinity of the Enhancement Lagoon from August 15 through September 15 to monitor the response of the sport fishery to the different coho salmon stocks. The counts took place during the peak hour of fishing effort when the water is first pouring over the sill into the Enhancement Lagoon during the daylight hours.

Approximately 32% and 34% of the stocked coho salmon returning to the Enhancement Lagoon during 1999 and 2000 were coded wire tagged and adipose finclipped as smolt. The contribution of hatchery-produced coho to the personal use set gillnet fishery only on the east side of the Homer Spit was estimated; the number sampled without adipose fins from the personal use harvest was expanded by the fraction tagged at the hatchery as smolt. Of the 499 coho salmon examined during the four 48-hour personal use fishing periods in 1999, 402 or 81% were estimated to be of hatchery origin (Table 35). The proportion of hatchery fish was significantly different during all the openings and higher during the last two openings than the first two. In 2000, 685 coho salmon were examined during the two fishing periods the fishery was open and 608 or 90% were estimated to be fish stocked in the Enhancement Lagoon. The number of hatchery fish in the harvest was higher during the second opening than the first. It was previously thought that the wild return to the Fox River occurs later than the enhanced return.

A portion of the Ship Creek coho stock that was released in the Enhancement Lagoon beginning in 2001 was coded wire tagged and finclipped. No strays were found at the weir operated in Deep Creek from July into September 2002 to enumerate coho salmon escapement and look for strays from the Homer Spit enhancement project. Additionally, Silver and Stonehocker creeks, 4 miles across Kachemak Bay from the Homer Spit, were seined periodically during July to mid September in 2002 to look for stray coho salmon from the Homer Spit enhancement project. No strays were encountered.

MANAGEMENT OBJECTIVES

The Homer Spit stocked salmon sport fishery is not specifically addressed in a regulatory management plan. Department objectives for this fishery are:

Objective 1: Annually stock 210,000 early-run Chinook salmon smolt in the Homer Spit Enhancement Lagoon to produce 6,500 returning adults all of which are available for harvest in the recreational fishery.

Objective 2: 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 3: Provide for 25,000 angler-days of annual sport fishing opportunity directed at early-run Chinook salmon on the Homer Spit and in Seldovia Bay and Halibut Cove Lagoon.

Objective 4: Generate 10,000 angler-days of sport fishing opportunity directed at stocked coho salmon in Kachemak Bay.

Objective 5: Manage the stocked fisheries to achieve, insofar as possible, a 100% harvest of stocked salmon.

The Board determined that non-snagging techniques would be employed to harvest stocked early-run Chinook salmon as long as these fish could reasonably be expected to accept bait and lures. The Board further determined that the fishery would be prosecuted with non-snagging 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 non-snagging techniques and the department had met any brood-stock requirements, 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. This management scheme has been applied to the other salmon species stocked in the Lagoon except for the early-run coho salmon stock that overlaps with the onset of the late coho salmon run.

BOARD OF FISHERIES ACTIONS

There were no sport fishing regulatory changes proposed for this fishery for the 1990, 1992 1995, 1996 or 1998 Board meetings and none were adopted. However, the Board considered a proposal to limit the duration of the personal use gillnet fishery at the 1998 meeting and chose to reduce the harvest guideline (see the section on Kachemak Bay coho salmon fisheries). A housekeeping proposal to clarify the regulatory language regarding snag openings in Kachemak Bay and at the Homer Spit was passed by the BOF in fall 2001.

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 or in the numbers of adult fish returning. Management of the early-run fishery has not changed since 1989. Restriction of weighted hooks and weights or bobbers following hooks by regulation is under consideration.

No late-run Chinook salmon will return to the Enhancement Lagoon after 2004. From 2001 through 2004, the department did not stock late-coho salmon and has begun stocking a coho salmon stock that returns earlier and that has similar timing to the late-run Chinook salmon stock. The new early-run coho salmon stock has proven to be very popular – much more angler effort occurs during this run than was attracted by the late Chinook salmon run. The timing of the new stock is such that interception of stocked fish by the personal use gillnet fishery will be reduced. Although the change will provide more fishing opportunity, fishing pressure on wild stocks may increase, both those migrating to the Fox River and elsewhere in the management area. The personal use gillnet fishery harvest guideline of 1,000-2,000 coho salmon is based on pre-stocking levels and is thought to be sustainable. Impacts from human development of the Fox River area are unknown and may have reduced the harvestable surplus of wild fish.

Changes to the personal use set gillnet fishery may be required to mitigate the loss of stocked coho salmon to the fishery.

CURRENT ISSUES

Because this is a stocked terminal harvest fishery, resource conservation of the returns is not a concern. At issue is the harvest technique of snagging versus non-snagging 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 and regulations became effective in 1989.

The conflict between fishers who wish to harvest salmon by non-snagging methods in the Enhancement Lagoon and those who wish to snag was largely solved by the snagging regulation enacted by the Board in 1989. Although some anglers continue to object to the legalization of snagging, they are fewer than before the snagging closures were implemented. The public has generally been supportive of the Board's harvest strategy employed on the Homer Spit. Public compliance with emergency orders has been good although reports of snagging during periods closed to this activity are frequent.

Anglers developed a technique using a weight following a single hook, referred to as "tight lining," that is technically legal, but resulted in fish being snagged in the mouth and also in other body parts. The technique increased the incidence of snagging-related complaints by the public and snagging citations by enforcement personnel. During 2001, the use of weighted hooks and weights following hooks was restricted by emergency order during snagging closures to lessen the incentive for anglers to snag and keep fish during the period when the fish are still biting (Appendix B1). The restriction produced a change from the use of weights following the hook to the use of bobbers following the hook to snag salmon in the mouth. Tight lining continues to produce complaints from the public.

The demise of the late-run Chinook salmon caused a flurry of concern among anglers and prompted the department to seek alternative fishing opportunity during the time between the early-run Chinook and the coho return. Loss of opportunity in late July and early August combined with complaints about the interception of stocked fish in the personal use set gillnet fishery led to the replacement of the historic stock of coho salmon with an earlier returning coho salmon stock. While the opportunity to harvest coho salmon in July and early August was welcomed, the loss of opportunity in August and September was not. Interested citizens and department personnel are cooperating to raise funds to rear the later returning Bear Lake stock at the CIAA operated Trail Lakes Hatchery so both early and late coho salmon return to the Enhancement Lagoon. Record coho harvests in 2002 and 2003, and high angler-effort (Table 33) speak to the popularity of both runs of coho salmon with anglers fishing at the Homer Spit Fishing Lagoon.

RECOMMENDED RESEARCH AND MANAGEMENT

Changes in fishing effort from changes to the coho salmon stocking program will continue to be monitored.

All salmon produced by department hatcheries are now marked by altering hatchery water temperatures to produce banding patterns on the salmon otoliths. The banding pattern on the otoliths of salmon stocked in Cook Inlet is unique and different from the pattern on fish stocked in other waters. Coho salmon heads should be sought from anglers and post-spawn coho salmon

in nearby local creeks with wild coho salmon stocks for extraction otoliths to ascertain that straying is not occurring from department stocking programs.

The hatcheries began releasing Chinook salmon smolt at a smaller size in 2001 to reduce the incidence of jack salmon in the return. Previous Chinook size at stocking averaged 17 grams, now the target size is 13 grams. The target size is determined from studies of outmigrating smolt from the parent streams. This information is not available for the Ninilchik River, the parent stock of Chinook planted in Kachemak Bay locations.

Many questions about the effects of rearing and stocking practices are unanswered. The effect on age composition in the return of smolt size at stocking is unknown. Smolt are held for up to 5 days after they are stocked and volunteers feed the smolt every 2 hours of daylight during this period. The benefits of this practice to survival and fidelity to release location have not been tested. The marine survival of the stocked salmon has not been estimated nor has size of the return. The impact on survival and fidelity to release location of varying levels of fresh water in the vicinity of the release location has not been investigated. Research focused on these questions could do much toward reducing the cost and improving the benefits of stocking anadromous fish in marine waters.

The impacts of stocked fisheries on wild stocks have not been investigated. It is not known if the stocking program in Kachemak Bay truly displaces fishing pressure from local wild stocks or if it actually attracts additional anglers to the area that would otherwise have fished elsewhere. The stray rate to other Kachemak Bay systems of stocked fish is not known.

HALIBUT COVE LAGOON STOCKED EARLY-RUN CHINOOK SALMON FISHERY

HISTORICAL PERSPECTIVE

Halibut Cove Lagoon is located approximately 10 miles across Kachemak Bay from the Homer Spit (Figure 5). This is formerly the site of 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, where all five species of Pacific salmon were reared experimentally for varying periods of time. Since 1979, the Lagoon has served only as a Chinook salmon smolt imprinting and rearing site.

Access to the fishery is via boat. Chinook salmon begin to return here in late May, with the run ending by mid July. Snagging is permitted by regulation after June 23. After this date the fish are maturing and angler efficiency using non-snagging techniques is reduced. Halibut Cove is a terminal harvest area; there is no natural production due to the absence of spawning area. The fishery is relatively small; the peak harvest was 2,911 Chinook in 1988 (Table 36). It provides fishing opportunity in a beautiful and remote setting.

This stocked return is subject to a commercial set gillnet interception fishery adjacent to the lagoon from the first Monday in June until September 30. The use of purse seines has been prohibited inside the lagoon since 1992 and outside the lagoon since 1996. The commercial set gillnet fishery harvest of Chinook salmon in the Halibut Cove Subdistrict has ranged from 280 to 1,400, averaging 650 fish annually from 1991 through 2000. The number of Chinook salmon harvested in the commercial fishery is estimated from fish tickets.

FISHERY PERFORMANCE

Fishing success has been rated by anglers as good during the peak of the run in most years since 1996. However, anglers reported only fair fishing in 1997 and 1998. Poor success during those years may have related to the low number of Chinook salmon that were stocked in the Lagoon in 1995. Catch rates in 2000 were reportedly poor to fair until late in the run. No onsite survey to estimate the size of the harvest has been conducted since 1984.

MANAGEMENT OBJECTIVES

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

Objective 1: Annually stock 105,000 early-run Chinook salmon smolt in Halibut Cove Lagoon, which will return approximately 3,000 adult fish available for harvest in the Halibut Cove recreational fishery.

Objective 2: Manage the fishery to achieve insofar as is practical a 100% harvest of early-run stocked Chinook salmon.

Objective 3: In concert with the stocking projects on the Homer Spit and the early-run Chinook stocking project in Seldovia Bay, generate 25,000 angler-days of annual sport fishing opportunity directed at Chinook salmon in Kachemak Bay.

This is a stocked terminal harvest fishery; resource conservation is not a concern of management. Inseason management is conducted by regulations 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 provides for a percentage of the harvest to be taken with non-snagging techniques. It also provides the opportunity for virtually all fish returning to Halibut Cove Lagoon to be harvested (Objective 2).

BOARD OF FISHERIES ACTIONS

The Board reviewed two public proposals at its November 1992 meeting that 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. The 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.

At its November 1998 meeting, the Board again considered public proposals regarding interception of Halibut Cove Chinook salmon in the commercial setnet fishery. A proposal to delay the opening of the commercial season from the first Monday in June until June 10 to reduce the commercial catch of stocked Chinook salmon was not adopted by the Board. A proposal to limit the mesh size of commercial gillnets on or after the first Monday in June to 5 1/4 inches from 6 inches to reduce the commercial interception of Chinook was amended to establish a 6-inch maximum mesh size year around.

OUTLOOK

Chinook salmon smolt size at stocking was reduced in 2001 to reduce the number of 1-ocean "jacks" in the return. No change in stocking level is anticipated at this time. However, hatchery space is fully allocated, and increases in one stocking program necessitate the reduction or elimination of others. If the department seeks to maximize fishing opportunity in the region,

stocking locations and small fisheries such as Halibut Cove Lagoon may be discontinued to provide for new fisheries where more anglers can be served.

CURRENT ISSUES

This is a stocked terminal harvest fishery. There are no biological concerns associated with its management, although the incidental commercial Chinook salmon harvest is of concern to some recreational anglers. Current regulations compromise the department's ability to achieve the objective in that all Chinook salmon produced are not available to the recreational angler.

RECOMMENDED RESEARCH AND MANAGEMENT

Questions about the effects of rearing and stocking practices referred to in the section of this report on the Homer Spit stocked fisheries apply to the fishery at Halibut Cove Lagoon as well.

SELDOVIA BAY STOCKED EARLY-RUN CHINOOK SALMON FISHERY

HISTORICAL PERSPECTIVE AND FISHERY PERFORMANCE

Seldovia is located approximately 15 miles southwest of the Homer Spit across Kachemak Bay (Figure 5). Chinook salmon smolt were released beginning in 1987 to create a new sport fishery. The release site was in the Seldovia Harbor until 2000 when fish were released upstream of a dam in Fish Creek, a small tributary to Seldovia Slough. This is a terminal harvest fishery where all fish are intended for harvest and none spawn at the stocking location.

Local anglers and tourists first benefited from this program with the return of Chinook salmon jacks in 1988 and both jacks and 2-ocean fish, which had attained 8 to 17 pounds, in 1989. The full complement of ocean age classes has returned since 1991. From 1991, the sport harvest reported in the SWHS ranged from 100 to 600 Chinook salmon (Table 37). These harvest estimates are believed to be conservative because fewer than 30 respondents to the mail survey reported fishing in Seldovia in 1988-1990, 1992, 1995 and 1999, rendering the estimates inaccurate. The reported sport catch and harvest of Chinook salmon from Seldovia Bay is variable but stable.

In 1998, angler counts were conducted to estimate fishing effort in the sport fishery in the Seldovia Slough and Seldovia Harbor to evaluate the benefit of the stocking program. Sport anglers expended a total of 3,986 angler hours: 931 by anglers under the age of 16 and 3,055 angler hours by anglers 16 and over.

A subsistence set gillnet fishery for salmon was created in Seldovia Bay by the BOF during its 1995 meeting. The harvest of Chinook salmon was limited to 200 fish to protect the enhanced Chinook fishery in Seldovia Bay. The annual possession limit is 20 Chinook per household. The fishery is opened for two 48-hour periods per week from April 1 to May 30 and one 36-hour period each of the first 2 weekends in August. Annual harvest of Chinook and sockeye salmon taken in the spring fishery are reported in Table 38.

A commercial set gillnet fishery also occurs in Seldovia Bay. Much of this harvest is likely composed of enhanced Chinook returning to Seldovia. Commercial harvests averaged 40 prior to stocking from 1984 through 1988 (Table 37). From 1991 to 2000, the average commercial harvest has been 390 Chinook salmon. The highest harvest since 1991 was 770 Chinook salmon in 1995 and the lowest was 161 in 2001.

MANAGEMENT OBJECTIVES

The Seldovia Bay stocked Chinook salmon fishery on the north side of Kachemak Bay is not specifically addressed in any regulatory management plans. Department objectives for this fishery are:

Objective 1: Annually stock 105,000 early-run Chinook salmon in Fish Creek to produce approximately 3,000 adult fish, which are available for harvest in the recreational fishery.

Objective 2: In concert with the early-run stock projects on the Homer Spit and the early-run Chinook salmon stocking project in Halibut Cove, to generate 25,000 angler-days of annual sport fishing opportunity directed at Chinook salmon in Kachemak Bay.

BOARD OF FISHERIES ACTIONS

A subsistence set gillnet fishery for salmon was created in Seldovia Bay by the BOF during its 1995 meeting. The Board established a customary and traditional use finding for this area and subsequently crafted regulations to control this fishery. The harvest of Chinook salmon was limited to 200 to protect the enhanced Chinook salmon fishery in Seldovia Bay. The Seldovia subsistence fishery was opened for two 48-hour periods per week from April 1 to May 20 and one 36-hour period each of the first 2 weekends in August. The Board adopted a proposal extending the April/May period by 10 days to May 30 at their February 1998 meeting. During that meeting they rejected a companion proposal to expand the area open to this fishery. Instead, the Board modified the customary and traditional use determination to close additional waters near the Seldovia Harbor to reduce harvest of enhanced Chinook salmon in the subsistence fishery. Subsistence fishers were required to be present when their nets were fishing. A proposal to limit the mesh size of commercial gillnets on or after the first Monday in June to 5 1/4 inches from 6 inches to reduce the commercial interception of Chinook was modified to establish a 6-inch mesh size requirement year round in the commercial fishery.

OUTLOOK

Beginning in 2000, smolt were no longer stocked and held in net pens in the Seldovia Harbor prior to release but were placed in fresh water upstream of the Fish Creek Dam. This action was taken to increase the number of Chinook salmon returning by improving fidelity and survival. Smolt size at stocking was reduced in 2001 to reduce the number of 1-ocean "jacks" in the return. No change in stocking level is anticipated in the near future.

The fishery is small relative to most other stocked saltwater terminal fisheries in Southcentral Alaska. As with the stocked early-run fishery in Halibut Cove Lagoon, if new salmon stocking projects are identified, their costs and benefits will be weighed against those of existing projects. Smaller fisheries provide diversity but provide less angler opportunity, and may lose out in the competition for hatchery space.

CURRENT ISSUES

Support for this fishery from the local community is strong although numerous complaints have been lodged about snagging violations prior to the June 24 regulatory opening for this harvest method. Complaints have also arisen over the practice of snagging and wasting wild chum salmon that return to the Seldovia Slough after the Chinook salmon run is over. Snagging is legal because the slough is salt water but the waste of fish is not. It may be necessary to close the slough to snagging at the conclusion of the Chinook salmon return to prevent snagging of other fish species. Although not a consideration in managing this fishery, the incidental

commercial and subsistence Chinook salmon harvest is of concern to some recreational anglers. Current regulations compromise the department's ability to achieve the objective that all Chinook salmon produced be available to the recreational angler.

RECOMMENDED RESEARCH AND MANAGEMENT

Sport angler participation, harvest and catch are no longer estimated with the SWHS as part of an effort to improve estimates of harvest from broader geographical regions of the management area by combining estimates from small fisheries. Some mortality occurs from stocking in Fish Creek Reservoir from improperly moderated water outflow from the dam and from birds feeding on outmigrating smolt. Department personnel should remain on hand immediately after stocking to maintain optimum flow from the dam for smolt survival.

