

2021/22 BSAI crab catch and fishery performance

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Crab Plan Team Meeting

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Seattle, WA

Directed fishery observer coverage

Mandatory catcher-vessel coverage requirements, per **5 AAC 39.645**.

All vessels processing crab must carry observers.

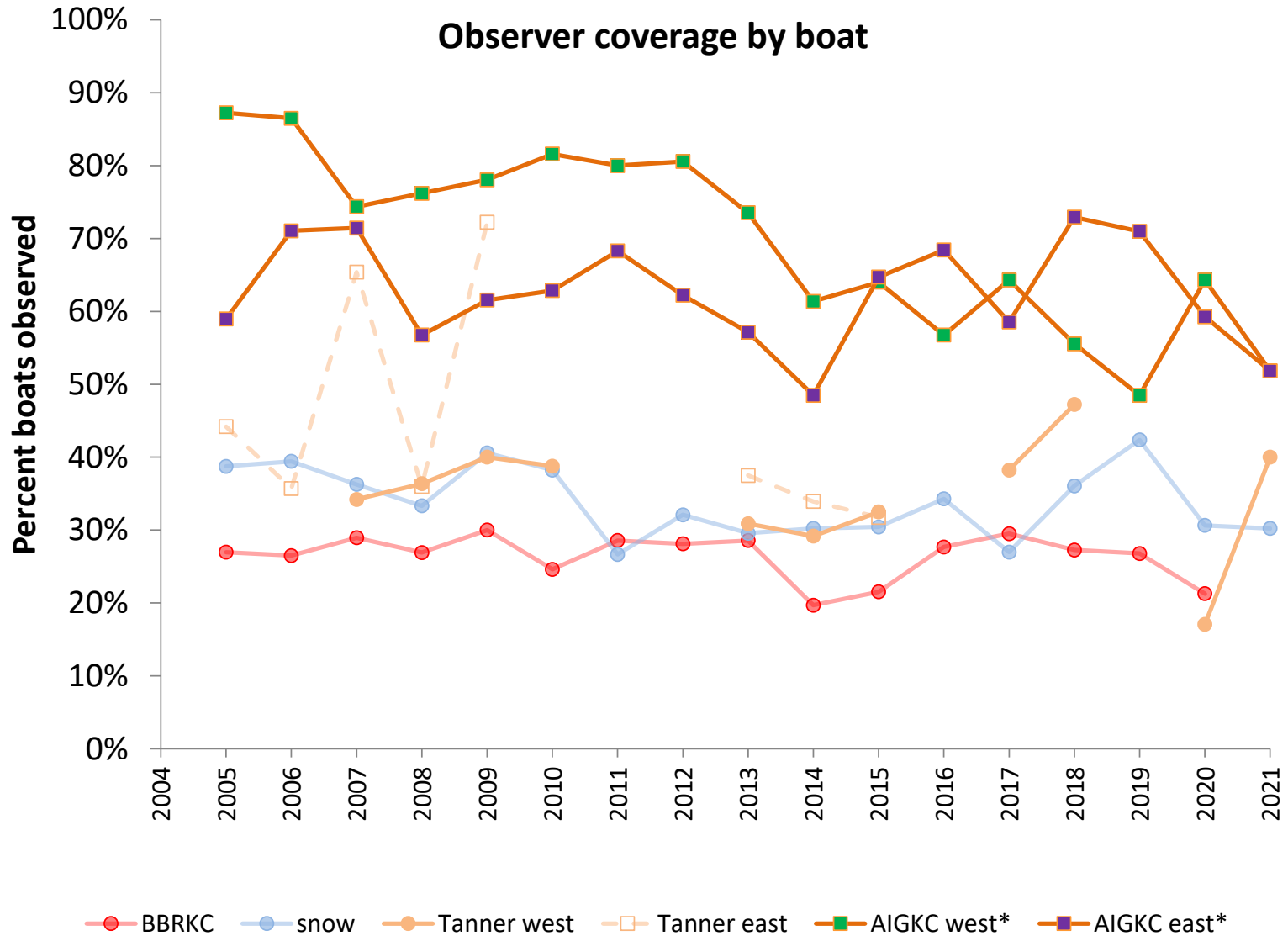
Fishery	Coverage
Bering Sea snow crab	30-100% (a)
Bristol Bay red king crab	20% (a)
Bering Sea Tanner crab	30-100% (a)
Pribilof District red king crab	100%
Pribilof District blue king crab	100%
Saint Matthew Island blue king crab	100%
Norton Sound red king crab	Discretionary
Aleutian Islands golden king crab	50% (b)
Pribilof District golden king crab	100%
Adak red king crab	100%

- **2021/22** Generally status quo

^a Vessels required to carry observers are randomly selected.

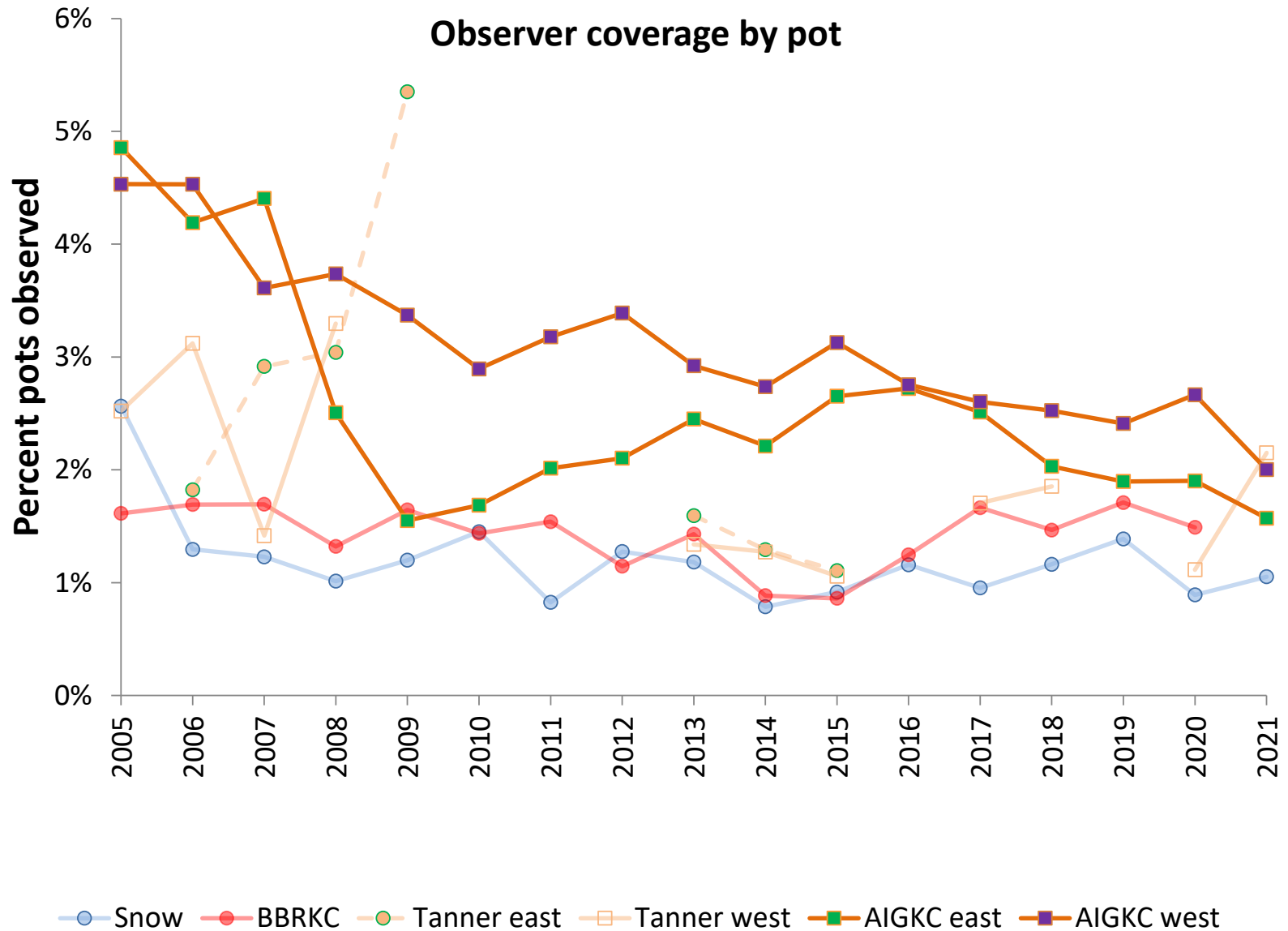
^b All catcher vessels must carry an observer during harvest of 50% of total landed catch weight in each three-month trimester of nine-month season Aug 1 – Oct 31; Nov 1 – Jan 31; Feb 1 – April 30.

Directed fishery observer coverage



*AIGKC calculated by trip because of trimester regulation

Directed fishery observer coverage



Groundfish Vessels in Full Coverage vs Partial Coverage

- **Full coverage vessels (1 or 2 observers 100% of the time)**
 - Catcher/Processors (limited exceptions for non-trawl CPs)
 - Motherships
 - AFA Pollock catcher vessels delivering shoreside
 - Non-Pollock BSAI trawl catcher vessels can opt for 100% coverage during all fishing
- **Partial Coverage**
 - Catcher Vessels fishing groundfish
 - Catcher Vessels fishing IFQ/CDQ halibut/sablefish
 - Non-trawl Catcher/Processors – They have to apply in advance
- **No selection for observer coverage**
 - Vessels using Electronic Monitoring (EM, 30% selection rate)
 - 40 feet and under
 - Jig Catcher Vessels
 - No FFP (can only fish inside three miles)
 - State Guideline Harvest Level fisheries

Partial Coverage Groundfish Observer Rates

- Prior to 2013 observer coverage for CVs ≥ 60 ft and <125 ft was based on 30% of fishing days by gear and quarter, ≥ 125 ft CVs and CPs were 100%
- 2013 observer program restructured
- In 2013 and 2014 partial observer coverage rates were the same for all gear types on vessels 57.5 feet and larger
 - 14.5% in 2013
 - 16% in 2014
- 2015 partial observer coverage rates were split by vessel size
 - 24% on vessels 57.5 feet and larger
 - 12% on vessels 40-57.5 feet

	EM	Trawl	Tender Trawl	HAL	Tender HAL	Pot	Tender Pot
2016	NA	28%	NA	15%	NA	15%	NA
2017	NA	18%	14%	11%	25%	4%	4%
2018	30%	20%	17%	17%	NA	16%	17%
2019	30%	24%	27%	18%	NA	15%	16%
2020	30%	20%	NA	15%	NA	15%	NA
2021	30%	16%	NA	15%	NA	15%	NA
2022	30%	30%	NA	19%	NA	17%	NA

Electronic Monitoring (EM) on Hook-and-Line and Pot Gear vs Trawl Gear

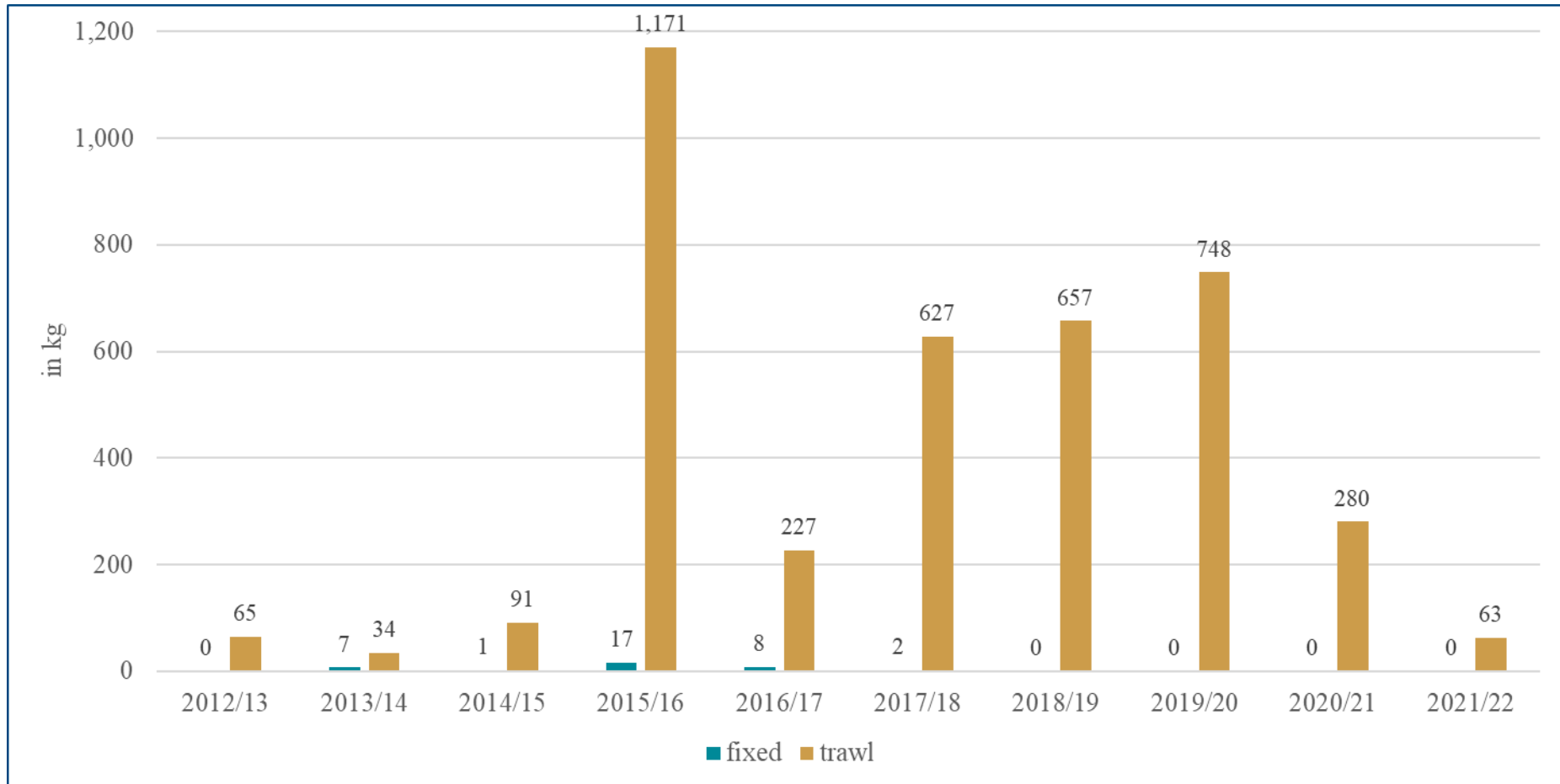
- **Hook-and-line and pot** (began in 2018)
 - EM for catch estimations
 - Cameras must be on for entire trip when selected
 - Discarding of some bycatch is allowed (no discarding of IR/IU species or rockfish)
 - All video is reviewed to identify and count discards
 - EM reviewers have a hard time identifying crab to species
 - Currently crab that are not identified to species do not count towards any stock species.
- **Pelagic trawl pollock** (began in 2020 with Exempted Fishing Permit)
 - EM for compliance monitoring
 - Cameras must be on 100% of the time
 - Operating under maximum retention (jellyfish and large animals like sharks can be discarded but must be reported on the landing report) All video is reviewed to monitor catch handling (i.e. ensure minimal discarding)
 - Observers at the dock monitor 100% of the offload and sample catch
 - All crab bycatch is weighed and counted at the dock

Incidental Crab Catch in Groundfish Fisheries

- All weights are in kilograms
- Mortality has been applied (50% for fixed gear and 80% for trawl gear)
- All weights are extrapolated from observer/EM data
- All weights came from AKFIN database
- Incidental catch data in this presentation are for the crab year (July 1 to June 30) except for Pribilof Island Golden king crab and Norton Sound red king crab which are a calendar year
- Fixed gear includes pot, hook-and-line, and jig
- Trawl gear includes non-pelagic and pelagic trawl

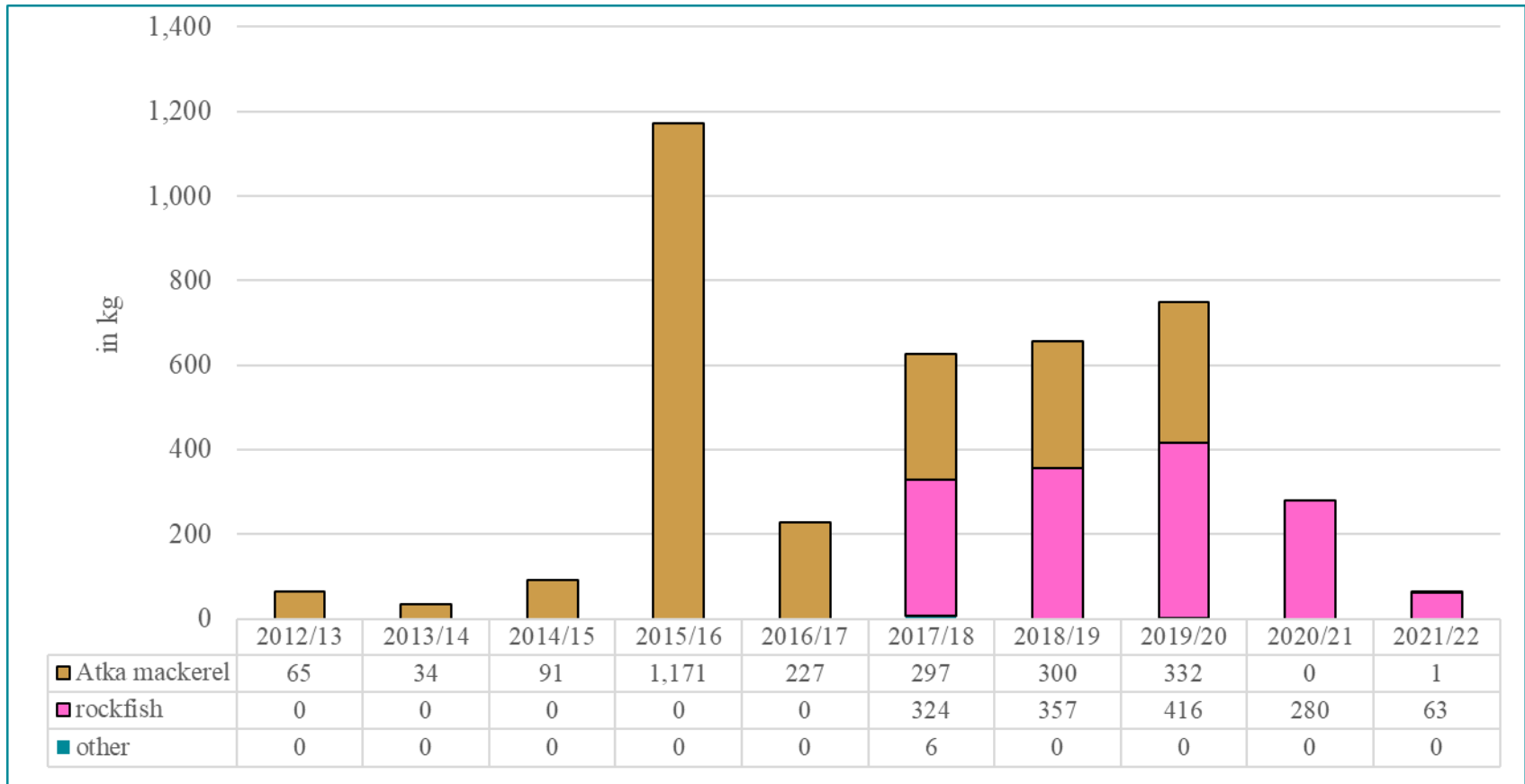


Aleutian Islands Red King Crab Incidental Catch in Groundfish Fisheries



- Not much federal fixed gear fishing in this area.
- Not very much fixed gear observer coverage.

