

Fishery Data Series No. 11-67

**Summary of the Noncommercial Pot Shrimp Fishery
by Permit for Prince William Sound, Alaska, 2002–
2005 and 2009–2010**

by

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and

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December 2011

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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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	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
Weights and measures (English)		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft ³ /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	\geq
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia (for example)	e.g.	less than or equal to	\leq
pound	lb	Federal Information Code	FIC	logarithm (natural)	ln
quart	qt	id est (that is)	i.e.	logarithm (base 10)	log
yard	yd	latitude or longitude	lat. or long.	logarithm (specify base)	log ₂ , etc.
		monetary symbols (U.S.)	\$, ¢	minute (angular)	'
Time and temperature		months (tables and figures): first three letters	Jan,...,Dec	not significant	NS
day	d	registered trademark	®	null hypothesis	H_0
degrees Celsius	°C	trademark	™	percent	%
degrees Fahrenheit	°F	United States (adjective)	U.S.	probability	P
degrees kelvin	K	United States of America (noun)	USA	probability of a type I error (rejection of the null hypothesis when true)	α
hour	h	U.S.C.	United States Code	probability of a type II error (acceptance of the null hypothesis when false)	β
minute	min	U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
second	s			standard deviation	SD
Physics and chemistry				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
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				

FISHERY DATA SERIES NO. 11-67

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December 2011

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This document should be cited as:

Hochhalter, S. J., and P. A. Hansen. 2011. Summary of the noncommercial pot shrimp fishery by permit for Prince William Sound, Alaska, 2002–2005 and 2009–2010. Alaska Department of Fish and Game, Fishery Data Series No. 11-67, Anchorage.

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ABSTRACT

The noncommercial pot shrimp fishery in Prince William Sound, Alaska has been monitored periodically (2002–2005, 2009–2010) with a permit that requires users to report the location, duration, and harvest of their sets of pot gear. These data were used to generate estimates of total annual effort and harvest in the noncommercial fishery and to monitor the spatial distribution of effort and harvest. Total effort within the noncommercial fishery has rapidly expanded from 19,387 (SE 734) pot days of effort in 2002 to 78,083 (SE 805) pot days of effort in 2010. Likewise, total harvest has increased from 9,288 (SE 238) lbs of shrimp in 2002 to 87,699 (SE 463) lbs in 2010. Conversely, the spatial distribution of effort and harvest has remained relatively constant over this same time frame. On average, the majority of effort (70%) and harvest (56%) in the noncommercial fishery occurs within relatively isolated areas nearest the ports of Whittier and Valdez. Increased spot shrimp (*Pandalus platyceros*) mortality via this fishery in areas nearest the ports of Whittier and Valdez raises concern for localized depletion.

Key words: spot shrimp, *Pandalid*, *Pandalus platyceros*, Prince William Sound, noncommercial pot fishery

INTRODUCTION

Recreational fisheries in the state of Alaska are monitored by the Alaska Department of Fish and Game (ADF&G) with a variety of methods that include a postseason mail-out survey of all sport fish license holders (statewide harvest survey; SWHS; e. g., Jennings 2011), onsite creel surveys, and harvest permits that require submittal of a postseason harvest report. The method used to monitor a particular fishery is based, in part, on the ability of the survey method to provide parameter estimates on a time scale and with a quality (precision and accuracy) that matches the needs of management. In general, the ADF&G Division of Sport Fish (SF) relies on the SWHS to generate estimates of participation, catch, and harvest for most sport fisheries throughout the state. However, because estimates generated by the SWHS are not available to managers until after the following fishing season (e.g., 2010 estimates were not available until November 2011), the timeliness of SWHS estimates can be inadequate if inseason management is necessary or if estimation of the harvest level for one year is dependent on the harvest from the previous year (e.g., surplus production models). Additionally, several fisheries throughout the state allow users to harvest fish resources under personal use, subsistence, or sport fish designation and although regulations for each user type are similar, harvest may not be recorded by SWHS (e.g., Prince William Sound noncommercial shrimp fishery) because subsistence users are not required to obtain a sport fish license prior to participation in these fisheries.

