C4 Preliminary/Initial Review of Crab Prohibited Species Catch Limits in the BSAI Groundfish Trawl Fisheries

Presentation to the Council

February 2021

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History of Council Action

Dec 2019

- Council received public testimony on this issue
- Initiated a Preliminary/ Initial review analysis

Feb 2021

- SSC/ AP/ Council consideration of Preliminary/ Initial review analysis

Also consulted with the Crab Plan Team several times during the development of this analysis: May 2020, Sept 2020, and Jan 2021

Section 2.1, page 17 & 18

Purpose and Need

- *"At present, most Bering Sea crab stocks are experiencing low productivity and small population sizes, leading to large reductions in directed harvest levels….*

….This action is intended to ensure there is consistency in management measures between directed fisheries and bycatch in groundfish fisheries, making more explicit the balance of impacts to all the fisheries and communities that are affected by the status of depressed stocks."

Section 1.1, page 17 for the full Purpose and Need

Alternatives

- 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

Section 2, page 21

Triggered Area Closures

Zone 1 area closure – BBRKC and Tanner crab PSC
Zone 2 area closure – Tanner crab PSC

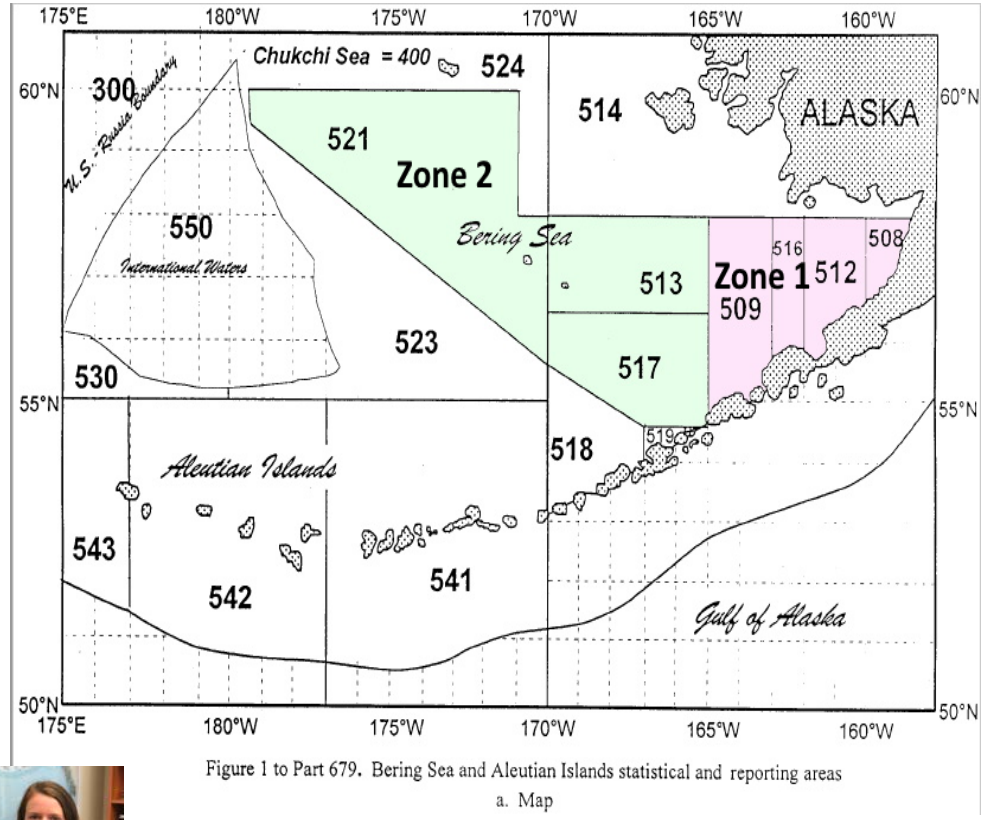


Figure 1 to Part 679. Bering Sea and Aleutian Islands statistical and reporting areas
a. Map