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TABLE AND FIGURES

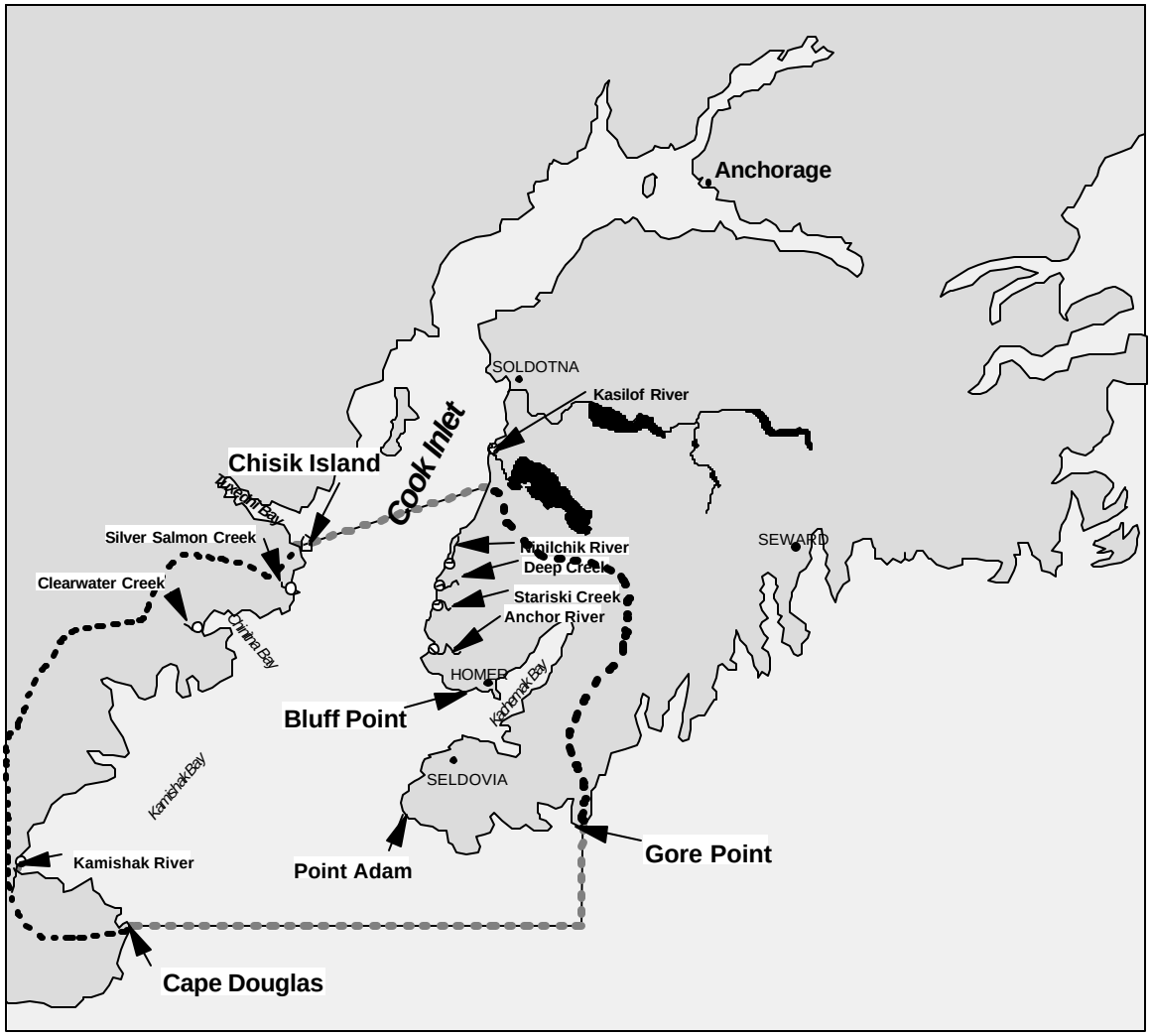


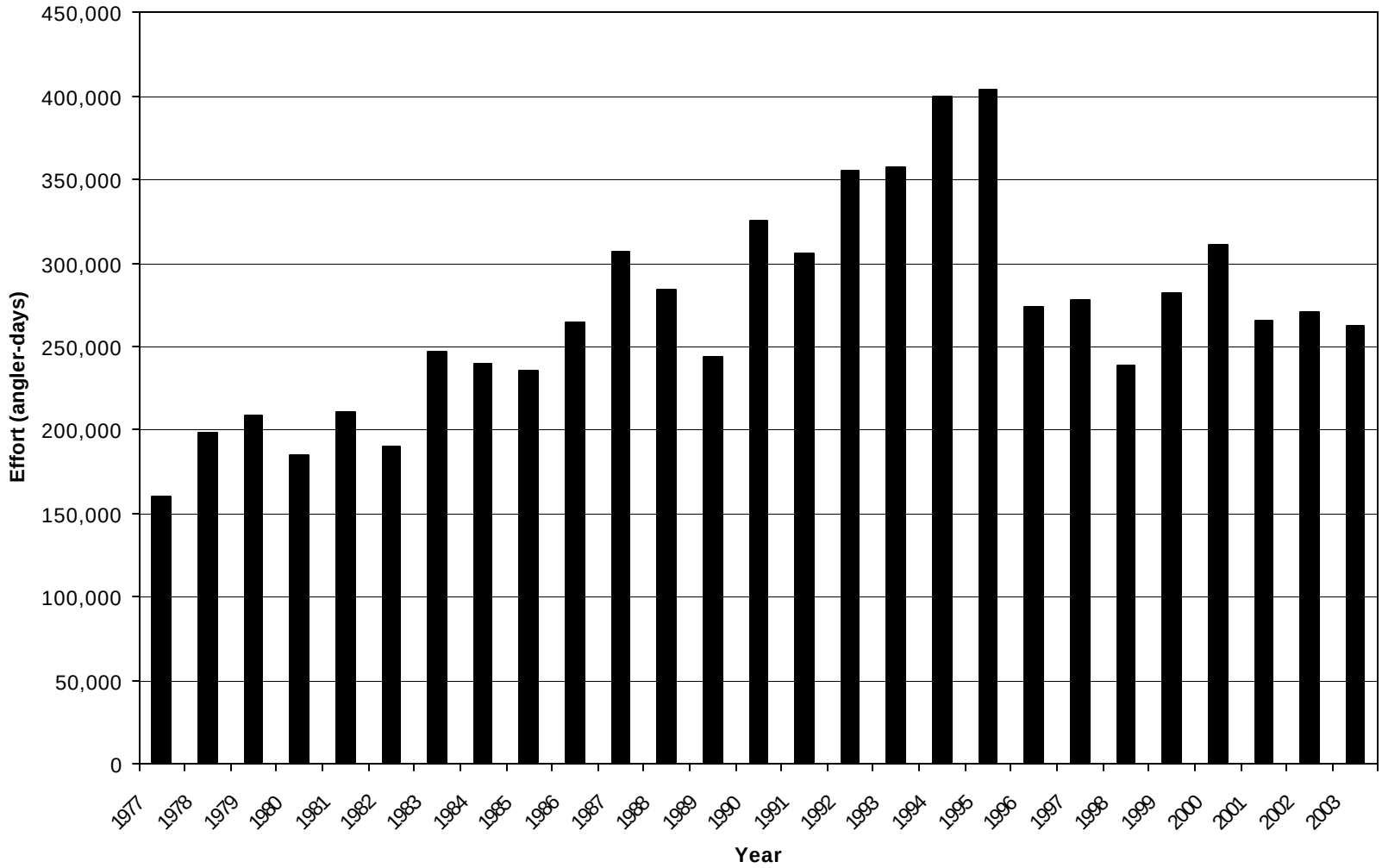
Figure 1.-The Lower Cook Inlet Management Area includes Cook Inlet south of a line from the Kasilof River to the southern tip of Chisik Island, and north of the latitude of Cape Douglas and west of the longitude of Gore Point and all fresh waters flowing into these salt waters, not including the Kasilof River.

Table 1.-Angler-days of effort expended by recreational anglers fishing Lower Cook Inlet Management Area waters, 1977-2003.

	West Cook Inlet		Central Cook Inlet (N. of Bluff Point)			Lower Cook Inlet (S. of Bluff Point)			Management	Percent	
Year	Salt Water	Fresh Water	Saltwater Finfish	Saltwater Shellfish	Freshwater Finfish	Saltwater Finfish	Saltwater Shellfish	Freshwater Finfish	Area Total	of State	Alaska Total
1977			57,611 [a]		55,706	46,827 [a]			160,144	13.4	1,198,486
1978			64,429 [a]		74,378	59,128 [a]			197,935	15.4	1,286,063
1979	880		65,677 [a]		77,027	64,656 [a]			208,240	15.3	1,364,739
1980	928		63,481 [a]		63,273	57,078 [a]			184,760	12.4	1,488,962
1981	972		25,538	31,298	59,648	67,894	25,391		210,741	14.8	1,420,772
1982	1,501		29,718	31,954	49,687	61,315	15,712		189,887	11.7	1,623,090
1983	707	1,739	45,337	31,470	52,721	91,229	20,334	3,844	247,381	14.3	1,732,528
1984	1,673	652	53,955	30,013	53,320	72,441	25,162	2,243	239,459	12.8	1,866,837
1985	1,942	970	55,435	32,652	63,464	63,272	16,732	1,024	235,491	12.1	1,943,069
1986	2,562	399	66,377	33,486	63,132	74,781	21,755	2,231	264,723	12.8	2,071,412
1987	810	903	80,565	25,427	71,191	104,602	20,710	2,569	306,777	14.2	2,152,886
1988	3,989	782	54,799	30,998	50,260	127,748	13,306	2,339	284,221	12.3	2,311,291
1989	2,136	1,474	62,503	22,693	44,583	98,922	9,594	2,180	244,085	10.8	2,264,079
1990	2,406	1,140	82,881	29,427	61,718	133,938	10,342	4,068	325,920	13.3	2,453,284
1991	2,287	1,187	83,988	32,012	60,052	118,015	6,690	1,613	305,844	12.5	2,456,328
1992	2,526	989	93,175	44,537	67,710	127,971	15,727	2,575	355,210	14.0	2,540,374
1993	3,064	2,534	85,460	40,376	70,330	140,302	13,753	2,155	357,974	14.0	2,559,408
1994	4,151	900	111,560	48,546	70,085	143,033	18,187	3,071	399,533	14.7	2,719,911
1995	4,254	2,239	121,936	42,220	55,785	156,222	17,682	3,717	404,055	14.5	2,787,670
1996	2,753	1,865	73,229	29,943	37,797	116,089	11,584	802	274,062	13.7	2,006,528
1997	2,819	1,551	81,602	28,343	38,435	114,998	9,263	1,003	278,014	13.4	2,079,514
1998	2,403	937	68,965	26,636	35,766	99,481	3,926	752	238,866	12.9	1,856,976
1999	2,336	1,887	75,790	36,278	48,263	107,623	9,149	695	282,021	11.3	2,499,152
2000	3,344	1,414	84,602	37,755	48,895	122,613	11,445	1,097	311,165	11.8	2,627,805
2001	2,275	744	73,577	32,642	38,252	108,426	8,090	1,900	265,906	11.8	2,261,906
2002	2,120	1,638	65,204	34,406	38,468	120,892	7,439	644	270,811	12.0	2,259,091
2003	1,220	2,487	56,969	25,361	37,080	132,586	5,836	746	262,285	11.8	2,219,398
1977-2003 Mean	2,242	1,354	69,791	32,977	55,075	101,188	13,818	1,965	270,574	13.1	2,075,984
1999-2003 Mean	2,259	1,634	71,228	33,288	42,192	118,428	8,392	1,016	278,438	11.7	2,373,470

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Includes shellfish.



Source: SWHS (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

Figure 2.-Angler-days of sport fishing effort expended by recreational anglers fishing Lower Cook Inlet Management Area waters, 1977-2003.

Table 2.-Historical recreational harvest of Pacific halibut in Cook Inlet waters, 1977-2003.

Year	Lower Cook Inlet [a]	Central Cook Inlet [b]	West Cook Inlet [c]	Total Cook Inlet	Statewide Total
1977	4,050	9,416	[d]	13,466	23,244
1978	4,821	20,756	[d]	25,577	37,085
1979	6,518	20,479	[d]	26,997	47,705
1980	8,177	21,808	[d]	29,985	64,658
1981	9,427	29,294	[d]	38,721	74,212
1982	10,681	28,851	[d]	39,532	92,358
1983	23,503	36,623	[d]	60,126	117,042
1984	23,455	37,747	[d]	61,202	124,950
1985	21,198	41,450	510	63,158	127,634
1986	42,072	41,943	1,072	85,087	160,885
1987	33,039	44,380	869	78,288	145,829
1988	44,321	91,688	1,192	137,201	225,106
1989	51,739	73,892	1,224	126,855	229,016
1990	56,397	90,380	1,685	148,462	247,202
1991	60,423	86,405	1,576	148,404	266,523
1992	60,670	81,430	984	143,084	264,943
1993	67,826	92,057	2,507	162,390	313,147
1994	79,775	88,260	2,725	170,760	329,046
1995	81,322	86,832	e	168,154	325,188
1996	81,807	105,968	e	187,775	350,220
1997	88,270	105,646	e	193,916	380,256
1998	85,153	94,209	e	179,362	350,464
1999	69,264	86,239	e	155,503	332,657
2000	93,991	107,736	e	201,727	403,280
2001	87,618	94,864	e	182,482	365,539
2002	73,398	93,625	e	167,023	350,809
2003 [f]				190,094	402,862
1977-2003 Mean	48,804	65,845	1,434	117,975	227,847
1999-2003 Mean	81,068	95,616		179,366	371,029

Source: SWHS (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Cook Inlet salt waters east of the center of Cook Inlet, south of Anchor Point including Kachemak Bay and Gulf Coast waters west of Gore Point.

[b] Cook Inlet salt waters east of the center of Cook Inlet and north of Anchor Point.

[c] Cook Inlet salt waters west of the center of Cook Inlet and from the Susitna River south to Cape Douglas.

[d] Halibut information was not requested in the SWHS West Cook Inlet questionnaire before 1985.

[e] After 1994 the West Cook Inlet estimates were apportioned and included in the Central and Lower Cook Inlet subareas.

[f] Estimates for subareas within Cook Inlet had not been apportioned by the publication date of this report.

Table 3.-Chinook salmon harvests in Lower Cook Inlet Management Area waters, 1977-2003.

	West Cook Inlet			Bluff Point and South			North of Bluff Point			
Year	Salt Water	Fresh Water	Total	Salt Water Stocked Locations	Salt Water Other Locations	Total	Salt Water	Fresh Water	Total	Area Total
1977					970	970	4,470	2,670	7,140	8,110
1978					816	816	4,800	4,358	9,158	9,974
1979	10		10		1,034	1,034	4,070	4,109	8,179	9,213
1980					431	431	1,636	1,510	3,146	3,577
1981	95		95		1,145	1,145	2,711	3,196	5,907	7,052
1982	189		189		1,963	1,963	3,836	2,749	6,585	8,548
1983	41		41		2,664	2,664	2,832	3,294	6,126	8,790
1984	75		75	537	1,559	2,096	4,613	2,407	7,020	9,116
1985	50		50		883	883	6,256	1,904	8,160	9,043
1986	112		112	665	439	1,104	4,174	2,462	6,636	7,740
1987	29		29	1,738	452	2,190	5,125	2,489	7,614	9,804
1988	171		171	8,222	1,472	9,694	6,018	2,548	8,566	18,260
1989	183	58	241	3,486	899	4,385	5,487	2,182	7,669	12,054
1990	23		23	3,513	1,123	4,636	6,719	3,583	10,302	14,938
1991	149		149	2,786	775	3,561	6,883	5,997	12,880	16,441
1992	166	9	175	2,602	2,978	5,580	8,609	8,389	16,998	22,578
1993	141		141	7,007	4,400	11,407	11,725	9,543	21,268	32,675
1994	328	19	347	3,985	6,154	10,139	9,272	8,064	17,336	27,475
1995	164	76	240	5,508	3,642	9,150	11,283	5,087	16,370	25,520
1996	181		181	3,592	3,509	7,101	7,092	4,770	11,862	18,963
1997	371	133	504	4,000	3,591	7,591	8,926	6,075	15,001	22,592
1998	117		117	2,584	3,417	6,001	7,682	2,775	10,457	16,458
1999				3,638	3,605	7,243	6,386	4,095	10,481	17,724
2000	93	207	300	3,028	3,628	6,656	6,074	4,449	10,523	17,179
2001	55	21	76	2,835 [a]	3,715	6,550	4,948	2,881	7,829	14,379
2002	28		28	2,621 [a]	5,300	7,921	3,889	2,384	6,273	14,194
2003	72	37	109	4,059 [a]	6,394	10,453	4,303	3,238	7,541	17,994
1977-2003 Mean	124	70	148	3,495	2,480	4,939	5,919	3,971	9,890	14,829
1999-2003 Mean	62	88	128	3,236	4,528	7,765	5,120	3,409	8,529	16,294

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Halibut Cove Lagoon and Seldovia harvests no longer assessed; includes only Homer Spit shore angler harvest estimates.

Table 4.-Coho salmon harvests in Lower Cook Inlet Management Area waters, 1977-2003.

	West Cook Inlet			South of Bluff Point			North of Bluff Point)			Area Total
Year	Salt Water	Fresh Water	Total	Saltwater Stocked Locations	Saltwater Other Locations	Total	Salt Water	Fresh Water	Total	
1977					4,749	4,749	557	1,900	2,457	7,206
1978					2,137	2,137	503	3,231	3,734	5,871
1979	50		50		2,633	2,633	387	3,707	4,094	6,777
1980	69		69		1,748	1,748	405	3,603	4,008	5,825
1981	48		48		2,149	2,149	918	4,255	5,173	7,370
1982	755		755		2,148	2,148	639	3,105	3,744	6,647
1983	62	1,872	1934		2,408	2,408	860	2,401	3,261	7,603
1984	125	773	898		1,397	1,397	972	2,881	3,853	6,148
1985	124	747	871		1,232	1,232	734	5,262	5,996	8,099
1986	78	302	380	245	1,193	1,438	1,467	2,132	3,599	5,417
1987	127	706	833	459	994	1,453	1,986	4,111	6,097	8,383
1988	18	764	782	200	1,328	1,528	1,109	4,602	5,711	8,021
1989	251	875	1126	1,439	1,766	3,205	888	5,682	6,570	10,901
1990	110	375	485	1,272	2,540	3,812	1,274	4,430	5,704	10,001
1991	63	1,144	1207	3,822	3,604	7,426	1,365	5,528	6,893	15,526
1992	283	567	850	1,109	2,540	3,649	1,270	3,886	5,156	9,655
1993	177	1,579	1756	5,823	4,186	10,009	2,190	6,962	9,152	20,917
1994	65	443	508	5,355	3,866	9,221	3,478	6,971	10,449	20,178
1995	1,018	1,979	2997	5,367	3,418	8,785	2,020	4,786	6,806	18,588
1996	702	3,502	4204	9,060	6,233	15,293	2,788	5,572	8,360	27,857
1997	32	722	754	6,091	4,905	10,996	2,793	3,264	6,057	17,807
1998	158	697	855	6,672	6,402	13,074	1,795	6,425	8,220	22,149
1999	235	885	1120	3,890	5,629	9,519	2,425	7,564	9,989	20,628
2000	440	1,264	1704	7,067	5,903	12,970	3,136	6,765	9,901	24,575
2001	483	2,232	2715	11,015	11,273	22,288	5,301	5,766	11,067	36,070
2002	665	1,289	1954	14,508	18,264	32,772	5,807	7,684	13,491	48,217
2003	173	2,511	2684	18,531	10,300	28,831	2,865	8,585	11,450	42,965
1977-2003 Mean	252	1,201	1,262	5,663	4,257	8,032	1,849	4,854	6,703	14,863
1999-2003 Mean	399	1,636	2,035	11,002	10,274	21,276	3,907	7,273	11,180	34,491

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

Table 5.-Dolly Varden harvest in Lower Cook Inlet Management Area waters, 1977-2003.

