Gulf of Alaska Tanner Crab Protections

Discussion Paper, January 12, 2024[1]

1 Introduction

In June 2023, the North Pacific Fishery Management Council (Council) tasked staff to prepare a discussion paper to inform potential Gulf of Alaska (GOA) Tanner crab *Chionoecetes bairdi* protections. This discussion paper should examine catch and bycatch by target groundfish fisheries and gear types during 2019-2023, Tanner and king crab distributions, and options for full monitoring in areas around Kodiak Island. Specifically, the discussion paper should:

- Include information by target fishery and gear type (pelagic trawl, non-pelagic trawl, and pot) in statistical areas 525702 and 525630 from 2019-2023 on:
    - Groundfish harvest, Tanner crab bycatch, and the number and proportion of trips covered by an observer or electronic monitoring.
- Include information on current Tanner and king crab distributions in the Kodiak District and to the extent practicable, the proportion of the surveyed abundance of Kodiak District Tanner and king crab in:
    - Statistical areas 525702 and 525630; the Marmot Bay Tanner Crab Protection Area; the Type I closure areas of Marmot Flats, Alitak Flats, and Towers; the Type II closure areas of Barnabas and Chirikof Island.

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- Include information on options to implement full monitoring requirements in statistical areas 525702 and 525630 through the current partial coverage observer and electronic monitoring programs or pay as you go trawl and pot gear.

2 Background

Several species of crab may be incidentally caught in GOA groundfish fisheries, however, this discussion paper focuses primarily on Tanner crab *C. bairdi*. The following sections provide updated information on the groundfish fisheries and Tanner bycatch in the statistical areas 525630 and 525702. As requested by Council, this discussion paper focuses on non-pelagic trawl (NPT), pot (POT), and pelagic trawl (PTR) gear, from 2019 – 2023, in the two statistical areas.

This discussion paper builds on reviews that have been performed with past papers including the 2017 discussion paper on direct and indirect protections to Tanner crab and Tanner crab habitat in the Central Management Area of the Gulf of Alaska and the 2018 discussion paper evaluating target fisheries and observer coverage in regions around Kodiak Island. Additional background resources include the 2009 discussion paper focused on Chinook Salmon and Tanner Crab bycatch in the Gulf of Alaska.

2.1 Data sources and procedures used in this discussion paper

2.1.1 Data sources and analytical software

Catch, bycatch, and observer data were obtained from the NMFS Alaska Region Catch Accounting System with data compilation from the Alaska Fisheries Information Network.

Abundance estimates for Tanner crab were provided by the Alaska Department of Fish and Game (ADFG) staff from ADFG surveys.

Data for groundfish catch and Tanner crab PSC are inclusive of January 1, 2019 – December 25, 2023. These data exclude Halibut catch data. State Pacific cod fishery data is included.

Data analysis was performed using R statistical software (RStudio 2023.09.1 for Windows) using the tidyverse package (R Core Team 2023; Wickham et al. 2019).

2.1.2 Estimation procedures for bycatch and discards in the Alaska groundfish fisheries

The Alaska Region manages groundfish and prohibited species catch (PSC) under Fishery Management Plans (FMP) for Groundfish in the Bering Sea/Aleutian Islands and for the Gulf of Alaska. The Alaska Region estimates bycatch (henceforth, PSC or bycatch) and discards (non-retained catch) based on data from the North Pacific Groundfish Observer Program, Weekly Production Reports (WPR), and Alaska Department of Fish and Game fish tickets.

2.2 Description of groundfish fishery closure areas that protect GOA crab

The Council has established several areas around Kodiak Island to protect GOA crab species. Tanner crab are considered a prohibited species catch and cannot be retained and should be avoided. Closure area descriptions can be found in the conservation glossy recently compiled by Council staff, and are summarized below (Table 1) (NPFMC 2023).

The Marmot Bay Tanner Crab Protection Area (Table 1, Figure 1) was established by the Council in October 2009 with GOA GF FMP Amendment 89 (79 FR 2794) and established direct protection for vulnerable Tanner crab and their habitat. The area is closed to all fishing with trawl gear, except for pollock fishing with PTR gear. The Marmot Bay Tanner Crab Protection Area is an area of high

abundance of Tanner crab with a high incidence of bycatch in the groundfish trawl fisheries. This allows for a protected area for Tanner crab by closing to year-round trawling, except for pollock fishing with pelagic trawl gear. The closure area aimed to reduce the incidental catch of Tanner crab in GOA groundfish fisheries and to reduce negative impacts of non-pelagic trawl gear on Tanner crab and Tanner crab habitat.

In addition to establishing the Marmot Bay Tanner Crab Protection Area, NMFS issued regulations to implement Amendment 89 (79 FR 2794, 50 CFR Part 679, enacted in January 2014) and revised regulations governing the configuration of modified NPT gear. The rule requires that nonpelagic trawl gear used in the directed flatfish fisheries in the Central Regulatory Area of the GOA be modified to raise portions of the gear off the sea floor (sweeps). The modifications to nonpelagic trawl gear used in these fisheries aimed to reduce the unobserved injury and mortality of Tanner crab, and to reduce the potential adverse impacts of nonpelagic trawl gear on bottom habitat. The rule also made a minor technical revision to the modified nonpelagic trawl gear construction regulations to facilitate gear construction for those vessels required to use modified nonpelagic trawl gear in the GOA and Bering Sea groundfish fisheries.

Several areas have been established near Kodiak Island to protect Red king crab *Paralithodes camtschaticus* populations which also provide direct and indirect protections to Tanner crab. These areas are designated as type I, II, or III areas (Table 1, Figure 1). The Type I closure areas (Marmot Flats, Alitak Flats, and Towers areas, Table 1, Figure 1) were established by the Council in September 1986 to enact trawl restrictions with GOA GF FMP Amendment 15 (52 FR 1283) in April 1987. The area is closed to NPT gear. The closure areas were renewed in June 1989 (GOA GF FMP Amendment 18, 54 FR 50386) and 1992 (GOA GF FMP Amendment 26, 58 FR 503). These areas provide protection to red king crab stocks and indirectly provide protection to Tanner crab. These areas are known to historically have high king crab concentrations and to promote rebuilding of the crab stocks, are closed all year to all trawling, except with pelagic gear. They were established to provide extensive protection for vulnerable crab and their habitats. The closures provide for the conservation of habitat biodiversity and ecosystems and minimize bycatch of red king crab.

The Type II closure areas (Barnabas and Chirikof Island areas) were established through the same amendments as the Type I areas described in the paragraph above (Table 1, Figure 1). The areas are closed to NPT gear from February 15 – June 15. These areas provide protection to red king crab and indirect protection to Tanner crab. These are areas known to historically have king crab concentrations, but lower than in Type I areas. The action established seasonal protection for adult female crab during vulnerable molting period and associated habitats.

Type III closure areas are adjacent to Type I and II areas and have been identified as important juvenile king crab rearing or migratory areas. Type III areas become operational following a determination that a recruitment event has occurred. A recruitment event has been defined as the appearance of female king crab in substantially increased numbers (when the total number of females estimated for a given district equals the number of females established as a threshold criterion for opening that district to commercial crab fishing). When necessary, Type III areas will be closed by regulatory amendment in which the Regional Administrator will specify which of the Type III areas are designated as either Type I or II, depending on information available. Otherwise, Type III areas are open. Although this tool has been created for management of these Type III areas, closures have not been triggered from a lack of recruitment. Adult and juvenile red king crab populations remain low based on trawl surveys in and around the Kodiak trawl closure areas, despite the implementation of these long-term closure areas.

Table 1: Types, gear prohibitions, and names of area closures providing direct (Tanner crab protection area) and indirect (Type I, II, and III) protections for Tanner crab in the Kodiak Island area.

Area Type, Prohibition, and Name	Definition	Conservation Value
Tanner Crab Trawl Closure Area *Prohibition:* All fishing with trawl gear, except for pollock fishing with pelagic trawl gear Marmot Bay Tanner Crab Protection Area (112 nm^2)	Tanner crab area of high abundance with a high incidence of bycatch in the groundfish trawl fisheries. Allows for a protected area for Tanner crab by closing to year-round trawling, except for pollock fishing with pelagic trawl gear.	Established protection for vulnerable Tanner crab and their habitat. Closure area reduced the incidental catch of Tanner crab in GOA groundfish fisheries. Reduction of negative impacts of non-pelagic trawl gear on Tanner crab and Tanner crab habitat.
Type I *Prohibition:* Nonpelagic trawl gear Alitak Flats and Towers (879 nm^2) Marmot Flats Area (280 nm^2)	Areas known to historically have high king crab concentrations. To promote rebuilding of the crab stocks, are closed all year to all trawling, except with pelagic gear.	Established extensive protection for vulnerable crab and their habitats. Closures provide for conservation of habitat biodiversity and ecosystems and minimize bycatch of red king crab.
Type II *Prohibition:* Nonpelagic trawl gear from February 15 – June 15 Chirikof Island Area (528 nm^2) Barnabas Area (82 nm^2)	Areas known to historically have king crab concentrations, but lower than in Type I areas.	Established seasonal protection for adult female crab during vulnerable molting period and associated habitats.
Type III *Prohibition:* May be closed to trawling by NOAA Regional Administrator, otherwise open Outer Marmot Bay Barnabas Horse's Head Chirikof	Areas adjacent to Type I and II that have been identified as important juvenile king crab rearing or migratory areas. These become operational following determination that a recruitment event has occurred.	Can provide additional protections of up to 1,288 nm^2 area across the four regions. To date, these closures have not been triggered from a lack of recruitment.

Sources: GOA Groundfish FMP and the North Pacific Conservation and Spatial Management Areas in Alaska's Exclusive Economic Zone: Area Summaries.