C. Opilio Bycatch Limitation Zone(COBLZ) – snow crab PSC

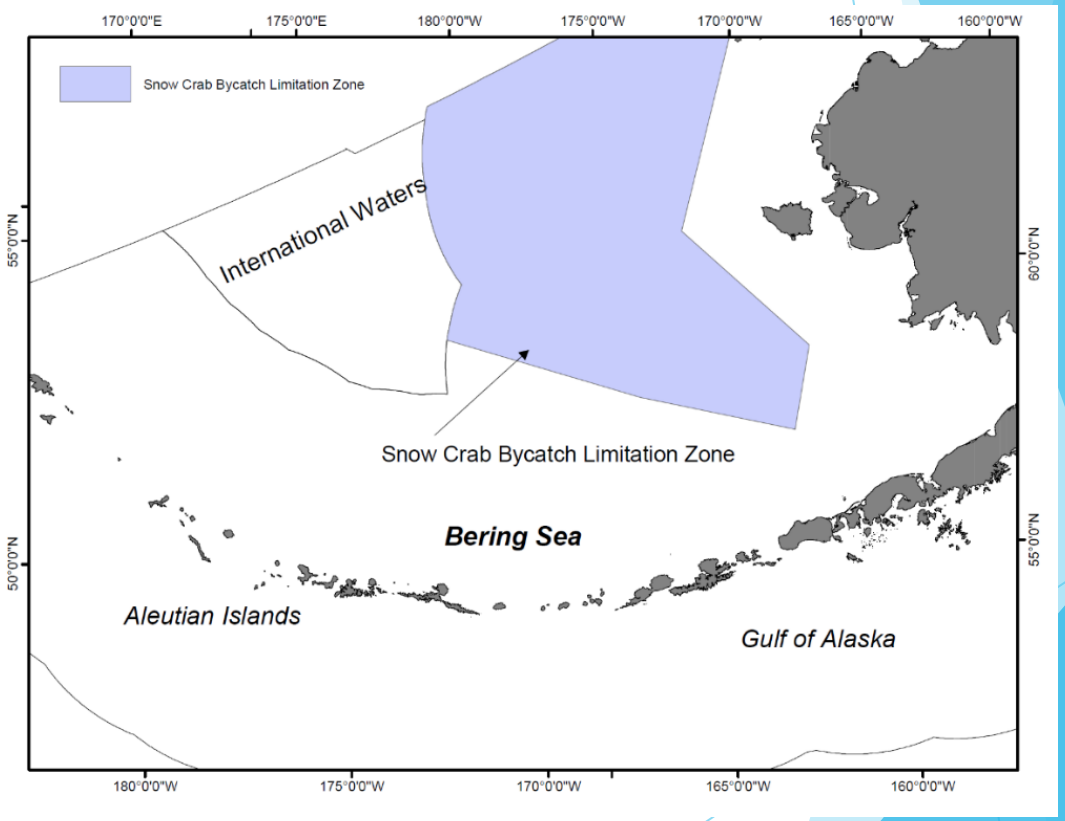


Figure 1 and 2, page 22

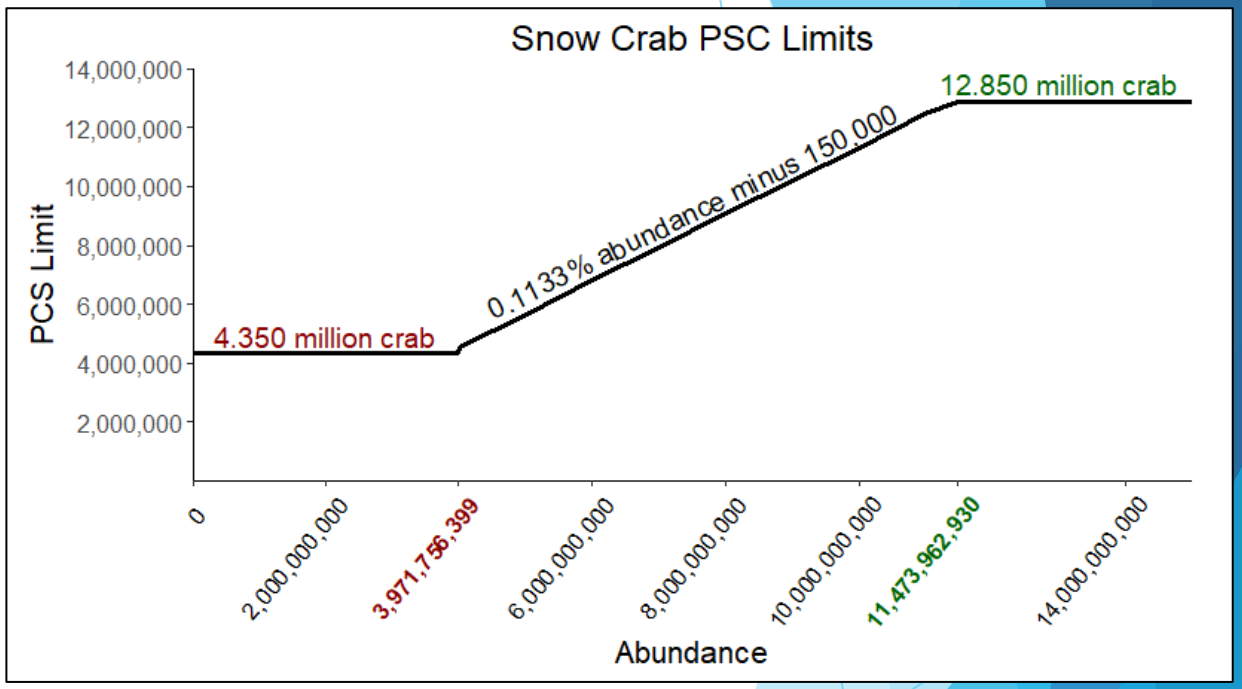
Zone 1 Red King Crab PSC Limits

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.

Table 4, page 24

COBLZ Snow Crab PSC Limits

- Set annually at 0.1133% of the snow crab abundance estimates minus 150,000 crab unless minimum or maximum abundance threshold is reached.
  - If 0.1133% multiplied by the total abundance is less than 4.5 million, then the minimum PSC limit will be 4.350 million animals.
  - If 0.1133% multiplied by the total abundance is greater than 13 million, then the maximum PSC limit will be 12.850 million animals.

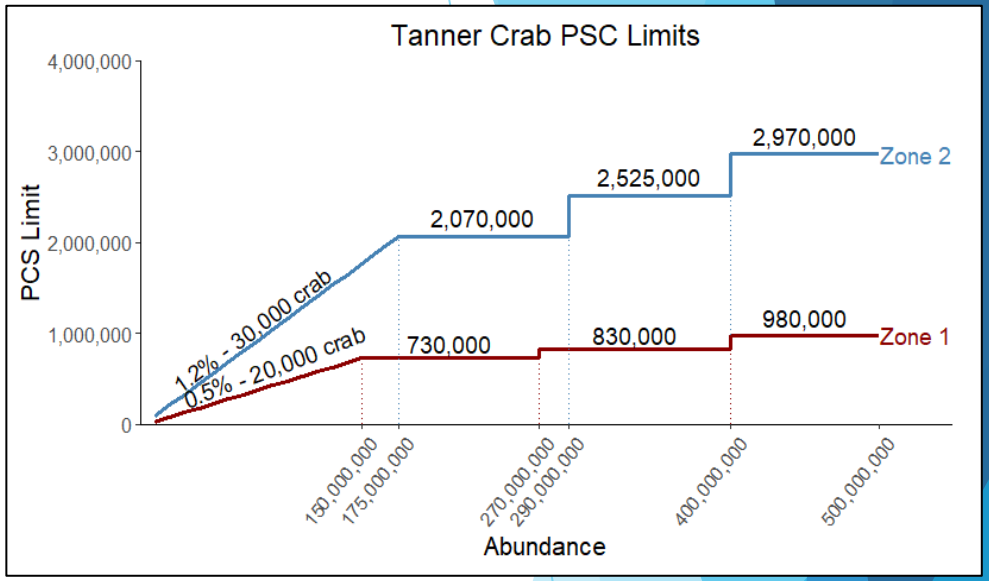


Section 2.1, page 25

EBS Tanner Crab PSC Limits

Zone 1:

When the total abundance of C. bairdi crab 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



Zone 2:

When the total abundance of C. bairdi crab 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
(4) Over 400 million animals	2,970,000 animals

