EBS Snow Crab Rebuilding Plan
Selecting Alternatives for Analysis

June 2022

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Introduction

- Oct 19, 2021, NMFS notified Council that BS snow crab status has been changed to overfished therefore MSA section 304 requires a rebuilding plan be developed and implemented within two years of stock being declared overfished
- Council is scheduled to select alternatives for analysis
- The paper provided for this meeting is an update of the February 2022 progress report

Overfishing and Rebuilding Plans

- Section 2.1 provides MSA section 304 and the NS 1 guidelines for rebuilding overfished stocks
- A stock is overfished if MMB < MSST
  - MMB is 50,600 mt, which is less than the MSST threshold of 76,700 mt
- This triggers MSA and NS1 guidelines to rebuild stock within an appropriate timeframe
- Council must specify a time period for rebuilding the stock (T_{target}) based on being as short as possible taking into account:
  - Status and biology of the stock
  - Needs of fishing communities
  - Recommendation by international organizations in which the U.S. participates, and
  - Interaction of the overfished stock within the marine ecosystem

Time period shall not exceed 10 year, except where biology of the stock, other environmental conditions, or management measures under an international agreement dictate otherwise

Overfishing and Rebuilding Plans

- The shortest rebuilding time (T_{min}) is calculated based on time frame to rebuild the stock to its MSY biomass (B_{MSY}) in the absence of no fishing mortality (F=0)
  - If T_{min} is ≤ 10 years, then the maximum rebuilding time (T_{max}) is 10 years for rebuilding a stock to its B_{MSY}
  - If T_{min} for the stock exceeds 10 years, then one of the following methods can be used to determine T_{max}:
    - T_{min} plus the length of time associated with one generation time for the stock
    - Amount of time the stock is expected to take to rebuild to B_{msy} if fished at 75% of maximum fishing mortality threshold, or
    - T_{min} multiplied by 2

Stock Status for Snow Crab

- Section 2.2 provides an overview of the stock status of BS snow crab
- Survey data show spatial gradients by maturity and size for both sexes of snow crab
  - Larger males have been more prevalent on the southwest portion of the shelf while smaller males have been more prevalent on the northwest portion of the shelf
  - Females show a similar pattern
  - The distributions of crab by size and maturity have also change over time
  - In recent years, MMB was increasing as a large recruitment moved through the size classes, but that recruitment has since disappeared with MMB of 50.6 kt in 2021 survey
- Figure 1 on page 12 show the biomass of mature male and female snow crab from 1982 to 2020

