Crab Conservation Prioritization

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Crab Conservation Workplan

- December 2022 a Crab conservation workplan was drafted to present potential non-regulatory and regulatory management measures for Council-managed fisheries that impact BBRKC and EBS snow crab

D2 Crab Conservation Workplan Motion

Council requests the Crab Plan Team add discussion of the following items to their 2023 CPT schedule and provide feedback on the relative prioritization of these issues and their ability to improve stock condition.

1. *Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.*
2. *Align crab PSC limit boundaries with the crab stock management area for snow crab*
3. *Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab*
4. *Update trawl crab PSC limits based on status of crab stocks*
5. *Establish non-trawl crab PSC limits*

The Council approves the SSC recommendation to form a working group to develop a framework for how to estimate the magnitude of unobserved mortality for crab stocks and how these estimations may be utilized in BSAI crab stock assessments.

GOALS FOR CPT

- Assess the work that has already been completed
- **Prioritize the 5 issues**
- Provide insight into additional research needed for a meaningful review of the management measures

	Likely to not provide stock benefit	Uncertain of benefit to the stock	Highly Beneficial to stock
Research required			
Research completed			

1. Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.

- No Snow crab Spatial/dynamic closure analyses
- BBRKC April 2022 Discussion Paper
- BBRKC October 2022 Expanded Discussion Paper
- BBRKC December 2022 Emergency Rule Analysis

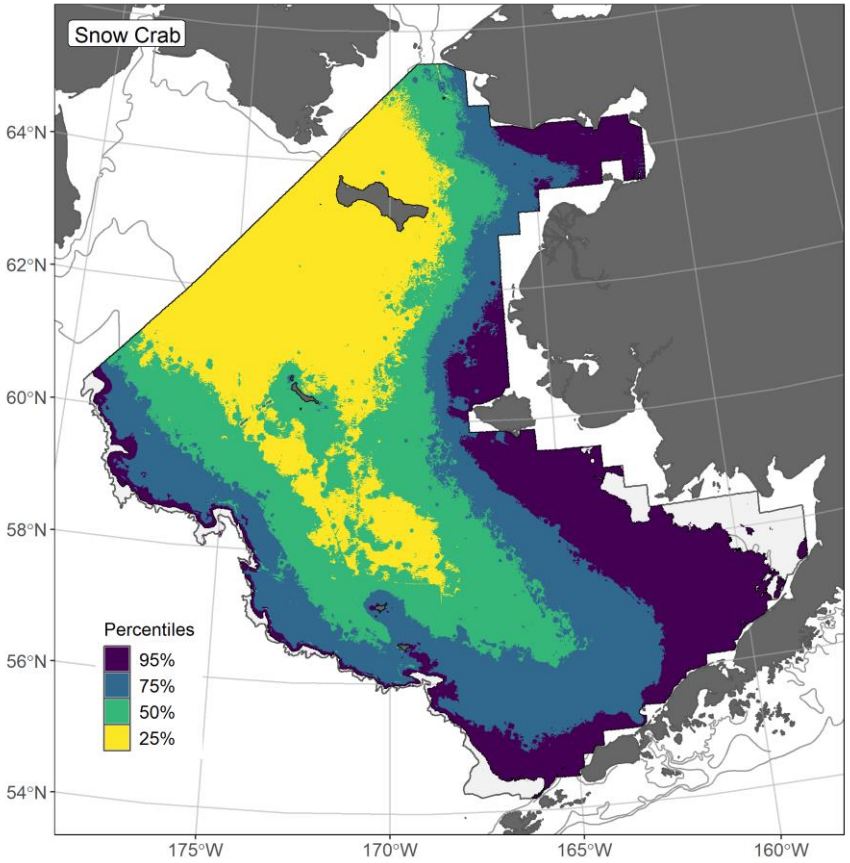
1. Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.

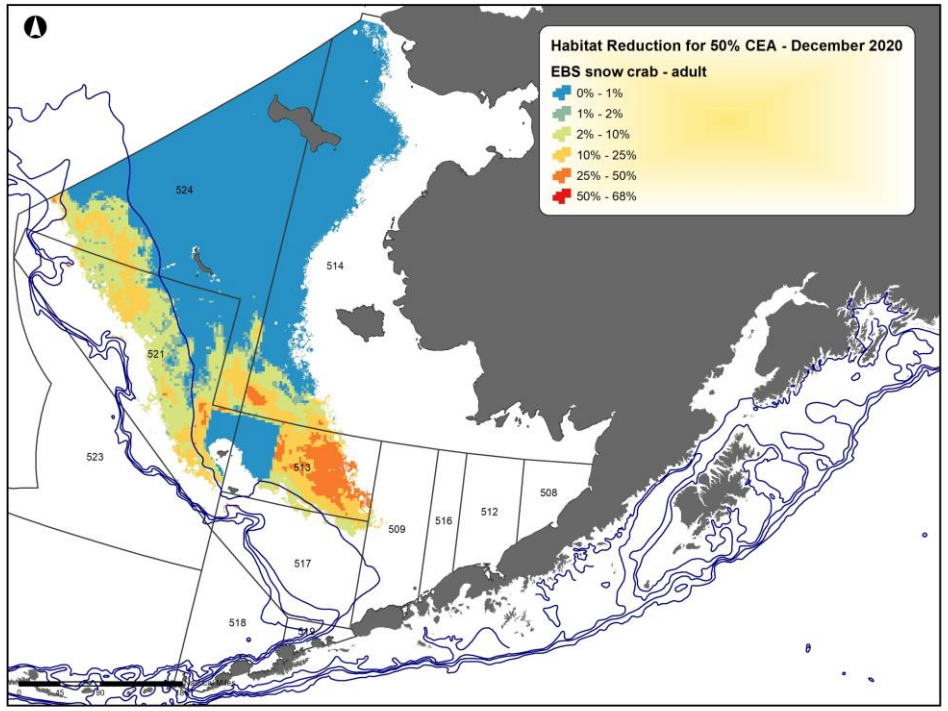
I. In-season management
    I. Season closures, extensions or openings in all or part of a management area; modification of the allowable gear in all or part of a management area; adjustment to TAC or PSC limits; or interim closures of statistical areas to directed fishing for specific groundfish species.
    II. In-season management efforts can be constrained by various factors
II. Incentive approaches
III. Time and area closures.
    I. Permanent closure, seasonal closures, rotational area closures

1. Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.

1. Fixed year closure: General spatial distribution of Snow Crab at different life-stages.
2. Fixed partial-year closure areas:
    a) Distributional shift of life stages intra-annually,
    b) Determine the extent to which seasonal patterns are consistent across years
    c) Identify seasons of particular importance for the biology of the crab (e.g., molting and mating; larval settlement).
3. Dynamic closures that shift in both time and space
    a) All of the above information is needed
    b) AND predictive variables that inform distribution in an upcoming season, which would trigger the opening/closing of certain areas

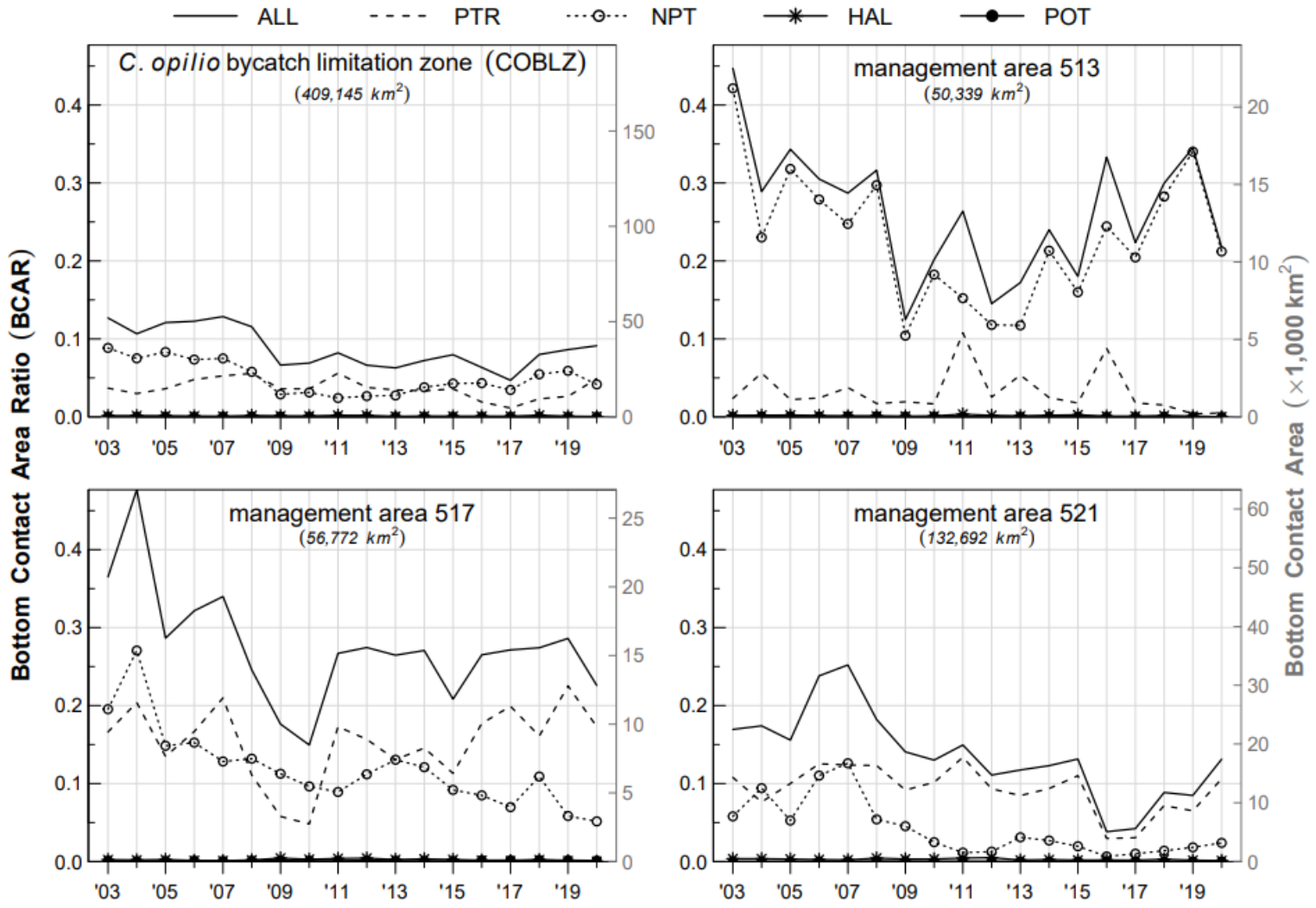
1. CONSIDER THE EFFICACY AND ABILITY TO IDENTIFY AREAS (STATIC AND/OR DYNAMIC) FOR GROUNDFISH FISHERY CLOSURES TO PROTECT SNOW CRAB, AND SUGGESTED AREAS THAT COULD BRING MEANINGFUL SAVINGS.