The Prince William Sound (PWS) sport fishery for shrimp has been monitored annually by SWHS since 1994 and intermittently by harvest permit since 2002 (Marston and Brazil 2008). The initial need for a noncommercial shrimp permit stemmed from concern regarding the status of the PWS shrimp resource combined with a lack of monitoring of harvest by subsistence users (SWHS only surveys sport fish license holders). In March 2000, the Alaska Board of Fisheries (BOF) adopted regulations that included a mandatory shrimp permit for all noncommercial users (sport, personal use, and subsistence). After 4 years (2002–2005), a comparison was made between SWHS and permit harvest estimates. Although SWHS estimates were consistently lower than those generated from the permit data, a high level of correlation between the 2 estimates suggested the permit was no longer necessary to manage the fishery under the management strategy in place at that time. As such, ADF&G successfully submitted a proposal to BOF during the 2005/2006 statewide shellfish BOF meeting to eliminate the permit. In March 2009, BOF adopted a PWS Pot Shrimp Management Plan that, among other things, allocated 40% of the harvestable surplus of shrimp to commercial users and 60% to noncommercial users. Harvestable surplus is estimated annually prior to the start of the fishing season (15 April) with a

surplus production model which requires more timely and precise estimates of noncommercial harvest than are provided by the SWHS. As such, it became necessary to reinstate the noncommercial shrimp permit prior to the start of the 2009 shrimp pot fishery season.

The PWS noncommercial shrimp permit (hereafter permit) requires all noncommercial users to report the date, location, duration, number of pots, and harvest of shrimp (gal) for each set of pot gear made throughout the fishing season (15 April–15 September). With these data, total effort and harvest is estimated (detailed below) and spatial distribution of effort and harvest is monitored. This report summarizes these data for the years 2002–2005, 2009, and 2010.

OBJECTIVES

The objectives of the noncommercial PWS shrimp permit are as follows:

- 1) Estimate effort (pot days of effort) and harvest of shrimp in the PWS management area noncommercial shrimp fishery such that the estimate of total harvest is within 10% of the true value 95% of the time.
- 2) Monitor the spatial distribution of noncommercial effort and harvest of shrimp in PWS.

METHODS

All noncommercial participants (i.e., personal use, subsistence, and sport fish) in PWS shrimp fisheries were required to obtain a permit (Appendix A1) or be named on the permit of another household member. Permits were made available at major license vendors in the Anchorage, Seward, Valdez, and Whittier areas. Permits were also issued at ADF&G offices in Anchorage, Cordova, Fairbanks, and at Village Council offices in Tatitlek and Chenega. License vendors and ADF&G offices were required to return the top copy of the permit to ADF&G, Division of Sport Fish, in Cordova. This “vendor copy” had the permit holder’s name, sport license number, and address. The carbonless copy paper used for the permit allowed information from the “vendor copy” to be transferred to the second page (permittee’s copy).

Permit holders were required to record on the permit their effort (number of pots and soak time), harvest (in gallons of whole shrimp), and location of each set. Permit holders were also required to return their harvest records to Cordova ADF&G by 15 October each year; permit holders that did so were considered “compliant.” Permit holders who failed to return their permits by 7 November (“noncompliant”) were mailed a reminder letter (Appendix B1) on 15 November. Nonrespondents from the first reminder letter were mailed a second reminder letter in mid-December. Dates for mailing reminder letters allowed adequate time for permit holders to respond prior to subsequent reminder letters being mailed.

Vendors who failed to return their vendor copies were contacted at the end of the season and reminded of their obligation. Although this minimized the number of missing vendor copies, a portion of the vendor copies were not received each year. Permits returned with no corresponding vendor copy (i.e., the vendor did not return the vendor copy, but the permit holder did return the permit; hereafter referred to as “orphan permits”) were used to estimate the total number of permits issued for that year. Specifically, orphan permits were assumed to have the same response rate as voluntarily returned permits for which a vendor copy was received. This response rate was then used to estimate the total number of orphan permits as follows:

$$\hat{N} = \frac{o}{\hat{p}} + M \quad (1)$$

where

- \hat{N} = the total number of household permits issued,
- o = the number of permits issued and returned by households before the first reminder letter, but with no vendor card (“orphan permits”), and
- \hat{p} = the response rate before the first reminder letter among households with vendor cards.

\hat{p} was calculated as follows:

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

where

- m = the number of permits with vendor cards, returned before the first reminder letter, and
- M = the total number of permits with vendor cards.

Variance was estimated as follows:

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

where

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

The estimated number of permits issued was then divided into 4 groups:

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

where

- N_{cf} = the number of compliant households who reported fishing,
- N_{cz} = the number of compliant households who reported they did not fish,
- \hat{N}_{df} = the estimated number of noncompliant households who fished, and
- \hat{N}_{dz} = the estimated number of noncompliant households who did not fish.

\hat{N}_{df} was estimated as follows:

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

where

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

n_d = the number of noncompliant households responding to the last reminder, and
 n_{df} = the number of noncompliant households who responded to the last reminder and reported fishing.

\hat{N}_{dz} was estimated as follows:

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

Information from returned permits (effort, harvest, location, and associated dates for each set of pot gear) was entered into a database. Occasionally, a permit holder ended up with 2 or more permits if the original permit was lost. Prior to mailing out reminder letters, all but 1 of the permits for a given individual was marked as “duplicate” in the database. If 2 copies of 1 permit were received (e.g., the person responded to 2 reminder letters), only the first response was entered into the database. An exception to this was if a person returned a permit, but then got a second permit and went fishing after the first was returned (identifiable because the dates of the harvest information on the second permit were after those on the first permit). In that case, the record from the second permit was appended to the end of the first permit and the second permit was marked as a duplicate.

