

Fishery Data Series No. 10-89

Upper Cook Inlet Personal Use Salmon Fisheries, 2007-2009

by

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December 2010

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

FISHERY DATA SERIES NO. 10-89

UPPER COOK INLET PERSONAL USE SALMON FISHERIES, 2007-2009

by

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December 2010

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ABSTRACT

From 2007 to 2009 participants in the Upper Cook Inlet personal use salmon fisheries were required to record their harvest and effort on a free permit and return it to the Alaska Department of Fish and Game after the fisheries closed. The number of permits issued increased every year of the study with over 29,600 permits issued in 2009. The response rate for returned permits averaged 86% during this study. Returned permits were used to estimate total harvest and effort for the Kasilof River set gillnet, Kasilof River dip net, Kenai River dip net, and Fish Creek dip net fisheries. Sockeye salmon harvest from 2007 to 2009 averaged 21,674 fish for the Kasilof River set gillnet fishery, 56,793 fish for the Kasilof River dip net fishery, 288,457 fish for the Kenai River dip net fishery, and 9,898 for the Fish Creek dip net fishery. Most permits were issued to residents of Anchorage followed by residents of the Kenai Peninsula and the Matanuska-Susitna Valley. Most permit holders did not fill their seasonal annual limit, and differences in their success varied with the number of fisheries they participated in, which fisheries they participated in, and the amount of effort spent fishing.

Key words: Kenai River, Kasilof River, Fish Creek, personal use, dip net, set gillnet, subsistence, sockeye salmon, coho salmon, Chinook salmon, pink salmon, chum salmon, flounder, permit.

INTRODUCTION

Subsistence and personal use (PU) fishing in Cook Inlet has undergone numerous regulatory changes over the past two decades, reflecting the efforts by the state and federal governments and the court system to develop a legal definition of subsistence use (Brannian and Fox 1996). In 1996, most of Cook Inlet was closed to subsistence harvest of salmon. In lieu of subsistence fisheries, four personal use fisheries were opened to all Alaska residents: Fish Creek dip net, Kasilof River set gillnet, Kasilof River dip net, and Kenai River dip net. All of these fisheries target sockeye salmon *Oncorhynchus nerka*, although Chinook salmon *O. tshawytscha*, coho salmon *O. kisutch*, pink salmon *O. gorbuscha*, chum salmon *O. keta*, and flounder Pleuronectidae are harvested incidentally. All participants in the Upper Cook Inlet personal use (UCIPU) fisheries are required to get a free permit or be a member of a household with a permit. UCIPU permits are household permits that allow all members of the household to fish under the same permit. Completed permits must be returned to the Alaska Department of Fish and Game (ADF&G) following each fishing season. This report presents harvest, effort and other summary information from UCIPU salmon permits issued during the 2007-2009 seasons for the Kenai River dip net, Kasilof River dip net, Kasilof River set gillnet (Figure 1), and Fish Creek dip net fisheries).

MANAGEMENT PLANS

All UCIPU salmon fisheries are managed under the provisions of the Upper Cook Inlet Personal Use Salmon Fishery Management Plan (5 AAC 77.540).

Kasilof River

Two personal use fisheries occur in the Kasilof River. These are the set gillnet and the dip net fisheries. Inseason management of the set gillnet fishery is the responsibility of the Alaska Department of Fish and Game, Commercial Fisheries Division (CFD). CFD also operates a sonar counter on the Kasilof River. From 1996 through 2001 the set gillnet fishery was opened and closed by emergency order based on a target harvest range. In 2002, the Alaska Board of Fisheries (BOF) changed the management plan so that the set gillnet fishery opens and closes by regulation, therefore inseason management is required only if the sonar count and biological escapement goal cannot be met. Inseason management of the dip net fishery is the responsibility of the Alaska Department of Fish and Game, Sport Fish Division (SFD). The dip net fishery also

opens and closes by regulation, and inseason management is only required if the sonar count and biological escapement goal cannot be projected.

Kenai River

Inseason management of the Kenai River dip net fishery is the responsibility of SFD. The fishery opens and closes by regulation, and inseason management by SFD is only required if it is projected that the inriver escapement goal for sockeye salmon will not be met.

Fish Creek

Inseason management of the Fish Creek dip net fishery is the responsibility of SFD. SFD is also responsible for operation of a weir in Fish Creek. Prior to 2002, the fishery opened and closed by regulation; however, frequent inseason management actions were required due to poor inriver returns. In 2002, BOF changed the management plan so that the fishery would be opened by emergency order only if the department projects that the escapement of sockeye salmon into Fish Creek will exceed 70,000 fish.

FISHING REGULATIONS

Regulations for these fisheries are outlined in 5 AAC 77.015, 5 AAC 77.525, and 5 AAC 77.540. The fisheries are open to Alaska residents only. The total annual limit for all UCIPU fisheries is 25 salmon for the head of the household and 10 salmon for each additional household member. There is an annual limit of one Chinook salmon from the Kenai River dip net fishery, and no Chinook salmon can be retained from the Kasilof River dip net fishery. However, there is no annual limit for Chinook salmon caught in the Kasilof River set gillnet fishery. Fish Creek opens by emergency order and targets sockeye salmon. No other fish species can be retained in the Fish Creek dip net fishery.

Kasilof River Set Gillnet

The legal fishing area is from ADF&G regulatory markers located at the river mouth to ADF&G commercial fishing regulatory markers located approximately 1 mile from the mouth in either direction (Figure 1; Panel A). Additionally, fishing is prohibited more than 1 mile from the mean high tide mark and within any flowing waters of the Kasilof River at any tide stage. Only one set gillnet can be operated per permit. The set gillnet has to be attended by the permit holder or a person named on the permit at all times it is being used to harvest fish. No set gillnet can be operated within 100 feet of another set gillnet. The gillnet cannot exceed 10 fathoms in length, have larger than a 6-inch stretched mesh size, or be more than 45 meshes deep. By regulation, the fishery is open from June 15 through June 24, between 0600 and 2300 hours.

Kasilof River Dip Net

Dipnetting is allowed in the area from regulatory markers located on the Cook Inlet beaches outside of the terminus of the river upstream for 1 mile (Figure 1; Panel B). The dip netting season is open 24 hours a day and begins on June 25 and ends on August 7.

A legal dip net for all UCIPU dip net fisheries is a bag-shaped net supported on all sides by a rigid frame. The net opening may not exceed 5 feet across, and the depth of the net must be at least one-half the net opening. The mesh used to construct the net may not exceed 4.5 inches stretched. Dip nets must be operated by hand.

Kenai River Dip Net

Dip nets can only be used from shore in the area from ADF&G regulatory markers located on the Cook Inlet beaches outside of the terminus of the river upstream to the Warren Ames Bridge

(Figure 1, Panel C). The north shoreline is closed to dipnetting from shore between an ADF&G marker located below Main Street in Kenai upstream to ADF&G markers near the Kenai City Dock. This regulation is implemented to minimize erosion to the bluffs below the city of Kenai.

Dipnetting from a boat is only allowed from ADF&G markers located near the Kenai City Dock upstream to the Warren Ames Bridge. Salmon may not be taken from a boat powered by a two-stroke motor other than one that is manufactured as a direct fuel injection motor. The fishery is open from July 10 through July 31, between 0600 and 2300 hours.

Fish Creek

Prior to 2002, dipnetting was allowed in the area from ADF&G regulatory markers located on both sides of the terminus of the creek upstream to ADF&G regulatory markers located approximately ¼ mile upstream of the Knik-Goose Bay Road. Regulations for 1996-2001 allowed personal use dipnetting from July 10 through July 31, between 1100 and 2300 hours.

In 2002 regulations were modified so that the fishery would open only by emergency order, but the area and location of the fishery remained the same. Fish Creek was opened in 2009 for the first time since 2001, and the fishery ran from August 1 through August 8.

OBJECTIVES

From 2007-2009 the objectives of the study were to:

1. Make permits available to Alaska residents that qualified to participate in the upper Cook Inlet personal use fisheries; and
2. Estimate participation (household days fished) and harvest for the upper Cook Inlet personal use fisheries.

METHODS

STUDY DESIGN

All participants in UCIPU salmon fisheries were required to get a permit or be a member of a household with a permit. Permits were free to residents with valid Alaska sport fishing licenses and were issued by more than 60 vendors and ADF&G offices located in Anchorage, Fairbanks, the Kenai Peninsula, and the Matanuska-Susitna Valley.

Each permit was divided into numbered halves (Appendix A1). Permits were sequentially numbered, and vendors were given known sequences. The top half was a vendor copy which was retained by the vendor and contained the permit holder's contact information, sport fishing license number, and the angler's signature. Vendor copies were returned to the Anchorage ADF&G office periodically throughout the summer using courtesy reply envelopes provided by the Division of Sport Fish. Data from the returned vendor copies were entered into an electronic database periodically throughout the summer.

The bottom half of each permit was a harvest card that was given to the permit holder. The permit holder was required to have this permit in their possession when personal use fishing. Permit holders were also required to record harvest information including fishery, dates fished, and salmon harvest by species immediately upon harvesting a fish. A check box was provided for households that did not fish. All permits, even those issued to households that did not fish, were required to be returned to ADF&G by August 15.

Permit holders who did not return their permits received up to two reminder letters. Reminder letters were essentially copies of the original permits with the original permit numbers. These letters stated that ADF&G had not received their completed permits and reminded permit holders to immediately send back their harvest information. Reminder letters were mailed to allow an approximate 4-week response period from the previous mailing. Data from returned permits were entered into an electronic database as they were received. In some cases returned permits reported that the household harvested in excess of their seasonal limit, fished out of season, were not Alaska residents, or some other regulatory violation. This information was entered into the database as it was recorded on the permit.

All permit holders who returned their permits before the second reminder letter were considered “compliant” households. Information obtained by permit holders who returned their permits after the second reminder letter was mailed was considered from “non-compliant” households. Participation and harvest by non-compliant households was estimated by calculating the mean participation (household days fished) and harvest by species for non-compliant permits that were returned. These were then expanded to include all non-respondents. Total estimates of participation and harvest by species for each fishery were obtained by summing the estimates for the non-compliant households with the information obtained from compliant households.

Occasionally vendors failed to return vendor copies from some of the permits they issued. This resulted in some permit holders returning permits that lacked a vendor copy. The total number of permits issued was estimated by assuming that the response rate (prior to mailing the first reminder letter) among known permits was the same as the response rate among the permits lacking a vendor copy (the “orphan permits”). This response rate was applied to the orphan permits to estimate the total number of permits issued but lacked a vendor copy.

DATA ANALYSIS

Because some vendors did not return all of their permits, the total number of permits issued was estimated as:

$$\hat{N} = \left(o \hat{p}^{-1} \right) + M \quad (1)$$

where:

\hat{N} = the total number of permits issued,

o = the number of permits issued and returned by permit holders before the first reminder letter, but with no vendor card (the “orphan permits”),

$\hat{p} = \frac{m}{M}$ = the response rate before the first reminder letter among permits with vendor cards,

m = the number of permits returned before the first reminder letter mailing with vendor cards,

M = the total number of permits with vendor cards.

With variance estimated as:

$$\hat{V}[\hat{N}] = \left[\frac{o^2 \hat{V}[\hat{p}]}{\hat{p}^4} \right], \quad (2)$$

where:

$$\hat{V}[\hat{p}] = \left(\frac{\hat{p}(1-\hat{p})}{M-1} \right)$$

The estimated number of permits issued was divided in four groups:

$$\hat{N} = N_{cf} + N_{cz} + \hat{N}_{df} + \hat{N}_{dz} , \quad (3)$$

where:

N_{cf} = the number of compliant permits who reported fishing,

N_{cz} = the number of compliant permits who reported they did not fish,

$$\hat{N}_{df} = (\hat{N} - (N_{cf} + N_{cz}))\hat{w}$$

the estimated number of non-compliant permits who reported fishing, and

$$\text{where } \hat{w} = \frac{n_{df}}{n_d}$$

\hat{N}_{dz} = the estimated number of non-compliant permits who reported they did not fish.

Harvest for each species or participation for each fishery was estimated by the following procedure (with subscripts denoting parameter of estimation deleted for simplicity):

$$\hat{H} = H_{cf} + \hat{H}_{df} ; \quad (4)$$

where:

\hat{H} = estimated total harvest or participation;

H_{cf} = harvest or participation reported by compliant permits, and

\hat{H}_{df} = estimated harvest by non-compliant households = $\hat{N}_{df} \bar{h}_{df}$

where \bar{h}_{df} = the mean harvest or participation per household for non-compliant households that reported they had fished,

$$= \frac{\left(\sum_{j=1}^{n_{df}} h_{dfj} \right)}{n_{df}} ;$$

h_{dfj} = reported harvest by responding non-compliant household j , and

n_{df} = the number of non-compliant households responding to the second reminder.

Variance was calculated as (Goodman 1960):

$$\hat{V}[\hat{H}] = \hat{V}[\hat{H}_{df}] = \hat{N}_{df}^2 \hat{V}[\bar{h}_{df}] + \bar{h}_{df}^2 \hat{V}[\hat{N}_{df}] - \hat{V}[\bar{h}_{df}] \hat{V}[\hat{N}_{df}] , \quad (5)$$

where:

$$\hat{V}[\hat{N}_{df}] = \hat{V}[\hat{N}] \hat{V}[\hat{w}] = \hat{N}^2 \hat{V}[\hat{w}] + \hat{w}^2 \hat{V}[\hat{N}] - \hat{V}[\hat{w}] \hat{V}[\hat{N}], \quad (6)$$

$$\hat{V}[\hat{w}] = \left(\frac{\hat{w}(1 - \hat{w})}{n_d - 1} \right),$$

and

$$\hat{V}[\bar{h}_{df}] = \left(1 - \frac{n_{df}}{\hat{N}_{df}} \right) \frac{s_{df}^2}{n_{df}}, \quad (7)$$

$$s_{df}^2 = \frac{\sum_{j=1}^{n_{df}} (h_{dfj} - \bar{h}_{df})^2}{n_{df} - 1}. \quad (8)$$

Standard errors were the square root of the variance estimates. Permit holders who failed to indicate which fishery they participated in were estimated as “unknown fishery” by the procedure outlined above.

RESULTS

PERMITS ISSUED AND RETURNED

The number of permits issued for UCIPU fisheries increased every year from 2007 through 2009 with an estimated 23,046 (SE=1) permits issued in 2007, 23,722 (SE=1) permits issued in 2008, and 29,619 (SE=1) permits issued in 2009 (Table 1). The return rates decreased slightly from 88% in 2007 to 85% in 2008 and 2009. On average, 61% of permit holders returned their permits voluntarily, 17% were returned after the first reminder letter, and 8% were returned after the second reminder. On average, 18% of the households that were issued UCIPU permits during this study period did not fish (Table 2).

ESTIMATED HARVEST AND EFFORT

There were approximately 1,170,433 salmon and 11,189 flounder harvested in UCIPU fisheries between 2007 and 2009 (Tables 3 and 4). All five species of salmon were harvested with sockeye comprising the majority (Figure 2). Effort for all fisheries averaged 31,624 household days, and ranged from an average of 1,452 days fished for the Fish Creek dip net fishery to an average of 22,950 days fished for the Kenai River dip net fishery (Table 3). Fishing effort was greatest in 2009 (37,753 days fished, SE=46), and lowest in 2008 (28,480 days fished, SE=34; Table 3). The Kenai River dip net fishery was the most popular UCIPU fishery, and most of the salmon harvest and effort occurred there (Table 3). Since 2005, it has been legal to harvest flounder in UCIPU fisheries with the exception of Fish Creek. The greatest harvest of flounder occurred in the Kenai River dip net fishery (Table 4).