- Habitat Resiliency
- EFH process
- Areas for meaningful snow crab conservation

October 2022 FE Discussion Paper
December 2022 Snow Crab Rebuilding Analysis


ALL
PTR
NPT
HAL
POT
C. opilio bycatch limitation zone (COBLZ)
(409,145 km²)
management area 513
(50,339 km²)
management area 517
(56,772 km²)
management area 521
(132,692 km²)
Bottom Contact Area Ratio (BCAR)
Bottom Contact Area (×1,000 km²)
'03
'05
'07
'09
'11
'13
'15
'17
'19

1. Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.

1. Data Deficiencies for Static/dynamic closed areas for snow crab?
    1. Stock distribution across life stages
    2. Recruitment is uncertain
    3. EFH for crab by life stage

PSC Regulations

Trawl Gear- RKC in Zone 1

When the number of mature female red king crab is ...	The zone 1 PSC limit will be ...
(A) At or below the threshold of 8.4 million mature crab or the effective spawning biomass is less than or equal to 14.5 million lb (6,577 mt)	32,000 red king crab.
(B) Above the threshold of 8.4 million mature crab and the effective spawning biomass is greater than 14.5 but less than 55 million lb (24,948 mt)	97,000 red king crab.
(C) Above the threshold of 8.4 million mature crab and the effective spawning biomass is equal to or greater than 55 million lb	197,000 red king crab.

PSC Regulations

Trawl Gear- Tanner Crab in Zone 1

When the total abundance of *C. bairdi* crabs is ...	The PSC limit will be ...
(*1*) 150 million animals or less	0.5 percent of the total abundance minus 20,000 animals
(*2*) Over 150 million to 270 million animals	730,000 animals
(*3*) Over 270 million to 400 million animals	830,000 animals
(*4*) Over 400 million animals	980,000 animals

PSC Regulations

Trawl Gear- Tanner Crab in Zone 2

When the total abundance of *C. bairdi* crabs is ...	The PSC limit will be ...
(*1*) 175 million animals or less	1.2 percent of the total abundance minus 30,000 animals
(*2*) Over 175 million to 290 million animals	2,070,000 animals
(*3*) Over 290 million to 400 million animals	2,520,000 animals

PSC Regulations

Trawl Gear- Snow Crab in COBLZ

(A) ***PSC Limit.*** The PSC limit will be 0.1133 percent of the total abundance, minus 150,000 *C. opilio* crabs, unless;

(B) ***Minimum PSC Limit.*** If 0.1133 percent multiplied by the total abundance is less than 4.5 million, then the minimum PSC limit will be 4.350 million animals; or

(C) ***Maximum PSC Limit.*** If 0.1133 percent multiplied by the total abundance is greater than 13 million, then the maximum PSC limit will be 12.850 million animals.

History of PSC Actions

Crab PSC discussion papers were considered at the Council in

- October 2009, June 2010, February 2013, and February 2014, February 2021
- Snow crab focus PSC in a February 2016 discussion paper and subsequent analysis in December 2018.
- BBRKC focus Chapter 3 April 2022 Discussion paper
- BBRKC October 2022 Expanded Discussion paper
- Topics including but not limited to: the disconnect between the BSAI Crab and BSAI Groundfish FMPs, inclusivity of all gear types, and the levels of the PSC limits themselves

History of PSC Actions

May 2008 CPT recommended crab PSC limits be examined	- The CPT had concerns about the lack of connectivity between the BSAI Groundfish FMP and the BSAI Crab FMP and thus ability for in-season management measures should the catch reach the ABC. - This means that only the directed fishery would be impacted by the ACL being exceeded. - The CPT also wanted bycatch from all gear types considered and consideration of a way to debt crab PSC based on size instead of number.
June 2009 → Council received a CPT report ← Initiated a discussion paper	- After receiving feedback from the CPT, the Council requested staff prepare a discussion paper summarizing the current crab bycatch by stock in groundfish fisheries as well as the current measures under the BSAI groundfish FMP to control crab bycatch.
Oct 2009 → Council received a discussion paper ← Initiated an expanded discussion paper	- In addition to summarizing current PSC use and controls, this discussion paper also included a suite of questions for the Council to consider if it was considering changes to the PSC limits - The Council asked for an expanded discussion paper with the inclusion of a list of additional information requested by the SSC and AP.
June 2010 Council received an expanded discussion paper Initiated an analysis of all 10 crab stocks	- This expanded discussion paper updated the information from the original discussion paper as well as responding to the list of informational requests from the SSC and AP - The Council responded by adopting a problem statement/set of alternatives/initiating an analysis to consider implementing PSC limits for all 10 crab stocks, with a suite of additional components to consider as well (e.g., whether to change closure areas, application of limits and closures by trawl and fixed gear and changes to accounting time frames)