After all records were entered into the database, the records were screened for errors. Flagged records were checked by comparing the database information to the original permits. If the database accurately reflected what was written on a permit, then no changes were made. Errors were corrected and only those records that met all checks were placed in “corrected” database tables.

The database was scanned to identify and flag the following:

- 1) incorrect areas (outside of PWS)
- 2) permit records marked as “not returned,” yet containing harvest data or having “true” entered in the “did not fish” field
- 3) permit records marked as duplicates, yet without a final replacement permit associated with them
- 4) permit records marked as duplicates, yet containing harvest or “did not fish” information (see 2 paragraphs above for final disposition of this information)
- 5) permit records containing harvest data, or having “true” entered in the “did not fish” field, or marked as having no reported harvest, yet were not recorded as returned
- 6) permit records marked as “returned” but not marked as duplicates, yet containing no harvest data, no record of “true” under the “did not fish” field, nor a record of “no harvest reported”

Harvest and effort were estimated with the following general equation (for simplicity, subscripts denoting parameter of estimation [harvest or effort] are not shown):

$$\hat{H} = H_{cf} + \hat{H}_{df}; \tag{4}$$

where

- \hat{H} = estimated total harvest or effort,
- H_{cf} = harvest or effort reported by compliant households, and
- \hat{H}_{df} = estimated harvest by noncompliant households.

\hat{H}_{df} was estimated as follows:

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

where

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

which is the mean harvest or effort per household for noncompliant households that fished and where

- h_{dfj} = reported harvest by household j that responded, was noncompliant and fished, and
- n_{df} = the number of noncompliant households responding to the reminder mailings.

Variance was calculated as follows:

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

where

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

$$\hat{V}[\hat{w}] = \left(\frac{\hat{w}(1 - \hat{w})}{n_d - 1} \right), \quad (7)$$

$$\hat{V}[\bar{h}_{df}] = \left(1 - \frac{n_{df}}{\hat{N}_{df}} \right) \frac{s_{df}^2}{n_{df}}, \quad (8)$$

and

$$s_{df}^2 = \frac{\sum_{j=1}^{n_{df}} (h_{dfj} - \bar{h}_{df})^2}{n_{df} - 1}. \quad (9)$$

Shrimp harvest was then converted from gallons of whole shrimp to pounds of shrimp with the conversion factor of 2.4 lbs/gallon of whole shrimp (M.G. Miller, ADF&G Division of Sport Fish Biologist, unpublished data).

In addition to the estimates of total harvest and effort, we calculated the catch per unit effort (CPUE) for selected statistical areas (Appendix C1) with catch equal to pounds of whole spot shrimp (*Pandalus platyceros*) and effort equal to 1 pot soaked for 24 hours. We assumed that the proportional distribution of effort and harvest by nonrespondents was similar to that of respondents. Therefore, to calculate effort and harvest by statistical area we multiplied the percentage of the total reported effort and harvest for each statistical area by the expanded estimate of total effort and harvest. Temporal trends in effort, harvest, and CPUE were investigated for those statistical areas that support most of the non-commercial effort and harvest.

RESULTS AND DISCUSSION

The permit required of all participants in the PWS noncommercial shrimp fishery has proven to be an effective monitoring method; timeliness and precision of the harvest estimates have met the management needs each year that the permit has been in regulation. The permit has improved the timeliness of parameter estimates relative to the timeliness of SWHS; the estimate of total harvest with the permit method is available to managers 5 months after the fishery closes (mid-February) as opposed to SWHS which provides harvest estimates 14 months after the fishery closes. The relatively precise parameter estimates generated by the permit data (Table 1) are a result of the relatively high reporting rate by permit holders (average of 89%; Table 1). In addition to providing estimates of effort and harvest, the permit also provides data necessary to forecast harvest for upcoming seasons, a necessary exercise when managing the noncommercial allocation (Appendix D).

Table 1.—Number of permits issued, reporting rate, total pot days of effort, total harvest of whole spot shrimp, catch per unit effort (CPUE), and the total number of lost pots by year in the noncommercial pot shrimp fishery, Prince William Sound, AK.