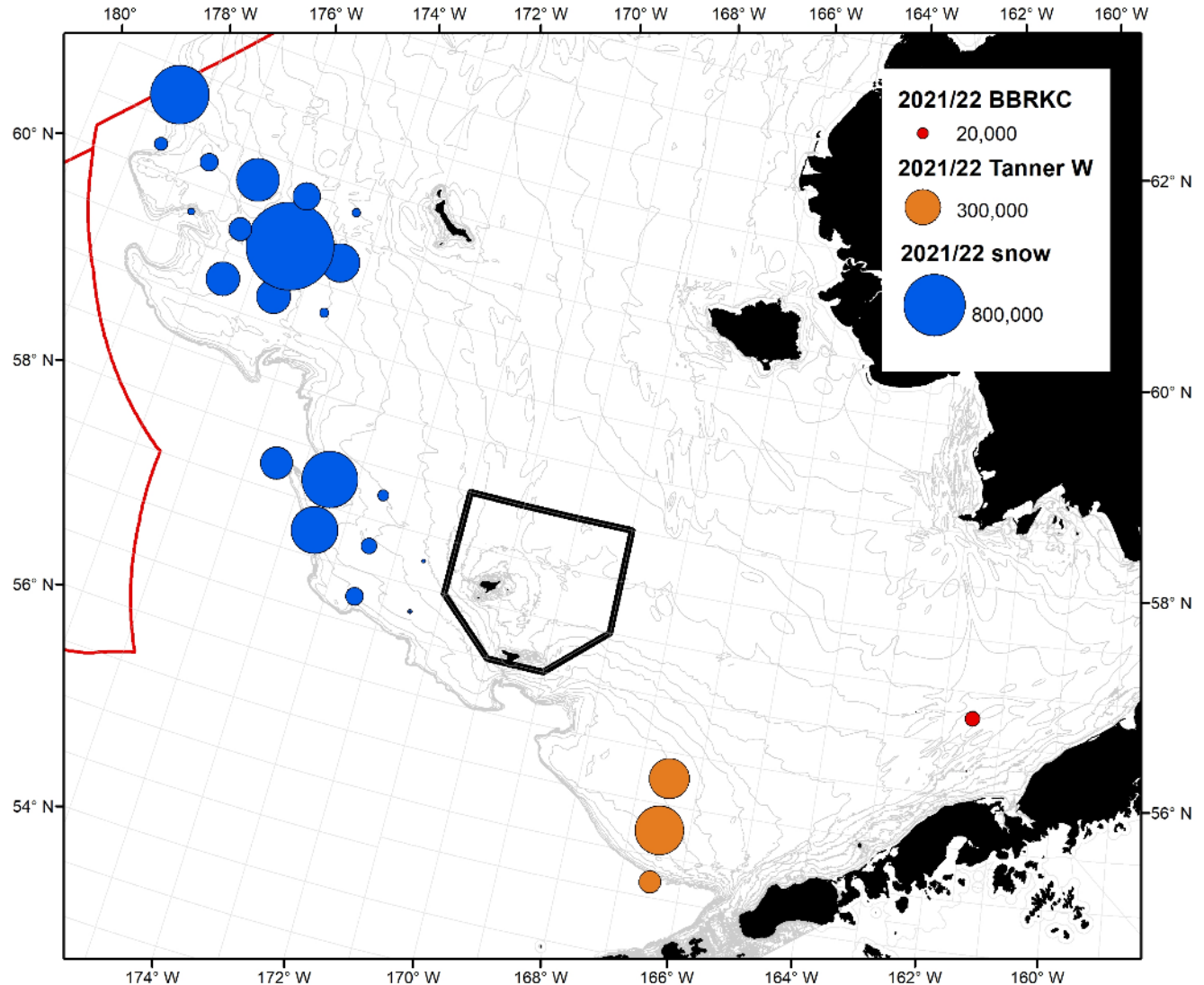
Aleutian Islands Red King Crab Trawl Incidental Catch by Trip Target



- Majority of 2021/22 bycatch occurred in July.
- In recent years A80 has been targeting both Atka mackerel and rockfish within the same trip.
- Most RKC is found while fishing in the summer months (June – August).
- “Other” species includes: Kamchatka flounder, Pacific cod, and pollock.

2021/22 Tanner W + snow crab directed fisheries

- Excludes stat areas with <3 vessels
- BBRKC cost recovery fishery



A large pile of crabs, likely blue crabs, is shown in a blue net. The crabs are densely packed and appear to be freshly caught. The net is secured with yellow and blue ropes. The background is dark, suggesting the net is on a boat or in a dark environment.

BBRKC

2021/22 fishery closed

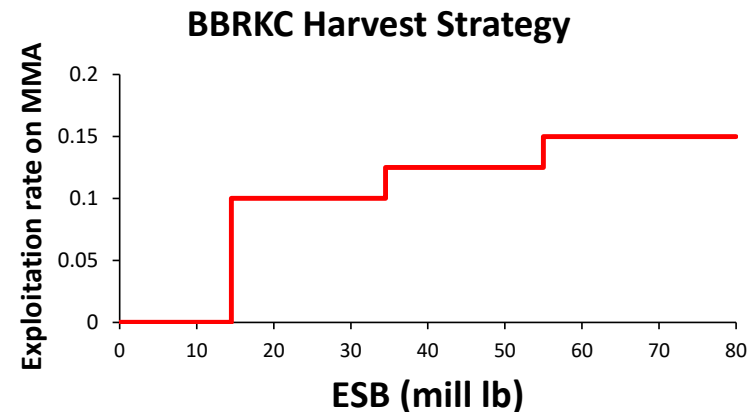
Bristol Bay Red King Crab Harvest Strategy

1. Stock threshold for opening fishery:

- 8.4-million mature-sized females (≥ 90 mm CL), and
- 14.5-mill lb of effective spawning biomass (ESB)

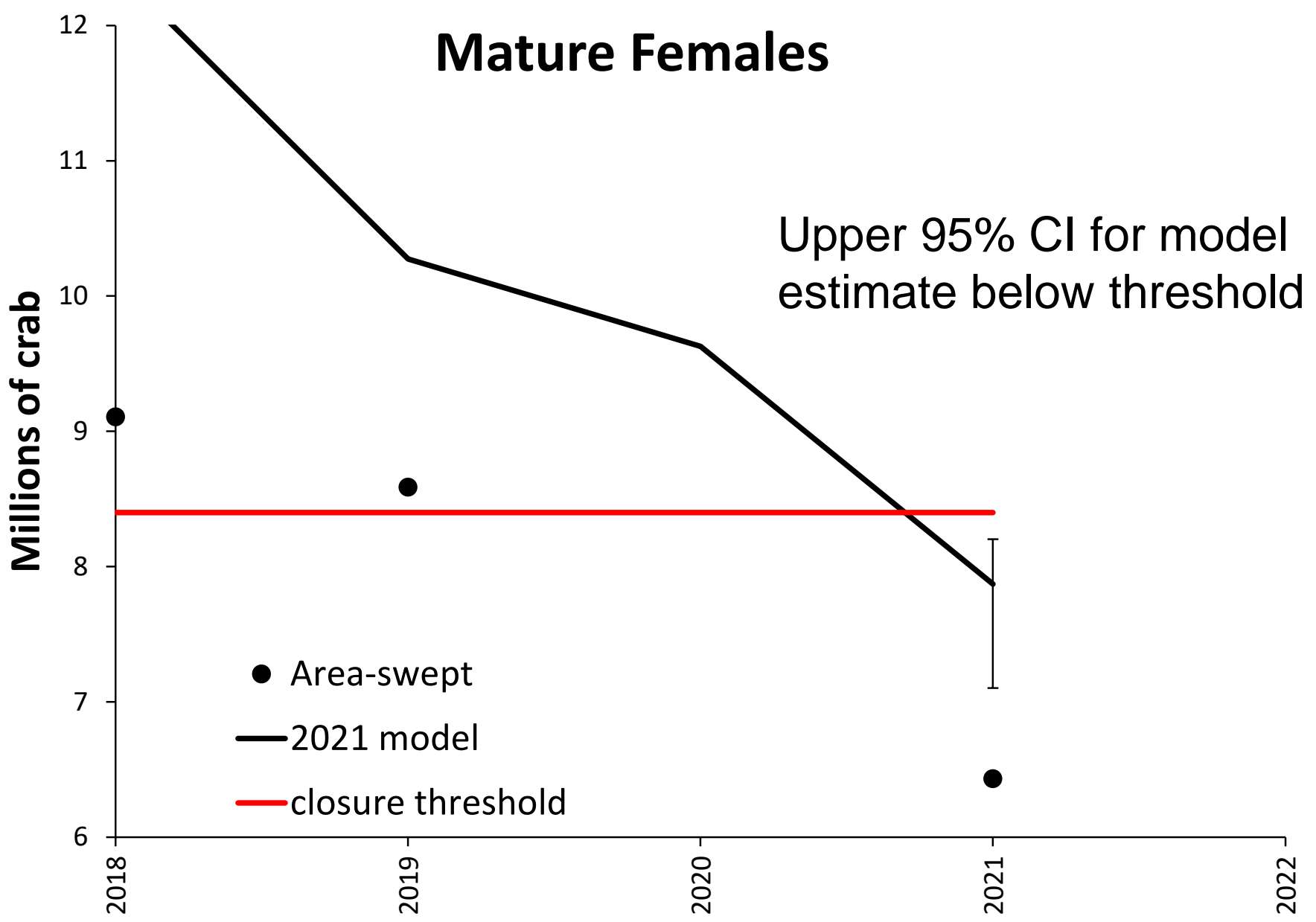
2. Exploitation rate on mature-sized (≥ 120 -mm CL) male abundance:

- 10%, when ESB < 34.75 -mill lb
- 12.5%, when ESB is between 34.75-mill lb and 55.0-mill lb
- 15%, when ESB ≥ 55.0 -mill lb

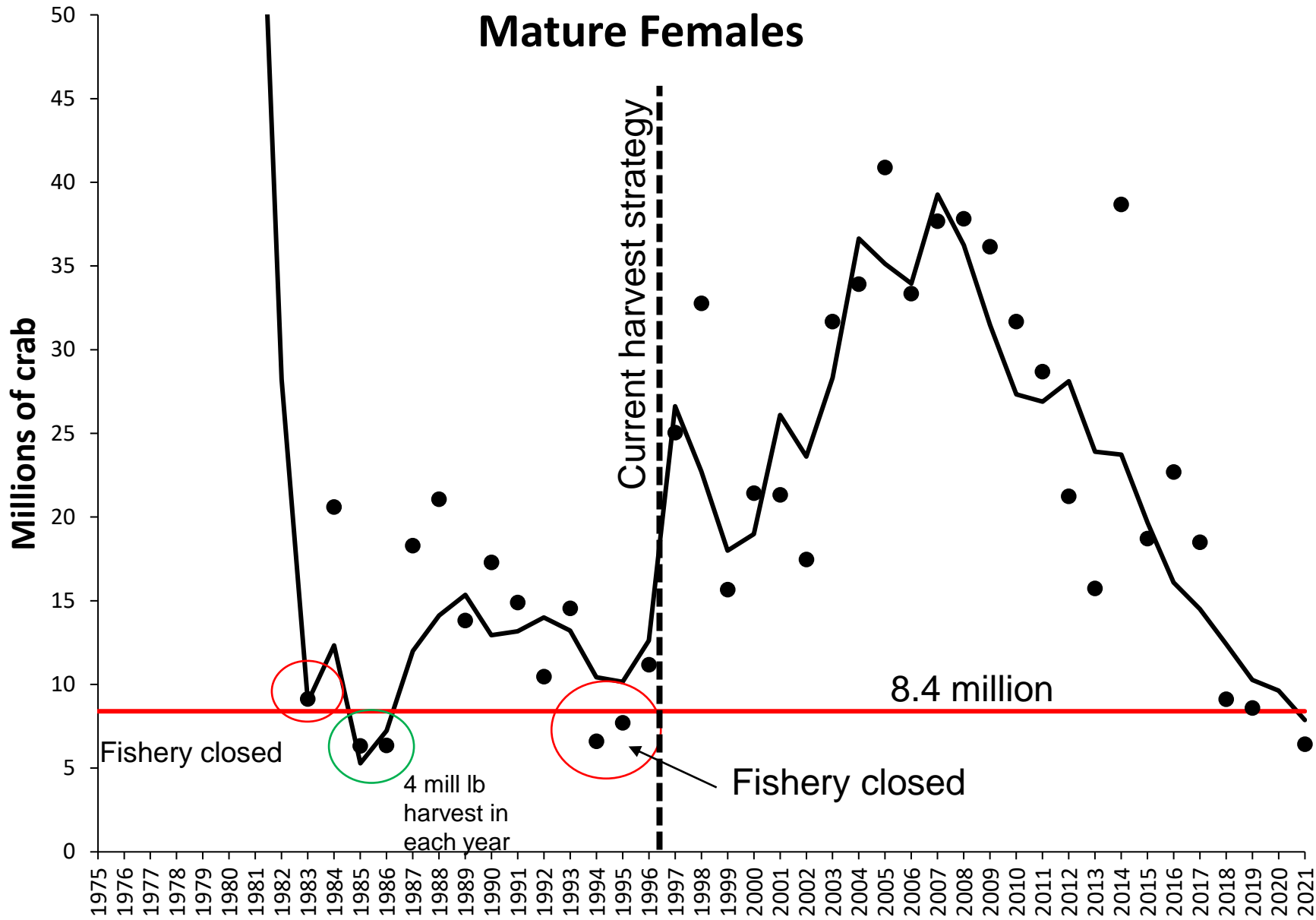


3. Harvest capped at 50% of legal male abundance

Mature Females



- Area-swept
- 2021 model
- closure threshold



Mature Female Abundance Threshold

- Blunt tool meant to avoid recruitment overfishing
- **8.4 million MFA threshold:** estimated at 20% of equilibrium level of fertilized females from Ricker stock-recruitment curve (“Thompsons rule”, Thompson 1990)
 - Defined as the minimum mature female abundance *“that allows sufficient recruitment so that the stock can eventually reach a level that produces MSY”* (1989 BSAI Crab FMP)