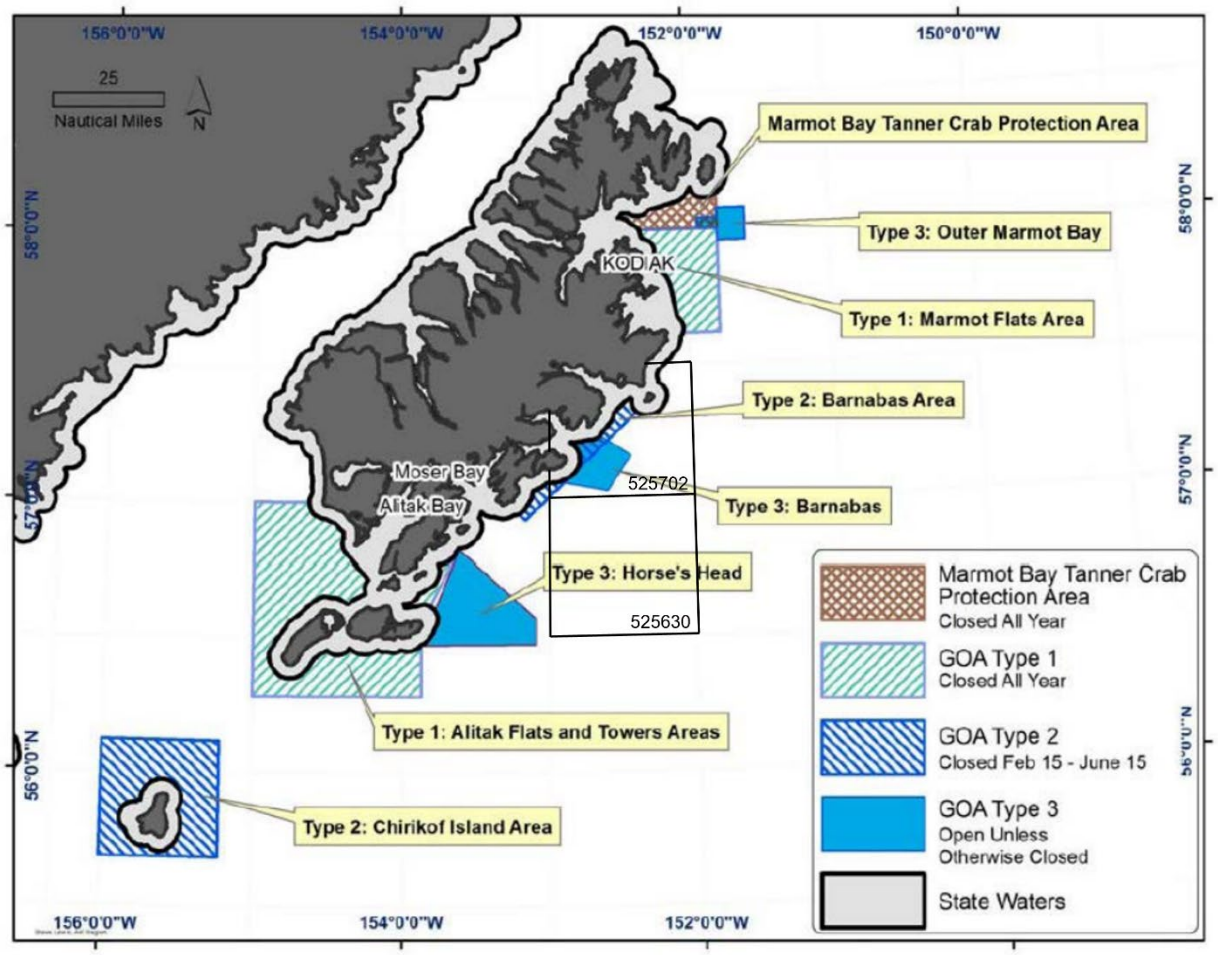

Figure 1: Tanner and King crab closure areas around Kodiak Island and ADF&G statistical areas 525702 and 525630. Sources: GOA Groundfish FMP and ADF&G Statistical Area Chart 8 – Kodiak.

2.3 Tanner crab *C. bairdi* sources of mortality other than directed crab fishery

Sources of mortalities of Tanner crab including discard mortality during events in which Tanner crab are caught as bycatch in either crab or groundfish fisheries, and other ecosystem effects. This discussion paper does not include a comprehensive examination of mortality of Tanner crab, rather will succinctly address some of the common causes.

Discard mortality

Causes of discard mortality may be attributed to handling which may result in physical injury, on-deck anoxia, and/or cold (freezing) temperature stress. As a comparison in Bering Sea fisheries, the 2023 Stock Assessment and Fishery Evaluation (SAFE) report for the Bering Sea Tanner crab fisheries assumes mortality rates of discarded crab are 32% for in both the directed crab fisheries and in the fixed gear groundfish fisheries, and 80% in trawl sector groundfish fisheries. The differences in gear type and handling procedures account for the variation in assumed mortality rates for the fisheries.

Ecosystem effects

Pacific cod *Gadus macrocephalus* are a known predator of benthic Tanner crab (Jewett 1978; Albers & Anderson 1985; Urban & Hart 1999; Yang 2004; Yang et al., 2006; Aydin et al., 2007; Poltev &

Stominok 2008; Urban 2012). In the Eastern Bering Sea and GOA, Tanner crab and Snow crab *C. opilio* have been found to comprise 9% of Pacific cod diets (Aydin et al., 2007). In Marmot Bay in the GOA, Tanner crab were found to comprise 20 – 45% of Pacific cod diets by weight (Urban 2012). Other predators of Tanner crab include Tom cod *Microgadus proximus*, skates, Pacific halibut *Hippoglossus stenolepis*, octopi, and sea otter (Jewett & Feder 1983; Livingston & deReynier 1996; Urban & Hart 1999). Tanner crab are also known to be cannibalistic with larger crab preying upon smaller individuals (Urban & Hart 1999).

Bitter Crab Syndrome, caused by a parasitic dinoflagellate, is a chronic and lethal disease affecting Alaskan crabs, including Tanner crab. Small crab may be infected more frequently with a shorter time until fatality due to the effects of the disease (Meyers et al., 1987; Meyers et al., 1996; Siddeek et al., 2010). Parasitized crabs are lethargic, have an exaggerated red coloration to the carapace, chalky textured meat, and cooked meat has an astringent "bitter" aftertaste (Bishop et al. 2002). Transmission of the parasite has several potential methods of transmission: prevalence in seawater, cannibalism or feeding on detritus or amphipods containing infectious pores, and sexual transmission (Bishop et al. 2002). Black mat syndrome is an additional lethal disease affecting Tanner crab which prevents molting (Sparks 1982; Urban & Hart, 1999). Infestations of egg clutches by the nemertean worm of the genus *Carcinonemertes* can eliminate an entire clutch. Such infestations have been found in the highest prevalence, up to 70%, around Kodiak Island and Cook Inlet (Urban & Hart, 1999).

In the EBS, variation in Tanner crab recruitment has been attributed to environmental factors during the larval period such as ocean current, bottom temperature, and sea surface temperatures (Zheng & Kruse, 2006). Rosenkranz et al. (1998, 2001) found warmer bottom temperatures and warmer sea surface temperatures to have a positive effect on feeding success of Tanner crab larvae, primarily due to increases in prey density. The combined effects of cod biomass and sea surface temperature may alter the productivity and distribution of Tanner crab (Szuwalski et al., 2021).

Tanner crab vulnerability by season

Tanner crab are more vulnerable during molting and mating, occurring between February through mid-May. The time frame of vulnerability differs depending on the size and maturity of the crab (small juveniles molting to larger juveniles may occur earlier than large juveniles molting to maturity), temperature, and location. It is common for ADF&G to see large-scale Tanner crab molting events around Kodiak anytime between February and early May, while mating aggregations often occur towards the end of that time frame in mid-May. The regulatory closure date for the ADF&G Tanner crab pot fishery is in the middle of that time of vulnerability, on March 31. Fisheries occurring in statistical areas 525630 and 525702 in 2019 – 2023 are described in the table below (Table 2). NPT and POT gear are used in each month and PTR gear was used in each month with the exception of December in statistical areas 525630 and 525702 from 2019 – 2023.

Table 2: Fisheries occurring in statistical areas 525630 and 525702 in 2019 – 2023. An "X" indicates the fishery occurred during that month (column).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arrowtooth Flounder	X	X	X	X	X	X		X	X	X	X	
Flathead Sole					X							X
Halibut			X	X	X	X	X	X	X	X	X	
Pacific Cod	X	X	X	X						X	X	X
Pollock	X	X	X	X	X			X	X	X	X	
Rex Sole			X		X							
Rockfish				X	X	X	X	X	X	X	X	
Sablefish			X	X	X	X	X	X	X	X	X	
Shallow Water Flatfish			X	X	X	X	X	X	X	X	X	X

In the GOA and Prince William Sound, seasonal differences have been observed between mating periods for pubescent and multiparous females (Stockhausen 2023, 2023 Tanner SAFE). There, pubescent molting and mating takes place over a protracted period from winter through early summer, whereas multiparous mating occurs over a relatively short period during mid-April to early June (Hilsinger 1976; Munk et al. 1996; Stevens 2000). In the EBS, hatching and extrusion of new clutches in multiparous Tanner crab begins in April and ends approximately mid-June (Stockhausen 2023; Somerton 1981a; Somerton 1981b).

3 Groundfish fisheries

This paper analyzes groundfish fisheries, gear types, and observer coverage in statistical areas 525630 and 525702. Data is also included for the Central GOA which is defined as the Gulf of Alaska waters around Kodiak Island ranging from 147º W longitude to 159º W longitude; from Prince William Sound to the Shumagin Islands. Several target fisheries occur in statistical areas 525630 and 525702, including flatfish (Arrowtooth flounder, Rex sole, Flathead sole, and Shallow water flatfish), Pacific cod, Pollock, Rockfish, and Sablefish. This data also includes state-managed cod harvest in these two statistical areas. Halibut was not considered in this analysis. Gear types include non-pelagic trawl (NPT), pot (POT), and pelagic trawl (PTR). This analysis also examines observer coverage on a "per trip" basis, rather than landings. A trip was identified as a unique report for vessels fishing in statistical areas 525630 or 525702. A trip was flagged as observed if the NMFS Catch Accounting System (CAS) indicated an observer was onboard during the trip.