Kasilof River Set Gillnet

Participation in the Kasilof River set gillnet fishery in 2007-2009 averaged 1,622 household days and ranged from 1,534 (SE=7) household days in 2008 to 1,761 (SE=9) household days in 2009

(Table 3). Sockeye salmon harvests averaged 21,674 fish and ranged from 14,943 (SE=66) fish in 2007 to 26,646 (SE=167) fish in 2009 (Table 3). Chinook salmon harvests had the opposite trend. Harvests averaged 207 fish but ranged from 127 (SE=2) fish in 2009 to 343 (SE=3) fish in 2007 (Table 3).

The Kasilof River set gillnet fishery has the shortest UCIPU fishery season. In 2007, over 50% of the sockeye harvest was taken by June 19. In 2008 and 2009, 50% of the harvest was achieved by June 20 which is the median date for this fishery (Figure 3; Appendix B1).

Kasilof River Dip Net

Between 2007 and 2009, participation in the Kasilof River dip net fishery averaged 5,943 household days with a range of 4,627 (SE=9) days in 2007 to 7,650 (SE=21) days in 2009 (Table 3). Sockeye harvest averaged 56,793 fish with the greatest harvest occurring in 2009 (73,035 sockeye salmon, SE=246). Harvests of other species were all less than 1,000 fish, except for the harvest of coho salmon in 2009 which was 1,441 (SE=30).

The harvest timing of the Kasilof River dip net fishery was relatively consistent between years. Over half the sockeye harvested were taken by July 20 in 2007, July 18 in 2008, and July 17 in 2009 (Figure 4; Appendix B2). The exploitation rate for both of the Kasilof River personal use fisheries (set gillnet and dip net combined) averaged 12% of the total Kasilof harvest and increased from 9% in 2007 to 18% in 2010 (Table 5).

Kenai River Dip Net

Participation in the Kenai River dip net fishery averaged 22,950 household days and ranged from 20,772 (SE=27) days in 2008 to 26,171 (SE=35) days in 2009 (Table 3). Sockeye salmon harvest averaged 288,457 fish with a range of 234,109 (SE=338) fish in 2008 to 339,993 (SE=524) fish in 2009 (Table 3). Harvests of other species were comparatively small. For example, pink salmon had the second highest harvest, but the mean was only 6,017 fish.

The harvest timing of the Kenai River dip net fishery was relatively consistent between 2008 and 2009, although most sockeye salmon were harvested later in the 2007 season (Figure 5; Appendix B3). In 2008 and 2009, 50% of the sockeye harvest occurred by July 20 which is the median date of the fishery. In 2007, 50% of the harvest level was achieved on July 22. Sockeye salmon exploitation rates in the Kenai River dip net fishery ranged from 10% (2007) to 18% (2009) of the total Kenai River harvest (Table 5). The mean exploitation rate was 14%, slightly higher than the mean exploitation rate from the Kenai River sport fishery (12%). The commercial sockeye fishery had the largest exploitation rate for the total Kenai harvest and averaged 74% during 2007-2009.

Fish Creek Dip Net

Participation in the Fish Creek dip net fishery was 1,452 household days in 2009 (Table 3). There were 9,898 (SE=73) sockeye salmon harvested (Table 3), with over 50% of these taken by August 5 (Figure 6; Appendix B4). Harvests of other salmon species were minimal with less than 70 of each species taken during the fishery. However, these harvests were technically violations because the Fish Creek emergency order (EO 2-RS-2-25-09) was issued for sockeye salmon only (Table 3).

CHARACTERISTICS OF PERMIT HOLDERS

Residency of Permit Holders

Approximately 97% of all UCIPU permit holders resided in Southcentral Alaska (Region 2) during each year of the study (Table 6). Less than 3% of the participants lived in Interior Alaska (Region 3), and only 0.2% resided in Southeast Alaska (Region 1). Of the participants from Southcentral, most were from Anchorage, followed by the Kenai Peninsula, and the Matanuska-Susitna Valley. The percentage of permit holders from Anchorage decreased by about 2% from 2007 to 2009, which differs from the increasing trend observed during the first 10 years of the UCIPU fisheries (Dunker and Lafferty 2007; Reimer and Sigurdsson 2004).

Despite the 2% decrease, Anchorage residents represented the majority of the permit holders in the Kenai River and Kasilof River personal use dip net fisheries (Table 7; Figure 7). They also comprised the majority of permit holders who did not participate in any UCIPU fisheries. Of the permit holders from Anchorage that participated in the fisheries, the average harvest was 20.8 (SE=0.12) salmon (Figure 8). Residents of the Kenai Peninsula were the predominate participants in the Kasilof River personal use set gillnet fishery in 2008, but their participation in this fishery did not differ substantially from that of Anchorage residents in 2007 and 2009 (Figure 7). Kenai residents who fished harvested an average of 22.2 (SE=0.14) salmon (Figure 8). Permit holders from the Matanuska-Susitna Valley were the predominant participants in the Fish Creek dip net fishery (Figure 7), and only about 1% of the Fish Creek dip net participants were from the Kenai Peninsula. Matanuska-Susitna Valley residents and residents from Interior and Southeast Alaska each had the highest average harvest of 23.5 (SE=0.48) salmon. The mean harvest decreases for all residency areas when permit holders that did not fish are included. In these cases, mean harvest was 15.8 (SE=0.09) for Anchorage, 16.2 (SE=0.13) for Kenai, and 18.0 (SE=0.02) for Matanuska Susitna Valley residents. In general, patterns in the residency of participants in UCIPU fisheries were relatively consistent throughout this study and did not differ much from patterns observed during previous years (Dunker and Lafferty 2007).

Seasonal Variation

The overall mean harvest per permit from permit holders who fished was 21.7 (SE=0.07) and for all permits, including those that did not fish, it was 16.3 (SE=0.07). The average percentage of permit holders who fished and harvested their annual limits was 38.8% (SE=0.2%) in 2009, 34.5% in 2008 (SE=0.2%), and 37.5% in 2007 (SE=0.3%; Table 8). Between 2007 and 2009, the percentage of all permit holders that did not harvest any of their allowable annual limits ranged from 24% to 28% (Figure 9). During all 3 years, 17% or less of all permit holders harvested their limits (81-100%; Figure 9). The Kasilof River gillnet fishery was the least utilized of all UCIPU fisheries, excluding Fish Creek (Table 3). However, participants fishing the Kasilof River set gillnet fishery were on average the most successful, except for 2007 when there was slightly greater success in the Kenai dip net fishery (Figure 10). In 2008 and 2009, participants in the Kasilof River gillnet fishery harvested an average of 65% (SE=0.01) of their annual limits. In contrast, participants fishing the dip net fisheries harvested less than half of what they were allowed during all years (Figure 10).

Of all the salmon harvested in UCIPU fisheries, over 75% came from the Kenai River dip net fishery each year, whereas less than 25% were typically harvested from the Kasilof River fisheries (Figure 11). In 2009, only 2% of the total salmon harvested were taken from Fish Creek (Figure 11).

Household Size

Permits were most commonly issued to two-person households from 2007 to 2009 (Table 8). Although some very large households obtained permits, households of five people or less comprised 93.1% of the total permits issued (Table 8). For all permits issued, the average percentage of the annual limit harvested varied by only about 7% for households of different sizes, with households of two having the greatest “success” and households of six having the least success (Table 8). When analyzed separately by fishery using data from permit holders who participated in only one fishery, households of one tended to be slightly more successful than households of other sizes in filling their limits (Figure 12). Overall patterns in the percentage of permits and the percentage of salmon harvested according to household size were remarkably similar between fisheries (Figure 12). Though the permits are issued per household, an attempt was made to evaluate harvest patterns per person by dividing the harvest on each permit by the number of household members (Figure 13). When looked at this way, there was virtually no difference between years, and the mean harvest per person was approximately 6 salmon (or 8, if permits that did not fish are excluded). When looked at separately by fishery and year for permit holders that only fished in one fishery, the mean harvests per person reflect the overall trends. Harvests per person were highest in the Kasilof gillnet fishery, particularly in 2008 and 2009 (Figure 13).

Number of Days Fished/Fisheries Visited/Harvest Rates

Thirty-three percent of permit holders fished multiple days per season and 45.7% of permit holders fished only 1 day (Table 8). Permit holders that fished only 1 day harvested 38.6% (SE=0.2%) of their annual limits, but permit holders that fished for at least 5 days harvested 69.3% (SE=0.6%) of their annual limits. When analyzed separately by fishery for permit holders that participated in only one fishery, the average percentage of the annual limit filled increased as the effort (days fished) increased for all UCIPU fisheries (Figure 14). People fishing the Kasilof gillnet fishery for 5 or more days were the most successful in filling their annual limits. Participants in UCIPU fisheries, in general, increased their harvest with added days of fishing effort. Dip netters in the Kenai filled a higher percentage of their limits than those fishing the Kasilof when they fished between 1 and 3 days. However, if participants dipnetted for 4 days or longer, there was no difference in their average harvests (Figure 14). Overall, the percentage of permits and the percentage of salmon harvested over multiple days were quite similar between all UCIPU fisheries (Figure 14).

Only about 6.1% of UCIPU permit holders participated in more than one fishery during this study (Table 8). Of those who participated in two fisheries, 90% fished the Kenai River along with another fishery (most often Kasilof River dip net). Of those who participated in three fisheries, combinations involving the Kenai River accounted for 100%. During this study period, fishing in multiple fisheries increased the average percentage of the annual limit filled from 46.1% (SE=0.2%) for one fishery to 68.8% (SE=2.7) for three fisheries (Table 8).

DISCUSSION

More UCIPU permits were issued during this study than ever before, indicating that these fisheries are continuing to increase in popularity. On average, 25,462 permits were issued each year from 2007 through 2009 (Table 1). In 1996-2006, the number of permits issued was less than 22,000 (Dunker and Lafferty 2007; Reimer and Sigurdsson 2004). Return rates for UCIPU permits remain high. Although the average permit return rate of 86% was slightly less than the

average return rate of 88% in 2004-2006 (Dunker and Lafferty 2007), it was the same as the return rate in 1996-2003 (Reimer and Sigurdsson 2004).

With the growing popularity of UCIPU fisheries, effort and harvest estimates have also increased. Average annual effort in 2007–2009 was 31,624 days fished (Table 3), compared to 24,385 days fished between 2004 and 2006 (Dunker and Lafferty 2007), and 18,761 days fished between 1996 and 2003 (Reimer and Sigurdsson 2004). Also, the average salmon harvest was substantially higher in 2007–2009, averaging 390,343 salmon per year compared with an average of 323,273 salmon in 2004–2006 and 207,543 salmon in 1996–2003 (Dunker and Lafferty 2007; Reimer and Sigurdsson 2004). Mean effort and harvest increased by about 40% from the effort and harvest in 1996-2003 (Reimer and Sigurdsson 2004). However, effort per permit has remained relatively stable over the years (Appendix C1), whereas harvest per permit has been much more variable (Appendix C). Thus, the increases in total effort and harvest observed in this study are a function of more permits issued, rather than an increase in effort and harvest by individual households.

During 2007 and 2009, total fishing effort and harvest of sockeye salmon in the Kenai River dip net fishery was the highest ever (Appendices C1 and C2). In particular, the most effort and sockeye harvest occurred during the 2009 Kenai River dip net season (Appendices C1 and C2), although harvest of sockeye per permit was actually higher in 2005. Coho salmon harvests were also high during 2007–2009, with the greatest harvest occurring in 2008 (Appendix C3). Chinook salmon harvests hit a record high in the Kenai dip net fishery in 2007, but then decreased in 2008 and 2009 (Appendix C4). Chum and pink salmon harvests were not substantially higher in any UCIPU fisheries than in previous years (Appendices C5 and C6). However, the second highest pink salmon harvest in the Kenai dip net fishery occurred in 2008 (Appendix C6). These trends are likely the result of the growing number of permits issued in UCIPU fisheries (Table 1; Dunker and Lafferty 2007; Reimer and Sigurdsson 2004). Additionally, the percentage of permit holders who were issued permits but did not fish was lower than in previous years (Table 2; Dunker and Lafferty 2007; Reimer and Sigurdsson 2004).

The Kenai dip net fishery has grown since 1996 with a few exceptions. One notable exception occurred in 2006 and was likely the result of an inseason closure that resulted in lower effort and harvest levels (Dunker and Lafferty 2007). Effort and harvest was lowest in 2008 which was also the year with the lowest total sockeye run during this study period (Table 5). In 2009, overall effort and harvest were at an all time high (Table 3), although harvest per person did not substantially differ from 2007 (Figure 13). This corresponds to the growing interest in the fishery which could be attributed to several factors including a greater awareness of the fishery and a growing desire to fill the freezer in light of the economic recession. Regardless of the reason for the increased participation, the percentage of participants who filled their annual limit fishing in the Kenai was similar to previous years (Figures 9 and 10; Dunker and Lafferty 2007).

Harvest and effort in the Kasilof River personal use fisheries increased in 2007-2009 beyond all previous years, except 2006, when the Kenai closure likely drew more people to the Kasilof dip net fishery (Dunker and Lafferty 2007). The success of Kasilof dip netters as determined by the average percent of the annual limits filled and the sockeye harvest per permit did not appear to differ much from previous years, and the success of Kasilof gillnetters, in fact, was lower during 2007-2009 (Figure 10, Appendix C2; Dunker and Lafferty 2007). Although participants in the Kasilof gillnet fishery harvest a greater percentage of their annual limit than participants in the

dip net fisheries, it remains the least popular Kenai UCIPU fishery (Dunker and Lafferty 2007; Reimer and Sigurdsson 2004).

Fish Creek opened in 2009 for the first time since 2001. The opening of this fishery likely motivated more residents from the Matanuska-Susitna Valley to obtain UCIPU permits who ordinarily might not have. This is illustrated by the higher percentage of participants from the Matanuska-Susitna Valley in 2009 than in previous years (Table 6; Dunker and Lafferty 2007) and likely played a substantial role in the high number of permits issued that year.

Most permit holders did not fill their seasonal annual limit although differences in the percentage of the annual limit filled varied with respect to the number of fisheries fished and the amount of effort spent fishing (Table 8, Figure 9). Residency trends observed during this study were similar to those reported by Dunker and Lafferty (2007) and Reimer and Sigurdsson (2004), with the exception of the higher percentage of Matanuska-Susitna valley participants in 2009 (Table 6). Regardless, most permits were issued to residents of Anchorage followed by residents of the Kenai Peninsula and the Matanuska-Susitna Valley, and relatively few permits were issued to Alaskans who did not reside in Southcentral Alaska (Table 6, Figure 7). Participants residing in the Matanuska-Susitna Valley and from outside of Southcentral Alaska harvested more salmon per permit, on average, than residents from Anchorage and the Kenai Peninsula (Figure 8). This could be attributed to expending more effort fishing when traveling further distances to the Kenai UCIPU fisheries. This is speculation because residents from these areas did not spend more days fishing than residents from Anchorage and the Kenai Peninsula (Figure 8).

Public perception with regard to UCIPU fisheries is that regulatory violations are common (Dunker and Lafferty 2007; Barrett 2001 a-b in Reimer and Sigurdsson 2004). However, regulatory violations have only occasionally been recorded on permits (Dunker and Lafferty 2007; Reimer and Sigurdsson 2004); some of which occurred during the 2007-2009 study period. For example, 115 Chinook salmon were recorded on permits from the Kasilof River dip net fishery where regulations do not allow retention of Chinook (Table 3, Appendix C4). Also, a small number (less than 1%) of permit holders reported harvests in excess of their annual harvest limit (Figure 9). In addition, a few permits holders each year (less than 0.5%) gave out-of-state addresses on the vendor copy of their permit (Table 6).

