Fishery Data Series No. 13-59

Upper Cook Inlet Personal Use Salmon Fisheries, 2010–2012

by

Kristine J. Dunker

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

Symbols and Abbreviations

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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 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)

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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ABSTRACT

From 2010 to 2012, 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. Participation in these fisheries peaked in 2011 when 34,515 permits were issued. Permit response rate averaged 80% during this period. 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. From 2010 through 2012, sockeye salmon harvest averaged 21,447 fish for the Kasilof River set gillnet fishery, 64,653 fish for the Kasilof River dip net fishery, 484,770 fish for the Kenai River dip net fishery, and 14,471 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 households did not fill their annual limit, and differences in their success varied with the number and types of 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, Alaska has undergone numerous regulatory changes over the past two decades, reflecting 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, 4 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 in any of the four personal use fisheries. Permits, filled out in their entirety with participation dates, locations, and harvests, must be returned to the Alaska Department of Fish and Game (ADF&G) following each fishing season (Appendix A1). This report presents harvest, effort, and other summary information from UCIPU salmon permits issued during the 2010–2012 seasons for the Kenai River dip net, Kasilof River dip net, Kasilof River set gillnet, 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 (Alaska Administrative Code 5 AAC 77.540).

Kasilof River

Two personal use fisheries occur in the Kasilof River, which drains Tustumena Lake south of the Kenai River: the set gillnet and the dip net fisheries (Figure 1, Panels A and B). Inseason management of the set gillnet fishery is the responsibility of ADF&G Division of Commercial Fisheries (CF). CF 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, requiring inseason management only if the projected biological escapement goal cannot be met based on the inseason sonar count. Inseason management of the dip net fishery is the responsibility of ADF&G Division of Sport Fish (SF). The dip net fishery also opens and closes by regulation, and inseason management is only

required if the biological escapement goal cannot be met based on the projected inseason sonar count.

Kenai River

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

Fish Creek

Fish Creek drains Big Lake, which is located approximately 60 highway miles north of Anchorage, and empties into Knik Arm. The fishery is accessed by boat from Knik Arm or from Knik-Goose Bay Road. SF is responsible for inseason management of the Fish Creek dip net fishery as well as the 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 opened only by emergency order when ADF&G projected escapement of sockeye salmon into Fish Creek exceeding 70,000 fish.

FISHING REGULATIONS

Regulations for these fisheries are outlined in Alaska administrative codes 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 combined is 25 salmon for the head of the household and 10 salmon for each additional household member. Unless closed to harvest by emergency order, there is an annual limit of 1 Chinook salmon from the Kenai River dip net fishery. No Chinook salmon can be retained from the Kasilof River dip net fishery, but 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.

Kasilof River Set Gillnet

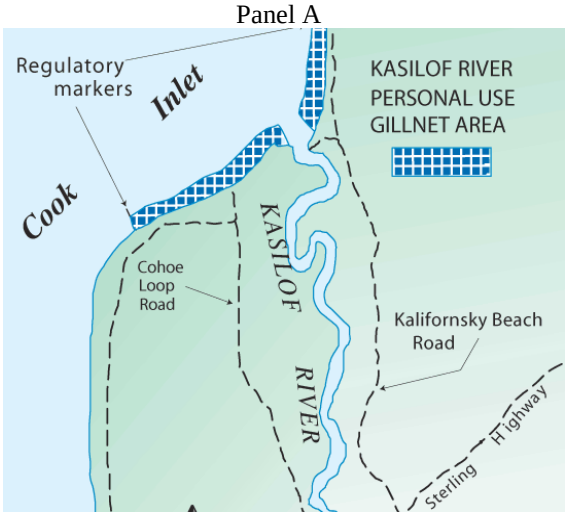
The legal fishing area is from ADF&G regulatory markers located at the river mouth to ADF&G commercial fishing regulatory markers located approximately 1 mile from the mouth in either direction (Figure 1, Panel A). Additionally, fishing is prohibited more than 1 mile from the mean high tide mark and 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 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 15 June through 24 June, between 0600 and 2300 hours.

Kasilof River Dip Net

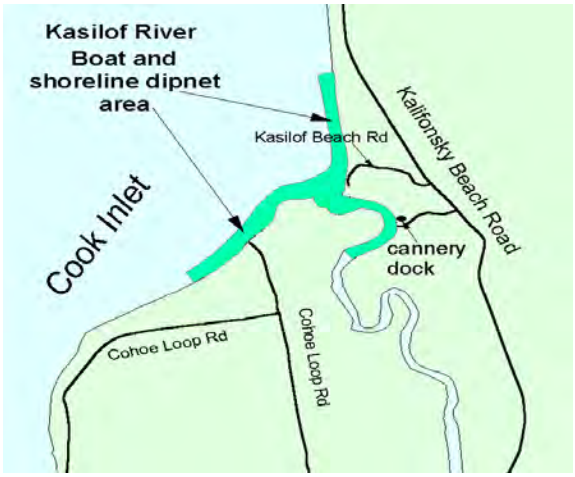
Dipnetting is allowed in the area from regulatory markers located on the Cook Inlet beaches outside of the terminus of the river upstream for 1 mile (Figure 1, Panel B). The dip net season is open 24 hours per day and begins on 25 June and ends on 7 August.

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.

Panel A



Panel B



Panel C

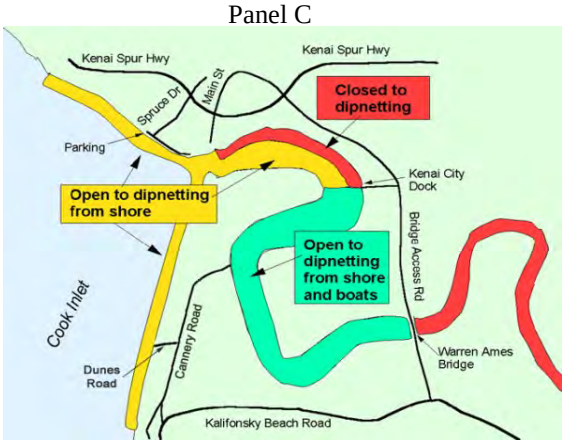


Figure 1.–Maps of Upper Cook Inlet personal use salmon fisheries: A) Kasilof River set gillnet fishery, B) Kasilof River dip net fishery, and C) Kenai River dip net fishery.

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 2-stroke motor other than one that is manufactured as a direct fuel injection motor. The fishery is open from 10 July through 31 July, 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 one-quarter mile upstream of the Knik-Goose Bay Road. Regulations for the years 1996-2001 allowed personal use dipnetting from 10 July through 31 July, between 1100 and 2300 hours.

In 2002, regulations were modified so that the fishery opened only by emergency order, but the area and location of the fishery remained the same. In 2010, Fish Creek was opened from 1100 to 2300 hours from 24 July to 31 July and in 2011, it was open the same hours from 29 July to 31 July. Fish Creek did not open in 2012.

OBJECTIVES

From 2010 through 2012, the objectives of the study were as follows:

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

METHODS

STUDY DESIGN

All participants in 2010–2012 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 their signature. Vendor copies were returned to the Anchorage ADF&G office periodically throughout the summer using courtesy reply envelopes provided by SF. 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 applicant. Participants were required to have this permit in their possession when personal use fishing. Immediately

upon harvesting a fish, participants were required to record harvest information including fishery, dates fished, and number of salmon harvested by species. 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 15 August of each year.

Households that did not return their permits received up to 2 reminder letters featuring a copy of the original permit with the original permit number. These letters stated that ADF&G had not received their completed permits and reminded participants to send their harvest information immediately. The second reminder letter was mailed after allowing 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 had harvested in excess of their seasonal limit, fished out of season, were not Alaska residents, or had committed some other regulatory violation. This information was entered into the database as it was recorded on the permit.

All households that returned their permits before the second reminder letter were considered "compliant" households. Permits that were returned after the second reminder letter was mailed were considered "noncompliant" households. Participation and harvest by noncompliant households was estimated by calculating the mean participation (household-days fished) and harvest by species for noncompliant permits that were returned. These were then expanded to include all nonrespondents (i.e., both noncompliant households and those that did not return a permit at all). Total estimates of participation and harvest by species for each fishery were obtained by summing the estimates for the noncompliant households with the information obtained from compliant households.

Occasionally, vendors failed to return vendor copies from some of the permits they had issued. This resulted in some households 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 permits lacking a vendor copy ("orphan permits"). This response rate was applied to the orphan permits to estimate the total number of permits issued without a vendor copy.

DATA ANALYSIS

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

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

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 ("orphan permits"),

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

M = the total number of permits with vendor cards,

where

$$\hat{p} = \frac{m}{M}, \tag{2}$$

and where

m = the number of permits with vendor cards returned before the first reminder letter was mailed.

Variance was estimated as follows:

$$\hat{V}\left[\hat{N}\right]=\left[\frac{o^2\hat{V}\left[\hat{p}\right]}{\hat{p}^4}\right] \tag{3}$$

where

$$\hat{V}\left[\hat{p}\right]=\left(\frac{\hat{p}(1-\hat{p})}{M-1}\right). \tag{4}$$

The estimated number of issued permits was divided in 4 groups:

$$\hat{N}=N_{cf}+N_{cz}+\hat{N}_{df}+\hat{N}_{dz}, \tag{5}$$

where

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

N_{cz} = the number of compliant permits that reported no fishing,

$\hat{N}_{df}$ = the estimated number of noncompliant permits that reported fishing, and

$\hat{N}_{dz}$ = the estimated number of noncompliant permits that reported no fishing,

where

$$\hat{N}_{df}=\left(\hat{N}-(N_{cf}+N_{cz})\right)\hat{w} \tag{6}$$

and

$$\hat{w}=\frac{n_{df}}{n_d}. \tag{7}$$

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

$$\hat{H}=H_{cf}+\hat{H}_{df} \tag{8}$$

where

$\hat{H}$ = estimated total harvest or participation,

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

$\hat{H}_{df}$ = estimated harvest by noncompliant households,

where

$$\hat{H}_{df}=\hat{N}_{df}\bar{h}_{df} \tag{9}$$

and where

$\bar{h}_{df}$ = the mean harvest or participation per household for noncompliant households that reported fishing,

where

$$\bar{h}_{df} = \frac{\left(\sum_{j=1}^{n_{df}} h_{dfj}\right)}{n_{df}} \tag{10}$$

and where

h_{dfj} = reported harvest by responding noncompliant household *j*, and

n_{df} = the number of noncompliant households responding to the second reminder.

Variance was calculated as follows (Goodman 1960):

$$\hat{V}\left[\hat{H}\right] = \hat{V}\left[\hat{H}_{df}\right] = \hat{N}_{df}^2\,\hat{V}\left[\bar{h}_{df}\right] + \bar{h}_{df}^2\,\hat{V}\left[\hat{N}_{df}\right] - \hat{V}\left[\bar{h}_{df}\right]\hat{V}\left[\hat{N}_{df}\right], \tag{11}$$

where

$$\hat{V}\left[\hat{N}_{df}\right] = \hat{V}\left[\hat{N}\right]\hat{V}\left[\hat{w}\right] = \hat{N}^2\,\hat{V}\left[\hat{w}\right] + \hat{w}^2\,\hat{V}\left[\hat{N}\right] - \hat{V}\left[\hat{w}\right]\hat{V}\left[\hat{N}\right], \tag{12}$$

$$\hat{V}\left[\hat{w}\right] = \left(\frac{\hat{w}(1-\hat{w})}{n_d - 1}\right), \text{ and} \tag{13}$$

$$\hat{V}\left[\bar{h}_{df}\right] = \left(1 - \frac{n_{df}}{\hat{N}_{df}}\right)\frac{s_{df}^2}{n_{df}}, \tag{14}$$

where

$$s_{df}^2 = \frac{\sum_{j=1}^{n_{df}} \left(h_{dfj} - \bar{h}_{df}\right)^2}{n_{df} - 1}. \tag{15}$$

Standard errors were calculated from the square root of the variance estimates. Households that 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 between 2010 and 2011 from an estimated 31,590 (SE 1) permits to an estimated 34,515 (SE 2) permits, the highest number ever issued (Table 1). In 2012, there were 34,315 (SE 3) permits issued (200 less than 2011). The return rates for permits remained at 80% each year during this period. On average, 58% of households returned their permits voluntarily, 15% were returned after the first reminder letter, and 7% were returned after the second reminder. On average, 13% of households that were issued UCIPU permits during this study period did not fish (Table 2).

ESTIMATED HARVEST AND EFFORT

There were an estimated 1,816,547 salmon and 14,053 flounder harvested in UCIPU fisheries between 2010 and 2012 (Tables 3 and 4). All five species of salmon were harvested but the

major portion comprised sockeye salmon (Figure 2). Effort for all fisheries averaged 42,807 household-days, and ranged from an average of 2,111 days fished for the Fish Creek dip net fishery to an average of 31,845 days fished for the Kenai River dip net fishery (Table 3). Fishing effort was greatest in 2012 (43,585 household-days fished, SE 71), and lowest in 2010 (41,387 household-days fished, SE 56; 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 Fishery

Participation in the Kasilof River set gillnet fishery for the years 2010–2012 averaged 1,799 household-days per year and ranged from 1,696 (SE 21) household-days in 2012 to 1,855 (SE 13) household-days in 2010 (Table 3). Annual sockeye salmon harvest averaged 21,447 fish and ranged from 15,638 (SE 197) fish in 2012 to 26,780 (SE 244) fish in 2011 (Table 3). Chinook salmon harvests followed the same trend. Annual harvest averaged 135 fish but ranged from 103 (SE 3) fish in 2012 to 167 (SE 4) fish in 2011 (Table 3).

The Kasilof River set gillnet fishery has the shortest UCIPU fishing season. In 2010 and 2012, over 50% of the sockeye harvest was taken by 21 June. In 2011, most of the harvest occurred earlier with over 50% of the harvest taken by 19 June (Figure 3; Appendix B1).

Table 1.–Number of Upper Cook Inlet personal use salmon fishery permits issued by year and number of permits returned by mailing and year, 2010–2012.

	Permits issued[a]		Permits returned[b]								Permits not returned	
			Voluntary[c]		Mailing 1		Mailing 2		Total			
Year	Number	SE	Number	%	Number	%	Number	%	Number	%	Number	%
2010	31,590	1	17,193	55%	5,355	17%	2,674	9%	25,222	80%	6,092	20%
2011	34,515	2	20,276	60%	4,825	14%	2,080	6%	27,181	80%	6,789	20%
2012	34,315	3	20,266	60%	4,610	14%	2,172	7%	27,048	80%	6,616	20%
Average	33,473		19,245	58%	4,930	15%	2,309	7%	26,484	80%	6,499	20%

[a] "Permits issued" is an estimate that accounts for permits lacking a vendor copy ("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 permits that reported no fishing, by year for 2010–2012.

	Permits issued		Did not fish		Did fish	
Year	Number	SE	Number	%	Number	%
2010	31,590	1	4,069	13%	27,521	87%
2011	34,515	2	4,440	13%	30,075	87%
2012	34,315	3	4,402	13%	29,913	87%
Average	33,473		4,304	13%	29,170	87%

Table 3.–Effort (household-days) and harvest in Upper Cook Inlet personal use (UCIPU) salmon fisheries, 2010–2012.

		Days fished			Sockeye salmon			Chinook salmon			Coho salmon			Pink salmon			Chum salmon			Total		
Fishery[a]	Year	Est.	SE	RP[b]	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP	Est.	SE	RP
Kasilof R. gillnet	2010	1,855	13	1%	21,924	170	2%	136	3	4%	23	5	43%	23	5	43%	1	0	0%	22,106	170	2%
	2011	1,846	16	2%	26,780	244	2%	167	4	5%	47	10	42%	23	1	9%	3	0	0%	27,020	244	2%
	2012	1,696	21	2%	15,638	197	2%	103	3	6%	161	19	23%	53	19	70%	15	1	13%	15,969	199	2%
Average		1,799			21,447			135			77			33			6			21,698		
Kasilof R. dip net	2010	7,588	27	1%	70,774	303	1%	31	2	13%	1,768	45	5%	974	24	5%	279	9	6%	73,826	307	1%
	2011	6,571	35	1%	49,766	351	1%	24	3	25%	977	39	8%	652	40	12%	144	14	19%	51,562	355	1%
	2012	6,536	32	1%	73,419	448	1%	16	1	12%	1,170	42	7%	896	38	8%	147	11	15%	75,649	452	1%
Average		6,898			64,653			24			1,305			841			190			67,012		
Kenai R. dip net	2010[c]	28,342	44	0%	389,552	702	0%	865	7	2%	2,870	56	4%	3,655	28	2%	508	15	6%	397,451	705	0%
	2011[d]	32,818	60	0%	537,765	1,105	0%	1,243	10	2%	4,745	107	4%	3,914	86	4%	915	47	10%	548,583	1,115	0%
	2012[e]	34,374	61	0%	526,992	1,109	0%	40	3	15%	4,008	117	6%	3,770	102	5%	425	15	7%	535,236	1,120	0%
Average		31,845			484,770			716			3,874			3,780			616			493,757		
Fish Creek dip net	2010[f]	2,843	14	1%	23,705	161	1%	12	2	33%	3,576	84	5%	1,721	28	3%	290	9	6%	29,303	184	1%
	2011[g]	1,379	14	2%	5,236	86	3%	2	0	0%	905	29	6%	155	10	13%	72	7	19%	6,371	92	3%
	2012[h]																					
Average		2,111			14,471			7			2,241			938			181			17,837		
Unknown fishery	2010	760	8	2%	8,300	125	3%	15	1	13%	168	7	8%	109	2	4%	12	1	16%	8,605	125	3%
	2011	836	11	3%	10,695	136	2%	17	1	12%	80	5	12%	135	17	25%	35	5	28%	10,962	137	2%
	2012	979	17	3%	13,548	254	4%	8	2	49%	173	25	28%	136	11	16%	40	6	29%	13,905	256	4%
Average		858			10,848			13			140			127			29			11,157		
UCIPU total	2010	41,387	56	0%	514,254	808	0%	1,059	8	1%	8,405	113	3%	6,482	47	1%	1,091	20	4%	531,291	818	0%
	2011	43,450	72	0%	630,242	1,176	0%	1,453	11	1%	6,754	122	4%	4,880	100	4%	1,169	50	8%	644,498	1,187	0%
	2012	43,585	71	0%	629,598	1,198	0%	168	5	6%	5,512	130	5%	4,854	111	4%	627	19	6%	640,758	1,211	0%
Average		42,807			591,365			893			6,890			5,405			962			605,516		

Note: "Est." is estimate, SE is standard error, and RP is relative precision.