	South of Bluff Point			North of Bluff Point			
Year	Salt Water	Fresh Water	Total	Salt Water	Fresh Water	Total	Area Total
1977	4,137		4,137	603	11,437	12,040	16,177
1978	2,866		2,866	325	22,418	22,743	25,609
1979	3,218		3,218	382	27,808	28,190	31,408
1980	3,917		3,917	164	13,156	13,320	17,237
1981	4,212		4,212	313	18,403	18,716	22,928
1982	3,606		3,606	526	12,484	13,010	16,616
1983	3,997	1,678	5,675	493	18,871	19,364	25,039
1984	1,659	312	1,971	237	7,595	7,832	9,803
1985	2,324		2,324	243	8,826	9,069	11,393
1986	2,172	306	2,478	15	5,367	5,382	7,860
1987	1,358	380	1,738	379	3,911	4,290	6,028
1988	2,819	218	3,037	200	3,802	4,002	7,039
1989	2,083	343	2,426	382	1,848	2,230	4,656
1990	1,522	176	1,698	61	3,811	3,872	5,570
1991	1,393	275	1,668	246	1,983	2,229	3,897
1992	1,804	378	2,182	205	3,097	3,302	5,484
1993	1,720	172	1,892	150	1,506	1,656	3,548
1994	1,516	216	1,732	311	2,034	2,345	4,077
1995	737	154	891	285	2,102	2,387	3,278
1996	1,765	586	2,351	171	2,162	2,333	4,684
1997	1,541	706	2,247	378	2,178	2,556	4,803
1998	1,790	115	1,905	297	3,854	4,151	6,056
1999	774	209	983	288	1,671	1,959	2,942
2000	1,045	695	1,740	491	2,605	3,096	4,836
2001	1,019	195	1,214	422	2,131	2,553	3,767
2002	580	114	694	196	1,158	1,354	2,048
2003	1,265	356	1,621	117	1,539	1,656	3,277
1977-2003 Mean	2,105	379	2,386	292	6,954	7,246	9,632
1999-2003 Mean	937	314	1,250	303	1,821	2,124	3,374

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

Table 6.-Razor clam harvest, participation and success rates on eastside Kenai Peninsula beaches north of Anchor Point, 1969-2003.

Year	Participation (Digger-days)	Harvest	Clams/Digger day
1969	12,200	375,800	31
1970	11,370	314,650	28
1971	6,800	187,760	28
1972	15,400	437,530	28
1973	23,770	682,600	29
1974	27,410	872,450	32
1975	24,260	896,080	37
1976	29,320	939,000	32
1977	25,393	871,247	34
1978	29,750	896,667	30
1979	30,323	966,677	32
1980	31,494	771,603	25
1981	31,298	829,436	27
1982	31,954	963,994	30
1983	31,470	978,720	31
1984	29,963	1,044,307	35
1985	32,652	1,070,265	33
1986	33,486	1,124,728	34
1987	25,427	979,020	39
1988	30,998	1,171,308	38
1989	22,693	832,155	37
1990	29,427	950,974	32
1991	32,012	1,166,787	36
1992	44,537	1,156,034	26
1993	40,364	946,766	23
1994	48,546	1,271,174	26
1995	42,220	1,158,107	27
1996	29,943	814,360	27
1997	28,343	829,841	29
1998	26,636	643,612	24
1999	36,278	750,447	21
2000	37,755	842,270	22
2001	32,642	640,633	20
2002	34,406	767,780	22
2003	25,361	568,662	22
1977-2003 Mean	32,421	926,206	29
1999-2003 Mean	33,288	713,958	21

Source: Harvest and participation were determined by creel survey from 1969-1976 and by the Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b) from 1977-2003.

Table 7.-Kachemak Bay and Lower Cook Inlet shellfish sport and personal use fishery harvest and participation, 1981-2003.

Year	Participation All Species (angler-days)	King Crab (numbers)	Dungeness Crab (numbers)	Tanner Crab (numbers)	Shrimp (gallons)	Hardshell Clams (gallons)	Razor Clams (numbers)	Other Shellfish (numbers)
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	20,334	409	15,083	3,084	3,577	16,110		2,633
1984	25,162	62	15,113	2,332	2,419	8,891	37,476	349
1985	16,732	closed	29,530	3,502	3,260	10,334	16,205	2,982
1986	21,755	closed	34,217	7,926	4,771	20,212	40,937	128
1987	20,710	closed	51,279	8,988	7,788	23,577	25,855	9,080
1988	13,306	closed	32,053	4,669	2,090	26,597	18,374	3,474
1989	9,594	closed	10,075	closed	1,199	18,195	15,954	13,015
1990	10,342	closed	7,034	closed	2,038	11,821	21,701	11,707
1991	6,690	closed	closed	1,142	613	10,476	7,963	1,513
1992	15,727	closed	10,050	4,165	1,547	9,993	11,358	13,327
1993	13,753	closed	15,198	9,206	656	8,350	10,692	7,995
1994	18,187	closed	19,155	9,648	2,087	13,279	13,974	2,384
1995	17,682	closed	8,957	10,936	1,654	20,311	14,669	7,708
1996	11,584	closed	6,428	12,059	301	29,163	6,089	1,327
1997	9,263	closed	5,905	11,376	closed	9,426	1,997	882
1998	3,926	closed	closed	16,763	closed	12,431	4,030	
1999	9,149	closed	closed	17,045	closed	7,971	4,524	216
2000	11,445	closed	closed	19,672	closed	14,697	7,275	992
2001	8,090	closed	closed	7,818 [a]	closed	13,141	3,838	1,620
2002	7,439	closed	closed	669 [b]	closed	12,047	7,887	2,163
2003	5,836	closed	closed	closed	closed	10,074	7,241	1,925
1981-2003 Mean	13,818		18,310	7,978	2,883	13,929	13,902	5,716
1999-2003 Mean	8,392					11,586	6,153	1,383

Source: Harvests were estimated from the Statewide Harvest Survey (Mills 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b), except Tanner crab harvests 1996-2002 which are summaries of reported harvest on returned shellfish permits.

[a] Expanded harvest.

[b] July 19 reduced bag limit from 15 to 5; August 3 closed fishery.

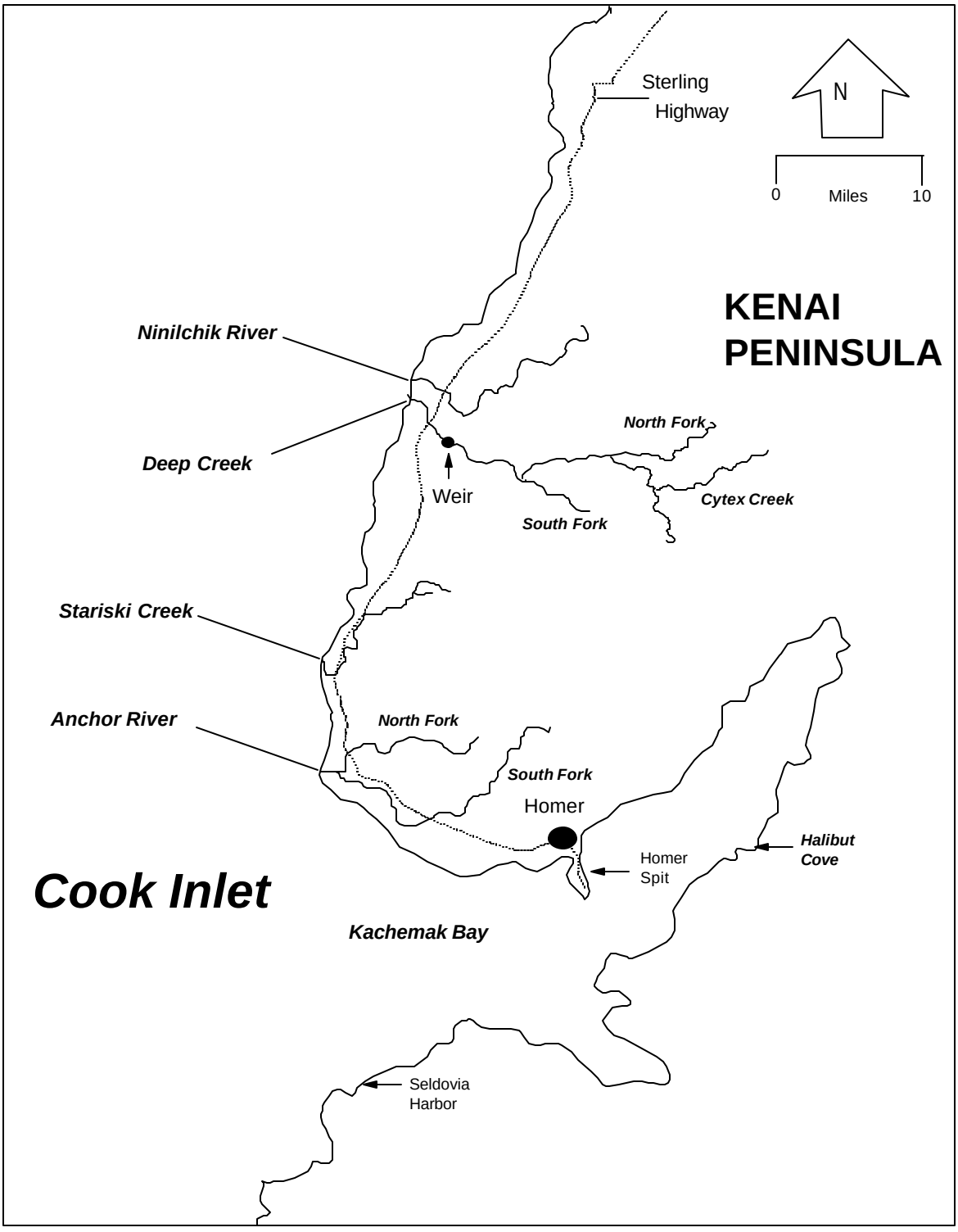


Figure 3.-Lower Kenai Peninsula road system streams.

Table 8.-Cook Inlet marine early-run Chinook salmon sport fishery harvest and effort, 1972-2003.

	Deep Creek Area		
Year	Harvest	Days Fished	Harvest/ Hour
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
1987	3,613		
1988	4,243		
1989	3,863		
1990	4,694		
1991	4,824		
1992	5,996		
1993	8,136		
1994	6,850		
1995	8,230		
1996	4,702		
1997	5,646		
1998	5,783		
1999	4,907		
2000	4,773		
2001	3,671		
2002	3,368		
2003	4,042		
Mean	3,835	12,714	0.052

Source: 1972-1986 from creel survey (Hammarstrom 1974-1981; Hammarstrom and Larson 1982-1984, Hammarstrom and Larson 1986; and Hammarstrom et al. 1985). 1987-2003 data from Statewide Harvest Survey (Mills 1988-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b). Harvest was apportioned 70.5% to the early run and 29.5% to the late run for 1987-1993, based on estimates from onsite creel surveys from 1972-1986. Early-run percentages of total harvest for 1994 and 1995 were 74.9% and 75.48%, respectively, based on creel survey (McKinley 1995, 1996). Beginning in 1996, the Statewide Harvest Survey has generated separate estimates for the early (prior to and including June 24) and late (after June 24) runs. Table numbers may not necessarily match those of the SWHS because different site groupings were used for this report. All Boat sites north of Bluff Point to Ninilchik were used.

Table 9.-Cook Inlet marine late-run Chinook salmon sport fishery harvest and effort, 1972-2003.

	Deep Creek Area		
Year	Harvest	Days Fished	Harvest/ Hour
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
1987	1,512		
1988	1,775		
1989	1,616		
1990	1,964		
1991	2,019		
1992	2,509		
1993	3,404		
1994 [a]	2,296		
1995 [a]	2,673		
1996	2,006		
1997	2,850		
1998	1,680		
1999	997		
2000	1,026		
2001	860		
2002	427		
2003	200		
Mean	1,395	7,233	0.050

Source: 1972-1986 from creel survey (Hammarstrom 1974-1981; Hammarstrom and Larson 1982-1984, Hammarstrom and Larson 1986; and Hammarstrom et al. 1985). 1987-2003 data from Statewide Harvest Survey (Mills 1988-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b). Harvest was apportioned 70.5% to the early run and 29.5% to the late run for 1987-1993, based on estimates from onsite creel surveys from 1972-1986. Late-run percentages of total harvest for 1994 and 1995 were 25.1% and 24.52%, respectively, based on creel survey (McKinley 1995, 1996). Beginning in 1996, the Statewide Harvest Survey has generated separate estimates for the early (prior to and including June 24) and late (after June 24) runs. Table numbers may not necessarily match those of the SWHS because different site groupings were used for this report. All Boat sites north of Bluff Point to Ninilchik were used.

Table 10.-Comparison of charter logbook data and Statewide Harvest Survey marine Chinook salmon harvest from Central Cook Inlet north of Bluff Point, 1998-2003.

Year		Charter logbook (reported harvest)	Statewide Harvest Survey (estimated harvest)
1998			
	Early	3,231	3,183
	Late	635	516
	Total	3,866	3,699
1999			
	Early	2,725	2,309
	Late	865	373
	Total	3,590	2,682
2000			
	Early	2,695	2,160
	Late	823	569
	Total	3,518	2,729
2001			
	Early	2,248	2,214
	Late	348	301
	Total	2,596	2,515
2002			
	Early	2,213	1,747
	Late	486	223
	Total	2,699	1,970
2003			
	Early	2,565	2,215
	Late	457	111
	Total	3,022	2,326

Table 11.-Early- and late-run guided and unguided angler Chinook harvests north of Bluff Point, 1986-2003.

Year	Early run Unguided	Guided	Early run Total	Late run Unguided	Guided	Late run Total	Total Unguided	Total Guided	Total Overall
1986	2,719	168	2,888	1,138	71	1,208	3,857	239	4,096
1987	3,268	345	3,613	1,368	144	1,512	4,636	489	5,125
1988	4,026	217	4,243	1,684	91	1,775	5,710	308	6,018
1989	3,611	252	3,863	1,511	105	1,616	5,122	357	5,479
1990	4,186	508	4,694	1,752	212	1,964	5,938	720	6,658
1991	3,031	1,794	4,824	1,268	750	2,019	4,299	2,544	6,843
1992	3,624	2,372	5,996	1,516	993	2,509	5,140	3,365	8,505
1993	4,548	3,588	8,136	1,903	1,501	3,404	6,451	5,089	11,540
1994	3,809	3,042	6,850	1,276	1,019	2,296	5,085	4,061	9,146
1995	4,225	4,004	8,230	1,373	1,301	2,673	5,598	5,305	10,903
1996	2,464	2,238	4,702	1,099	907	2,006	3,563	3,145	6,708
1997	2,989	2,657	5,646	1,656	1,194	2,850	4,645	3,851	8,496
1998	2,600	3,183	5,783	1,164	516	1,680	3,764	3,699	7,463
1999	2,598	2,309	4,907	624	373	997	3,222	2,682	5,904
2000	2,613	2,160	4,773	457	569	1,026	3,070	2,729	5,799
2001	1,457	2,214	3,671	559	301	860	2,016	2,515	4,531
2002	1,621	1,747	3,368	204	223	427	1,825	1,970	3,795
2003	1,827	2,215	4,042	89	111	200	1,916	2,326	4,242

Source: Statewide Harvest Survey (Mills 1987-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b). Harvest was apportioned 70.5% to the early run and 29.5% to the late run for 1987-1995, based on estimates from onsite creel surveys from 1972-1986. Beginning in 1996, the Statewide Harvest Survey has generated separate estimates for the early (prior to and including June 24) and late (after June 24) runs.

Table 12.-Contribution statistics from coded wire tagged Chinook salmon recovered in the late-run Central Cook Inlet marine recreational fisheries north of Bluff Point, 1997 and 1998.

Year	Harvest	Number Examined	Number of Tags Recovered	Harvest Explained	Cook Inlet Hatchery	Cook Inlet Wild	Non-Cook Inlet
1997	2,850	1,045	22	815 (28.6%)	122 (4.3%) [a]	436 (15.3%) [b]	257 (9.0%)
1998	1,680	453	4	269 (16.0%)	10 (0.6%)		259 (15.4%)

[a] Not all age classes represented.

[b] Preliminary estimate as tagging fraction for the Kenai River wild Chinook salmon has not been finalized.

Table 13.-Contribution statistics from coded wire tagged Chinook salmon recovered in the early-run Central Cook Inlet marine recreational fisheries north of Bluff Point, 1996-2002.

Year	Harvest	Number Examined	Number of Tags Decoded	Harvest Explained	Cook Inlet Hatchery		Deep Creek	Other Cook Inlet Wild	Non-Cook Inlet
					Other	Ninilchik			
1996	4,702	1,470	24	543 (11.5%)	13 (0.3%)	[a] 183 (3.9%)		[a]	348 (7.4%)
1997	5,646	2,442	49	687 (12.2%)	137 (2.4%)	[a] 167 (3.0%)	149 (2.6%)	[a]	234 (4.1%)
1998	5,783	2,789	60	1,270 (22.0%)	61 (1.1%)	54 (0.9%)	281 (4.9%)		874 (15.1%)
1999	4,907	2,019	60	607 (12.4%)	137 (2.8%)	73 (1.5%)	155 (3.2%)		241 (4.9%)
2000	4,773	1,839	66	603 (12.6%)	181 (3.8%)	63 (1.3%)	77 (1.6%)		282 (5.9%)
2001	3,671	1,552	78	815 (22.2%)	159 (4.3%)	45 (1.2%)		[a]	611 (16.6%)
2002	3,368	1,609	32	396 (11.8%)	42 (1.2%)	9 (0.3%)		[a]	345 (10.2%)
Average				703 (14.9%)	104 (2.3%)	85 (1.7%)	166 (3.1%)		419 (9.2%)

Sources: 1996 – modified from McKinley 1999.
1997, 1998 – R. Begich, ADF&G SF, Homer, personal communication.
1999-2001 – Begich *In prep*.
2002 - R. Begich, ADF&G SF, Homer, personal communication.