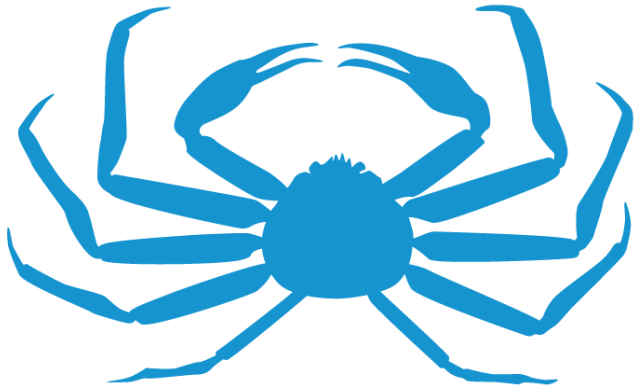
Table 5 and 6, page 25

Sources of Abundance

- The Council also requested that the analysis include source numbers for the crab abundance estimates used to calculate the PSC limits and clearly state whether they are from raw numbers from the NMFS bottom trawl survey or from stock assessment model estimates.

	Abundance estimate	Effective spawning biomass
BBRKC	Modeled survey estimates of mature female abundance using data from NMFS bottom trawl survey	From stock assessment (mature males and females)
EBS Snow	Modeled estimates of total abundance (accounting for survey selectivity) using data from NMFS bottom trawl survey	N/A
EBS Tanner	Modeled estimates of total abundance (accounting for survey selectivity) using data from NMFS bottom trawl survey	N/A

Table 2, page 23



Background and Summary of Alt 1, No Action

Highlight several sections of the EA and RIR analysis

Description of the Fisheries

Groundfish Fisheries

- Amendment 80
  - 18-20 CP vessels
  - Average crew size: 37
  - Fleet ex-vessel value: $133 million
- BSAI TLAS
  - 58-83 vessels
    - In 2020: 2 AFA CPs, 44 AFA CVs, 11 non-AFA CVs
  - Average CV crew size: 4
  - Fleet ex-vessel value: $36.5 million
  - P. Cod deliveries to 8-11 shoreside processors
- BSAI CDQ
  - 21-29 vessels
  - Average crew size: 23
  - Fleet ex-vessel value: $78 million

Crab Fisheries

- Average crew size: 6
- BBR and BSS
  - 60-70 CVs
  - 2 CPs
- EBST and WBST
  - 24-49 CVs
  - 1 CP
- Harvesting sector gross ex-vessel revenue
  - BBR: $70 million
  - BSS: $109.5 million
  - BST: $22.2 million

Bristol Bay Red King Crab in Zone 1

Alternative 1: BBRKC Use Based on the Lowest Limits

- Have not been set to lowest threshold between 2008-2020
- Retrospectively – had BBRKC been set to lowest limit in these years – sectors *may* have reached limit and been closed out of Zone 1 (represented in blue)
- Lower PSC limits may come at a cost (even when catch has not approached the limits)

Bristol Bay RKC Zone 1	CDQ PSQ			A80			BSAI TLAS		
	Limit	Use	% of limit	Limit	Use	% of limit	Limit	Use	% of limit
2008	3,424	2,623	77%	14,282	78,426	549%	8,739	4,492	51%
2009	3,424	2,187	64%	14,282	59,428	416%	8,739	4,664	53%
2010	3,424	779	23%	14,282	54,314	380%	8,739	0	0%
2011	3,424	3,630	106%	14,282	31,003	217%	8,739	3,336	38%
2012	3,424	2,605	76%	14,282	24,164	169%	8,739	225	3%
2013	3,424	2,425	71%	14,282	22,524	158%	8,739	224	3%
2014	3,424	1,455	42%	14,282	26,333	184%	8,739	177	2%
2015	3,424	62	2%	14,282	12,615	88%	8,739	77	1%
2016	3,424	430	13%	14,282	21,442	150%	8,739	1,448	17%
2017	3,424	3,722	109%	14,282	27,143	190%	8,739	4,167	48%
2018	3,424	1,936	57%	14,282	9,799	69%	8,739	989	11%
2019	3,424	2,044	60%	14,282	20,775	145%	8,739	2,141	25%
2020	3,424	6,137	179%	14,282	30,367	213%	8,739	3,971	45%