Natural Mortality

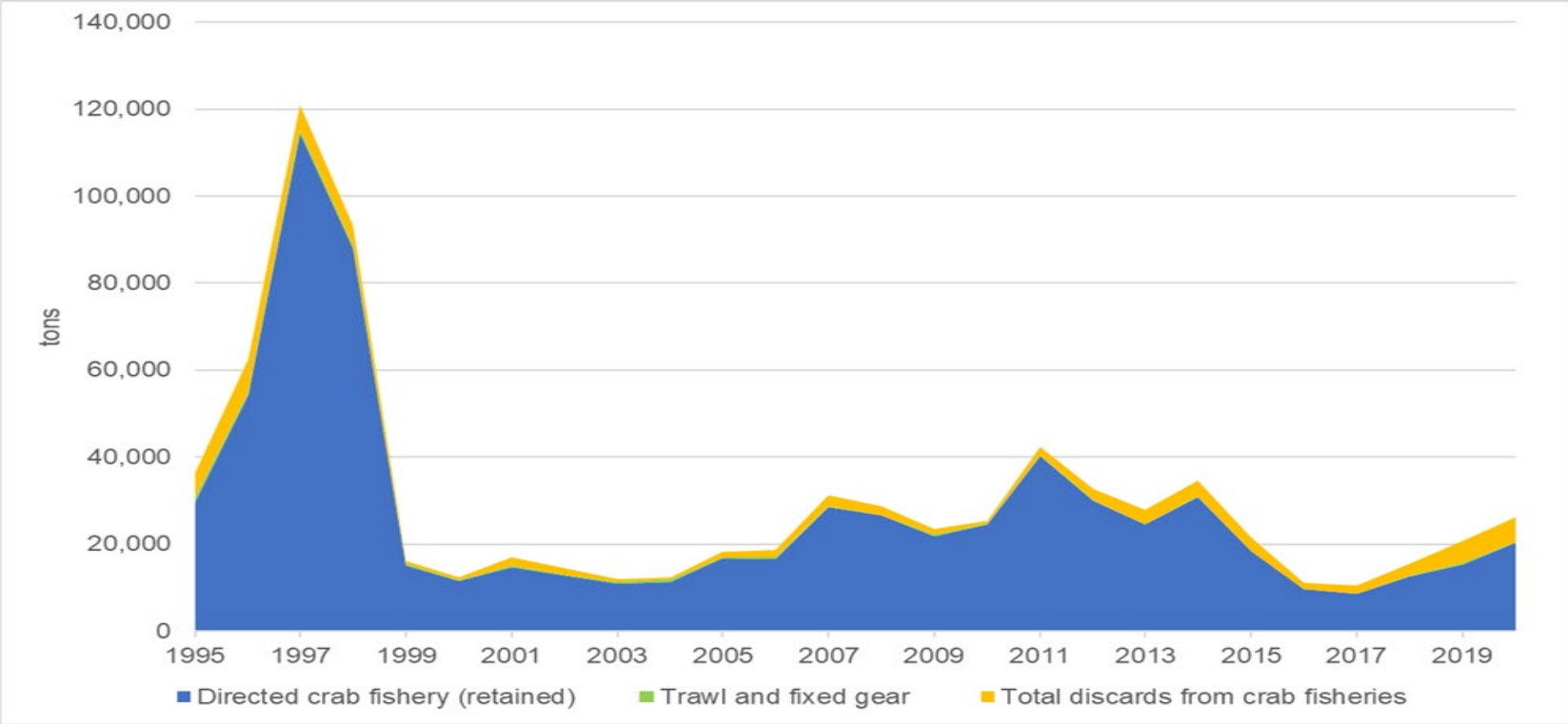
- Section 2.3 provides an overview of different sources of mortality
- Section 2.3.1 provides brief description of natural mortality
  - Currently, analyses are underway to understand the feasibility of estimating both time-varying mortality and catchability within a population dynamics model
  - The goal of these analyses are to provide evidence to support or refute the assumptions about variation in mortality made in the stock assessment about elevated natural mortality in recent years
    - Hypotheses related to temperature, disease, bycatch, discards, cannibalism, and predation are being explored

Directed Fishing Mortality

- Section 2.3.2 provides information on the directed fishery
  - Typically, the snow crab season starts Oct 15 and ends on May 15 for Eastern subdistrict and May 31 for Western subdistrict
  - Only male crab may be harvested
  - Fishing is not allowed during mating and molting periods (spring)
  - Size limit is greater than or equal than 3.1 inches or 78mm carapace width

Directed Fishing Mortality

- Figure 4 (page 18) shows directed snow crab catch, discards from other crab fisheries, and trawl and fixed gear PSC in the groundfish fisheries