Year	Estimated no. permits issued	SE	Reporting rate (%)	Effort (pot days)	SE	Harvest (lbs)	SE	CPUE	No. lost pots
2002	717	2	84	19,387	734	9,288	238	0.48	192
2003	1,061	0	91	24,094	350	13,965	130	0.58	315
2004	1,649	5	90	30,694	572	25,694	410	0.84	323
2005	2,112	4	90	37,271	279	31,950	250	0.86	439
2009	2,733	0	89	47,631	1,071	56,120	668	1.18	649
2010	3,181	0	90	78,083	805	87,699	463	1.12	890

The number of permits issued has increased by an average of 493 permits for each new year the permit was in regulation (Table 1). Coincident with an increase in the number of participants each year, total effort and total harvest have increased as well (Table 1). Total effort has increased from 19,387 pot days in 2002 to over 78,000 pot days in 2010. Total harvest in the noncommercial fishery has increased from 9,288 lbs in 2002 to 87,699 lbs in 2010 (Table 1). Although total effort and total harvest of shrimp have increased by approximately 4-fold and 9-fold, respectively, since 2002, harvest by noncommercial users was 3% below the harvestable surplus allocated to the fishery in 2009 (57,900 lbs; K. G. Goldman, ADF&G Division of Commercial Fisheries Biologist, Unpublished data) and 6% over the allocated harvestable surplus in 2010 (82,200 lbs; K. G. Goldman, ADF&G Division of Commercial Fisheries Biologist, Unpublished data). This indicates

that while the fishery has grown substantially over the 8-year time period under consideration in this report, the available harvestable surplus of shrimp during these years has been sufficient to accommodate this growth. Furthermore, the increase in harvestable surplus allowed for an increase in pot limits from 5 to 8 per vessel in 2010.

The spatial distribution of effort (Table 2) and harvest (Table 3) has remained relatively constant since 2002. The statistical areas of PWS that support most of the reported noncommercial effort (Table 2) and harvest (Table 3) are the waters nearest Valdez (466100), Whittier (486033), Port Wells (486034), Unakwik Inlet (476036 and 476101), and Port Nellie Juan (486031 and 486003). The Whittier and Valdez statistical areas have supported on average 70% (range = 65–74%) and 56% (range = 53–59%) of the total annual reported effort and harvest, respectively, with no detectable trend across years. CPUE within the noncommercial fishery increased through 2009 and then declined slightly in 2010 at 3 of the 5 statistical areas (Figure 1). In Port Wells and Port Nellie Juan, fishery CPUE continued to increase through 2010 (Figure 1). It is likely that the observed patterns in fishery CPUE are driven by a combination of shrimp abundance and variability in fisherman efficiency. However, the relative contribution of shrimp abundance and fisherman efficiency towards explaining trends in fishery CPUE cannot be discerned from the permit data. With that said, ADF&G PWS pot shrimp survey data suggests that the relative abundance of spot shrimp greater than 32 mm carapace length increased steadily from 1998 through 2009 and then decreased slightly in 2010 (K. G. Goldman, ADF&G Biologist, unpublished data). This suggests that CPUE in the noncommercial fishery broadly tracks trends in spot shrimp CPUE observed in fishery-independent surveys of spot shrimp in PWS.

The noncommercial pot shrimp fishery in Prince William Sound has shown a consistent increase in effort and harvest over the last 9 years. Conversely, the spatial distribution of effort and harvest has remained similar over this same time period. The relatively restricted spatial distribution of effort and harvest in the noncommercial fishery raises several concerns about the spatial resolution of the annual estimates of harvestable surplus and their usefulness for managing the noncommercial fishery under the current management plan. For example, the estimate of harvestable surplus is generated for the entire PWS shrimp stock and lacks the spatial resolution necessary to apportion harvestable surplus to smaller geographical areas (e.g., Valdez Arm or Whittier vicinity). While it may be reasonable to expect that the greater PWS shrimp stock can support a given harvest level for a particular year, the sustainability of the observed spatial distribution of harvest in the noncommercial fishery is unknown. Additionally, ADF&G does not conduct pot shrimp surveys within the Whittier and Valdez areas and no fishery-independent data is available for these locations. It is unknown whether the dynamics of the greater PWS shrimp stock are indicative of localized dynamics (e.g. near Whittier and Valdez) where higher fishing mortality rates occur. A lack of fishery-independent data coupled with increasing effort and harvest raises concern for localized depletion of shrimp in these areas. ADF&G is currently seeking ways in which the spot shrimp survey in PWS can be modified to address these concerns without compromising the statistical validity of the survey and without increasing the cost of the survey.

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Table 2.—Contribution of selected statistical areas to total effort expended in the noncommercial shrimp fishery in Prince William Sound, AK by year.