Table 9, page 29

Alternative 1: Impact of Lower BBRKC Limits to the Groundfish Trawl Sectors

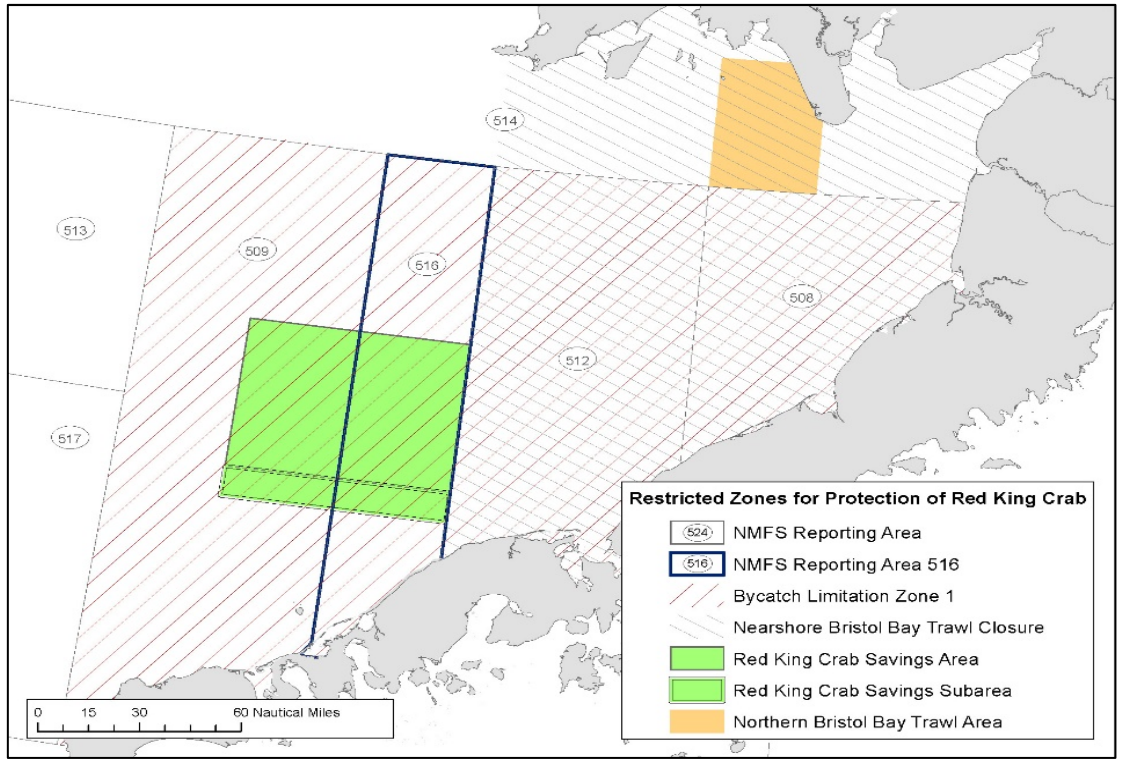


Figure 15, page 54

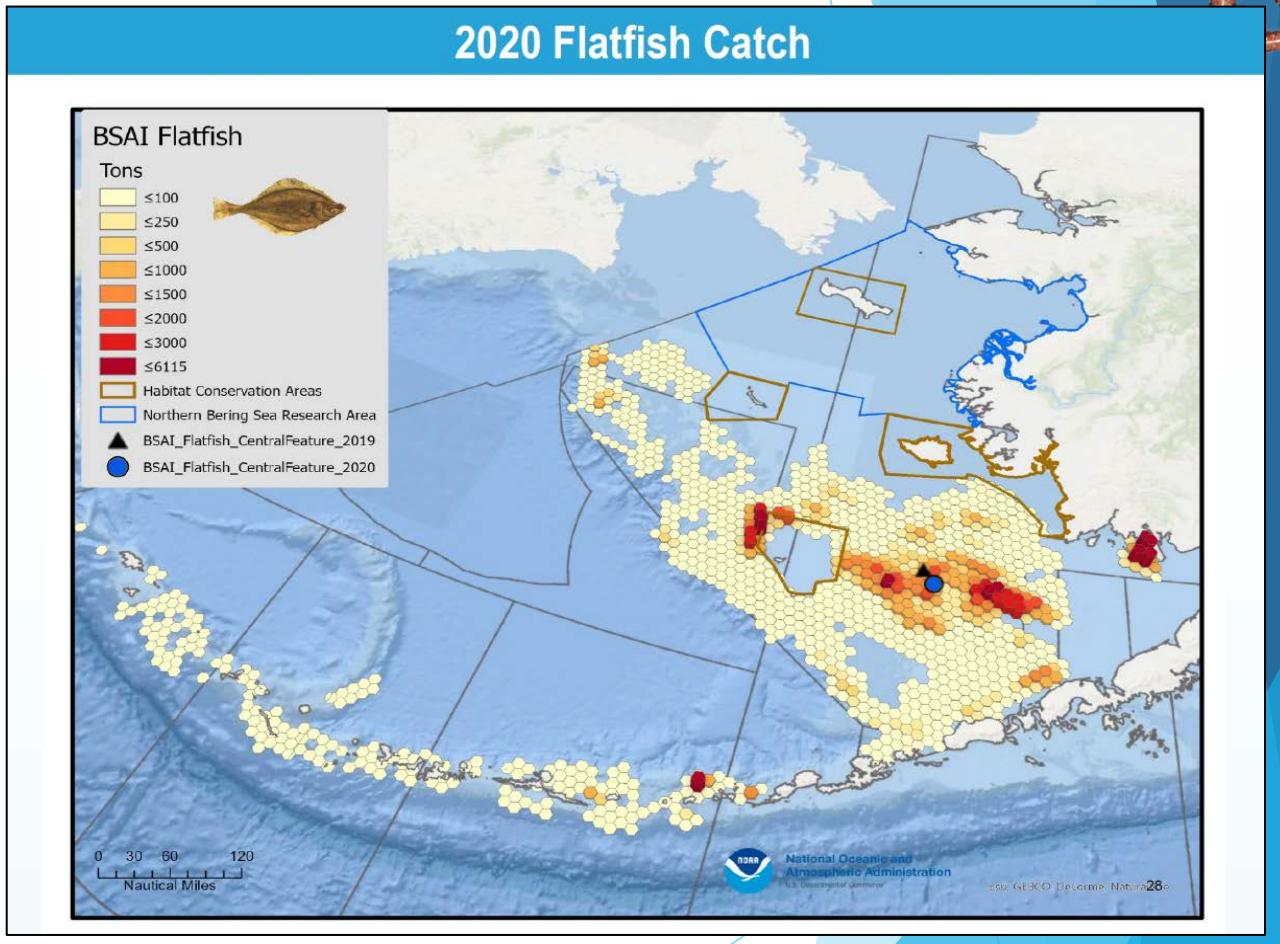


Figure 46, page 126

Alternative 1: Impact of Lower BBRKC Limits to Processors and Communities Related to Trawl Fisheries

- Shoreside processing connection to this action is through the trawl CV Pacific cod component of the TLA sector
  - Deliveries to five communities: Adak, Akutan, Dutch Harbor/Unalaska, King Cove, and Sand Point
  - Based on past BBRKC PSC use in this sector, lower PSC limits unlikely to change the amount of P.cod landed or distribution of landings
- Also, community connections through spending (induced impacts) associated with crew, vessel owners, others employed, as well as spending from port calls, landings tax, and CDQ community connections
  - If BBRKC limits drop, these communities could be impacted under Alt 1

Alternative 1: Potential Effects on BBRKC

- trawl PSC still represents a small portion of fishing mortality
- other gear types are estimated to represent a greater portion of the crab bycatch
- crab PSC limits at their lowest threshold may have a modest impact on stock's ability to rebuild