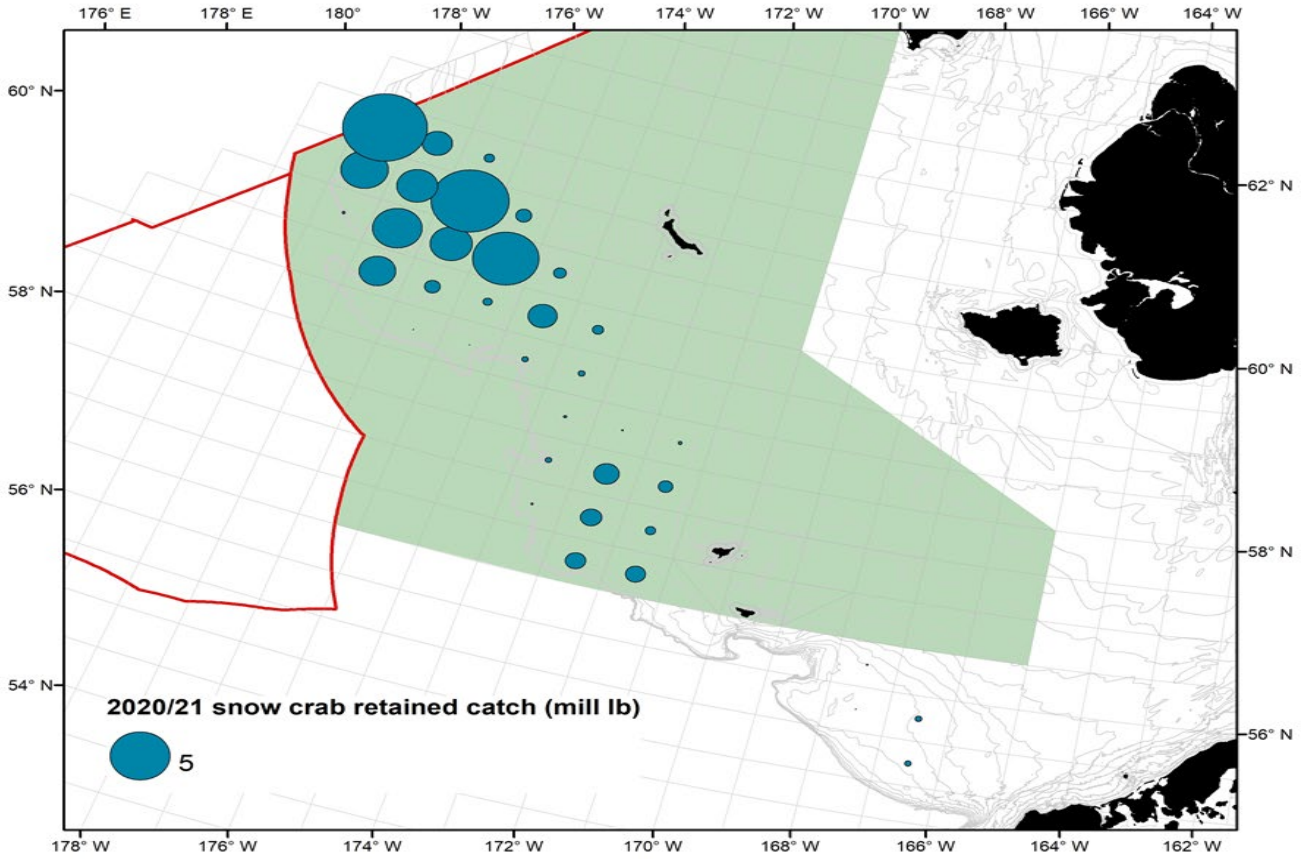
Directed Fishing

- Table 3 (page 18) provides TAC, retain catch inside/outside the COBLZ, discards and discard mortality and bycatch and bycatch morality in the directed Tanner and BBRKC fisheries from 2011/2012 season through the 2020/2021 season

		Directed fishery					Tanner fishery		BBRKC fishery	
Year	TAC	Ret Catch Inside COBLZ	Ret Catch Outside COBLZ	Total retained catch	Discard	Discard mortality	Bycatch	Bycatch mortality	Bycatch	Bycatch mortality
2011/12	40,322	33,715	6,578	40,293	3,919	1,176	0	0	4	1
2012/13	30,096	25,744	4,308	30,053	5,504	1,651	0	0	8	2
2013/14	24,486	22,035	2,452	24,486	10,599	3,180	277	83	1	0
2014/15	30,822	18,124	12,694	30,818	11,779	3,534	1,786	536	1	0
2015/16	18,421	12,221	6,200	18,421	10,946	3,284	3,221	966	1	0
2016/17	9,784	7,223	2,562	9,784	4,517	1,355	0	0	3	1
2017/18	8,601	7,781	820	8,602	5,863	1,759	235	71	6	2
2018/19	12,511	11,503	1,007	12,509	8,635	2,591	732	220	2	1
2019/20	15,431	15,161	272	15,433	15,525	4,657	0	0	1	0
2020/21	20,412	20,334	78	20,412	6,062	1,819	484	145	3	1