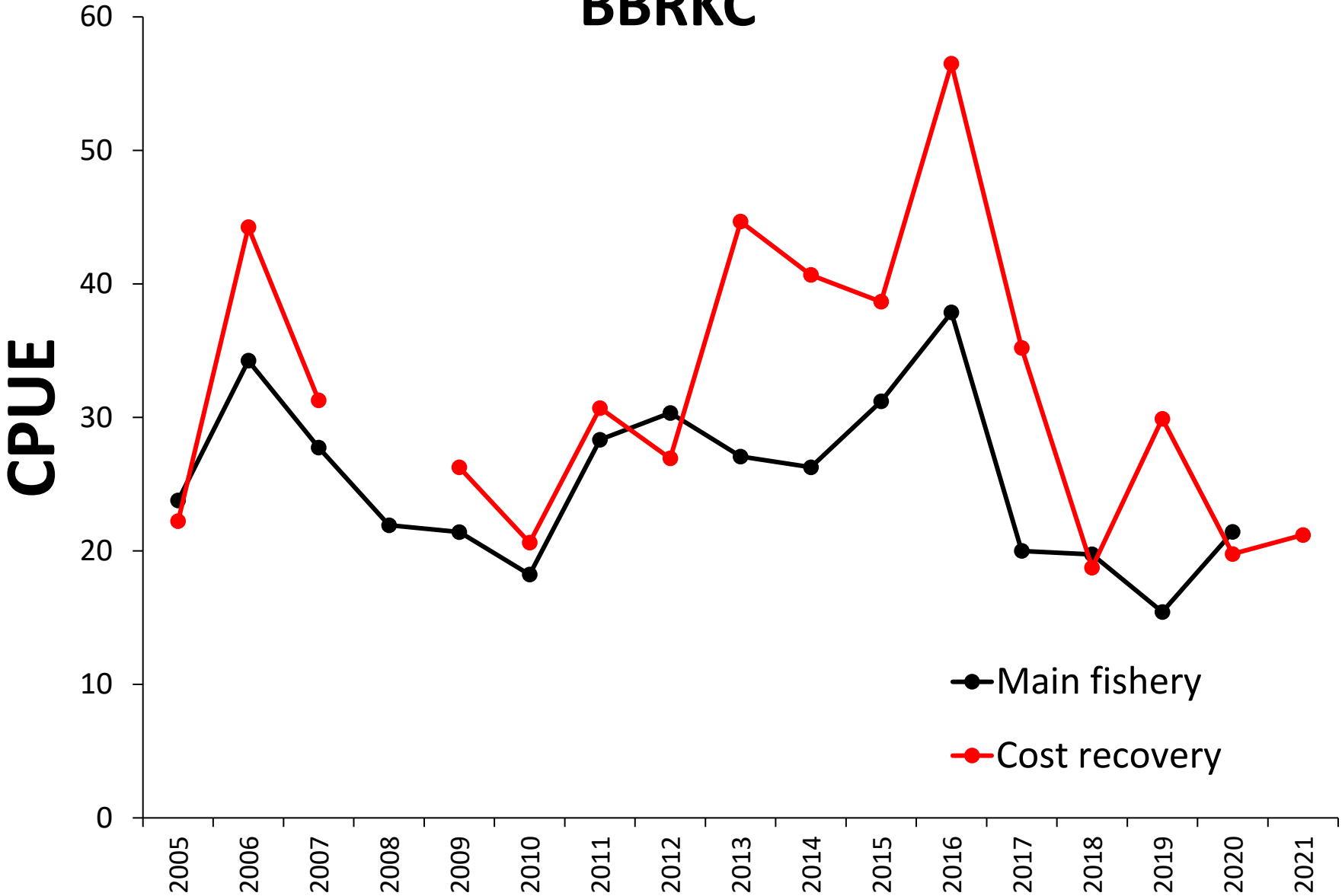
BBRKC retained catch



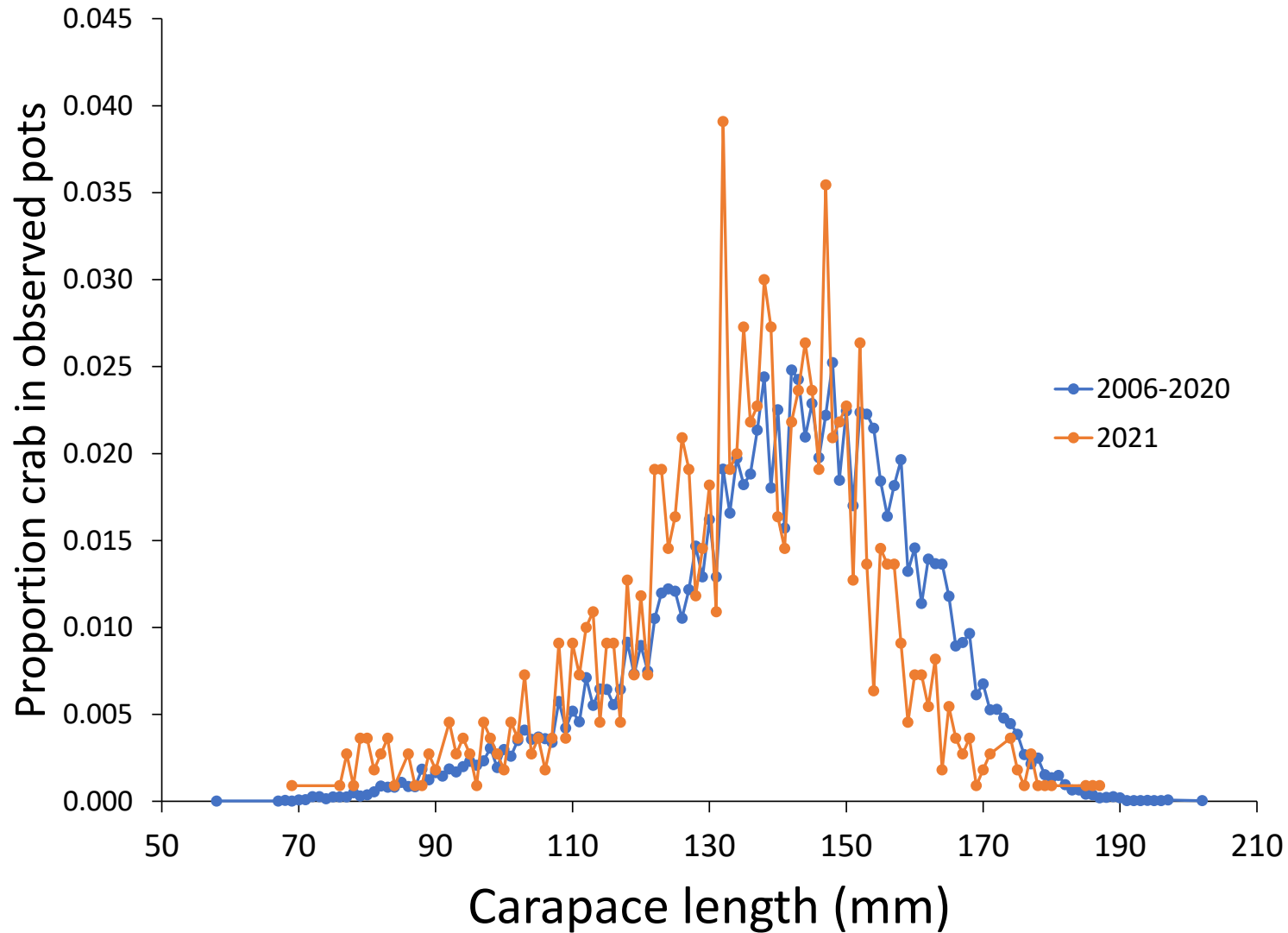
2021/22 Cost
recovery fishery

- 38,465 lbs
- 6,230 crab

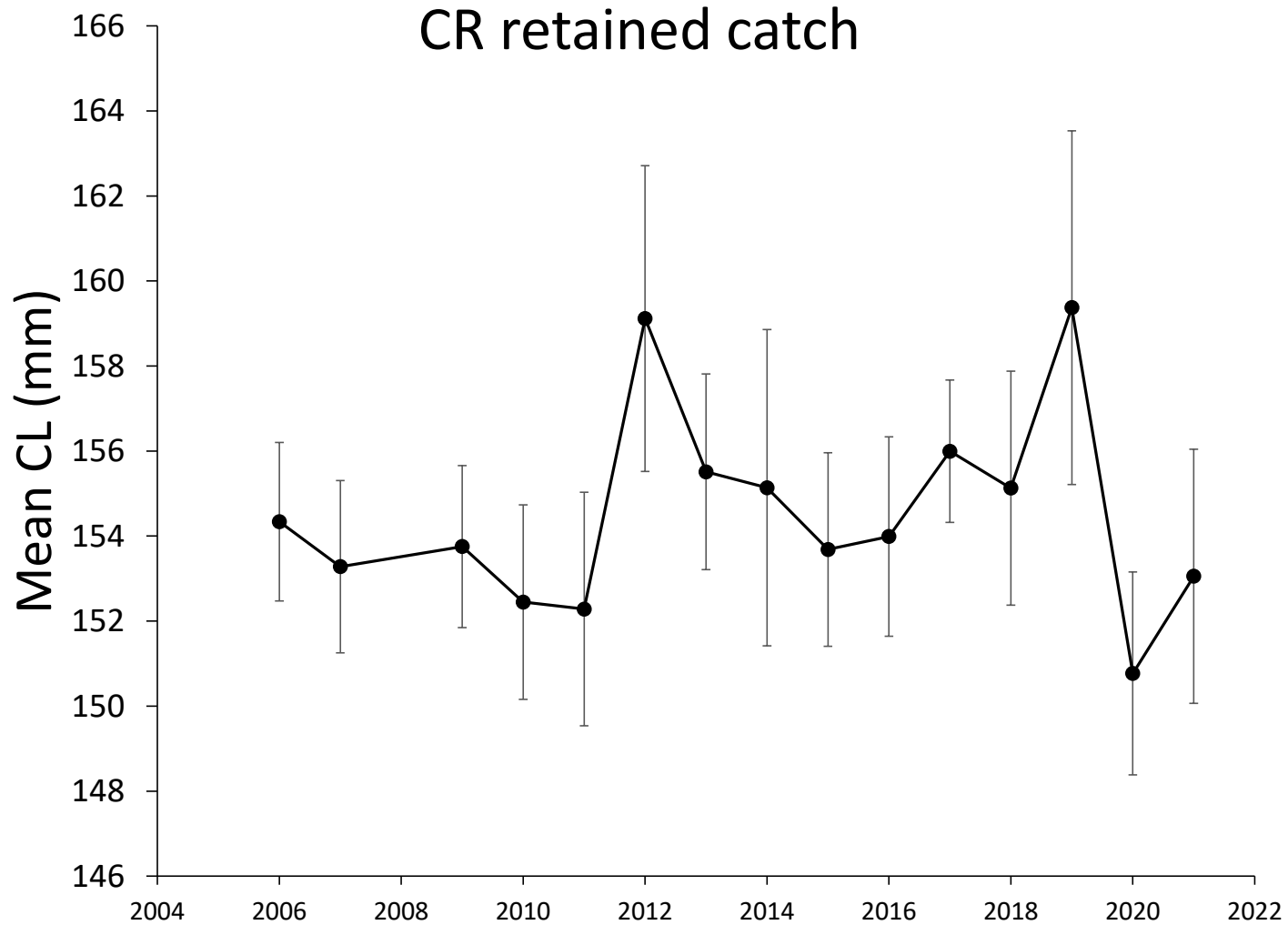
BBRKC



Observer data in CR fisheries

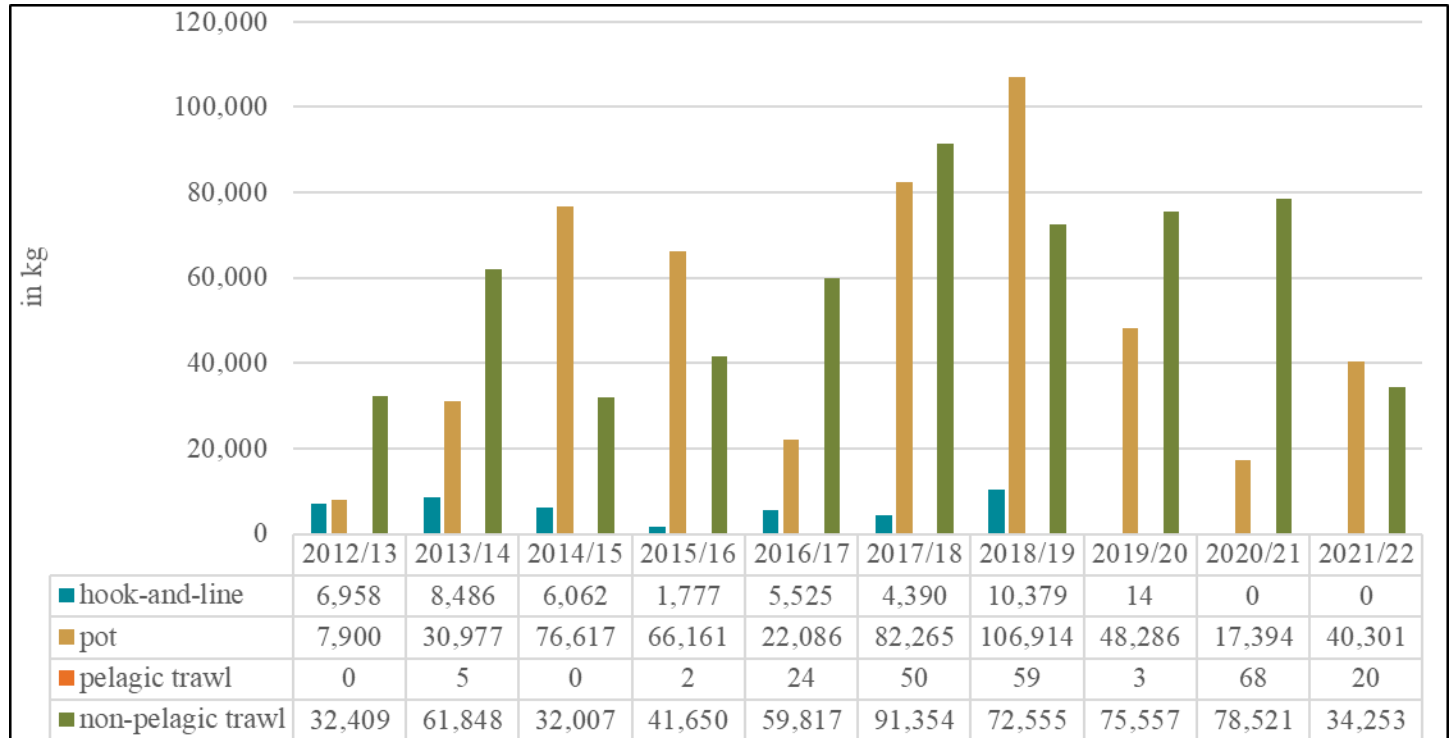


Cost recovery fisheries



Bristol Bay Red King Crab Incidental Catch in Groundfish Fisheries

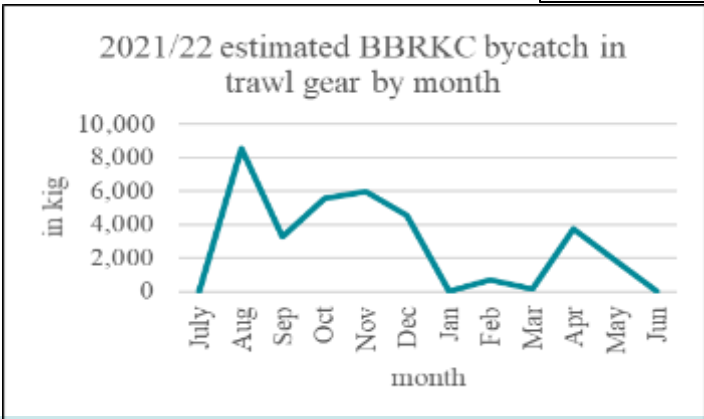
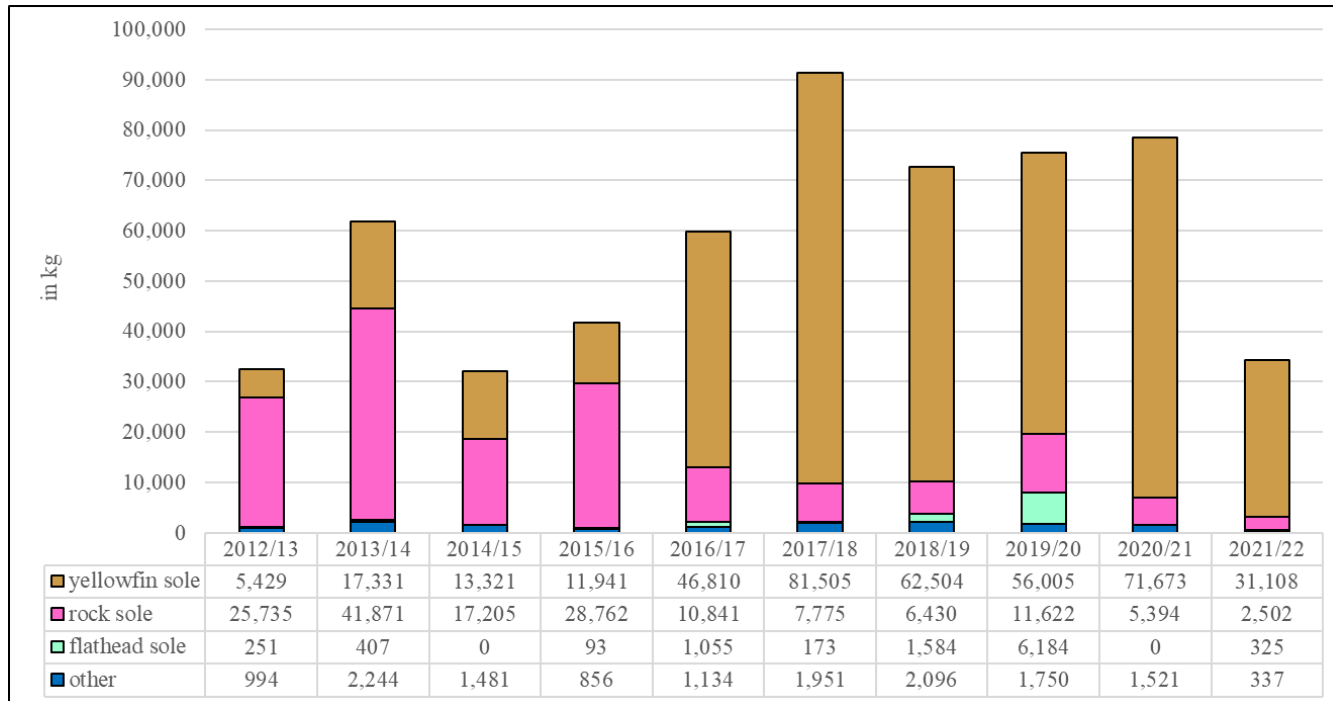
- In most years there is more RKC bycatch in the Pacific cod pot fisheries in the fall.
- Observers reported more females in pot gear than in trawl gear in the past eight years in BB : 72%-91% female in pot gear vs 20% - 46% in trawl gear.



- Lower RKC rates during the 2020/21 crab year in the fixed gear sectors could be due to:
 - Lower observer coverage in the pot Pacific cod fishery in the fall of 2020 due to COVID (although there was EM data in this sector)
 - Lower Pacific cod TACs
 - Pacific cod pot fleet using more gear with crab excluders

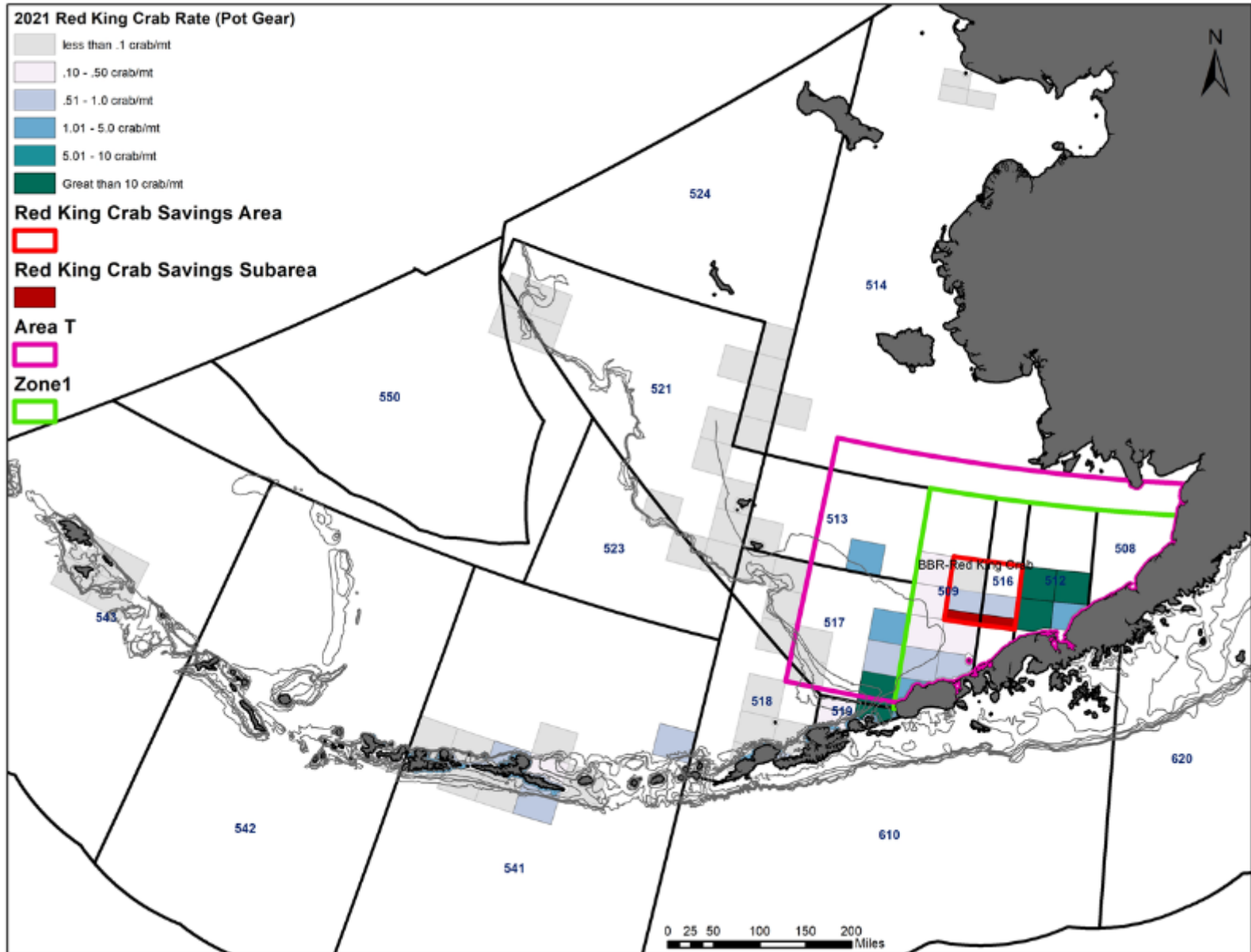
Bristol Bay Red King Crab Trawl Incidental Catch by Trip Target

- Rock sole and yellowfin sole are often targeted during the same fishing trip.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, and pollock.
- Red king crab savings subarea in Bristol Bay was closed to nonpelagic trawl in 2022.