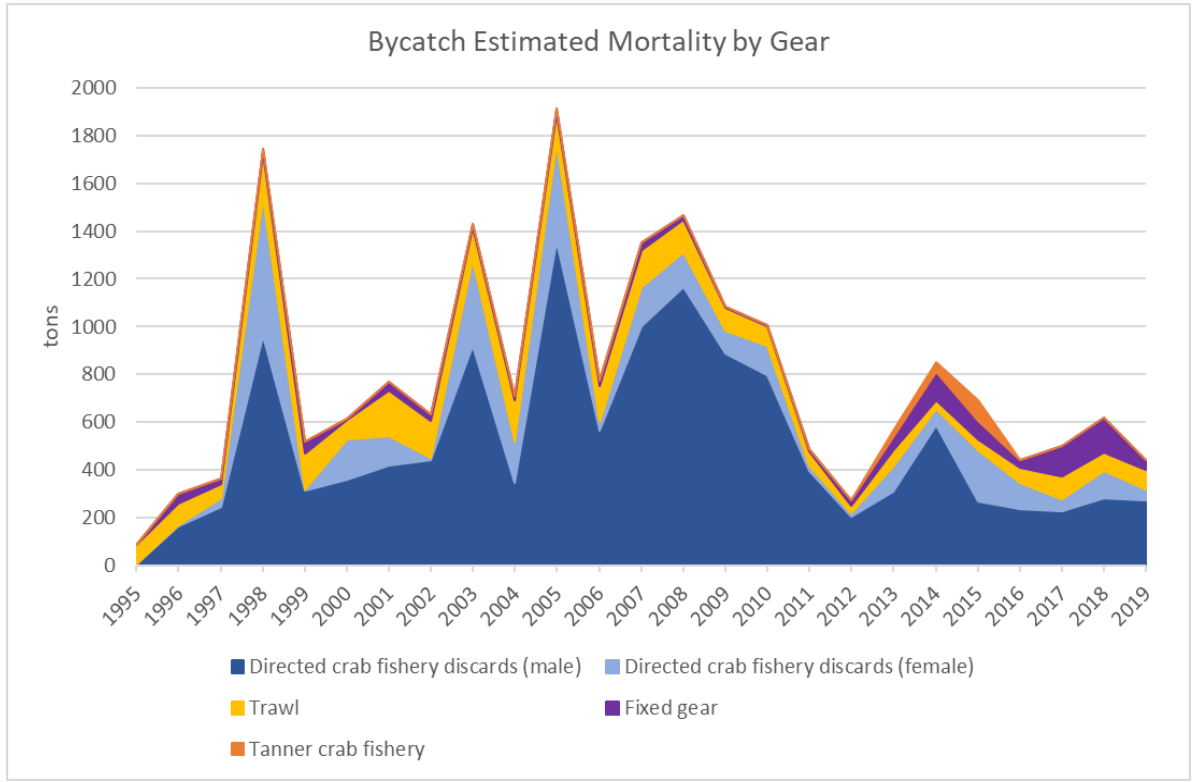


Figure 7, page 47
Also Section 3.5.2, page 86-90

Sensitivity Analyses

- Potential impacts of unobserved trawl mortality
- For BBRKC, when **bycatch biomass increases by 500% or more** in the models, estimated MMB values in the terminal years **could decrease about 14%** or more; the decreases might be much larger for some years.
- For Tanner crab, based on previous catch rates, **increasing the bycatch by 1000**% would have lowered the MMB in the 1970s by an estimated **~100,000 t, while in recent years it would have been estimated to be ~6,000 t less.**
- For snow crab, bycatch has been small enough that **increasing the bycatch input by 1000% resulted in only a ~2% change** in the terminal year of MMB (with largest changes in the mid-1990s through mid-2010).

Section 3.4.6.1, page 85-86 and Appendix 4

Alternative 1: Impact of Lower BBRKC Limits on the Crab Directed Fishery

- Declines over the last 10 years
  - 87% TAC reduction
  - Season truncated by 1-2 months
  - 1.8 trips per vessel
  - Decline in vessel participation and available crew positions
  - Drastic reduction in overall value and crew earnings
- Given the expectation for modest stock impacts, BBRKC PSC limits set to lower thresholds expected to have limited indirect impacts to the directed fishery

Section 4.6.1.4, page 129

Overfishing and Rebuilding Plans

- Council requested additional information on triggers for which a stock is redefined as *overfished* and the process of a rebuilding plan.
- Overfished if MMB < MSST, defined as $B/B_{MSY} \leq 50\%$
- Triggers MSA and NS1 guidelines to rebuild stock *within an appropriate timeframe*
  - Rebuilt when stock reaches B_{MSY} for two consecutive years
- Rebuilding plans must consider:
  - Harvest strategy
  - Bycatch control measures
  - Habitat protection measures
- Monitoring requirements

Section 3.3.5, page 678 and Appendix 2

Overfishing and Rebuilding – Status of BBRKC

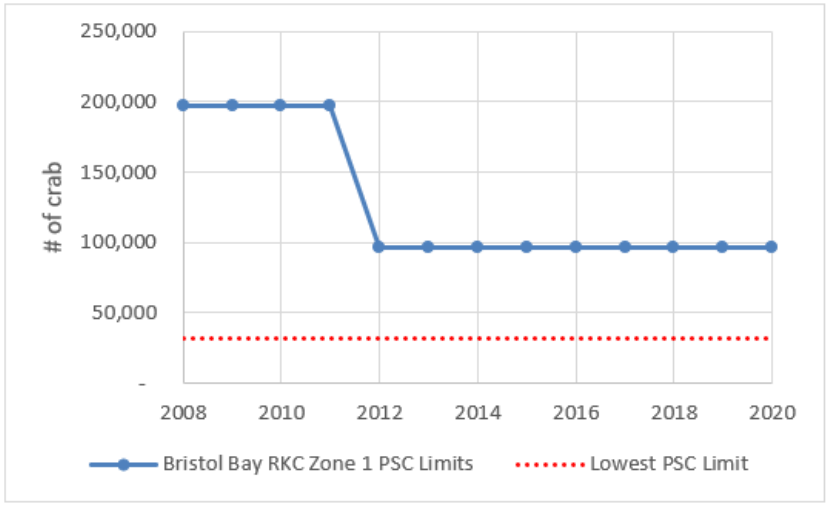
- BBRKC is listed as a Tier 3b stock
  - 3: Reliable estimates of the spawner/recruit relationship are not available, but proxies for FMSY and BMSY can be estimated
  - b: Current biomass is less than BMSY but greater than the level specified as *critical biomass threshold*
- Approaching *overfished* status