[a] Not all age classes represented, so does not represent true contribution of this stock.

Table 14.-Estimated proportion of non-spawning Chinook salmon in the Central Cook Inlet marine recreational fisheries north of Bluff Point, 1996-2002.

	Number Females Examined			Nonspawners			
Year	Nearshore[a]	Offshore[b]	Total	Nearshore[a]	Offshore[b]	Total Number	(Percent of Total)
Early run							
1996 [c]			370			79	(21.4%)
1997	969	55	1,024	200	36	236	(23.0%)
1998	717	131	848	281	99	380	(44.8%)
1999	683	120	803	86	80	166	(20.7%)
2000	556	174	730	150	136	286	(39.2%)
2001	495	89	584	228	58	286	(49.0%)
2002	487	85	572	237	62	299	(52.3%)
Late run							
1997	322	54	376	7	34	41	(10.9%)
1998	112	62	174	6	50	56	(32.2%)

Sources: 1996 – modified from McKinley 1999.
1997, 1998 – R. Begich, ADF&G SF, Homer, personal communication.
1999-2001 – Begich *In prep*.
2002 - R. Begich, ADF&G SF, Homer, personal communication.

[a] Less than ¾ mile from shore.

[b] More than ¾ mile from shore.

[c] Nearshore/Offshore data not available.

Table 15.-Origin of mature (spawning) CWT Chinook salmon sampled in the Central Cook Inlet marine fishery, 1996-2002.

Year	Total CWT Recoveries Sampled for Maturity	Number Mature			Number Immature			Total Origin or Maturity Unknown
		Cook Inlet Origin	Non-Cook Inlet	Total	Cook Inlet Origin	Non-Cook Inlet	Total	
1996	10	7	0	7	0	3	3	0
1997	53	30	4	34	5	4	9	10
1998	80	28	3	31	4	17	21	28
1999	67	44	2	46	2	7	9	12
2000	79	39	3	42	7	9	16	21
2001	93	35	7	42	3	29	32	19
2002	72	8	3	11	0	14	14	47

Sources: 1996 – modified from McKinley 1999.
1997, 1998 – R. Begich, ADF&G SF, Homer, personal communication.
1999-2001 – Begich *In prep*.
2002 - R. Begich, ADF&G SF, Homer, personal communication.

Table 16.-Estimates of the number of non-spawning (non-local) and spawning Chinook salmon harvested in the early-run Central Cook Inlet marine recreational fisheries north of Bluff Point, 1996-2002.

Year	Total Harvest[a]	Estimated Fraction		Total Number Stock Origin Explained	Stock Origin Unexplained		
		Non-spawners[b]	Spawners		Total Number	Estimated Number of Non-spawners	Estimated Number of Spawners
1996	4,702	0.21	0.79	543	4,159	873	3,286
1997	5,646	0.23	0.77	687	4,959	1,141	3,818
1998	5,783	0.45	0.55	1,270	4,513	2,031	2,482
1999	4,907	0.21	0.79	607	4,300	903	3,397
2000	4,773	0.39	0.61	603	4,170	1,626	2,544
2001	3,671	0.49	0.51	815	2,856	1,399	1,457
2002	3,368	0.52	0.48	396	2,972	1,545	1,427
Mean	4,693	0.36	0.64	703	3,990	1,360	2,630

[a] From Table 13.
[b] From Table 14.

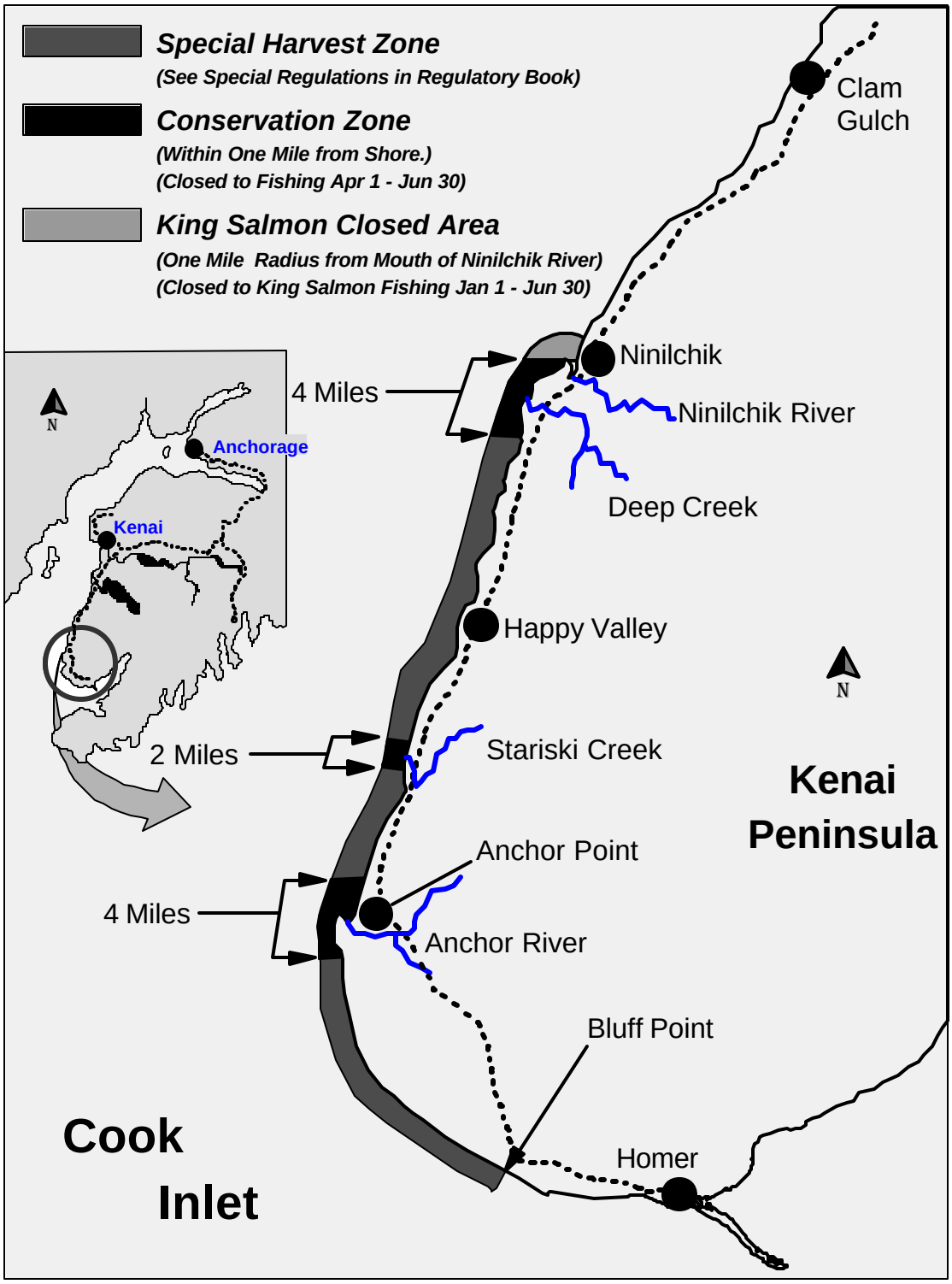


Figure 4.-Central Cook Inlet regulatory zones.

Table 17.-Cook Inlet marine Chinook salmon harvest by month and year reported in charter logbooks, 1998-2003.

	Winter	Spring/Summer Month					
	(Sep-Mar)	Apr	May	Jun	Jul	Aug	Total
1998							
Number Vessels	39	28	1,350	918	866	230	3,431
Harvest	40	35	2,466	1,078	500	127	4,246
Prop. of Total	0.009	0.008	0.581	0.254	0.118	0.030	
1999							
Number Vessels	88	23	1,325	1,001	833	454	3,724
Chinook Harvest	154	34	2,001	1,317	416	375	4,297
Prop. of Total	0.036	0.008	0.471	0.310	0.098	0.088	
2000							
Number Vessels	81	67	1,577	904	723	401	3,753
Chinook Harvest	189	84	2,001	1,082	610	371	4,337
Prop. of Total	0.044	0.020	0.477	0.258	0.146	0.089	
2001							
Number Vessels	114	62	1,532	679	604	667	3,658
Chinook Harvest	225	145	1,778	725	282	277	3,432
Prop. of Total	0.066	0.042	0.518	0.211	0.082	0.081	
2002							
Number Vessels	142	47	1,338	705	743	744	3,719
Chinook Harvest	384	111	1,723	1,144	352	149	3,863
Prop. of Total	0.099	0.029	0.446	0.296	0.091	0.039	
2003							
Number Vessels	157	58	1,193	751	521	363	3,043
Chinook Harvest	473	253	1,996	1,380	230	163	4,495
Prop. of Total	0.105	0.056	0.444	0.307	0.051	0.036	
Average							
Number Vessels	104	48	1,386	826	715	477	3,555
Chinook Harvest	244	109	1,882	1,068	468	257	4,016
Prop. of Total	0.060	0.027	0.468	0.266	0.116	0.064	

Table 18.-Number of Chinook salmon examined for tags and number of tags recovered from the summer season marine Chinook salmon sport fishery south of Bluff Point, 1997-2002.

Year	Number Examined	Number of Tags Recovered			
		Total	Cook Inlet Hatchery	Cook Inlet Wild	Non-Cook Inlet
Early					
1997	92	4	2	0	2
1998	142	6	0	0	6
1999	136	9	5	0	4
2000	73	2	0	0	2
2001	263	13	5	0	8
2002	171	15	0	0	15
Late Run					
1997	22	0	0	0	0
1998	72	3	0	1	2

Table 19.-Estimated proportion of non-spawning Chinook in the Cook Inlet marine recreational fisheries south of Bluff Point, 1997-2002.

Year	Number Females Examined	Non-spawners	
		Number	Percent of Total
Early run			
1997	26	25	(96.2%)
1998	53	43	(81.1%)
1999	62	28	(45.2%)
2000	38	17	(44.7%)
2001	86	68	(79.1%)
2002	82	71	(86.6%)
Late run			
1997	8	1	(12.5%)
1998	27	19	(70.4%)

Table 20.-Angler participation and harvest of Chinook, coho, pink, and sockeye salmon; Dolly Varden; rainbow trout and steelhead trout, Anchor River, 1977-2003.

	Harvest							
						Rainbow/Steelhead		
Year	Chinook Salmon	Coho Salmon	Pink Salmon	Sockeye Salmon	Dolly Varden	Harvest	Catch	Days Fished
1977	1,077	1,339	27		9,222	2,099		31,515
1978	2,109	1,559	139		17,357	2,305		42,671
1979	1,913	4,006	18		21,364	1,782		44,220
1980	605	2,649	339		10,948	1,186		33,272
1981	1,069	2,949	11		15,271	928		34,257
1982	718	2,379	161		10,375	698		24,709
1983	1,269	1,395	252		17,277	1,605		28,881
1984	998	1,135	249	167	5,599	985		26,919
1985	672	2,239	124	224	7,716	475		31,715
1986	1,098	1,021	136	39	3,914	520		34,938
1987	761	2,010	54	1,263	2,735	643		39,045
1988	976	2,219	109	109	2,746	200		24,356
1989	578	2,635	115	136	1,476		2,066 [a]	19,145
1990	1,479	2,782	163	136	2,821		1,978 [a]	28,829
1991	1,047	3,169	125	152	1,409		2,349 [a]	22,187
1992	1,685	2,267	92	66	2,532		2,720 [a]	24,028
1993	2,787	4,003	98	45	1,031		4,156 [a]	29,338
1994	2,478	3,360	79	82	1,574		4,035 [a]	27,856
1995	1,475	3,080	47	94	1,537		2,232 [a]	25,888
1996	1,483	1,762	78	218	963		7,570 [a]	16,016
1997	1,563	1,636	321	165	1,575		3,103 [a]	17,020
1998	783	2,386	7	174	2,105		3,878 [a]	14,310
1999	1,409	1,780	54	174	1,061		3,920 [a]	21,184
2000	1,730	2,604	123	127	1,903		8,693 [a]	22,971
2001	889	2,960	11	61	1,652		3,045 [a]	19,195
2002	1,047	3,830	124	52	662		3,501 [a]	19,245
2003	1,011	3,999	68	504	1,124		3,409 [a]	17,482
1977-2003 Mean	1,286	2,487	116	199	5,480	1,119	3,777	26,711
1999-2003 Mean	1,217	3,035	76	184	1,280		4,514	20,015

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Rainbow/steelhead trout caught and released. Retention of this species is prohibited. 1989 catch estimates from unpublished Statewide Harvest Survey data.

Table 21.-Angler participation and harvest of Chinook, coho, pink, and sockeye salmon; Dolly Varden; rainbow trout and steelhead trout, Deep Creek, 1977-2003.

	Harvest							
	Chinook	Coho	Pink	Sockeye	Dolly	Rainbow/ Steelhead		Days
Year	Salmon	Salmon	Salmon	Salmon	Varden	Harvest	Catch	Fished
1977	425	306	109		1,330	569		11,399
1978	804	1,383	294		3,046	498		13,872
1979	703	362	9		2,027	263		12,560
1980	182	478	321		1,028	236		8,796
1981	604	464	11		1,382	248		10,127
1982	791	366	293		1,247	239		12,149
1983	1,154	545	42		1,112	315		13,505
1984	761	1,197	112	318	973	311		15,760
1985	249	2,301	37	187	850	179		19,802
1986	944	588	52	52	306	688		17,354
1987	604	1,050	18	191	72	85		16,734
1988	777	1,528	72	182	219	291		12,115
1989	843	2,254	28	117	333		409 [a]	13,414
1990	1,411	1,111	35	165	708		1,291 [a]	23,567
1991	1,776	1,290	50	876	287		425 [a]	17,048
1992	1,379	737	46	378	401		740 [a]	15,226
1993	2,503	1,722	81	145	145		1,448 [a]	19,535
1994	2,379	1,895	25	141	377		1,156 [a]	18,357
1995	1,161	1,014	180	87	301		520 [a]	12,727
1996	886	2,313	21	55	615		1,079 [a]	9,629
1997	1,249	1,115	106	252	276		384 [a]	9,712
1998	539	2,035	47	185	1,061		1,350 [a]	9,206
1999	741	2,651	165	214	496		689 [a]	11,367
2000	937	2,045	62	72	355		1,805 [a]	12,174
2001	593	1,828	0	129	240		627 [a]	7,834
2002	507	1,832	223	0	452		954 [a]	8,925
2003	775	1,751	0	406	314		2,456 [a]	8,959
1977-2003 Mean	951	1,339	90	208	739	327	1,022	13,402
1999-2003 Mean	711	2,021	90	164	371		1,306	9,852

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Rainbow/steelhead trout caught and released. Retention of this species is prohibited. 1989 catch estimates from unpublished Statewide Harvest Survey data.

[b] Preliminary.

Table 22.-Angler participation and harvest of Chinook, coho, pink, and sockeye salmon; Dolly Varden; rainbow trout and steelhead trout, Ninilchik River, 1977-2003.

	Harvest							
	Chinook	Coho	Pink	Sockeye	Dolly	Rainbow/ Steelhead		Days
Year	Salmon[a]	Salmon	Salmon	Salmon	Varden	Harvest	Catch	Fished
1977	1,168	122	0		424	230		11,350
1978	1,445	88	46		1,003	307		14,173
1979	1,493	200	0		2,390	509		18,282
1980	723	321	260		853	381		19,706
1981	1,523	432	0		875	464		14,184
1982	1,240	241	10		514	179		11,806
1983	871	210	42		199	157		9,458
1984	648	549	150	1,405	524	137		10,122
1985	983	697	0	373	87	501		10,213
1986	420	336	13	465	505	275		9,250
1987	1,112	924	108	2,488	507	291		13,329
1988	795	709	36	1,073	655	272		12,533
1989	744	379	216	526	39		505 [b]	9,997
1990	693	368	12	58	116		177 [b]	8,323
1991	3,123	789	116	203	222		512 [b]	19,640
1992	5,316	785	37	1,101	131		1,008 [b]	27,816
1993	4,235	845	0	406	29		442 [b]	20,466
1994	3,108	1,089	17	943	65		804 [b]	21,827
1995	2,451	620	38	161	133		178 [b]	16,160
1996	2,401	1,071	0	284	560		522 [b]	11,445
1997	3,263	402	32	236	141		380 [b]	11,064
1998	1,453	836	13	101	272		576 [b]	10,994
1999	1,945	2,980	107	964	114		694 [b]	15,344
2000	1,782	1,724	20	255	228		760 [b]	12,405
2001	1,399	708	0	1,181	228		283 [b]	10,602
2002	830	1,655	85	109	44		468 [b]	9,572
2003	1,452	2,526	0	191	20		952 [b]	9,843
1977-2003 Mean	1,727	800	50	626	403	309	551	13,700
1999-2003 Mean	1,482	1,919	42	540	127		631	11,553

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[a] Enhanced return beginning in 1991.

[b] Rainbow/steelhead trout caught and released. Retention of this species is prohibited. 1989 catch estimates from unpublished Statewide Harvest Survey data.

Table 23.-Sport harvest (1976-2003) and unexpanded escapement index counts (1976-2004) of Chinook salmon in Anchor River, Deep Creek, and Ninilchik River.

	Anchor River		Deep Creek		Ninilchik River	
Year	Harvest	Aerial Escapement	Harvest	Aerial Escapement	Harvest	Aerial Escapement
1976	830	2,125	220	1,075	630	956
1977	1,077	3,585	425	848	1,168	1,169
1978	2,109	2,209	804	582	1,445	724
1979	1,913	1,335	703	726	1,493	854
1980 [a]	605		182		723	
1981 [a]	1,069	1,066	604	427	1,523	552
1982	718	1,493	791	977	1,240	947
1983	1,269	1,033	1,154	550	871	445
1984	998	1,087	761	380	648	346
1985	672	1,328	249	644	983	582
1986	1,098	2,287	944	976	420	307
1987	761	2,524	604	968	1,112	523
1988	976	1,458	777	409	795	569
1989	578	940	843	561	744	280
1990	1,479	967	1,411	347	693	288
1991	1,047	589	1,776	294	3,123 [c]	594
1992	1,685	99	1,379	63	5,316 [c]	[b]
1993	2,787	1,110	2,503	486	4,235 [c]	688
1994	2,478	837	2,379	364	3,108 [c]	252
1995	1,475	[b]	1,161	229	2,451 [c]	[b]
1996	1,483	277	886	193	2,401 [c]	158
1997	1,563	477	1,249	136	3,263 [c]	393
1998	783	789	539	676	1,453 [c]	316
1999	1,409	685	741	1,190	1,945 [c]	357
2000	1,730	752	937	556	1,782 [c]	578
2001	889	414	823	551	1,945 [c]	258
2002	1,047	748	507	696	830	[d]
2003	1,011	680	775	1,008	1,452	[d]
2004		834		1,075		
Mean	1,269	1,175	933	607	1,707	528

Source: Harvest estimates for all three streams in 1976 are from punch card returns (Hammarstrom 1977), all other harvest estimates are from Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b). Escapement estimates are aerial counts.