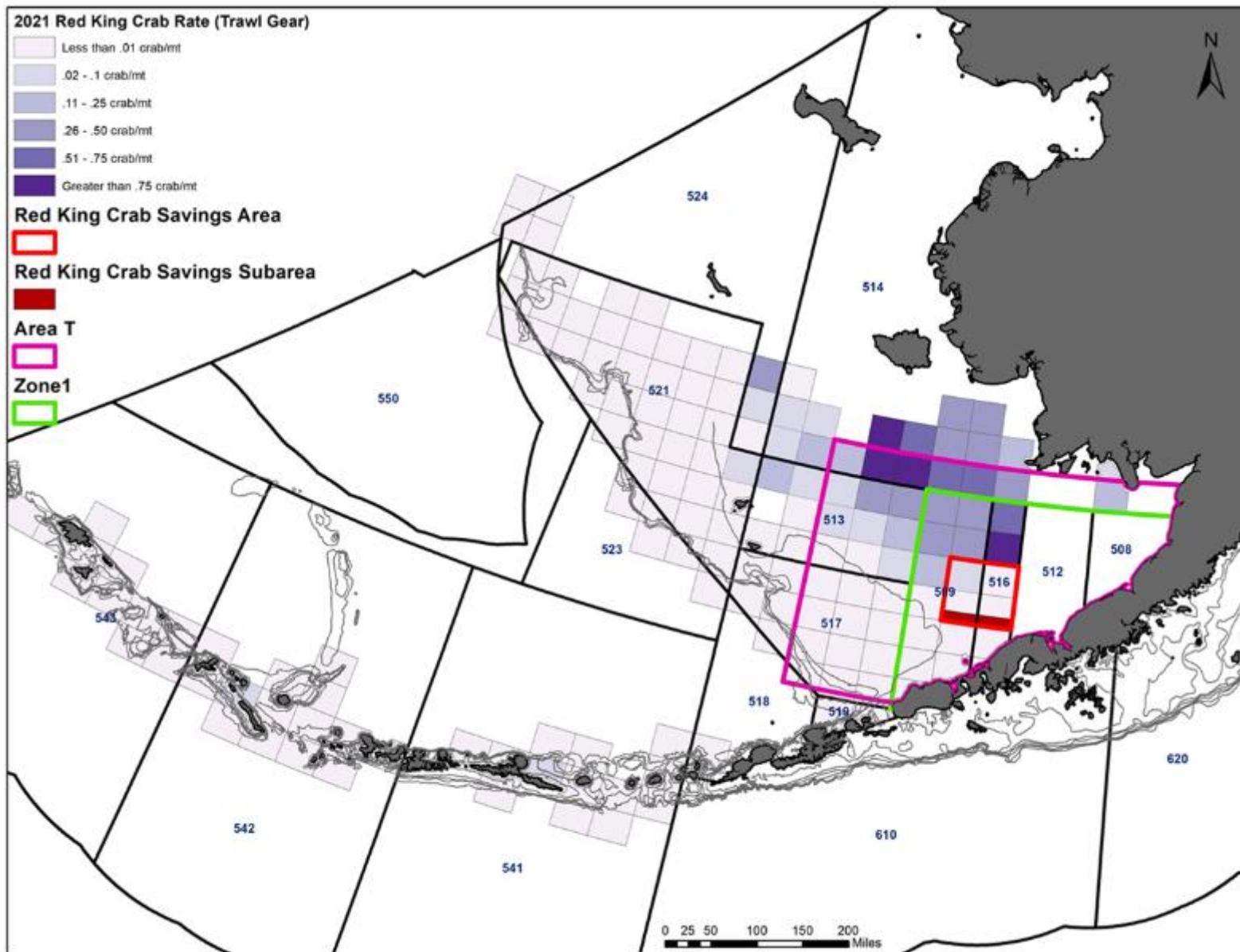


- Bycatch of BBRKC in trawl gear typically occurs throughout the crab year.
- In 2021/22 bycatch peaked in August during the yellowfin sole fishery due to high red king crab rates in the stock area.
- The majority of yellowfin sole harvest in the stock area occurred Feb-May when the crab rates were lower.

Rate of red king crab in pot gear in 2021 Calendar Year



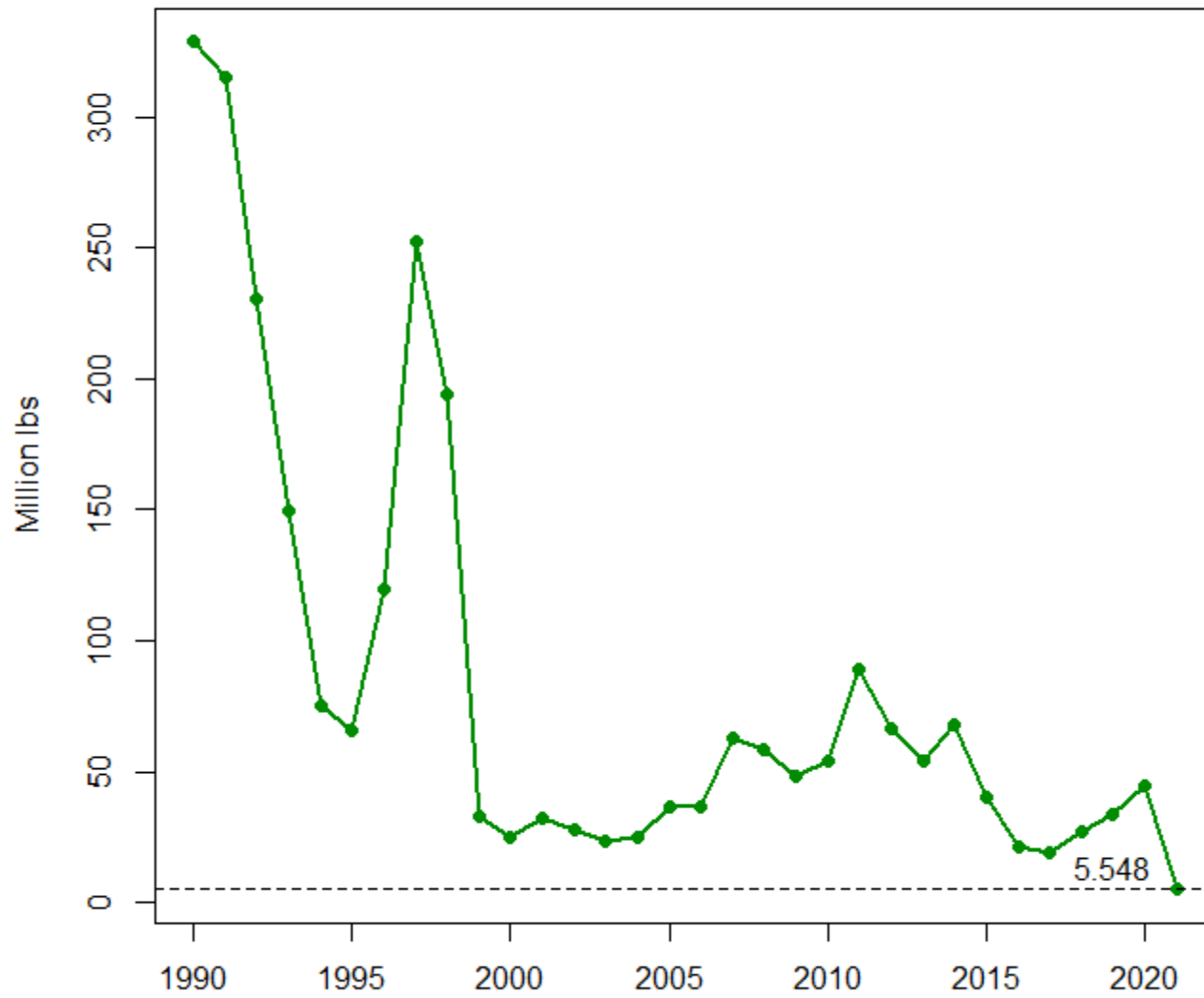
Rate of red king crab in trawl gear in 2021 Calendar Year



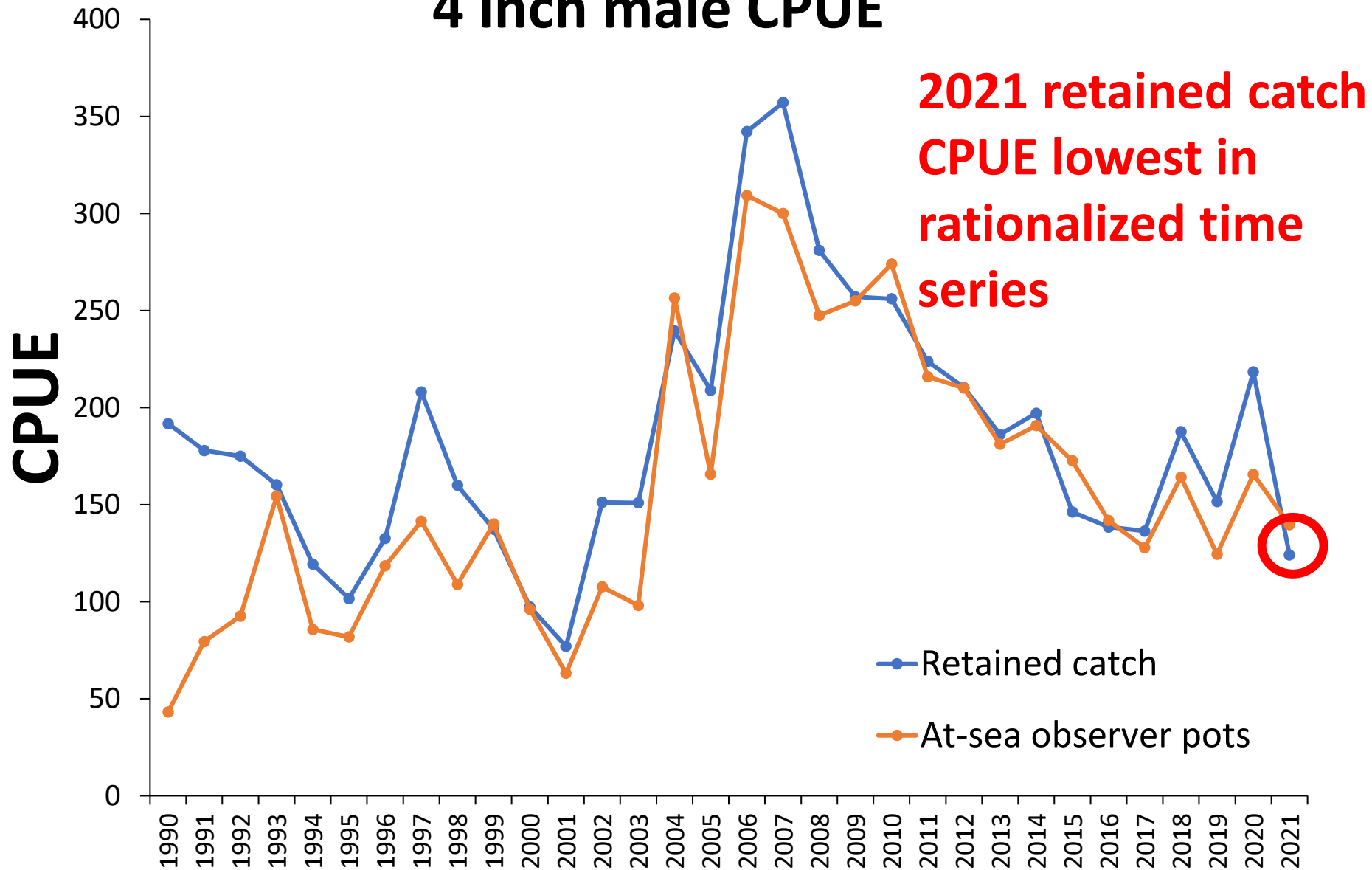
A large pile of snow crabs, showing their characteristic light brown and tan coloration. The crabs are densely packed, with many legs and claws visible. The background is a soft, out-of-focus greyish-brown.