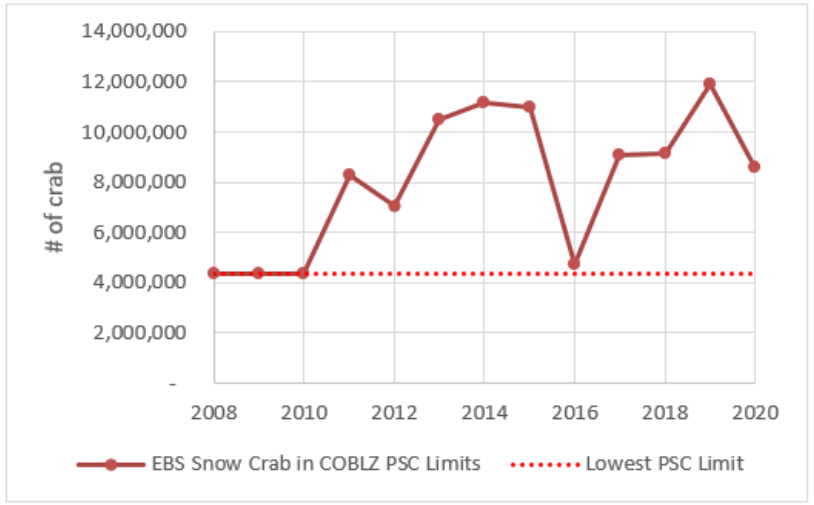
Year	Tier	B/B_{MSY}
2016/17	3b	0.93
2017/18	3b	0.85
2018/19	3b	0.82
2019/20	3b	0.75
2020/21	3b	**0.59**

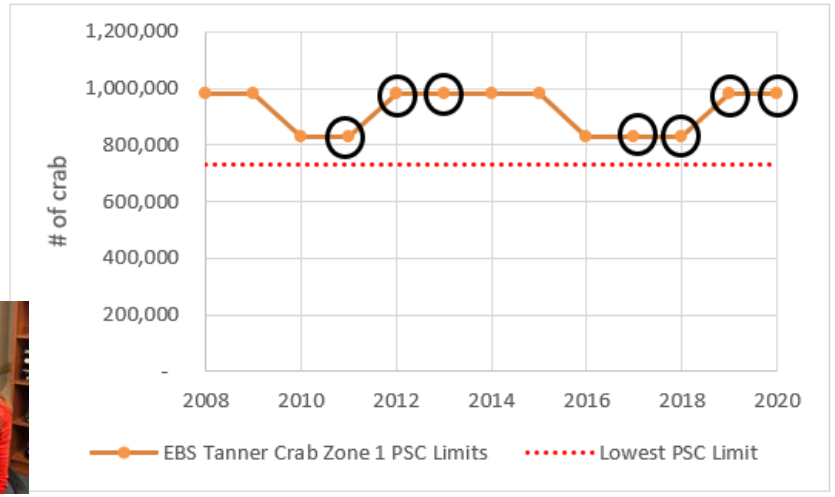
Section 3.3.5, page 678 and Appendix 2

Snow Crab in COBLZ and Tanner Crab in Zone 1 and 2

Trawl PSC limits by crab fishery, with years of closed crab fisheries circled, 2008-2020







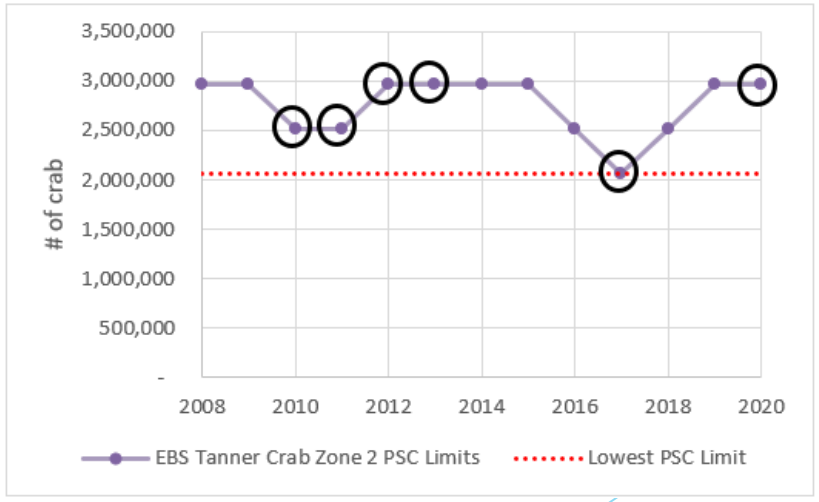


Figure 3, page 31

EBS Snow crab COBLZ PSC use relative to the lowest limits (# of crab), 2008-2020

EBS Snow Crab in COBLZ	CDQ PSQ			A80			BSAI TLAS		
	Limit	Use	% of limit	Limit	Use	% of limit	Limit	Use	% of limit
2008	481,500	10,998	2%	1,975,093	601,773	30%	1,291,546	64,590	5%
2009	481,500	56,254	12%	1,975,093	356,667	18%	1,291,546	23,129	2%
2010	481,500	11,530	2%	1,975,093	266,102	13%	1,291,546	1,379,131	107%
2011	481,500	29,749	6%	1,975,093	480,262	24%	1,291,546	212,241	16%
2012	481,500	26,600	6%	1,975,093	326,335	17%	1,291,546	239,451	19%
2013	481,500	19,445	4%	1,975,093	400,283	20%	1,291,546	224,401	17%
2014	481,500	34,958	7%	1,975,093	329,062	17%	1,291,546	81,796	6%
2015	481,500	40,269	8%	1,975,093	394,127	20%	1,291,546	48,005	4%
2016	481,500	12,189	3%	1,975,093	145,705	7%	1,291,546	2,711	0%
2017	481,500	19,709	4%	1,975,093	125,564	6%	1,291,546	4,946	0%
2018	481,500	291,314	61%	1,975,093	1,216,259	62%	1,291,546	68,722	5%
2019	481,500	74,151	15%	1,975,093	834,553	42%	1,291,546	17,017	1%
2020	481,500	19,953	4%	1,975,093	655,590	33%	1,291,546	57,192	4%

Table 10, page 33

EBS Tanner Zone 1 PSC use relative to the lowest fixed limits (# of crab), 2008-2020