The aforementioned regulatory violations display a lack of understanding of personal use fishing regulations by some permit holders, but these types of violations are not widespread. More significant problems would occur if large numbers of fishermen were not obtaining permits or failing to return obtained permits.

Accurate reporting is essential to the accuracy of the effort and harvest estimates. Alaska Wildlife Troopers and staff from the Alaska Department of Fish and Game, Division of Sport Fish enforce regulatory violations and check the accuracy of harvest reported on permits in the field. Local Alaska Wildlife Troopers indicate that they rarely encounter personal use fishermen who do not have a permit. For instance, in 2009, they spent over 460 hours enforcing the personal use fishing regulations. Of 1,200 contacts made, they issued only 131 citations, and most of these were for using a two-stroke motor rather than for inaccurate or incomplete harvest recording.

The return rate for permits was slightly lower during this study period than reported from 2004-2006 (Dunker and Lafferty 2007). However, the current return rate is sufficient to generate accurate harvest and effort estimates. The return rate will continue to be monitored. If it

continues to decrease, ADF&G will begin enforcement efforts against permit holders who fail to return their permits. In cooperation with the department, Alaska Wildlife Troopers could begin issuing citations to those permit holders that received permits but failed to return their permits for at least 2 consecutive years. If this were to happen, the goal of this enforcement action would be to make the public more aware of the regulations, the importance of following them, and ultimately, increase compliance with the UCIPU fishery regulations.

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TABLES

Table 1.-Number of Upper Cook Inlet personal use salmon fishery permits issued by year and number of permits returned by mailing and year, 2007-2009.

Year	Permits		Permits Returned ^b								Permits not	
	Issued ^a		Voluntary ^c		Mailing 1		Mailing 2		Total		Returned	
	Number	SE	Number	%	Number	%	Number	%	Number	%	Number	%
2007	23,046	1	14,090	61%	4,250	18%	1,972	9%	20,312	88%	2,734	12%
2008	23,722	1	13,743	58%	4,385	18%	2,131	9%	20,259	85%	3,289	14%
2009	29,619	1	18,426	62%	4,715	16%	1,888	6%	25,029	85%	4,384	15%
Mean	25,462		15,420	61%	4,450	17%	1,997	8%	21,867	86%	3,469	14%

^a "Permits Issued" is an estimate that accounts for "orphan permits."

^b "Permits Returned" and "Permits not Returned" are based on permits actually received and are not estimates.

^c Voluntary households are those that voluntarily returned their completed permits without being mailed a reminder letter.

Table 2.-Number of Upper Cook Inlet personal use salmon fishery permit holders that did not fish, 2007-2009.

Year	Permits Issued		Did Not Fish		Did Fish	
	Number	SE	Number	%	Number	%
2007	23,046	1	4,190	18%	18,856	82%
2008	23,722	1	4,561	19%	19,161	81%
2009	29,619	1	4,867	16%	24,752	84%
Mean	25,462		4,539	18%	20,923	82%

Table 3.-Effort and harvest in Upper Cook Inlet personal use salmon fisheries, 2007-2009.

Year	Days	Days Fished			Sockeye			Chinook			Coho			Pink			Chum			Total		
	Open	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP
<u>Kasilof River Gillnet</u>																						
2007	10	1,570	7	1%	14,943	66	1%	343	3	2%	68	4	12%	2	0	0%	0	0	0%	15,356	66	1%
2008	10	1,534	7	1%	23,432	107	1%	151	2	3%	65	3	9%	35	4	22%	23	3	26%	23,706	107	1%
2009	10	1,761	9	1%	26,646	167	1%	127	2	3%	165	0	0%	14	1	14%	11	2	36%	26,963	167	1%
Mean		1,622			21,674			207			99			17			11			22,008		
<u>Kasilof River Dip Net</u>																						
2007	44	4,627	9	0%	43,293	105	0%	35	1	6%	487	8	3%	383	6	3%	136	2	3%	44,334	106	0%
2008	44	5,552	14	0%	54,051	153	1%	46	3	13%	509	11	4%	787	10	2%	143	4	5%	55,536	154	1%
2009	44	7,650	21	1%	73,035	246	1%	34	1	6%	1,441	30	4%	274	19	14%	173	3	3%	75,957	248	1%
Mean		5,943			56,793			38			812			481			151			58,609		
<u>Kenai River Dip Net</u>																						
2007	22	21,908	23	0%	291,270	335	0%	1,509	4	1%	2,111	24	2%	1,939	23	2%	472	17	7%	297,301	337	0%
2008	22	20,772	27	0%	234,109	338	0%	1,362	10	1%	2,609	21	2%	10,631	49	1%	504	8	3%	249,215	343	0%
2009	22	26,171	35	0%	339,993	524	0%	1,189	7	1%	2,401	29	2%	5,482	27	1%	285	7	5%	349,350	525	0%
Mean		22,950			288,457			1,353			2,374			6,017			420			298,622		
<u>Fish Creek Dip Net</u>																						
2007		0																				
2008		0																				
2009	7	1,452	8	1%	9,898	73	1%	10	0	0%	53	6	22%	66	3	9%	33	5	30%	10,060	73	1%
<u>Unknown Fishery</u>																						
2007		534	3	1%	6,729	52	2%	37	1	5%	61	3	10%	28	1	7%	6	0	0%	6,861	52	1%
2008		622	4	1%	6,890	63	2%	41	2	10%	66	3	9%	412	9	4%	58	3	10%	7,467	64	2%
2009		719	7	2%	7,968	84	2%	25	1	8%	144	10	14%	133	4	6%	57	5	17%	8,327	85	2%
Mean		625			7,196			34			90			191			40			7,552		
<u>Upper Cook Inlet Personal Use Fisheries Total</u>																						
2007		28,639	29	0%	356,235	386	0%	1,924	5	1%	2,727	26	2%	2,352	24	2%	614	17	5%	363,852	388	0%
2008		28,480	34	0%	318,482	412	0%	1,600	11	1%	3,249	24	1%	11,865	52	1%	728	10	3%	335,924	416	0%
2009		37,753	46	0%	457,540	629	0%	1,385	7	1%	4,204	45	2%	5,969	34	1%	559	13	5%	470,657	631	0%
Mean		31,624			377,419			1,636			3,393			6,729			634			390,144		

-continued-

Table 3.-Page 2 of 2.

Notes: Relative precision (RP) = $((SE * 1.96) / \text{estimate})$.

EO 2-RS-1-26-07 expanded area for dipnetting in the Kasilof from July 23 to August 7.

EO 2-RS-1-31-07 extended the Kenai dip net fishery to be open 24 hours, daily.

EO 2-RS-1-23-08 expanded area for dipnetting in the Kasilof from July 17 to August 7.

EO 2-RS-1-24-09 expanded area for dipnetting in the Kasilof from July 18 to August 7.

EO 2-RS-2-25-09 opened Fish Creek to dipnetting for sockeye only from 6am to 1pm, August 1 to August 7.

Table 4.-Flounder harvest, standard errors, and relative precision in Upper Cook Inlet personal use fisheries, 2007-2009.

Year	Days Open	Days Fished			Flounder		
		Est.	SE	RP ^a	Est.	SE	RP ^a
<u>Kasilof Gillnet</u>							
2007	10	1,570	7	1%	151	3	4%
2008	10	1,534	7	1%	109	3	5%
2009	10	1,761	9	1%	240	4	3%
<u>Kasilof Dip Net</u>							
2007	44	4,627	9	0%	234	2	2%
2008	44	5,552	14	0%	350	4	2%
2009	44	7,650	21	1%	653	7	2%
<u>Kenai River Dip Net</u>							
2007	22	21,908	23	0%	2,352	11	1%
2008	22	20,772	27	0%	2,747	17	1%
2009	22	26,171	35	0%	4,057	21	1%
<u>Fish Creek Dip Net</u>							
2007	0						
2008	0						
2009	7	1,452	8	1%	0	0	0%
<u>Unknown Fishery</u>							
2007		534	3	1%	62	1	3%
2008		622	4	1%	104	2	4%
2009		719	7	2%	130	5	8%
<u>Upper Cook Inlet Personal Use Fisheries Total</u>							
2007		28,639	29	0%	2,799	12	1%
2008		28,480	34	0%	3,310	18	1%
2009		37,753	46	0%	5,080	24	1%

^a Relative precision (SE*1.96)/estimate

Notes: EO 2-RS-1-26-07 expanded area for dipnetting in the Kasilof from July 23 to August 7.

EO 2-RS-1-31-07 extended the Kenai dip net fishery to be open 24 hours, daily.

EO 2-RS-1-23-08 expanded area for dipnetting in the Kasilof from July 17 to August 7.

EO 2-RS-1-24-09 expanded area for dipnetting in the Kasilof from July 18 to August 7.

EO 2-RS-2-25-09 opened Fish Creek to dipnetting for sockeye only from 6am to 1pm, August 1-7; flounder could not be retained in the Fish Creek dip net fishery.

Table 5.-Sockeye salmon exploitation rate (%) by Upper Cook Inlet personal use and other fisheries, 2007-2009.

Year	Total Run ^a	Total Harvest	Personal Use Harvest	% of Harvest	Commercial Harvest	% of Harvest	Sport Harvest	% of Harvest	Educational Harvest ^c	% of Harvest	Federal Subsistence Harvest ^d	% of Harvest
<i>Kasilof River</i>												
2007 ^a	1,015,956	679,690	58,236	9%	616,158	91%	3,693	0.5%	1,573	0.2%	30	0.004%
2008 ^a	1,050,079	746,575	77,483	10%	660,445	88%	7,470	1.0%	1,069	0.1%	108	0.01%
2009 ^b	809,357	541,673	99,681	18%	434,025	80%	6,835	1.3%	1,125	0.2%	7	0.001%
Mean	958,464	655,979	78,467	12%	570,209	86%	5,999	0.9%	1,097	0.2%	48	0.01%
<i>Kenai River</i>												
2007 ^a	3,417,484	2,806,808	291,270	10%	2,202,073	78%	308,812	11%	3,941	0.1%	712	0.03%
2008 ^a	2,307,224	1,871,856	234,109	13%	1,402,735		230,030	12%	3,374	0.2%	1,608	0.1%
2009 ^b	2,360,996	1,928,029	339,993	18%	1,325,961		255,295	13%	5,683	0.3%	1,097	0.1%
Mean	2,695,235	2,202,231	288,457	14%	1,643,590	74%	264,712	12%	4,333	0.2%	1,139	0.1%
<i>Fish Creek</i>												
					75%							
2007 ^a	48,344	20,199	-	-	69% ^c 19,910	99%	289	1.4%	-	-	-	-
2008 ^a	26,942	7,102	-	-	7,053	99%	26	0.4%	23	0.3%	-	-
2009 ^b	112,454	39,670	9,898	25%	29,117	73%	655	1.7%	-	-	-	-
Mean	62,580	22,324	9,898	25%	18,693	90%	323	1%	23	0.3%	-	-

^a From Tobias and Willette *In prep.*

^b 2009 sport and commercial harvests estimates are preliminary and subject to change (Willette, personal communication).

^c Educational harvests are reported in Shields 2010. Educational harvest estimates were partitioned as follows:
All Kenaitze Tribe harvests were attributed to the Kenai, all Kasilof Historical Association, Ninilchik Traditional Council, and Ninilchik Native Descendents harvests were attributed to the Kasilof, and Fish Creek harvests were only included when directly referred to in the FMR.

^d Federal subsistence harvests provided through personal communication with Robert Begich, ADF&G, Sport Fish, Soldotna.

Table 6.-Residence areas for Upper Cook Inlet personal use salmon fishery permit holders by year, 2007-2009.

	SWHS	Year		
Area of Residence	Area ^a	2007	2008	2009
<i>Regional breakdown^b</i>				
Region 1	A-H	0.2%	0.2%	0.2%
Region 2	J-N,P-T	97.1%	97.1%	96.7%
Region 3	I, U-Z	2.4%	2.5%	2.8%
Out of State/Unknown residence		0.3%	0.3%	0.2%
TOTAL		100%	100%	100%
<i>Region 2 breakdown</i>				
Anchorage area	L	59.7%	58.8%	57.5%
Kenai Peninsula area	P	25.7%	26.2%	24.0%
Matanuska-Susitna Valley area	K	14.4%	14.9%	18.3%
Other	J,M,N,Q-T	0.2%	0.1%	0.2%
TOTAL		100%	100%	100%

^a Statistical areas used in the Statewide Harvest Survey (Jennings et al. *In prep*).

^b Region 1 is Southeastern Alaska, Region 2 is Southcentral Alaska, and Region 3 is Interior Alaska.

Table 7.-Effort and harvest by area of residence for participants in the Upper Cook Inlet Personal Use fisheries, 2007-2009.

Region	Fishery	2007		2008		2009	
		Days fished	Total salmon	Days fished	Total salmon	Days fished	Total salmon
Region 1	Kenai dip net	35	468	34	399	37	362
	Kasilof dip net	3	23	5	10	5	21
	Kasilof gillnet	12	39	13	66	11	124
	Fish Creek					1	1
	Unknown fishery	3	18	2	55	0	0
Region 2	Kenai dip net	19,246	262,121	17,899	215,627	22,386	300,970
	Kasilof dip net	4,016	38,582	4,747	48,016	6,443	63,346
	Kasilof gillnet	1,360	13,295	1,384	21,452	1,541	23,163
	Fish Creek					1,260	8,769
	Unknown fishery	449	5,776	526	6,282	581	6,964
Region 3	Kenai dip net	472	6,220	477	6,118	732	9,539
	Kasilof dip net	141	1,386	140	1,338	265	2,868
	Kasilof gillnet	27	374	15	254	42	742
	Fish Creek					19	88
	Unknown fishery	18	290	11	199	22	161
Unknown / Out of State	Kenai dip net	72	875	51	724	48	496
	Kasilof dip net	17	120	24	236	21	230
	Kasilof gillnet	4	28	3	66	1	23
	Fish Creek					2	21
	Unknown fishery	3	11	0	0	2	32
Region 2 breakdown							
Anchorage	Kenai dip net	11,452	154,369	10,609	120,544	13,036	170,925
	Kasilof dip net	2,488	24,158	2,869	28,372	3,809	37,378
	Kasilof gillnet	508	5,181	482	7,653	582	9,087
	Fish Creek					400	2,571
	Unknown fishery	266	3,091	339	3,842	346	3,883
Kenai Peninsula	Kenai dip net	5,045	66,593	4,606	58,593	5,821	78,193
	Kasilof dip net	891	7,615	1,084	10,075	1,442	12,085
	Kasilof gillnet	535	5,025	618	8,837	644	8,859
	Fish Creek					17	82
	Unknown fishery	121	1,691	103	1,290	147	1,644
Mat-Su Valley	Kenai dip net	2,732	40,883	2,664	36,066	3,486	51,349
	Kasilof dip net	628	6,722	761	9,461	1,184	13,731
	Kasilof gillnet	315	3,054	282	4,907	311	5,082
	Fish Creek					843	6,116
	Unknown fishery	62	994	83	1,122	88	1,437
Other	Kenai dip net	17	276	20	424	43	503
	Kasilof dip net	9	87	6	108	8	152
	Kasilof gillnet	2	35	2	55	4	135
	Fish Creek						
	Unknown fishery	0	0	1	28		

Note: Data exclude "Orphan Permits."

Table 8.-Summary of Upper Cook Inlet personal use permit holders by year, number of fisheries fished, number of days fished, and household size, 2007-2009.