[a] Escapement counts not conducted or considered minimal due to high turbid water during aerial escapement surveys.

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

[c] Enhanced run.

[d] Discontinued. Run strength now indexed by weir count between July 8 and July 24.

Table 24.-Estimated number of Chinook salmon and coho salmon fingerling and smolt tagged with coded wire tags in Deep Creek, 1994-1997 and 2001-2003.

	Number of Chinook		Number of Coho	
	Captured	Tagged	Captured	Tagged
1994	[a]	13,255	6,283	0
1995	17,757 [b]	13,568	10,822	9,671
1996	9,468 [b]	8,966	5,261	4,868
1997	7,899 [b]	7,419	12,124	6,948
2001	10,371 [c]	0	4,785	2,536
2002	8,806 [c]	0	10,728	7,319
2003	6,252 [c]	0	3,593	2,667

Source: Bendock 1995, 1996; King and Breakfield 1998, 1999, 2002; A. A. Eskalin, Graduate Research Associate, University of Alaska Fairbanks School of Fisheries and Ocean Sciences; personal communication.

[a] Number of Chinook captured was not enumerated.

[b] Number of captures larger than 55 mm; smolt smaller than 55 mm were not counted.

[c] Number of smolt captures; a majority was larger than 55 mm.

Table 25.-Summary of Chinook salmon captures during weir operation and upstream netting, Deep Creek, 1997-2000.

	Weir Installation[a]	Weir Count[b]	Upstream Netting	Inriver Harvest[c]	Total Count[d]	Aerial Count	CWT Recovery[e]
1997	24-May	1,732	96	1,249	3,077	136	136
1998	20-Jun	367	118	539	1,024	676	47
1999	17-Jun	2,055	231	741	3,027	1,190	183
2000	15-Jun	1,148	92	937	2,177	556	137

[a] Date weir was fish-tight, installation was postponed due to high water in 1998 through 2000.

[b] Weir counts are minimums, immigration in progress prior to weir installation.

[c] Statewide harvest survey estimates, not available for 2000 return.

[d] Sum of weir count, upstream netting and harvest; minimum count.

[e] Number of Chinook salmon sacrificed for coded wire tag recovery information.

Table 26.-Ninilchik River Chinook salmon sport fishery statistics and aerial survey escapement index counts, 1991-2003.

		Creel Survey			Statewide Harvest Survey			
Year	Fishery Days	Effort (Angler Hours)	Harvest	Catch	Effort (Total Days Fished[a])	Harvest	Catch	Aerial Escapement Count
1991	19	51,318	5,053	9,718	19,640	3,123	5,260	594
1992	19	60,246	4,896	12,606	27,816	5,316	11,425	[b]
1993	23	51,203	5,610	15,054	20,466	4,235	9,491	688
1994	23				21,827	3,108	5,482	252
1995	23				16,160	2,451	4,313	[b]
1996	19				11,445	2,401	7,481	158
1997	9				11,064	3,263	6,879	393
1998	9				10,994	1,453	3,395	316
1999	9				15,344	1,945	4,153	357
2000	9				12,405	1,738	4,648	578
2001	12				10,602	1,399	3,014	258
2002	12 [c]				9,572	830	2,180	[d]
2003	17 [c]				9,843	1,452	4,205	
Mean					15,611	2,605	5,643	399

Source: Creel data from Boyle and Alexandersdottir 1992; Boyle et al. 1993; Balland et al. 1994; Statewide Harvest Survey data from Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b.

[a] Days fished at the Ninilchik River targeting all species.

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

[c] Additional opening for hatchery fish only downstream of Sterling Highway Bridge.

[d] Aerial escapement counts discontinued; replaced by weir index count July 8 to July 24.

Table 27.-Summary of Chinook salmon return and escapement counts, Ninilchik River weir, 1999-2004.

		Weir Count	Proportion	Inriver Harvest	Total Return	Inriver Exploitation	CWT Recovery	Egg Take Kill	Spawning Escapement
1999	Wild	1,644	0.72	973 [a]	2,617	0.37		68	1,576
	Hatchery	641	0.28	972 [a]	1,613	0.60	42	26	573
	Total	2,285 [b]	1.00	1,945	4,230	0.46	42	94	2,149
2000	Wild	1,634	0.66	869	2,503	0.35		81	1,553
	Hatchery	853	0.34	869	1,722	0.50	108	60	685
	Total	2,487	1.00	1,738	4,225	0.41	108	141	2,238
2001	Wild	1,414	0.68	699	2,113	0.33		210	1,204
	Hatchery	672	0.32	699	1,371	0.51	130		542
	Total	2,086	1.00	1,398	3,484	0.40	130	210	1,746
2002	Wild	1,516	0.73			0.78 [c]		176	1,340
	Hatchery	559	0.27			0.22 [c]	109	55	395
	Total	2,075	1.00	830	2,905	0.29	109	231	1,735
2003	Wild	1,258	0.75			0.69 [c]		131	1,127
	Hatchery	425	0.25			0.31 [c]	69	20	336
	Total	1,683	1.00	1,452	3,135	0.46	69	151	1,463
2004	Wild	1,525	0.74					132	1,393
	Hatchery	536	0.26				62	0	474
	Total	2,061	1.00				62	132	1,867
Mean	Wild	1,499	0.71	847	2,411	0.35 [d]		133	1,366
	Hatchery	614	0.29	847	1,569	0.54 [d]		27	501
	Total	2,113	1.00	1,633	3,596	0.40	87	160	1,866

[a] Hatchery harvest estimate average of 50% is based on harvest sampling in 2000 and 2001.

[b] Weir count includes 31 wild Chinook salmon and 38 hatchery Chinook salmon netted downstream of the weir.

[c] Exploitation rate during third regulatory weekend only.

[d] 1999 through 2001 average.

Table 28.-Number of wild and hatchery-reared Chinook salmon counted at the Ninilchik River weir, July 8 through July 24, 1994 through 2004.

Year	Wild chinook	Percent of Total Escapement	Hatchery Chinook	Percent of Total Escapement
1994	423		40	
1995	503		342	
1996	591		264	
1997	235		358	
1998	422		268	
1999	799	0.49	277	0.43
2000	834	0.51	426	0.50
2001	710	0.50	367	0.55
2002	655	0.43	169	0.30
2003	393	0.31	150	0.35
2004	416	0.27	158	0.29
Mean 1994-2004	544		256	
SEG [a]	400-850			

[a] SEG = Sustainable Escapement Goal established in 2001 based on weir counts July 8-July 24, 1994-2000. Goal for Ninilchik is based on return of wild fish.

Table 29.-Harvest and catch of Dolly Varden in Lower Kenai Peninsula roadside streams, 1977 through 2003.

	Anchor River[a]		Stariski Creek[a]		Deep Creek[a]		Ninilchik River[a]		All	
Year	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch
1977	9,222		461		1,330		424		11,437	
1978	17,357		1,012		3,046		1,003		22,418	
1979	21,364		2,027		2,027		2,390		27,808	
1980	10,948		327		1,028		853		13,156	
1981	15,271		875		1,382		875		18,403	
1982	10,375		348		1,247		514		12,484	
1983	17,277		283		1,112		199		18,871	
1984	5,559		499		973		524		7,555	
1985	7,716				850		87		8,653	
1986	3,914		183		306		505		4,908	
1987	2,735		199		72		507		3,513	
1988	2,746		182		219		655		3,802	
1989	1,476				333		39		1,848	
1990	2,821	11,441	167	375	708	3,862	115	1,614	3,811	17,292
1991	1,409	14,433	65	91	287	2,480	222	887	1,983	17,891
1992	2,532	18,303	8	8	401	2,941	131	1,573	3,072	22,825
1993	1,031	9,719	67	184	145	1,423	29	410	1,272	11,736
1994	1,574	13,305	9	36	377	3,437	65	167	2,025	16,945
1995	1,537	10,957	55	119	301	1,325	133	332	2,026	12,733
1996	963	17,189	24	269	615	4,346	560	2,297	2,162	24,101
1997	1,575	17,467	64	213	276	2,409	140	1,024	2,055	21,113
1998	2,105	16,195	25	261	1,061	4,477	272	1,016	3,463	21,949
1999	1,061	17,076		22	496	2,458	114	818	1,671	20,374
2000	1,903	20,469	24	232	355	2,209	228	1,444	2,510	24,354
2001	1,652	11,980	11	43	240	1,271	228	1,330	2,131	14,624
2002	662	11,419		203	452	2,765	44	993	1,158	15,380
2003	1,124	18,305			314	9,703	20	952	1,458	28,960
Avg. 1977-1989	9,689		581		1,071		660		11,912	
Avg. 1990-2003	1,568	14,876	47	158	431	3,222	164	1,061	2,200	19,306

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b).

[b] Catch first reported in SWHS during 1990.

Table 30.-Fish counted at the Anchor River weir, 1987-1995.

Year	Dates of operation	Dolly Varden	Coho Salmon	Pink Salmon	Chinook Salmon	Sockeye Salmon	Chum Salmon	Steelhead/ rainbow
1987	July 4 - Sept. 10	19,062	2,409	2,084	204	33	19	136
1988	July 3 - Oct. 5	14,935	2,805	777	245	30	24	878
1989	July 6 - Nov. 5	11,384	20,187	4,729	95	212	165	769
1990	July 4 - Aug. 15	10,427	190	355	144	39	17	3
1991	July 4 - Aug. 15	18,002	13	1,757	39	46	9	5
1992	July 4 - Oct. 1	10,051	4,596	992	129	174	39	1,261
1993	July 3 - Aug. 16	8,262	290	998	90	71	12	1
1994	July 3 - Aug. 16	17,259	420	723	111	61	2	1
1995	July 4 - Aug. 12	10,994	725	1,094	112	73	4	10

Source: Larson et al. 1988, Larson and Balland 1989, Larson 1990-1995, 1997.

Table 31.-Harvest and catch of steelhead trout in Lower Kenai Peninsula roadside streams, 1977 through 2003.

	Anchor River[a]		Stariski Creek[a]		Deep Creek[a]		Ninilchik River[a]		All	
Year	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch[b]	Harvest	Catch
1977	2,099		294		569		230		3,192	
1978	2,305		352		498		307		3,462	
1979	1,782		236		263		509		2,790	
1980	1,186		105		236		381		1,908	
1981	928		118		248		464		1,758	
1982	698		59		239		179		1,175	
1983	1,605		42		315		157		2,119	
1984	985		137		311		137		1,570	
1985	475		50		179		501		1,205	
1986	520		31		688		275		1,514	
1987	643		62		85		291		1,081	
1988	200		18		291		272		781	
1989	[c]	2,066		10		409		505		2,990
1990		1,978		104		1,291		177		3,550
1991		2,349		12		425		512		3,298
1992		2,720		70		740		1,008		4,538
1993		4,156		31		1,448		442		6,077
1994		4,035		75		1,156		804		6,070
1995		2,232		0		520		178		2,930
1996		7,570		47		1,079		522		9,218
1997		3,103		0		384		380		3,867
1998		3,878		71		1,350		576		5,875
1999		3,920		305		689		694		5,608
2000		8,693		329		1,805		760		11,587
2001		3,045		51		627		283		4,006
2002		3,501		203		954		468		5,126
2003		3,409		46		2,456		952		6,863
Average	1,119	3,777	125	90	327	1,022	309	551	1,880	5,440

[a] All harvest and catch data from Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b)

[b] Catch first estimated by SWHS during 1989. 1989 catch estimates from unpublished Statewide Harvest Survey data.

[c] Starting 1989, regulations were catch and release only.

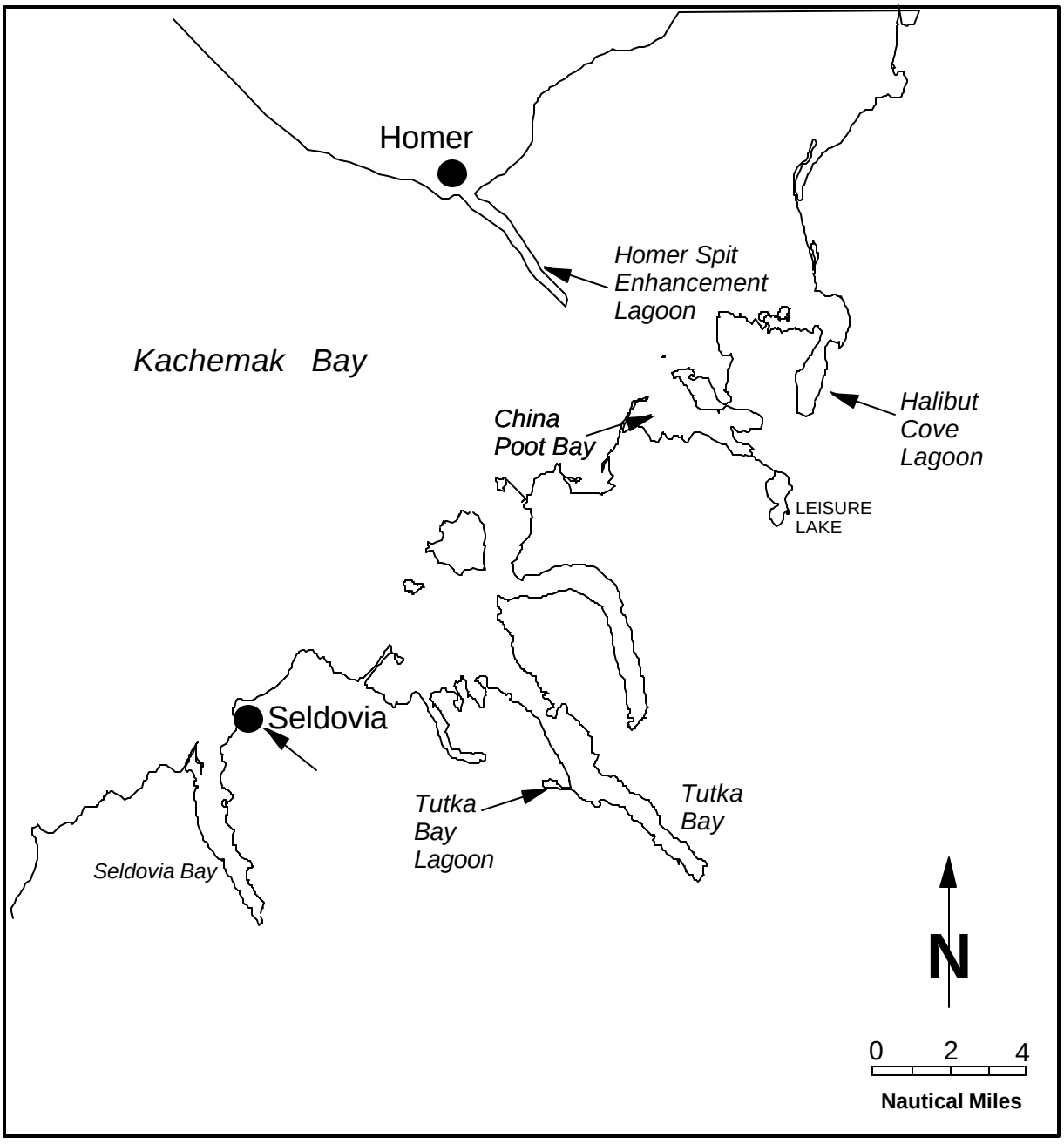


Figure 5.-Kachemak Bay enhanced fishery sites.

Table 32.-Salmon smolt releases to terminal fisheries in Kachemak Bay, 1974-2004.

Release Year	Homer Spit				Halibut Cove Lagoon	Seldovia
	Early-Run Chinook	Late-Run Chinook	Early-Run Coho	Late-Run Coho	Early-Run Chinook	Early-Run Chinook
1974					3,872	
1975					3,463	
1976					16,183	
1977					48,907	
1978					126,306	
1979					305,145	
1980					260,295	
1981					76,472	
1982						
1983					200,900	
1984	88,753				84,000	
1985	152,226				98,000	
1986	103,946				101,331	
1987	103,860				94,100	80,420
1988	219,572			62,550	93,874	111,435
1989	212,737			153,844	115,682	108,300
1990	210,087			122,945	112,458	98,525
1991	190,915			100,029	92,363	91,592
1992	227,125	126,130		100,570	117,850	112,935
1993	212,292	100,000		116,129	100,228	106,497
1994	163,963	156,873		156,213	98,872	107,246
1995	216,026	123,048		110,701	37,577	116,165
1996	204,085	108,204		149,685	97,729	118,274
1997	217,733	100,933		232,146	78,133	103,757
1998	177,730	112,100		130,219	65,893	69,461
1999	163,170	59,611		129,602	79,221	74,057
2000	219,984			122,338	83,277	68,114
2001	208,062		100,280	124,762	106,719	102,793
2002	190,026		95,648	120,707	106,279	83,045
2003	206,292		222,735 [a]	105,000 [b]	106,844	107,521
2004	168,644		130,243	110,000 [b]	103,771	88,682

[a] Includes 100,000 coho diverted from Bird Creek because of highway construction.

[b] Purchased from CIAA with private funding.

Table 33.-Shorebased harvest and angler participation directed toward enhanced Chinook, pink, and coho salmon stocks in the Homer Spit fishery, 1987-2003.

	Chinook Salmon Harvest[a]					Total	
Year	Early run	Late run[b]	Total	Pink Salmon Harvest[c]	Coho Salmon Harvest	Days Fished	Harvest
1987			833				833
1988			5,275	1,819		20,282	7,094
1989			1,956	3,856	1,439	16,758	7,251
1990			2,027	697	1,272	22,751	3,996
1991			1,634	647	3,822	11,495	6,103
1992			1,406	485	1,109	8,440	3,000
1993			4,997	1,836	5,823	28,290	12,656
1994			2,607		5,355	30,221	7,962
1995			4,266		5,367	36,451	9,633
1996	933	1,423	2,356		9,060	24,315	11,416
1997	1,512	1,450	2,962		6,091	23,197	9,053
1998	1,051	805	1,856		6,672	15,093	8,528
1999	1,753	688	2,441		3,890	19,448	6,331
2000	1,223	789	2,012		7,067	23,227	9,079
2001	1,371	1,164	2,535		11,015	18,516	13,550
2002	2,266	3,555	5,821		14,508	24,981	20,329
2003	3,775	284	4,059		18,531	28,380	22,590
Mean	1,444	1,411	2,812	1,557	5,892	21,564	8,551

Source: Statewide Harvest Survey (Mills 1979, 1980, 1981a, b, 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, *In prep* a, b)

[a] Early-run fish only prior to 1993 when 1-ocean late run fish were first available. Early and late run harvests estimated separately beginning in 1996.