History of PSC Actions

Feb 2013 → Council received a discussion paper ← Requested a revised discussion paper	- In a discussion paper, Council staff highlighted that the 10-stock analysis the Council had requested would be extremely lengthy and complex. Moreover, if the Council's objective was to provide guidance to the State of Alaska in establishing appropriate buffers beneath the ABC for groundfish bycatch, the current alternative set may be overly complex for achieving that objective. - Thus, the Council focused its next steps on an expanded discussion paper for four stocks. The Council requested that the paper include a historical evaluation of the existing closures for both permanent closures and closures triggered by a PSC limit. Additionally, the paper will describe the stock and PSC (by groundfish gear type) distribution relative to these areas.
Feb 2014 → Council received a discussion paper ← Requested a discussion paper specifically on snow crab	- This was a shorter discussion paper focused on four crab stocks – BBRKC, EBS Snow crab, EBS Tanner crab, and St Matt's blue king crab. - Included information on the spatial distribution of the stock as well as the distribution and amount of PSC caught by trawl and fixed gear bycatch fisheries in order to see if the boundaries of the areas are appropriately specified - Council requested a revised discussion paper considering how to implement future PSC limits in weights rather than in numbers and consideration of PSC limits for snow crab that can be used as a template for other stocks

History of PSC Actions

Feb 2016 → Council received a discussion paper ← Requested an analysis for snow crab	- This discussion paper includes a summary of and updated information on PSC limits that were included in previous discussion paper iterations - It also includes baseline information needed to evaluate the efficacy of closure areas and crab PSC management measures in groundfish fisheries specifically for snow crab - The Council initiated an analysis for snow crab PSC by adopting a purpose and need statement and set of alternatives.
Dec 2018 → Council received an Initial Review Analysis for snow crab ← Requested additional data and industry to consider non-regulatory measures	- Council considered an Initial Review Analysis for changes to snow crab PSC limits - The Council did not move that action forward but requested staff provide a data report on snow crab bycatch that describes the spatial distribution of bycatch throughout the BSAI by gear and fishery - The Council also encouraged the crab and groundfish industry to coordinate to find non-regulatory measures to minimize snow crab bycatch.
Feb 2021 → Council received an Initial Review Analysis for crab PSC limits ← The Council took no further action	- Council considered an Initial Review Analysis for changes adjust crab PSC limits - The Council did not move the action forward
April 2022/October 2022/ Dec. 2022 → Council received a Discussion Paper and Expanded Discussion paper on BBRKC ← Requested an analysis for BBKRC	- Following review of the RKCSA Emergency Rule, the Council requested an analysis assessing closed areas to protect BBRKC stock - The Council has not reviewed the analysis yet

2. Align crab PSC limit boundaries with the crab stock management area for snow crab

- February 2014 Analysis
- February 2016 Analysis
- April 2022 Analysis suggests there would be limited impacts on crab stocks, but alignment of boundaries could improve the transparency of crab PSC management.

Table 9 Total snow crab PSC taken within the COBLZ area, and the proportion by trawl gear (which accrues toward the COBLZ limit) as compared with trawl PSC for the whole Bering Sea area.

Year	COBLZ total PSC	total PSC	proportion total PSC (all gears) in COBLZ	Proportion of trawl PSC of total COBLZ	Proportion of total trawl PSC Bering Sea wide
2004-2005	3,237,561	3,426,667	94%	98%	93%
2005-2006	1,089,579	1,328,250	82%	96%	79%
2006-2007	1,426,916	2,013,533	71%	96%	68%
2007-2008	1,183,054	1,893,592	62%	81%	51%
2008-2009	723,380	1,113,976	65%	86%	56%
2009-2010	1,706,116	2,491,146	68%	97%	66%
2010-2011	556,321	824,215	67%	96%	65%
2011-2012	570,801	681,392	84%	100%	84%
2012-2013	792,006	859,358	92%	100%	92%
2013-2014	186,079	247,397	75%	100%	75%

2. Align crab PSC limit boundaries with the crab stock management area for snow crab

1. COBLZ does not cover the whole distribution of the EBS snow crab stock. Both survey distribution and bycatch occur in a substantial district to the south of the COBLZ boundary.
2. The PSC limit only applies to trawl PSC and only when caught inside COBLZ.
3. Overall groundfish bycatch of snow crab is low in relation to total snow crab catch (~1% in 2015). – Remains true (0.0171% in 2022)
4. The Council should clarify if existing measures for snow crab should be revised to be consistent with stock distribution and stock status (i.e. if the area should cover all of the EBS and apply to all gear types) or if bycatch mortality in groundfish fisheries is low enough to not be a concern for revising management measures for snow crab.

Year	All Gear Combined PSC (# of snow crab)			
	All Gear within COBLZ	All gear combined outside of COBLZ	Groundfish total (# of crabs)	Proportion of All gear PSC within COBLZ
2006	947,860	65,766	1,396,273	68%
2007	1,822,029	80,781	3,488,173	52%
2008	678,843	115,938	1,573,101	43%
2009	436,212	90,304	1,186,785	37%
2010	1,767,295	499,668	2,266,964	78%
2011	790,261	127,133	917,394	86%
2012	624,107	65,756	689,862	90%
2013	695,295	42,016	737,312	94%
2014	496,403	112,187	608,590	82%
2015	527,549	112,941	640,489	82%
2016	198,038	30,543	228,581	87%
2017	174,579	167,715	342,293	51%
2018	1,587,643	72,295	1,659,938	96%
2019	967,584	71,817	1,039,401	93%
2020	791,758	152,540	944,298	84%
2021	261,891	73,964	335,855	78%
2022	208,097	35,021	243,118	86%
2023**				

3. Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab

- BBRKC Discussion Paper (April 2022 Chapter 3.4/ October 2022)
- Snow Crab Rebuilding Initial Review Analysis- Section 3.3 – December 2022
- February 2021 Analysis
- December 2018 Snow Crab PSC initial review- revise C. opilio PSC limits
  - Alternative 2: Revise *C. opilio* PSC limits to be based on the stock assessment model estimate. Remove the minimum and maximum C. opilio PSC limit for trawl vessels in the COBLZ, and reduce the C. opilio PSC limit to (Option 1: 0.10%, Option 2: 0.075%, or Option 3: 0.05%) of the total abundance of C. opilio.
  - Alternative 3: Revise *C. opilio* PSC limits to be based on the stock assessment model estimate. Reduce the maximum and/or minimum C. opilio PSC limit for trawl vessels in the COBLZ by (Option 1: 10%, Option 2: 15%, or Option 3: 50%).
    - Alternative 3 will retain the 0.1133% estimator to calculate total snow crab PSC limit but will reduce the maximum and minimum limits for trawl vessels in the COBLZ. The minimum and maximum PSC limits proposed by Alternative 3 are:
      - Option 1 (10% reduction) – 4,050,000 minimum, 11,700,000 maximum
      - Option 2 (15% reduction) – 3,825,000 minimum, 11,050,000 maximum
      - Option 3 (50% reduction) – 2,250,000 minimum, 6,500,000 maximum

3. Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab

Year	Snow crab abundance estimate[1] (billions of animals)	Snow crab PSC limit	Snow crab PSC limit without floor	Nonpelagic trawl PSC (# of crabs)					Pelagic trawl PSC (# of crabs)			Pot PSC (# of crabs)*			H&L PSC (# of crabs)*			Groundfish total (# of crabs)	Total groundfish PSC for all gears relative to abunance
				PSC inside COBLZ	PSC inside COBLZ as a % of PSC limit	PSC outside COBLZ	Total PSC (from both COBLZ and outside COBLZ)	Total PSC as a % of PSC limit without a floor	PSC inside COBLZ	Outside COBLZ	Total PSC	PSC inside COBLZ	Outside COBLZ	Total PSC	PSC inside COBLZ	Outside COBLZ	Total PSC		
2006	5.22	5,761,674	5,761,674	947,380	22%	63,343	1,010,723	29%	480	2,423	2,903	N/A	N/A	333,050	N/A	N/A	49,597	1,396,273	0.4188%
2007	**3.25**	**4,350,000**	**3,532,250**	1,821,672	42%	78,201	1,899,874	52%	357	2,580	2,936	N/A	N/A	1,536,818	N/A	N/A	48,545	3,488,173	0.3920%
2008	**3.33**	**4,350,000**	**3,622,890**	677,361	16%	112,455	789,816	28%	1,482	3,483	4,965	N/A	N/A	695,159	N/A	N/A	83,162	1,573,101	0.2847%
2009	**2.60**	**4,350,000**	**2,795,800**	436,051	10%	87,256	523,307	16%	162	3,048	3,209	N/A	N/A	605,631	N/A	N/A	54,638	1,186,785	0.2375%
2010	**3.06**	**4,350,000**	**3,316,980**	1,677,389	20%	25,164	1,702,552	20%	5,227	383	5,610	62,247	460,357	522,605	22,432	13,765	36,197	2,266,964	0.1918%
2011	7.47	8,310,480	8,310,480	741,568	11%	20,670	762,238	11%	4,444	670	5,113	16,647	85,029	101,676	27,602	20,764	48,366	917,394	0.1177%
2012	6.34	7,029,520	7,029,520	600,223	6%	22,767	622,990	6%	2,721	501	3,222	1	16,536	16,536	21,163	25,951	47,114	689,862	0.1054%
2013	9.40	10,501,333	10,501,333	673,966	6%	15,285	689,251	6%	3,670	395	4,065	0	14,784	14,784	17,660	11,552	29,212	737,312	0.0946%
2014	10.01	11,185,892	11,185,892	466,885	4%	14,280	481,165	4%	2,823	508	3,331	2,159	82,808	84,967	24,536	14,591	39,127	608,590	0.0867%
2015	9.85	11,011,976	11,011,976	484,297	10%	4,367	488,664	10%	2,906	55	2,961	20,390	101,171	121,561	19,956	7,347	27,303	640,489	0.0806%
2016	4.29	4,708,314	4,708,314	163,878	2%	2,211	166,090	2%	765	119	884	6,039	13,998	20,037	27,356	14,215	41,570	228,581	0.0741%
2017	8.17	9,105,477	9,105,477	153,101	2%	6,243	159,343	2%	253	81	334	2,567	142,891	145,457	18,658	18,501	37,158	342,293	0.0688%
2018	8.18	9,120,539	9,120,539	1,577,907	13%	4,242	1,582,149	13%	247	30	277	399	52,136	52,535	9,090	15,886	24,976	1,659,938	0.0646%
2019	10.65	11,916,450	11,916,450	936,578	11%	4,650	941,228	11%	48	21	69	19,726	52,447	72,174	11,231	14,699	25,930	1,039,401	0.0443%
2020	7.71	8,580,898	8,580,898	756,559	11%	22,296	778,855	11%	1,672	42	1,714	24,037	118,021	142,059	9,490	12,181	21,671	944,298	0.0346%
2021	6.48	7,191,840	7,191,840	234,590	5%	12,105	246,695	17%	451	71	522	15,903	51,549	67,452	10,948	10,238	21,186	335,855	0.0223%
2022	**1.42**	**4,350,000**	**1,458,860**	172,299	4%	3,036	175,336	6%	29	13	42	23,484	21,820	45,304	12,285	10,152	22,437	243,118	0.0171%
2023**	**2.58**	**4,350,000**	**2,777,672**																

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN file name Crab_PSC_AREA(10-12-22)

Bold text indicates the PSC limit was set to its lowest limit

[1]Abundance estimate is based survey results from the previous year.