	% of permits	Salmon harvested	% of total harvest	Average % of bag limit filled	SE (% of bag limit filled)
Year					
2007	30.9	330,104	31.5	37.5	0.3
2008	30.9	300,957	28.7	34.5	0.2
<u>2009</u>	<u>38.2</u>	<u>417,920</u>	<u>39.8</u>	38.8	0.2
Total	100	1,048,981	100		
Number of fisheries fished ^a					
0	21.1	0	0	0	0
1	72.8	942,323	89.8	46.1	0.2
2	5.9	102,799	9.8	57.3	0.5
3	0.2	3,835	0.4	68.8	2.7
4	<u>0.00002</u>	<u>24</u>	<u>0.00002</u>	37	0
Total	100.00002	1,048,981	100		
Number of days					
0	21.1	0	0	0	0
1	45.7	472,690	45.2	38.6	0.2
2	20.8	319,912	30.5	54.0	0.3
3	7.8	150,275	14.3	63.3	0.4
4	2.9	63,647	6.0	69.3	0.6
5+	<u>1.7</u>	<u>42,457</u>	<u>4</u>		
Total	100	1,048,981	100		
Number of household members					
1	15.7	97,896	9.3	38.7	0.4
2	33.4	299,480	28.6	39.8	0.2
3	16.9	175,942	16.8	35.9	0.3
4	18.1	223,491	21.3	34.8	0.3
5	9.0	126,168	12.0	33.6	0.4
6	3.8	59,112	5.6	32.6	0.6
7+	<u>3.1</u>	<u>66,892</u>	<u>6.4</u>	34.5	0.7
Total	100	1,048,981	100		

Note: Data presented for "reported harvests" only; Harvests in Table 3 are estimates that include harvests by non-respondents.

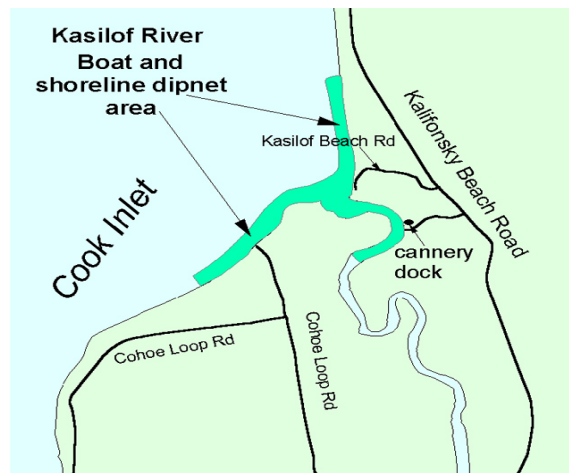
^a For all years combined.

FIGURES

Panel A



Panel B

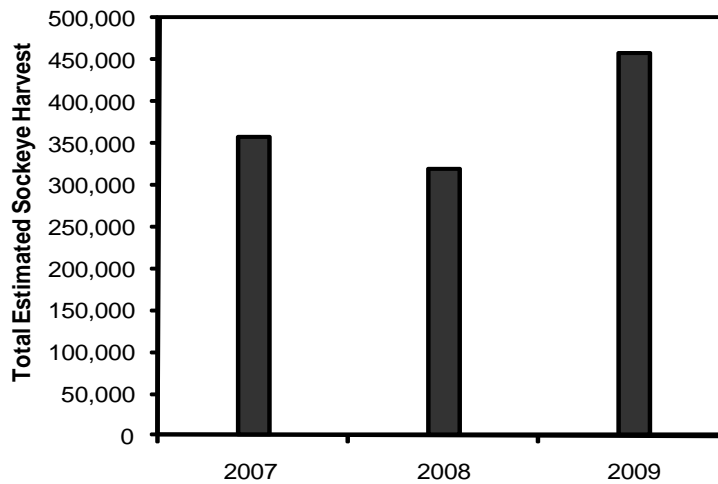


Panel C

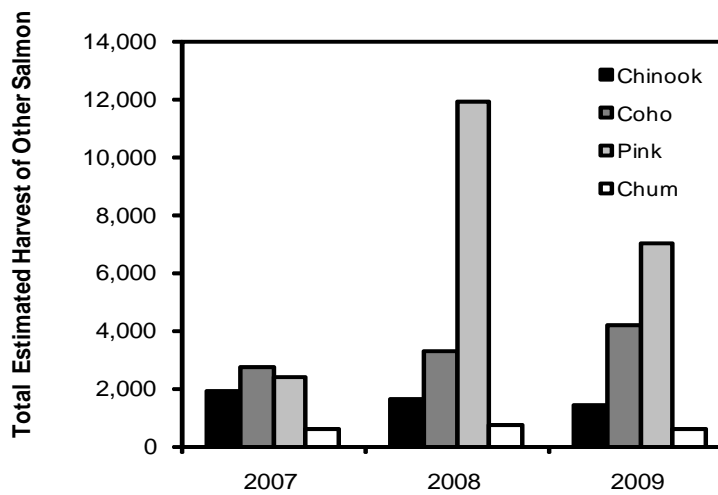


Kasilof River set gillnet fishery (Panel A), Kasilof River dip net fishery (Panel B), and Kenai River dip net fishery (Panel C).

Figure 1.-Upper Cook Inlet personal use salmon fisheries



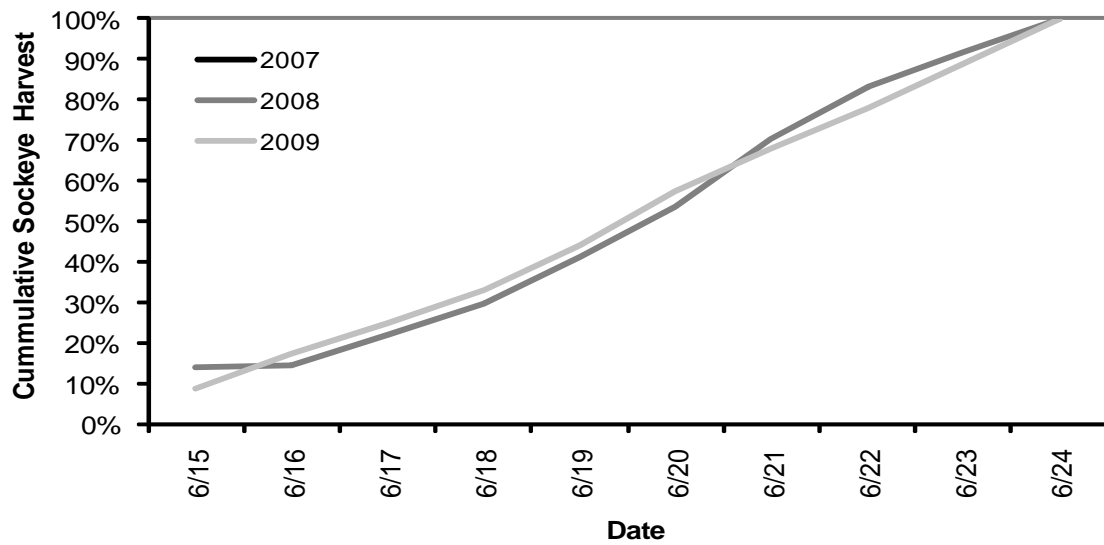
Note: All standard errors are less than ± 630



Note: All standard errors are less than ± 60

Note: Top figure shows harvest of sockeye salmon, and the bottom figure shows harvest for all other salmon species. Note the difference in the y-axis scales.

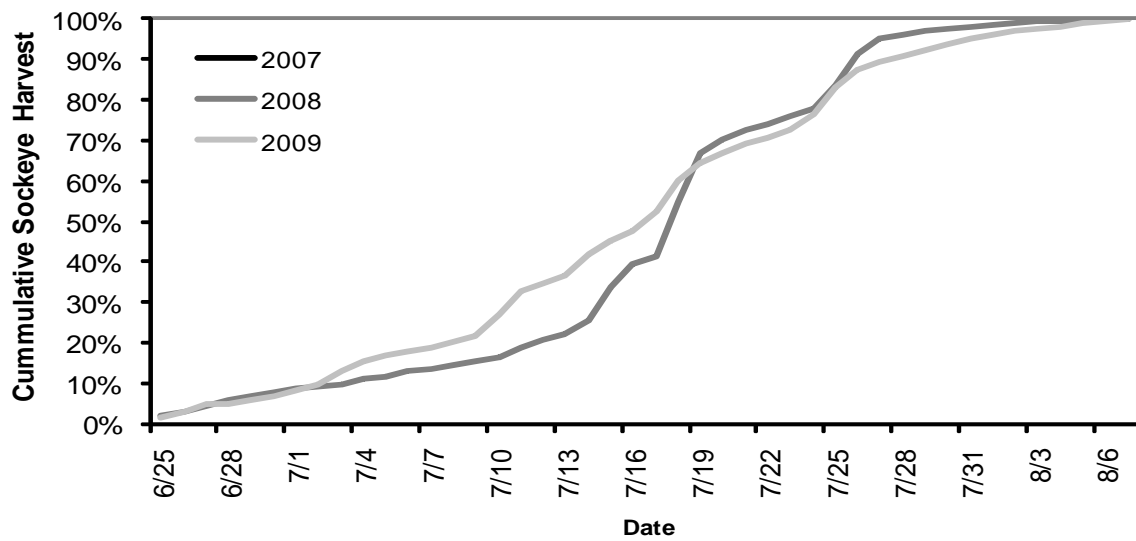
Figure 2.-Total estimated salmon harvest for all Upper Cook Inlet personal use fisheries combined.



Note: Total harvest of sockeye salmon by day is listed in Appendix B1.

Data presented are for "known" permits during legal harvest dates only.

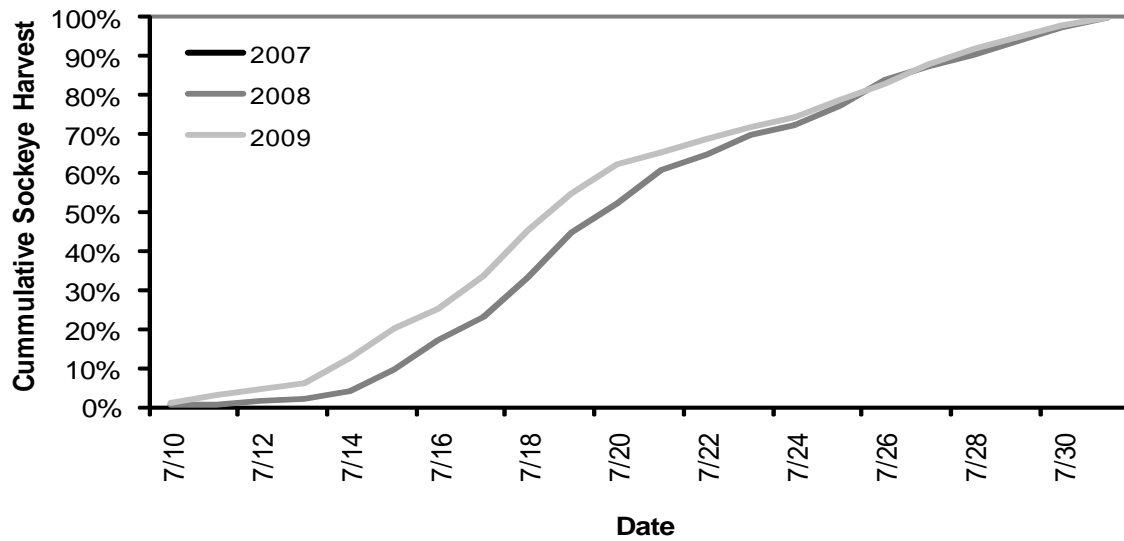
Figure 3.-Cumulative harvest timing for sockeye salmon during the Kasilof River personal use set gillnet fishery, 2007-2009.



Note: Total harvest of sockeye salmon by day is listed in Appendix B2.

Data presented are for "known" permits during legal harvest dates only.

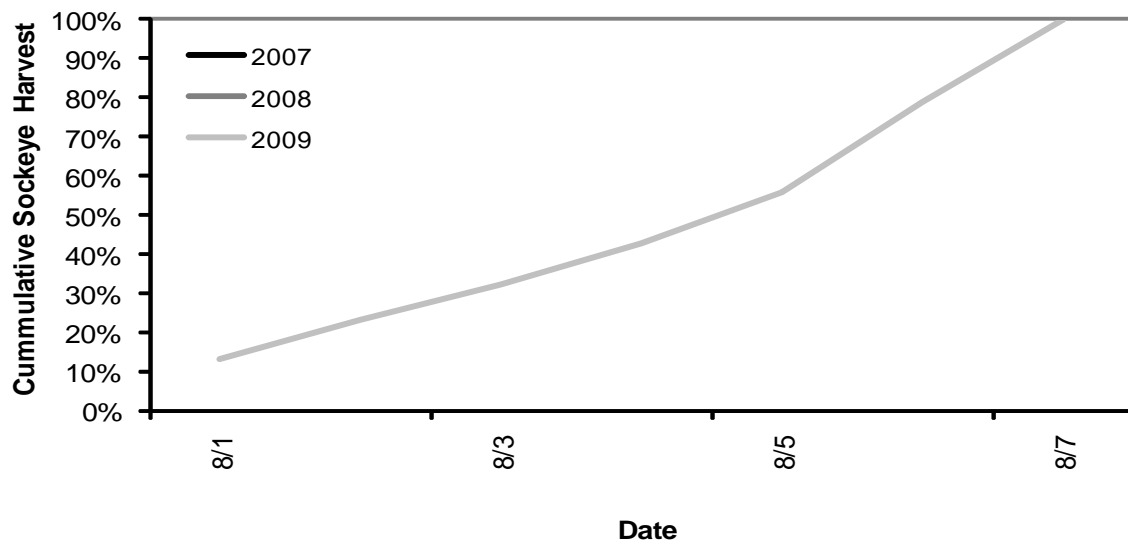
Figure 4.-Cumulative harvest timing for sockeye salmon during the Kasilof River personal use dip net fishery, 2007-2009.



Note: Total harvest of sockeye salmon by day is listed in Appendix B3.

Data presented are for "known" permits during legal harvest dates only.