[a] Kasilof River gillnet fishery was open 10 days each year; Kasilof River dip net fishery was open 44 days each year; Kenai River dip net fishery was open 22 days each year; and Fish Creek dip net fishery was open 7 days in 2010, 3 days in 2011, and was not open in 2012.

[b] Relative precision (RP) = [(SE×1.96)/estimate)].

[c] EO 2-RS-1-40-10 increased the hours of the Kenai dip net fishery to 24 hours from 24 July to 31 July 2010.

[d] Emergency order (EO) 2-RS-1-22-11 increased the hours of the Kenai dip net fishery to 24 hours from 20 July through 31 July 2011 and EO 2-KS-1-23-11 prohibited retention of Chinook (king) salmon in this fishery from 24 July through 31 July 2011.

[e] EO 2-KS-1-35-12 prohibited the retention of king salmon in the Kenai River dip net fishery 10–31 July 2012 and EO 2-RS-1-46-12 increased the hours of the fishery to 24 hours from 20–31 July 2012.

[f] EO 2-RS-2-38-10 opened Fish Creek to dipnetting for all salmon species except king salmon from 0600 hours 24 July to 2300 hours 31 July 2010.

[g] EO 2-RS-2-25-11 opened Fish Creek to dipnetting for all salmon species except king salmon from 0600 hours 29 July to 2300 hours 31 July 2011.

[h] Fish Creek was not open to dipnetting in 2012.

Table 4.–Effort (household-days) and flounder harvests, standard errors, and relative precision in Upper Cook Inlet personal use (PU) fisheries, 2010–2012.

		Days fished			Flounder		
Fishery[a]	Year	Estimate	SE	RP[b]	Estimate	SE	RP
Kasilof River gillnet	2010	1,855	13	1%	127	4	6%
	2011	1,846	16	2%	88	7	16%
	2012	1,696	21	2%	62	4	13%
Kasilof River dip net	2010	7,588	27	1%	1,078	10	2%
	2011	6,571	35	1%	651	16	5%
	2012	6,536	32	1%	720	15	4%
Kenai River dip net	2010[c]	28,342	44	0%	3,935	33	2%
	2011[d]	32,818	60	0%	3,239	33	2%
	2012[e]	34,374	61	0%	3,847	36	2%
Fish Creek dip net	2010[f]	2,843	14	1%	2	0	0%
	2011[g]	1,379	14	2%	14	5	70%
	2012[h]						
Unknown fishery	2010	760	8	2%	129	5	8%
	2011	836	11	3%	73	6	16%
	2012	979	17	3%	86	5	11%
Upper Cook Inlet PU fisheries total	2010	41,387	56	0%	5,271	35	1%
	2011	43,450	72	0%	4,066	38	2%
	2012	43,585	71	0%	4,716	39	2%

Note: "Est." is estimate, SE is standard error, and RP is relative precision.

[a] Kasilof River gillnet fishery was open 10 days each year; Kasilof River dip net fishery was open 44 days each year; Kenai River dip net fishery was open 22 days each year; and Fish Creek dip net fishery was open 7 days in 2010, 3 days in 2011, and was not open in 2012.

[b] Relative precision (RP) = [(SE×1.96)/estimate)].

[c] EO 2-RS-1-40-10 increased the hours of the Kenai dip net fishery to 24 hours from 24 July to 31 July 2010.

[d] Emergency order (EO) 2-RS-1-22-11 increased the hours of the Kenai dip net fishery to 24 hours from 20 July through 31 July 2011 and EO 2-KS-1-23-11 prohibited retention of Chinook (king) salmon in this fishery from 24 July through 31 July 2011.

[e] EO 2-KS-1-35-12 prohibited the retention of king salmon in the Kenai River dip net fishery 10–31 July 2012 and EO 2-RS-1-46-12 increased the hours of the fishery to 24 hours from 20–31 July 2012.

[f] EO 2-RS-2-38-10 opened Fish Creek to dipnetting for all salmon species except king salmon from 0600 hours 24 July to 2300 hours 31 July 2010.

[g] EO 2-RS-2-25-11 opened Fish Creek to dipnetting for all salmon species except king salmon from 0600 hours 29 July to 2300 hours 31 July 2011.

[h] Fish Creek was not open to dipnetting in 2012.

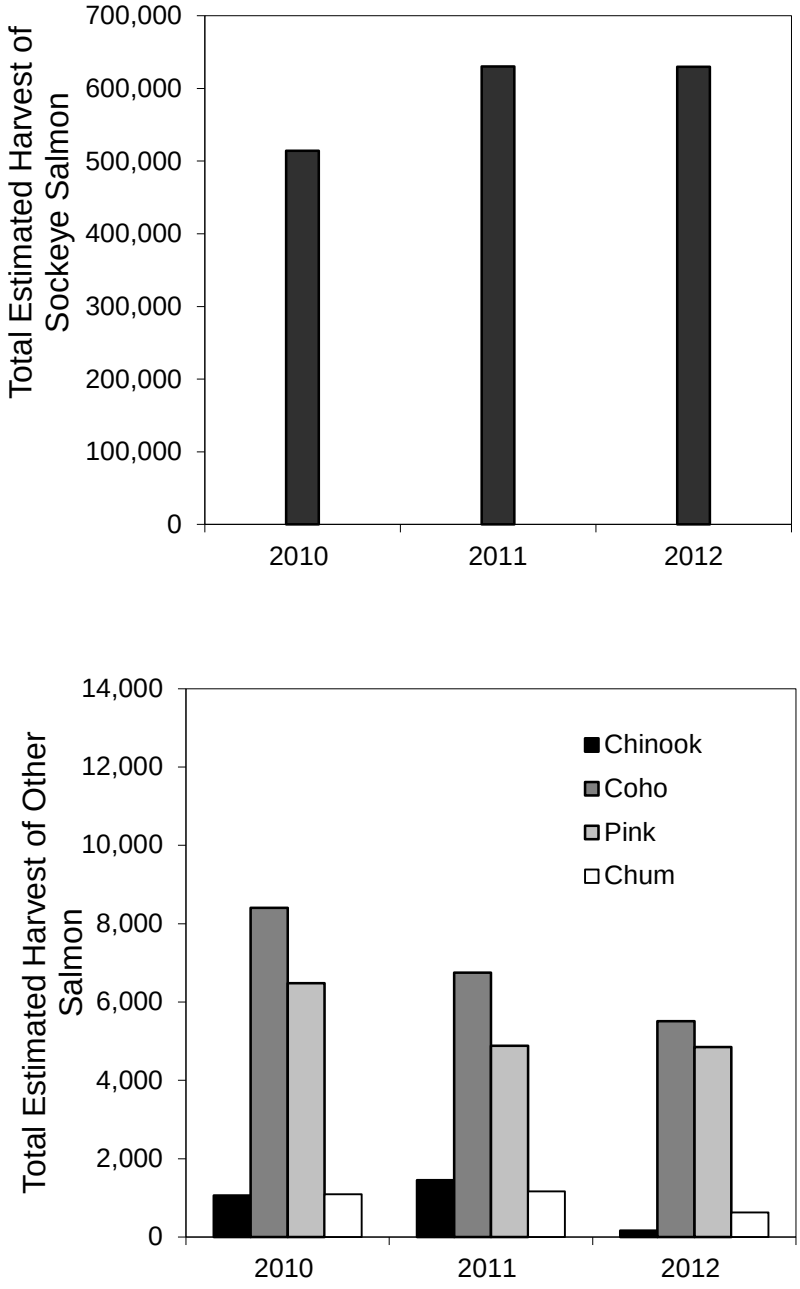


Figure 2.–Total estimated salmon harvest for all Upper Cook Inlet personal use fisheries combined. Top figure shows harvest of sockeye salmon, and the bottom figure shows harvest for all other salmon species.

Note: Y-axes scales differ between graphs. For top graph, all standard errors are less than ±1,200; for bottom graph, all standard errors are less than ±130.

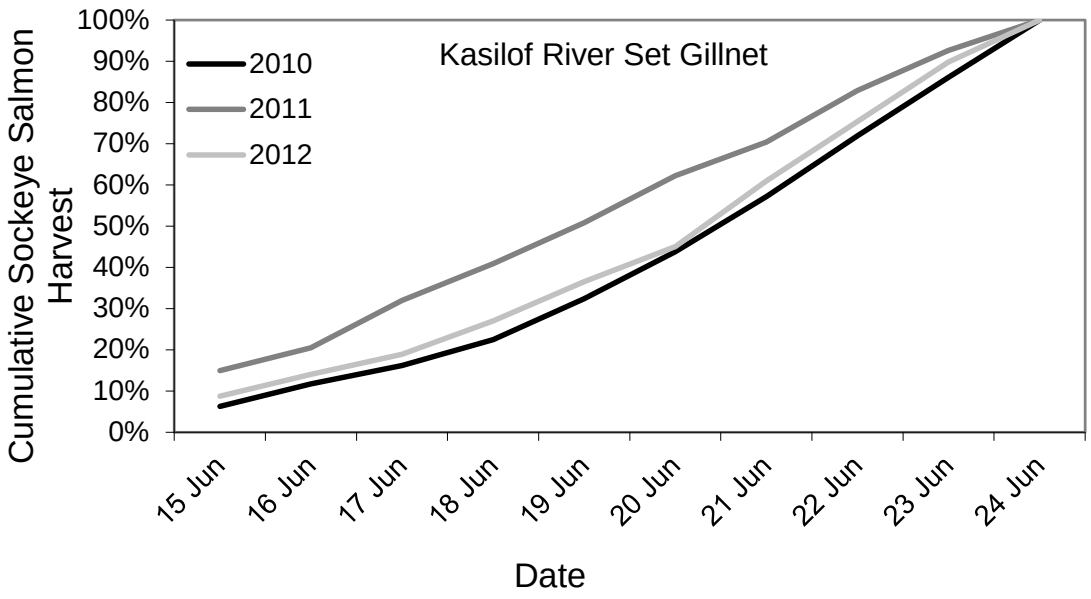


Figure 3.–Cumulative harvest timing for sockeye salmon during the Kasilof River personal use set gillnet fishery, 2010–2012.

Note: Total harvest by day of sockeye salmon is listed in Appendix B1. Data presented are for "known" permits during legal harvest dates only.

Kasilof River Dip Net Fishery

Between 2010 and 2012, participation in the Kasilof River dip net fishery averaged 6,898 household-days per year and followed a similar annual trend in effort to the Kasilof River set gillnet fishery with greatest number of household-days in 2012 (6,536 [SE 32]) and least number in 2010 (7,588 [SE 27]) (Table 3). Annual sockeye salmon harvest averaged 64,653 fish with the greatest harvest occurring in 2012 (73,419 sockeye salmon, SE 448). Unlike the set gillnet fishery, the lowest sockeye salmon harvest in the Kasilof River dip net fishery occurred in 2011, when only 49,766 (SE 351) fish were harvested. Harvests of other salmon species totaled less than 2,400 fish.

The harvest timing of the Kasilof River dip net fishery was relatively consistent between years. Over half the sockeye salmon harvested were taken by 16 July in 2010 and 2011 and by 19 July in 2012 (Figure 4; Appendix B2). The percent of the overall sockeye salmon harvest for both Kasilof River personal use fisheries (set gillnet and dip net combined) averaged 22% of the total Kasilof River harvest and increased from 14% in 2011 to 35% in 2012 (Table 5).

Kenai River Dip Net Fishery

Participation in the Kenai River dip net fishery averaged 31,845 household-days per year and ranged from 28,342 (SE 44) days in 2010 to 34,374 (SE 61) days in 2012 (Table 3). Annual sockeye salmon harvest averaged 484,770 fish with a range of 389,552 (SE 702) fish in 2010 to 537,765 (SE 1,105) fish in 2011 (Table 3). Harvests of other species were comparatively small. For example, coho salmon had the second highest harvest, with an average of 3,874 fish.

The harvest timing of the Kenai River dip net fishery was relatively consistent among the years 2010–2012 (Figure 5; Appendix B3). In all years, 50% of the harvest was achieved on or before

20 July, which is the median date of this fishery. In 2010 and 2011, over half of all sockeye salmon were harvested by 17 July and 18 July, respectively. In 2012, 50% of the harvest level was achieved on 20 July. The percent of the total Kenai River sockeye salmon harvest taken from the dip net fishery averaged 14% and ranged from 11% (2011) to 15% (2010 and 2012) (Table 5). The commercial sockeye salmon fishery comprised the largest portion of the overall sockeye salmon harvest in the Kenai River and averaged 75% during the years 2010–2012.

Fish Creek Dip Net Fishery

There were 2,843 (SE 14) household-days of effort in the Fish Creek dip net fishery in 2010 and 1,379 (SE 3) days in 2011, although the fishery was only open for 3 days that year (Table 3). There were an estimated 23,705 (SE 161) sockeye salmon harvested in 2010 and 5,236 (SE 86) sockeye salmon harvested in 2011 (Table 3), with over 50% of these taken by 27 July in 2012 and by 29 July, the first day of the fishery, in 2011 (Figure 6; Appendix B4). Harvests of other salmon species were minimal with the exception of coho salmon, which had a mean harvest of 2,241 for the two years this fishery was open (Table 3). During these years, the Fish Creek dip net fishery comprised an average of 13% of the overall sockeye salmon harvest in Fish Creek (Table 5).

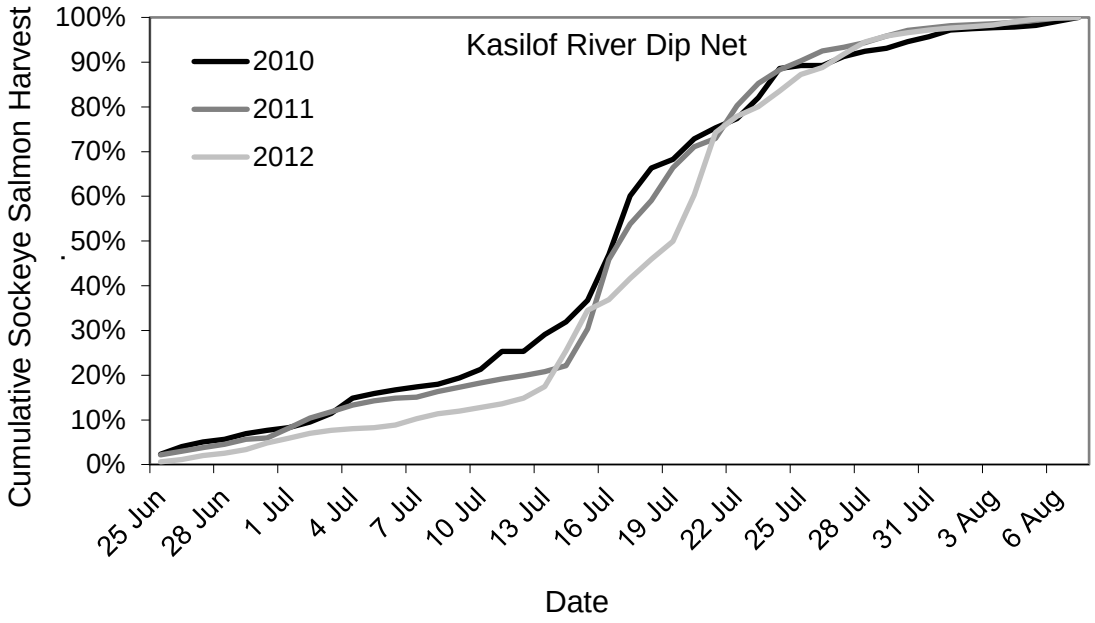


Figure 4.–Cumulative harvest timing for sockeye salmon during the Kasilof River personal use dip net fishery, 2010–2012.

Note: Total harvest by day of sockeye salmon is listed in Appendix B2. Data presented are for "known" permits during legal harvest dates only.

Table 5.–Percent of the total sockeye salmon harvest by Upper Cook Inlet personal use fisheries, 2010–2012.

Fishery	Year	Total run [a]	Total harvest	Personal use harvest	%	Commercial harvest[a]	%	Sport harvest [b]	%	Educational harvest [c,d]	%	Federal subsistence harvest [c,d]	%
Kasilof River													
	2010	788,004	520,761	92,698	17.80%	423,293	81.28%	4,470	0.86%	260	0.05%	40	0.01%
	2011	798,322	554,948	76,546	13.79%	470,194	84.73%	8,182	1.47%	25	<0.01%	1	<0.01%
	2012	628,535	254,788	89,057	34.95%	158,955	62.39%	6,740	2.65%	12	<0.01%	24	0.01%
	Mean	738,287	443,499	86,100	22.18%	350,814	76.13%	6,464	1.66%	19	<0.01%	22	<0.01%
Kenai River													
	2010	3,236,419	2,534,912	389,552	15.44%	1,821,553	72.21%	304,635	12.08%	6,034	0.24%	903	0.04%
	2011	6,136,604	4,856,107	537,765	11.11%	3,900,524	80.58%	395,840	8.18%	5,278	0.11%	1,089	0.02%
	2012	4,716,072	3,514,369	526,992	15.06%	2,514,080	71.86%	455,454	13.02%	1,618	0.05%	547	0.02%
	Mean	4,696,365	3,635,129	484,770	13.87%	2,745,386	74.88%	384,976	11.09%	4,310	0.13%	846	0.02%
Fish Creek													
	2010	245,119	118,414	23,705	20.04%	93,904	79.40%	665	0.56%				
	2011	153,194	86,175	5,236	6.09%	80,525	93.66%	217	0.25%				
	2012[e]	39,198	20,135			20,135	97.35%	548					
	Mean	145,837	74,908	14,471	13.07%	64,855	90.13%	477	0.41%				

Note: Total harvest is the sum of the sport, commercial, educational, Federal subsistence harvest, and personal use harvests presented in this table. "%" refers to the percent of the total harvest.