[b] Stocking program discontinued in 2000; last return will occur in 2004.

[c] Stocking program discontinued; last return was in 1993.

Table 34.-Personal use/subsistence fishery catches for the Southern District of Cook Inlet, 1969-2004.

	Harvest[a]						
Year	Chinook Salmon	Sockeye Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Other	Total
1969	0	9	752	38	0	17	816
1970	0	12	1,179	143	13	39	1,386
1971	2	16	1,549	44	7	20	1,638
1972	1	11	975	48	69	19	1,123
1973	0	18	1,304	84	40	9	1,455
1974	0	16	376	43	77	27	539
1975	4	47	1,960	632	61	95	2,799
1976	16	46	1,962	1,513	56	75	3,668
1977	12	46	2,216	639	119	84	3,116
1978	4	35	2,482	595	34	89	3,239
1979	6	37	2,118	2,251	41	130	4,583
1980	43	32	3,491	1,021	25	153	4,765
1981	15	73	4,370	718	68	0	5,244
1982	41	49	7,398	956	154	0	8,598
1983	5	17	2,701	305	44	2	3,074
1984	3	25	3,639	804	105	27	4,603
1985	5	49	3,317	138	34	3	3,546
1986	7	68	3,831	3,132	56	0	7,094
1987	5	50	3,979	279	61	0	4,374
1988	14	73	5,007	1,445	75	0	6,614
1989	41	156	7,219	883	53	49	8,401
1990	12	200	8,323	1,846	69	0	10,450
1991	8	47	4,931	366	23	0	5,375
1992	5	63	2,292	643	21	0	3,024
1993	6	44	1,992	463	18	0	2,523
1994	66	80	4,097	1,178	18	0	5,439
1995	118	108	2,916	343	7	0	3,492
1996	302	102	3,347	1,022	24	0	4,797
1997	383	191	1,817	257	12	0	2,660
1998	135	20	1,461	167	5	0	1,788
1999	276	119	1,803	168	3	0	2,369
2000	104	28	2,064	304	4	0	2,504
2001	86	27	1,579	150	16	0	1,858
2002	61	33	1,521	251	12	0	1,878
2003	17	57	1,071	170	9	0	1,324
2004	7	56	1,554	172	16	0	1,805
Average	50	57	2,850	645	40	23	3,666

[a] After 1991 harvest estimates are based on both returned permits and oral reports.

Table 35.-Hatchery contribution to the personal use gillnet harvest from the east side of the Homer Spit during open fishing periods in 1999 and 2000.

	1999			2000		
Date	Total Examined	Number Hatchery Origin	Percent Hatchery	Total Examined	Number Hatchery Origin	Percent Hatchery
Period 1	147	102	70	385	318	83
Period 2	43	15	36	290	290	100
Period 3	139	136	98			
Period 4	170	149	87			
Total	499	402	81	675	608	90

Table 36.-Summary of Chinook salmon sport harvest and effort 1984-2001 and commercial harvest, Halibut Cove, 1984-2004.

Year	Sport Angler Effort (days fished)	Sport Harvest	Commercial Harvest	Total Return
1984		537	200	737
1985		[a]	300	300
1986		368	350	718
1987		905	500	1,405
1988		2,911	1,350	4,261
1989		1,380	1,420	2,800
1990		1,302	810	2,112
1991	5,889	1,064	420	1,484
1992	3,418	1,040	1,034	2,074
1993	4,728	1,727	1,200	2,927
1994	5,875	1,094	500	1,594
1995	2,798	794	785	1,579
1996	6,682	917	420	1,337
1997	6,018	632	392	1,024
1998	4,642	625	426	1,051
1999	4,325	990	825	1,815
2000	2,032	408	584	992
2001 [b]			325	
2002 [b]			889	
2003 [b]			667	
2004 [b]			883	
1984-2000 Average	3,666	1,043	658	1,659

Source: Sport harvest from the Statewide Harvest Survey (Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003).

[a] No data.

[b] Beginning in 2001 the Statewide Harvest Survey no longer solicited harvest from specific Kachemak Bay locations.

Table 37.-Summary of Chinook salmon sport harvest and effort, 1984-2000, and commercial and subsistence harvests, 1984-2004, in Seldovia Bay.

Year	Sport Angler Effort (days fished)	Sport Harvest	Commercial Harvest	Subsistence Harvest	Total Harvest
1984	100	[a]	52		52
1985	1,179	[a]	70		70
1986	1,804	[a]	27		27
1987	454	[a]	7		7
1988	1,292	36	40		76
1989	1,408	150	182		332
1990	2,011	184	370		554
1991	2,509	88	350		438
1992	1,665	156	301		457
1993	1,445	283	419		702
1994	2,530	284	407		691
1995	1,504	448	770		1,218
1996	2,677	319	322	51	692
1997	3,061	406	476	44	926
1998	1,959	103	325	132	560
1999	1,981	207	287	150	644
2000	4,516	608	241	189	1,038
2001 [b]			161	134	
2002 [b]			216	123	
2003 [b]			99	67	
2004 [b]			244	87	
1984-2000 Average	1,888	252	273	113	499

Source: Statewide Harvest Survey (Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003).

[a] No data.

[b] Beginning in 2001 the Statewide Harvest Survey no longer solicited harvest from specific Kachemak Bay locations.

Table 38.-Summary of participation and Chinook and sockeye salmon harvests in the spring subsistence fishery, Seldovia Bay, 1996-2004.

Year	Permits Issued	Permits Fished	Chinook Harvest (numbers)	Sockeye Harvest (numbers)
1996	41	13	51	7
1997	19	12	44	19
1998	20	10	132	61
1999	16	12	150	130
2000	28	17	186	249
2001	19	14	134	124
2002	20	12	123	222
2003	19	10	67	210
2004	13	19	87	56

APPENDIX A: NINILCHIK RIVER CHINOOK SALMON STOCKING RECORDS

Appendix A1.-Numbers of Chinook salmon smolt stocked in the Ninilchik River, 1988-2004.

Release Year	Brood Source/ Eggtake location	Rearing Facility	Number Released	Percent Marked	Weight (grams)
1988	Ninilchik/Ninilchik	Ft. Richardson	247,327	12	
1989	Ninilchik/Ninilchik	Ft. Richardson	199,831	9	
1990	Ninilchik/Ninilchik	Ft. Richardson	215,804	19	
1991	Ninilchik/Ninilchik	Ft. Richardson	87,992	24	
1992	Ninilchik/Ninilchik	Ft. Richardson	132,387	31	
1993	Ninilchik/Ninilchik	Ft. Richardson	184,585	23	
1994	Ninilchik/Ninilchik	Ft. Richardson	201,513	23	
1995 [a]	Ninilchik/Ninilchik	Ft. Richardson	54,662	99	
1996 [a]	Ninilchik/Ninilchik	Ft. Richardson	51,688	98	
1997 [b]	Ninilchik/Ninilchik	Ft. Richardson	50,698	99	
1998 [b]	Ninilchik/Ninilchik	Ft. Richardson	48,798	97	11.4
1999 [b]	Ninilchik/Ninilchik	Ft. Richardson	49,853	98	13.6
2000 [b]	Ninilchik/Ninilchik	Ft. Richardson	51,298	98	10.2
2001 [b]	Ninilchik/Ninilchik	Ft. Richardson	54,770	99	13.6
2002 [b]	Ninilchik/Ninilchik	Ft. Richardson	54,631	99	12.1
2003 [b]	Ninilchik/Ninilchik	Ft. Richardson	47,997	92	12.6
2004 [b]	Ninilchik/Ninilchik	Ft. Richardson	51,303	100	11.3

[a] Smolt held in Ninilchik harbor prior to release there.

[b] Smolt released in fresh water.

APPENDIX B: EMERGENCY ORDERS

Appendix B1.-Emergency orders issued for LCIMA waters during 1996-2004.

Emergency Orders issued in 1996:

1. E.O. No. 2-SHR-1-08-96 closed the recreational shrimp fishery in Kachemak Bay east of a line from Anchor Point to Point Pogibshi. Effective April 15 through December 31, 1996.
2. E.O. No. 2-KS-1-20-96 extended the Chinook salmon fishery on the Ninilchik River on a continual basis between Saturday, June 15 through Monday, June 24. Effective June 15, 12:01 a.m. through Monday June 24, 1996.
3. E.O. No. 2-SS-1-41-96 opened the Homer spit lagoon to snagging for Chinook salmon and coho salmon. Effective September 8 through December 31, 1996.

Emergency Orders issued in 1997:

1. E.O. No. 2-SHR-7-01-97 closed sport fishing for shrimp in all of Kachemak Bay east of a line from Anchor Point to Point Pogibshi. Effective January 1 through December 31, 1997.
2. E.O. No. 2-PU-H-02-96 closed the personal use fishery for shrimp in waters of Kachemak Bay east of a line from Anchor Point to Point Pogibshi. Effective January 1 through December 31, 1997.
3. E.O. No. 2-KS-7-21-97 opened snagging at the Homer Lagoon. Effective 12:00 p.m. July 2 through July 7, 1997.
4. E.O. No. 2-PS-7-32-97 increased the bag limit for pink salmon to 12 per day in the marine waters of Tutka Bay. Effective August 9 through September 21, 1997.
5. E.O. No. 2-SS-7-35-97 closed the Fox Creek Personal Use dip net fishery.
6. E.O. No. 2-SS-7-36-97 increased the daily bag and possession limit for salmon other than Chinook salmon, including silver salmon 16 inches or more in length from one to three in Ninilchik River, Deep Creek, Stariski Creek and the Anchor River. Effective August 29 through October 15, 1997.
7. E.O. No. 2-SS-7-41-97 opened the Homer Lagoon to snagging. Effective August 7 through December 31, 1997.

Emergency Orders issued in 1998:

1. E.O. No. 2-DC-7-05-98 closed the Dungeness crab sport fishery in Lower Cook Inlet east of a line extending from Anchor Point to Point Bede. Effective May 29 until further notice.
2. E.O. No. 2-DC-7-06-98 closed the personal use fishery for Dungeness crab in Lower Cook Inlet east from a line extending from Anchor Point to Point Bede. Effective May 29 until further notice.

3. E.O. No. 2-KS-7-13-98 opened the Homer Spit and enhancement lagoon to snagging. Effective July 1 through July 7, 1998.
4. E.O. No. 2-RS-7-24-98 closed the Ninilchik Traditional Council Educational Fishery. Effective July 28 through August 10, 1998.
5. E.O. No. 2-RS-1-27-98 rescinded E.O. No. 2-RS-7-24-98 and restored the Ninilchik Traditional Council Educational fishery to the regular fishing times. Effective August 3 through October 1, 1998.
6. E.O. No. 2-PU-7-29-98 closed the personal use dip net fishery in Fox Creek. Effective August 22 through December 31, 1998.
7. E.O. No. 2-SS-7-32-98 opened snagging on the Homer Spit. Effective 12:00 p.m. September 18 through December 31, 1998.

Emergency Orders issued in 1999:

1. E.O. No. 2-KS-7-08-99 opened the Homer Spit fishing lagoon to snagging. Effective 12:00 p.m. June 30 through July 4, 1999.
2. E.O. No. 2-RS-7-19-99 opened China Poot Creek to sockeye dipnetting. Effective 12:00 p.m. August 11 through 12:00 p.m. August 20, 1999.
3. E.O. No. 2-SS-7-24-99 opened Homer Spit and enhancement lagoon to snagging. Effective 12:00 p.m. September 24 through December 31, 1999.

Emergency Orders issued in 2000:

1. E.O. No. 2-KS-7-08-00 opened snagging on the Homer Spit and enhancement lagoon. Effective June 24 through July 2, 2000.
2. E.O. No. 2-SS-7-22-00 opened the Homer Spit and lagoon to snagging. Effective 12:00 p.m. September 22 through December 31, 2000.

Emergency Orders issued in 2001:

1. E.O. No. 2-RS-7-02-01 closed all waters of the English Bay River drainage and Port Graham Subdistrict to sockeye salmon sport fishing from June 1, 2001 12:01 a.m. until August 31.
2. E.O. No. 2-KS-7-05-01 opened Deep Creek downstream of the regulatory marker for an additional 3-day weekend, June 16, 2001, 12:01 a.m. to June 18, 2001, 11:59 p.m.
3. E.O. No. 2-KS-7-05-02 opened the Ninilchik River downstream of the regulatory marker for an additional 3-day weekend, June 16, 2001, 12:01 a.m. to June 18, 2001, 11:59 p.m.
4. E.O. No. 2-KS-7-10-01 opened the Homer Spit Enhancement Lagoon area to snagging from noon, Friday, June 29, 2001, until 11:59 p.m., Sunday, July 8, 2001.

5. E.O. No. 2-KS-7-11-01 prohibited the use of weighted hooks or weights following hooks in the Homer Spit Enhancement Lagoon area from Monday, July 9, 2001 until superceded by emergency order.
6. E.O. No. 2-TC-7-19-01 reduced the personal use daily bag and possession limit from 20 male crab to five and the pot limit from five to one per person and two per boat.
7. E.O. No. 2-TC-7-18-01 reduced the sport fishery daily bag and possession limit from 20 male crab to five and the pot limit from five to one per person and two per boat.
8. E.O. No. 2-SS-7-22-01 opened the Homer Spit Enhancement Lagoon area to snagging from noon, Sunday September 16, 2001 through 11:59 p.m., Monday, December 31, 2001.

Emergency Orders issued in 2002:

1. E.O. No. 2-KS-7-08-02 opened the Ninilchik River from its mouth to the downstream edge of the Sterling Highway Bridge, from Saturday, June 15, 12:01 a.m. to Monday, June 17, 11:59 p.m., 2002, to sport fishing for hatchery king salmon only. The daily bag and possession limit was 1 fish 20 inches or greater in length or 10 fish under 20 inches. Only unbaited artificial lures were permitted.
2. E.O. No. 2-KS-7-16-02 opened the Homer Spit Enhancement Lagoon area to snagging for king salmon from noon, Friday, June 28, 2002 until 11:59 p.m., Sunday, July 7, 2002.
3. E.O. No. 2-TC-7-19-02 reduced sport Tanner crab bag and possession limits from 20 per person to 5 per person, effective July 19, 2002. The number of pots used to harvest Tanner crab was reduced to two per person and a maximum of two per vessel.
4. E.O. No. 2-TC-7-20-02 reduced personal Tanner crab bag and possession limits from 20 per person to 5 per person effective July 19, 2002. The number of pots used to harvest Tanner crab was reduced to two per person and a maximum of two per vessel.
5. E.O. No. 2-SS-7-16-02 opened the Homer Spit Enhancement Lagoon area to snagging for silver salmon from noon, Friday, September 13, 2002 through 11:59 p.m. Tuesday, December 31, 2002.

Emergency Orders issued in 2003:

1. E.O. No. 2-KS-7-03-03 opened the Ninilchik River from its mouth to the downstream edge of the Sterling Highway Bridge, from Saturday, June 14, 2003, 12:01 a.m., to Monday, June 30, 2003, 11:59 p.m. to sport fishing for hatchery king salmon only. The daily bag and possession limit was 1 fish 20 inches or greater in length and 10 fish under 20 inches. Use of only one single hook was allowed.
2. E.O. No. 2-KS-7-09-03 opened the Homer Spit Enhancement Lagoon area to snagging from noon, Wednesday, June 25, 2003 until 11:59 p.m., Sunday, July 6, 2003.
3. E.O. No. 2-SS-7-24-03 opened the Homer Spit Enhancement Lagoon area at noon, Wednesday, September 17, 2003 until 11:59 p.m., Wednesday, December 31, 2003.

Emergency Orders issued in 2004:

1. E.O. No. 2-KS-7-03-04 opened the Ninilchik River from its mouth upstream to the regulatory marker located approximately 2 miles upstream, to fishing for hatchery king salmon 7 days per week. Bait was allowed. Only one, single hook could be used. A person could not possess a king salmon that had been filleted, headed, mutilated or otherwise disfigured in a manner that prevented identification of hatchery or wild origin until permanently transported away from the fishing site if the fish was taken from the riverbank. "Fishing site" meant the riverbank where the fish was hooked and removed from the water. The emergency order was effective 12:01 a.m., Saturday, May 29, 2004 until 11:59 p.m. December 31, 2004.
2. E.O. No. 2-KS-7-07-04 opened the Anchor River to fishing at 12:00 a.m., Saturday, June 26, 2004, through 11:59 p.m. June 28, 2004 from its mouth upstream approximately 2 miles to the Department marker located approximately 600 feet downstream of the confluence of the North and South forks of the Anchor River.
3. E.O. No. 2-KS-7-12-04 opened the Homer Spit to snagging king salmon, 12:01 p.m., Thursday, July 1, 2004 through 11:59 p.m., Monday July 5, 2004.
4. E.O. No. 2-KS-7-15-04 12:01 a.m., Friday, July 16, 2004, rescinded Emergency Order 2-KS-7-03-04 which opened the Ninilchik River to fishing for hatchery king salmon 7 days per week.
5. E.O. No. 2-SS-7-24-04 opened the Homer Spit to snagging silver salmon noon, Friday, September 10 through 11:59 p.m., Friday, December 31, 2004.

APPENDIX C: WEIR COUNTS

Appendix C1.-Daily and cumulative count of wild and hatchery-reared Chinook salmon through the Ninilchik River weir, 1999-2004.