3.1 Groundfish harvest by target fishery and gear type

Examination of the fisheries by both gear type and fishery can pose limitations due to confidentiality requirements. For this analysis, Arrowtooth flounder and Rex sole have been grouped with Deep water flatfish; Flathead sole and Shallow water flatfish have been grouped as shallow water flatfish. Even with such groupings, some data has been omitted due to confidentiality. Here, the fishery named is indicative of the dominant species (or group of species) for the associated catch. Additional consideration was given to ways in which the most data could be provided. Recent declines in the flatfish fisheries in the region prompted a grouping to compare Pollock and non-Pollock (Arrowtooth flounder, Rex sole, Flathead sole, Shallow water flatfish, Pacific cod, Rockfish, and Sablefish) targets. Seasonal comparisons were performed to overlap with the time and which Tanner crab are most vulnerable and with fishery seasons, thus, two seasons were compared: the early season from 01-January through 31-May and the late season from 01-June through 31-December.

In 2019 – 2023, the Pollock fishery was the predominant fishery in statistical areas 525630 and 525702 with 56% (31,420 mt) of the retained catch for the two statistical areas attributed to Pollock (Table 3, Table 4). The second highest contributor was the deep water flatfish grouping of Arrowtooth flounder and Rex sole with 27% (14,869 mt) of the fishery in these two statistical areas attributed to this grouping. 77% (42,894 mt) of the retained catch was attributed to statistical area 525702 while 23% (12,997 mt) of the retained catch attributed to statistical area 525630, when comparing to the total retained catch for both areas (55,890 mt) (Table 3). When grouping all non-Pollock targets for the two statistical areas of interest, non-Pollock consisted of 44% (24,470 mt) to the total retained catch (55,890 mt) associated with statistical areas 525630 and 525702 (Table 4).

Table 3: Groundfish retained catch for 2019 – 2023 in metric tons for statistical areas 525630, 525702, and Central Gulf of Alaska (CGOA) and the proportions of catch from statistical areas 525630 and 525702 compared to CGOA by fishery and gear type. Note: deep water flatfish combines Arrowtooth flounder and Rex sole, shallow water flatfish combines flathead sole and shallow water flatfish.

	Stat Area 525630 (mt)	Stat Area 525702 (mt)	All CGOA (mt)	Proportion from 525630	Proportion from 525702	Proportion from 525630 and 525702 combined
By Fishery						
Deep water flatfish	6,518	8,351	75,668	0.09	0.11	0.20
Shallow water flatfish	144	6,606	11,673	0.01	0.57	0.58
Pacific Cod	122	132	22,463	0.01	0.01	0.01
Pollock	4,183	27,237	457,360	0.01	0.06	0.07
Rockfish	1,701	202	142,177	0.01	0.00	0.01
Sablefish	329	365	20,901	0.02	0.02	0.03
By Gear Type						
NPT	10,939	20,595	198,791	0.06	0.10	0.16
POT	33	207	39,812	0.00	0.01	0.01
PTR	2,024	22,092	491,638	0.00	0.04	0.05

Table 4: Groundfish retained catch for 2019 – 2023 in metric tons for statistical areas 525630, 525702, and Central Gulf of Alaska (CGOA) and the proportions of catch from statistical areas 525630 and 525702 compared to CGOA for Pollock and non-Pollock targets.

	Stat Area 525630 (mt)	Stat Area 525702 (mt)	All CGOA (mt)	Proportion from 525630	Proportion from 525702	Proportion from 525630 and 525702 combined
Pollock	4,183	27,237	457,360	0.01	0.06	0.07
non-Pollock	8,814	15,656	272,882	0.03	0.06	0.09

NPT contributed the most (56%, 31,533 mt)) to the groundfish catch compared to POT (0.00%, 240 mt) and PTR gear (43%, 24,116 mt) (Table 3, Table 5). In statistical areas 525630 and 525702, 37 unique vessels fished from 2019 – 2023 (Table 5). PTR gear had slightly higher number of unique vessels, however in the statistical areas of interest, cumulative catch was higher with NPT gear. The POT sector had the lowest number of unique vessels of the gear types examined in this analysis (Table 5). Data for the 2023 season is incomplete and only includes landings updated through December 25, 2023.

Table 5: Number of unique vessels and cumulative catch by gear type in statistical areas 525630 and 525702 and CGOA, 2019 – 2023.

	Statistical Areas 525630 and 525702		All CGOA	
	Unique Vessels	Retained Catch (mt)	Unique Vessels	Retained Catch (mt)
NPT	37	31,533	52	198,791
POT	11	240	187	39,812
PTR	39	24,116	63	491,638

Annual examination of groundfish catch in statistical areas 525630 and 525702 from 2019 – 2023 shows Pollock with the highest annual catch of the fisheries for all five years (as of December 25, 2023) (Table 6). Overall, Pollock had the highest groundfish catch (mt) and Pacific cod had the lowest. The non-Pollock grouping of target fishes precipitously declined after 2020 (Table 7). From 2019 – 2020, the average retained catch was 9,521 mt, however, from 2021 – 2023, the annual average retained catch for non-Pollock targets was 1,809 mt (Table 7). Pollock retained catch has also declined in recent years, however not as much as non-Pollock targets with a 2019 – 2020 average of 8,308 mt, largely driven by the 2019 retained catch, and the 2021 – 2023 average of 4,935 mt (Table 7).

Table 6: Groundfish retained catch (in metric tons) caught in target fisheries from 2019 – 2023 in statistical areas 525630 and 525702. Note: deep water flatfish combines Arrowtooth flounder and Rex sole, shallow water flatfish combines flathead sole and shallow water flatfish. Data marked with "*" omitted due to confidentiality.

	2019	2020	2021	2022	2023
Deepwater flatfish	9,028	4,647	165	284	745
Shallow water flatfish	1,496	2,473	*	*	*
Pacific Cod	*	*	*	*	*
Pollock	11,327	5,289	5,481	5,195	4,128
Rockfish	*	*	379	164	213
Sablefish	*	166	220	196	*

Table 7: Groundfish retained catch (in metric tons) caught in Pollock and non-Pollock targets from 2019 – 2023 in statistical areas 525630 and 525702.

	2019	2020	2021	2022	2023
Pollock	11,327	5,289	5,481	5,195	4,128
non-Pollock	11,320	7,722	2,477	1,377	1,573

In statistical areas 525630 and 525702, catch generally increases from January through April, generally declines from end of April through August, and reaches its highest catch in September and October, then declining through the remainder of the year. This trend may fluctuate slightly among years, but September remains the highest on average for the years examined. On average, 90% of the total Pollock retained catch in statistical areas 525630 and 525702 occurs in the late season, from 01-June through 31-December, from 2019 – 2023 (Table 8). Similarly, the non-Pollock retained targets are higher in the late season (61%). For all fisheries (Pollock and non-Pollock), 76% of the retained catch occurs from 01-June – 31-December, on average (Table 8). When comparing the proportion of retained catch associated with either statistical area 525630 or 525702 compared to CGOA, on average 1% of the retained Pollock catch and 9% of the retained non-Pollock targets in the early season are associated with either statistical area

525630 or 525702 (Table 8). In the late season, an average of 17% of the retained Pollock catch and 7% of the retained non-Pollock targets are associated with either statistical area 525630 or 525702, as compared to CGOA (Table 8).

Table 8: Groundfish retained catch from 2019 - 2023 in metric tons for statistical areas 525630 and 525702 (combined), and all of Central Gulf of Alaska (CGOA) and the proportions of catch from statistical areas 525630 and 525702 compared to all CGOA for Pollock and non-Pollock targets.

	2019	2020	2021	2022	2023
January 01 - May 31					
CGOA: Pollock	58,398	47,225	48,578	59,454	66,899
CGOA: non-Pollock	29,965	29,849	17,014	18,478	19,943
Stat Areas: Pollock	79	470	572	518	747
Stat Areas: non-Pollock	7,040	5,280	231	239	630
Proportion Pollock (from stat areas)	*0.00*	*0.01*	*0.01*	*0.01*	*0.01*
Proportion non-Pollock (from stat areas)	*0.23*	*0.18*	*0.01*	*0.01*	*0.03*
June 01 - December 31					
CGOA: Pollock	31,544	35,876	29,610	44,403	35,372
CGOA: non-Pollock	28,241	27,196	34,507	37,737	29,952
Stat Areas: Pollock	11,248	4,819	4,909	4,677	3,381
Stat Areas: non-Pollock	4,281	2,442	2,246	1,138	943
Proportion Pollock (from stat areas)	*0.36*	*0.13*	*0.17*	*0.11*	*0.10*
Proportion non-Pollock (from stat areas)	*0.15*	*0.09*	*0.07*	*0.03*	*0.03*

4 Tanner crab bycatch in groundfish fisheries

Several fisheries occur in statistical areas 525630 and 525702, including flatfish (Arrowtooth flounder, Rex sole, Flathead sole, and Shallow water flatfish), Pacific cod, Pollock, Rockfish, and Sablefish. Tanner crab bycatch varies across gear type, target fishery, and temporally (seasonally and annually). This assessment examines bycatch by target fishery and groupings of targets (as described in the previous section; Pollock and non-Pollock targets), by gear type (NPT, POT, and PTR), and seasonally (as described in the previous section; 01-January through 31-May and 01-June through 31-December) and annually.