[a] Mark Willette, Fishery Biologist, ADF&G Division of Commercial Fisheries, Soldotna, AK, e-mail correspondence dated October, 2013.

[b] Jennings et al. 2011; *In prep a*, *b*.

[c] Begich et al. *In prep.*

[d] Jason Pawluk, Fishery Biologist, ADF&G Division of Sport Fish, Soldotna, AK, personal communication.

[e] The Fish Creek personal use fishery did not open in 2012.

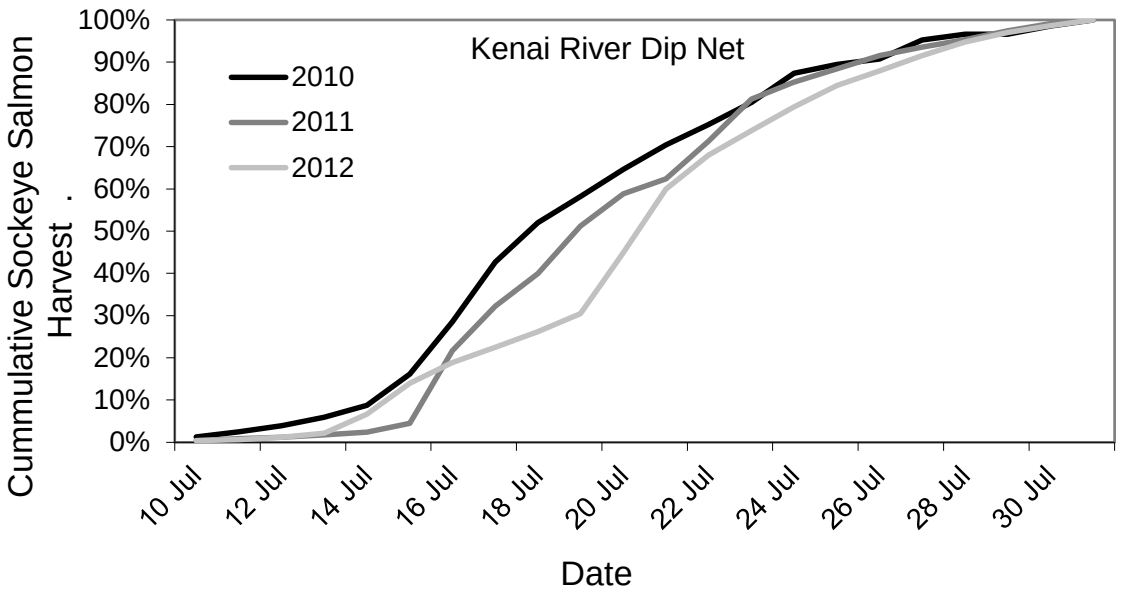


Figure 5.–Cumulative harvest timing for sockeye salmon during the Kenai River personal use dip net fishery, 2010–2012.

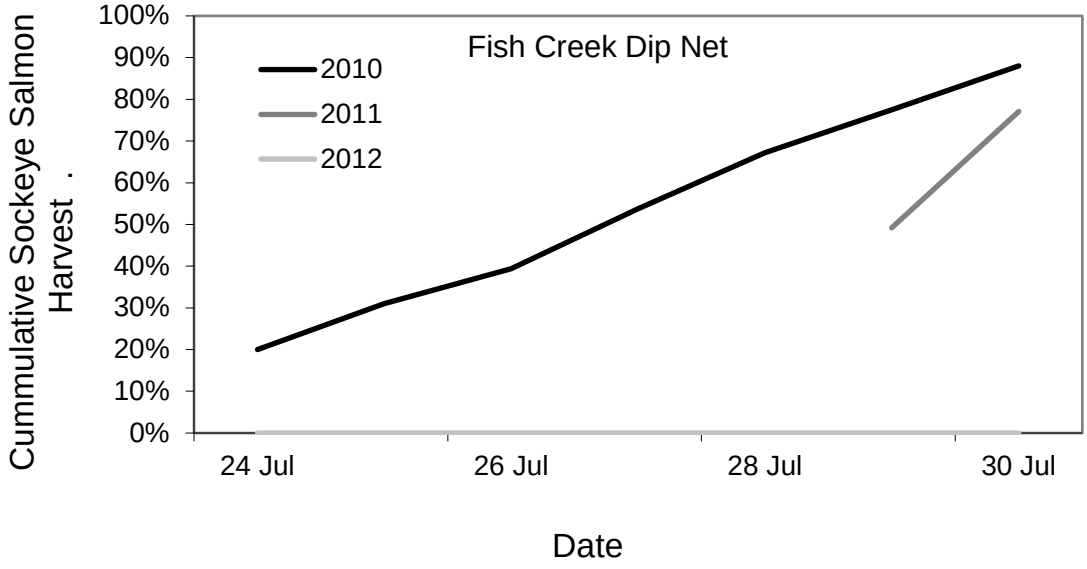


Figure 6.–Cumulative harvest timing for sockeye salmon during the Fish Creek personal use dip net fishery, 2010–2012.

CHARACTERISTICS OF PERMIT HOLDERS

Residency of Permit Holders

Over 95% of all UCIPU participants resided in Southcentral Alaska (Region 2) during each year of the study (Table 6). Less than 3.5% of the participants lived in Interior Alaska (Region 3), and less than 0.3% resided in Southeast Alaska (Region 1). Of the participants from Southcentral Alaska, most were from Anchorage (at least 57%), followed by the Kenai Peninsula (at least 21%), and the Matanuska-Susitna Valley (at least 17%). The percentage of households from Anchorage increased by about 3% from 2010 to 2012, which is consistent with the increasing trend observed during the first 10 years of the UCIPU fisheries (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007), but inconsistent with the slight decreasing trend observed during the previous three years (2007–2009) of these fisheries (Dunker 2010).

Table 6.–Residence areas for Upper Cook Inlet personal use salmon fishery permit holders by year, 2010–2012.

			Year		
Category	Area of residence	SWHS area[a]	2010	2011	2012
Statewide[b]					
	Region 1	A-H	0.2%	0.3%	0.2%
	Region 2	J-N,P-T	95.2%	96.3%	95.5%
	Region 3	I, U-Z	3.4%	3.0%	3.1%
	Out of state or unknown residence		1.2%	0.3%	1.0%
	Total		100%	100%	100%
Region 2					
	Anchorage area	L	60.8%	57.7%	58.5%
	Kenai Peninsula area	P	21.6%	22.4%	21.8%
	Matanuska-Susitna Valley area	K	17.4%	19.7%	19.5%
	Other	J,M,N,Q-T	0.3%	0.2%	0.3%
	Total		100%	100%	100%

Note: Data exclude permits lacking a vendor copy ("orphan permits").

[a] Statistical areas used in the Statewide Harvest Survey (SWHS) (Jennings et al. 2011).

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

Anchorage residents remain the majority of the participants in the Kenai River and Kasilof River personal use dip net fisheries (Table 7; Figure 7) and comprised the majority of permit-holding households that did not participate in any UCIPU fisheries. Of the Anchorage residents that participated in the fisheries, the average household harvest was 22.9 (SE 0.09) salmon (Figure 8). Residents of the Kenai Peninsula harvested a greater proportion of salmon in the Kasilof River personal use set gillnet fishery in 2010, but their proportion decreased slightly, and Anchorage residents harvested a greater proportion of salmon in this fishery in 2011 and 2012 (Figure 7). Kenai Peninsula residents participating in UCIPU fisheries harvested an average of 22.6 (SE 0.13) salmon per household (Figure 8). Residents from the Matanuska-Susitna Valley (Mat-Su) harvested the greatest portion of salmon in the Fish Creek dip net fishery (Figure 7). No Kenai Peninsula residents participated in the Fish Creek dip net fishery in 2010, and only 2% of harvested salmon were taken by residents of the Kenai Peninsula in 2011. Mat-Su residents had the highest average harvest of 25 (SE 0.18) salmon per household. The mean harvest decreases for all residency areas when permit holders that did not fish are included. In these cases, mean harvest was 19.5 (SE 0.08) salmon per household for Anchorage, 18.0 (SE 0.13) for Kenai Peninsula, and 20.8 (SE 0.17) for Mat-Su 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).

Table 7.–Effort and harvest by residence of participants in the Upper Cook Inlet personal use fisheries, 2010–2012.

			2010		2011		2012	
Category	Area of residence	Fishery	Days fished	Total salmon	Days fished	Total salmon	Days fished	Total salmon
Statewide								
	Region 1	Kenai dip net	44	665	64	832	68	961
		Kasilof dip net	1	16	6	28	9	105
		Kasilof gillnet	4	45	4	25	5	51
		Fish Creek	7	63	1	0		
		Unknown fishery	0	0	0	0	0	0
	Region 2	Kenai dip net	22,863	321,852	26,079	440,296	27,171	423,619
		Kasilof dip net	5,918	58,473	5,050	39,709	5,159	58,972
		Kasilof gillnet	1,543	18,496	1,568	22,986	1,348	12,736
		Fish Creek	2,301	23,997	1,083	5,130		
		Unknown fishery	593	6,695	650	8,888	670	9,977
	Region 3	Kenai dip net	774	11,807	928	16,013	1,103	18,176
		Kasilof dip net	276	2,538	154	1,206	190	2,485
		Kasilof gillnet	39	290	27	463	41	416
		Fish Creek	17	206	7	19		
		Unknown fishery	19	161	23	448	20	297
	Unknown or out of state	Kenai dip net	54	663	330	5,604	396	6,467
		Kasilof dip net	5	77	57	453	68	847
		Kasilof gillnet	2	26	5	83	6	66
		Fish Creek	9	98	11	41		
		Unknown fishery	1	0	1	22	9	73
Region 2								
	Anchorage	Kenai dip net	13,649	188,210	15,687	259,529	16,641	259,151
		Kasilof dip net	3,664	36,486	3,137	24,512	3,176	35,956
		Kasilof gillnet	574	6,907	606	9,382	499	5,039
		Fish Creek	721	7,375	310	1,433		
		Unknown fishery	381	4,293	436	5,962	414	5,812
	Kenai Peninsula	Kenai dip net	5,536	74,439	5,817	93,902	6,013	85,390
		Kasilof dip net	1,207	10,257	918	6,362	924	9,018
		Kasilof gillnet	653	7,761	649	8,917	591	4,895
		Fish Creek	0	0	8	105		
		Unknown fishery	131	1,293	119	1,373	156	2,134
	Mat-Su Valley	Kenai dip net	3,631	58,504	4,519	86,093	4,455	78,101
		Kasilof dip net	1,042	11,663	987	8,798	1,042	13,825
		Kasilof gillnet	313	3,797	308	4,620	251	2,741
		Fish Creek	1,578	16,590	765	3,592		
		Unknown fishery	81	1,109	92	1,439	100	2,031
	Other	Kenai dip net	47	699	56	772	60	936
		Kasilof dip net	5	67	8	37	17	173
		Kasilof gillnet	3	31	5	67	7	61
		Fish Creek	2	32	0	0		
		Unknown fishery	0	0	3	114	0	0

Note: Data exclude permits lacking a vendor copy ("orphan permits").

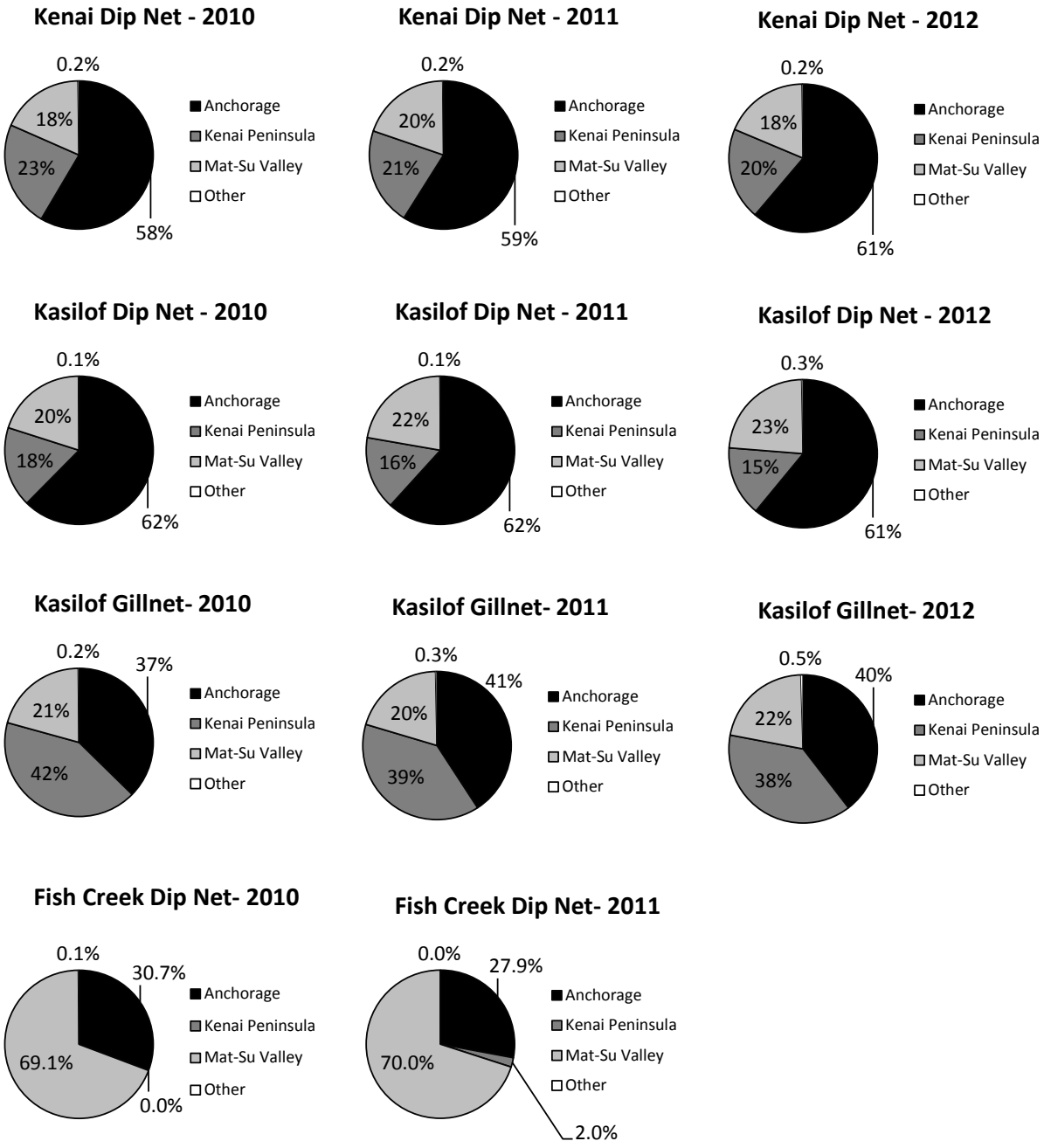


Figure 7.–Proportion of salmon harvested in the Upper Cook Inlet personal use fisheries by residence of permit holders.

Note: Data exclude permits lacking a vendor copy ("orphan permits").

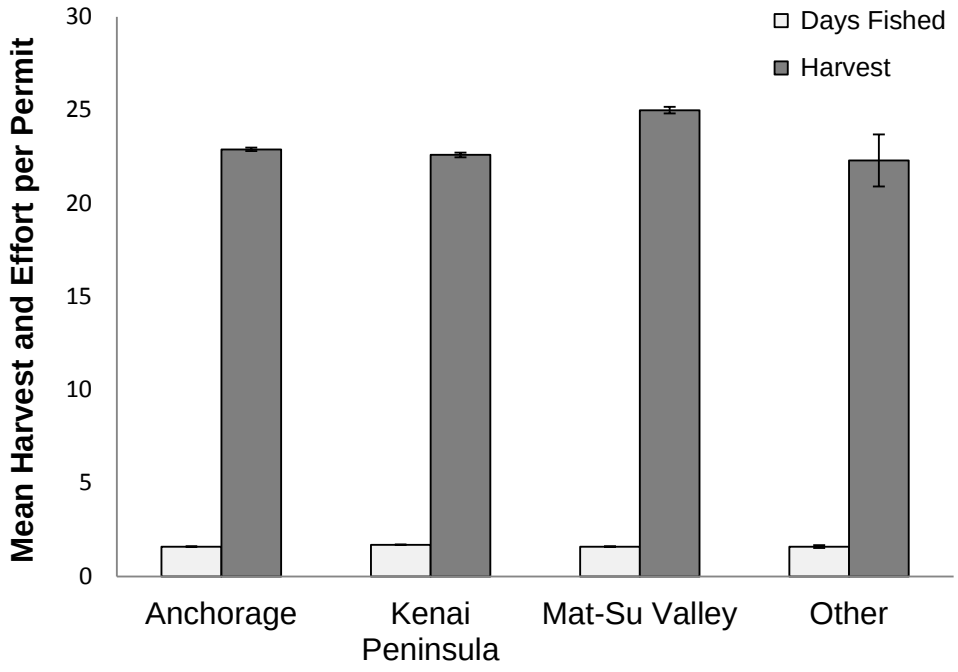


Figure 8.–Mean harvest and days fished per permit by residence of participants in the Upper Cook Inlet personal use fisheries.