	1999						2000						2001					
	Wild		AFC		Total		Wild		AFC		Total		Wild		AFC		Total	
	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %
17-May	0	0	0	0	0	0	0	0	0	0	0	0						
18-May	0	0	0	0	0	0	0	0	0	0	0	0						
19-May	0	0	0	0	0	0	0	0	0	0	0	0						
20-May	0	0	0	0	0	0	1	0	0	0	1	0						
21-May	0	0	0	0	0	0	0	0	0	0	0	0						
22-May	0	0	0	0	0	0	0	0	0	0	0	0						
23-May	0	0	0	0	0	0	1	0	0	0	1	0						
24-May	0	0	0	0	0	0	1	0	0	0	1	0						
25-May	0	0	0	0	0	0	0	0	0	0	0	0						
26-May	0	0	0	0	0	0	0	0	0	0	0	0						
27-May	0	0	0	0	0	0	0	0	0	0	0	0						
28-May	0	0	0	0	0	0	2	0	0	0	2	0						
29-May	0	0	0	0	0	0	15	1	0	0	15	1						
30-May	0	0	0	0	0	0	2	1	0	0	2	1						
31-May	6	0	0	0	6	0	0	1	1	0	1	1	0	0	0	0	0	0
1-Jun	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
2-Jun	0	0	0	0	0	0	2	1	0	0	2	1	0	0	0	0	0	0
3-Jun	2	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0
4-Jun	10	1	0	0	10	1	15	2	1	0	16	2	0	0	0	0	0	0
5-Jun	17	2	0	0	17	2	14	3	0	0	14	2	0	0	0	0	0	0
6-Jun	30	4	0	0	30	3	10	4	0	0	10	3	0	0	0	0	0	0
7-Jun	9	5	0	0	9	3	5	4	0	0	5	3	0	0	0	0	0	0
8-Jun	3	5	0	0	3	3	0	4	0	0	0	3	0	0	0	0	0	0
9-Jun	0	5	0	0	0	3	2	4	0	0	2	3	0	0	0	0	0	0
10-Jun	1	5	0	0	1	4	0	4	0	0	0	3	0	0	0	0	0	0
11-Jun	3	5	0	0	3	4	0	4	0	0	0	3	0	0	0	0	0	0
12-Jun	0	5	0	0	0	4	0	4	0	0	0	3	0	0	0	0	0	0
13-Jun	0	5	0	0	0	4	0	4	0	0	0	3	0	0	0	0	0	0
14-Jun	0	5	0	0	0	4	0	4	0	0	0	3	2	0	0	0	2	0
15-Jun	0	5	0	0	0	4	0	4	0	0	0	3	22	2	4	1	26	1
16-Jun	1	5	0	0	1	4	0	4	0	0	0	3	27	4	3	1	30	3
17-Jun	0	5	0	0	0	4	0	4	0	0	0	3	11	4	3	1	14	3
18-Jun	0	5	0	0	0	4	0	4	0	0	0	3	14	5	1	2	15	4
19-Jun	1	5	0	0	1	4	0	4	0	0	0	3	2	6	1	2	3	4
20-Jun	0	5	0	0	0	4	0	4	0	0	0	3	7	6	2	2	9	5
21-Jun	0	5	0	0	0	4	0	4	0	0	0	3	14	7	1	2	15	5
22-Jun	0	5	0	0	0	4	0	4	1	0	1	3	4	7	0	2	4	6
23-Jun	3	5	0	0	3	4	8	5	0	0	8	3	24	9	1	2	25	7
24-Jun	5	6	0	0	5	4	4	5	0	0	4	3	28	11	1	3	29	8
25-Jun	3	6	0	0	3	4	8	6	0	0	8	4	27	13	2	3	29	10
26-Jun	4	6	0	0	4	4	8	6	0	0	8	4	25	15	1	3	26	11
27-Jun	3	6	0	0	3	5	18	7	2	1	20	5	50	18	4	4	54	13
28-Jun	18	7	0	0	18	5	36	9	2	1	38	6	17	19	3	4	20	14
29-Jun	16	8	1	0	17	6	52	12	2	1	54	9	18	21	1	4	19	15
30-Jun	14	9	0	0	14	7	30	14	3	1	33	10	15	22	3	5	18	16

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	1999						2000						2001					
	Wild		AFC		Total		Wild		AFC		Total		Wild		AFC		Total	
	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %
1-Jul	51	12	4	1	55	9	6	15	0	1	6	10	9	22	3	5	12	17
2-Jul	15	13	1	1	16	10	9	15	0	1	9	10	6	23	2	5	8	17
3-Jul	14	14	0	1	14	11	20	16	1	2	21	11	1	23	1	6	2	17
4-Jul	122	22	12	3	134	17	19	18	3	2	22	12	5	23	1	6	6	18
5-Jul	136	30	6	4	142	23	95	23	14	4	109	17	45	26	4	6	49	20
6-Jul	52	33	0	4	52	25	111	30	18	6	129	22	73	32	2	7	75	23
7-Jul	45	36	1	4	46	27	13	31	4	6	17	22	83	37	12	8	95	28
8-Jul	19	37	1	4	20	28	2	31	0	6	2	23	23	39	11	10	34	30
9-Jul	40	40	4	5	44	30	0	31	1	6	1	23	24	41	3	10	27	31
10-Jul	37	42	4	6	41	32	14	32	3	7	17	23	4	41	12	12	16	32
11-Jul	30	44	2	6	32	34	60	36	3	7	63	26	49	44	7	13	56	34
12-Jul	38	46	7	7	45	36	234	50	44	12	278	37	70	49	23	17	93	39
13-Jul	59	50	6	8	65	39	126	58	41	17	167	44	112	57	34	22	146	46
14-Jul	20	51	3	9	23	40	2	58	0	17	2	44	33	60	4	22	37	48
15-Jul	117	59	12	11	129	45	0	58	0	17	0	44	80	65	32	27	112	53
16-Jul	49	62	10	12	59	48	1	58	1	17	2	44	72	70	31	32	103	58
17-Jul	25	63	7	13	32	50	67	62	24	20	91	48	67	75	33	37	100	63
18-Jul	16	64	9	15	25	51	66	66	54	26	120	52	40	78	28	41	68	66
19-Jul	102	70	39	21	141	57	76	71	66	34	142	58	25	80	10	42	35	68
20-Jul	85	76	33	27	118	62	6	71	4	34	10	58	62	84	48	49	110	73
21-Jul	45	78	29	32	74	66	28	73	16	36	44	60	24	86	53	57	77	77
22-Jul	25	80	24	36	49	68	54	76	49	42	103	64	9	86	10	59	19	78
23-Jul	22	81	21	39	43	70	33	78	32	46	65	67	0	86	0	59	0	78
24-Jul	70	86	66	50	136	76	65	82	88	56	153	73	22	88	24	62	46	80
25-Jul	66	90	61	60	127	82	72	86	86	66	158	79	93	95	115	79	208	90
26-Jul	40	92	48	68	88	86	72	91	72	75	144	85	28	97	58	88	86	94
27-Jul	18	93	29	73	47	88	36	93	67	82	103	89	13	98	23	92	36	96
28-Jul	16	94	20	76	36	89	28	95	40	87	68	92	5	98	7	93	12	96
29-Jul	12	95	17	79	29	91	34	97	31	91	65	95	6	98	8	94	14	97
30-Jul	22	97	33	85	55	93	4	97	20	93	24	96	1	98	4	94	5	97
31-Jul	9	97	11	86	20	94	8	98	4	94	12	96	3	99	3	95	6	97
1-Aug	3	97	6	87	9	95	10	98	17	96	27	97	3	99	4	95	7	98
2-Aug	12	98	10	89	22	96	5	99	9	97	14	98	5	99	6	96	11	98
3-Aug	7	98	12	91	19	96	17	100	18	99	35	99	5	100	6	97	11	99
4-Aug	10	99	11	93	21	97	5	100	7	100	12	100	1	100	4	98	5	99
5-Aug	1	99	15	95	16	98	1	100	1	100	2	100	6	100	15	100	21	100
6-Aug	10	100	18	98	28	99	1	100	2	100	3	100						
7-Aug	1	100	1	99	2	99	0	100	0	100	0	100						
8-Aug	0	100	0	99	0	99	0	100	1	100	1	100						
9-Aug	0	100	0	99	0	99												
10-Aug	0	100	0	99	0	99												
11-Aug	3	100	9	100	12	100												
12-Aug	0	100	0	100	0	100												
13-Aug	0	100	0	100	0	100												
TOTAL	1,613		603		2,216		1,635		853		2,487		1,414		672		2,086	

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	2002						2003						2004					
	Wild		AFC		Total		Wild		AFC		Total		Wild		AFC		Total	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
Date		%		%		%		%		%		%		%		%		%
17-May							1		0	0	1	0						
18-May		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-May		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-May		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-May		0		0	0	0	2	0	1	0	3	0	0	0	0	0	0	0
22-May	0	0		0	0	0	1	0	1	0	2	0	0	0	0	0	0	0
23-May	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0
24-May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-May	0	0	0	0	0	0	57	5	9	3	66	4	0	0	0	0	0	0
26-May	0	0	0	0	0	0	0	5	0	3	0	4	0	0	0	0	0	0
27-May	0	0	0	0	0	0	0	5	0	3	0	4	0	0	0	0	0	0
28-May	0	0	0	0	0	0	0	5	0	3	0	4	0	0	0	0	0	0
29-May	0	0	0	0	0	0	0	5	0	3	0	4	0	0	0	0	0	0
30-May	0	0	0	0	0	0	3	5	0	3	3	4	4	0	1	0	5	0
31-May	0	0	0	0	0	0	10	6	0	3	10	5	39	3	5	1	44	2
1-Jun	0	0	0	0	0	0	13	7	0	3	13	6	2	3	0	1	2	3
2-Jun	0	0	0	0	0	0	14	8	0	3	14	7	2	3	0	1	2	3
3-Jun	0	0	0	0	0	0	2	8	1	3	3	7	7	4	0	1	7	3
4-Jun	0	0	0	0	0	0	19	10	1	3	20	8	8	4	2	1	10	3
5-Jun	0	0	0	0	0	0	5	10	1	3	6	8	11	5	1	2	12	4
6-Jun	0	0	0	0	0	0	0	10	1	4	1	8	10	6	3	2	13	5
7-Jun	0	0	0	0	0	0	55	14	7	5	62	12	18	7	2	3	20	6
8-Jun	0	0	0	0	0	0	7	15	0	5	7	13	0	7	0	3	0	6
9-Jun	3	0	0	0	3	0	6	16	1	5	7	13	0	7	0	3	0	6
10-Jun	0	0	0	0	0	0	15	17	4	6	19	14	1	7	0	3	1	6
11-Jun	23	2	5	1	28	1	6	17	0	6	6	14	2	7	0	3	2	6
12-Jun	27	3	3	1	30	3	23	19	3	7	26	16	4	7	0	3	4	6
13-Jun	10	4	2	2	12	4	46	23	5	8	51	19	4	7	0	3	4	6
14-Jun	7	5	0	2	7	4	48	26	8	10	56	22	19	9	3	3	22	7
15-Jun	14	6	3	2	17	5	14	28	6	12	20	24	2	9	0	3	2	7
16-Jun	7	6	0	2	7	5	4	28	2	12	6	24	2	9	0	3	2	7
17-Jun	3	6	2	3	5	5	11	29	0	12	11	25	7	9	1	3	8	8
18-Jun	0	6	0	3	0	5	0	29	0	12	0	25	23	11	3	4	26	9
19-Jun	16	7	6	4	22	6	2	29	0	12	2	25	3	11	0	4	3	9
20-Jun	8	8	2	4	10	7	6	29	0	12	6	25	37	14	2	4	39	11
21-Jun	0	8	0	4	0	7	5	30	2	12	7	25	115	21	4	5	119	17
22-Jun	6	8	1	4	7	7	10	31	0	12	10	26	56	25	2	5	58	20
23-Jun	4	8	0	4	4	7	8	31	8	14	16	27	64	29	11	7	75	23
24-Jun	14	9	1	4	15	8	0	31	0	14	0	27	41	32	3	8	44	26
25-Jun	13	10	2	5	15	9	2	31	0	14	2	27	51	35	8	10	59	28
26-Jun	28	12	3	5	31	10	27	34	1	15	28	29	20	36	4	10	24	30
27-Jun	5	12	3	6	8	11	27	36	3	15	30	31	32	38	0	10	32	31
28-Jun	13	13	1	6	14	11	19	37	3	16	22	32	21	40	4	11	25	32
29-Jun	52	17	2	6	54	14	12	38	0	16	12	33	1	40	2	11	3	32
30-Jun	49	20	4	7	53	16	0	38	0	16	0	33	43	43	17	15	60	35

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	2002						2003						2004					
	Wild		AFC		Total		Wild		AFC		Total		Wild		AFC		Total	
	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %	Daily	Cum. %
1-Jul	33	22	8	9	41	18	19	40	3	17	22	34	13	44	1	15	14	36
2-Jul	35	24	11	11	46	21	57	44	2	17	59	37	24	45	8	16	32	38
3-Jul	46	27	13	13	59	24	37	47	7	19	44	40	20	46	10	18	30	39
4-Jul	41	30	14	15	55	26	50	51	23	24	73	44	101	53	21	22	122	45
5-Jul	44	33	18	19	62	29	26	53	17	28	43	47	65	57	33	28	98	50
6-Jul	25	35	6	20	31	31	19	55	13	31	32	49	12	58	7	29	19	51
7-Jul	21	36	8	21	29	32	8	55	1	32	9	49	12	59	4	30	16	51
8-Jul	14	37	3	22	17	33	7	56	4	32	11	50	41	62	9	32	50	54
9-Jul	18	38	4	22	22	34	17	57	7	34	24	51	33	64	7	33	40	56
10-Jul	38	41	12	25	50	36	16	59	4	35	20	53	20	65	5	34	25	57
11-Jul	15	42	13	27	28	38	28	61	10	37	38	55	6	65	3	35	9	57
12-Jul	20	43	10	29	30	39	4	61	7	39	11	55	30	67	7	36	37	59
13-Jul	37	45	8	30	45	41	20	63	12	42	32	57	22	69	11	38	33	61
14-Jul	17	47	5	31	22	42	21	64	14	45	35	59	17	70	4	39	21	62
15-Jul	11	47	0	31	11	43	44	68	14	48	58	63	16	71	4	40	20	63
16-Jul	21	49	6	32	27	44	38	71	8	50	46	66	20	72	4	40	24	64
17-Jul	44	52	9	34	53	47	12	72	4	51	16	67	21	74	7	42	28	65
18-Jul	60	56	11	36	71	50	26	74	11	54	37	69	43	77	13	44	56	68
19-Jul	72	60	16	38	88	54	24	76	7	56	31	71	36	79	12	46	48	70
20-Jul	36	63	6	40	42	56	45	79	16	59	61	74	23	80	13	49	36	72
21-Jul	35	65	5	40	40	58	46	83	13	62	59	78	23	82	13	51	36	74
22-Jul	49	68	11	42	60	61	7	84	6	64	13	79	22	83	9	53	31	75
23-Jul	51	72	11	44	62	64	22	85	10	66	32	80	9	84	8	54	17	76
24-Jul	117	79	39	51	156	72	16	87	3	67	19	82	34	86	29	60	63	79
25-Jul	85	85	42	59	127	78	24	88	5	68	29	83	29	88	21	64	50	82
26-Jul	0	85	0	59	0	78	11	89	2	68	13	84	24	90	15	66	39	84
27-Jul	42	88	27	64	69	81	10	90	2	69	12	85	32	92	31	72	63	87
28-Jul	35	90	27	69	62	84	3	90	2	69	5	85	24	93	14	75	38	89
29-Jul	32	92	28	74	60	87	12	91	15	73	27	87	11	94	26	80	37	90
30-Jul	18	93	30	79	48	89	37	94	29	80	66	91	45	97	49	89	94	95
31-Jul	29	95	21	83	50	92	18	96	27	86	45	93	20	98	20	93	40	97
1-Aug	10	96	12	85	22	93	12	97	16	90	28	95	8	99	7	94	15	98
2-Aug	12	97	13	87	25	94	10	97	6	91	16	96	9	99	12	96	21	99
3-Aug	6	97	10	89	16	95	12	98	14	95	26	97	4	100	8	98	12	99
4-Aug	10	98	7	90	17	96	11	99	10	97	21	99	4	100	10	99	14	100
5-Aug	12	98	15	93	27	97	9	100	13	100	22	100	1	100	3	100	4	100
6-Aug	8	99	7	94	15	98												
7-Aug	3	99	12	96	15	98												
8-Aug	4	99	6	97	10	99												
9-Aug	1	100	1	97	2	99												
10-Aug	3	100	6	99	9	99												
11-Aug	4	100	8	100	12	100												
12-Aug																		
13-Aug																		
TOTAL	1,516		559		2,075		1,258		425		1,683		1,525		536		2,061	

Appendix C2.-Daily and cumulative DIDSON counts of Chinook salmon, Anchor River, May 30 through July 9, 2003.

Date		Daily Count [a]	Cumulative Count	Cumulative Percent
30-May		163	163	2
31-May		339	502	6
1-Jun		902	1,404	16
2-Jun		342	1,746	20
3-Jun		456	2,202	25
4-Jun		375	2,577	30
5-Jun		528	3,105	36
6-Jun		385	3,490	40
7-Jun		224	3,714	43
8-Jun		460	4,174	48
9-Jun		323	4,497	52
10-Jun		584	5,081	59
11-Jun		150	5,231	60
12-Jun		121	5,352	62
13-Jun		181	5,533	64
14-Jun		478	6,011	69
15-Jun		265	6,276	72
16-Jun		213	6,489	75
17-Jun		166	6,655	77
18-Jun	[b]	57	6,712	77
19-Jun	[b]	69	6,781	78
20-Jun	[b]	61	6,842	79
21-Jun	[b]	130	6,972	80
22-Jun	[b]	108	7,080	82
23-Jun	[b]	150	7,230	83
24-Jun	[b]	111	7,341	85
25-Jun	[b]	93	7,434	86
26-Jun	[b]	63	7,497	86
27-Jun	[b]	47	7,544	87
28-Jun	[b]	42	7,586	87
29-Jun	[b]	12	7,598	88
30-Jun	[b]	113	7,711	89
1-Jul	[b]	176	7,887	91
2-Jul	[b]	453	8,340	96
3-Jul	[b]	120	8,460	97
4-Jul	[b]	11	8,471	98
5-Jul	[b]	48	8,519	98
6-Jul	[b]	3	8,522	98
7-Jul	[b]	13	8,535	98
8-Jul	[b]	44	8,579	99
9-Jul	[b]	99	8,678	100
Total		8,678		

[a] Based on hourly counts of DIDSON sonar files, and a partial weir.

[b] Files were recounted. Only fish greater than 675 mm were counted as Chinook salmon. This was to preclude the chance of Dolly Varden or pink salmon being counted as Chinook salmon.

Appendix C3.-Anchor River mainstem escapement, May 15-September 14, 2004.