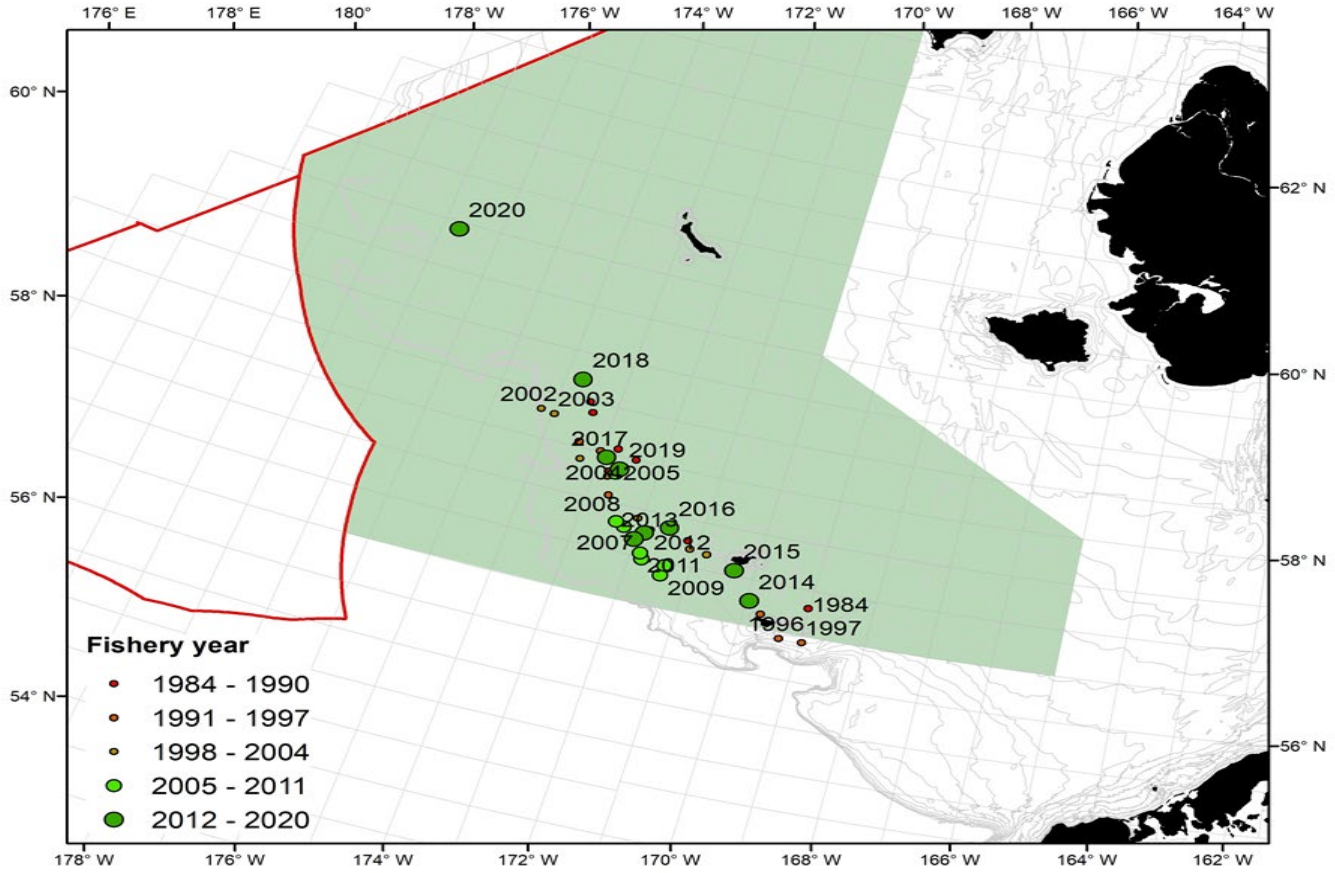
Directed Fishing

- Figure 5 (page 19) shows retained catch of snow crab in the 2020/2021 directed fishery, where size of the blue dot correspond to the magnitude of catch in each ADF&G statistical areas. The shaded green is the COBLZ.



