Evaluating the Criteria to Limit Entry in Prince William Sound Shrimp Pot Fisheries

Research Section

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1 Introduction

On 6 December 2021, the Commercial Fisheries Entry Commission (CFEC) received a petition to limit entry in the Prince William Sound (PWS) shrimp pot fishery from the ShrimpPros Association. The CFEC Commissioners directed the CFEC Research Section to gather relevant data about this fishery and provide a report to the Commission to evaluate the need for limited entry and any potential benefits the program might convey to the fishery, while at the same time ensuring that the Commission meets its statutory obligations under the limited entry program.

Under AS 16.43, for CFEC to limit a fishery it must find that limited entry is necessary to promote the conservation and sustained yield management of the fishery resource, and the economic health and stability of the fishery. In other words, to justify a limitation of a fishery, CFEC must be able to show that the fishery resource is under pressure and that limited entry would help to alleviate that pressure. When CFEC receives a petition to limit entry for an open-access fishery, we thus evaluate the following criteria:

1. Participation: Is the number of participants increasing, decreasing, or remaining stable? A sustained increase in participation over time might indicate increasing pressure on the fishery resource.
2. Harvest: Has harvest been below, within, or above guidelines? Have allocations been achieved? If harvests are often above guidelines, this might indicate pressure on the fishery resource.
3. Estimated average gross earnings: Are estimated average gross earnings increasing, decreasing, or remaining stable? A sustained decrease in estimated average gross earnings might indicate pressure on the economic health of the fishery.

This report summarizes the historical trends and current status for the Prince William Sound (PWS) commercial shrimp pot fishery permit types (P09E and P91E), including guideline harvest levels, changes in participation and harvest, and estimated average gross earnings, with the aim of evaluating these three criteria.

This fishery may be participated in with either P09E permit for vessels under 60 feet of length, or a a P91E permit for vessels in excess of 60 feet in length. This report will evaluate the PWS shrimp pot fishery based on data gathered from these two permit types which will be examined in tandem (data from both permit types combined). The purpose for doing so is firstly because the Alaska Department of Fish and Game (ADFG) makes no distinction between vessel size when managing the fishery. Secondly, CFEC may not disclose information about individual permit holders or in aggregates of less than four permit holders. Participation from P91E permit holders is often below this four permit holder cut off mark, and would be excluded from analysis available to the public if the permits were not examined in a combined data set.

This report differs in methodology from other published CFEC documents when it comes to aggregating data. Every effort has been made to define the PWS shrimp pot fishery in the same way that ADFG defines the PWS shrimp pot fishery. This is because evaluating Guideline Harvest Levels (GHL) is an essential portion of evaluating this fishery. It is the task of ADFG, not CFEC, to define harvest as it pertains to GHL. CFEC normally excludes certain harvests and permit types from analysis, such as fish kept for personal use. ADFG includes these harvests as commercial harvest that counts towards the commercial guideline harvest level.

Throughout this report, Spearman's rank coefficient is used to examine the relationship between time and yearly aggregates of harvest and participation. Spearman's rank coefficient, denoted with rho (ρ), is a non-parametric statistical measure used to evaluate the correlation between two variables. In this report we use it to examine the relationship between ordered years and harvest or participation totals. Values greater than zero denote a positive correlation, while values less than zero denote a negative correlation. Values of ρ are always bounded by 1 and -1. P-values are used to determine if the correlation is statistically significant or not.

All dollar amounts are reported in 2023 dollars.

2 Participation

2.1 Historical changes in the number of fishable permits and participation rate

Figure 1 shows the changes over time in the number of fishable PWS shrimp pot permits. A fishable permit is a permit with an embossed permit card. Since the PWS commercial shrimp pot fishery re-opened in 2010, the number of fishable permits has averaged 143 for PWS shrimp pot permits. The number of fishable PWS permits was 197 in 2010 and 142 in 2022.

Figure 2 shows the changes over time in the percentage of fishable PWS shrimp pot permits that recorded landings. Over 2010-2022, the percentage of fishable PWS shrimp pot permits with landings averaged 40%. The percentage of fishable permits with landings was 42% in 2010 and 47% in 2022.