Snow crab

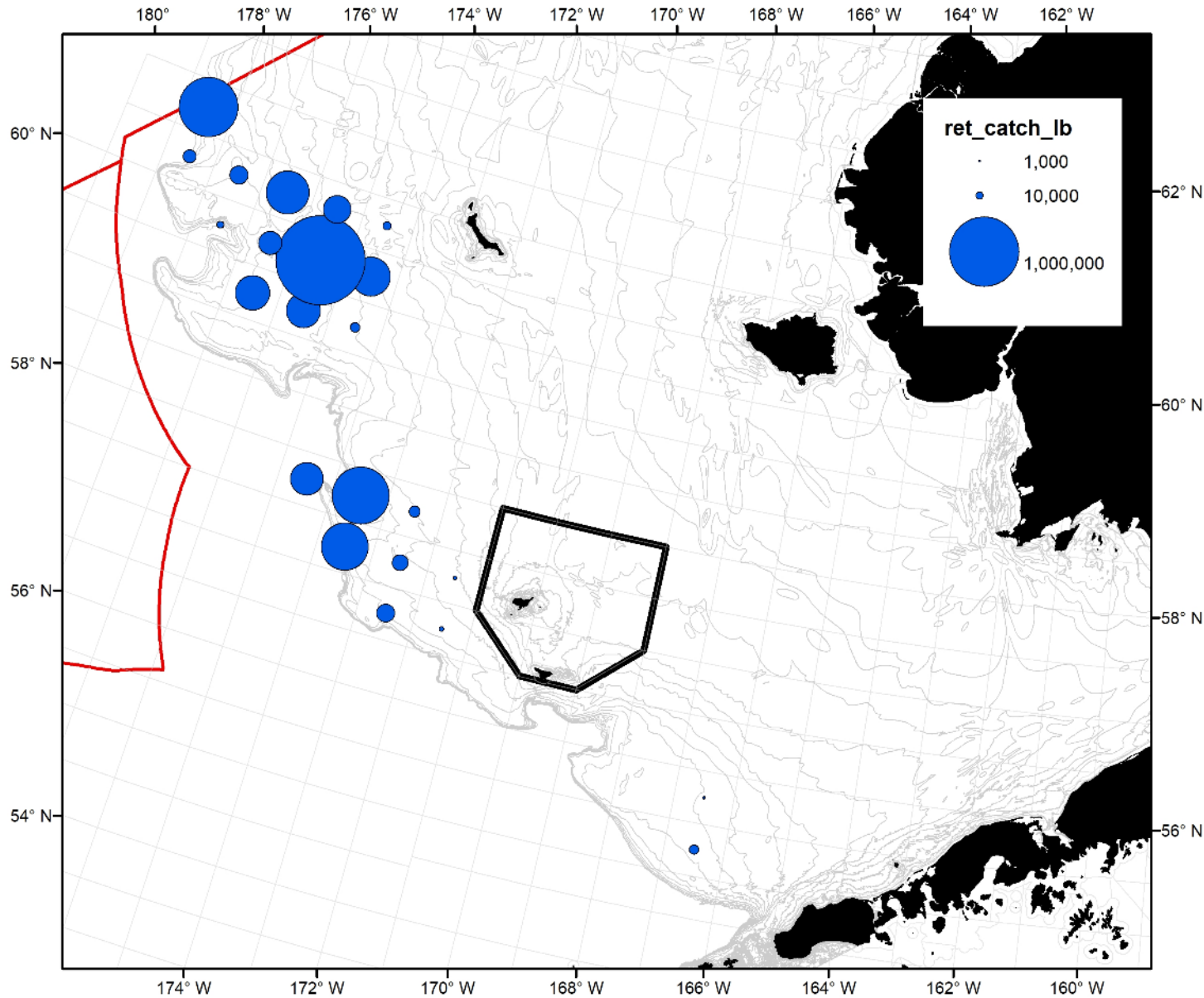
snow crab retained catch



4 inch male CPUE



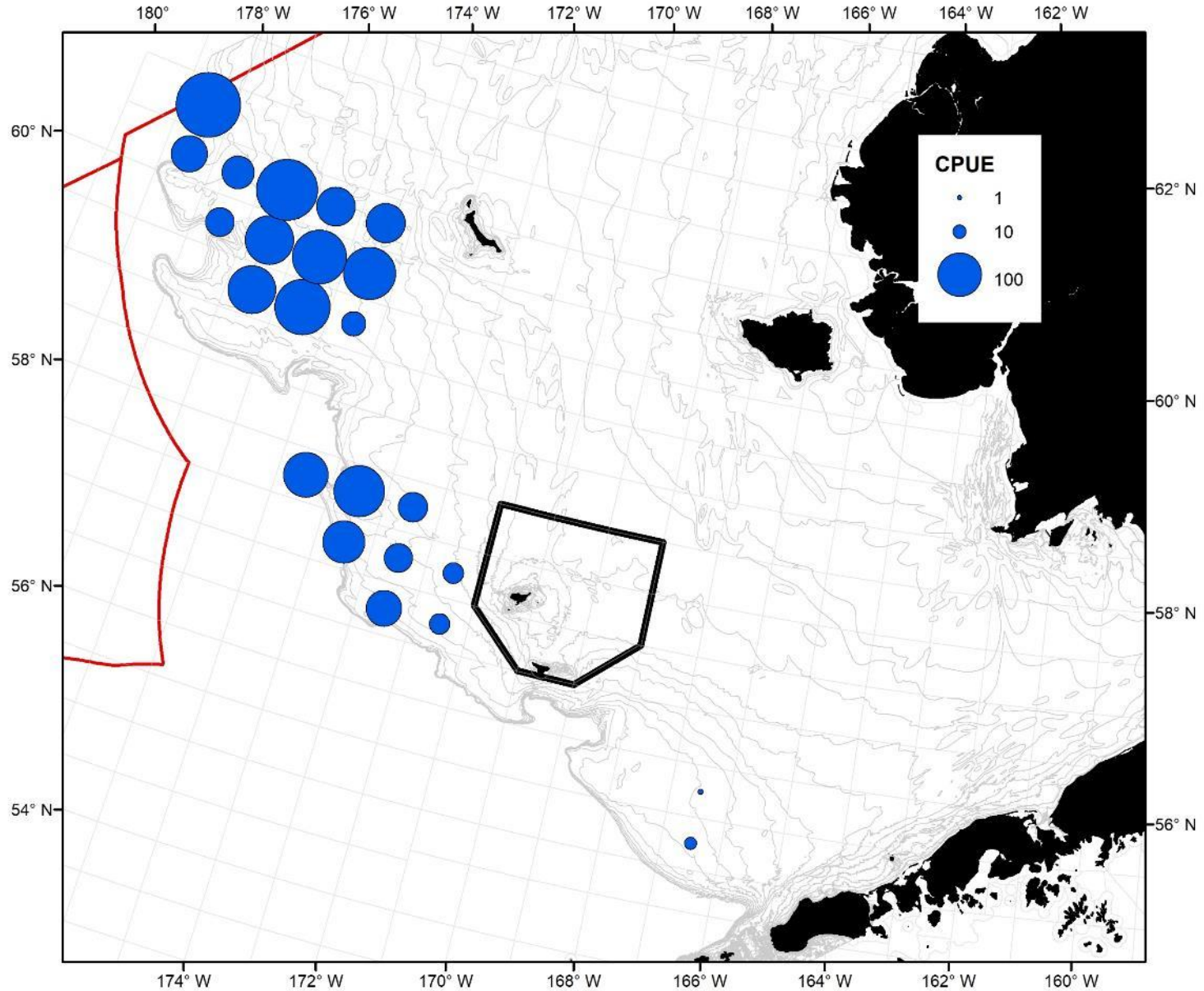
2021/22 snow crab retained catch



* Excludes stat
areas with <3
vessels

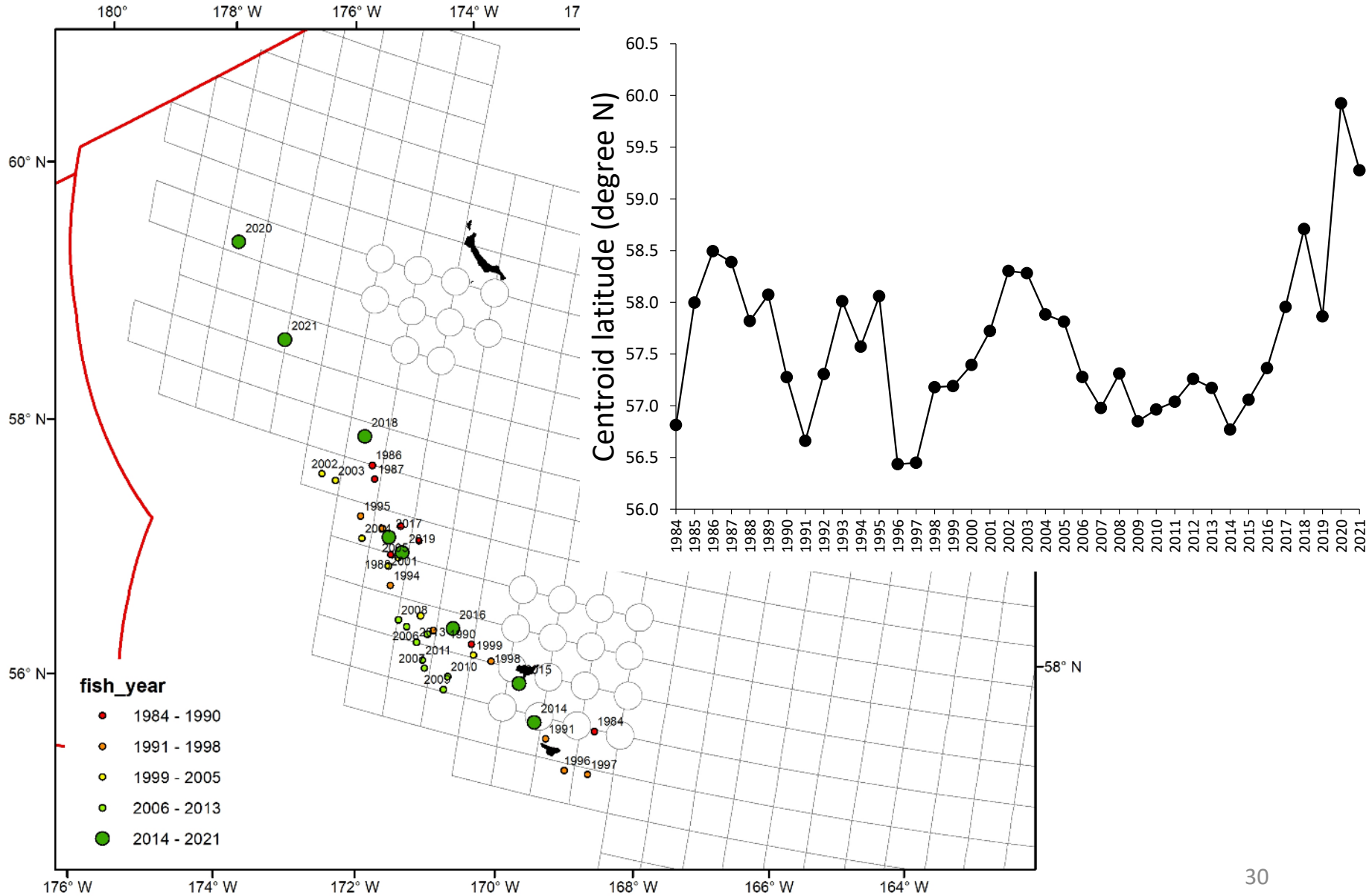
2021/22

snow crab CPUE

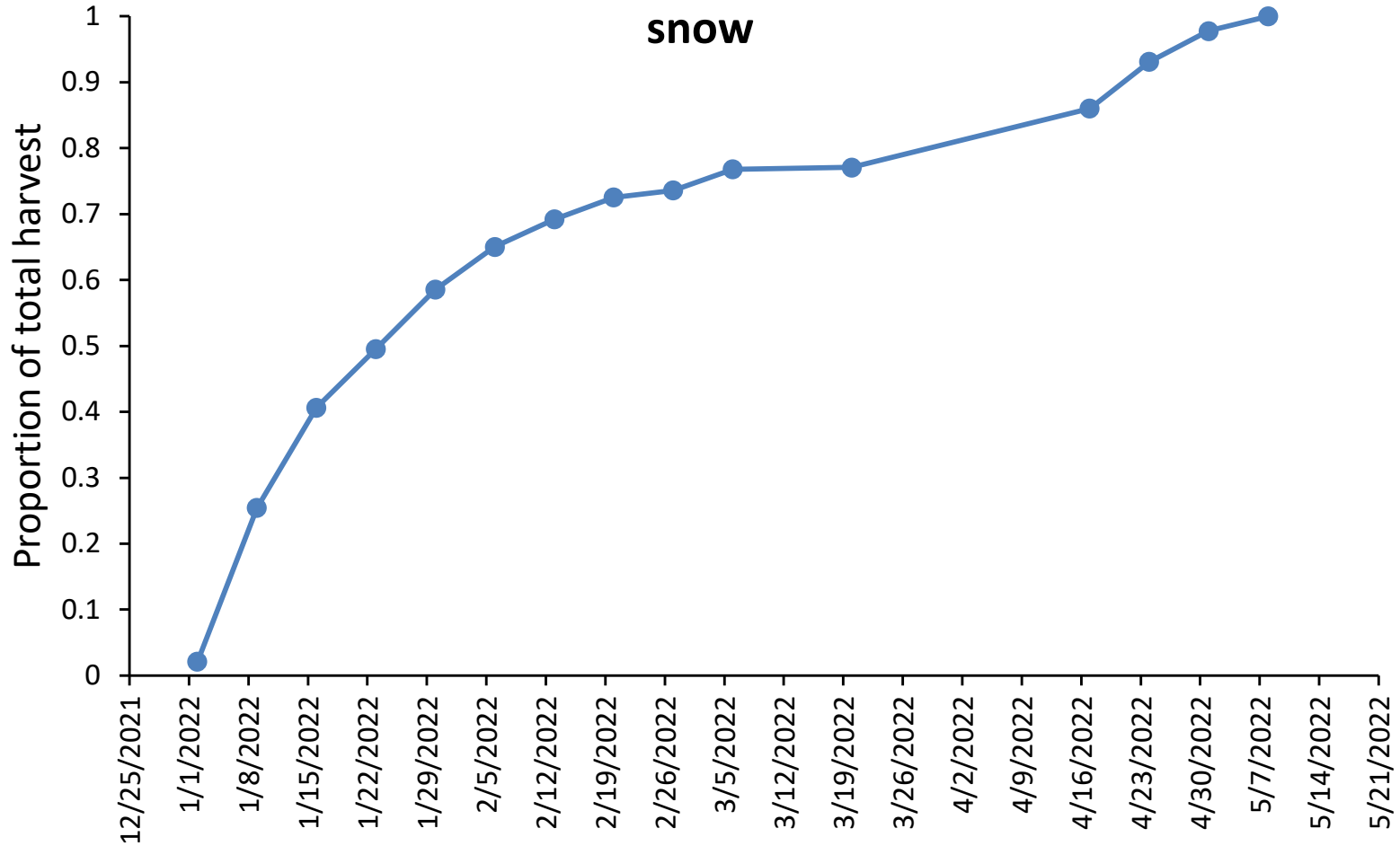


* Excludes stat
areas with <3
vessels

Snow crab weighted mean centers of catch



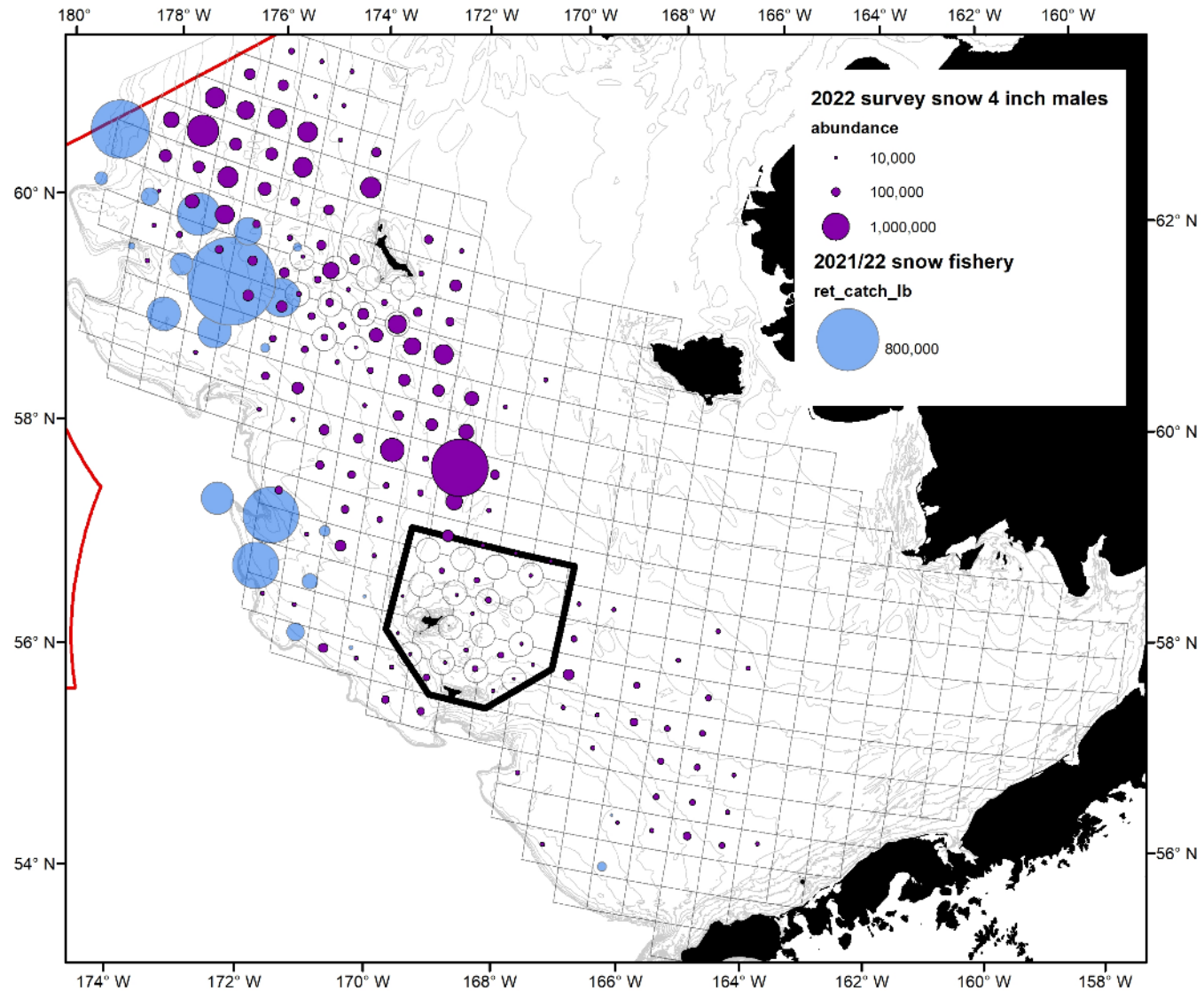
2021/22 snow crab



~50% of harvest occurred ~Feb

Survey occurs in June+ July

~6 months between



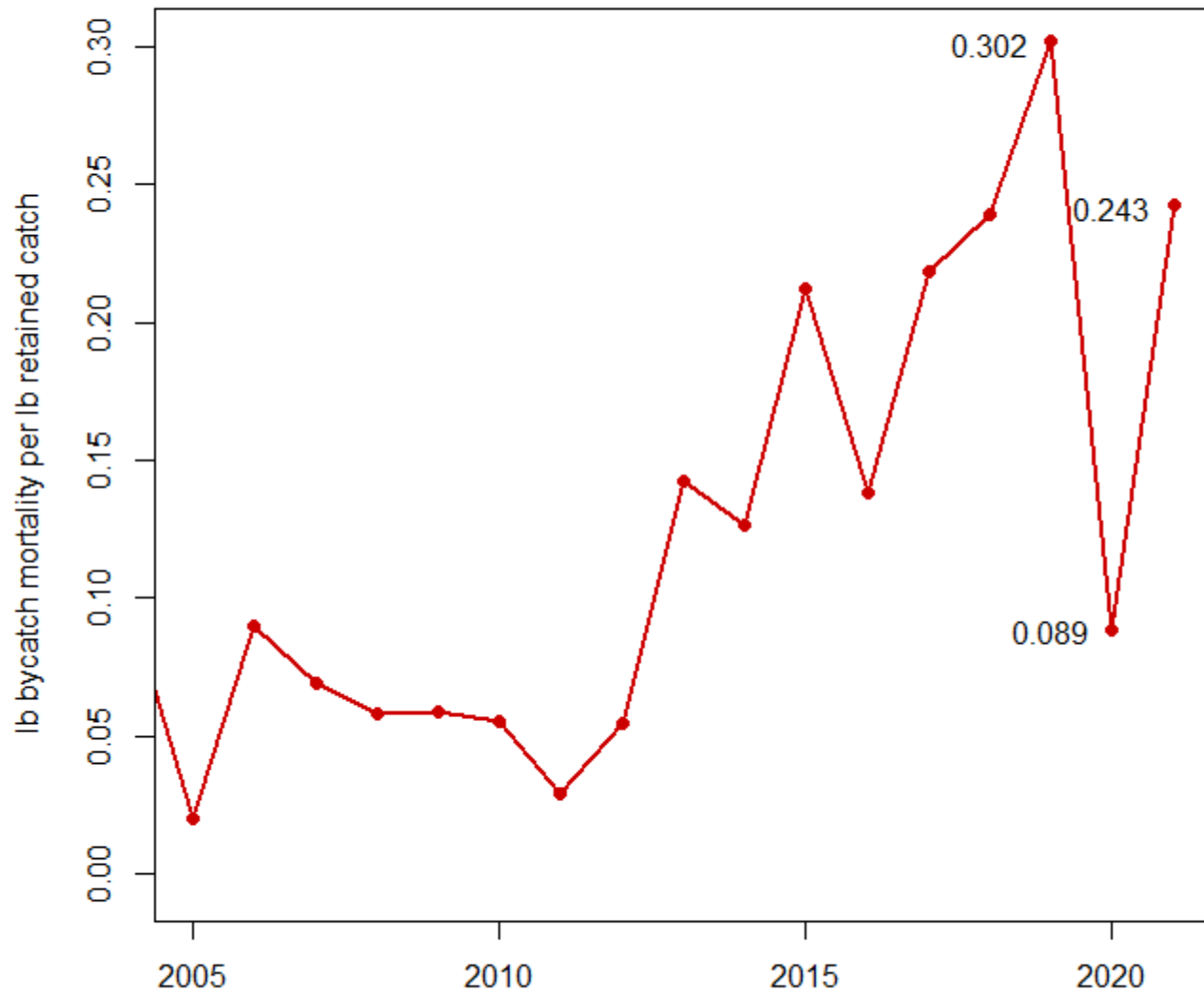
Purple = 2022 survey abundance 4 inch males