Note: Data are presented for all permit holders who fished. Overall mean harvest per permit was 23.3 ± 0.07. For all permits, including those that "did not fish," the mean harvests per permit are as follows: Anchorage 19.5 ± 0.08, Kenai Peninsula 18.0 ± 0.13, Matanuska-Susitna Valley 20.8 ± 0.17, Other 17.5 ± 1.3. Overall mean harvest per permit is 19.4 ± 0.06 and overall mean days fished per permit is 1.4 ± 0.06.

Household and Fishery Variation in Harvest

The overall mean harvest per permit from households that fished was 23.3 (SE 0.07) and for all permits, including those that did not fish, it was 19.4 (SE 0.06). The percentage of households that fished and harvested 100% of their annual limits was 14% in 2010, 18.8% in 2011, and 17.6% in 2012. However, most households harvested between 49% and 55% of their annual limits (Table 8). Between 2010 and 2012, approximately one-quarter (22–27%) of households harvested more than 80% of their bag limits, and approximately 20% (19–21%) did not harvest any of their bag limits (Figure 9). The Kasilof River gillnet fishery was the least utilized of all UCIPU fisheries, excluding Fish Creek in 2011, which was only open for 3 days (Table 3). However, participants fishing the Kasilof River set gillnet fishery tended to be the most successful, harvesting an average of 53% (SE 0.001) to 71% (SE 0.001) of their annual bag limits (Figure 10). Participants fishing the dip net fisheries, in contrast, generally harvested less than half of what they were allowed during all years with the exception of Kenai River dip net participants who harvested an average of 58% of their limits (SE 0.0002) in 2011 (Figure 10).

Of all the salmon harvested in the UCIPU fisheries, over 76% came from the Kenai River dip net fishery each year, whereas less than 18% were typically harvested from the Kasilof River fisheries (Figure 11). Less than 6% of all salmon harvested were taken in the Fish Creek dip net fishery during the years it was open (Figure 11). Similarly, over 71% of households participated in the Kenai River dip net fishery each year, whereas less than 23% and less than 8% participated in the Kasilof River fisheries or the Fish Creek dip net fishery, respectively (Figure 12).

Table 8.–Summary of Upper Cook Inlet personal use permit holders by year, number of fisheries fished, number of days fished, and household size, 2010–2012.

Category		% Permits by category	Total salmon harvested	% Total harvest by category	Average % of bag limit filled	SE (% of bag limit filled)
Year						
	2010	31.6	446,707	29.3	49.0	0.2
	2011	34.4	542,681	35.6	55.0	0.2
	2012	34.0	535,412	35.1	54.0	0.2
	Total	100	1,524,800	100		
Number of fisheries fished [a]						
	0	16.5	0	0	0	0
	1	77.5	1,385,913	90.9	52.2	0.1
	2	5.8	132,687	8.7	60.3	0.5
	3	0.2	6,041	0.4	66.8	2.3
	4	0.003	159	0.01	98.5	1.5
	Total	100	1,524,800	100		
Number of days[a]						
	0	16.5	0	0	0	0
	1	49.2	739,610	48.5	45.8	0.2
	2	22.0	452,042	29.6	58.6	0.2
	3	8.0	204,239	13.4	68.1	0.4
	4	2.9	82,669	5.4	73.2	0.6
	5	1.3	43,402	2.8	74.1	0.8
	6	0.1	1,675	0.2	82.0	2.9
	7+	0.03	1,163	0.1	78.3	4.5
	Total	100	1,524,800	100		
Number of household members[a]						
	1	15.1	147,973	9.7	59.7	0.4
	2	32.6	424,769	27.9	56.8	0.2
	3	16.7	245,399	16.1	50.0	0.3
	4	18.3	321,556	21.1	48.8	0.3
	5	9.2	183,730	12.0	46.7	0.4
	6	4.3	92,284	6.1	44.6	0.6
	7+	3.8	109,089	7.1	45.1	0.6
	Total	100	1,524,800	100		

Note: Data presented for "reported harvests" only. Harvests presented in Table 3 are estimates that include harvests by nonrespondents.

[a] For all years combined.

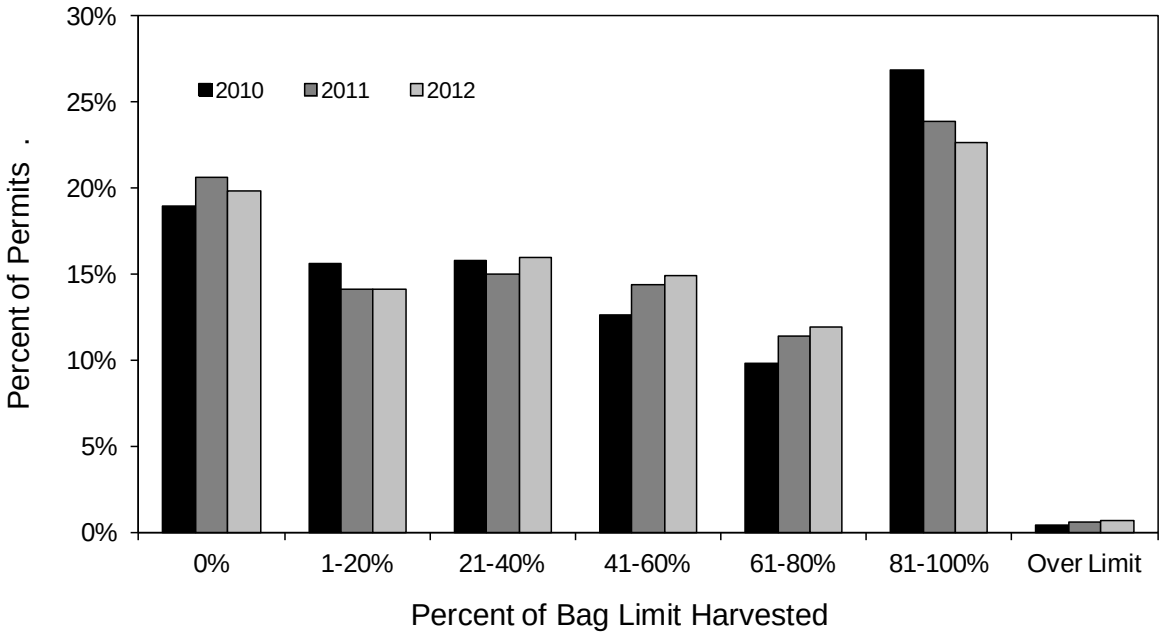


Figure 9.–Percent of bag limits filled by Upper Cook Inlet personal use salmon fishery permit holders, 2010–2012.

Note: The category 0% includes participants that did not fish as well as participants that fished and did not catch anything.

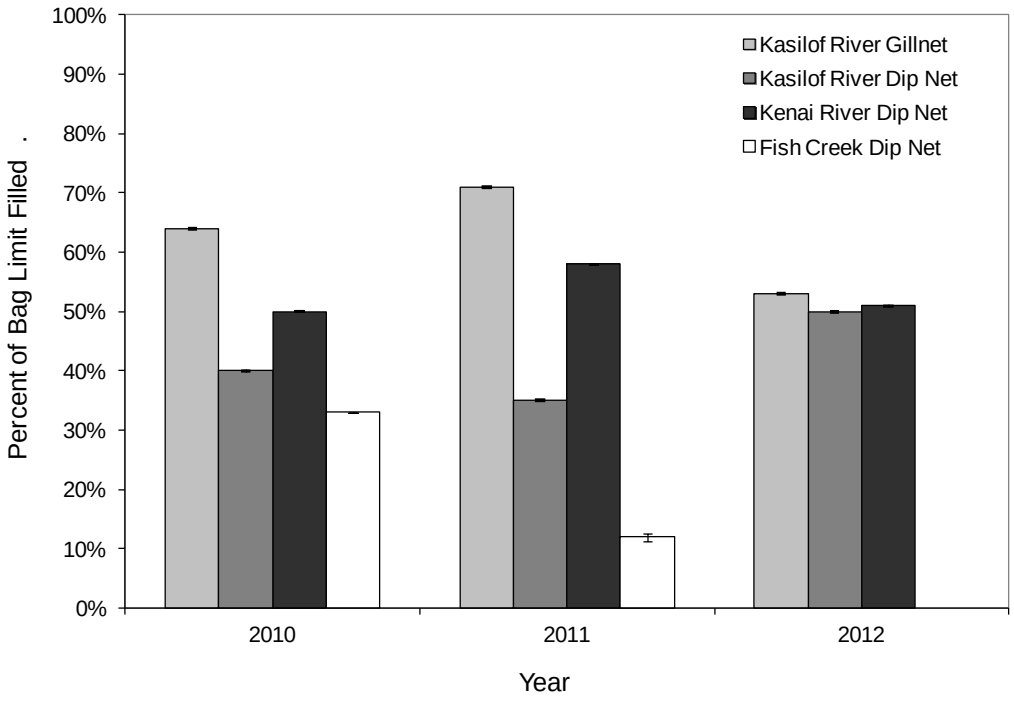


Figure 10.–Average percent of bag limit filled by fishery, 2010–2012.

Note: Data are presented for permit holders that only participated in 1 fishery and that fishery was known (99% of permit holders who fished).

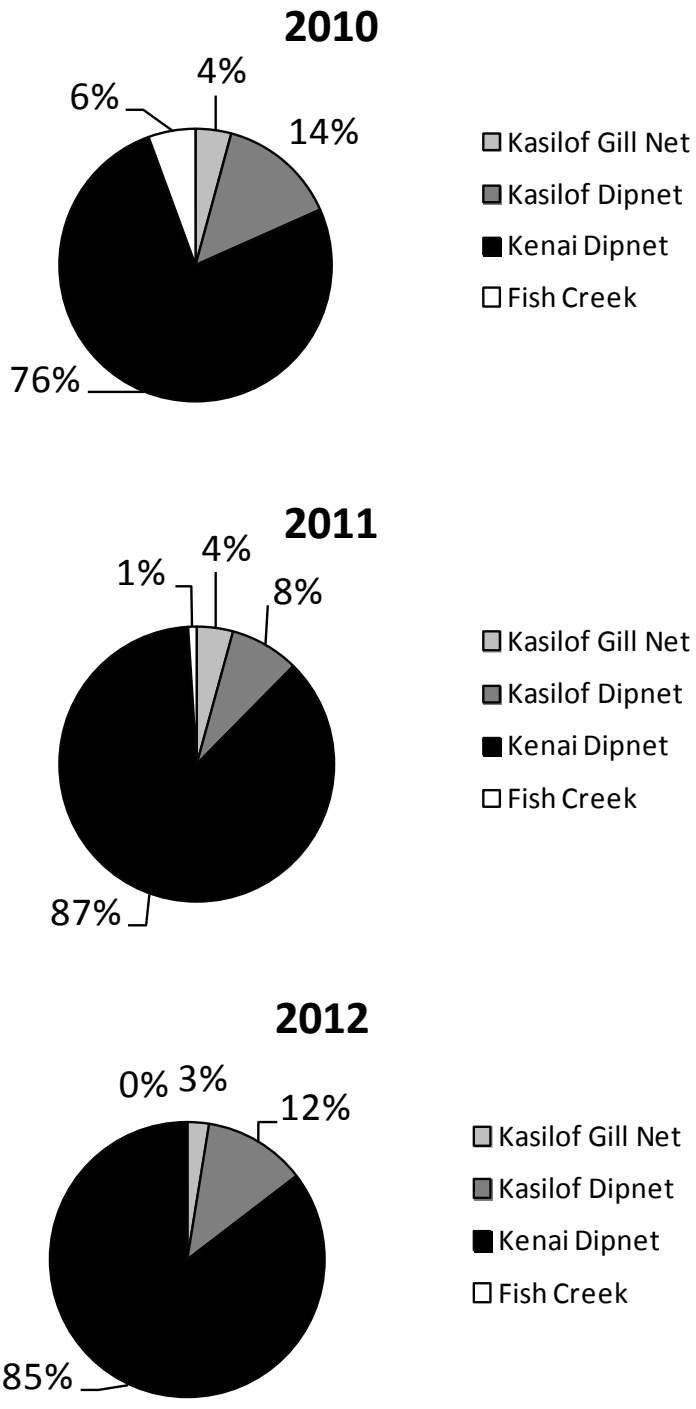


Figure 11.–Percent of salmon harvest by fishery, 2010–2012.

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

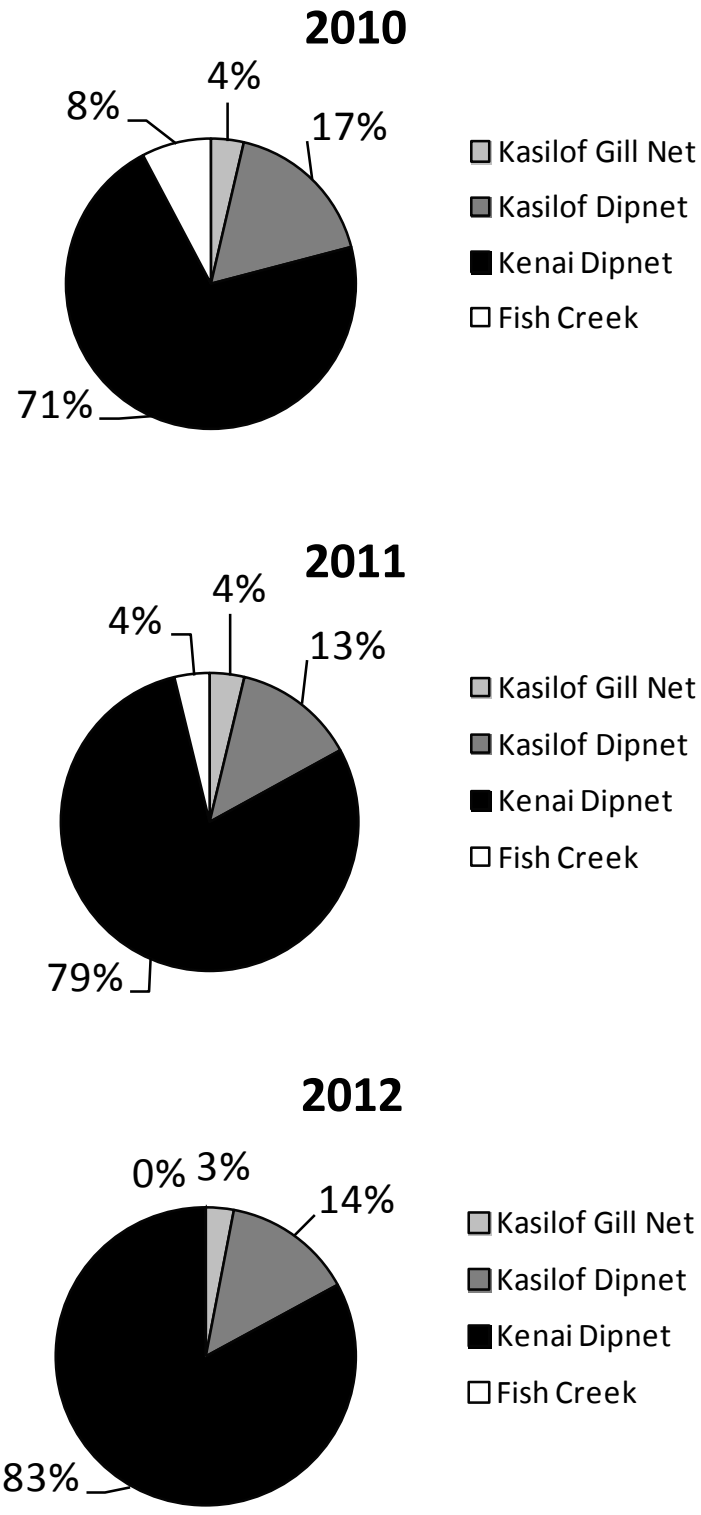


Figure 12.–Percent of permits participating in each fishery, 2010–2012.

Note: Data presented are only for permits that fished and the fishery location was known (82% of all permits).

Household Size

From 2010 to 2012, permits were most commonly issued to 2-person households (Table 8). Although some very large households obtained permits, households of 5 people or less comprised 92% of the total permits issued (Table 8). For all permits issued, the average percentage of the annual limit harvested varied by about 15% for households of different sizes, with single-person households tending to have the greatest "success" fulfilling bag limits and households of 6 tending to have the least success (Table 8; Figure 13). Overall patterns in the percentage of permits and the percentage of salmon harvested according to household size were remarkably similar between fisheries (Figure 13). 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 14). When looked at this way, there was very little difference between years, and the mean harvest per person was approximately 7.4 (SE 0.02) salmon; if permits that did not fish are excluded, mean harvest per person was 8.9 (SE 0.03) salmon. When looked at separately by fishery and year for households that only fished in one fishery, the mean harvests per person in the Kenai River dip net fishery ranged between 8 and 10 fish, and harvests per person were highest in the Kasilof gillnet fishery, particularly in 2010 and 2011 (12–13 salmon per person; Figure 14).

Number of Days Fished, Fisheries Visited, and Harvest Rates

Thirty-four percent of households with personal use permits fished multiple days per season and 49.2% of households with personal use permits fished only 1 day (Table 8). Households that fished only 1 day harvested an average of 45.8% (SE 0.2%) of their annual limits, but households that fished for at least 5 days harvested over 74% (SE 0.8%) of their annual limits. When analyzed separately by fishery for households that participated in only 1 fishery, participants in UCIPU fisheries generally increased their harvest with added days of fishing effort. For all fisheries, households (fishing only 1 fishery) achieved over 80% of their annual limits if they participated for at least 4 days (Figure 15). However, if participants of any of the fisheries fished for 4 days or longer, there was no difference in their average harvests (Figure 15). Overall, patterns in the percentage of permits and the percentage of salmon harvested over multiple days were similar between all UCIPU fisheries (Figure 15).

Only about 6% of households participated in more than one fishery during this study (Table 8). Of those households that participated in 2 fisheries, 90% fished the Kenai River along with another fishery (most often Kasilof River dip net). Of those that participated in 3 fisheries, combinations involving the Kenai River accounted for 95%. During this study period, fishing in multiple fisheries increased the average percentage of the annual limit filled from 52.2% (SE 0.1%) for 1 fishery to 98.5% (SE 1.5) for 4 fisheries (Table 8), although this is likely confounded by the fact that households that fished in multiple fisheries also participated for multiple days.