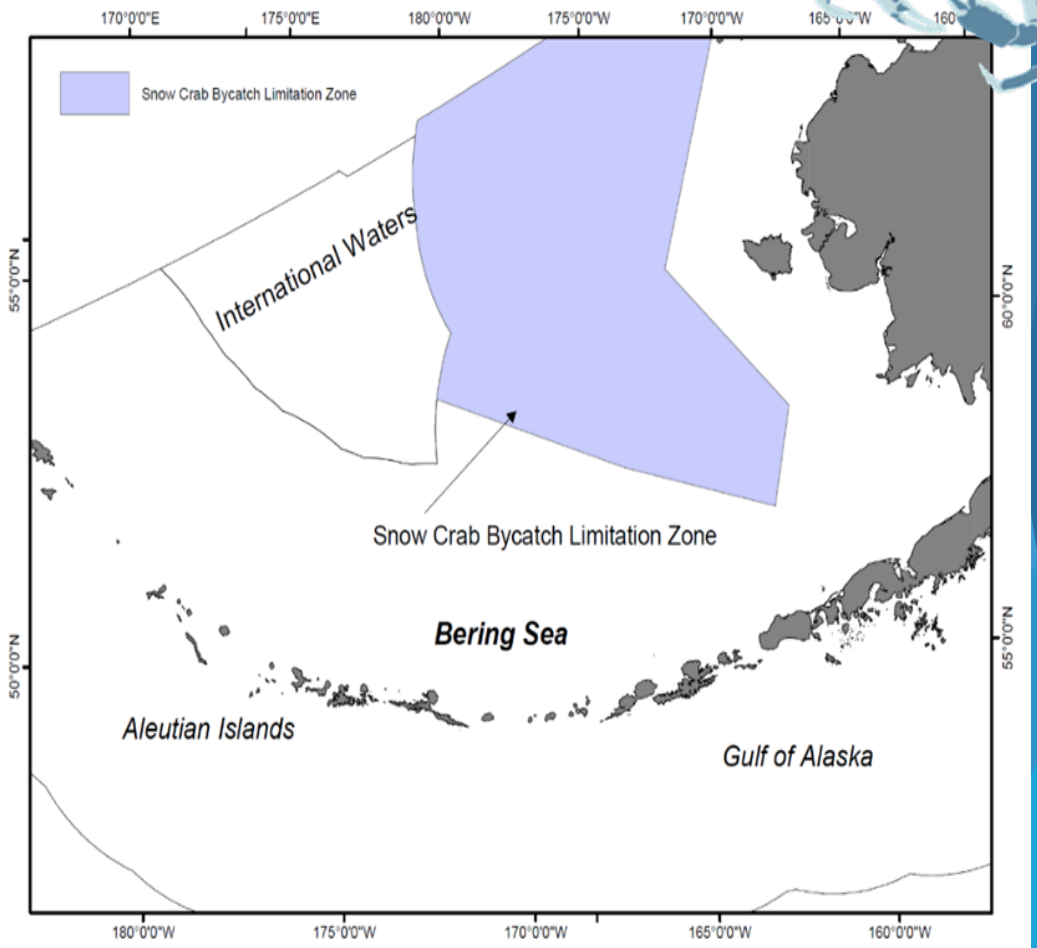
Directed Fishing

- Figure 6 (page 20) is the weighted center of the snow crab catch in the directed fishery from 1984 through 2020. The 2020/2021 fishery occurred much further north than in historic years.