Blue = 2021/22 fishery harvest

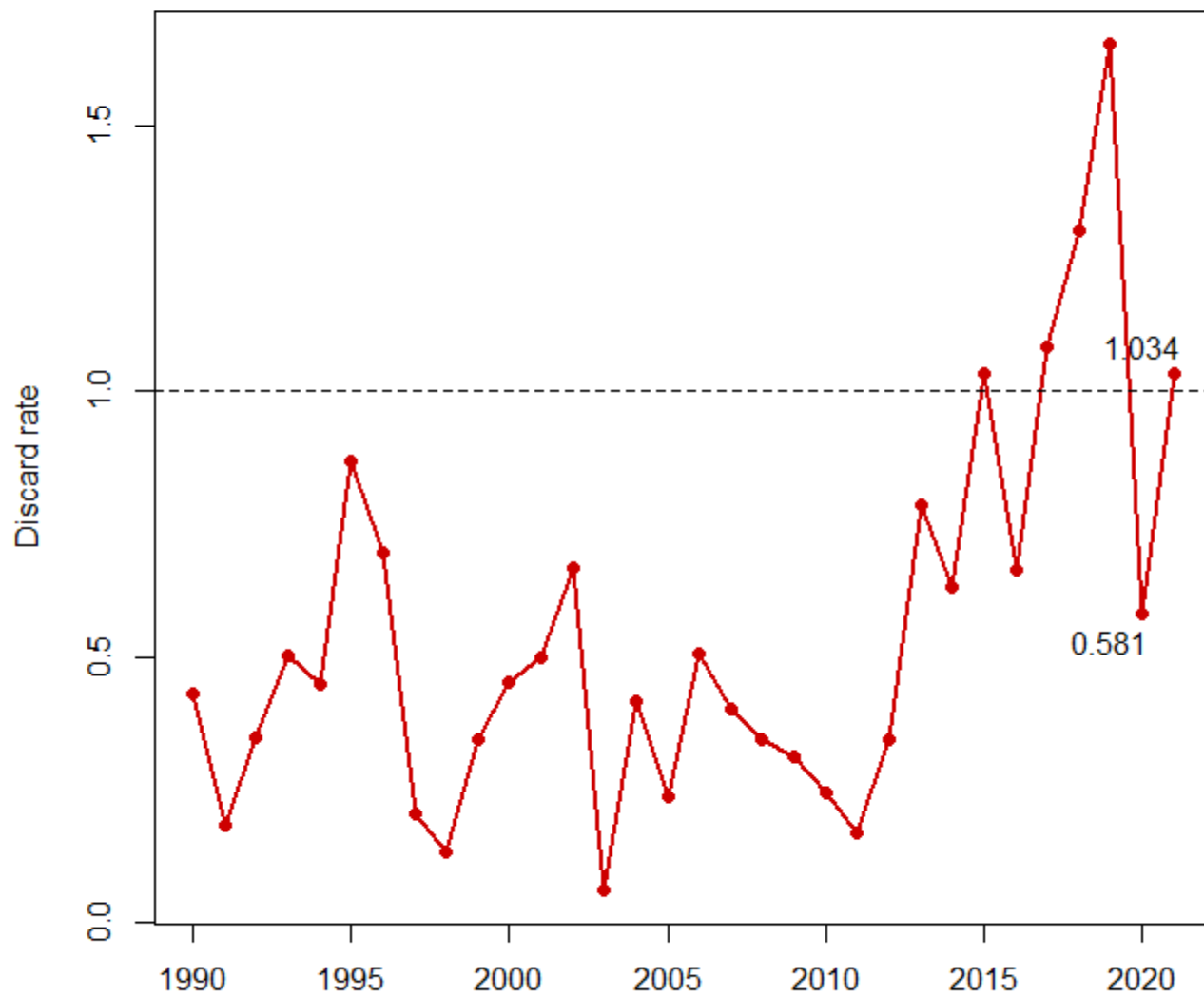
2021/22 Snow crab: observations from the fleet

- Captains reported much smaller areas of high CPUE fishing compared to 2020/21.
- Most of the season described by captains as “pothole fishing” where there were only small pockets of high CPUE fishing that didn’t hold up to setting gear back on.
- Heavy freezing spray conditions and significant sea ice coverage throughout most of the season made operating especially challenging.

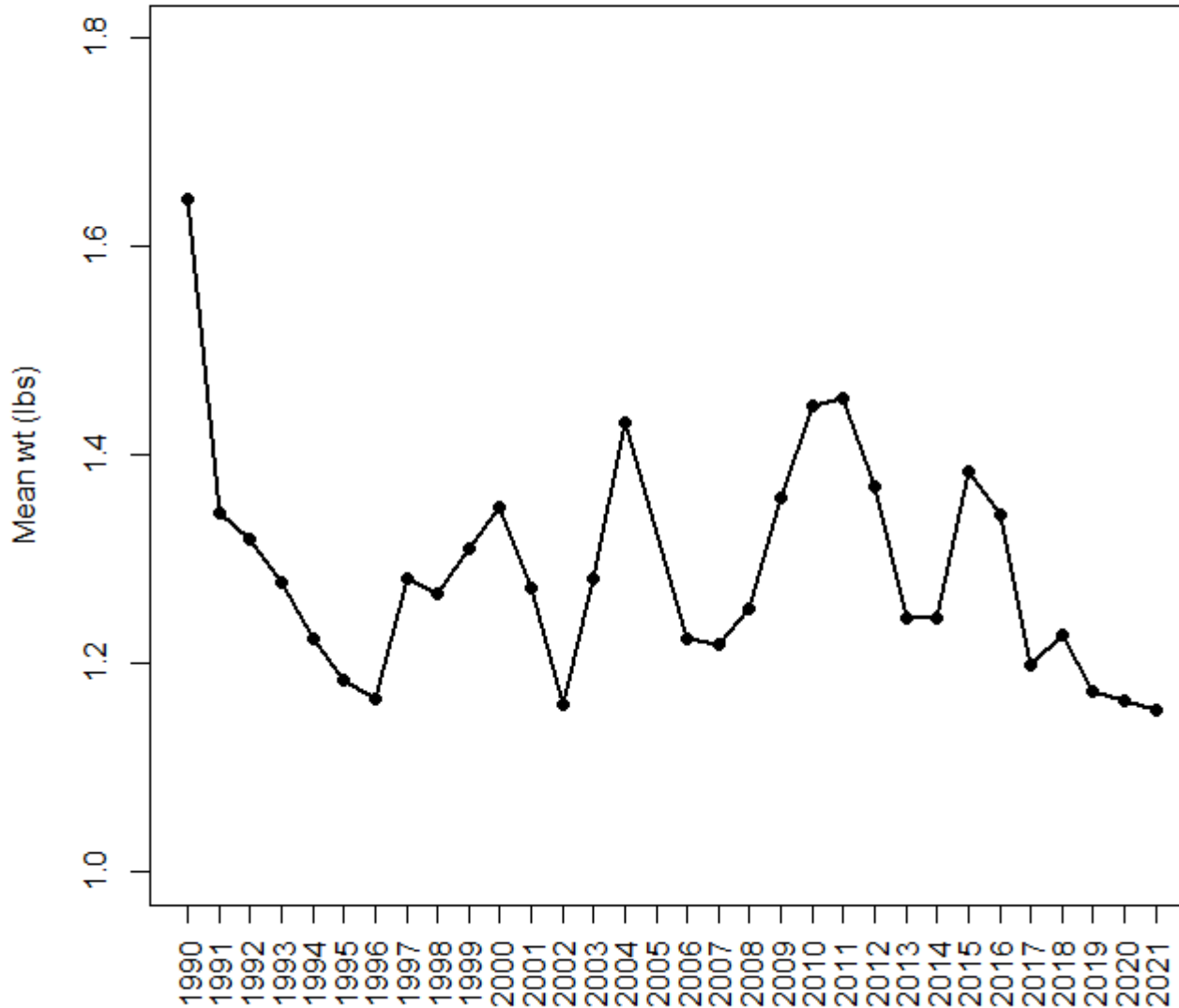
Snow crab discard mortality rate



snow crab legal male discard rate

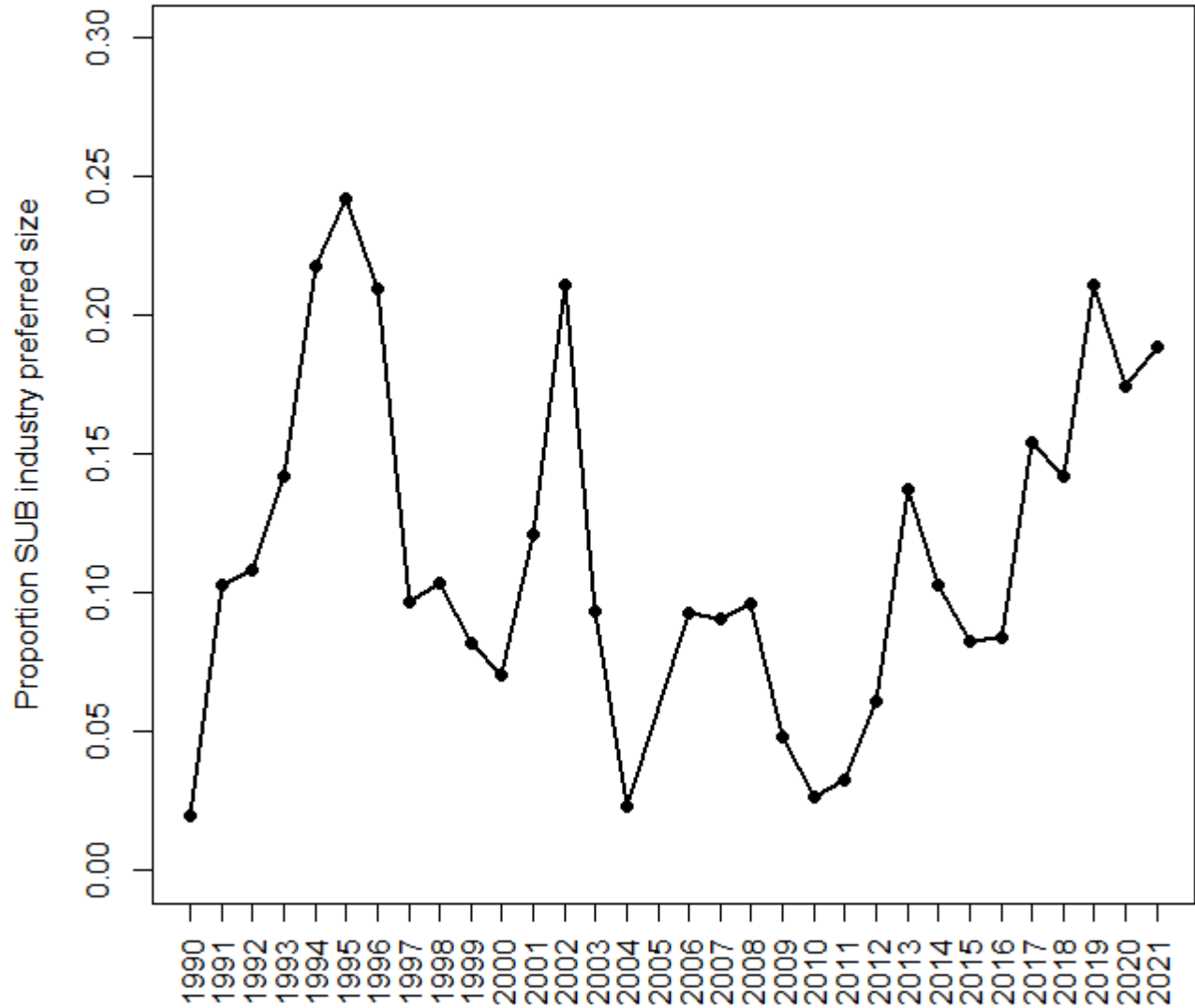


Retained catch (dockside data)



Declining
retained
catch mean
wts

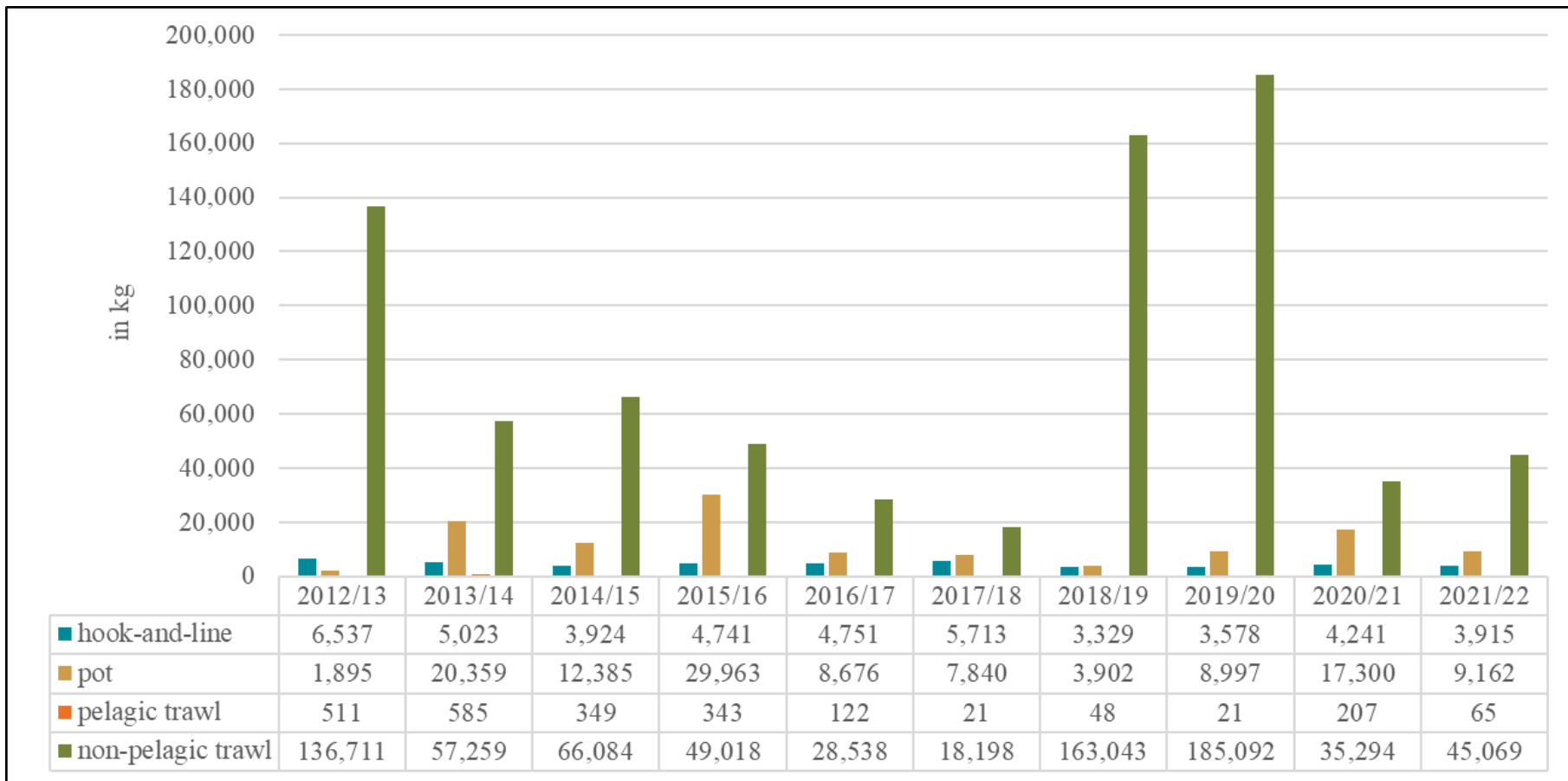
Retained catch (dockside data)



Increasing proportion sub-4-inch crab

I.e., Retaining more small crab

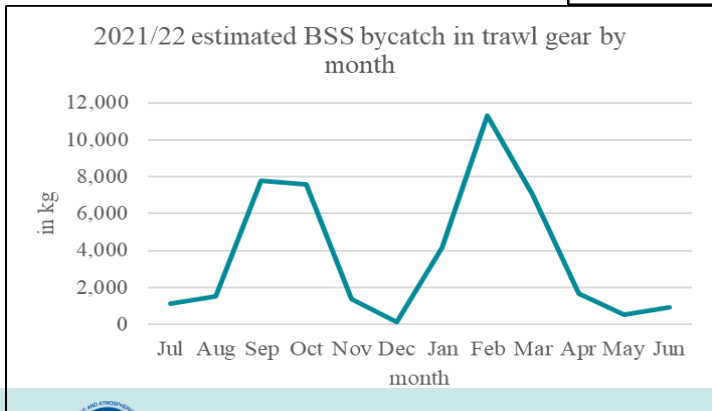
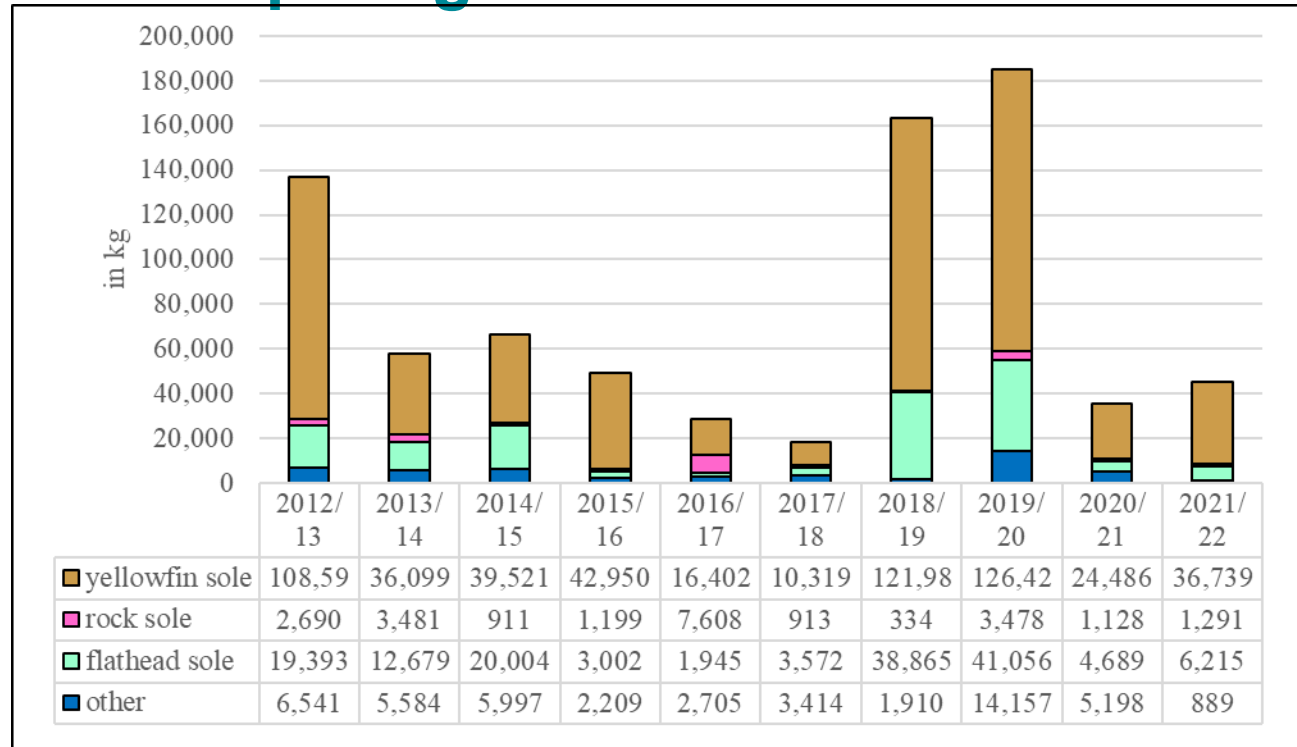
Bering Sea Snow Crab Incidental Catch in Groundfish Fisheries



- Pot and hook-and-line Pacific cod fishing accounts for most BSS bycatch in the fixed gear category.
- Hook-and-line Pacific cod fishing is spread out throughout the stock area.
- Pot Pacific cod fishing is concentrated on the north side of Unimak Island to Port Moller.