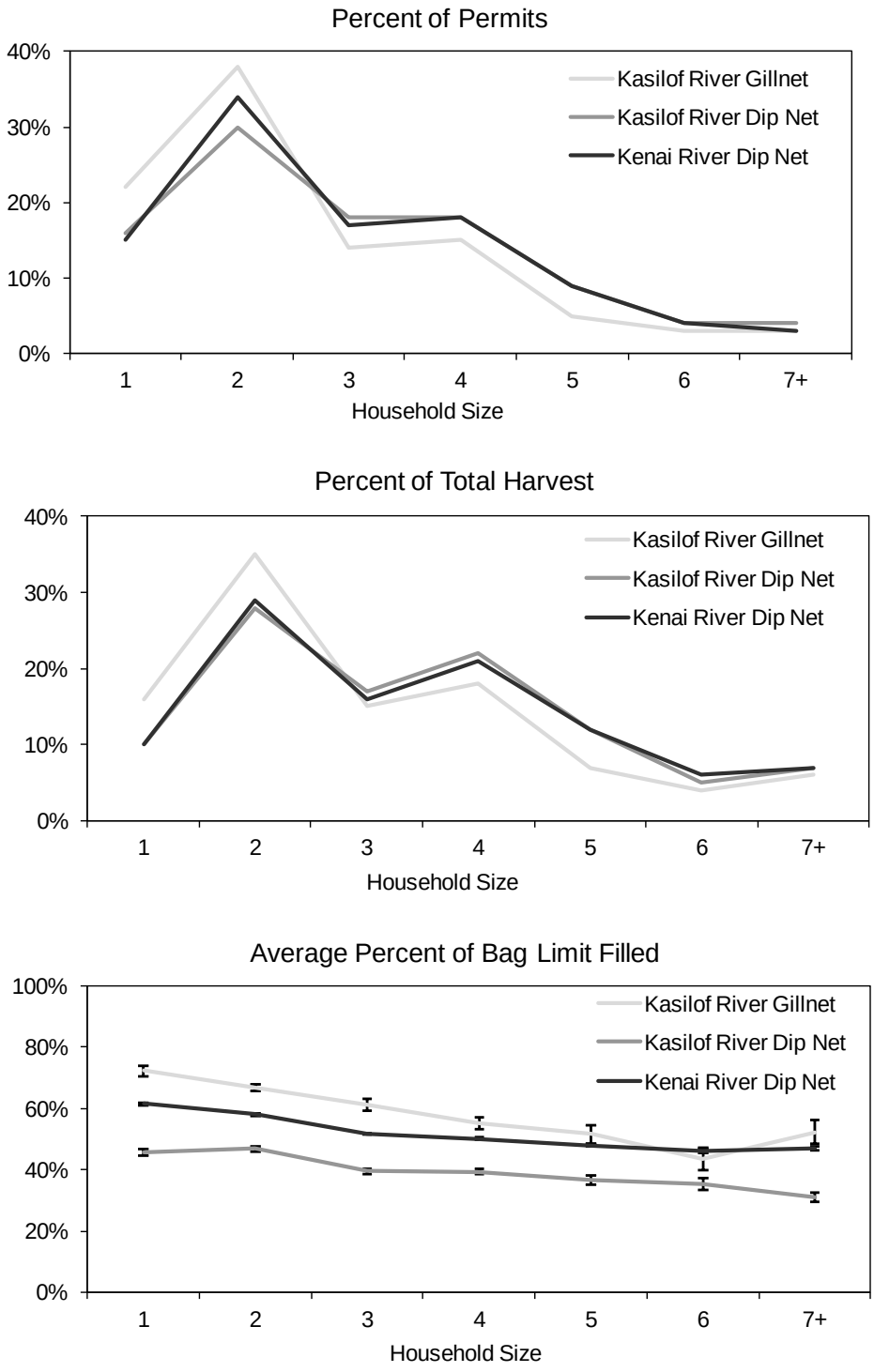


Figure 13.–Percent of permits (top), percent of total harvest (middle), and average percent of bag limit filled (bottom) by personal use salmon fishery and household size, 2010–2012.

Note: Data presented are for participants that only fished in one of the following fisheries: Kenai dip net, Kasilof dip net, and Kasilof gillnet (~93% 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.

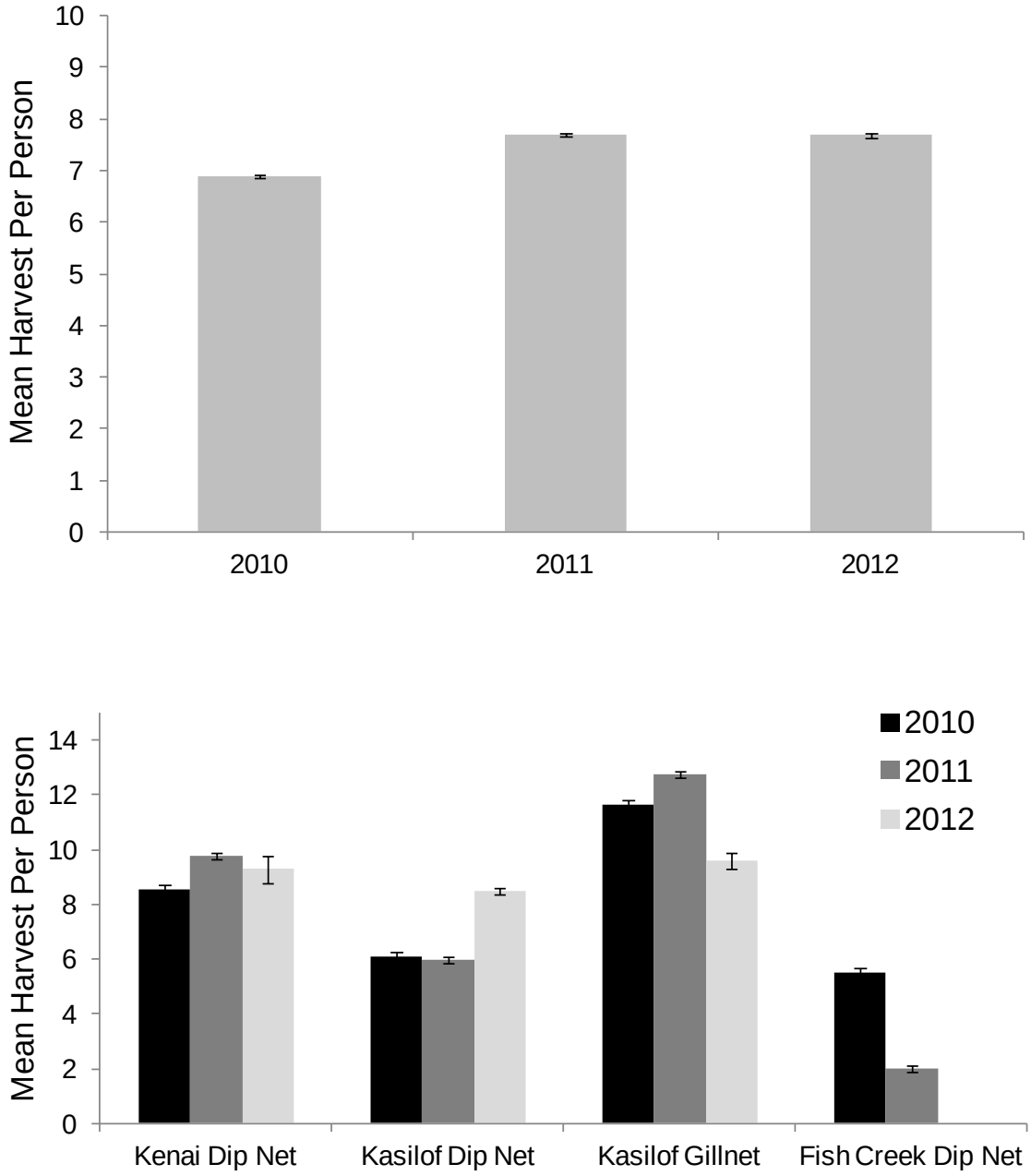
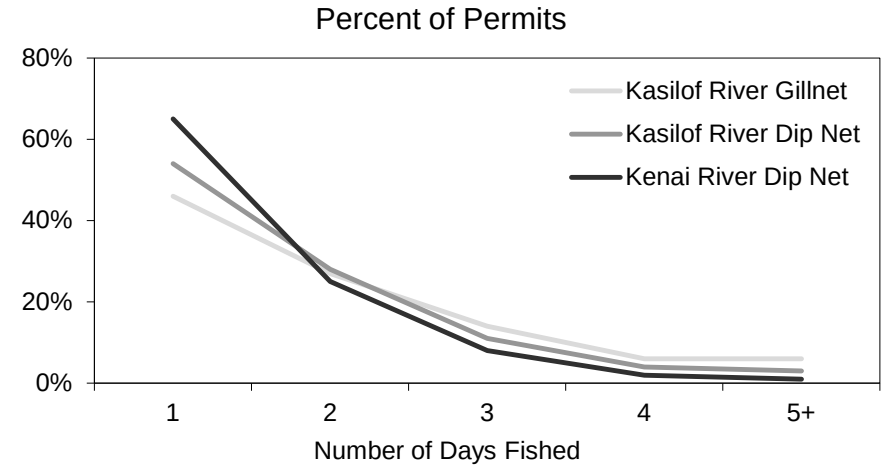
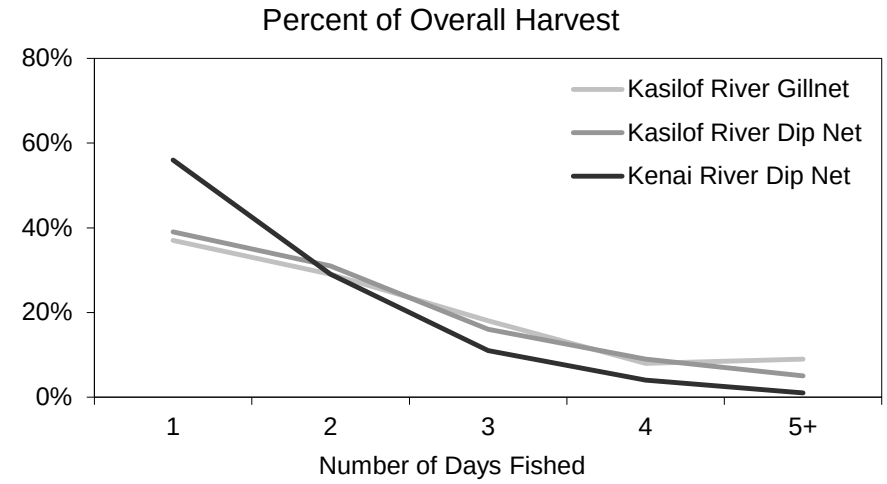


Figure 14.–Mean harvest per person in Upper Cook Inlet personal use fisheries by year (top) and by fishery and year (bottom).

Note: Data presented in the top graph are for the entire data set, including permits that did not fish. Data presented in the bottom graph are for permit holders that only participated in one fishery and the fishery was known (99% of permit holders who fished).





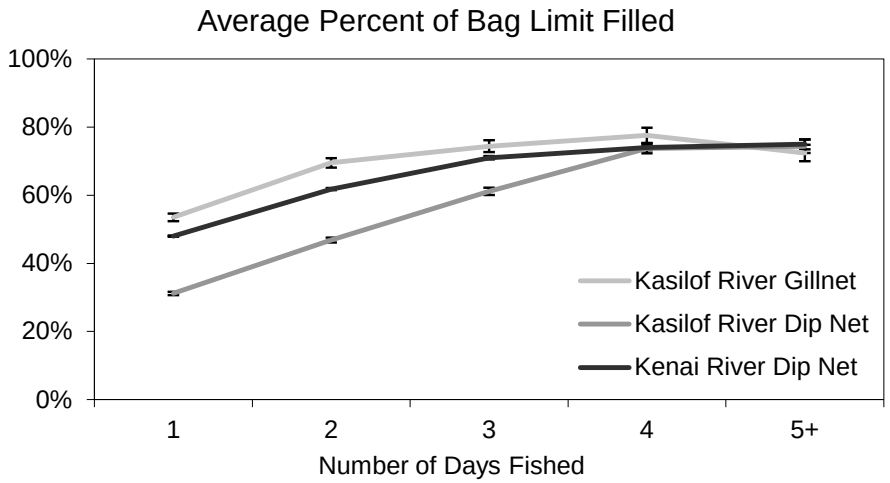


Figure 15.–Percent of permits, percent of total harvest, and average percent of bag limit filled by personal use salmon fishery and number of days fished, 2010–2012.

Note: Data presented are for participants that only fished in one of the following fisheries: Kenai dip net, Kasilof dip net, and Kasilof gillnet (~93% 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.

DISCUSSION

More UCIPU permits were issued during this study than ever before, indicating that these fisheries are continuing to increase in popularity (Appendix C1). On average, 33,473 permits were issued each year from 2010 through 2012 (Table 1). In contrast, the average number of permits issued from the beginning of these fisheries in 1996 through the present was 21,830 (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010). Return rates for UCIPU permits decreased during this study period by 6% from the return rate reported for the years 2007–2009 (Dunker 2010), which is perhaps a function of the growing popularity of these fisheries coupled with a lack of familiarity with the reporting requirements by new participants.

With the growing popularity of UCIPU fisheries, effort and harvest estimates have also increased. Average annual effort from 2010 through 2012 was about 12,000 more household-days (Table 3) than average effort from 2007 through 2009 (Dunker and Lafferty 2007) and about 16,000 more household-days above the historic average effort between 1996 and 2012 (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010). Also, the average salmon harvest was substantially higher during the years 2010–2012, averaging about 215,000 more salmon per year compared with the average salmon harvest between 2007 and 2009 (Dunker 2010) and 275,000 more salmon than the historic average between 1996 and 2012 (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007). Overall, mean effort and harvest have certainly increased since the fisheries first opened. However, effort per permit has remained relatively stable over the years (Appendix D1), whereas harvest per permit has been much more variable (Appendices D2–D6). The increases in total effort and harvest observed in this study appear to be a function of greater numbers of issued permits and larger sockeye salmon runs, particularly to the Kenai River (Table 5; Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010), rather than substantial increases in effort and harvest by individual households (Appendices C1 and D1). Additionally, the percentage of permit holders who were issued permits but did not fish was lower than in previous years (Table 2; Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010). During this study period, the average percent of households that opted not to fish dropped by 4% from the historic average between 1996 and 2012 (Table 2; Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010).

During 2010 through 2012, total fishing effort and harvest of sockeye salmon in the Kenai River dip net fishery was the highest ever (Appendices D1 and D2). In particular, the greatest sockeye salmon harvest occurred during the 2011 Kenai River dip net season (Appendix D2). Although effort in this fishery peaked in 2012, harvest of sockeye per permit actually dropped slightly in 2012 from the peak in 2011. Coho salmon harvests were also highest during the 2010–2012 period, following the same trend as sockeye salmon with a decrease in harvest in 2012 (Appendix D3). Chinook salmon harvests were lower during this study than in previous years (Appendix D4), but this can be explained by the closures to Chinook salmon harvests due to low returns, especially in 2012. Total chum salmon harvest in the Kenai River dip net fishery peaked in 2011 (Appendix D5), but pink salmon harvests were lower than in previous years and did not fluctuate much at all during this study period (Appendix D6).

The Kenai River dip net fishery has grown since 1996 with a few exceptions. Effort in this fishery was at an all-time high in 2012, although salmon harvest, particularly for sockeye salmon, was slightly higher in 2011, which was also the year with the largest total sockeye salmon run during this study period (Table 5). The difference in sockeye salmon harvest between 2010 and 2011 was only about 650 fish, and harvest per person did not substantially differ

between these two years (Figure 14), although harvest per person was greater in 2010 and 2011 than in previous years (2007–2010) (Figure 14; Dunker 2010). This corresponds to growing interest in the fishery that can be attributed to several factors including a greater awareness of the fishery, increased dependence on subsistence resources because of a poorer economy over the last 5 years, and an increasingly larger inriver run of sockeye salmon to the Kenai River (Appendix E1), which is often well publicized in fishing reports and by the media. Regardless of the reason for the increased participation, the percentage of annual bag limit filled by households fishing in the Kenai River was similar to previous years with the exception of 2011, when participants harvested about 8% more of their bag limit (Figure 10; Dunker 2010).

Harvest of sockeye salmon and overall effort in the Kasilof River personal use fisheries were slightly higher, but not substantially so from previous years (Appendices D1 and D2). The success of Kasilof River dipnetters as determined by the average percent of annual bag limit filled and the sockeye harvest per permit did not differ much from previous years (Figure 10 and Appendix D2; Dunker and Lafferty 2007; Dunker 2010). Although participants in the Kasilof River set gillnet fishery harvested a greater percentage of their annual limit than participants in the dip net fisheries, it remains the least popular Kenai Peninsula UCIPU fishery (Figure 12; Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010).

The Fish Creek dip net fishery was opened for 1 week in 2010 and for 3 days in 2011. As expected and consistent with other years in which this fishery has been open, participants were overwhelmingly from the Matanuska-Susitna Valley (Figure 7; Dunker 2010) and harvest levels were not as high as in the Kenai Peninsula UCIPU fisheries (Figures 10 and 11).