* Denotes sectors that do not have a PSC limit

**Denotes estimated PSC limit and PSC is not yet available for the 2023 groundfish fisheries.

N/A - PSC for pot and hook-and-line gears prior to 2010 was not broken out by inside/outside COBLZ.

4. Update trawl crab PSC limits based on status of crab stocks

February 2021 PSC analysis

- Alternative 1: No action
- Alternative 2: Reduced PSC limits for BSAI trawl CDQ and non-CDQ groundfish fishing when the corresponding directed crab fishery is closed. When no Crab Rationalization Program individual fishing quota (IFQ) is issued in a season for BBRKC, bairdi, or opilio, set the crab PSC limit for that stock at the lowest abundance-based level. As described in regulation at 50 CFR 679.21(e)(1), the PSC limits for the groundfish fisheries would be as follows under this alternative when the directed crab fishery is closed:
  - Bairdi Zone 1 - 0.5% of total abundance minus 20,000 animals
  - Bairdi Zone 2 - 1.2% of the total abundance minus 30,000 animals
  - BBRKC Zone 1 - 32,000 red king crab
  - Opilio - 4.350 million animals

5. Establish non-trawl crab PSC limits

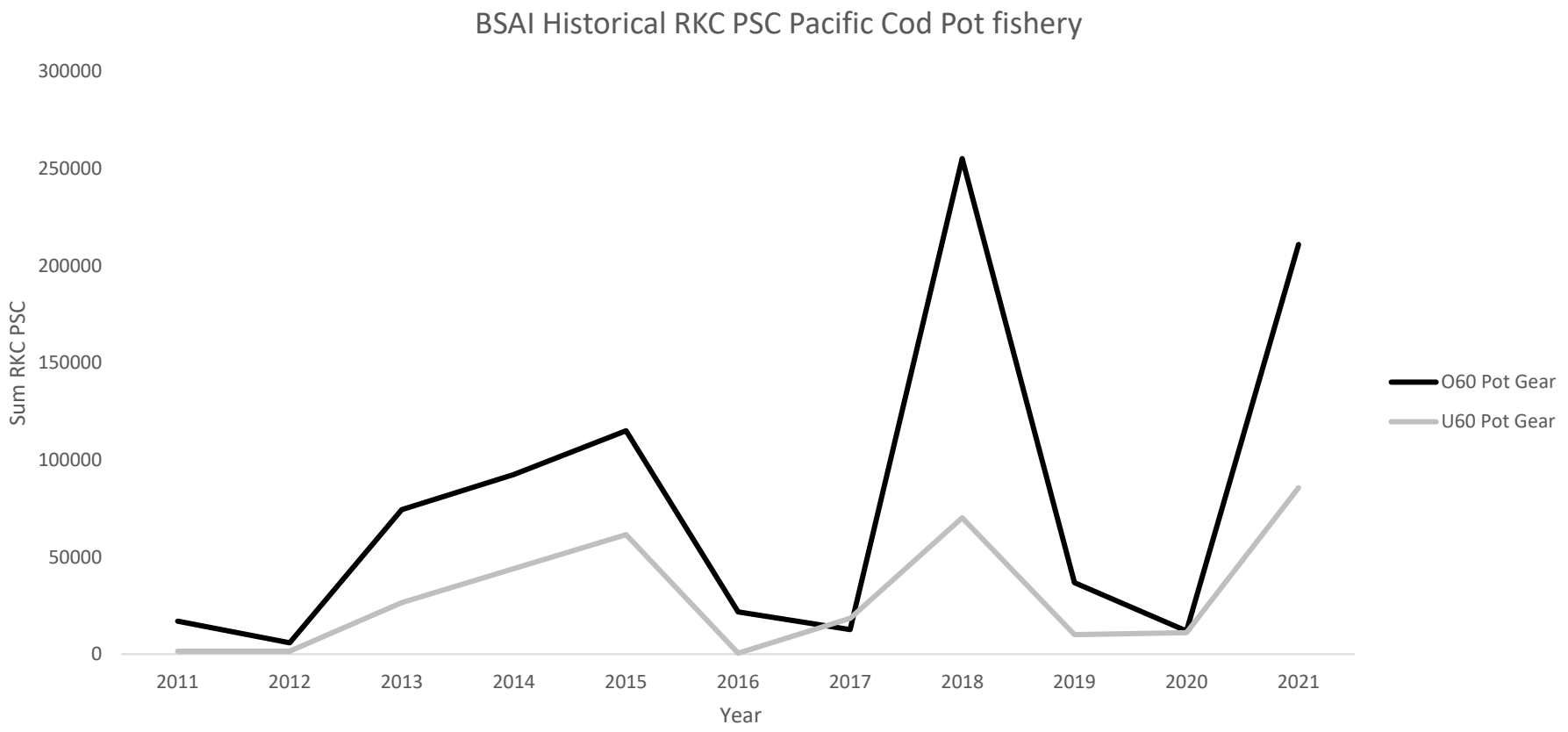
- October 2009
- June 2010
- February 2014
- October 2022 Council review of non-trawl gear PSC limits for BBRKC suggests that establishing pot gear PSC limits may be challenging due to limited observer data from Pacific cod fishery

Table 5 Bycatch mortality by fishery and gear type and overall bycatch numbers for EBS snow crab 2008/09.