In 2019 – 2023 for both seasons, the shallow water flatfish grouping of Flathead Sole and shallow water flatfish contributed to the most to the Tanner crab PSC estimates with 84% attributed to statistical areas 525630 and 525702 as compared to all of CGOA (Table 9). Estimated PSC was 41% for Pollock and 40% for deep water flatfish targets for statistical areas 525630 and 525702 as compared to CGOA as a whole (Table 9). The non-Pollock targets were associated with 44% of the Tanner crab PSC estimates for statistical areas 525630 and 525702 as compared to CGOA as a whole (Table 10).

Total Tanner crab bycatch (in number caught) in the groundfish catch in statistical areas 525630 and 525702 was highest in with NPT gear and lowest with POT gear (Table 9). NPT (46%; 411,312 estimated Tanner crab) contributed the most to Tanner crab PSC estimates compared to POT (0.00%; 65 estimated Tanner crab) and PTR (22%; 762 estimated Tanner crab) gear (Table 9).

Table 9: Tanner crab PSC estimates (estimated number of crab caught as bycatch) for 2019 – 2023 in number of crab for statistical areas 525630, 525702, and all of Central Gulf of Alaska (CGOA) and the proportions of catch from statistical areas 525630 and 525702 compared to all CGOA by fishery and gear type. Note: deep water flatfish combines Arrowtooth flounder and Rex sole, shallow water flatfish combines flathead sole and shallow water flatfish.

	Stat Area 525630	Stat Area 525702	All CGOA	Proportion from 525630	Proportion from 525702	Proportion from 525630 and 525702 combined
By Fishery						
Deepwater flatfish	118,301	174,887	725,083	0.16	0.24	0.40
Shallow water flatfish	2,638	84,778	103,566	0.03	0.82	0.84
Pacific Cod	144	65	34,261	0.00	0.00	0.01
Pollock	4,708	21,514	64,680	0.07	0.33	0.41
Rockfish	448	922	4,310	0.10	0.21	0.32
Sablefish	2,137	1,524	5,782	0.37	0.26	0.63
By Gear Type						
NPT	128,342	282,970	899,607	0.14	0.31	0.46
POT	0	65	34,554	0.00	0.00	0.00
PTR	107	655	3,520	0.03	0.19	0.22

Table 10: Tanner crab PSC estimates (estimated number caught) for 2019 – 2023 in number of crab for statistical areas 525630, 525702, and all of Central Gulf of Alaska (CGOA) and the proportions of catch from statistical areas 525630 and 525702 compared to all CGOA by fishery and gear type.

	Stat Area 525630	Stat Area 525702	All CGOA	Proportion from 525630	Proportion from 525702	Proportion from 525630 and 525702 combined
Pollock	4,780	21,514	64,680	0.07	0.33	0.41
non-Pollock	123,669	262,177	873,001	0.14	0.30	0.44

When examining the data annually for statistical areas 525630 and 525702 combined, the deep water flatfish grouping of Arrowtooth flounder and Rex sole generally has the highest Tanner crab PSC in total numbers caught, followed by the shallow water flatfish grouping, Pollock, and Sablefish (Table 11). For the non-Pollock targets, PSC estimates have declined since the highest levels in 2019 and 2020 (Table 12), which is associated with decreased catch for the non-Pollock fishery targets (Table 7).

Table 11: Tanner crab bycatch estimates (in number caught) in the Groundfish harvest by target fishery in statistical areas 525625 and 525702, from 2019 – 2023. Note that data is inclusive of Jan. 1, 2019 – Sep. 30, 2023. Omitted data due to confidentiality is indicated with "*". Blanks are representative of no data points for that fishery/year combination.

	2019	2020	2021	2022	2023
Deepwater flatfish	71,535	215,794	1,962	312	3,585
Shallow water flatfish	*	35,365	*	*	*
Pacific Cod		*	*	*	*
Pollock	16,905	7,715	1,050	155	468
Rockfish	*	*	372	*	*
Sablefish	*	1,622	1,114	*	*

Table 12: Tanner crab bycatch estimates (in estimated number caught) in the Groundfish harvest by Pollock and non-Pollock targets in statistical areas 525625 and 525702, from 2019 – 2023.

	2019	2020	2021	2022	2023
Pollock	16,905	7,715	1,051	155	468
non-Pollock	116,893	253,369	8,121	3,267	4,195

The average Tanner crab bycatch rate (number of crab per metric ton of catch) was analyzed by the targeted fishery for 2019 – 2023. The Arrowtooth flounder, shallow water flatfish, Rex sole, and Sablefish fisheries were found to have the highest estimated rates of Tanner crab bycatch (Table 13). When grouping Pollock and non-Pollock targets from 2019 – 2023, the non-Pollock grouping had the highest average estimated bycatch rates in statistical areas 525630 and 525702 (Table 14).

Table 13: Average Tanner crab bycatch rate (number of crab per metric ton of catch) by fishery in statistical areas 525630 and 525702 from 2019 – 2023. Omitted data due to confidentiality indicated with "*". Blanks indicate no data for that combination.

	2019	2020	2021	2022	2023
Arrowtooth Flounder	*	34.64	*	*	5.89
Flathead Sole	*		*		
Pacific Cod		*	0.63	0.00	*
Pollock	1.76	1.28	0.23	0.14	0.32
Rex Sole - GOA	*	*		*	
Rockfish	0.00	2.01	0.97	0.49	*
Sablefish	*	4.36	*	14.74	*
Shallow Water Flatfish	14.83	7.07	*	*	*

Table 14: Average Tanner crab bycatch rate (estimated number of crab per metric ton of catch) by Pollock and non-Pollock targets in the groundfish fishery in statistical areas 525630 and 525702 from 2019 – 2023.

	2019	2020	2021	2022	2023
Pollock	1.76	1.28	0.23	0.14	0.32
non-Pollock	7.01	23.04	1.33	5.77	3.01

The average Tanner crab bycatch rate (number of crab per metric ton of catch) was also analyzed by gear type (NPT, POT, PTR) for 2019 – 2023. The bycatch rate was consistently highest with NPT gear in statistical areas 525630 and 525702 (Table 15). This is likely due to the behavior and gear design of NPT gear and increased likelihood of coming into contact with Tanner crab and overlap in spatial areas.

Table 15: Average Tanner crab bycatch rate (estimated number of crab per metric ton of groundfish) in groundfish catch by gear type in statistical areas 525630 and 5235702 from 2019 – 2023. Omitted data due to confidentiality indicated with "*". Blanks indicate no data for that combination.

	2019	2020	2021	2022	2023
NPT	6.84	19.32	0.81	3.69	1.74
POT		*	*	*	*
PTR	0.01	0.82	0.06	0.23	0.30

4.1 Timing of bycatch in Federal groundfish fisheries

Estimated bycatch amounts of Tanner crab *C. bairdi* taken in the groundfish fisheries likely fluctuates temporally in direct response to interactions with the fisheries and groundfish catches (Table 16, Table 17, Figure 2). Average estimated bycatch of Tanner crab from 2019 – 2023 (in estimated number of crab) varied temporally, in statistical areas 525630 and 525702 (Table 16). Generally, estimated bycatch has decreased from 2019 through 2023. The highest estimated bycatch occurred in the early season of 2020, associated with the non-Pollock targets. On average, bycatch estimates are highest in February through April and September through October, though there is some temporal fluctuation with 2019 and 2020 generally having higher bycatch (Figure 2). Due to confidentiality, the analysis is limited on what can be analyzed on a monthly basis and an examination by target fishery was incomplete and therefore, not included in this paper.

Table 16: Seasonal Tanner crab estimated bycatch (in number of crab) in the groundfish fisheries by Pollock and non-Pollock targets in statistical areas 525630 and 525702 and CGOA, from 2019 – 2023.

	2019	2020	2021	2022	2023
January 01 - May 31					
Statistical Areas: Pollock	0	828	6	116	334
Statistical Areas: non-Pollock	39,936	233,753	65	632	290
CGOA: Pollock	23	1,552	76	503	936
CGOA: non-Pollock	99,844	576,237	8,222	6,586	7,410
June 01 - December 31					
Statistical Areas: Pollock	16,905	6,887	1,044	39	134
Statistical Areas: non-Pollock	76,957	19,615	8,056	2,635	3,905
CGOA: Pollock	41,864	17,452	1,715	241	318
CGOA: non-Pollock	114,869	27,816	16,195	4,904	10,919

Estimated bycatch rates also fluctuate temporally and seasonally. The highest estimated rate occurred in the early season of 2020 (Table 17). Excluding the highest value (early season, 2020), estimated bycatch rates are typically higher in the later season than in the early, which is likely associated with higher retained catch during this time (Table 17).

Table 17: Seasonal average Tanner crab estimated bycatch rate (number of crab per metric ton of groundfish catch) in the groundfish fisheries in statistical areas 525630 and 525702 from 2019 – 2023.