EBS Tanner Crab Zone 1	CDQ PSQ			A80			BSAI TLAS		
	Limit	Use	% of limit	Limit	Use	% of limit	Limit	Use	% of limit
2008	78,110	3,815	5%	274,511	141,453	52%	306,323	41,545	14%
2009	78,110	7,203	9%	274,511	167,340	61%	306,323	17,518	6%
2010	78,110	13,200	17%	274,511	148,284	54%	306,323	16,373	5%
2011	78,110	9,635	12%	274,511	221,988	81%	306,323	21,358	7%
2012	78,110	14,594	19%	274,511	171,355	62%	306,323	8,827	3%
2013	78,110	20,603	26%	274,511	239,861	87%	306,323	16,929	6%
2014	78,110	6,603	8%	274,511	155,223	57%	306,323	10,657	3%
2015	78,110	3,088	4%	274,511	71,616	26%	306,323	17,657	6%
2016	78,110	2,761	4%	274,511	50,605	18%	306,323	9,941	3%
2017	78,110	4,812	6%	274,511	95,674	35%	306,323	53,859	18%
2018	78,110	1,638	2%	274,511	21,763	8%	306,323	3,920	1%
2019	78,110	1,719	2%	274,511	23,181	8%	306,323	4,041	1%
2020	78,110	1,812	2%	274,511	113,122	41%	306,323	4,534	1%

Table 11, page 34

EBS Tanner Zone 2 PSC use relative to the lowest fixed limits (# of crab), 2008-2020

EBS Tanner Crab Zone 2	CDQ PSQ			A80			BSAI TLAS		
	Limit	Use	% of limit	Limit	Use	% of limit	Limit	Use	% of limit
2008	221,490	9,508	4%	437,542	386,049	88%	865,288	69,749	8%
2009	221,490	5,652	3%	437,542	226,578	52%	865,288	52,978	6%
2010	221,490	15,975	7%	437,542	225,088	51%	865,288	70,663	8%
2011	221,490	14,706	7%	437,542	566,190[1]	129%	865,288	61,437	7%
2012	221,490	16,964	8%	437,542	166,732	38%	865,288	43,728	5%
2013	221,490	16,753	8%	437,542	344,658	79%	865,288	70,504	8%
2014	221,490	38,298	17%	437,542	303,607	69%	865,288	103,381	12%
2015	221,490	9,055	4%	437,542	196,608	45%	865,288	25,527	3%
2016	221,490	4,885	2%	437,542	102,466	23%	865,288	5,609	1%
2017	221,490	5,630	3%	437,542	157,924	36%	865,288	27,350	3%
2018	221,490	17,988	8%	437,542	108,259	25%	865,288	10,166	1%
2019	221,490	15,580	7%	437,542	249,557	57%	865,288	7,007	1%
2020	221,490	3,301	1%	437,542	177,700	41%	865,288	25,272	3%

Table 12, page 34

Tanner and Snow Crab Stock Status

Tanner Crab

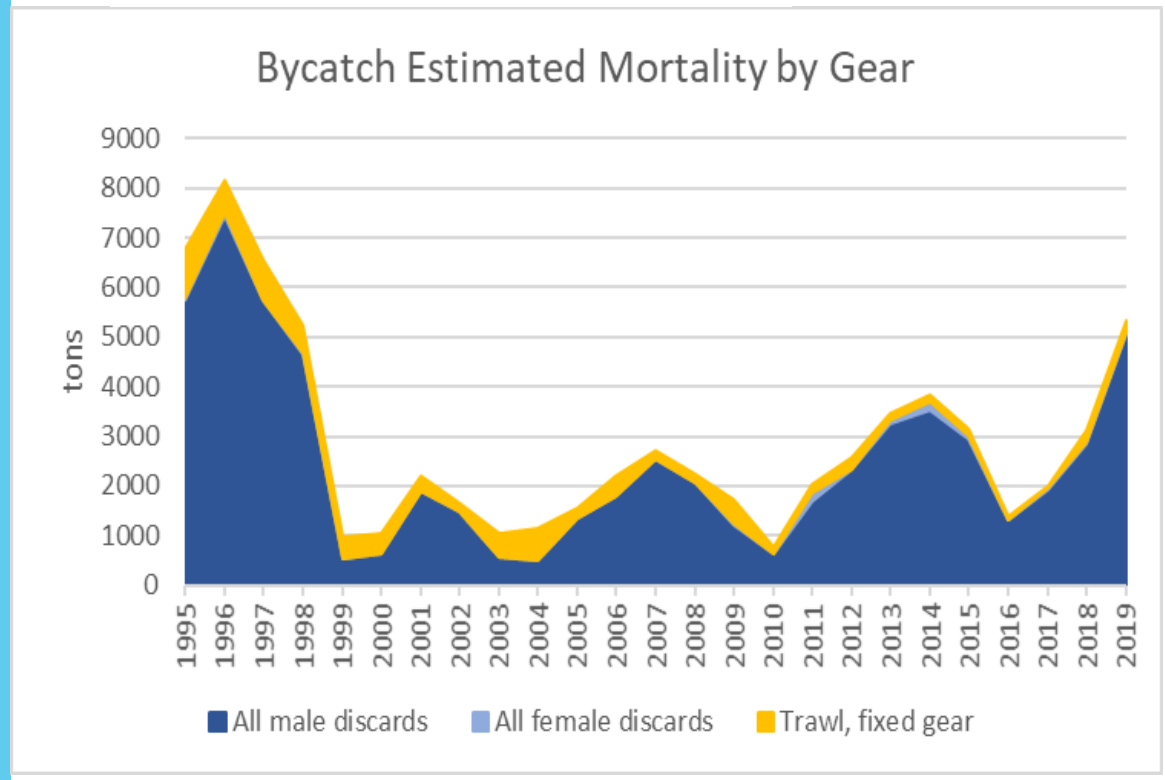
- EBT and WBT directed fisheries have experienced variable closures over time
- MMB has been declining since 2014/15
- Harvest strategy amended in March 2020
  - New thresholds for opening
  - Reduces number of years the fishery is closed

Snow Crab

- MMB increase
- Large recruitment, positive trends
- Unlikely for directed fishery closure in the near term