Name/ Statistical area	2002		2003		2004		2005		2009		2010	
	Pot days	%										
Valdez Arm/466100	9,694	50	8,192	34	14,119	46	15,281	41	20,958	44	32,795	42
Near Whittier/486033	4,459	23	7,710	32	5,832	19	10,436	28	13,337	28	24,987	32
S. Port Wells/486034	1,745	9	1,928	8	2,456	8	2,982	8	3,334	7	5,466	7
Port Nellie Juan/486031, 486003	1,551	8	2,891	12	3,376	11	2,236	6	2,382	5	3,123	4
Unakwik Inlet/476036, 476101	582	3	964	4	1,535	5	2,236	6	2,382	5	3,123	4
All other areas ^a	1,357	7	2,409	10	3,376	11	4,100	11	5,239	11	8,589	11
Total effort	19,387		24,094		30,694		37,271		47,631		78,083	

^a Each of the remaining 24 statistical areas where noncommercial shrimp harvest was reported contributed on average less than 5% to the total reported shrimp harvest on any given year.

∞

Table 3.—Contribution of selected statistical areas to total harvest of whole shrimp in the noncommercial fishery in Prince William Sound, AK by year.

Name/ Statistical area	2002		2003		2004		2005		2009		2010	
	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%
Valdez Arm/466100	3,901	42	3,771	27	9,764	38	8,627	27	14,030	25	19,294	22
Near Whittier/486033	1,579	17	3,631	26	4,882	19	8,627	27	16,836	30	29,818	34
S. Port Wells/486034	1,115	12	1,815	13	2,312	9	3,195	10	6,734	12	13,155	15
Port Nellie Juan/486031, 486003	1,115	12	2,095	15	3,083	12	2,556	8	3,928	7	7,016	8
Unakwik Inlet/476036, 476101	650	7	1,397	10	2,826	11	5,112	16	7,296	13	7,893	9
All other areas ^a	928	10	1,257	9	2,826	11	3,834	12	7,296	13	10,524	12
Total harvest	9,288		13,965		25,694		31,950		56,120		87,699	

^a Each of the remaining 24 statistical areas where noncommercial shrimp harvest was reported contributed on average less than 5% to the total reported shrimp harvest on any given year.