Most permit holders did not fill their 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 and Figure 9). However, the percentage of permits that harvested most of their limits (81–100%) was higher than in years previous to 2010 (Figure 9; Dunker and Lafferty 2007; Dunker 2010). Residency trends for these fisheries observed during this study have not changed substantially from earlier years. When comparing 1996 to the present, more Anchorage and Matanunska-Susitina Valley residents are now participating in these fisheries, and the percentage of Kenai area residents has decreased, but these shifts in residency patterns have occurred slowly over the years (Appendix F1). Regardless, from 2010 through 2012, 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 and Figure 7). Participants residing in the Matanuska-Susitna Valley 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). However, since 2007, Anchorage residents, obviously because of their high participation, have consistently harvested more total salmon than Kenai Peninsula or Matanuska-Susitna Valley residents (Appendix F2)

Public perception with regard to UCIPU fisheries is that regulatory violations are common (Barrett 2001 a-b in Reimer and Sigurdsson 2004; Dunker and Lafferty 2007). However, regulatory violations have only occasionally been recorded on permits (Reimer and Sigurdsson 2004; Dunker and Lafferty 2007; Dunker 2010); some of which occurred during the 2010–2012 study period. For example, 71 Chinook salmon were recorded on permits from the Kasilof River

dip net fishery where regulations do not allow retention of Chinook salmon, and 40 Chinook salmon were harvested from the Kenai River in 2012, when their retention was prohibited by emergency order (Table 3 and Appendix D4). Also, a small number (less than 0.7%) of households reported harvests in excess of their annual harvest limit (Figure 9). In addition, a few participants each year (less than 0.3%) 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 participants, but these types of violations are not widespread. More problems of significance would occur if large numbers of fishermen were not obtaining permits, were not recording harvested fish on their permits, or failing to return obtained permits.

Accurate and comprehensive 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 (Dunker 2010); of course, this is something that requires continued and diligent attention from law enforcement. The return rate for permits was lower during this study period than in previous years (Dunker and Lafferty 2007; Dunker 2010). However, the current return rate is sufficient to generate accurate and precise 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 ADF&G, 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, to increase compliance with the UCIPU fishery regulations. Finally, strides are being made to transition this permit program to an automated permit acquisition and reporting format. If this happens, it will be much easier to track and correspond with permit holders and preclude nonrespondents from obtaining permits and participating in these fisheries.

ACKNOWLEDGEMENTS

Thanks to all individuals involved with the success of this project. Kirk Brogdon was a principal investigator on this project. Pat Hansen served as project biometrician. In addition, Andrea Hamby, Margie Nussbaum, Diane Novinska, and Raili Kedzior were charged with entering the data from approximately 34,000 permits per year. There were over 60 vendors who were responsible for the distribution of Upper Cook Inlet personal use permits. Their help was invaluable, and they deserve many thanks.

REFERENCES CITED

Barrett, J. 2001a. Dipnetting spawns fishing frenzy, personal-use fishery brings no shortage of concerns., Peninsula Clarion. July 13, 2001. Kenai.

Barrett, J. 2001b. Scofflaws reportedly abundant in fishery. Peninsula Clarion. July 13, 2001. Kenai.

Begich, R. N., J. A. Pawluk, J. L. Cope and S. Simons. *In prep*. 2010-2012 Annual Management Report and 2013 recreational fisheries overview for North Kenai Peninsula; Fisheries under consideration by the Alaska Board of Fisheries, 2014. Alaska Department of Fish and Game, Fishery Management Report, Anchorage.

Brannian, L., and J. Fox. 1996. Upper Cook Inlet subsistence and personal use fisheries; Report to the Alaska Board of Fisheries, 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A96-03, Anchorage.http://www.adfg.alaska.gov/FedAidPDFs/RIR.2A.1996.03.pdf

Dunker, K. J. 2010. Upper Cook Inlet personal use salmon fisheries, 2007–2009. Alaska Department of Fish and Game, Fishery Data Series No. 10-89, Anchorage.http://www.adfg.alaska.gov/FedAidpdfs/FDS10-89.pdf

Dunker, K. J., and R. Lafferty. 2007. Upper Cook Inlet personal use salmon fisheries, 2004-2006. Alaska Department of Fish and Game, Fishery Data Series No. 07-88, Anchorage. http://www.adfg.alaska.gov/FedAidpdfs/fds07-88.pdf

Goodman, L. A. 1960. On the exact variance of products. Journal of the American Statistical Association 55:708-713.

Jennings, G. B., K. Sundet, and A. E. Bingham. 2011. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2010. Alaska Department of Fish and Game, Fishery Data Series No. 11-60, Anchorage.http://www.adfg.alaska.gov/FedAidpdfs/FDS11-60

Jennings, G. B., K. Sundet and A. E. Bingham. *In prep a*. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2011. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Jennings, G. B., K. Sundet and W. J. Romberg. *In prep b*. Estimates of participation, catch, and harvest in Alaska sport fisheries during 2012. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.

Reimer, A. M., and D. Sigurdsson. 2004. Upper Cook Inlet personal use salmon fisheries, 1996-2003. Alaska Department of Fish and Game, Fishery Data Series No. 04-31, Anchorage. http://www.adfg.alaska.gov/FedAidPDFs/fds04-31.pdf

APPENDIX A: EXAMPLE OF AN UPPER COOK INLET PERSONAL USE PERMIT

Appendix A1.–Example of an Upper Cook Inlet personal use permit.

Alaska Department of Fish & Game
2011 Upper Cook Inlet Personal Use Salmon Fishery Permit
ALASKA RESIDENTS ONLY

Permit # **11-00000**
VENDOR COPY

Last Name | First Name | Initial

Mailing Address

City | State | Zip Code | Phone Number

AK Driver's License # | Sport Fishing License #

The head of a household is allowed 25 salmon and each additional member is allowed 10 salmon. A household is allowed up to 10 flounders. **These are your limits for the entire 2011 season.**

Total Household Members | Total Household Salmon Limit

I have read and understood the permit requirements (listed on reverse of this card) and agree to return this permit to Alaska Department of Fish and Game by August 15th, 2011. I understand that failure to return my permit to ADF&G is a violation of 5 AAC 77.015(c) which is subject to a $200 fine and the loss of my future personal use fishing privileges.

Permit Holder Signature | Date | Vendor | Vendor Signature

Alaska Department of Fish & Game
2011 Upper Cook Inlet Personal Use Salmon Fishery Permit

Permit # **11-00000**

TIPS OF TAILS MUST BE REMOVED AND SALMON HARVEST MUST BE RECORDED PRIOR TO LEAVING FISHING SITE OR CONCEALING FISH FROM VIEW.

Last Name | First Name | Initial

Names of Other Household Members:

The head of a household is allowed 25 salmon and each additional member is allowed 10 salmon. A household is allowed up to 10 flounders. **These are your limits for the entire 2011 season.**

Total Household Members | Total Household Salmon Limit

Did you fish for personal use in 2011 ? ○ YES ○ NO

This permit is for gillnetting at the mouth of the Kasilof River and dipnetting at the mouth of the Kasilof and Kenai rivers. Dipnetting at Fish Creek is only open by Emergency Order. You must have this permit with you while fishing and you must record your harvest. Check the Southcentral Sport Fishing Regulations for legal times, gear, and species restrictions.

DATE			LOCATION FISHED (CHOOSE ONE)			HARVEST BY SPECIES					
	MM	DD	Kenai River	Fish Creek	Kasilof River	Red	Chum	King	Coho	Pink	Flounder
1.			○	○	○						
2.			○	○	○						
3.			○	○	○						
4.			○	○	○						
5.			○	○	○						

Report <u>each</u> day and location you fished and record your harvest, <u>even if you did not catch anything</u>.

-continued-

Appendix A1.–Part 2 of 2.

Vendor Instructions

Permit Requirements:

1. Applicant must be an **Alaska Resident**.
2. Application must have a valid **2011** Alaska resident Sport Fishing License or be under 16 years of age.
3. Applicants who are Disabled Alaska Veterans (DAV) or over age 60 must have an ADF&G Permanent Identification Card (PID) if they do not have a current resident Sport Fishing License.
4. Only **ONE** permit per household is allowed.
5. Harvest information is vital to the management and conservation of the resource. **Permits MUST be returned to ADF&G by August 15th, 2011** even if the permit holder did not fish. Failure to return this permit is a violation which is subject to a $200 fine and the loss of future personal use fishing privileges.

Special Instructions To The Vendor:

Return your vendor copies **each month** to ADF&G in the envelopes provided. All vendor copies of issued permits and remaining unissued permits must be returned after the fishery closes or by **September 15th, 2011**.

Return copies of issued permits and unissued forms to:

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

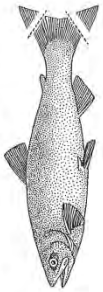
Issuing a Permit:

1. Ask to see the applicant's **2011** Alaska resident sport fishing license or PID, unless the applicant is under 16 years of age.
2. Write the sport fishing license number or PID number in the space provided on the top half of the form.
3. Have the applicant fill out his/her name, address, and driver's license number on the top half of the form. Then have them fill out his/her name and the names of other household members on the bottom half of the form.
4. The head of a household is allowed 25 salmon and each additional member is allowed 10 salmon. A household is allowed up to 10 flounders.
5. **Vendor must determine accurate member count for household** and the **total salmon harvest limit.** The total limits must be recorded on both the top and bottom of the form.
6. **Applicant must sign and date the top portion**. The Vendor must also sign and provide their vendor number.
7. Vendors keep the top half, and the applicant gets the bottom half along with the regulations/access brochure.
8. Vendors are responsible for verifying that ALL the identifying information on the top and bottom of the form is complete. Do NOT leave any blank spaces. **Do NOT allow people to walk out with blank permits**.

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

PLACE FIRST-CLASS POSTAGE HERE

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



IMPORTANT:
Return this permit to Fish and Game by August 15th, 2011 even if you did not fish.

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

APPENDIX B: SOCKEYE SALMON HARVEST BY DATE DURING THE UPPER COOK INLET PERSONAL USE FISHERIES, 2010–2012

Appendix B1.–Sockeye salmon harvest by date during the Kasilof River set gillnet fishery, 2010–2012.

	2010			2011			2012		
Date	Total	Average[a]	SE	Total	Average[a]	SE	Total	Average[a]	SE
15 Jun	1,167	9.0	0.7	2,793	17.3	0.9	1,133	8.9	0.8
16 Jun	1,026	7.7	0.7	1,992	13.6	0.8	688	5.8	0.6
17 Jun	831	6.1	0.6	2,679	14.6	0.8	637	5.7	0.5
18 Jun	1,175	7.1	0.5	2,091	13.0	0.8	1,053	8.0	0.6
19 Jun	1,860	10.8	0.7	2,313	13.8	0.9	1,237	9.4	0.8
20 Jun	2,144	12.0	0.8	2,659	14.9	0.9	1,114	8.0	0.5
21 Jun	2,503	14.4	0.9	1,925	12.6	0.8	2,065	12.4	0.8
22 Jun	2,752	15.5	0.9	2,912	15.2	1.0	1,874	11.0	0.6
23 Jun	2,654	15.5	0.8	2,270	14.6	1.0	1,888	10.5	0.6
24 Jun	2,605	17.4	1.1	1,722	15.9	1.3	1,318	10.6	0.7

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

[a] Average harvest per permit.

Appendix B2.–Sockeye salmon harvest by date during the Kasilof River dip net fishery, 2010–2012.

	2010			2011			2012		
Date	Total	Average[a]	SE	Total	Average[a]	SE	Total	Average[a]	SE
25 Jun	1,363	10.8	0.8	829	5.4	0.5	357	6.3	0.7
26 Jun	976	7.2	0.6	333	4.4	0.6	304	6.9	1.1
27 Jun	608	7.6	8.6	325	6.0	1.0	528	9.1	1.1
28 Jun	335	7.0	1.0	284	4.4	0.5	312	8.2	1.4
29 Jun	726	9.9	1.2	430	8.3	1.8	495	9.2	1.3
30 Jun	407	7.8	1.1	111	3.1	0.7	859	6.5	0.6
1 Jul	344	5.1	0.7	814	6.5	0.6	598	5.8	0.5
2 Jul	732	6.7	0.7	904	6.0	0.6	653	8.7	1.0
3 Jul	1,106	6.3	0.5	541	3.9	0.4	384	5.8	0.7
4 Jul	1,971	9.0	0.6	573	5.1	0.6	245	3.4	0.5
5 Jul	607	6.2	0.7	381	5.6	0.7	132	2.7	0.5
6 Jul	457	4.6	0.5	204	4.2	0.8	331	4.3	0.6
7 Jul	393	6.8	0.9	111	4.6	1.1	814	4.8	0.4
8 Jul	355	6.2	0.9	470	5.1	0.7	682	7.1	0.9
9 Jul	790	5.7	0.5	374	3.5	0.5	315	6.2	1.2
10 Jul	1,105	5.4	0.5	388	4.9	0.7	500	7.5	0.8
11 Jul	1,108	6.8	0.5	346	5.6	1.0	493	7.7	1.1
12 Jul	1,234	8.9	0.6	277	3.2	0.4	707	8.2	1.2
13 Jul	2,178	11.2	0.7	332	3.6	0.5	1,548	9.7	0.7
14 Jul	1,635	8.0	0.5	538	3.8	0.4	4,699	15.1	0.7
15 Jul	2,745	10.1	0.5	3,176	8.3	0.4	5,332	19.5	0.9
16 Jul	5,904	13.1	0.5	5,970	11.4	0.4	1,355	9.8	0.9
17 Jul	7,607	14.6	0.5	3,085	10.0	0.5	2,813	11.5	0.7
18 Jul	3,555	12.2	0.7	2,019	10.2	0.8	2,530	9.3	0.5
19 Jul	1,138	9.0	0.8	2,830	10.4	0.5	2,344	9.4	0.5
20 Jul	2,650	13.1	0.8	1,821	8.1	0.5	6,090	15.7	0.6
21 Jul	1,426	9.5	0.8	725	5.6	0.6	8,182	17.5	0.6
22 Jul	1,156	9.3	0.8	2,830	11.7	0.6	2,152	11.9	0.7
23 Jul	2,697	10.9	0.6	1,922	8.2	0.7	1,274	10.4	0.8
24 Jul	2,694	8.7	0.5	1,171	9.0	0.8	2,051	16.5	1.1
25 Jul	1,104	7.2	0.7	782	8.2	0.9	2,137	18.6	1.4
26 Jul	375	8.0	1.3	837	11.3	1.2	950	10.8	0.9
27 Jul	1,144	13.3	1.3	341	8.1	1.3	1,746	12.8	0.9
28 Jul	689	8.9	1.0	391	7.8	1.2	1,579	9.1	0.6
29 Jul	391	8.5	1.2	583	7.5	1.0	818	8.2	0.7
30 Jul	837	8.5	0.7	483	4.6	0.7	418	7.9	1.0
31 Jul	662	7.4	0.9	194	4.9	1.1	332	10.4	1.1
1 Aug	841	10.1	1.1	187	6.7	1.2	266	8.1	1.0
2 Aug	194	5.2	1.2	87	4.6	1.0	195	7.2	1.2
3 Aug	98	3.5	5.9	109	5.5	1.3	226	5.9	0.8
4 Aug	116	3.9	0.9	96	4.8	0.6	423	5.9	0.7
5 Aug	187	4.2	0.9	175	4.5	0.6	346	6.8	0.8
6 Aug	535	8.0	0.9	216	4.6	0.8	136	4.3	0.8
7 Aug	501	6.7	0.8	44	2.1	0.5	74	3.7	0.8

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

[a] Average harvest per permit.

Appendix B3.–Sockeye salmon harvest by date during the Kenai River dip net fishery, 2010–2012.

	2010			2011			2012		
Date	Total	Average[a]	SE	Total	Average[a]	SE	Total	Average[a]	SE
10 Jul	4,176	6.9	0.3	1,713	6.4	0.6	1,512	9.1	1.1
11 Jul	3,824	8.7	0.4	2,024	7.5	0.6	1,045	7.2	0.7
12 Jul	4,489	9.9	0.4	1,480	6.2	0.6	2,638	10.5	0.7
13 Jul	6,478	9.5	0.4	2,505	6.5	0.4	4,145	9.2	0.4
14 Jul	9,168	8.3	0.2	2,884	6.1	0.4	19,564	15.6	0.4
15 Jul	23,698	15.5	0.3	9,018	7.7	0.3	31,561	19.9	0.4
16 Jul	40,020	17.4	0.3	76,203	22.8	0.3	21,084	13.2	0.3
17 Jul	45,462	17.8	0.3	46,340	19.6	0.3	15,550	8.3	0.2
18 Jul	29,852	18.2	0.4	34,261	17.5	0.3	16,177	8.0	0.2
19 Jul	19,936	16.3	0.4	49,528	20.5	0.3	18,464	10.1	0.2
20 Jul	20,880	15.4	0.3	34,000	17.0	0.3	62,484	19.5	0.3
21 Jul	18,401	13.8	0.3	15,351	11.3	0.3	64,942	18.5	0.2
22 Jul	15,683	14.7	0.4	39,654	18.4	0.3	34,762	18.8	0.3
23 Jul	16,716	12.7	0.3	43,764	18.8	0.3	24,800	18.7	0.4
24 Jul	22,311	14.1	0.3	17,871	16.5	0.4	24,519	19.6	0.4
25 Jul	6,783	9.3	0.3	13,831	18.0	0.5	21,696	19.1	0.4
26 Jul	4,057	9.1	0.5	13,814	18.3	0.5	15,011	18.3	0.5
27 Jul	7,418	12.4	0.5	9,062	15.0	0.6	15,789	15.9	0.4
28 Jul	7,136	11.4	0.4	7,661	13.3	0.5	13,767	12.9	0.3
29 Jul	4,275	9.4	0.4	9,140	13.2	0.4	9,666	14.1	0.5
30 Jul	6,341	11.3	0.5	7,706	9.4	0.3	6,868	16.1	0.7
31 Jul	4,581	9.35	0.4	3,808	9.7	0.4	6,073	14.6	0.6

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

[a] Average harvest per permit.

Appendix B4.–Sockeye salmon harvest by date during the Fish Creek dip net fishery, 2010–2012.