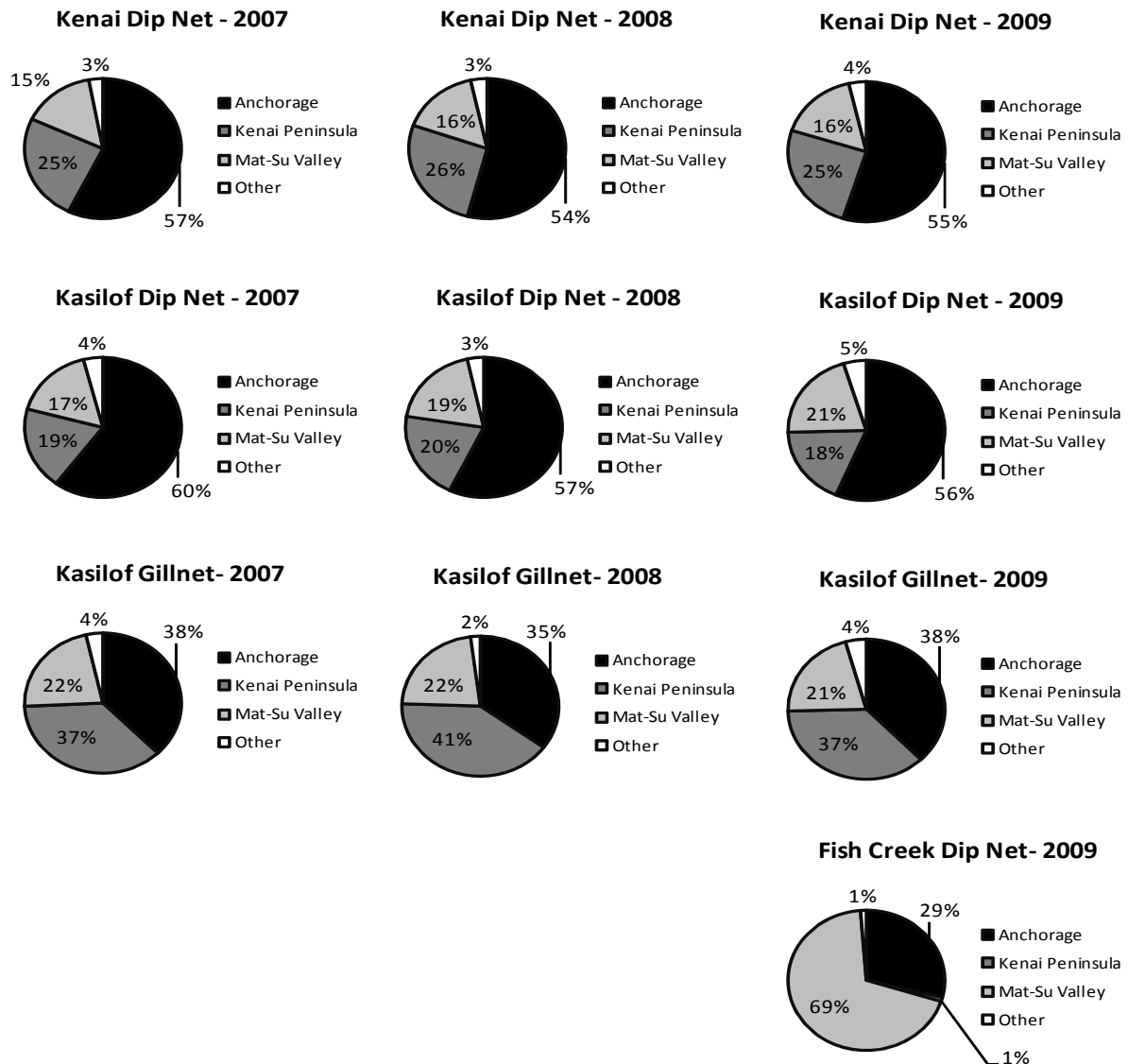
Figure 5.-Cumulative harvest timing for sockeye salmon during the Kenai River personal use dip net fishery, 2007-2009.



Note: Total harvest of sockeye salmon by day is listed in Appendix B4.

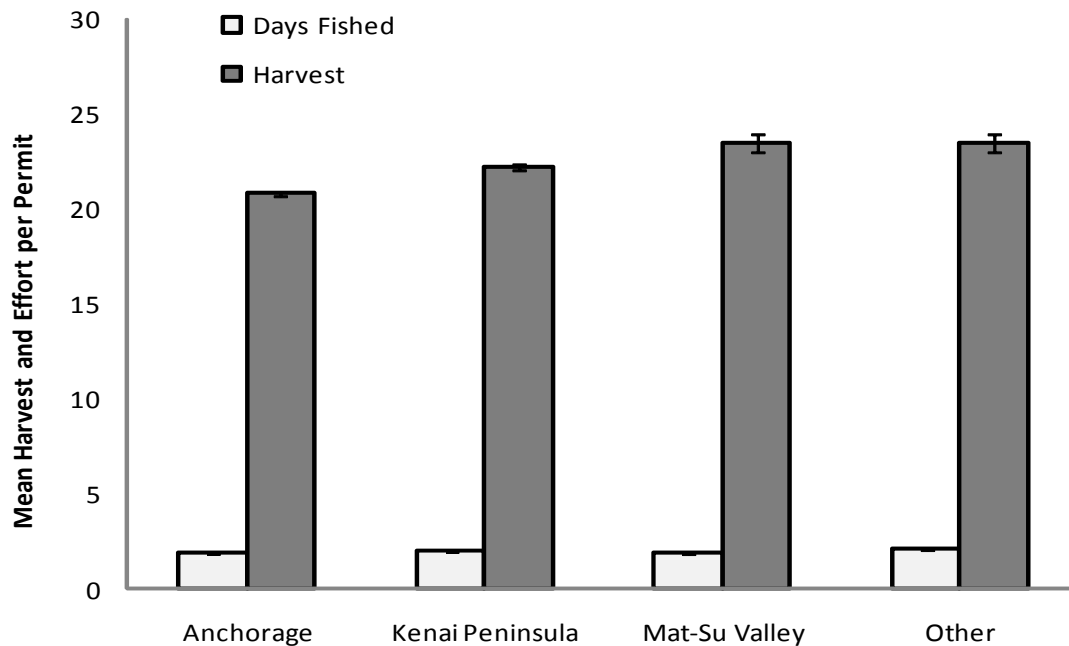
Data presented are for "known" permits during legal harvest dates only.

Figure 6.-Cumulative harvest timing for sockeye salmon during the Fish Creek personal use dip net fishery, 2007-2009.



Note: Data exclude "Orphan Permits"

Figure 7.-Proportion of salmon harvested in the Upper Cook Inlet personal use fisheries by residence of permit holders.



Note: Data presented for all permit holders who fished. Overall mean harvest per permit was 21.7 ± 0.07 .

For all permits, including those that "did not fish," the mean harvests per permit are as follows:

Anchorage: 15.8 ± 0.09 , Kenai Peninsula: 16.2 ± 0.13 , Mat-Su Valley: 18 ± 0.02 , Other: 17.4 ± 0.4 ;

Overall mean harvest per permit is 16.3 ± 0.07 and overall mean days fished per permit is 1.5 ± 0.01 .

Figure 8.-Mean harvest and days fished per permit by residence of participants in the Upper Cook Inlet personal use fisheries.

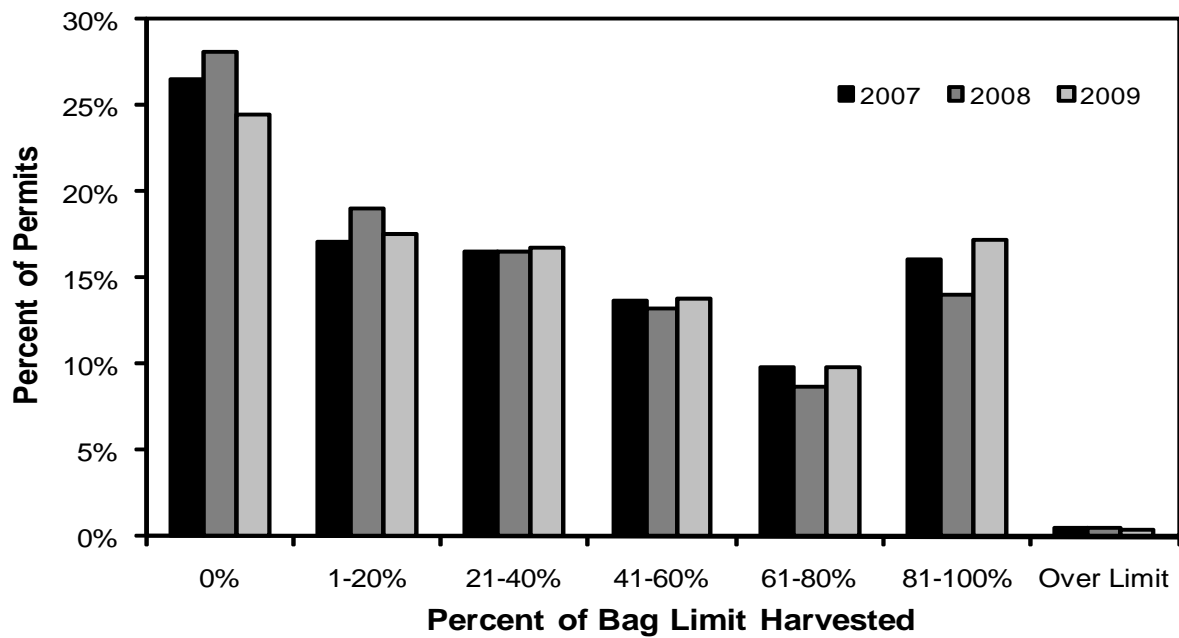
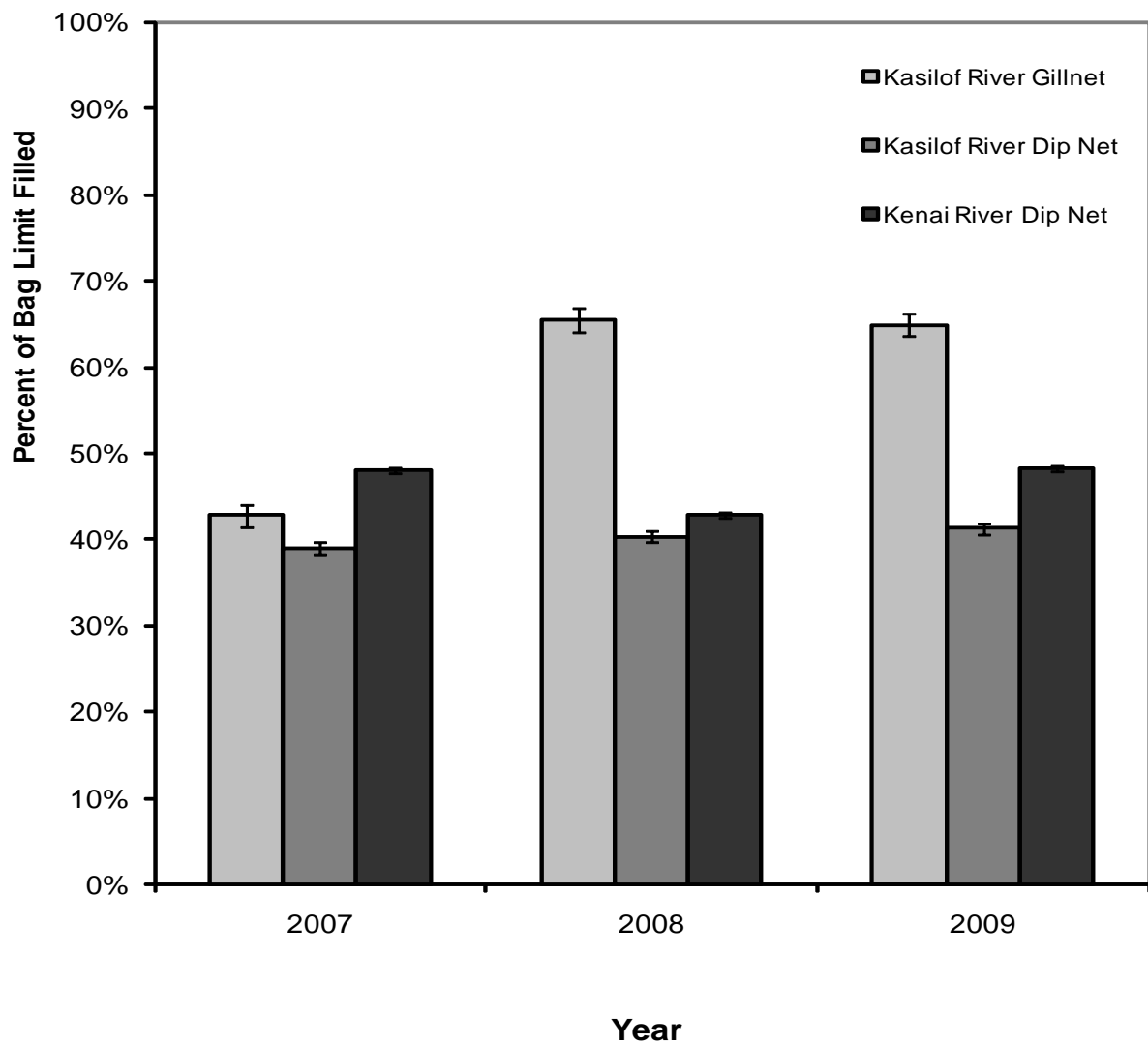
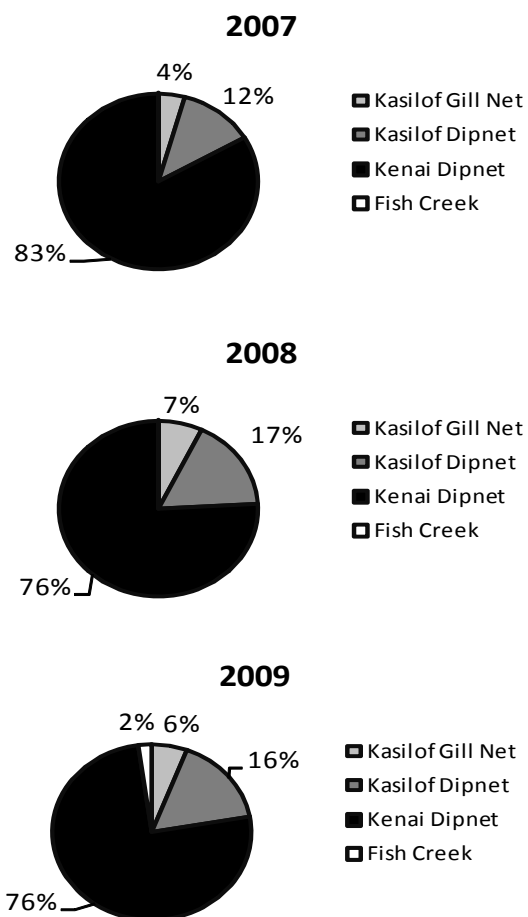


Figure 9.-Percent of annual limits filled by Upper Cook Inlet personal use salmon fishery permit holders, 2007-2009.



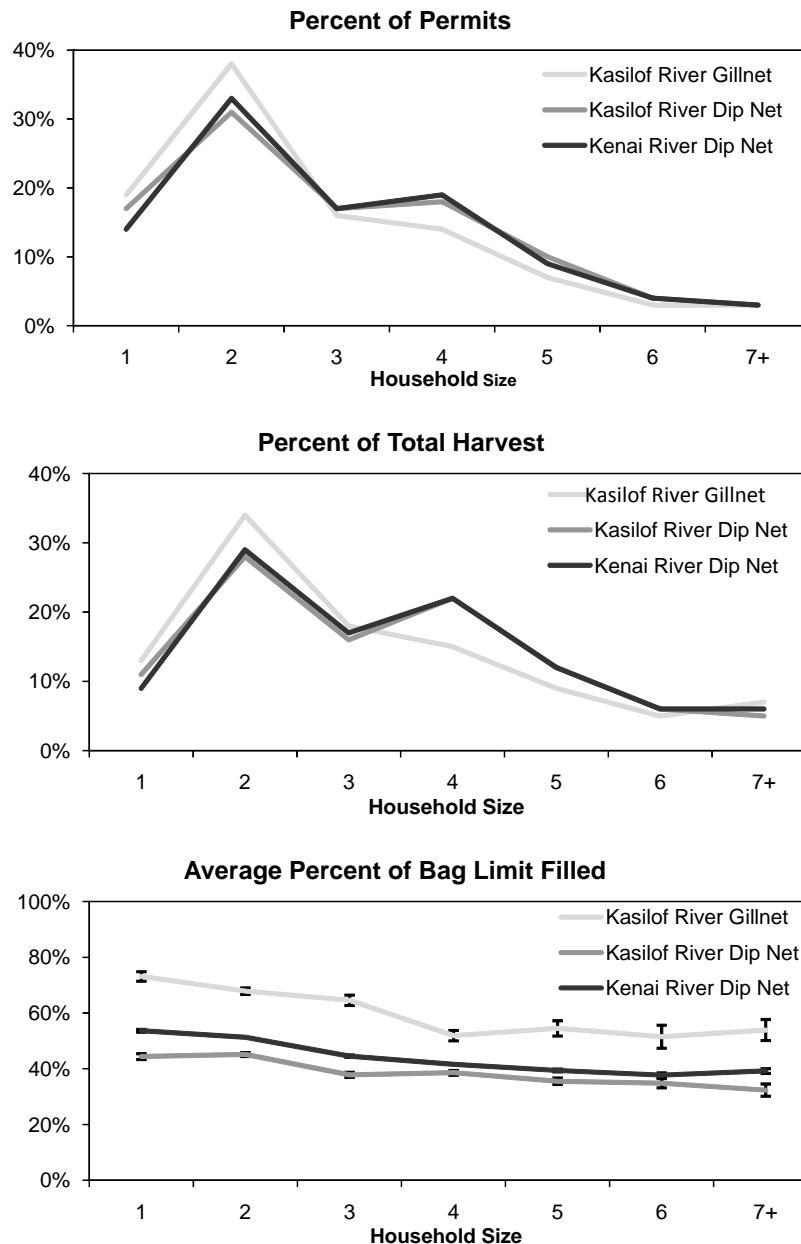
Note: Data presented are for permit holders that only participated in one fishery and the fishery was known (92% of permit holders who fished).