PSC Mortality

- Section 2.3.2 (starting on page 20) provides information on snow crab bycatch in the groundfish fisheries
- Trawl PSC accrues within the COBLZ and this area is closed to nonpelagic trawl directed fishing in the fishery/sector that reaches the specified PSC limit
- PSC limits are based on calendar year and not crab year (July 1- June 30)
- No bycatch measures are currently in place for any non-trawl gear fisheries inside or outside of the COBLZ



COBLZ Snow Crab PSC Limits

- Set annually at 0.1133% of the snow crab abundance estimates with a minimum and maximum abundance threshold minus an additional 150,000 crab
  - If 0.1133% multiplied by the total abundance is less than 4.5 million crab, then the minimum PSC limit will be 4.350 million crab
  - If 0.1133% multiplied by the total abundance is greater than 13 million crab, then the maximum PSC limit will be 12.850 million animals.
  - Table 4 (page 22) provides snow crab abundance and the PSC limit from 2012-2021

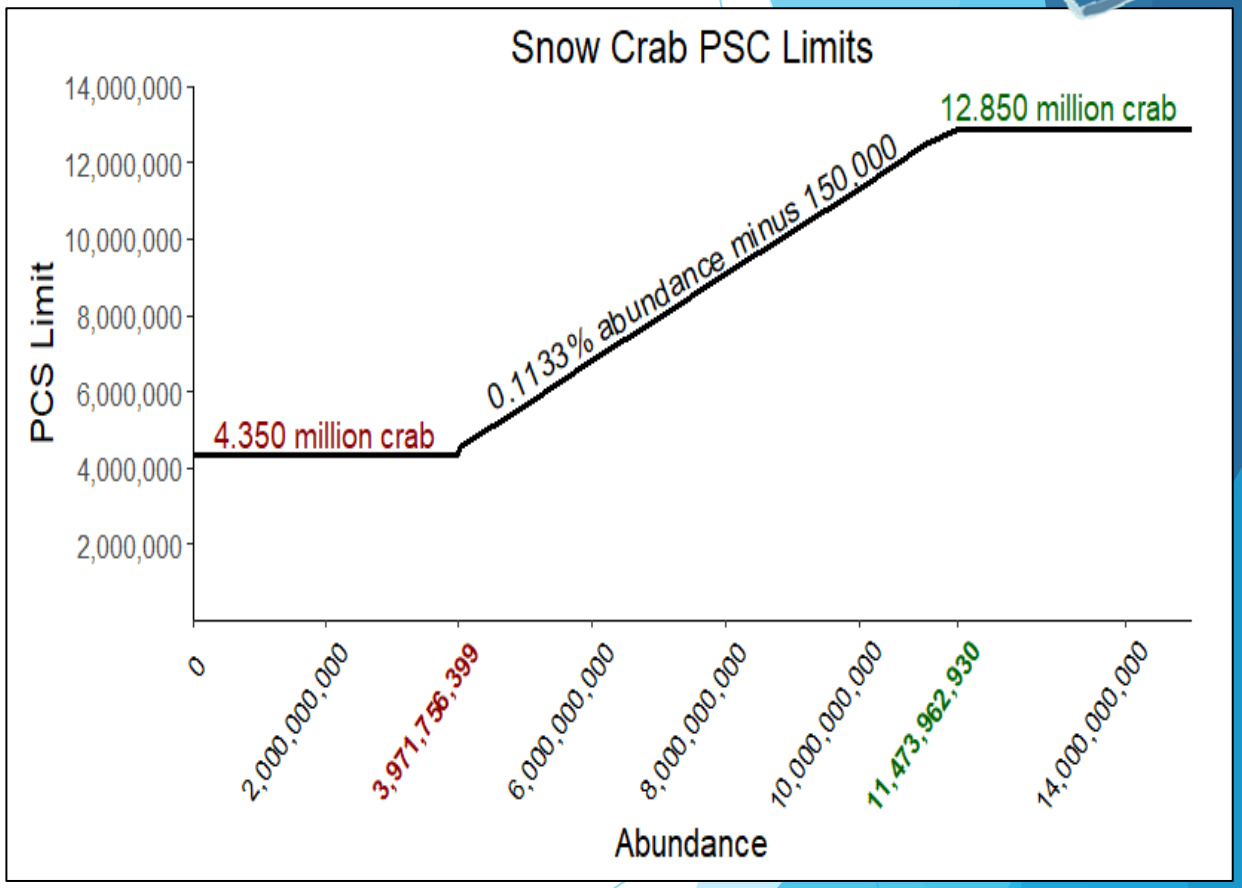
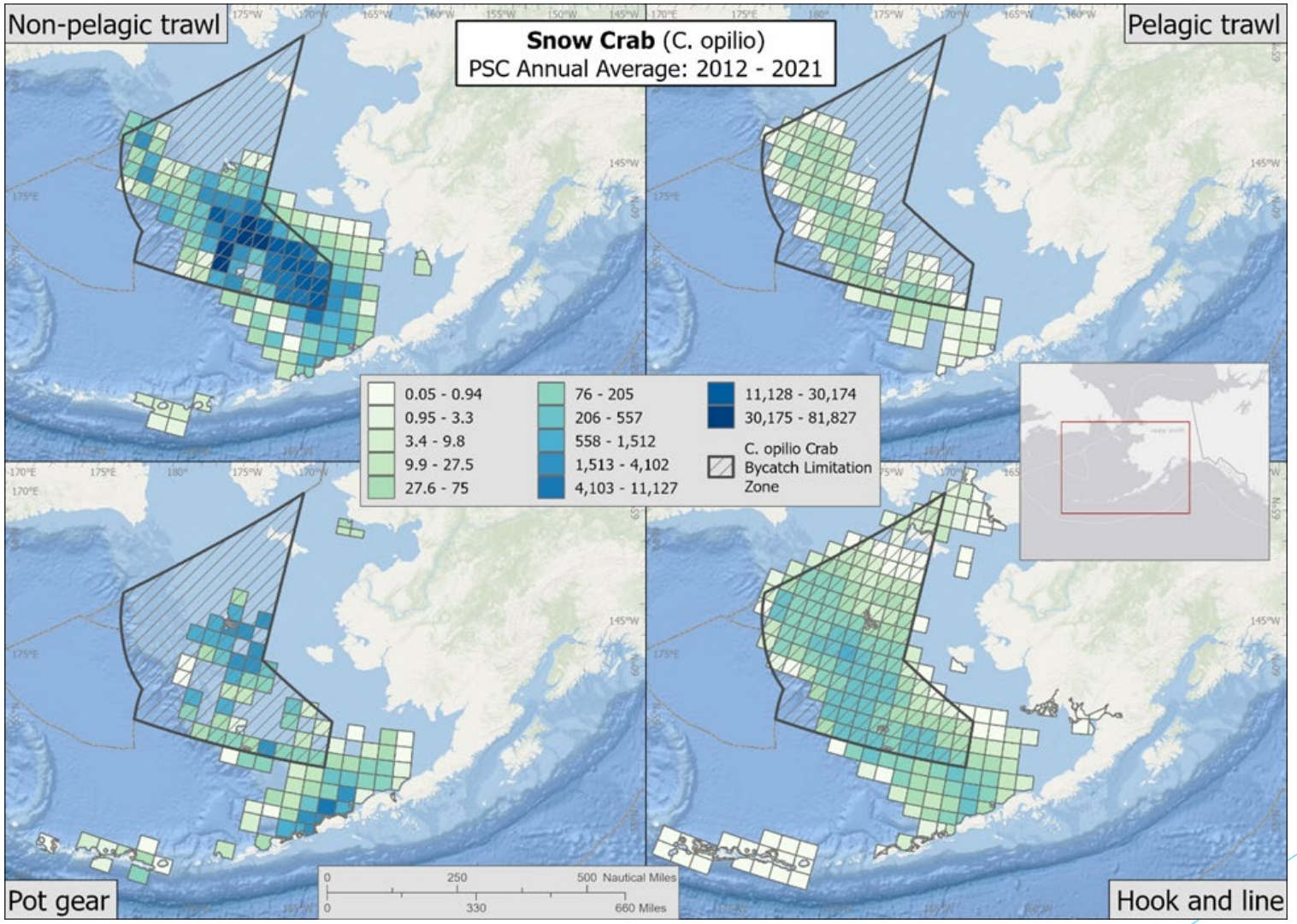