2008/09 Snow crab mortality by fishery

Fishery	HAL	NPT	POT	PTR	Total mortality	Total # crab
arrowtooth flounder	0	2,190			2,190	9,531
Deepwater Flat		86			86	374
Flathead sole		**44,595**			**44,595**	**194,115**
Greenland turbot	2	0			2	30
Other Flatfish		18			18	79
Pacific cod	**4,963**	**3,449**	**16,828**		**25,239**	**394,409**
Pollock	0	0		1,300	1,300	5,664
Rock sole		3,027		0	3,027	13,175
Sablefish	0	0	12		12	207
yellowfin sole		**109,614**			**109,614**	**477,127**
Total	4,966	162,980	16,839	1,300	186,085	1,094,727
COBLZ limit = 4,350,000					COBLZ catch	677,169

October 2009 PSC analysis


BSAI Historical RKC PSC Pacific Cod Pot fishery
300000
250000
200000
150000
100000
50000
0
Sum RKC PSC
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year
O60 Pot Gear
U60 Pot Gear

5. Establish non-trawl crab PSC limits

Year	Snow crab abundance estimate[1] (billions of animals)	Snow crab PSC limit	Nonpelagic trawl PSC (# of snow crabs)				Pelagic trawl PSC (# of snow crabs)*			
			PSC inside COBLZ	PSC Outside of COBLZ	Total PSC (from both COBLZ and outside COBLZ)	Proportion of PSC within COBLZ	PSC inside COBLZ	Outside COBLZ	Total PSC (from both COBLZ and outside COBLZ)	Proportion of PSC within COBLZ
2006	5.22	5,761,674	947,380	63,343	1,010,723	94%	480	2,423	2,903	17%
2007	**3.25**	**4,350,000**	1,821,672	78,201	1,899,874	96%	357	2,580	2,936	12%
2008	**3.33**	**4,350,000**	677,361	112,455	789,816	86%	1,482	3,483	4,965	30%
2009	**2.60**	**4,350,000**	436,051	87,256	523,307	83%	162	3,048	3,209	5%
2010	**3.06**	**4,350,000**	1,677,389	25,164	1,702,552	99%	5,227	383	5,610	93%
2011	7.47	8,310,480	741,568	20,670	762,238	97%	4,444	670	5,113	87%
2012	6.34	7,029,520	600,223	22,767	622,990	96%	2,721	501	3,222	84%
2013	9.40	10,501,333	673,966	15,285	689,251	98%	3,670	395	4,065	90%
2014	10.01	11,185,892	466,885	14,280	481,165	97%	2,823	508	3,331	85%
2015	9.85	11,011,976	484,297	4,367	488,664	99%	2,906	55	2,961	98%
2016	4.29	4,708,314	163,878	2,211	166,090	99%	765	119	884	87%
2017	8.17	9,105,477	153,101	6,243	159,343	96%	253	81	334	76%
2018	8.18	9,120,539	1,577,907	4,242	1,582,149	100%	247	30	277	89%
2019	10.65	11,916,450	936,578	4,650	941,228	100%	48	21	69	70%
2020	7.71	8,580,898	756,559	22,296	778,855	97%	1,672	42	1,714	98%
2021	6.48	7,191,840	234,590	12,105	246,695	95%	451	71	522	86%
2022	**1.42**	**4,350,000**	172,299	3,036	175,336	98%	29	13	42	70%
2023**	**2.58**	**4,350,000**								

5. Establish non-trawl crab PSC limits

Year	Snow crab abundance estimate[1] (billions of animals)	Snow crab PSC limit	Pot PSC (# of snow crabs)*				H&L PSC (# of snow crabs)*			
			PSC inside COBLZ	Outside COBLZ	Total PSC	Proportion of PSC within COBLZ	PSC inside COBLZ	Outside COBLZ	Total PSC	Proportion of PSC within COBLZ
2006	5.22	5,761,674	N/A	N/A	333,050	N/A	N/A	N/A	49,597	N/A
2007	**3.25**	**4,350,000**	N/A	N/A	1,536,818	N/A	N/A	N/A	48,545	N/A
2008	**3.33**	**4,350,000**	N/A	N/A	695,159	N/A	N/A	N/A	83,162	N/A
2009	**2.60**	**4,350,000**	N/A	N/A	605,631	N/A	N/A	N/A	54,638	N/A
2010	**3.06**	**4,350,000**	62,247	460,357	522,605	12%	22,432	13,765	36,197	62%
2011	7.47	8,310,480	16,647	85,029	101,676	16%	27,602	20,764	48,366	57%
2012	6.34	7,029,520	1	16,536	16,536	0%	21,163	25,951	47,114	45%
2013	9.40	10,501,333	0	14,784	14,784	0%	17,660	11,552	29,212	60%
2014	10.01	11,185,892	2,159	82,808	84,967	3%	24,536	14,591	39,127	63%
2015	9.85	11,011,976	20,390	101,171	121,561	17%	19,956	7,347	27,303	73%
2016	4.29	4,708,314	6,039	13,998	20,037	30%	27,356	14,215	41,570	66%
2017	8.17	9,105,477	2,567	142,891	145,457	2%	18,658	18,501	37,158	50%
2018	8.18	9,120,539	399	52,136	52,535	1%	9,090	15,886	24,976	36%
2019	10.65	11,916,450	19,726	52,447	72,174	27%	11,231	14,699	25,930	43%
2020	7.71	8,580,898	24,037	118,021	142,059	17%	9,490	12,181	21,671	44%
2021	6.48	7,191,840	15,903	51,549	67,452	24%	10,948	10,238	21,186	52%
2022	**1.42**	**4,350,000**	23,484	21,820	45,304	52%	12,285	10,152	22,437	55%
2023**	**2.58**	**4,350,000**								