Figure 10.-Average percent of annual limit filled by fishery, 2007-2009.



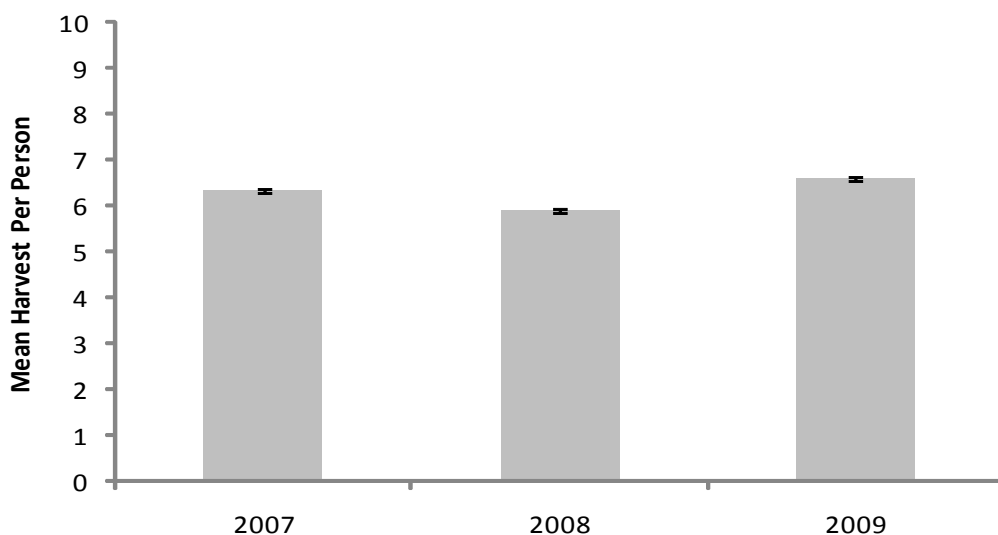
Note: Data presented exclude salmon reported from permits with "unknown" fisheries (2%).

Figure 11.-Percent of salmon harvest by fishery, 2007-2009.

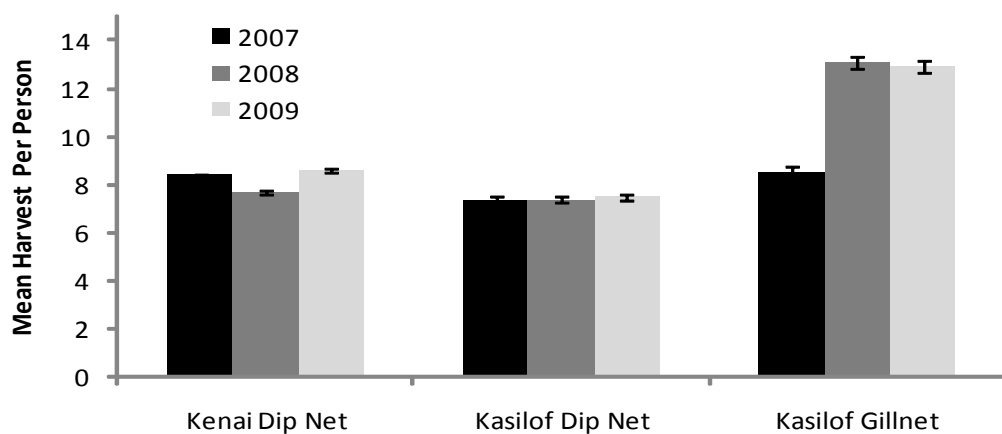


Note: Data presented are for participants that only fished in one of the following fisheries: Kenai dip net, Kasilof dip net, and Kasilof gillnet (~92% of permit holders who fished). These figures exclude data for participants who fished in multiple fisheries, did not fish at all, or did not accurately report their fishing location.

Figure 12.-Percent of permits, percent of total harvest, and average percent of annual limit filled by personal use salmon fishery and household size, 2007-2009.

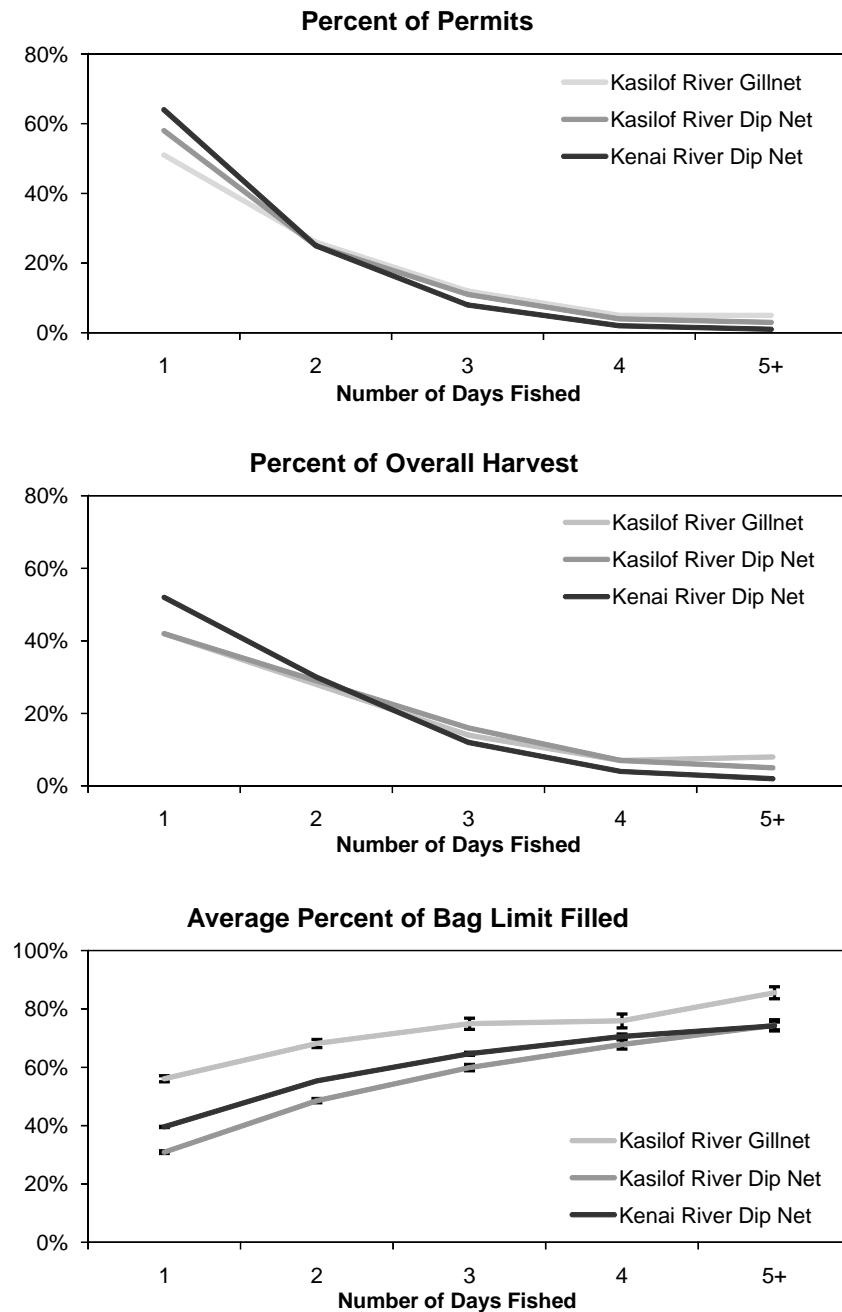


Note: Data presented are for the entire data set, including permits that did not fish.



Note: Data presented are for participants that only fished in one of the following fisheries: Kenai dip net, Kasilof dip net, and Kasilof gillnet (~92% of permit holders who fished). These figures exclude data for participants who fished in multiple fisheries, did not fish at all, or did not accurately report their fishing location.

Figure 13.-Mean harvest per person on the Upper Cook Inlet personal use permits.



Note: Data presented are for participants that only fished in one of the following fisheries: Kenai dip net, Kasilof dip net, and Kasilof gillnet (~92% of permit holders who fished). These figures exclude data for participants who fished in multiple fisheries, did not fish at all, or did not accurately report their fishing location.

Figure 14.-Percent of permits, percent of total harvest, and average percent of annual limit filled by personal use salmon fishery and number of days fished, 2007-2009.

**APPENDIX A. EXAMPLE OF AN UPPER COOK INLET
PERSONAL USE PERMIT**

Appendix A1.-Example of the 2009 Upper Cook Inlet personal use salmon permit.

Vendor Copy				Permit Number: 09-			
2009 Upper Cook Inlet Personal Use Salmon Fishery							
Last Name				First Name		Middle Initial	
Mailing Address							
City			State		Zip Code		
Phone Number: (907)							
Total Number of Household Members:		Total Household Salmon Harvest Limit:		You are allowed 25 salmon for the head-of-household, and 10 salmon for each additional household member. This is your salmon limit for the entire 2009 season. In addition, each household permit is allowed 10 flounders.			
2009 Alaska Resident Fishing License Number:				Alaska Driver's License Number:			
<p>I have read and understand the permit requirements (listed on the back) and agree to return this permit to Alaska Department of Fish and Game by August 15, 2009. Failure to return this permit is a violation of 5 AAC 77.015(c) and subject to a \$200 fine and loss of your future personal use fishing privileges.</p>							
Permit Holder Signature (Your name and address are subject to public disclosure)						Date	
Vendor Signature						Vendor Number:	

Permit Number: 09-									
2009 Upper Cook Inlet Personal Use Salmon Fishery Permit									
<p>☆ TIPS OF THE TAILS MUST BE REMOVED AND SALMON HARVEST MUST BE RECORDED IMMEDIATELY; WHICH, FOR PERSONAL USE FISHING, MEANS PRIOR TO LEAVING THE FISHING SITE OR CONCEALING THE FISH FROM VIEW.</p>									
Last Name		First Name		Middle Initial					
Names of Other Household Members									
Total Number of Household Members:		Total Household Salmon Harvest Limit:		You are allowed 25 salmon for the head-of-household, and 10 salmon for each additional household member. This is your salmon limit for the entire 2009 season. In addition, each household permit is allowed 10 flounders.					
<p><i>This permit is for gillnetting at the mouth of the Kaslof River and dipnetting at the mouth of the Kaslof and Kenai Rivers in 2009. Dipnetting at Fish Creek (near Wasilla) is only open by Emergency Order. You must have this permit with you while fishing, and you must record your harvest before you leave the fishing site. Check the Southcentral Sport Fishing Regulations for legal times, gear and species restrictions.</i></p>									
<p>Check this box if no one in your household fished <input type="checkbox"/></p>									
Report each day and location you fished, record your catch, even if you didn't catch anything.									
LOCATION FISHED (CHECK ONE)				HARVEST BY SPECIES					
DATE	Kenai River	Fish Creek	Kaslof River	RED	CHUM	KING	COHO	PINK	Flounder
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
M / Day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
<p>Return this permit to Fish and Game by August 15, 2009.</p> <p><i>You must return your permit even if you did not fish.</i></p>									

-continued-

Permit Requirements and Vendor Instructions

Permit Requirements

1. Applicant must be an Alaska Resident.
2. Applicant must have a valid 2009 Alaska resident Sport Fishing License or possess an ADF&G Permanent Identification card (PID – a permanent sport fishing, hunting, trapping license) or Disabled Alaska Veterans (DAV) license or applicant is under the age of 16 years.
3. Only ONE permit per household is allowed.
4. Permits **MUST** be returned to Fish and Game by August 15, 2009, even if the permit holder did not fish. Failure to return this permit is a violation and subject to a \$200 fine and loss of future personal use fishing privileges. Your harvest information is vital to the management and conservation of the resource.

SPECIAL INSTRUCTIONS TO THE VENDOR:

- Return your vendor copies each month to Fish & Game in the envelopes provided.
- All unissued permits and all vendor copies of permits must be returned after the fishery closes or by Sept. 15, 2009.

Send these in the envelopes provided to:

State of Alaska – Department of Fish & Game
Personal Use Salmon Permits
333 Raspberry Rd.
Anchorage, AK 99518-1599

Additional Questions?

Call the Sport Fish Information Center at (907) 267-2218

To Issue a Permit

1. Ask to see the applicant's 2009 Alaska sport fishing license or PID or DAV or identification of under 16 years of age.
2. Write the license number in the space provided on the top of the form.
3. Have the applicant fill out his/her name, address, and driver's license number on the top and bottom of the form, including names of other household members.
4. A household is allowed 25 salmon for the head-of-household and 10 salmon for each additional household member. A household is allowed 10 flounders.
5. Vendor must determine the total number of household members and the total salmon harvest limit, and write it in the spaces provided on the top and bottom portion of the form.
6. Applicant must sign and date the top portion. The Vendor must also sign and provide their vendor number.
7. The Vendor returns the Top portion to Fish and Game, and the applicant gets the Bottom.
8. Vendor is responsible for verifying that ALL the identifying information on the top and bottom of the form is complete. Do **NOT** leave any BLANK spaces.
9. Do Not allow people to walk out with blank permits.



PLACE
FIRST-
CLASS
POSTAGE
HERE

REMOVE BOTH TIPS OF THE TAIL FIN
FROM SALMON CAUGHT IN
PERSONAL-USE FISHERIES



**STATE OF ALASKA
DEPARTMENT OF FISH & GAME
PERSONAL USE SALMON PERMITS
333 RASPBERRY ROAD
ANCHORAGE AK 99518-1599**



**APPENDIX B. SOCKEYE HARVEST BY DATE DURING THE
UPPER COOK INLET PERSONAL USE FISHERIES, 2007-2009**

Appendix B1.-Sockeye harvest by date during the Kasilof River set gillnet fishery, 2007-2009.

Date	Harvest								
	2007			2008			2009		
	Total	Mean ^a	SE	Total	Mean ^a	SE	Total	Mean ^a	SE
Jun 15	1,585	10.8	0.8	1,831	13.4	0.9	2,073	13.4	0.9
Jun 16	1,622	9.5	0.7	1,314	10.5	0.7	1,992	12.2	0.8
Jun 17	1,091	8.3	0.7	1,585	11.6	0.8	1,820	10.8	0.7
Jun 18	1,572	10.1	0.7	1,668	13.0	1.2	1,986	12.3	0.9
Jun 19	1,503	10.1	0.8	2,519	15.9	0.9	2,643	14.9	1.0
Jun 20	1,704	10.0	0.7	2,707	14.6	0.8	3,172	15.6	0.8
Jun 21	1,231	8.7	0.7	3,582	18.5	1.0	2,470	16.0	1.0
Jun 22	1,266	8.7	0.6	2,751	17.7	1.0	2,389	16.1	1.0
Jun 23	1,166	9.6	0.8	1,867	16.8	1.6	2,611	17.6	1.0
Jun 24	633	9.2	2.0	1,772	20.8	1.6	2,630	22.3	1.4

Note: Data presented are for "known" permits during legal harvest dates only.