Table 5 Snow Crab PSC (page 23)

Year	Non-pelagic trawl PSC (# of crabs)		Pelagic trawl PSC (# of crabs)		Pot PSC (# of crabs)		H&L PSC (# of crabs)		Groundfish total (# of crabs)
	COBLZ	Outside COBLZ	COBLZ	Outside COBLZ	COBLZ	Outside COBLZ	COBLZ	Outside COBLZ	
2012	592,238	30,585	2,578	583	1	16,538	0	29,622	672,145
2013	644,451	43,296	3,568	398	0	14,796	0	18,280	724,788
2014	446,309	34,856	2,811	520	0	85,013	0	20,496	590,005
2015	482,551	6,113	2,906	55	0	121,525	0	16,495	629,645
2016	160,604	5,485	733	151	0	20,039	10	23,069	210,093
2017	150,218	9,125	248	86	1,396	144,362	17	21,969	327,421
2018	1,576,295	5,854	247	30	25	52,738	48	13,776	1,649,013
2019	933,480	7,748	48	21	0	72,390	13	15,819	1,029,519
2020	751,592	27,263	1,657	57	75	142,613	12	11,602	934,871
2021	228,293	14,218	449	73	1	67,763	17	12,635	323,449

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_PSC [Crab_PSC_AREA(11-13-20)]

Figure 9 Snow Crab PSC (page 24)



Council Snow Crab Rebuilding Timeline

- **October 19, 2021:** Snow Crab was declared overfished
  - Rebuilding of overfished stocks is required by the MSA section 304 within 2 years (October 2023)
    - MSA section 304 and the NS 1 guidelines for rebuilding overfished stocks
- **June 2022:** Select snow crab rebuilding alternatives for analysis
  - Summer 2022 – Staff will analyze the impacts of each of the alternatives
- **October 2022:** initial review of the snow crab rebuilding plan and potentially selected a preliminary preferred alternative
- **December 2022:** Council will take final action and select a preferred alternative to recommend to the Secretary of Commerce
  - Following selection of preferred alternative, NMFS prepares proposed FMP amendment text, draft notice of availability, draft Environmental Assessment, and, if required, a draft regulatory package

Additional Reference points

- **January 2023: 15 months.** Council action should be submitted to NMFS within 15 mo. of notification of overfished to ensure sufficient time for SOC to implement measures
- **October 19, 2023: End of Two-year window.** Council has selected a preferred recommended rebuilding plan and SOC has implemented the rebuilding plan

Council Snow Crab Rebuilding Alternatives

- During June 2022 Council meeting – Council will select snow crab rebuilding alternatives for analysis
  - Draft Alt 1 - no action; state harvest strategy with no rebuilding plan – violation of MSA to take no action to establish a rebuilding plan
  - Draft Alt 2 – Set target rebuilding time from for the number of years necessary to rebuild the stock of B_{msy} at a probability ≥ 50%
    - Rebuilding would ideally be achieved in less than 10 years (T_{MAX} = 10 years). Fastest rebuilding time (T_{min}), is calculated based on F=0 (no fishing mortality of any kind)

Council Snow Crab Rebuilding Alternatives

- Based on the Council's analytical range in the St. Matthew blue king crab rebuilding plan in 2020, Council might consider:
  - Draft Option 1: No directed fishing until stock is rebuilt
  - Draft Option 2: Allow directed snow crab fishing to open based on state harvest strategy while stock is rebuilding

Council Snow Crab Rebuilding Alternatives

- The Council could also consider other measures in the rebuilding plan to reduce snow crab mortality in the groundfish fisheries
  - Any changes to bycatch measures would require an amendment to the groundfish FMP and would need to be implemented in regulation
  - Council should weigh the additional analytical complexity and required time for Council deliberation of these measures in the rebuilding plan against the conservation benefits to snow crab stock and the risk of not meeting the MSA requirements to implement a rebuilding plan within two years

Thank You

Questions?