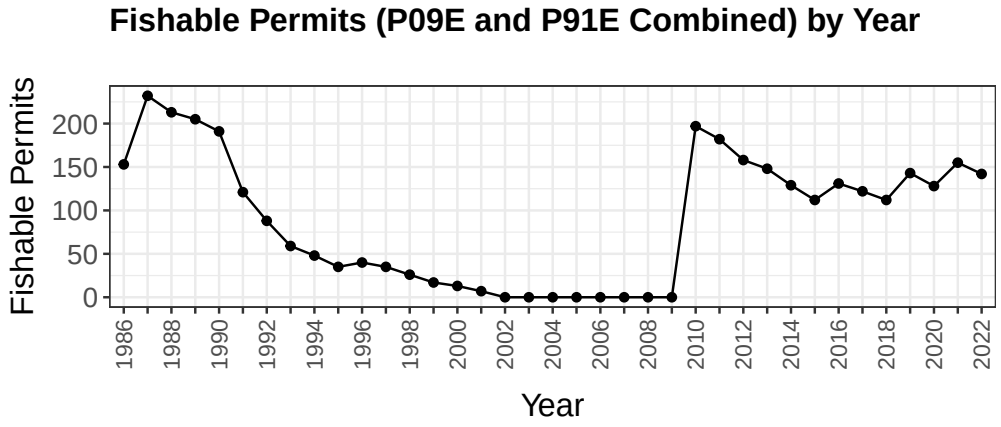

Figure 1: Number of fishable permits

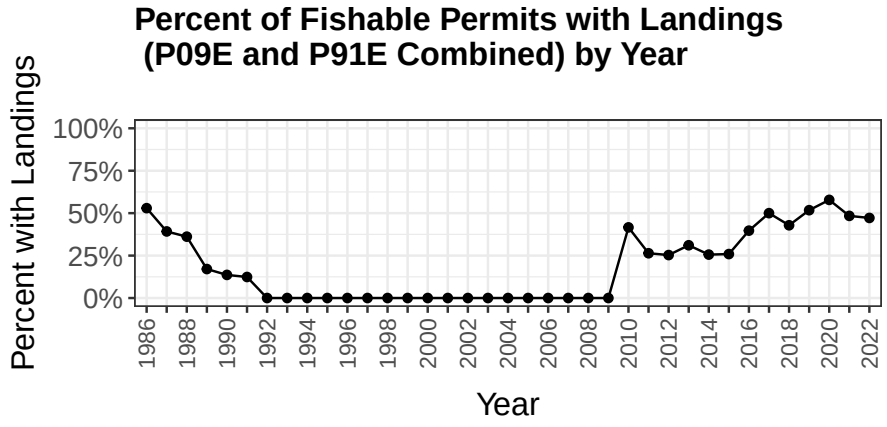

Figure 2: Participation rate (the percentage of fishable permits with recorded landings).

2.2 Is participation increasing, decreasing, or remaining stable?

To address this question, we first truncated the data set to include only years after the PWS commercial shrimp pot fishery re-opened in 2010 to capture the relevant trends in the fishery. We then calculated the Spearman's rank correlation coefficient for the relationship between year and the number of fishable permits, as well as between year and the proportion of fishable permits that reported landings.

There is no evidence that the number of fishable PWS shrimp pot permits is either increase or decreasing year by year (Spearman's $\rho = 0.4$, $p = 0.18$). The proportion of permits with landings had a significant positive association with year (Spearman's $\rho = 0.72$, $p = 0.01$). The proportion of permits participating does appear to be increasing over time, although the number of fishable permits in any given year shows no significant changes over time.

3 Harvest

3.1 Historical changes in harvest

Figure 3 shows the changes over time in the total annual pounds of shrimp harvested for P09E and P91E permit types combined.

Since the PWS commercial shrimp pot fishery re-opened in 2010, the total annual harvest has averaged 56,795 pounds for P09E and P91E permits combined. The total annual harvest by PWS shrimp pot permit holders was 46,277 pounds in 2010 and 65,879 pounds in 2022.