	2019	2020	2021	2022	2023
January 01 - May 31	4.45	28.91	0.06	0.80	0.57
June 01 - December 31	4.76	2.34	0.94	3.56	1.70

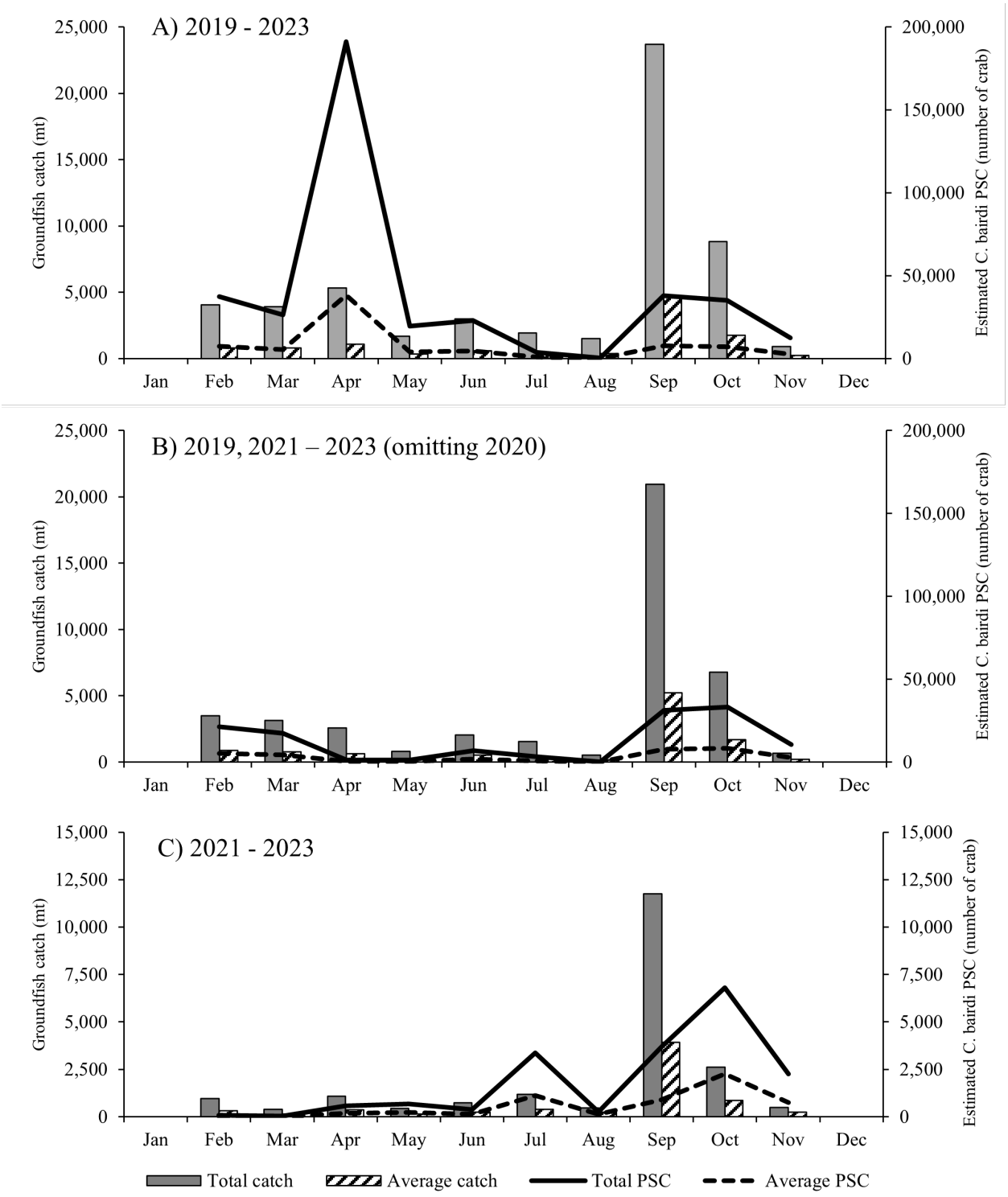

Figure 2: **Total and average monthly retained Groundfish catch and estimated *C. bairdi* bycatch (PSC, in number of crab) in statistical areas 525630 and 525702 from A) 2019 – 2023; B) 2019, 2021 – 2023 (omitting 2020); C) 2021 – 2023. Note that data for January and December has been omitted for confidentiality compliance.**

5 Observer coverage

In statistical areas 525630 and 525702, the following includes a description of trips that were being observed or had EM operating for a trip. This does not equate to the landing being observed, only that the trip was being observed or EM usage. There is no general trend in observer coverage in statistical areas 525630 and 525702, across all sectors. The Trawl CP sector has 100% observer coverage for all years analyzed. Observer coverage in the Trawl CV sector generally does not show a trend over the years examined, and the POT CV sector also did not show a general trend (Table 18). It is important to note that the trawl CP sector and vessels participating in the Rockfish program require 100% observer coverage.

Table 18: Sum of trips, observed trips, trips with EM, and the proportion of trips observed (with either an observer on board or through EM) as compared to the total trips in statistical areas 525630 and 525702, by sector, from 2019 – 2023.

	2019	2020	2021	2022	2023	Average 2019 - 2023
Trawl CV (NPT & PTR)						
Total trips	291	197	126	102	92	162
Total observed trips	86	39	32	29	30	43
Total trips with EM	0	0	0	0	0	0
Total trips with TEM	0	0	12	27	2	8
Proportion observed	0.30	0.20	0.35	0.55	0.35	0.35
Trawl CP (NPT & PTR)						
Total trips	16	16	17	9	4	12
Total observed trips	16	16	17	9	4	12
Total trips with EM	0	0	0	0	0	0
Total trips with TEM	0	0	0	0	0	0
Proportion observed	1.00	1.00	1.00	1.00	1.00	1.00
POT CV						
Total trips	34	20	49	45	56	41
Total observed trips	1	2	3	2	4	2
Total trips with EM	11	6	19	14	16	13
Total trips with TEM	0	0	0	0	0	0
Proportion observed	0.35	0.40	0.45	0.36	0.36	0.38

6 Tanner and king crab distributions

An annual trawl survey is conducted in the Kodiak District by ADF&G to assess Tanner crab populations. The survey uses a fixed-grid design established in 1988 to provide area-swept abundance estimates. Sampling is concentrated in area of historical Tanner crab habitat (Figure 3). Mature male, mature female, and legal male abundance estimated from the survey is directly used to determine fishery openings and harvest levels in each section.

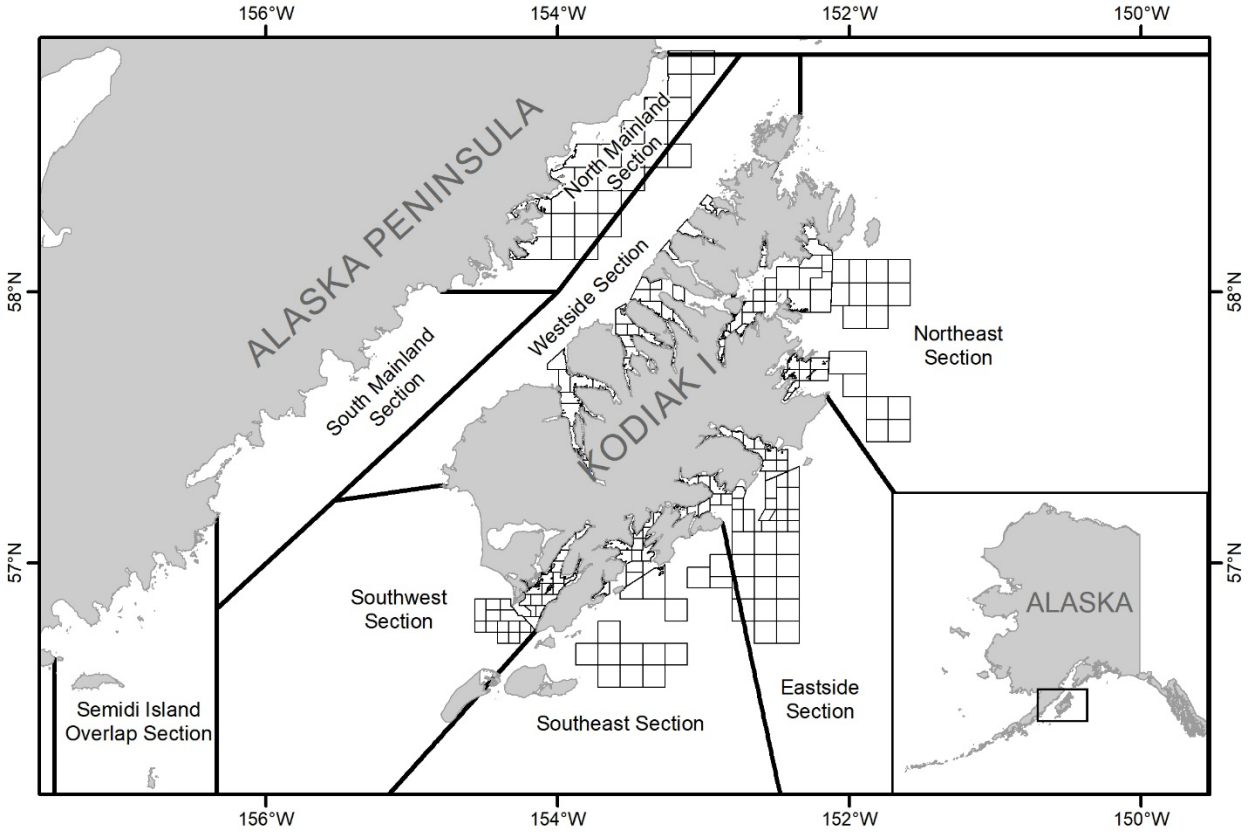

Figure 3: ADF&G trawl survey stations for Tanner crab abundance and fishery management sections around Kodiak Island.

Tanner crab abundance estimates in the Kodiak District for 2013–2023, based on the ADF&G surveys, are provided in Table 19, and illustrated in Figure 4. Survey results for the previous 10 years indicate a population with swings in overall abundance driven by large juvenile recruitment events in 2013 and 2018 followed by years of high mature crab abundance. Generally, mature female crab abundance peaked 2 years prior to mature male crab abundance. Across the Kodiak District during the most recent 11 years, the majority of Tanner crab have been found in the Eastside, Southeast, and Southwest Sections.

Additional information from the 2022 Kodiak District large-mesh bottom trawl survey is included in Figure 5 and can be found in the associated ADF&G report, which indicates the number of Tanner crab per kilometer towed in the Kodiak region. In the 2022 ADF&G survey, the highest CPUE was at station 486A in Upper Barnabas Gully within the Eastside Section (Figure 5, Spalinger and Silva 2023).

Table 19: Tanner crab abundance estimates from the ADF&G trawl survey around Kodiak Island, 2013 – 2023.