^a Mean is mean harvest per permit.

Appendix B2.-Sockeye harvest by date during the Kasilof River dip net fishery, 2007-2009.

	Harvest								
	2007			2008			2009		
	Total	Mean ^a	SE	Total	Mean ^a	SE	Total	Mean ^a	SE
Jun 25	232	5.8	1.3	786	13.1	1.6	734	7.5	0.7
Jun 26	209	5.6	1.0	495	9.9	1.3	960	7.8	0.6
Jun 27	264	6.8	0.9	607	9.9	1.3	1,121	9.6	0.9
Jun 28	205	7.3	1.1	709	9.7	0.8	208	4.2	0.6
Jun 29	118	4.9	1.7	432	8.3	1.2	343	7.2	1.2
Jun 30	131	3.5	0.9	407	9.5	2.6	793	10.6	0.9
Jul 1	272	5.6	0.9	386	7.6	1.5	706	9.3	0.9
Jul 2	121	4.3	0.9	391	5.6	0.7	811	7.4	0.6
Jul 3	205	5.3	0.8	183	3.9	0.8	2,243	9.9	0.5
Jul 4	402	6.1	1.0	577	3.7	0.3	1,229	6.6	0.5
Jul 5	200	6.5	3.7	308	3.1	0.4	1,005	8.5	0.7
Jul 6	465	5.5	0.8	494	6.2	0.9	537	8.8	0.9
Jul 7	949	7.2	0.7	200	5.1	0.7	741	8.2	1.1
Jul 8	830	9.4	0.9	492	8.8	1.3	857	7.6	0.8
Jul 9	184	5.8	1.0	495	6.9	0.6	725	7.6	0.7
Jul 10	447	7.3	0.8	423	6.4	0.9	3,171	12.0	0.7
Jul 11	305	5.9	1.1	1,092	7.5	0.5	3,495	12.2	0.6
Jul 12	170	3.3	0.6	792	5.9	0.5	1,224	7.1	0.6
Jul 13	895	6.6	0.6	740	6.7	0.6	1,043	8.2	0.6
Jul 14	1,700	7.2	0.5	1,525	13.5	0.9	3,196	14.7	0.8
Jul 15	1,452	6.5	0.4	3,671	20.2	1.1	2,095	9.4	0.6
Jul 16	570	6.3	0.7	2,479	14.1	0.8	1,357	7.9	0.7
Jul 17	1,659	11.4	0.9	996	8.7	0.8	2,980	9.7	0.5
Jul 18	3,551	18.5	0.9	5,992	16.7	0.7	4,733	9.9	0.4
Jul 19	961	9.4	1.0	5,489	12.2	0.6	2,362	9.7	0.6
Jul 20	3,508	12.2	0.6	1,421	6.8	0.6	1,606	9.1	0.8
Jul 21	4,827	14.3	0.7	1,185	8.8	0.7	1,433	9.1	0.8
Jul 22	1,991	12.4	0.8	735	6.9	0.5	956	7.8	0.9
Jul 23	556	8.2	1.1	810	7.0	0.7	1,035	7.4	0.6
Jul 24	1,591	15.4	1.2	760	8.2	0.9	2,356	9.4	0.5
Jul 25	1,414	14.4	1.1	2,656	12.9	0.7	3,948	10.6	0.5
Jul 26	1,069	13.7	1.3	3,448	13.0	0.7	2,688	11.4	0.6
Jul 27	776	8.8	1.0	1,813	13.2	0.9	1,002	10.0	0.9
Jul 28	860	6.1	0.5	473	8.4	1	873	10.6	0.9
Jul 29	678	6.3	0.6	378	7.7	1.1	1,102	11.4	0.9
Jul 30	506	8.7	0.8	246	5.3	0.7	730	9.2	0.9
Jul 31	453	12.9	2.3	236	5.6	1.2	871	10.5	1.1
Aug 01	249	6.2	0.9	153	2.7	0.6	674	6.3	0.7
Aug 02	209	5.5	1.3	217	2.4	0.3	474	6.3	0.7
Aug 03	343	6.6	0.9	130	3.0	0.6	249	7.1	1
Aug 04	625	8.2	0.9	45	2.8	0.9	459	11.2	1.6
Aug 05	337	5.7	0.6	91	2.9	0.6	505	10.1	1
Aug 06	203	5.1	0.8	65	3.0	0.8	213	6.0	1.1
Aug 07	208	5.0	0.7	91	2.8	0.9	351	5.7	0.8

Note: Data presented are for "known" permits during legal harvest dates.

^a Mean is mean harvest per permit.

Appendix B3.-Sockeye harvest by date during the Kenai River dip net fishery, 2007-2009.

Date	Harvest								
	2007			2008			2009		
	Total	Mean ^a	SE	Total	Mean ^a	SE	Total	Mean ^a	SE
Jul 10	1,146	7.5	0.8	571	5.9	0.8	2,658	8.6	0.6
Jul 11	757	5.5	0.6	721	6.1	0.7	5,542	11.2	0.5
Jul 12	647	4.9	0.6	1,450	6.5	0.5	4,093	8.7	0.4
Jul 13	1,698	5.4	0.4	1,143	9.3	1	5,228	12.5	0.5
Jul 14	3,907	5.8	0.2	3,843	14.8	0.8	17,856	19.8	0.5
Jul 15	4,119	6.7	0.3	11,292	19.9	0.6	21,973	17.0	0.4
Jul 16	2,125	5.2	0.4	15,152	18.2	0.5	14,248	12.6	0.3
Jul 17	3,990	8.2	0.4	11,848	13.3	0.4	24,914	12.9	0.3
Jul 18	19,883	17.7	0.4	19,053	11.7	0.3	32,852	13.6	0.2
Jul 19	6,649	8.3	0.3	23,022	11.4	0.2	27,235	16.5	0.3
Jul 20	25,622	14.3	0.3	15,074	11.3	0.3	21,801	16.0	0.3
Jul 21	47,331	18.5	0.3	16,294	14.9	0.4	9,502	8.9	0.3
Jul 22	19,446	15.3	0.3	8,668	9.1	0.3	10,156	8.6	0.2
Jul 23	7,651	10.6	0.4	9,401	8.8	0.3	7,795	8.8	0.3
Jul 24	11,749	12.9	0.4	4,937	7.1	0.3	6,990	6.8	0.2
Jul 25	25,865	18.8	0.4	9,738	8.5	0.2	12,861	9.8	0.3
Jul 26	19,531	19.4	0.4	13,126	11.2	0.3	12,695	13.9	0.4
Jul 27	16,388	14.7	0.4	7,534	10.7	0.3	13,187	18.4	0.5
Jul 28	16,061	11.5	0.3	5,769	9.4	0.4	12,270	18.1	0.5
Jul 29	6,482	8.3	0.3	6,165	10.6	0.4	8,533	14.1	0.4
Jul 30	6,432	10.8	0.4	7,009	10.6	0.4	9,033	15.1	0.5
Jul 31	4,855	10.5	0.4	5,331	10.1	0.4	5,451	11.2	0.5

Note: Data presented are for "known" permits during legal harvest dates.

^a Mean is mean harvest per permit.

Appendix B4.-Sockeye harvest by date during the Fish Creek dip net fishery, 2007-2009.

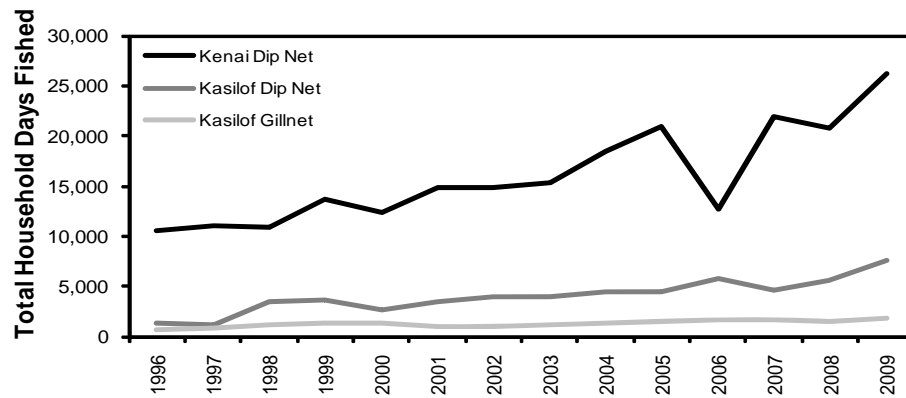
Date	Harvest								
	2007			2008			2009		
	Total	Mean ^a	SE	Total	Mean ^a	SE	Total	Mean ^a	SE
Aug 01							933	7.4	0.7
Aug 02							714	4.8	0.5
Aug 03							646	5.2	0.5
Aug 04							743	5.2	0.5
Aug 05							945	5.9	0.5
Aug 06							1,639	9.1	1.6
Aug 07							1,494	8.4	0.5

Note: Data presented are for "known" permits during legal harvest dates only.

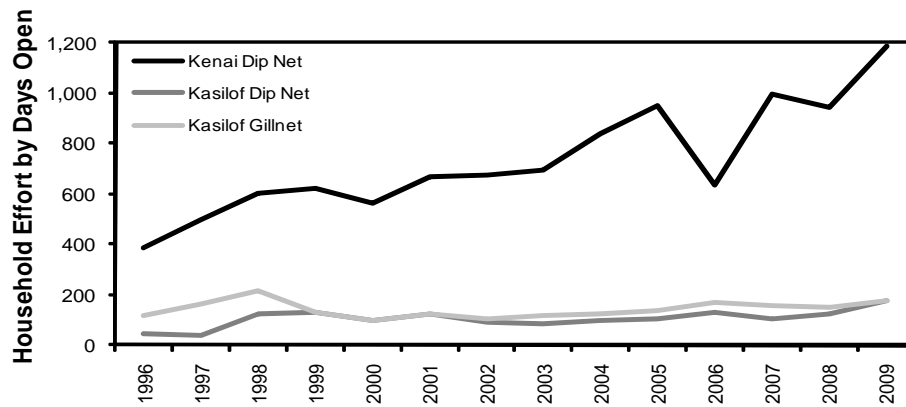
^a Mean is mean harvest per permit.

**APPENDIX C. EFFORT AND HARVEST TRENDS DURING THE
UPPER COOK INLET PERSONAL USE FISHERIES, 1996-2009**

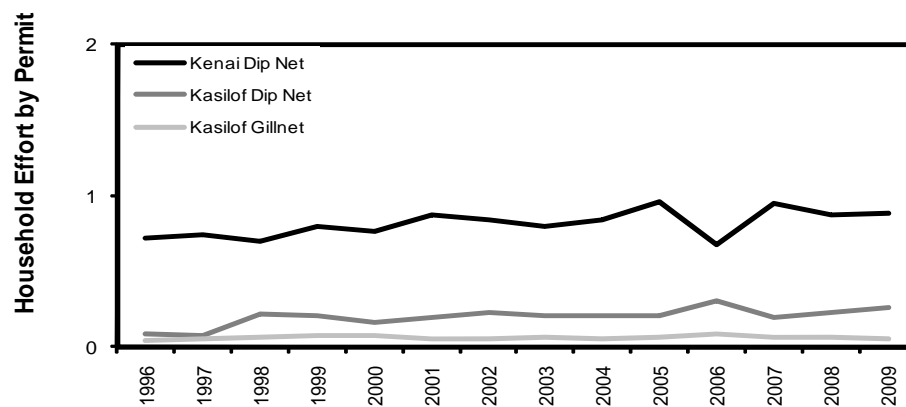
Appendix C1.-Trends in fishing effort during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than ± 90 .

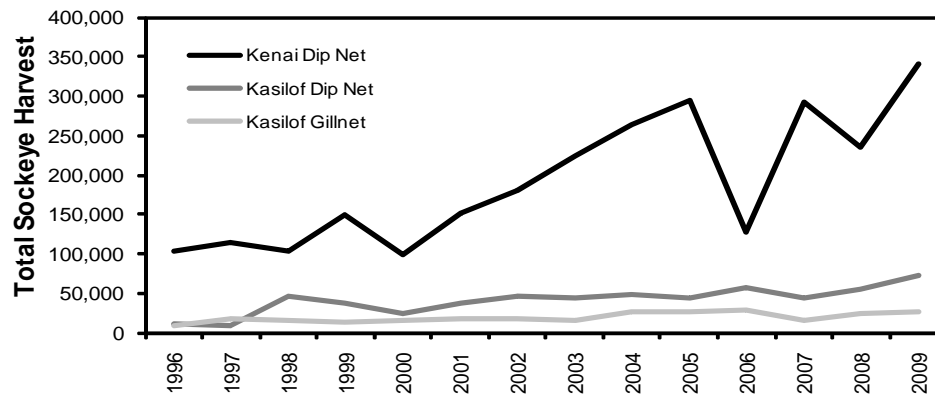


Note: calculated as overall number of household days fished/number of days the fishery was open

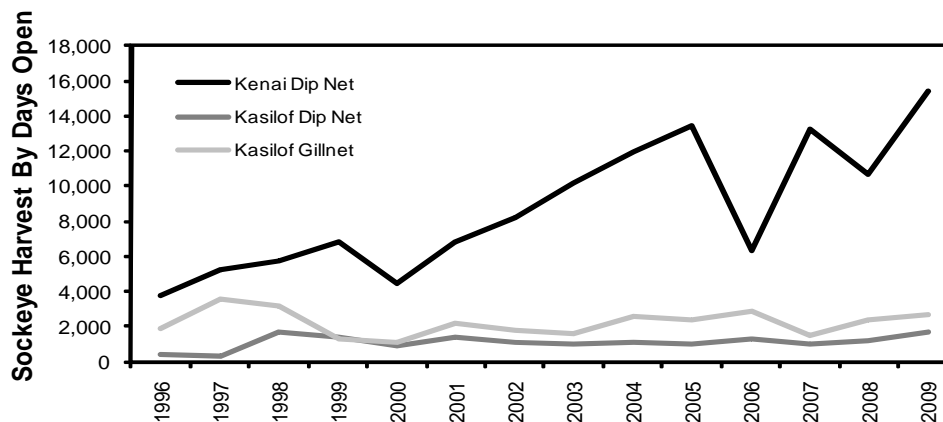


Note: calculated as the overall number of household days fished/number of permits.

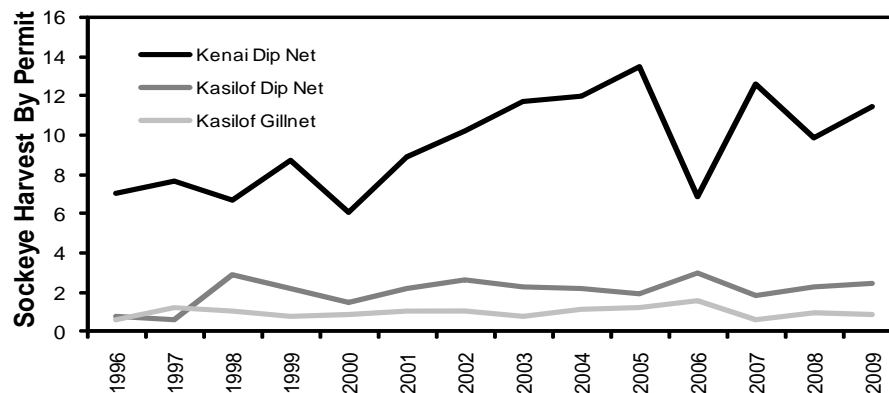
Appendix C2.-Trends in sockeye salmon harvest during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than $\pm 1,100$.