	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
5/15	69	69	1	0	0	0	0	0	0	0	0	0
5/16	45	114	1	0	0	0	0	0	0	0	0	0
5/17	66	180	2	0	0	0	0	0	0	0	0	0
5/18	173	353	3	0	0	0	0	0	0	0	0	0
5/19	85	438	4	0	0	0	0	0	0	0	0	0
5/20	258	696	6	0	0	0	0	0	0	0	0	0
5/21	345	1,041	9	0	0	0	0	0	0	0	0	0
5/22	303	1,344	11	0	0	0	0	0	0	0	0	0
5/23	396	1,740	15	0	0	0	0	0	0	0	0	0
5/24	201	1,941	16	0	0	0	0	0	0	0	0	0
5/25	201	2,142	18	0	0	0	0	0	0	0	0	0
5/26	300	2,442	21	0	0	0	0	0	0	0	0	0
5/27	225	2,667	22	0	0	0	0	0	0	0	0	0
5/28	306	2,973	25	0	0	0	0	0	0	0	0	0
5/29	351	3,324	28	0	0	0	0	0	0	0	0	0
5/30	213	3,537	30	0	0	0	0	0	0	0	0	0
5/31	285	3,822	32	0	0	0	0	0	0	0	0	0
6/1	453	4,275	36	0	0	0	0	0	0	0	0	0
6/2	461	4,736	40	0	0	0	0	0	0	0	0	0
6/3	492	5,228	44	0	0	0	0	0	0	0	0	0
6/4	228	5,456	46	0	0	0	0	0	0	0	0	0
6/5	189	5,645	47	0	0	0	0	0	0	0	0	0
6/6	465	6,110	51	0	0	0	0	0	0	0	0	0
6/7	369	6,479	55	0	0	0	0	0	0	0	0	0
6/8	567	7,046	59	0	0	0	0	0	0	0	0	0
6/9	497	7,543	63	0	0	0	0	0	0	0	0	0
6/10	251	7,794	66	0	0	0	0	0	0	0	0	0
6/11	428	8,222	69	0	0	0	1	1	0	0	0	0
6/12	563	8,785	74	0	0	0	7	8	0	0	0	0
6/13	178	8,963	75	0	0	0	2	10	0	0	0	0
6/14	201	9,164	77	0	0	0	5	15	0	0	0	0
6/15	140	9,304	78	0	0	0	1	16	0	0	0	0

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	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
6/16	273	9,577	81	0	0	0	5	21	0	0	0	0
6/17	251	9,828	83	0	0	0	1	22	0	0	0	0
6/18	275	10,103	85	0	0	0	0	22	0	0	0	0
6/19	80	10,183	86	0	0	0	10	32	0	0	0	0
6/20	81	10,264	86	0	0	0	5	37	0	0	0	0
6/21	75	10,339	87	0	0	0	5	42	1	0	0	0
6/22	106	10,445	88	0	0	0	9	51	1	0	0	0
6/23	38	10,483	88	0	0	0	6	57	1	0	0	0
6/24	42	10,525	89	0	0	0	5	62	1	0	0	0
6/25	61	10,586	89	0	0	0	4	66	1	0	0	0
6/26	63	10,649	90	0	0	0	2	68	1	0	0	0
6/27	77	10,726	90	0	0	0	8	76	1	0	0	0
6/28	46	10,772	91	0	0	0	12	88	1	0	0	0
6/29	31	10,803	91	0	0	0	38	126	2	0	0	0
6/30	34	10,837	91	0	0	0	18	144	2	0	0	0
7/1	20	10,857	91	0	0	0	28	172	2	0	0	0
7/2	73	10,930	92	0	0	0	131	303	4	0	0	0
7/3	31	10,961	92	0	0	0	34	337	4	0	0	0
7/4	63	11,024	93	0	0	0	11	348	4	0	0	0
7/5	52	11,076	93	0	0	0	32	380	5	0	0	0
7/6	45	11,121	94	0	0	0	68	448	6	0	0	0
7/7	10	11,131	94	0	0	0	87	535	7	0	0	0
7/8	37	11,168	94	0	0	0	55	590	8	0	0	0
7/9	40	11,208	94	0	0	0	97	687	9	0	0	0
7/10	93	11,301	95	0	0	0	233	920	12	0	0	0
7/11	76	11,377	96	0	0	0	261	1,181	15	0	0	0
7/12	27	11,404	96	0	0	0	153	1,334	17	0	0	0
7/13	7	11,411	96	0	0	0	185	1,519	19	0	0	0
7/14	38	11,449	96	0	0	0	450	1,969	25	0	0	0
7/15	31	11,480	97	0	0	0	187	2,156	27	0	0	0
7/16	12	11,492	97	2	2	0	861	3,017	38	0	0	0
7/17	29	11,521	97	0	2	0	311	3,328	42	0	0	0

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	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
7/18	64	11,585	97	0	2	0	1,231	4,559	58	0	0	0
7/19	59	11,644	98	0	2	0	301	4,860	62	0	0	0
7/20	14	11,658	98	0	2	0	1,004	5,864	75	0	0	0
7/21	13	11,671	98	0	2	0	153	6,017	77	0	0	0
7/22	19	11,690	98	0	2	0	394	6,411	82	0	0	0
7/23	9	11,699	98	0	2	0	708	7,119	91	0	0	0
7/24	3	11,702	98	0	2	0	68	7,187	92	0	0	0
7/25	1	11,703	98	0	2	0	51	7,238	92	0	0	0
7/26	34	11,737	99	20	22	0	211	7,449	95	0	0	0
7/27	25	11,762	99	4	26	0	86	7,535	96	0	0	0
7/28	18	11,780	99	5	31	1	48	7,583	97	0	0	0
7/29	11	11,791	99	0	31	1	109	7,692	98	0	0	0
7/30	14	11,805	99	1	32	1	33	7,725	98	0	0	0
7/31	15	11,820	99	2	34	1	40	7,765	99	0	0	0
8/1	2	11,822	99	12	46	1	34	7,799	99	0	0	0
8/2	12	11,834	100	1	47	1	15	7,814	100	1	1	5
8/3	7	11,841	100	8	55	1	4	7,818	100	0	1	5
8/4	12	11,853	100	0	55	1	0	7,818	100	0	1	5
8/5	5	11,858	100	2	57	1	4	7,822	100	0	1	5
8/6	6	11,864	100	5	62	1	6	7,828	100	0	1	5
8/7	3	11,867	100	2	64	1	3	7,831	100	0	1	5
8/8	2	11,869	100	6	70	1	2	7,833	100	0	1	5
8/9	8	11,877	100	6	76	1	1	7,834	100	0	1	5
8/10	2	11,879	100	11	87	2	0	7,834	100	0	1	5
8/11	1	11,880	100	34	121	2	0	7,834	100	0	1	5
8/12	1	11,881	100	19	140	2	0	7,834	100	0	1	5
8/13	0	11,881	100	12	152	3	0	7,834	100	0	1	5
8/14	0	11,881	100	8	160	3	1	7,835	100	0	1	5
8/15	0	11,881	100	46	206	4	1	7,836	100	0	1	5
8/16	1	11,882	100	82	288	5	0	7,836	100	0	1	5
8/17	0	11,882	100	117	405	7	0	7,836	100	0	1	5
8/18	0	11,882	100	97	502	9	0	7,836	100	0	1	5
8/19	0	11,882	100	41	543	9	0	7,836	100	0	1	5

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	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
8/20	0	11,882	100	204	747	13	0	7,836	100	0	1	5
8/21	0	11,882	100	59	806	14	0	7,836	100	0	1	5
8/22	0	11,882	100	30	836	15	0	7,836	100	0	1	5
8/23	0	11,882	100	19	855	15	0	7,836	100	0	1	5
8/24	0	11,882	100	55	910	16	0	7,836	100	1	2	10
8/25	2	11,884	100	37	947	17	1	7,837	100	0	2	10
8/26	0	11,884	100	30	977	17	0	7,837	100	0	2	10
8/27	0	11,884	100	14	991	17	0	7,837	100	0	2	10
8/28	0	11,884	100	20	1,011	18	0	7,837	100	0	2	10
8/29	0	11,884	100	23	1,034	18	0	7,837	100	1	3	15
8/30	0	11,884	100	28	1,062	19	0	7,837	100	0	3	15
8/31	0	11,884	100	16	1,078	19	0	7,837	100	1	4	20
9/1	0	11,884	100	30	1,108	19	0	7,837	100	0	4	20
9/2	0	11,884	100	3,666	4,774	83	5	7,842	100	1	5	25
9/3	0	11,884	100	825	5,599	98	3	7,845	100	5	10	50
9/4	0	11,884	100	11	5,610	98	0	7,845	100	1	11	55
9/5	0	11,884	100	1	5,611	98	1	7,846	100	0	11	55
9/6	0	11,884	100	9	5,620	98	0	7,846	100	3	14	70
9/7	0	11,884	100	12	5,632	98	0	7,846	100	2	16	80
9/8	0	11,884	100	13	5,645	99	0	7,846	100	2	18	90
9/9	0	11,884	100	7	5,652	99	0	7,846	100	1	19	95
9/10	0	11,884	100	5	5,657	99	0	7,846	100	1	20	100
9/11	0	11,884	100	16	5,673	99	0	7,846	100	0	20	100
9/12	0	11,884	100	33	5,706	100	0	7,846	100	0	20	100
9/13	1	11,885	100	22	5,728	100	0	7,846	100	0	20	100
Total	11,885			5,728			7,846			20		

Notes: May 15 to 1359 hrs on June 9, based on a partial weir and expanded 20 minute counts of DIDSON sonar files.

Starting at 1400 hrs June 9 to September 13, 2004, based on hand counts through a complete resistance board weir.

July 20 to July 23, based on hourly DIDSON sonar counts through a complete resistance board weir.

350 fish counted from the weir site downstream to the mouth of the Anchor River on 9/12/04.

Appendix C4.-Anchor River North Fork escapement, May 15-September 15, 2004.

	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
5/15			0			0			0			0
5/16			0			0			0			0
5/17			0			0			0			0
5/18	1	1	0	0	0	0	0	0	0	0	0	0
5/19	3	4	0	0	0	0	0	0	0	0	0	0
5/20	5	9	0	0	0	0	0	0	0	0	0	0
5/21	13	22	1	0	0	0	0	0	0	0	0	0
5/22	26	48	3	0	0	0	0	0	0	0	0	0
5/23	39	87	5	0	0	0	0	0	0	0	0	0
5/24	38	125	7	0	0	0	0	0	0	0	0	0
5/25	38	163	8	0	0	0	0	0	0	0	0	0
5/26	10	173	9	0	0	0	0	0	0	0	0	0
5/27	10	183	10	0	0	0	0	0	0	0	0	0
5/28	0	183	10	0	0	0	0	0	0	0	0	0
5/29	25	208	11	0	0	0	0	0	0	0	0	0
5/30	65	273	14	0	0	0	0	0	0	0	0	0
5/31	28	301	16	0	0	0	0	0	0	0	0	0
6/1	73	374	19	0	0	0	0	0	0	0	0	0
6/2	67	441	23	0	0	0	0	0	0	0	0	0
6/3	63	504	26	0	0	0	0	0	0	0	0	0
6/4	65	569	30	0	0	0	0	0	0	0	0	0
6/5	50	619	32	0	0	0	0	0	0	0	0	0
6/6	98	717	37	0	0	0	0	0	0	0	0	0
6/7	43	760	40	0	0	0	0	0	0	0	0	0
6/8	29	789	41	0	0	0	0	0	0	0	0	0
6/9	30	819	43	0	0	0	0	0	0	0	0	0
6/10	7	826	43	0	0	0	0	0	0	0	0	0
6/11	9	835	44	0	0	0	0	0	0	0	0	0
6/12	37	872	45	0	0	0	0	0	0	0	0	0
6/13	52	924	48	0	0	0	0	0	0	0	0	0
6/14	44	968	50	0	0	0	0	0	0	0	0	0
6/15	25	993	52	0	0	0	0	0	0	0	0	0
6/16	8	1,001	52	0	0	0	0	0	0	0	0	0
6/17	44	1,045	54	0	0	0	0	0	0	0	0	0
6/18	113	1,158	60	0	0	0	0	0	0	0	0	0
6/19	35	1,193	62	0	0	0	0	0	0	0	0	0
6/20	30	1,223	64	0	0	0	0	0	0	0	0	0
6/21	6	1,229	64	0	0	0	0	0	0	0	0	0
6/22	17	1,246	65	0	0	0	0	0	0	0	0	0
6/23	15	1,261	66	0	0	0	0	0	0	0	0	0
6/24	19	1,280	67	0	0	0	0	0	0	0	0	0
6/25	19	1,299	68	0	0	0	0	0	0	0	0	0
6/26	21	1,320	69	0	0	0	0	0	0	0	0	0
6/27	41	1,361	71	0	0	0	0	0	0	0	0	0

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	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
6/28	21	1,382	72	0	0	0	0	0	0	0	0	0
6/29	9	1,391	72	0	0	0	0	0	0	0	0	0
6/30	15	1,406	73	0	0	0	3	3	1	0	0	0
7/1	23	1,429	74	0	0	0	0	3	1	0	0	0
7/2	2	1,431	75	0	0	0	2	5	2	0	0	0
7/3	2	1,433	75	0	0	0	2	7	2	0	0	0
7/4	19	1,452	76	0	0	0	4	11	3	0	0	0
7/5	65	1,517	79	0	0	0	4	15	5	0	0	0
7/6	31	1,548	81	0	0	0	3	18	6	0	0	0
7/7	22	1,570	82	0	0	0	1	19	6	0	0	0
7/8	11	1,581	82	0	0	0	1	20	6	0	0	0
7/9	15	1,596	83	0	0	0	1	21	7	0	0	0
7/10	10	1,606	84	0	0	0	0	21	7	0	0	0
7/11	14	1,620	84	0	0	0	0	21	7	0	0	0
7/12	21	1,641	86	0	0	0	2	23	7	0	0	0
7/13	5	1,646	86	0	0	0	9	32	10	0	0	0
7/14	3	1,649	86	0	0	0	8	40	13	0	0	0
7/15	4	1,653	86	0	0	0	19	59	19	0	0	0
7/16	0	1,653	86	0	0	0	9	68	21	0	0	0
7/17	2	1,655	86	0	0	0	0	68	21	0	0	0
7/18	10	1,665	87	0	0	0	4	72	23	0	0	0
7/19	4	1,669	87	0	0	0	2	74	23	0	0	0
7/20	3	1,672	87	0	0	0	1	75	24	0	0	0
7/21	1	1,673	87	0	0	0	2	77	24	0	0	0
7/22	7	1,680	88	0	0	0	21	98	31	0	0	0
7/23	2	1,682	88	0	0	0	20	118	37	0	0	0
7/24	0	1,682	88	0	0	0	1	119	37	0	0	0
7/25	9	1,691	88	0	0	0	3	122	38	0	0	0
7/26	49	1,740	91	0	0	0	16	138	43	0	0	0
7/27	65	1,805	94	0	0	0	52	190	60	0	0	0
7/28	31	1,836	96	0	0	0	15	205	64	0	0	0
7/29	21	1,857	97	0	0	0	6	211	66	0	0	0
7/30	11	1,868	97	0	0	0	15	226	71	0	0	0
7/31	17	1,885	98	0	0	0	6	232	73	0	0	0
8/1	4	1,889	98	0	0	0	10	242	76	0	0	0
8/2	7	1,896	99	1	1	0	10	252	79	0	0	0
8/3	6	1,902	99	1	2	0	19	271	85	0	0	0
8/4	6	1,908	99	2	4	1	1	272	86	0	0	0
8/5	3	1,911	100	1	5	1	3	275	86	0	0	0
8/6	2	1,913	100	1	6	1	2	277	87	0	0	0
8/7	2	1,915	100	1	7	1	1	278	87	0	0	0
8/8	1	1,916	100	0	7	1	2	280	88	0	0	0
8/9	0	1,916	100	2	9	1	3	283	89	0	0	0
8/10	1	1,917	100	0	9	1	3	286	90	0	0	0

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	Chinook Salmon			Coho Salmon			Dolly Varden			Steelhead (upstream)		
	Count			Count[a]			Count[a]			Counts		
Date	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %	Daily	Cum.	Cum. %
8/11	2	1,919	100	0	9	1	2	288	91	0	0	0
8/12	0	1,919	100	4	13	2	6	294	92	0	0	0
8/13	0	1,919	100	3	16	2	0	294	92	1	1	100
8/14	0	1,919	100	1	17	3	3	297	93	0	1	100
8/15	0	1,919	100	0	17	3	3	300	94	0	1	100
8/16	0	1,919	100	2	19	3	1	301	95	0	1	100
8/17	0	1,919	100	2	21	3	5	306	96	0	1	100
8/18	0	1,919	100	4	25	4	3	309	97	0	1	100
8/19	0	1,919	100	15	40	6	1	310	97	0	1	100
8/20	0	1,919	100	19	59	9	0	310	97	0	1	100
8/21	0	1,919	100	31	90	13	0	310	97	0	1	100
8/22	0	1,919	100	15	105	16	0	310	97	0	1	100
8/23	0	1,919	100	0	105	16	0	310	97	0	1	100
8/24	0	1,919	100	3	108	16	0	310	97	0	1	100
8/25	0	1,919	100	8	116	17	0	310	97	0	1	100
8/26	0	1,919	100	10	126	19	0	310	97	0	1	100
8/27	0	1,919	100	0	126	19	0	310	97	0	1	100
8/28	0	1,919	100	0	126	19	0	310	97	0	1	100
8/29	0	1,919	100	0	126	19	0	310	97	0	1	100
1/1	0	1,919	100	2	128	19	0	310	97	0	1	100
8/31	0	1,919	100	2	130	19	0	310	97	0	1	100
9/1	0	1,919	100	0	130	19	0	310	97	0	1	100
9/2	0	1,919	100	168	298	44	1	311	98	0	1	100
9/3	0	1,919	100	277	575	85	0	311	98	0	1	100
9/4	0	1,919	100	27	602	89	0	311	98	0	1	100
9/5	0	1,919	100	8	610	90	1	312	98	0	1	100
9/6	0	1,919	100	0	610	90	0	312	98	0	1	100
9/7	0	1,919	100	3	613	91	0	312	98	0	1	100
9/8	0	1,919	100	2	615	91	1	313	98	0	1	100
9/9	0	1,919	100	4	619	91	0	313	98	0	1	100
9/10	0	1,919	100	7	626	92	0	313	98	0	1	100
9/11	0	1,919	100	5	631	93	0	313	98	0	1	100
9/12	0	1,919	100	28	659	97	0	313	98	0	1	100
9/13	0	1,919	100	12	671	99	2	315	99	0	1	100
9/14	0	1,919	100	3	674	100	2	317	100	0	1	100
9/15	0	1,919	100	3	677	100	1	318	100	0	1	100
Total	1,919			677			318			1		

Notes: Based on hand counts through a complete resistance board weir. Weir counts ended at 0800 hrs 9/15/04. 350-400 coho salmon counts from Sterling Highway upstream to weir site on 9/15/04 at 1430 hrs.