	Tanner crab abundance estimates					
Survey Year	All Tanner crab	Legal males	Mature males	Juvenile males	Mature females	Juvenile females
2013	200,210,816	1,788,323	4,324,158	97,798,329	3,235,667	94,852,661
2014	111,154,842	1,964,966	4,863,526	53,841,694	10,573,683	41,875,938
2015	39,524,572	825,019	3,191,561	20,688,072	7,738,562	7,906,379
2016	57,754,615	975,541	9,034,045	22,735,508	14,345,588	11,537,355
2017	72,128,283	2,214,334	8,892,965	31,087,381	7,886,767	24,261,166
2018	261,061,723	3,222,486	10,611,595	128,528,042	15,773,702	106,148,383
2019	223,690,705	1,125,123	9,667,901	112,624,291	38,748,568	62,649,947
2020	108,068,971	1,093,020	14,389,799	47,715,365	38,963,207	7,000,604
2021	77,697,172	3,282,526	33,460,860	21,392,426	19,537,295	3,306,590
2022	80,014,326	15,245,232	40,452,169	11,085,677	21,436,042	7,040,435
2023	121,791,771	7,056,385	16,407,693	48,423,366	8,407,165	48,553,546

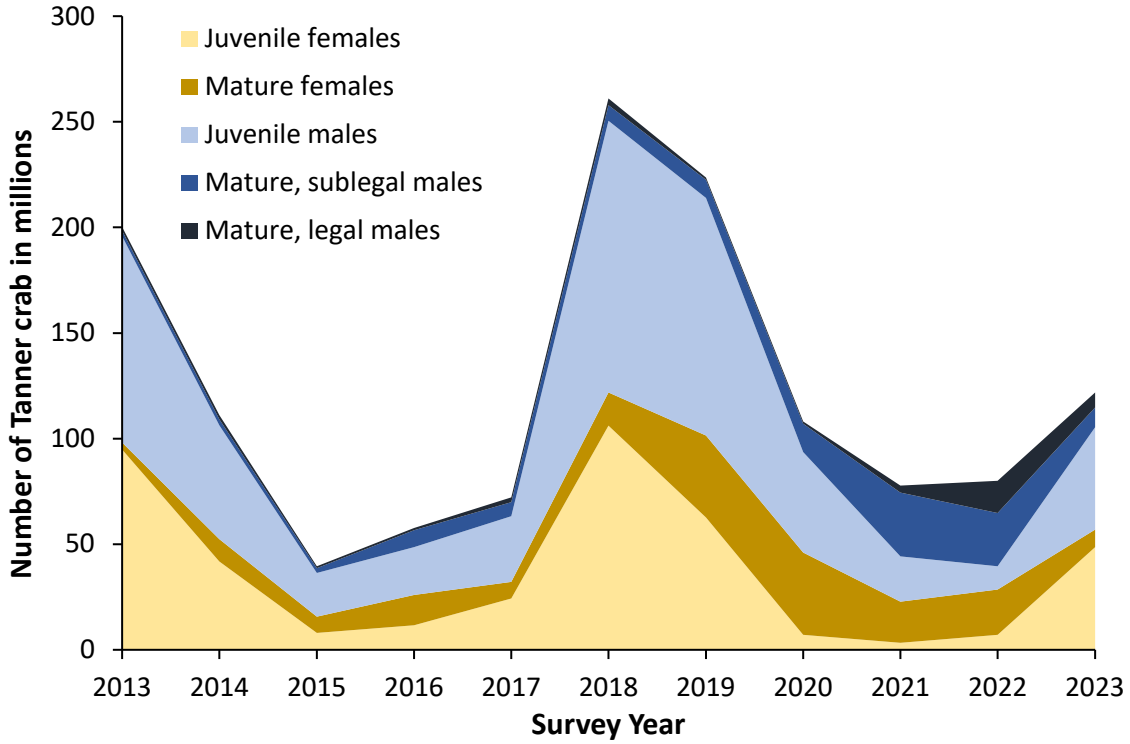

Figure 4: Tanner crab abundance estimates for Kodiak District, from the ADF&G trawl survey.

6.1 Statistical areas 525702 and 525630

Statistical areas 525702 and 525630 are within Federal waters of the Eastside and Southeast Sections of the Kodiak District Tanner crab management area (Figure 5). From 2013–2023 an average of 49% of all mature female Tanner crab, 47% of all mature male Tanner crab, and 41% of all legal male Tanner crab abundance in the Kodiak District was estimated from these two statistical areas (Table 20). Roughly 30% of total mature Tanner crab abundance was estimated in the single federal waters statistical area 525702.

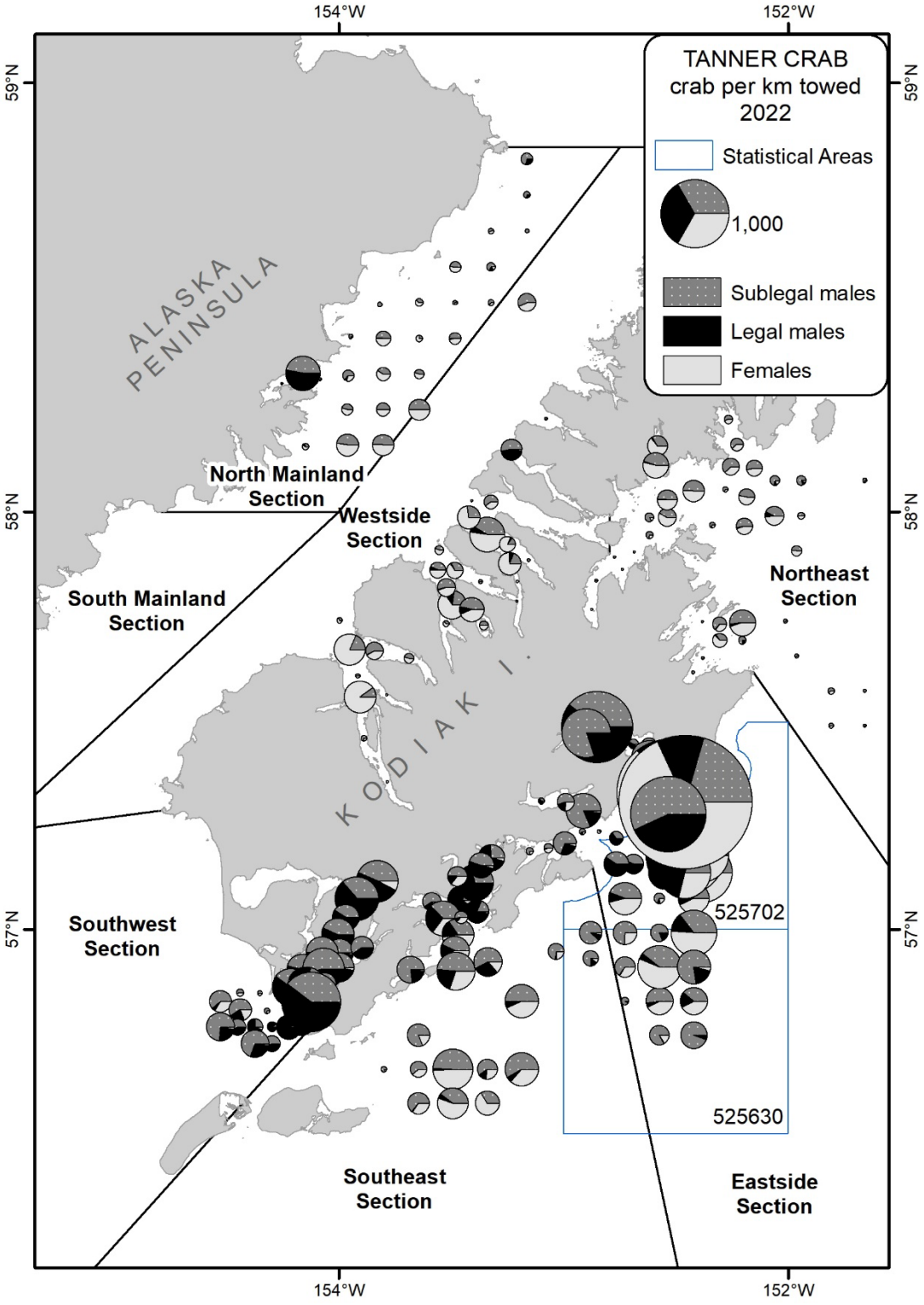

Figure 5: **Number of Tanner crab per kilometer towed in the 2022 Kodiak District large-mesh bottom trawl survey. Note: Statistical areas 525630 and 525702 are outlined in blue. Detailed information can be found in the Large-mesh bottom trawl survey of crab and groundfish report (Spalinger and Silva 2023, https://www.adfg.alaska.gov/FedAidPDFs/FMR23-07.pdf).**

Table 20: Average Tanner crab abundance estimates from the ADF&G trawl surveys (2013 – 2023) in statistical areas 525630, 525702, the Marmot Bay Tanner crab protection area, Type I closure areas, and Type II closure areas around Kodiak Island by sex and maturity.

	All Tanner crab		Legal males		Mature males		Juvenile males		Mature females		Juvenile females	
	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total
525702 (federal)	16,712,638	14%	1,033,856	29%	4,006,701	28%	4,732,394	9%	5,493,650	32%	2,479,897	7%
525630 (federal)	14,900,597	12%	416,664	12%	2,561,926	18%	5,699,205	11%	2,754,495	16%	3,884,976	10%
Marmot Bay Tanner Crab Protection Area	5,423,733	4%	9,771	0.3%	127,000	1%	2,446,057	5%	796,073	5%	2,054,604	5%
-*Federal waters portion*	1,146,607	1%	5,562	0.2%	41,585	0.3%	518,335	1%	91,753	1%	494,934	1%
Type I closures												
Marmot Flats	3,562,302	3%	15,153	0.4%	123,937	1%	1,663,109	3%	456,394	3%	1,318,863	3%
-*Federal waters portion*	1,949,593	2%	9,504	0.3%	61,464	0.4%	838,448	2%	268,827	2%	780,855	2%
Alitak Flats/Towers	15,671,030	13%	560,694	16%	1,642,776	12%	7,551,616	14%	920,455	5%	5,556,183	15%
-*Federal waters portion*	4,701,544	4%	90,770	3%	329,191	2%	2,140,838	4%	217,518	1%	2,013,998	5%
Type II closure												
Barnabas Area	36,289,210	30%	1,146,124	32%	4,071,648	29%	16,882,831	31%	4,285,222	25%	11,049,509	29%
-*Federal waters portion*	7,737,696	6%	479,950	14%	1,768,563	13%	2,466,515	5%	2,314,160	14%	1,188,459	3%
Kodiak District 2013–2023 Average	123,008,891		3,526,632		14,117,843		54,174,559		16,967,841		37,739,364	

6.2 Marmot Bay Tanner Crab Protection Area

The Marmot Bay Tanner Crab Protection Area covers both State and Federal waters of the Northeast Section. Average Tanner crab abundance from 2013 to 2023 in Federal waters of the crab protection area is estimated at only 1% of the Kodiak District total abundance.