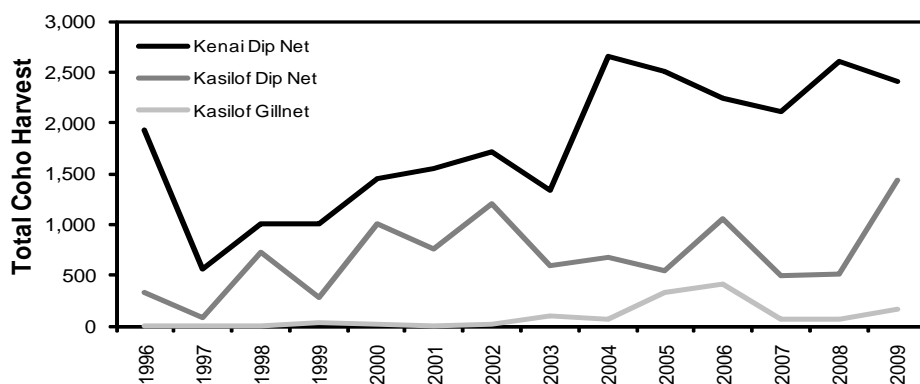


Note: calculated as the overall sockeye harvest/number of days the fishery was open each year.

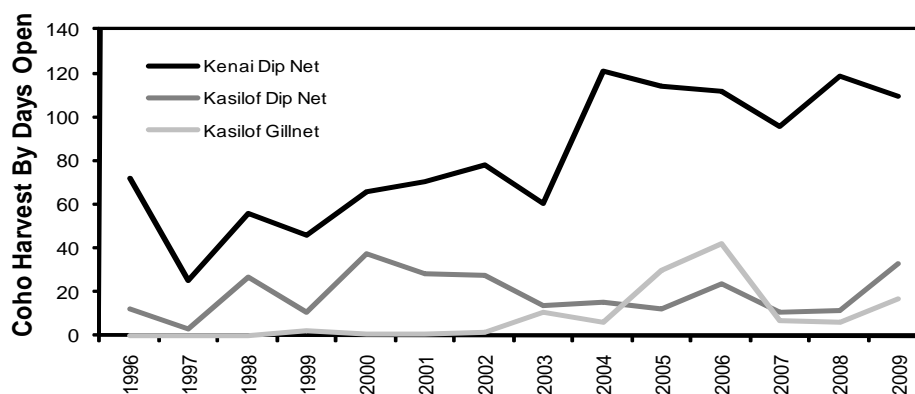


Note: calculated as the overall sockeye harvest/number of permits issued each year.

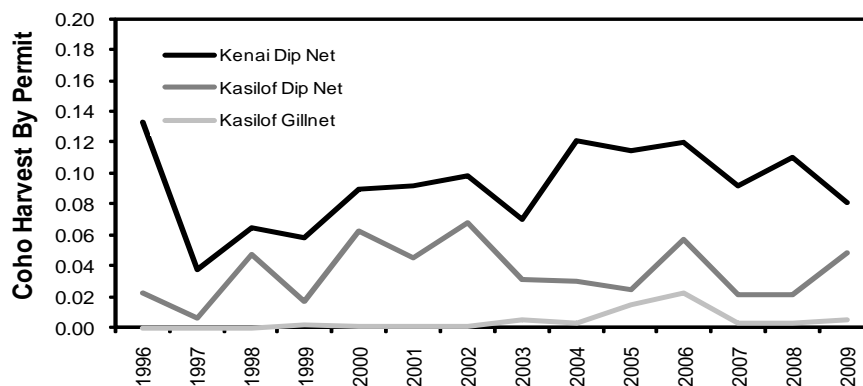
Appendix C3.-Trends in coho salmon harvest during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than ± 110 .

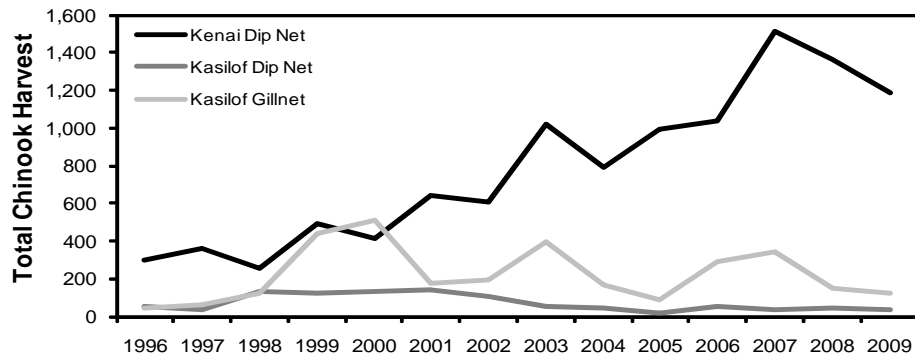


Note: calculated as the overall coho harvest/number of days the fishery was open each year.

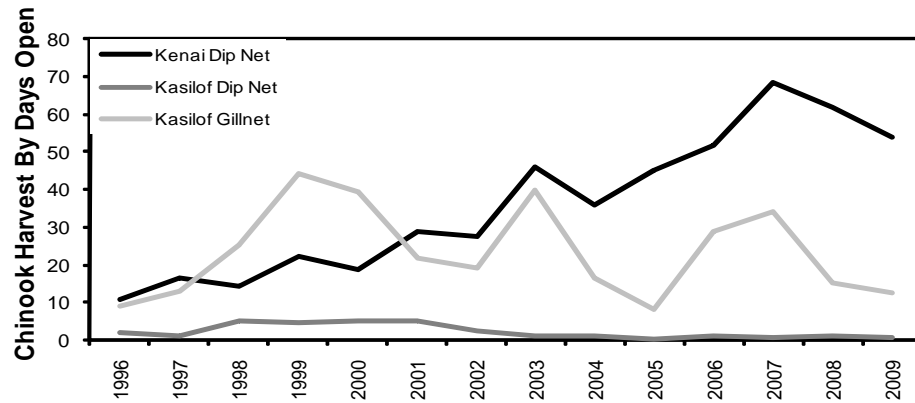


Note: calculated as the overall coho harvest/number of permits issued each year.

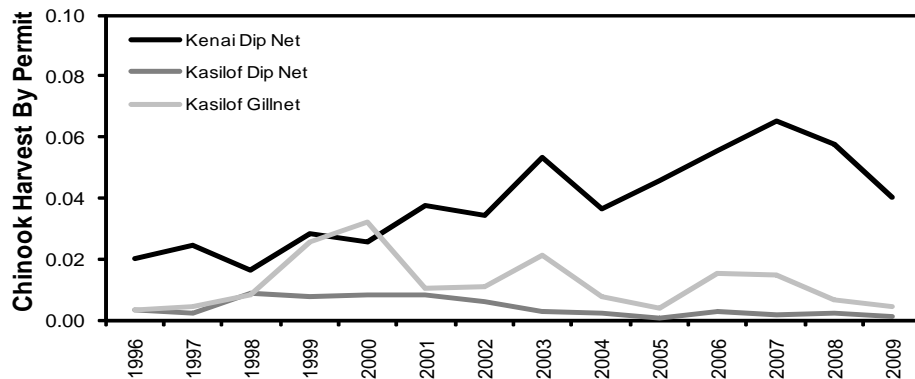
Appendix C4.-Trends in Chinook salmon harvest during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than ± 30 .

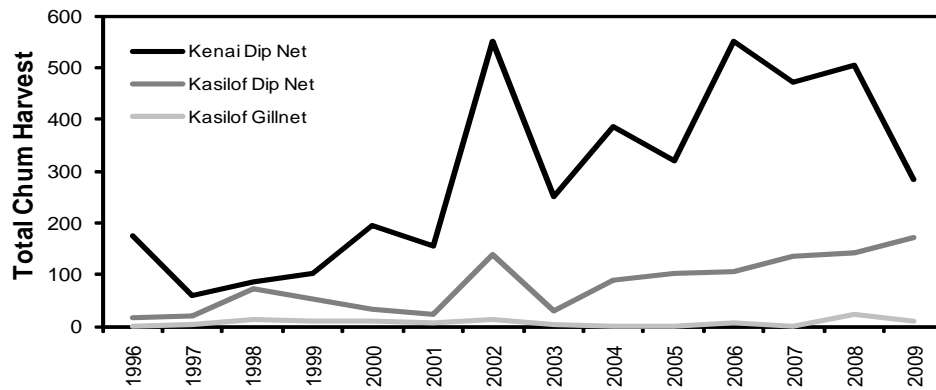


Note: calculated as the overall Chinook harvest/number of days the fishery was open each year.

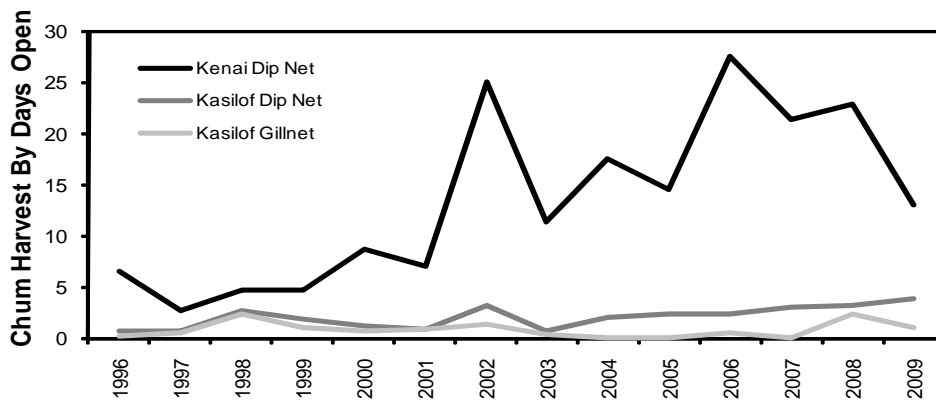


Note: calculated as the overall Chinook harvest/number of permits issued each year.

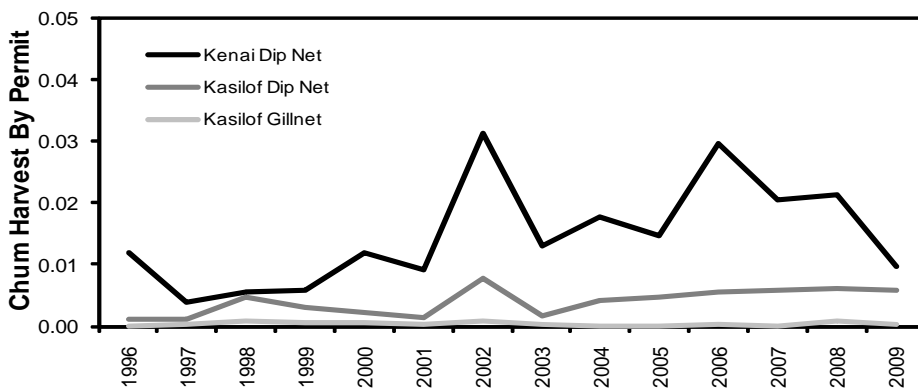
Appendix C5.-Trends in chum salmon harvest during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than ± 40 .

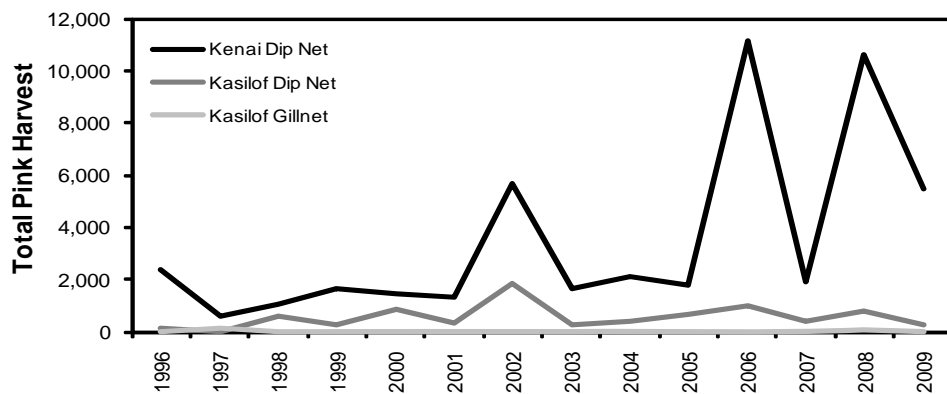


Note: calculated as the overall chum harvest/number of days the fishery was open each year.

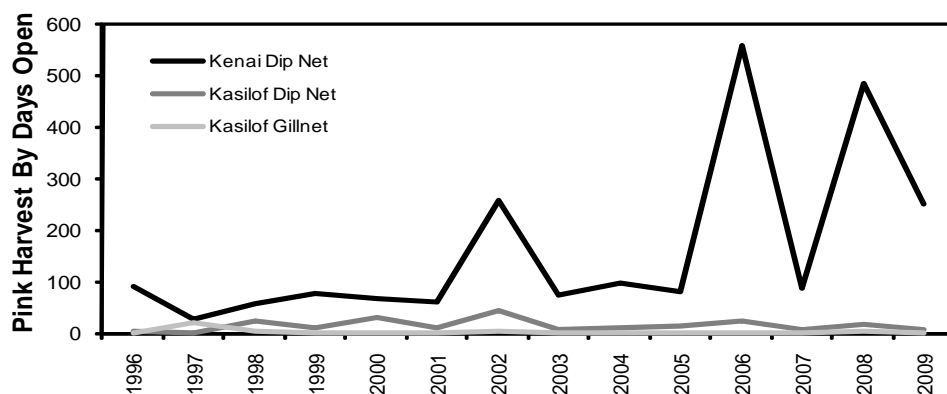


Note: calculated as the overall chum harvest/number of permits issued each year.

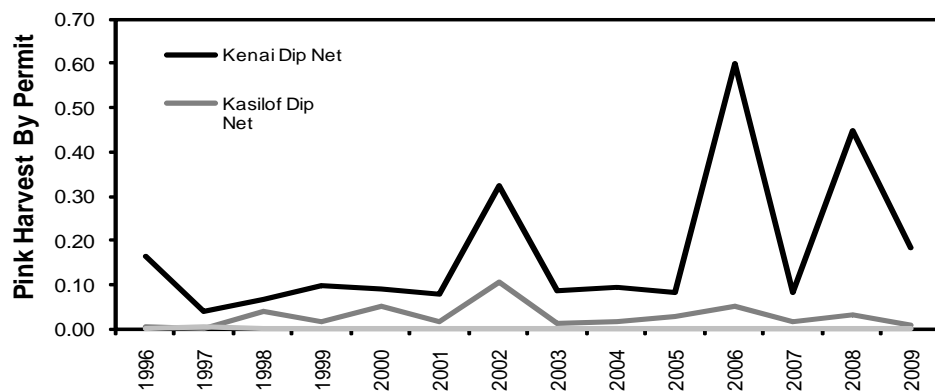
Appendix C6.-Trends in pink salmon harvest during the Upper Cook Inlet personal use salmon fisheries, 1996-2009.



Note: all standard errors are less than ± 110 .



Note: calculated as the overall pink harvest/number of days the fishery was open each year.



Note: calculated as the overall pink harvest/number of permits issued each year.