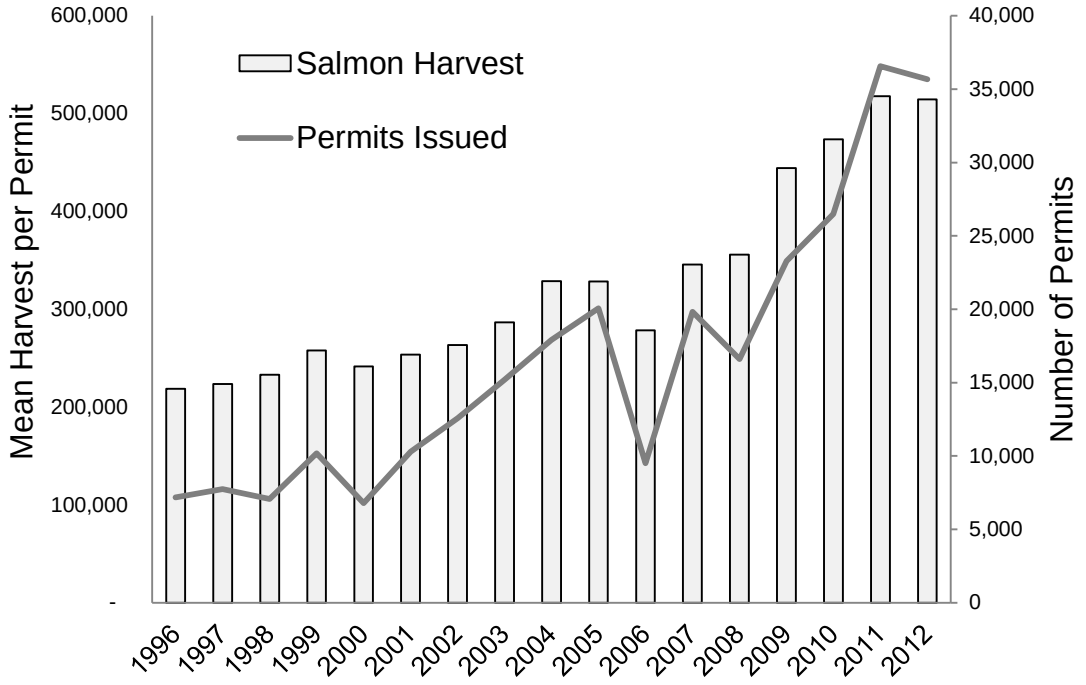
	2010			2011			2012		
Date	Total	Average[a]	SE	Total	Average[a]	SE	Total	Average[a]	SE
24 Jul	3,698	9.5	0.5				–	–	–
25 Jul	2,035	8.0	0.6				–	–	–
26 Jul	1,540	7.2	0.6				–	–	–
27 Jul	2,662	10.9	0.8				–	–	–
28 Jul	2,477	9.8	0.7				–	–	–
29 Jul	1,905	7.7	0.5	1,756	4.2	0.24	–	–	–
30 Jul	1,944	6.8	0.5	997	3.1	0.24	–	–	–
31 Jul	2,207	9.2	0.6	820	4.1	0.41	–	–	–

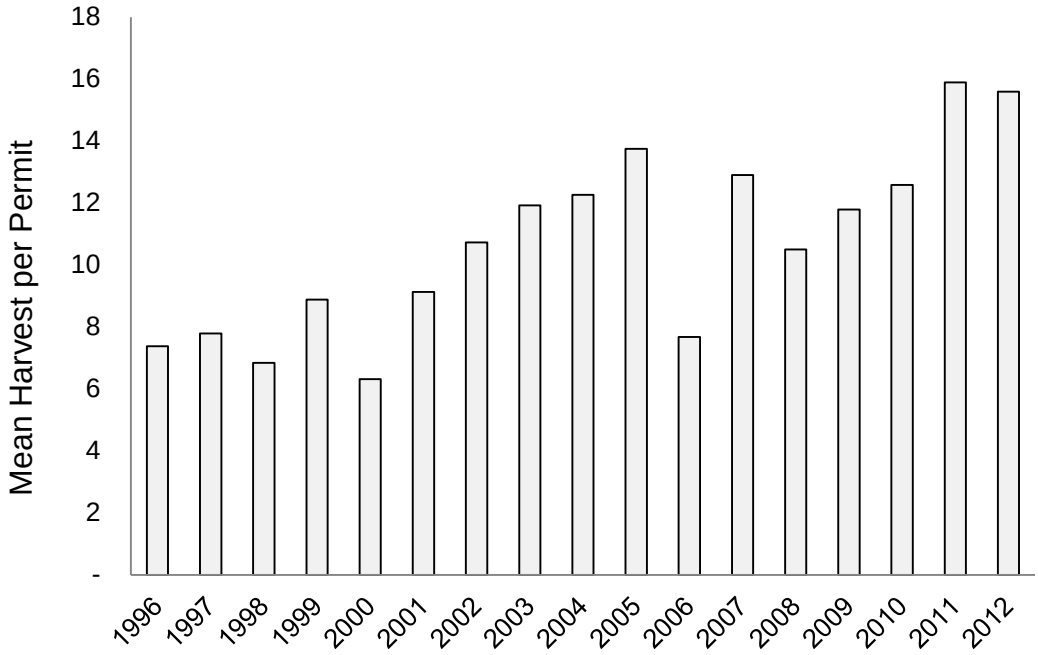
Note: Data presented are for "known" permits during legal harvest dates only.

[a] Average harvest per permit.

APPENDIX C: HISTORIC TRENDS IN UCIPU SALMON HARVEST, PARTICIPATION, AND HARVEST PER PERMIT, 1996-2012

Appendix C1.–Historic trends in UCIPU salmon harvest, participation, and harvest per permit, 1996–2012.

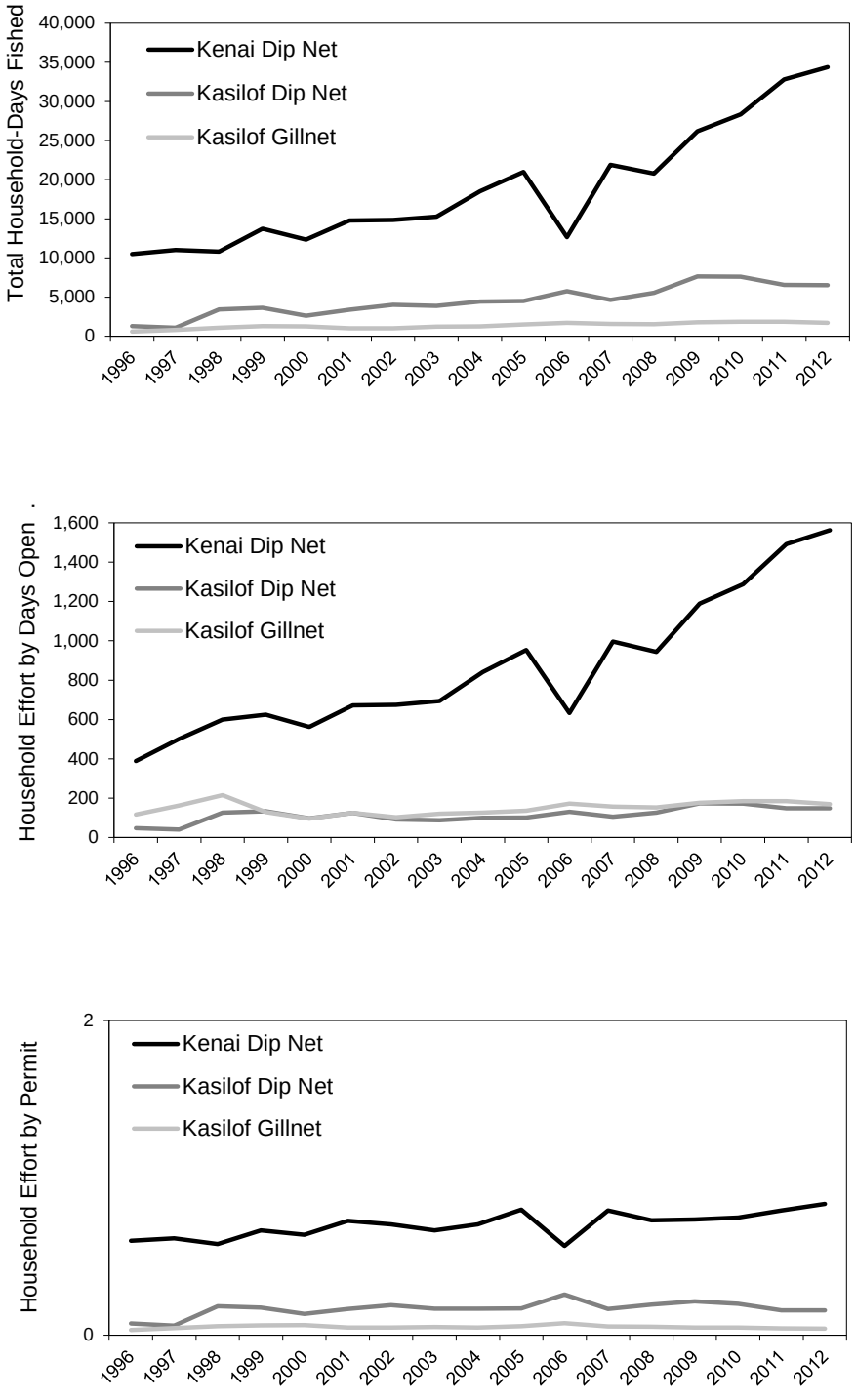




Note: Data presented for all permit holders who fished.

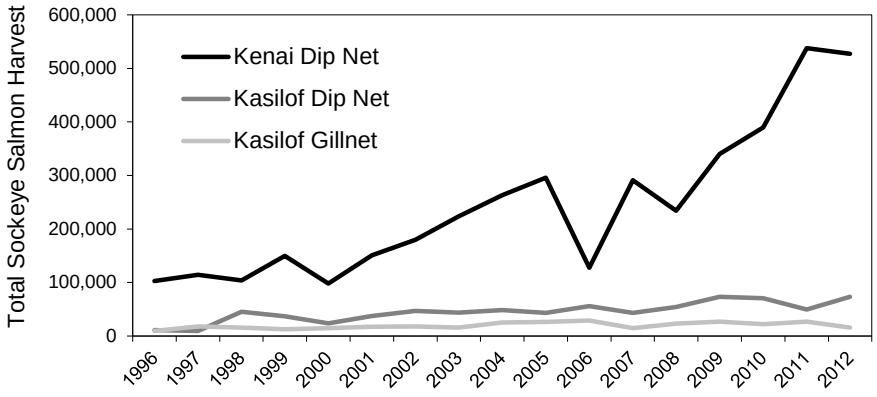
APPENDIX D: EFFORT AND HARVEST TRENDS DURING THE UPPER COOK INLET PERSONAL USE FISHERIES, 1996–2012

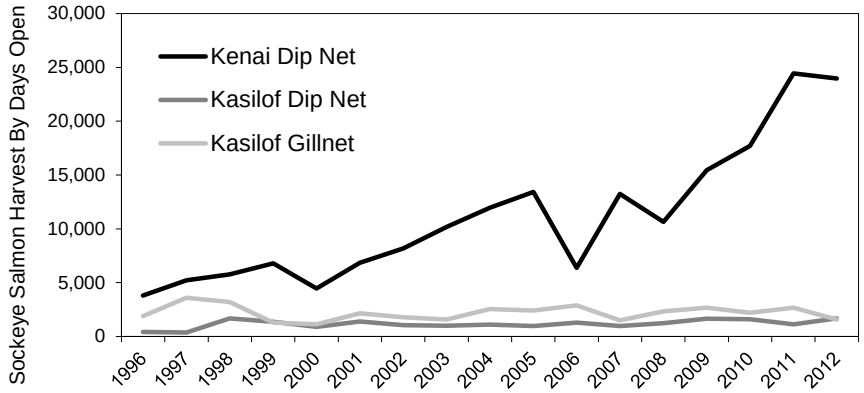
Appendix D1.–Total household-days fished (top), household effort by days open (middle), and household effort by permit (bottom) during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.

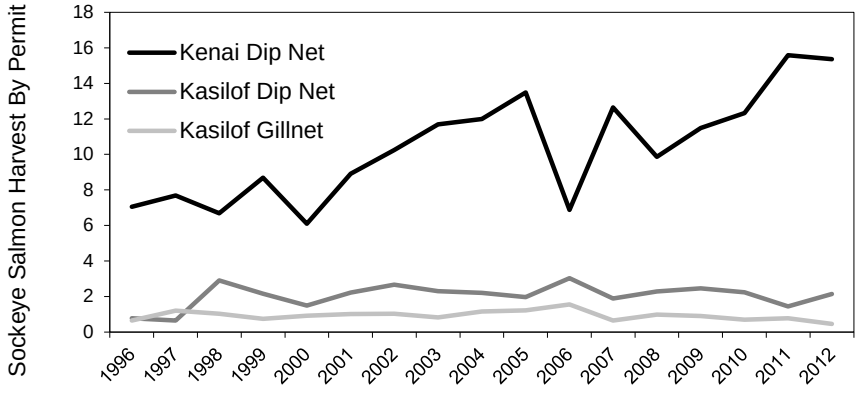


Note: For top graph, all standard errors are less than ±61. Middle graph data were calculated as the overall number of household-days fished divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall number of household-days fished divided by the number of permits.

Appendix D2.–Total sockeye salmon harvest (top), sockeye salmon harvest by days open (middle), and sockeye salmon harvest by permit (bottom) during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.

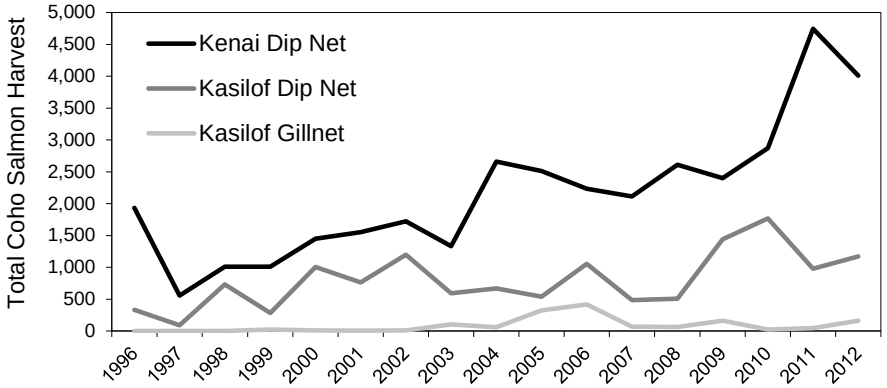


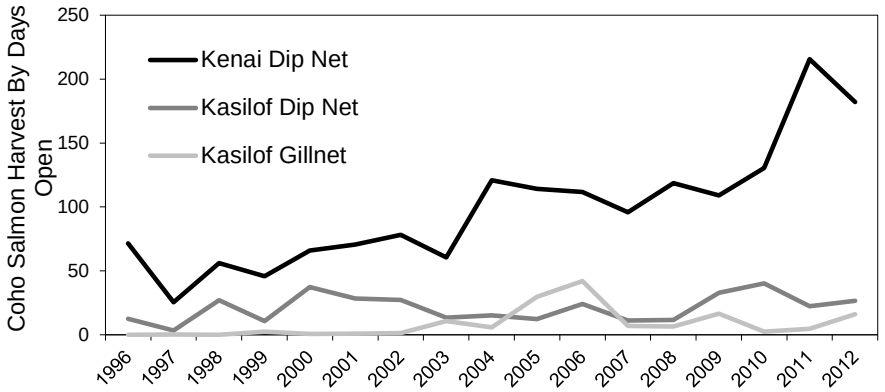


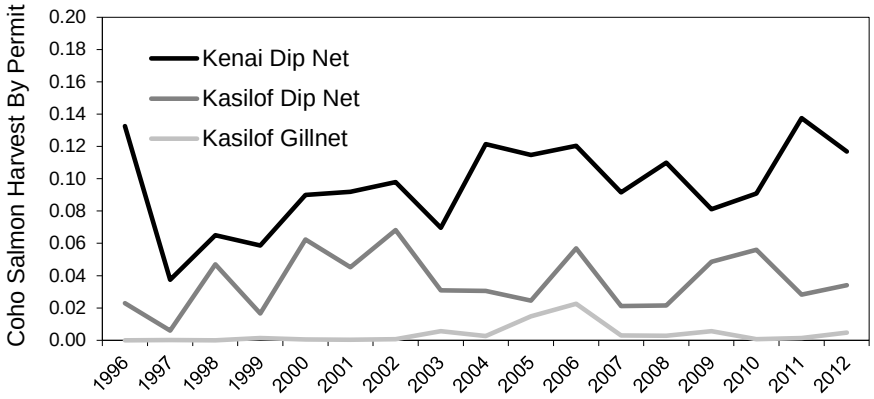


Note: For top graph, all standard errors are less than ±1,110. Middle graph data were calculated as the overall sockeye salmon harvest divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall sockeye salmon harvest divided by the number of permits issued each year.

Appendix D3.–Total coho salmon harvest (top), coho salmon harvest by days open (middle), and coho salmon harvest by permit (bottom) during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.