Bering Sea Snow Crab Trawl Incidental Catch by Trip Target

- 2018/19 and 2019/20 increased BSS bycatch in the yellowfin fishery was due mainly to increased yellowfin sole fishing in the area above the Pribilof Islands.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, and pollock.

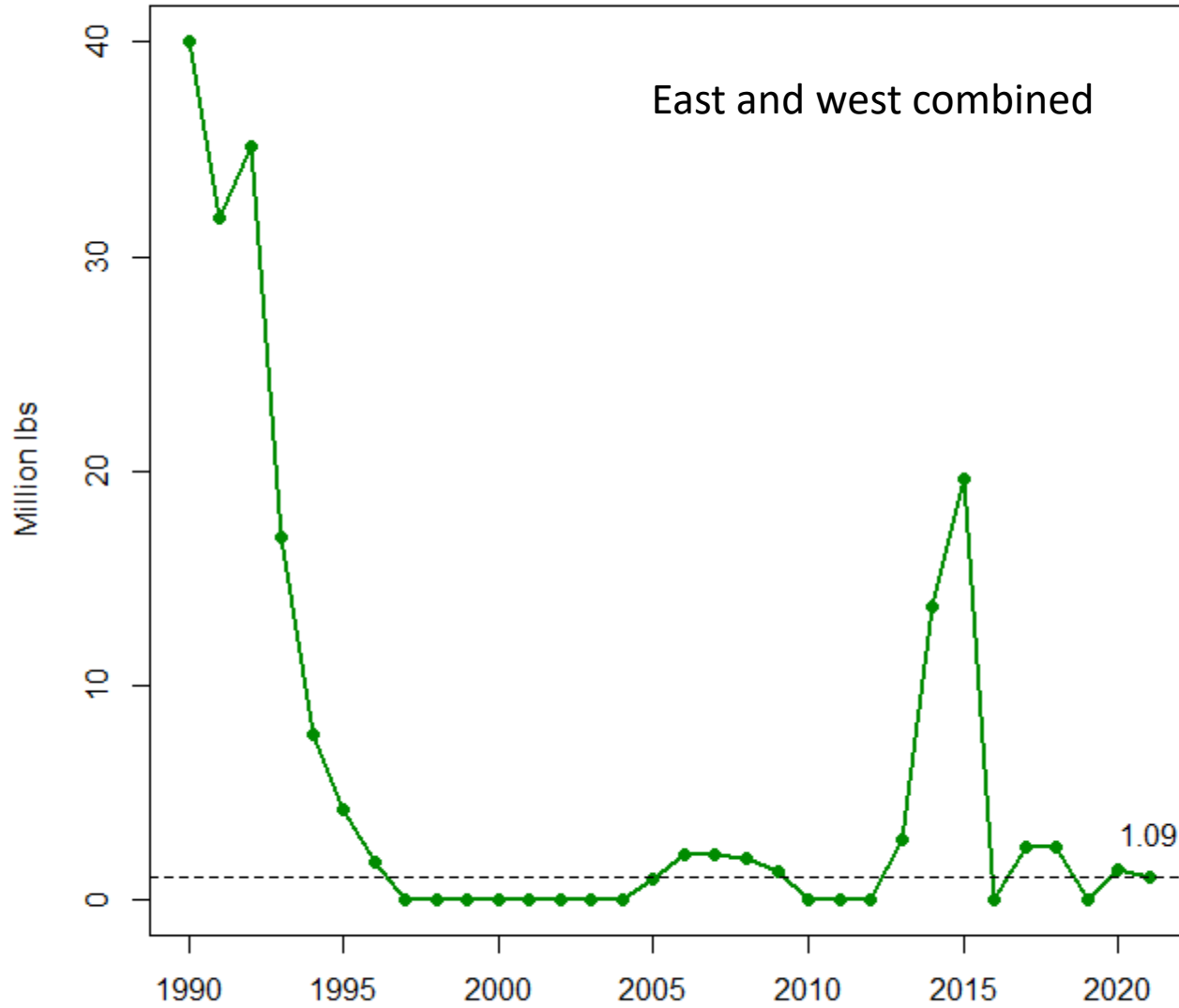


- Bycatch of BSS in trawl gear typically occurs throughout the crab year.
- In 2021/22 bycatch was highest in Feb/March during the yellowfin sole fishery.
- Rates are more consistent throughout the year.
- Majority of yellowfin/flathead harvest occurred Feb-May.