Sections 3.2.1 – 3.2.3, page 42- 53

EBS snow



EBS Tanner

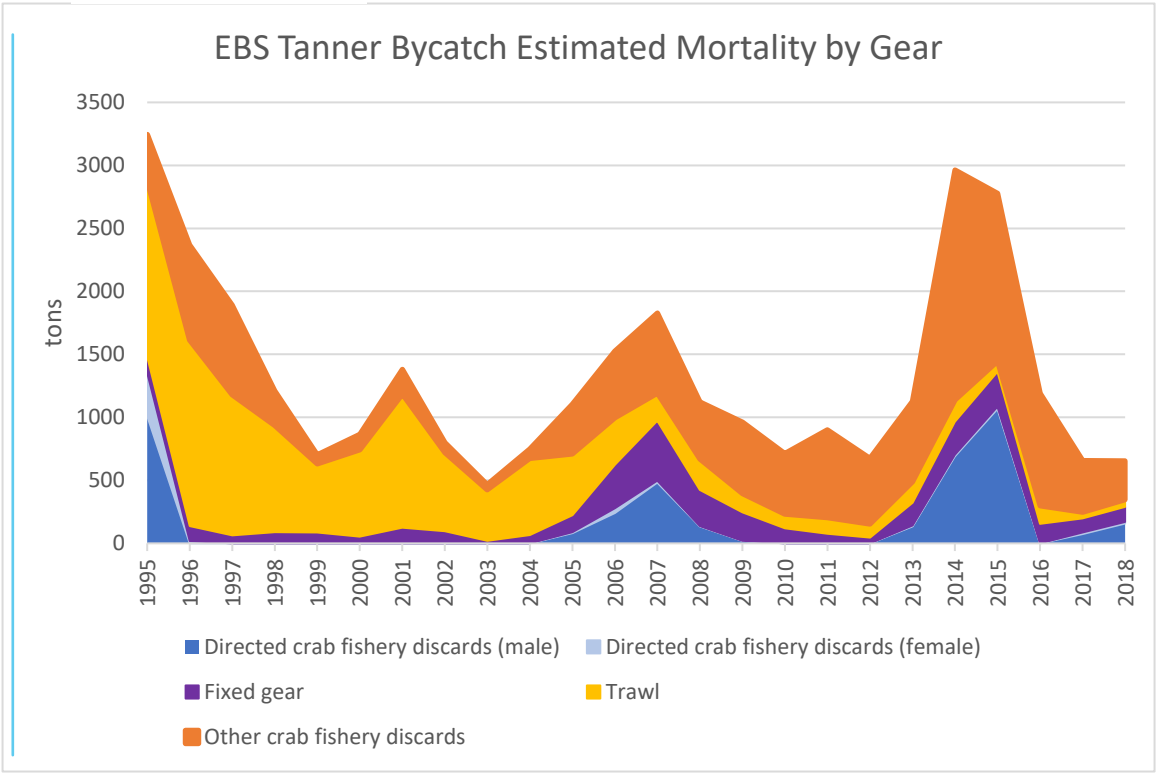
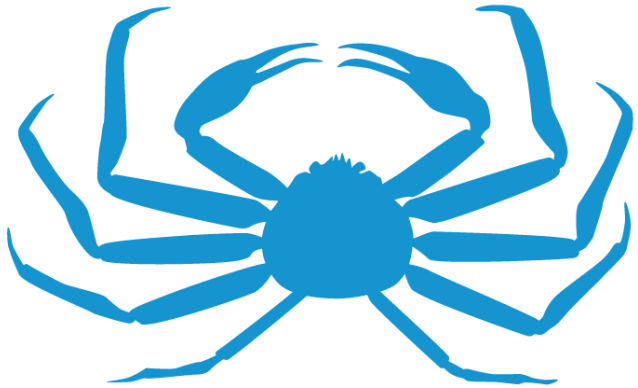


Figure 11, page 51

Figure 14, page 53



Summary of Anticipated Changes Under Alt 2

Primarily highlights Section 2.3 and 3.5.2 of the EA and Section 4.6.2 of the RIR analysis

Alternative 2

If directed _____ fishery is closed	PSC limit would be….
Bristol Bay red king crab	32,000 animals in Zone 1
Bering Sea snow crab	4.350 million animals in the COBLZ
Eastern Bering Sea Tanner*	730,000 animals in Zone 1
Western Bering Sea Tanner*	2.07 animals in Zone 2

*These limits are not the lowest tier currently specified in regulation, but the lowest fixed amount.

- Expected impacts under Alternative 2 are essentially the same *types* of impacts highlighted under Alternative 1
- Alternative 2 *may increase the likelihood* crab PSC would be applied at lowest abundance-based thresholds
  - Particularly Zone 1 and Zone 2 Tanner PSC limits
- Changes in groundfish trawl fishing behavior and thus changes in resource components are expected to be limited, relative to no action

Figure 7, page 28

Impacts of Alternative 2

- Limited scope of impacts is expected for BBRKC because thresholds are already aligned (not because lower PSC limits would have no effect)
- Limited scope of impacts expected for snow and Tanner based on past PSC relative to lowest PSC limits
  - However, large snow or Tanner crab recruitment events could change “typical” PSC pattern in groundfish trawl fisheries
  - Snow and Tanner crab PSC based on abundance estimates that include juveniles
  - Directed fishery may close due to low mature crab biomass, but large recruitment means PSC encounter rates could be higher
  - Further investigation of size selectivity

Section 2.3, page 27-34
Section 3.5.2, page 90

Additional Implications of Alternative 2

- Trawl crab PSC is a small portion of observed fishing mortality
  - Reduced BBRKC limits in Zone 1 may adversely impact groundfish trawl sector, but is most likely to provide greatest PSC savings
  - Reduced Tanner and snow crab limits would have limited impacts to groundfish sector, associated processors, and communities, based on past PSC use
- **More explicit and definitive link between management of directed crab fisheries and PSC limits in groundfish trawl fisheries**

Section 3.5.2, page 90-91;
Section 4.6.2; page 131-134

Thank You

Especially to stock assessment authors:

- Jie Zheng
- William Stockhausen
- Cody Szuwalski

And all reviewers/ contributors

(Section 6, page 142)

Questions?

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