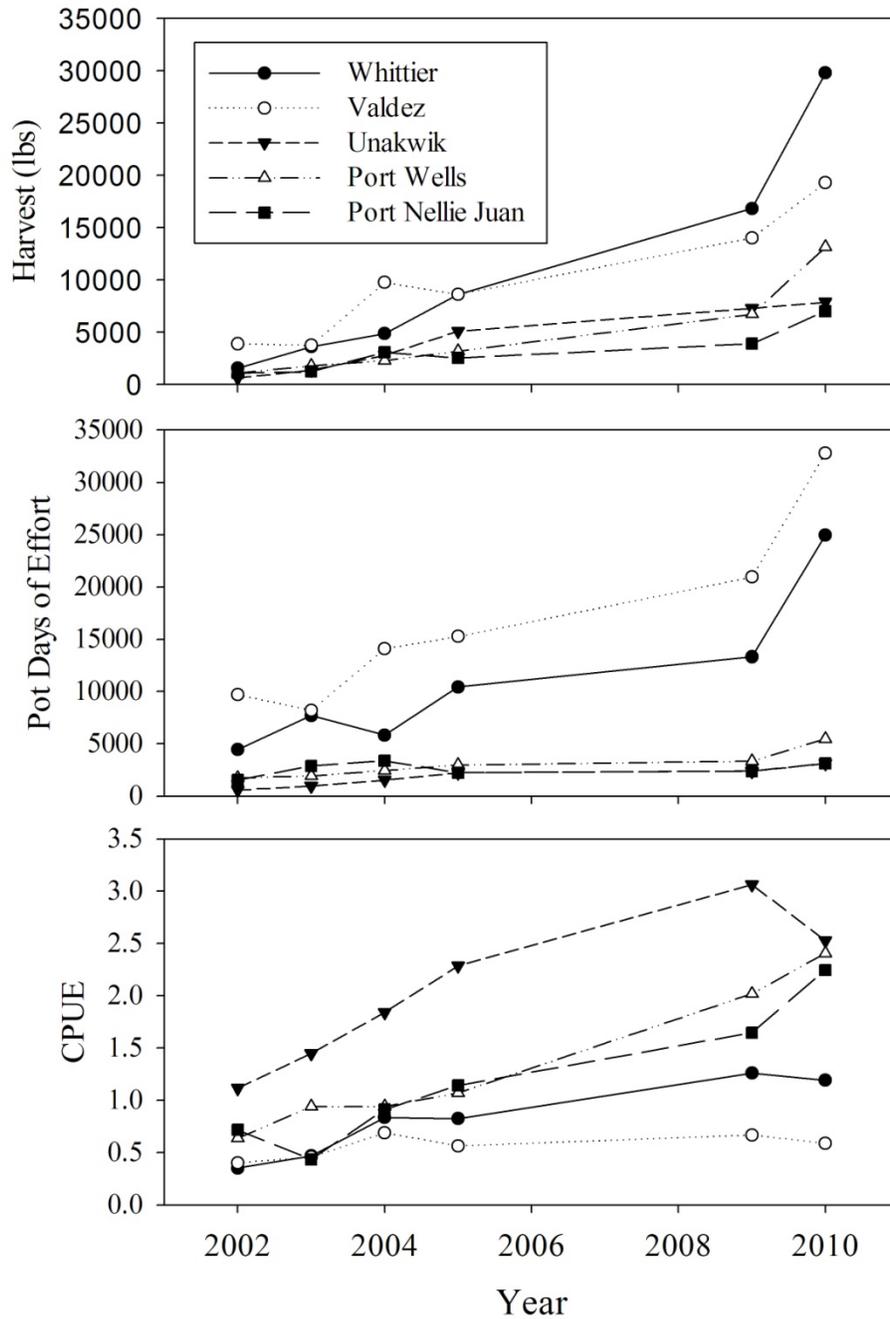


Figure 1.—Harvest, effort, and catch per unit effort (pounds of whole shrimp caught in 1 pot soaked for 24 hours; CPUE) at the 5 statistical areas that support the majority of effort and harvest in the noncommercial pot shrimp fishery of Prince William Sound, AK.

APPENDIX A: SHRIMP PERMIT

Appendix A1.-Copy of noncommercial shrimp permit

10-



2010 PRINCE WILLIAM SOUND SHRIMP PERMIT



Replacement for lost original
 Name: _____ Drivers License Number: _____ State: _____
 Address: _____ Sport Fishing License Number*: _____
 City: _____ * A valid fishing license is required for sport and personal use
 State: _____ Zip: _____
 Phone: _____ Alaska Resident Non-Resident
*optional
 Names of other household members: _____
 Signature of Permit Holder: _____ Date: _____

This permit is valid for the period April 15- Sept.15, 2010.

- **You must have this permit with you** while taking shrimp in the waters of Prince William Sound (Cape Fairfield to Cape Suckling). Your first initial, last name, address and name or Coast Guard number of the vessel used to operate the pots must be marked on a keg or buoy attached to your pots. It is also recommended to add your phone number to buoys.
- One permit may be used by all household members named on the permit. Household members may also get their own permit, but be careful to report each harvest on only one permit.
- If you share pots with a friend or relative, be careful to report each harvest on only one permit.
- Your copy of this permit must be returned no later than October 15, even if you did not fish
- Harvest information must be recorded in ink in the spaces below prior to leaving the fishing site or concealing the shrimp from view.

VENDOR NUMBER				DATE ISSUED :
----------------------	--	--	--	----------------------

Do not write below this line.

Vendor Copy

HOW TO ISSUE A PERMIT

1. The applicant should fill out the top portion of the permit, including the names of other household members who will fish with this permit. Review the information for legibility and accuracy. Verify that the applicant has signed the permit.
2. Write in your vendor number and today's date.
3. You keep the top (white) copy to mail back to us weekly. The permit holder gets the bottom copy.
4. If you mess up a permit, do not throw it out, just write Void on the permit and add it to your stack to return to Cordova Fish & Game. Weekly return of your copies is CRITICAL!
5. Return your top copies each week to Cordova Fish and Game. We have provided envelopes, but just in case, the address is:

STATE OF ALASKA
 DEPARTMENT OF FISH & GAME
 DIVISION OF SPORT FISH
 PRINCE WILLIAM SOUND SHRIMP PERMITS
 PO BOX 669
 CORDOVA, AK 99574-0669
6. If you have any un-issued copies or leftover top copies at the end of the season, they must be returned by Oct. 15, 2010.

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

-continued-

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PLACE
FIRST
CLASS
POSTAGE
HERE

Tape here

**STATE OF ALASKA
DEPARTMENT OF FISH & GAME
DIVISION OF SPORT FISH
PRINCE WILLIAM SOUND SHRIMP PERMITS
PO BOX 669
CORDOVA AK 99574-0669**

Tape here



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Summary of regulations	Sport	Personal Use	Subsistence
Alaska residency required?	No	Yes	Yes
Fishing license required?	Yes	Yes	No
Open season?	Apr. 15- Sept. 15		
Bag limit?	none		
Number of pots allowed?	Maximum 5 pots per person, with a maximum of 5 pots per vessel		
Open areas?	All salt waters of PWS	All salt waters of PWS	All salt waters of PWS except "Valdez non-subsistence area" (see below)
Can keep finfish?	No		
Can keep crab?	No		
Can keep octopus?	Yes		
Can buy, sell or trade shrimp?	No		

There is an area near Valdez that have been defined by the Board of Fisheries as "non-subsistence": all waters of Alaska in the Prince William Sound Area as described in 5 AAC 24.100, and that are within the Valdez city limits as of March 1993 (www.sf.adfg.state.ak.us/shellfish/).