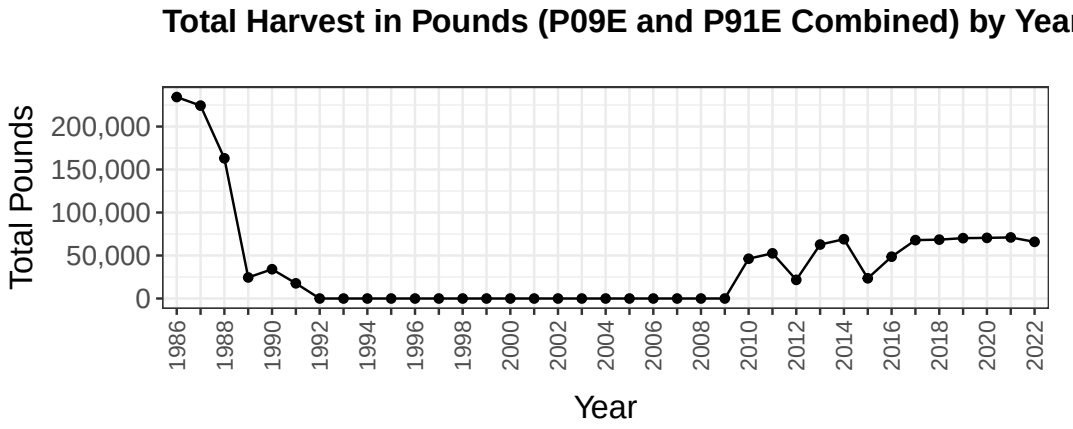

Figure 3: Total Annual Pounds Harvested

3.2 Guideline Harvest Level

Over the time period 2010-2022, harvest was usually very close to the Guideline Harvest Level (GHL)[1] (Table 1). Since 2010, the GHL has not been exceeded by more than 3% in any given year. The GHL for 2023 is 63,100 lbs [2].

3.3 Is harvest increasing, decreasing, or remaining stable?

As in the participation section, the data set includes only years after the PWS commercial shrimp pot fishery re-opened in 2010. We then calculated the Spearman's rank correlation coefficient for the relationship between year and the total number of pounds harvested.

[1] https://www.adfg.alaska.gov/FedAidPDFs/FMR22-03.pdf
[2] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1454985837.pdf

Table 1: Prince William Sound Area commercial shrimp pot fishery guideline harvest levels (GHL) and harvest, 2010–2023.

Year	GHL (lbs)	Total harvest (lbs)	% of GHL harvested
2010	55,000	45,349	82%
2011	52,760	52,550	100%
2012	51,240	21,561	42%
2013	66,300	61,644	93%
2014	66,600	68,464	103%
2015	67,000	23,138	35%
2016	47,061	48,423	103%
2017	67,000	67,421	101%
2018	67,200	67,375	100%
2019	68,100	68,947	101%
2020	68,100	69,898	103%
2021	70,000	70,168	100%
2022	66,900	65,872	98%
2023	63,100	NA	NA

No harvest data available for 2023. Figures provided in this table are from the ADFG Annual Management Reports and News Releases.

The total number of pounds harvested had a positive association with year (Spearman's $\rho = 0.7$, $p = 0.01$). The pounds of shrimp harvested in this fishery does appear to be increasing as time goes on, but this increase has not gone beyond the GHL.

4 Estimated Average Gross Earnings

4.1 Historical changes in estimated average gross earnings

Figure 3 shows the changes over time in the estimated average annual gross earnings per permit holder with landings for P09E and P91E permit types.

Since the PWS commercial shrimp pot fishery re-opened in 2010, mean estimated annual gross earnings averaged $7,277 for both permit types. Mean estimated annual gross earnings for PWS shrimp pot permit holders with landings was $2,914 in 2010 and $8,059 in 2022.