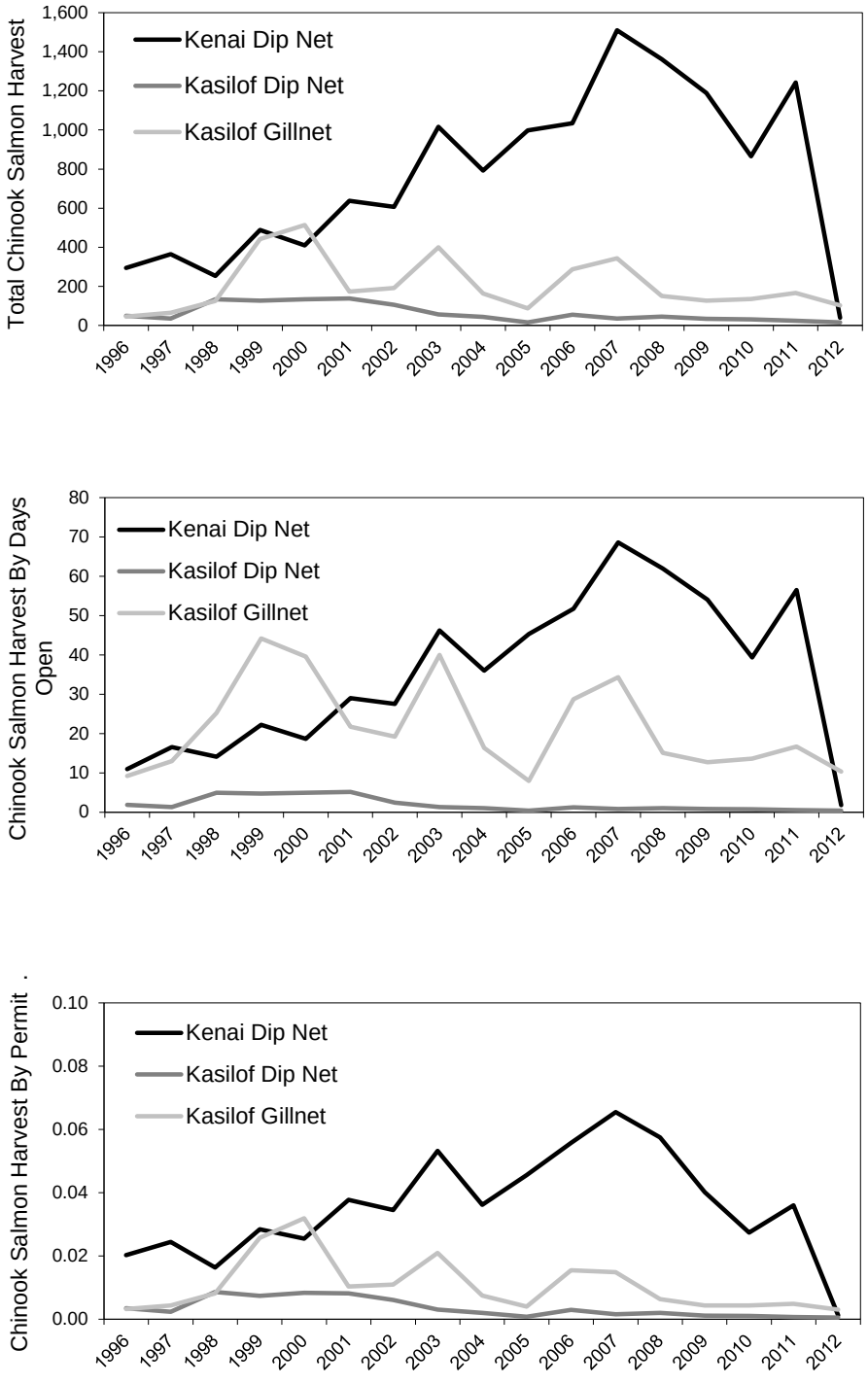






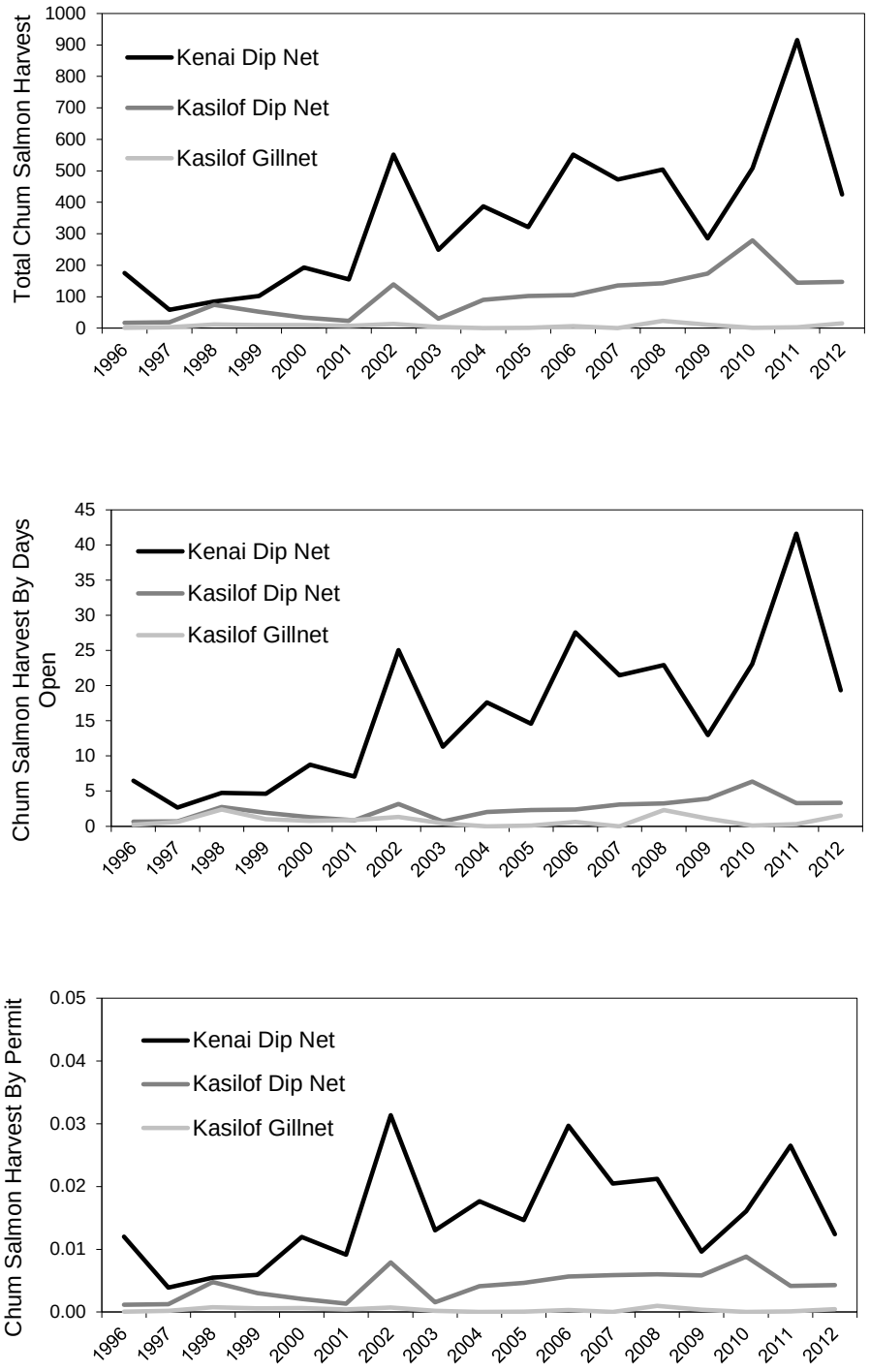
Note: For top graph, all standard errors are less than ±118. Middle graph data were calculated as the overall coho salmon harvest divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall coho salmon harvest divided by the number of permits issued each year.

Appendix D4.–Total Chinook salmon harvest (top), Chinook salmon harvest by days open (middle), and Chinook salmon harvest by permit (bottom)during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.



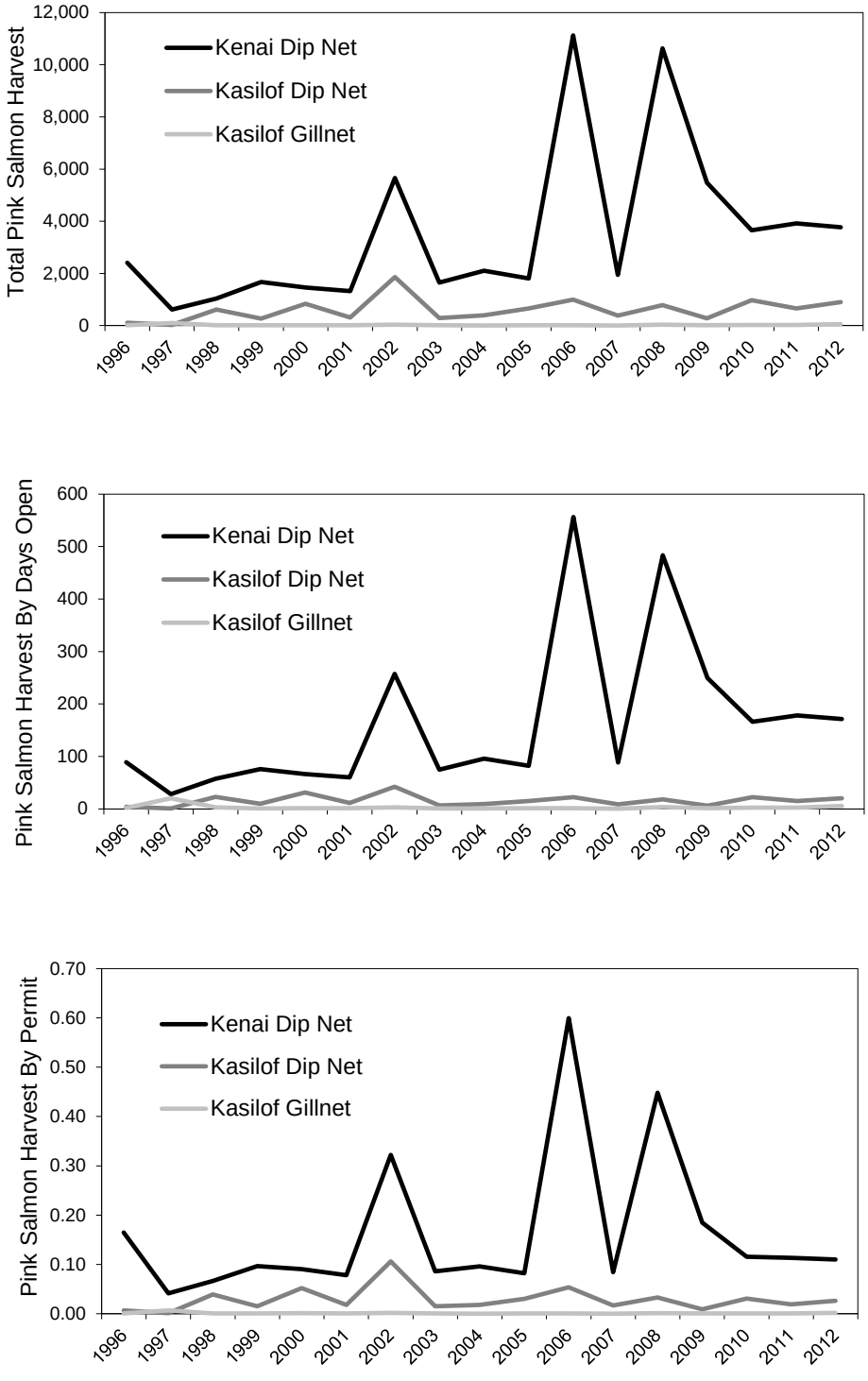
Note: For top graph, all standard errors are less than ±10. Middle graph data were calculated as the overall Chinook salmon harvest divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall Chinook salmon harvest divided by the number of permits issued each year.

Appendix D5.–Total chum salmon harvest (top), chum salmon harvest by days open (middle), and chum salmon harvest by permit (bottom) during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.



Note: For top graph, all standard errors are less than ±20. Middle graph data were calculated as the overall chum salmon harvest divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall chum salmon harvest divided by the number of permits issued each year.

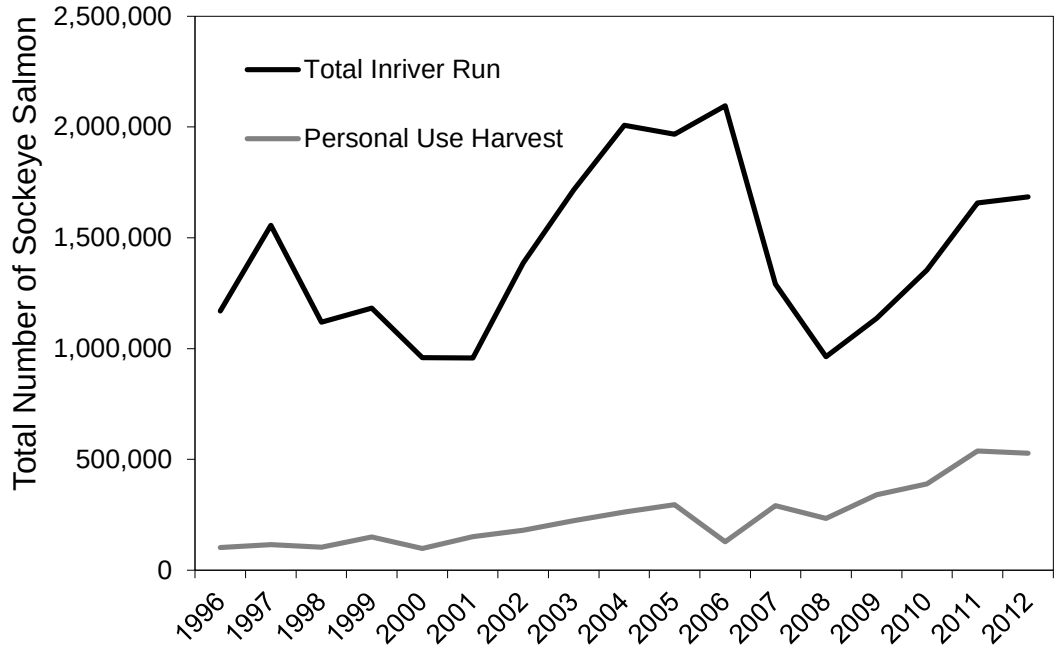
Appendix D6.–Total pink salmon harvest (top), pink salmon harvest by days open (middle), and pink salmon harvest by permit (bottom) during the Upper Cook Inlet personal use salmon fisheries, 1996–2012.



Note: For top graph, all standard errors are less than ±102. Middle graph data were calculated as the overall pink salmon harvest divided by the number of days the fishery was open each year. Bottom graph data were calculated as the overall pink salmon harvest divided by the number of permits issued each year.

APPENDIX E: TRENDS IN SOCKEYE SALMON HARVESTS RELATIVE TO TOTAL INRIVER SOCKEYE SALMON RUNS, KENAI RIVER, 1996–2012

Appendix E1.–Trends in sockeye salmon harvests relative to total inriver sockeye salmon runs, Kenai River, 1996–2012.



APPENDIX F: HISTORICAL RESIDENCY TRENDS FOR PARTICIPANTS IN THE UPPER COOK INLET PERSONAL USE SALMON FISHERIES

Appendix F1.–Historical residence areas for Upper Cook Inlet personal use salmon fishery participants.

Category	Area of residence	Percentage by year																
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Statewide[a]																		
	Region 1	0.2	0.2	0.3	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	2.0	0.2	0.3	0.2
	Region 2	98.5	98.6	98.1	98.3	98.5	98.1	97.7	97.4	97.1	97.0	96.7	97.1	97.1	96.7	95.2	96.3	95.5
	Region 3	1.3	1.3	1.3	1.5	1.3	1.6	2.0	2.3	2.5	2.7	2.9	2.4	2.5	2.8	3.4	3.0	3.1
	Out of state or unknown	0.0	0.0	0.3	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.3	0.3	0.2	1.2	0.3	1.0
	Total	100	100	100	100	100	100	100	100	100	100	100	100	100	1	100	100	100
Region 2																		
	Anchorage area	52.0	53.9	54.2	55.4	57.0	58.6	58.2	59.4	61.1	61.0	59.8	59.7	58.8	57.5	60.8	57.7	58.5
	Kenai Peninsula area	30.4	31.3	32.3	32.1	29.2	29.7	29.1	26.4	25.0	24.5	26.1	25.7	26.2	24.0	21.6	22.4	21.8
	Mat-Su Valley area	14.8	12.4	10.5	9.5	11.3	8.6	9.2	10.1	12.1	12.9	12.6	14.4	14.9	18.3	17.4	19.7	19.5
	Other	1.3	1.0	1.1	1.3	1.0	1.2	1.2	1.6	1.8	1.6	1.5	0.2	0.1	0.2	0.3	0.2	0.3
	Total	99	99	98	98	99	98	98	98	100	100	100	100	100	100	100	100	100

Note: Data exclude permits missing vendor copy ("orphan permits").

[a] Region 1 is Southeastern Alaska, Region 2 is Southcentral Alaska, and Region 3 is Interior Alaska.

Appendix F2.–Historical salmon harvest by Region 2 residence area.

Region 2 residency	Fishery	Total salmon harvest					
		2007	2008	2009	2010	2011	2012
Anchorage							
	Kenai dip net	154,369	120,544	170,925	188,210	259,529	259,151
	Kasilof dip net	24,158	28,372	37,378	36,486	24,512	35,956
	Kasilof gillnet	5,181	7,653	9,087	6,907	9,382	5,039
	Fish Creek	–	–	2,571	7,375	1,433	–
	Unknown	3,091	3,842	3,883	4,293	5,962	5,812
Kenai Peninsula							
	Kenai dip net	66,593	58,593	78,193	74,439	93,902	85,390
	Kasilof dip net	7,615	10,075	12,085	10,257	6,362	9,018
	Kasilof gillnet	5,025	8,837	8,859	7,761	8,917	4,895
	Fish Creek	–	–	82	0	105	–
	Unknown	1,691	1,290	1,644	1,293	1,373	2,134
Mat-Su Valley							
	Kenai dip net	40,883	36,066	51,349	58,504	86,093	78,101
	Kasilof dip net	6,722	9,461	13,731	11,663	8,798	13,825
	Kasilof gillnet	3,054	4,907	5,082	3,797	4,620	2,741
	Fish Creek	–	–	6,116	16,590	3,592	–
	Unknown	994	1,122	1,437	1,109	1,439	2,031
Other							
	Kenai dip net	276	424	503	699	772	936
	Kasilof dip net	87	108	152	67	37	173
	Kasilof gillnet	35	55	135	31	67	61
	Fish Creek	–	–	–	32	0	–
	Unknown	0	28	–	0	114	0

Note: Data exclude permits missing vendor copy ("orphan permits").