6.3 Type I Closure Areas

Marmot Flats

Similar to the Marmot Bay Tanner Crab Protection Area, the Marmot Flats Type I closure area covers both State and Federal waters of the Northeast Section. Average abundance in Federal waters of this closure area is estimated at only 2% of the total Kodiak District Tanner crab abundance. The estimated abundance of mature male Tanner crab in the Northeast Section has been at below average levels since 2009 and the number of legal males is currently at a survey low.

Alitak Flats and Towers

The Alitak Flats and Towers Type I closure area covers both State and Federal waters of the Southwest and Southeast Sections. Most of the Tanner crab abundance in this closure area is estimated from State waters, with only 4% of the 2013–2023 average abundance from the Federal waters portion.

The 2013–2023 average red king crab abundance in the Alitak Flats closure area made up 94% of the total Kodiak red king crab abundance.

6.4 Type II Closure Areas

Barnabas and Chirikof Island

The Barnabas Type II closure area covers both State and Federal waters of the Eastside and Southeast Section of the Kodiak District. State waters are closed year-round to nonpelagic trawl gear, while Federal waters of the closure area are closed seasonally. The Federal portion of this area is mostly contained within statistical area 525702 and accounts for approximately 14% of all mature female Tanner crab, 13% of all mature male Tanner crab, and 14% of all legal male Tanner crab estimated in the Kodiak District.

The Chirikof Island Type II closure area was not surveyed during 2013–2023 so precise estimates of Tanner crab abundance cannot be made. Based on surveys conducted in the early 2000s abundance is assumed to be low.

6.5 Additional information

Additional resources can be found in the table below and on the Alaska Department of Fish and Game website for abundance information, survey reports, management plans, and management reports.

Table 21: Additional resources available through the Alaska Department of Fish and Game website.

Document title and link
Large-Mesh Bottom Trawl Survey of Crab and Groundfish: Kodiak, Chignik, South Peninsula, and Eastern Aleutian Management Districts, 2022. (Spalinger and Silva 2023). https://www.adfg.alaska.gov/FedAidPDFs/FMR23-07.pdf
Fishery Management Plan for the Kodiak District Commercial Tanner Crab Fishery, 2024. (Whiteside 2023). https://www.adfg.alaska.gov/FedAidPDFs/RIR.4K.2023.09.pdf
Fishery Management Plan for the Kodiak District Commercial Tanner Crab Fishery, 2023 (Nichols 2022). https://www.adfg.alaska.gov/FedAidPDFs/RIR.4K.2022.12.pdf
Fishery Management Plan for the Kodiak District Commercial Tanner Crab Fishery, 2022 (Whiteside and Bevaart 2021). https://www.adfg.alaska.gov/FedAidPDFs/RIR.4K.2021.11.pdf
Fishery Management Plan for the Kodiak District Commercial Tanner Crab Fishery, 2020 (Richardson 2019). https://www.adfg.alaska.gov/FedAidPDFs/FMR19-26.pdf
Fishery Management Plan for the Kodiak District Commercial Tanner Crab Fishery, 2019 (Richardson and Nichols 2018). https://www.adfg.alaska.gov/FedAidPDFs/FMR18-31.pdf
Annual Management Report for Shellfish Fisheries in the Kodiak, Chignik, and South Peninsula Districts, 2022 (Whiteside and Looman 2023). https://www.adfg.alaska.gov/FedAidPDFs/FMR23-17.pdf
Annual Management Report for Shellfish Fisheries in the Kodiak, Chignik, and South Peninsula Districts, 2021 (Bevaart 2022). https://www.adfg.alaska.gov/FedAidPDFs/FMR22-18.pdf
Annual Management Report for Shellfish Fisheries in the Kodiak, Chignik, and South Peninsula Districts, 2020 (Bevaart and Phillips 2021). https://www.adfg.alaska.gov/FedAidPDFs/FMR21-29.pdf
Annual Management Report for Shellfish Fisheries in the Kodiak, Chignik, and South Peninsula Districts, 2019 (Richardson et al. 2020). https://www.adfg.alaska.gov/FedAidPDFs/FMR20-22.pdf
Updated Tanner Crab Harvest Strategies for Kodiak, Chignik, and South Peninsula Districts: A Report to the Alaska Board of Fisheries (Spalinger et al. 2021). https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2021-2022/state/rir_4k_2021_13.pdf
Historical Abundances of Tanner Crab *Chionoecetes bairdi* for Kodiak, Chignik, South Peninsula, and Eastern Aleutian Districts from Standardized LargeMesh Trawl Surveys, 1988–2021 (Spalinger and Knutson 2022). https://www.adfg.alaska.gov/FedAidPDFs/RIR.4K.2022.08.pdf

7 Options for implementation of full monitoring requirements

7.1 Background

Enhanced observer coverage requirements were initially explored as part of the 2017 discussion paper as options prior to Amendment 89. In 2010, the Council recommended 100% NPT observer coverage and 30% POT coverage in statistical areas 525630 and 525702 and Chiniak Gully near Kodiak, AK.

All vessels and processors that participate in federally managed or parallel groundfish and halibut fisheries off Alaska (except catcher vessels delivering unsorted codends to a mothership) are assigned to one of two categories: 1) the full observer coverage category (full coverage), or 2) the partial observer coverage category (partial coverage). Vessels and processors in the full coverage category have at least one observer present during all fishing or processing activity. Vessels and processors in the partial coverage category are assigned observer or EM coverage according to the scientific sampling plan described in the Annual Deployment Plan (ADP) developed by NMFS in consultation with the Council. Since 2013, observers have been deployed in the partial coverage category using established random sampling methods to collect data on a statistically reliable sample of fishing trips in the partial coverage category. Some vessels and processors may be in full coverage for some trips and partial coverage for other trips, depending on the observer coverage requirements for specific fisheries (2022 Observer Program Annual Report).

Observer coverage in the full coverage category is industry-funded through a pay-as-you-go system whereby fishing vessels procure observer services through NMFS-permitted observer service providers. Observer coverage in the partial coverage category is funded through a system of fees collected under authority of Section 313 of the Magnuson-Stevens Act. The fee is based on the ex-vessel value of groundfish and Pacific halibut and is assessed on landings by vessels not included in the full coverage category. The system of fees fairly and equitably distributes the cost of observer coverage among all vessels and processors in the partial coverage category and is independent of the level of coverage each vessel incurs under the Annual Deployment Plan (2022 Observer Program Annual Report).

The current structure of the Observer Program, including the definition of full and partial coverage, random deployment methods, and the fee system has been in place since 2013 when the Observer Program was restructured and changes were implemented under Amendment 86 to the Fishery Management Plan (FMP) for Groundfish of the BSAI Management Area and Amendment 76 to the FMP for Groundfish of the GOA (Amendments 86/76)2. Since 2013, a series of regulatory and Fishery Management Plan (FMP) amendments have been implemented to amend the Council's fisheries research plan and make specific modifications to observer coverage requirements under the Observer Program, which can be found in the 2022 Observer Program Annual Report.

Full Coverage Observer Program Description

Vessels and processors in the full observer coverage category must comply with observer coverage requirements at all times when fish are harvested or processed. Specific requirements are defined in regulation at 50 CFR § 679.51(a) (2). The full coverage category includes the following: Catcher/processors (with limited exceptions); Motherships; Catcher vessels that are participating in programs that have transferable prohibited species catch (PSC) allocations as part of a catch share program; Catcher vessels that are using trawl gear and have requested placement in the full coverage category for all fishing activity in the BSAI for one year; and Inshore processors receiving or processing Bering Sea pollock.

Independent estimates of catch, at-sea discards, and PSC -- among other data -- are collected aboard all catcher/processors and motherships in the full observer coverage category. Requiring at least one observer

on every catcher/processor means that at-sea discards and PSC estimates are not based on self-reported data or extrapolated observer data from other vessels. Catcher vessels participating in programs with transferable PSC allocations as part of a catch share program also are included in the full coverage category. These programs include Bering Sea pollock (both American Fisheries Act and CDQ programs), the groundfish CDQ fisheries (CDQ fisheries other than Pacific halibut and fixed gear sablefish; only vessels greater than 46 ft LOA), and the Central GOA Rockfish Program.

Independent observer data are important under these catch share programs because quota share recipients are prohibited from exceeding any allocation, including, in many cases, transferable PSC allocations. Allocations of exclusive harvest privileges can create increased incentive to misreport as compared to open-access or limited-access fisheries. Transferable PSC allocations also present challenges for accurate accounting because these species are not retained for sale and they represent a potentially costly limitation on the full harvest of the target species. To enforce a prohibition against exceeding a transferable target species or PSC allocation, NMFS must demonstrate that the quota holder had catch amounts that exceeded the allocation. Supporting a quota overage case for target species or PSC that could be discarded at sea from an unobserved vessel requires NMFS to rely on either industry reports or estimated catch based on discard rates from other similar observed vessels. These indirect data sources create additional challenges to NMFS in an enforcement action. In addition, the smaller the pool from which to draw similar observed vessels and trips, the more difficult it is to construct representative at-sea discard and PSC rates for individual unobserved vessels.