5. Establish non-trawl crab PSC limits

Future Considerations

- Non-trawl PSC limits for all BSAI crab?
  - PSC limit Boundaries?
  - Standardized approach regardless of stock
  - Observer coverage? Reporting of PSC
  - Hard cap?
- Snow crab PSC limit Confines- still within COBLZ?
  - Does COBLZ represent the best area for protecting snow crab from other gear types?
  - If no, where does a majority of other gear type PSC accrue?

Discussion for Conservation Prioritization

Council requests the Crab Plan Team add discussion of the following items to their 2023 CPT schedule and provide feedback on the relative prioritization of these issues and their ability to improve stock condition.

1. *Consider the efficacy and ability to identify areas (static and/or dynamic) for groundfish fishery closures to protect snow crab, and suggested areas that could bring meaningful savings.*
2. *Align crab PSC limit boundaries with the crab stock management area for snow crab*
3. *Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab*
4. *Update trawl crab PSC limits based on status of crab stocks*
5. *Establish non-trawl crab PSC limits*

CPT Preliminary poll results

Timing of Issues

3. Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab

Table 4. Comparison of published survey snow crab estimate and PSC limits to hindcast population estimate and PSC limits from the 2018 model.

Year	Published Survey Population Estimate	Published PSC limit	2018 hindcast Model Population Estimate	2018 Hindcast Model PSC limit
2008	3,330,000,000	4,350,000[1]	3,000,000,000	3,249,000
2009	2,600,000,000	4,350,000[1]	5,112,000,000	5,641,896
2010	3,060,000,000	4,350,000[1]	4,852,000,000	5,347,316
2011	7,467,000,000	8,310,480	4,221,000,000	4,632,393
2012	6,337,000,000	7,029,520	3,747,000,000	4,095,351
2013	9,401,000,000	10,501,333	3,830,000,000	4,189,390
2014	10,005,000,000	11,185,892	3,731,000,000	4,077,223
2015	9,852,000,000	11,011,976	5,340,000,000	5,900,220
2016	4,288,000,000	4,708,314	10,170,000,000	11,372,610
2017	8,169,000,000	9,105,477	12,960,000,000	14,533,680
2018	8,182,000,000	9,120,539	10,650,000,000	11,916,450

[1] Minimum PSC limit

Sources: NOAA annual specifications published online, Szuwalski (2018).

3. Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab

Table 5. Snow crab PSC limits for each option under Alternative 2 compared to hindcast modeled estimate of snow crab abundance from the 2018 snow crab model.

		Alternative 2 PSC limits		
Year	Modeled Abundance	Option1 0.10%	Option2 0.075%	Option3 0.05%
2008	3,000,000,000	2,850,000	2,100,000	1,350,000
2009	5,112,000,000	4,962,000	3,684,000	2,406,000
2010	4,852,000,000	4,702,000	3,489,000	2,276,000
2011	4,221,000,000	4,071,000	3,015,750	1,960,500
2012	3,747,000,000	3,597,000	2,660,250	1,723,500
2013	3,830,000,000	3,680,000	2,722,500	1,765,000
2014	3,731,000,000	3,581,000	2,648,250	1,715,500
2015	5,340,000,000	5,190,000	3,855,000	2,520,000
2016	10,170,000,000	10,020,000	7,477,500	4,935,000
2017	12,960,000,000	12,810,000	9,570,000	6,330,000
2018	10,650,000,000	10,500,000	7,837,500	5,175,000

Source: Szuwalski (2018)

3. Remove or revise trawl crab PSC limit floors for Bristol Bay red king crab and Eastern Bering Sea snow crab

Table 6. Snow crab PSC limits for each option under Alternative 3 compared to hindcast modeled estimate of snow crab abundance from the 2018 snow crab model.

		Alternative 3 PSC limits		
Year	Modeled Abundance	Option 1 -10%	Option 2 -15%	Option3 -50%
2008	3,000,000,000	4,050,000[a]	4,050,000[a]	3,249,000
2009	5,112,000,000	5,641,896	5,641,896	5,641,896
2010	4,852,000,000	5,347,316	5,347,316	5,347,316
2011	4,221,000,000	4,632,393	4,632,393	4,632,393
2012	3,747,000,000	4,095,351	4,095,351	4,095,351
2013	3,830,000,000	4,189,390	4,189,390	4,189,390
2014	3,731,000,000	4,077,223	4,077,223	4,077,223
2015	5,340,000,000	5,900,220	5,900,220	5,900,220
2016	10,170,000,000	11,372,610	11,050,000[b]	6,500,000[b]
2017	12,960,000,000	11,700,000[b]	11,050,000[b]	6,500,000[b]
2018	10,650,000,000	11,700,000[b]	11,050,000[b]	6,500,000[b]

[a] minimum PSC limit
[b] maximum PSC limit
Source: Szuwalski (2018)