Summary of shrimp pot regulations

1. Each keg or buoy must have the name of the fisher (first initial, last name) the address, and the name or AK number of the boat used to fish the pots. Phone numbers are also recommended.
2. Two vertical sides of all shrimp pots must be entirely made of webbing big enough to allow a 7/8-inch round wooden dowel to go through without stretching or otherwise deforming the opening. The two vertical sides must touch each other. The webbing on these two sides cannot be covered by anything. The other two sides, as well as the top and bottom, can be composed of any material. The 7/8-inch size allows undersized and juvenile shrimp to escape.
3. A pot with no definable sides, such as a round pot, must have 50% of its vertical surface area covered with the 7/8-inch webbing. The other 50% of the vertical sides, as well as the top and bottom, may be composed of any material.
4. The 7/8-inch requirement does not apply to the tunnels.

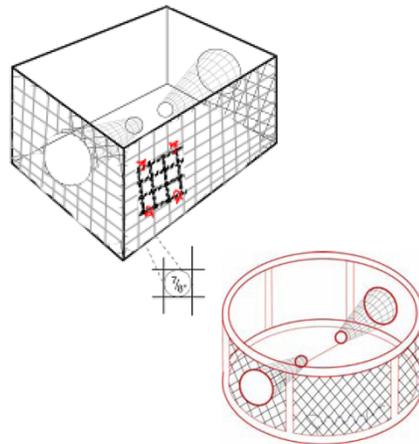
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Escape Mechanisms

Rigid mesh pots: must have an opening, at least 4-inch square, with its lower edge within 6 inches and parallel to the bottom of the pot. This may be covered with a single panel secured with no more than four single loops of 100% untreated cotton twine no larger than 30-thread. Each single loop of cotton twine may contain only one knot. The cotton twine may not be looped or laced along the opening. The panel must be attached in such a manner that when the cotton twine degrades the panel will drop away, fully exposing the opening.

Net mesh pots and pots with no definable sides: one of the sidewalls must have an opening at least 6 inches long. The opening can't be any further than 6 inches from the bottom of the pot. The opening must be parallel to the bottom of the pot. To lace the opening together, you must use 100% untreated cotton twine no larger than 30-thread. Knots can be used only at each end of the opening, not in the middle. The twine cannot be tied to or looped around the web bars. If a pot is lost, the 100% cotton degrades and allows shrimp to escape.

➤ See Page 62 of the Southcentral Sport Fishing Regulations for more complete descriptions of shrimp pots and required escape mechanisms.



APPENDIX B: REMINDER LETTER

STATE OF ALASKA

Sean Parnell, GOVERNOR

DEPARTMENT OF FISH AND GAME Division of Sport Fish

PO Box 669
Cordova, AK 99574
PHONE: (907) 424-3213

December 8, 2010

To: first_name last_name
address
city , state zipcode

From: Dan Bosch, Area Biologist, Anch/NGC/PWS, Division of Sport Fish
email: dan.bosch@alaska.gov

Subject: 2010 Prince William Sound Area Non-Commercial Shrimp Permits

*Our records show that you have not returned your **2010 Prince William Sound Shrimp permit**. Even if you think you have returned your permit, it has not reached us. Please return the original permit or use the Harvest Report on the back of this page – you can fold the page so that our address on the back is showing and then staple or tape it.*

Note that you must return the permit even if you did not fish – be sure to check the “Did Not Fish” box on the Harvest Report if this is the case. Failure to return your permit may result in denial of your shellfish harvest privileges in the future.

MAIL RESPONSES TO:

PWS Shrimp Permit
Alaska Department of Fish and Game
Division of Sport Fish
PO Box 669
Cordova, AK 99574