Inshore processors receiving deliveries of Bering Sea pollock are in the full coverage category because of the need to monitor and count salmon under transferable PSC allocations.

Partial Coverage Observer Program Description

The partial coverage category (50 CFR 679.51(a)) in the Pacific halibut and groundfish fisheries off Alaska includes the following: Catcher vessels designated on a Federal Fisheries Permit when directed fishing for groundfish in federally managed or parallel fisheries, except those in the full coverage category; Catcher vessels when fishing for halibut individual fishing quota (IFQ) or sablefish IFQ (there are no PSC limits for these fisheries); Catcher vessels when fishing for halibut CDQ, fixed-gear sablefish CDQ, or groundfish CDQ using pot or jig gear; or catcher vessels less than or equal to 46 ft LOA using hook-and-line gear fishing for groundfish; Catcher/processors that meet criteria that allows assignment to the partial coverage category; Shoreside or stationary floating processors, except those in the full coverage category.

Annual Deployment Plan and Reporting

Each year, NMFS prepares an Annual Deployment Plan (ADP) that describes the science-driven method for deployment of observers and EM systems to support statistically reliable data collection in the partial coverage category.

Amendments 86/76 established an annual process of 1) developing an Annual Deployment Plan (ADP) that describes plans and goals for observer and EM systems deployment in the partial coverage category in the upcoming year, and 2) preparing an annual report providing information and evaluating performance in the prior year.

The ADP describes how observer coverage and EM systems will be assigned to vessels and processors in the partial observer coverage category in the upcoming year. NMFS develops each ADP in consultation with the Council after reviewing an evaluation of deployment performance for the previous year. NMFS and the Council created the ADP process to provide flexibility in the deployment of observers and EM to gather reliable data for estimation of catch in the groundfish and halibut fisheries off Alaska. The ADP

process ensures that the best available information is used to evaluate deployment, including scientific review and Council input, to annually determine deployment methods.

The Kodiak Field Office provides support to observers primarily assigned to vessels in the GOA. Support includes conducting pre-cruise briefings with vessel representatives and observers prior to the observer's first trip onboard, conducting mid-cruise debriefings with observers to address any safety concerns on their vessels, reviewing their data collection methodology and recorded data, providing in situ problem resolution, and issuing sampling and safety equipment. In addition, staff receive, track, and ship biological samples that are collected by observers in support of resource management, scientific research, and observer training. Staff also serve as the primary FMA contact for observed vessels and processing facilities in the GOA and therefore played a key role in coordinating on the GOA portion of the pelagic trawl EM exempted fishing permit beginning in 2020 and continuing through 2022.

Costs of Coverage

The costs associated with the full coverage category are paid by the commercial fishing industry directly to permitted observer providers. This cost structure is sometimes referred to as "pay as you go." The services carried out by observer providers include paying observers, deploying observers to vessels and shoreside processors, recruiting, training, and debriefing. There are currently three active certified full-coverage providers in Alaska: Alaskan Observers Inc. (AOI); Saltwater, Inc. (SWI); and AIS, Inc.

Since 2011, certified observer providers have been required to submit to NMFS copies of all their invoices for observer coverage. The regulations require the submission of the following: vessel or processor name; dates of observer coverage; information about any dates billed that are not observer coverage days; rate charged for observer coverage in dollars per day (the daily rate); total amount charged (number of days multiplied by daily rate); the amount charged for air transportation; and the amount charged for any other observer expenses with each cost category separated and identified. The average "fully-loaded" cost per day of observer coverage in the full coverage category in 2022 was $395. This average combines invoiced amounts for the daily rate per observer day (variable cost) plus all other costs for transportation and other expenses (fixed costs).

NMFS implemented EM for the purposes of catch estimation on fixed gear vessels. EM costs are dependent on the number of vessels participating in the EM program, the number of systems that need to be purchased and/or replaced on an annual or recurrent basis, deployment rates, field support services, video review, and other factors. The preliminary cost of the fixed-gear EM program to NMFS in 2022 is: $896,635.

The preliminary cost to NMFS includes $883,234 for ongoing costs (EM Service Provider Fees and Overhead; Equipment Maintenance and Upkeep; Data Transmission; Data Review and Storage) and $13,401 for one-time costs (Equipment Purchases and Installation).

7.2 Options for implementation of expanded observer coverage in statistical areas 525630 and 525702

Currently, only the pelagic catcher vessel pollock fishery has the option to operate with EM cameras in continuous operation while fishing and all footage is reviewed for those vessels that participate in the EM program. Vessels are able to opt into the EM program under the current Exempted Fishing Permit (EFP) program and NMFS is on schedule to implement a regulatory trawl EM in 2025. The POT gear sector operates with cameras on only when selected for monitoring under existing regulations.

Implementation of full monitoring requirements in statistical areas 525630 and 525702 through the current partial coverage observer and EM programs or a pay as you go structure would be very complex within the current structure both in implementation and enforcement.

Full coverage, such as with Rockfish, would be the least complex and most feasible, however has potential to alter fishing behavior due to the requirement to obtain an observer. Vessel operators would need to pre-determine whether they would be fishing in the select statistical areas. The operator would be responsible for getting an observer – and paying for that observer coverage – through the current observer program for any trip in which they planned on fishing within statistical area 525630 or 525702.

Currently, the observer coverage has not been assigned based on a spatial scale, but this could be feasible; however, would likely entail a degree of complexity. As with the full-coverage model, vessel operators would need to pre-determine whether they would be fishing in the select statistical areas in order to be guaranteed an observer. However, since the operator would not have a financial penalty if they changed course and decided not to fish in either statistical area, time, resources, and data would have been allocated to the trip when unnecessary and data omitted. Contrarily, if an operator departed with the intent of fishing outside of the statistical areas but later determined the statistical areas would be preferred fishing for the trip, they would be unable to without first obtaining an observer. Additional consideration of shoreside requirements or electronic monitoring could also be explored in the future. Increasing observer coverage/requirements in these two statistical areas would require additional questions and considerations such as: is the goal to observe & document bycatch, would these additional requirements result in changes in fishing behavior seen favorable to the statistical areas (encourage/discourage fishing), consideration of a cost/benefit analysis both fiscally and of resources. Finally, increased observer coverage in these two statistical areas would decrease coverage in all other areas.

8 Summary

This discussion paper provides a summary of information about groundfish fishery harvests and Tanner and king crab distribution in the Kodiak District, as requested by the Council in June 2023. The Council's interest was to review data in order to inform potential GOA Tanner crab protections. Upon review of this discussion paper, the Council may choose to take no further action, to request more information from staff, or to initiate an analysis. If the Council chooses to move forward with an analysis, the Council should articulate a purpose and need for this action, and a set of alternatives to analyze. Considerations for a future analysis could include a detailed evaluation of the potential effects of any protection measures such as additional closures, gear restrictions, or required observer coverage on the fisheries and bycatch, effectiveness of such changes, and impacts to fishing behavior (namely, if fishing were to occur in other regions, what impacts may occur).

When examining all five years (2019 through 2023), the highest average Tanner bycatch occurs in April while the highest groundfish catch (when accounting for all fisheries) occurs in September (Figure 2). These differences may be associated with distributional changes over time (seasonal) in both the Tanner crab populations and fisheries. The data presented in the sections focused on bycatch are based on the NMFS catch accounting prohibited species catch data, which takes bycatch reports from observed fishing trips and extrapolates them to arrive at GOA-wide totals for Tanner bycatch. In order to examine the spatial distribution of bycatch at a finer scale, it is only possible to use the bycatch data collected on observed trips, as only observed hauls are associated with geographical coordinates. As such, the PSC estimates provided may vary from actual PSC numbers occurring in the fisheries, however the trends are likely indicative of actual PSC. If spring months are indeed a time of high bycatch for Tanner crab, closures similar to the Type II Red king crab closure in place in southeastern Kodiak (Figure 1), which is in effect from February 15 to June 15, would likely be effective at reducing Tanner crab bycatch in these statistical areas. Various reasons limit the information that is available to determine the degree to which bycatch amounts of Tanner crab taken in the groundfish fisheries are likely to affect the sustainability of the Tanner crab populations.

From January 1, 2019 – December 25, 2023, the shallow water flatfish group, deep water flatfish group, and Pollock target fisheries contributed most to the Tanner crab PSC estimates in statistical areas 525630 and 525702 (Table 9). Estimated PSC was 84% for shallow water flatfish, 41% for Pollock, 40% for deep water flatfish targets for statistical areas 525630 and 525702 as compared to CGOA (Table 9). Total Tanner crab bycatch (in number caught) in the groundfish catch in statistical areas 525630 and 525702 was highest with NPT gear and lowest with POT gear (Table 9).

On average, from 2019 – 2023, 90% of the total Pollock retained catch in statistical areas 525630 and 525702 occurs in the late season, from 01-June through 31-December, from 2019 – 2023 (Table 8). Similarly, non-Pollock retained targets are higher in the late season (61%). For all fisheries (Pollock and non-Pollock), 76% of the retained catch occurs from 01-June – 31-December, on average (Table 8). When comparing the proportion of retained catch associated with either statistical area 525630 or 525702 compared to CGOA, an average 1% of the retained Pollock catch and 9% of the retained catch in non-Pollock targets in the early season are associated with either statistical area 525630 or 525702 (Table 8). In the late season, an average of 17% of the retained Pollock catch and 7% of the retained catch in non-Pollock targets are associated with either statistical area 525630 or 525702, as compared to CGOA (Table 8).

From 2013–2023 an average of 49% of all mature female Tanner crab, 47% of all mature male Tanner crab, and 41% of all legal male Tanner crab abundance in the Kodiak District was estimated to be from statistical areas 525630 and 525702. Roughly 30% of total mature Tanner crab abundance was estimated in the single federal waters statistical area 525702.

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