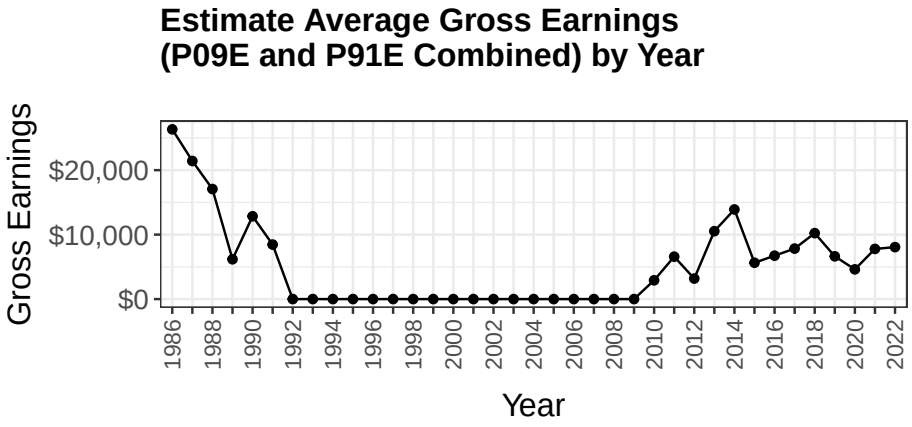

Figure 4: Estimated Average Gross Earnings

4.2 Are estimated average gross earnings increasing, decreasing, or remaining stable?

As in the participation and harvest sections, we truncated the data set to include only years after the PWS commercial shrimp pot fishery re-opened in 2010. We then calculated the Spearman's rank correlation coefficient for the relationship between year and estimated average gross earnings.

For the both P09E and P91E permit types combined, estimated average gross earnings had no association with year (Spearman's $\rho = 0.31$, $p = 0.31$).

5 Conclusions

With respect to each of the criteria for limiting entry, this report shows the following:

1. Participation. Is the number of participants increasing, decreasing, or remaining stable?

We did not find compelling evidence that the number of fishable permits is increasing. There was evidence that the proportion of fishable permits with landings is increasing over time. Essentially, the same number of people are buying permits from one year to another, but a larger proportion of them are fishing.

2. Harvest. Has harvest been below, within, or above guidelines? Have allocations been achieved?

We found some evidence that the PWS shrimp pot harvest is increasing. It should be noted that the total harvest has been very close to the Guideline Harvest Level (GHL) in recent years: for each of the past seven years, the total harvest has been within 3% of the GHL.

3. Estimated average gross earnings.

We did not find any evidence that the estimated average gross earnings was changing in a consistent way over time for the P09E and P91E permit types.

6 Appendix: summary tables

These tables contain all the information analyzed in the previous sections of this report. Note that all dollar values are presented in 2023 real dollars. Values from previous years were adjusted using the US Department of Labor's annual Consumer Price Index.

Table 2: Summary for Prince William Sound Shrimp Pot Permits

Year	Fishable Permits	Permits with Landings	Percentage of Fishable Permits with Landings	Mean Estimated Gross Earnings	Total Pounds
1986	153	81	53%	$26,329.3	234,286.00
1987	232	91	39%	$21,418.6	224,318.00
1988	213	77	36%	$17,070.3	163,026.00
1989	205	35	17%	$6,174.7	24,478.00
1990	191	26	14%	$12,846.8	34,040.00
1991	121	15	12%	$8,456.2	17,663.00
1992	88	0	0%	$0.0	0.00
1993	59	0	0%	$0.0	0.00
1994	48	0	0%	$0.0	0.00
1995	35	0	0%	$0.0	0.00
1996	40	0	0%	$0.0	0.00
1997	35	0	0%	$0.0	0.00
1998	26	0	0%	$0.0	0.00
1999	17	0	0%	$0.0	0.00
2000	13	0	0%	$0.0	0.00
2001	7	0	0%	$0.0	0.00
2002	0	0	0%	$0.0	0.00
2003	0	0	0%	$0.0	0.00
2004	0	0	0%	$0.0	0.00
2005	0	0	0%	$0.0	0.00
2006	0	0	0%	$0.0	0.00
2007	0	0	0%	$0.0	0.00
2008	0	0	0%	$0.0	0.00
2009	0	0	0%	$0.0	0.00
2010	197	82	42%	$2,913.7	46,277.00
2011	182	48	26%	$6,577.8	52,557.00
2012	158	40	25%	$3,182.4	21,672.00
2013	148	46	31%	$10,530.6	62,748.00
2014	129	33	26%	$13,897.2	68,955.00
2015	112	29	26%	$5,632.9	23,502.00
2016	131	52	40%	$6,731.7	48,635.00
2017	122	61	50%	$7,833.0	67,915.00
2018	112	48	43%	$10,227.5	68,463.00
2019	143	74	52%	$6,633.0	70,196.00
2020	128	74	58%	$4,607.9	70,509.00
2021	155	75	48%	$7,780.8	71,029.00
2022	142	67	47%	$8,058.7	65,879.00