Sincerely,

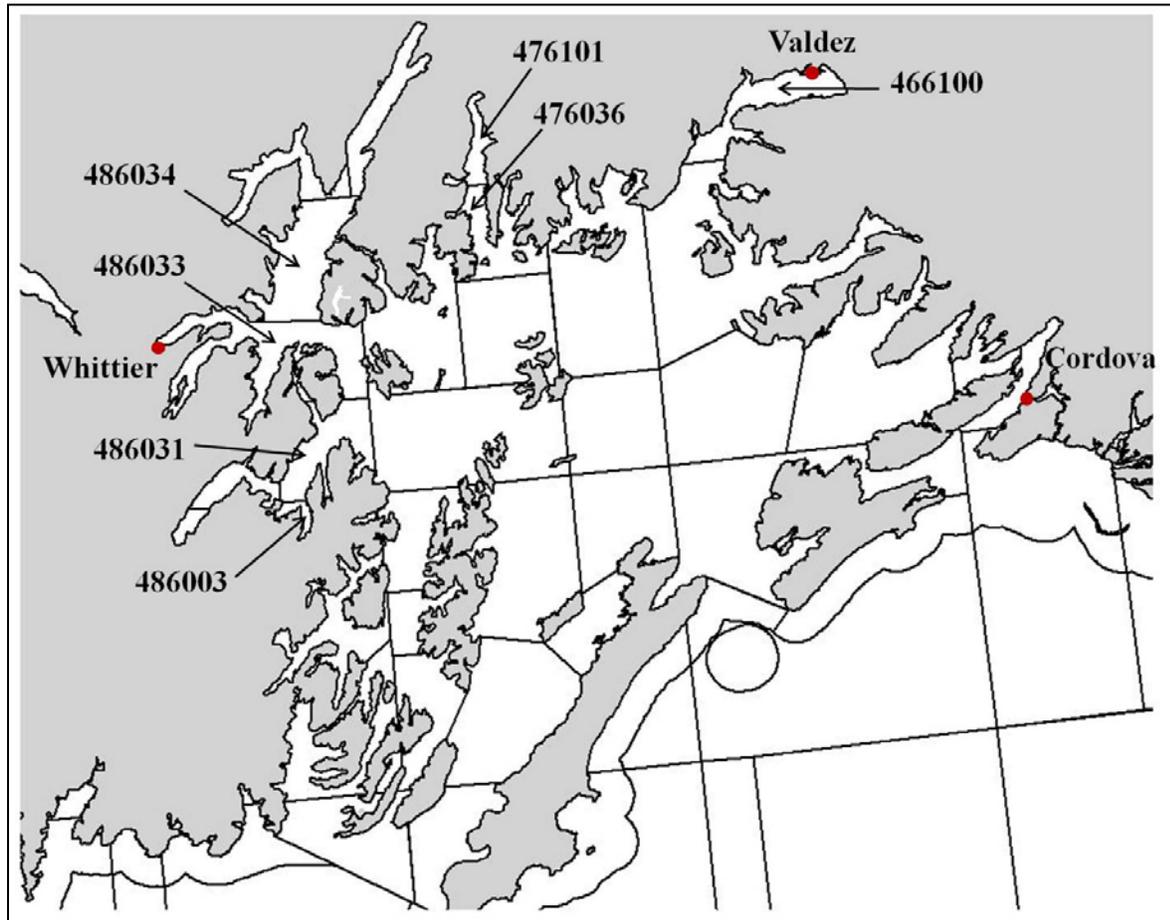
Sam Hochhalter

Sam Hochhalter, Assistant Area Management Biologist
Prince William Sound
Division of Sport Fish

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**APPENDIX C: PRINCE WILLIAM SOUND GROUND FISH
STATISTICAL AREAS**

Appendix C1.—Groundfish statistical areas of Prince William Sound, AK.



**APPENDIX D: METHOD FOR FORECASTING HARVEST
TO ESTABLISH PRESEASON POT LIMITS**

The Prince William Sound noncommercial shrimp fishery management plan (Alaska Administrative Code 5AAC 55.055) defines the allocation of the harvestable surplus of spot shrimp (*Pandalus platyceros*) as 60% to noncommercial users and 40% to commercial users. Annual estimates of the harvestable surplus of spot shrimp in Prince William Sound are calculated with a surplus-production model (K.G. Goldman, Alaska Department of Fish and Game, Division of Commercial Fisheries Biologist, unpublished data). To ensure the noncommercial harvest is near the allocated harvestable surplus for a given year, Alaska Department of Fish and Game uses data collected from returns of the noncommercial shrimp permit to establish preseason projections of noncommercial harvest of shrimp under various pot-limit scenarios for the upcoming season. To illustrate, we can use data available from the 2009 permits to project harvest for the 2010 season. First, all permit holders in 2009 who fished with the maximum number of pots are identified in the database. We then assume that these users would fish the maximum number of pots regardless of the pot limit. For example, the maximum number of pots for the 2009 season was 5, so we assume that all of the permit holders who fished with 5 pots during the 2009 season would have fished with 4, 6, 7, or 8 pots if any of these had been allowed. The harvest for each of these permit holders is then adjusted accordingly for each of the 4 different pot limits. The total harvest for 2009 for each of the 4 pot limits is then calculated using the adjusted harvest for these fishermen. To account for annual growth in participation that has been observed in the fishery (see Results and Discussion section), we calculate the average annual increase in the number of permits issued each year. The average increase in permits is then multiplied by the average harvest of shrimp per permit from 2009. This increase in harvest is then added to each of the estimates of total harvest for each of the 4 pot limit scenarios. The final estimates of total harvest for each of the pot limit scenarios are then compared to the 2010 allocation (provided by K. G. Goldman, ADF&G Division of Commercial Fisheries Biologist, unpublished data). The pot limit which resulted in a total harvest closest to the 2010 allocation is selected and that pot limit is then established via emergency order for the 2010 season.