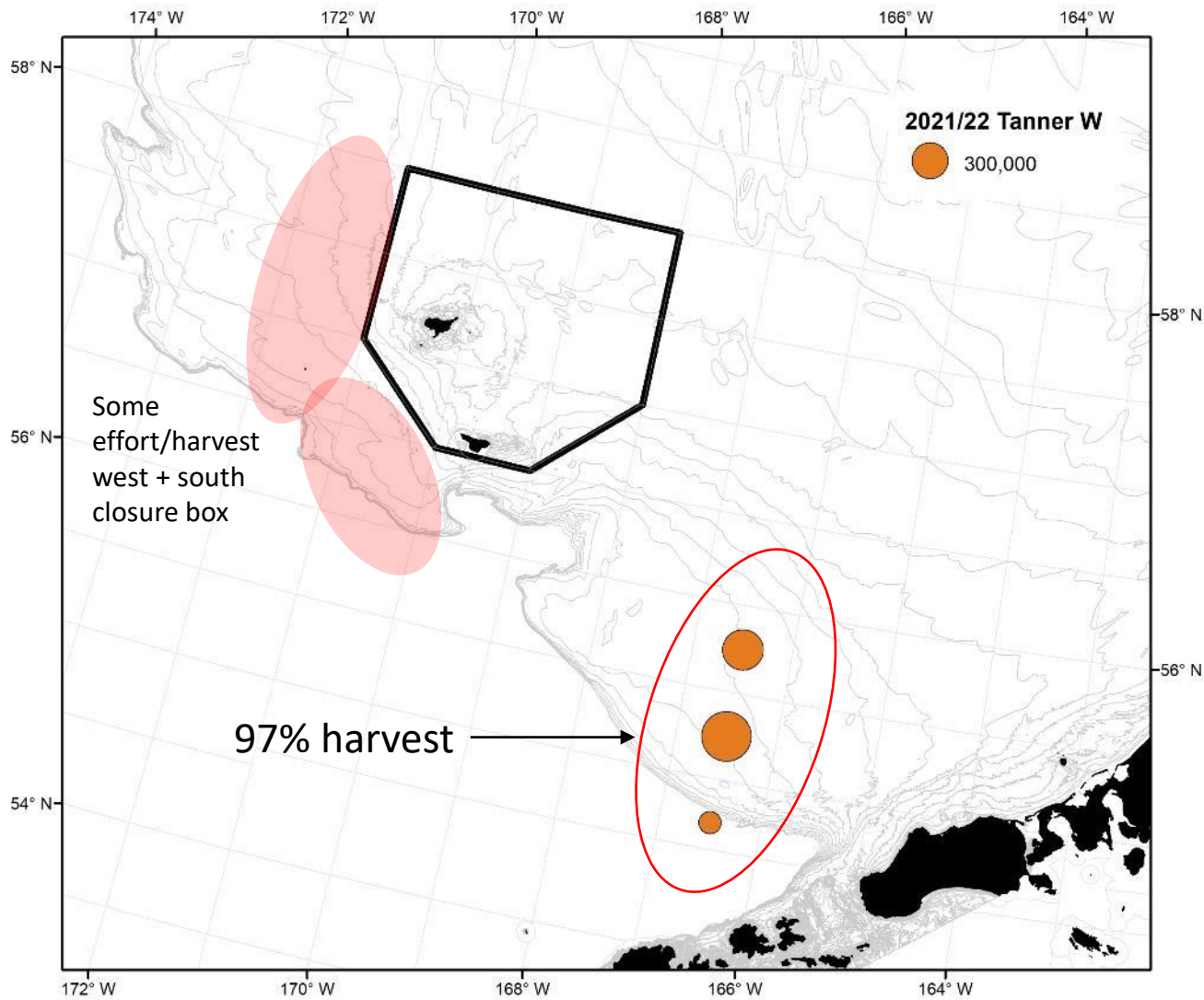
Tanner crab

Tanner crab retained catch



2021/22 TAC East=0, **West=1.1** mill lb

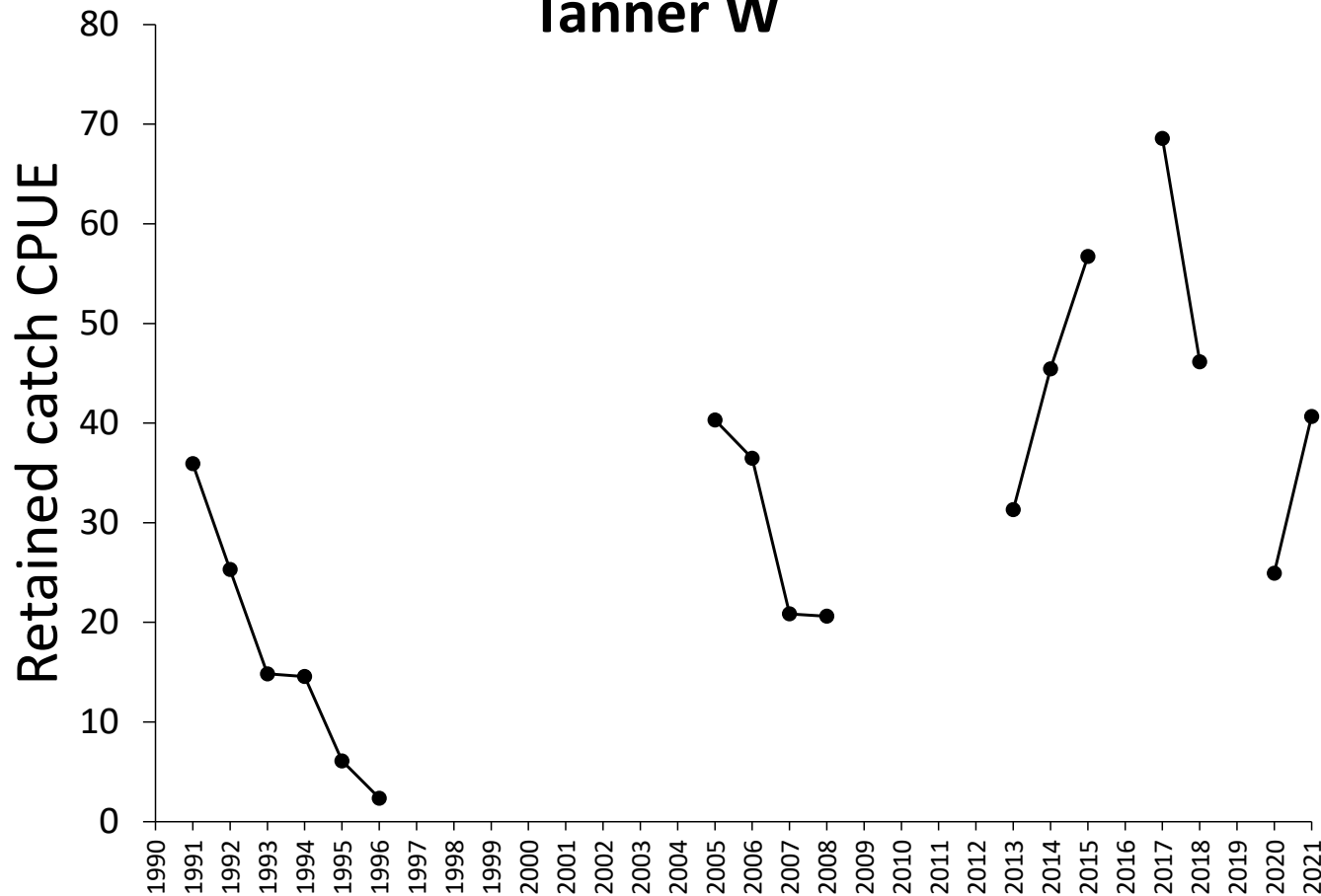
2021/22 Tanner crab retained catch



* Excludes stat
areas with <3
vessels

Retained catch CPUE

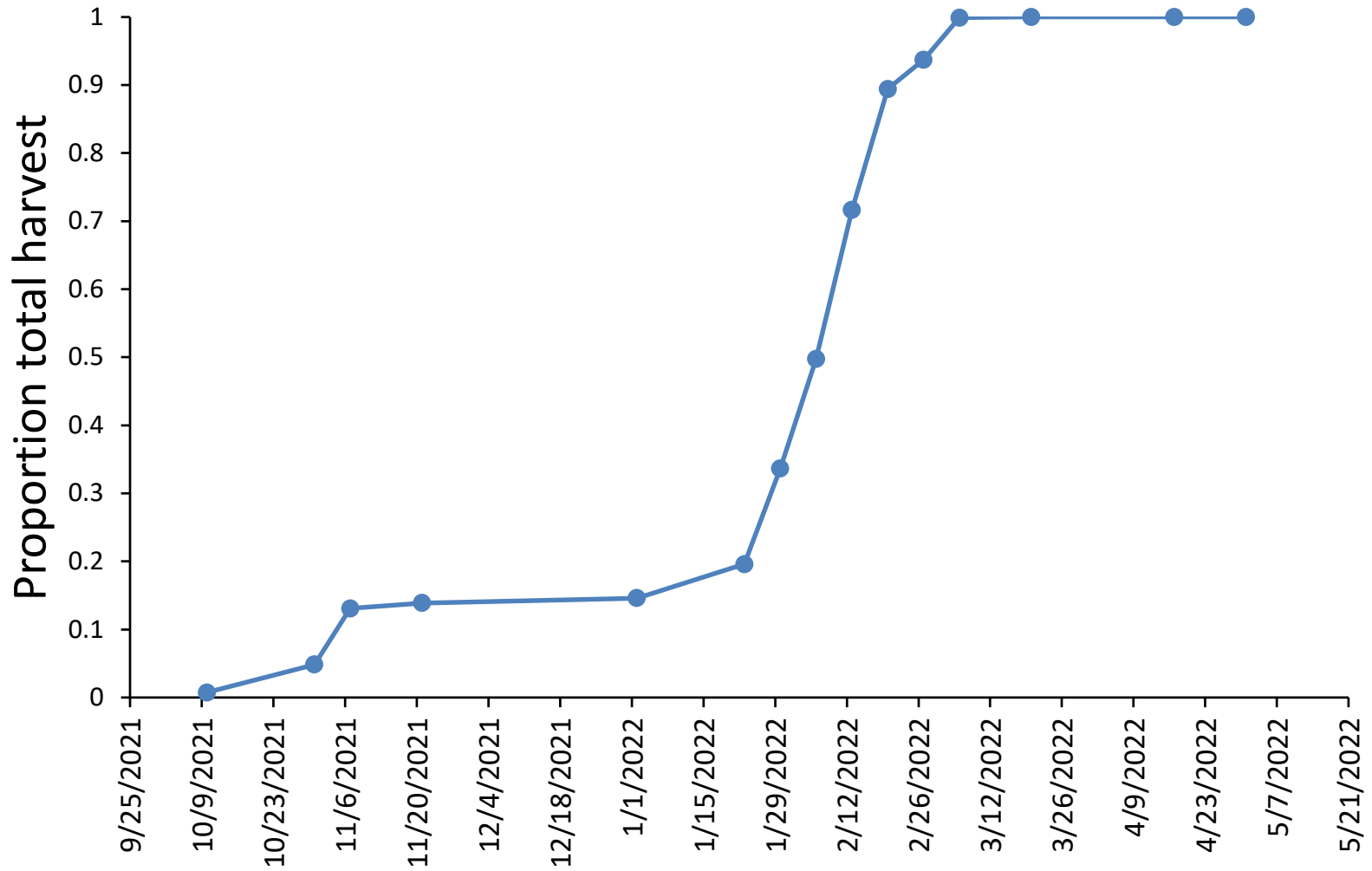
Tanner W



2021/22 CPUE approximated rationalized timeseries average, 40 crab/pot

2021/22 Tanner crab

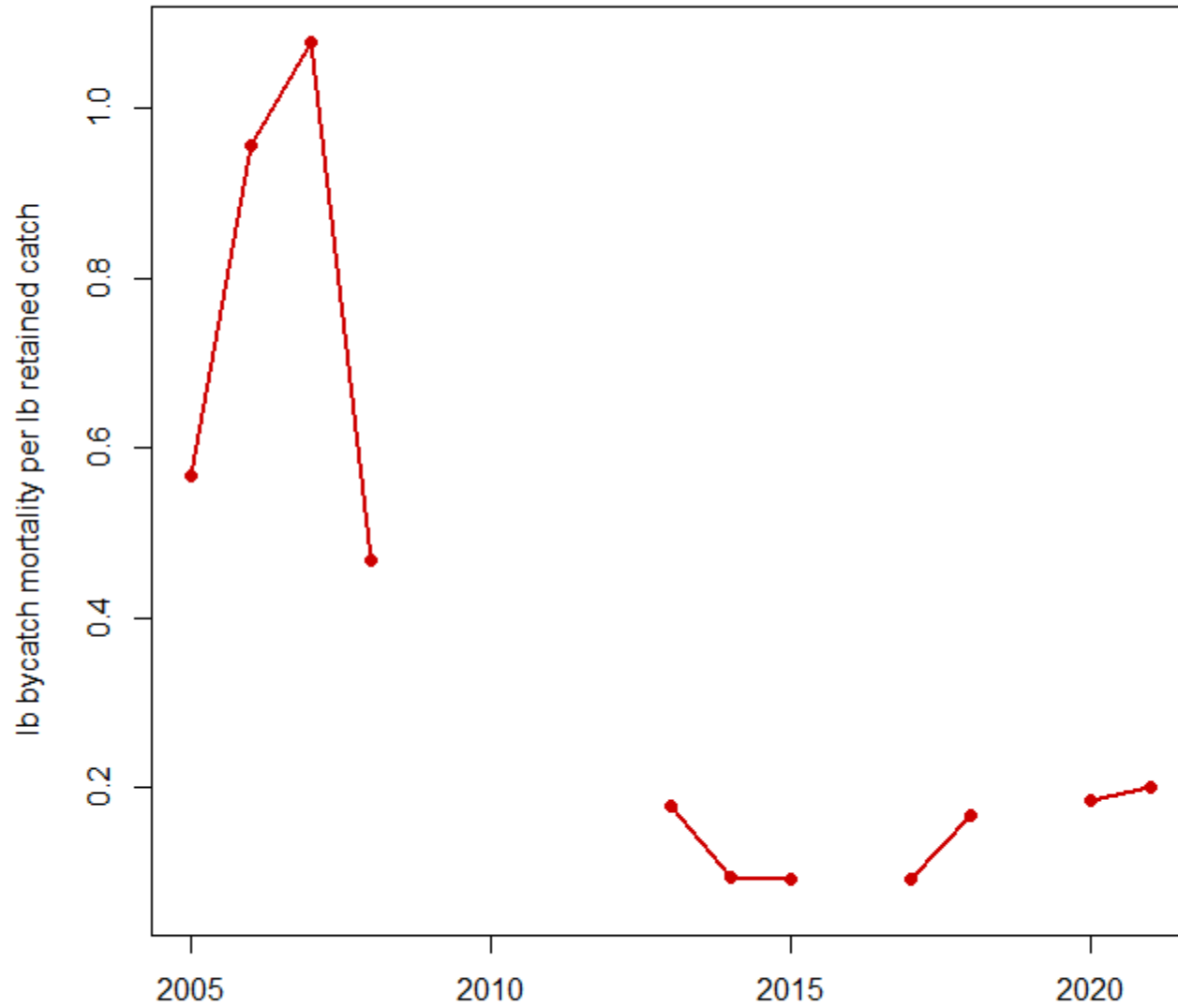
Tanner W



2021/22 WBT: observations from the fleet

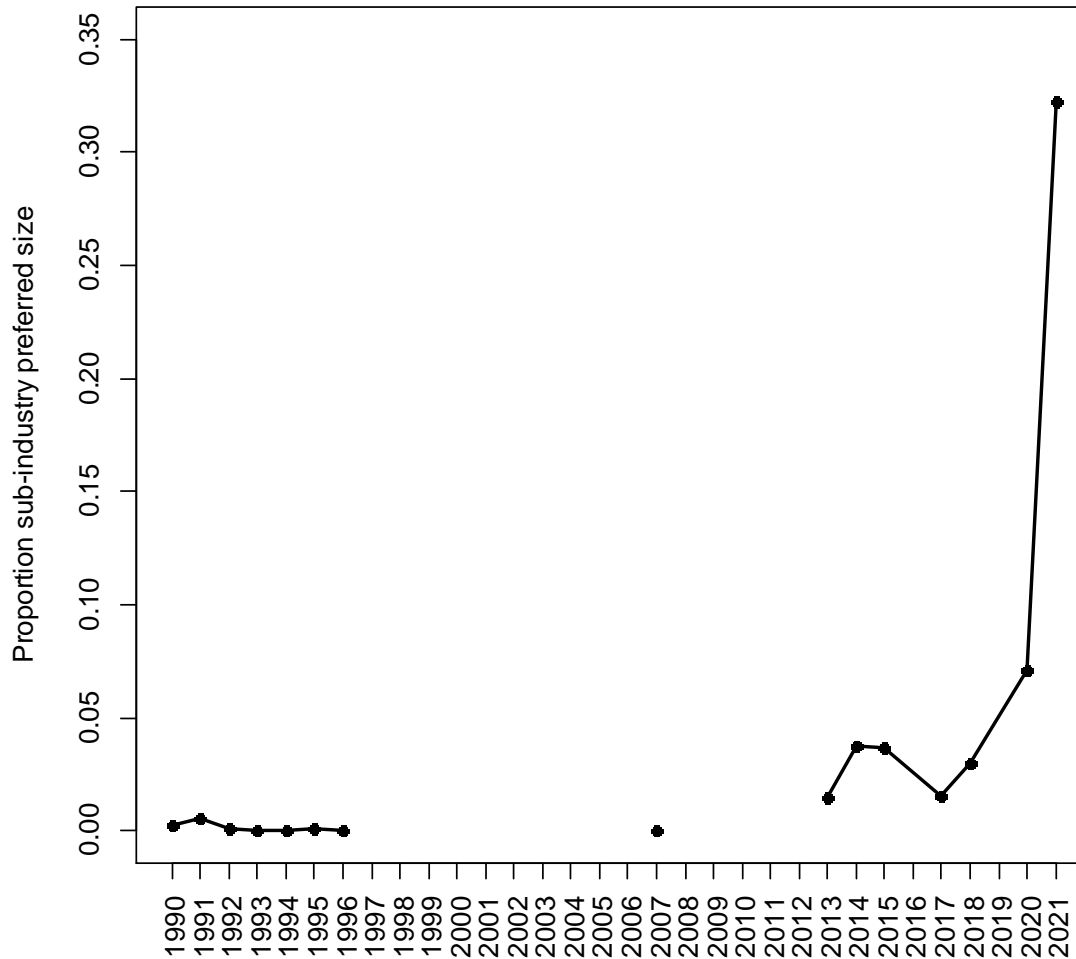
- High CPUE fishing on new-shell crab along the 166° W long. boundary in the southeastern most part of the grounds. Some captains reported this area was the best Tanner fishing they had ever seen.
- Low CPUE fishing around the Pribilof Islands. Discouraging given that this is the traditional Tanner fishing grounds.
- No effort at all on the east side of the Pribilof Islands due to low CPUE seen in the previous two seasons.
- High concern about bottom trawl flatfish fisheries E/W of the Pribilof Islands impacting both Tanner crab numbers and habitat.
- Observation that the current high CPUE fishing areas in the southeasternmost portion of the grounds are areas that see relatively little bottom trawl effort.

Tanner crab discard mortality rate



Retained Catch

Retained catch (dockside data)

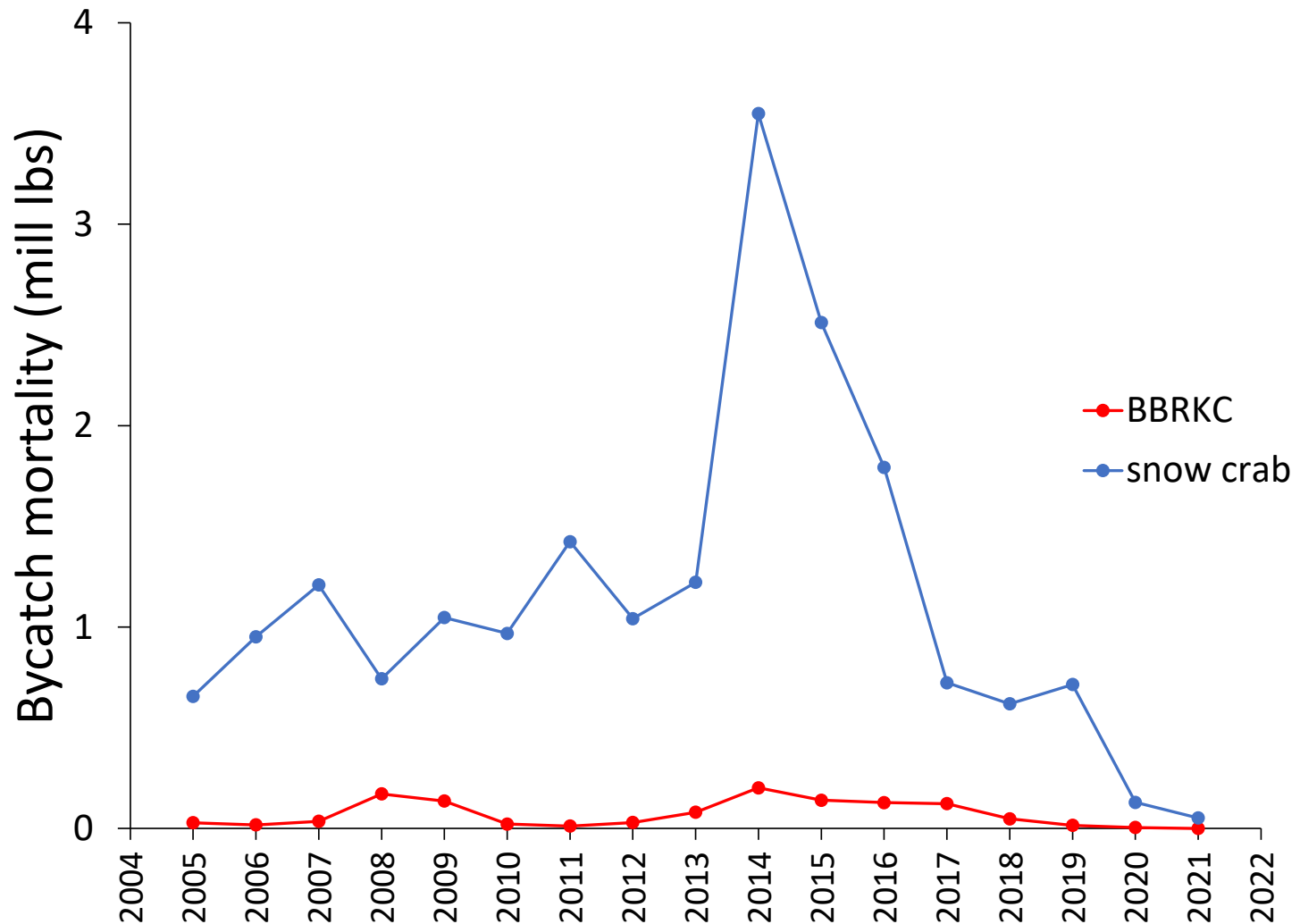


Legal size: 4.4 inches
Preferred size: 5 inches

With small snow crab TAC, there was market for small Tanner crab in place of snow crab.

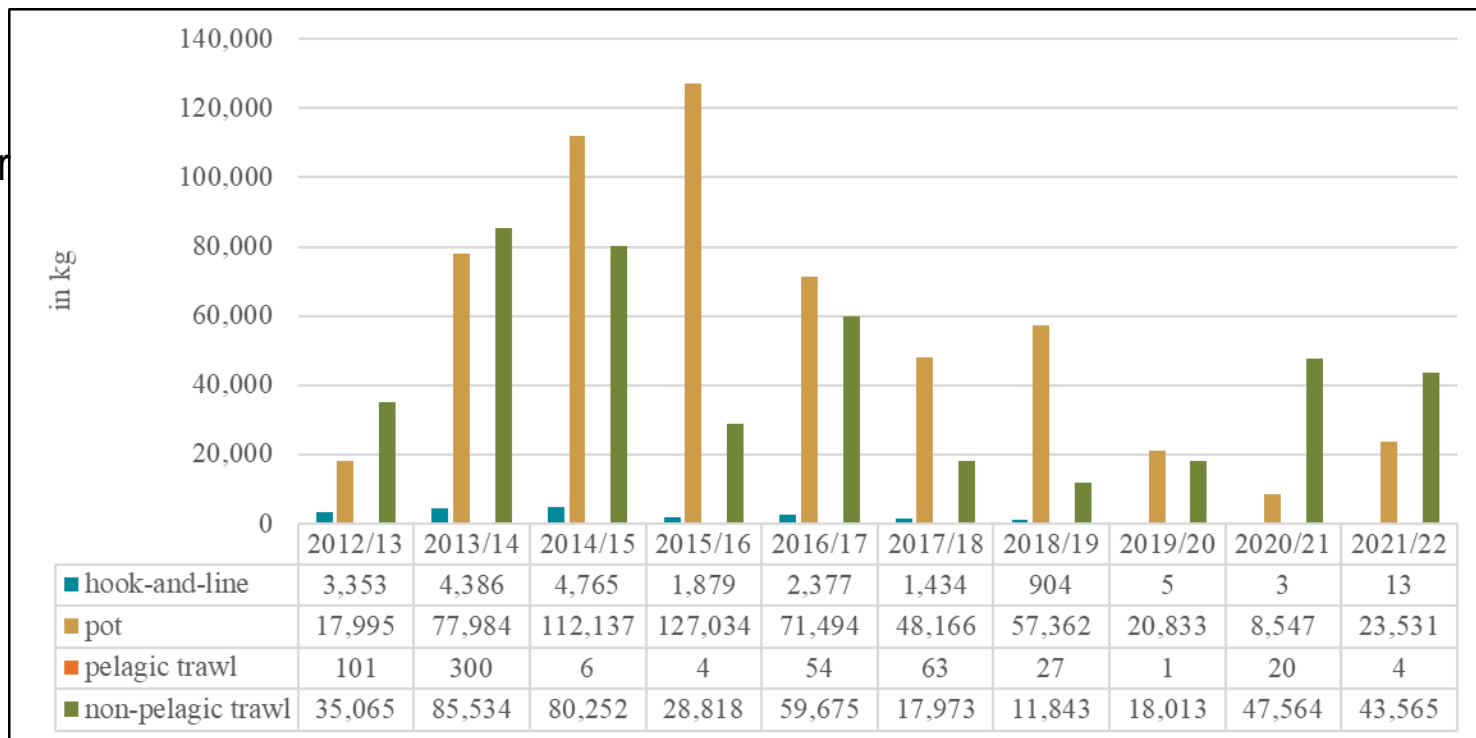
Most vessels retained down to smaller sizes than in the past.

Non-directed crab fisheries



Eastern Bering Sea Tanner Crab Incidental Catch in Groundfish Fisheries (East of 166° W)

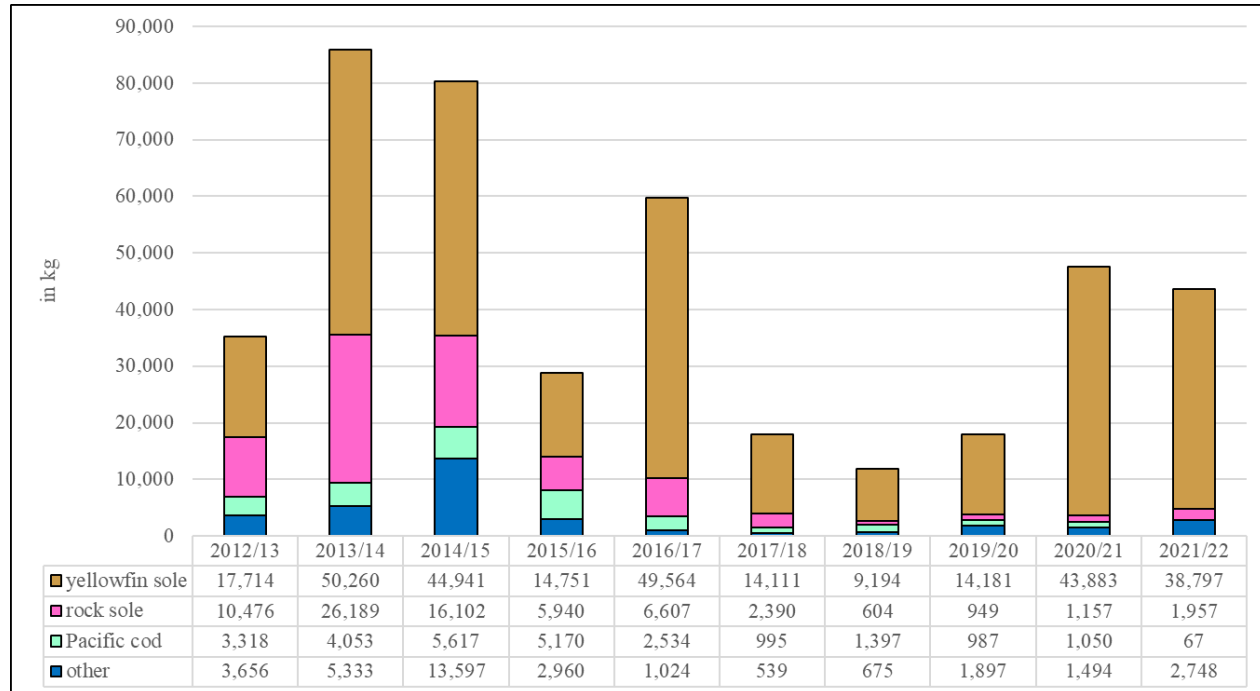
- Pacific cod fishing with pot gear accounts for most EBST bycatch in the fixed gear category.
- Pot Pacific cod fishing is concentrated on the north side of Unimak Island to Port Moller.



- Lower EBST rates during the 2020/21 crab year in the fixed gear sectors could be due to:
 - Lower observer coverage in the pot Pacific cod fishery in the fall of 2020 due to COVID (although there was EM data in this sector)
 - Lower Pacific cod TACs
 - Pacific cod pot fleet using more gear with crab excluders

Eastern Bering Sea Tanner Crab Trawl Incidental Catch by Trip Target (East of 166° W)

- The majority of bycatch in 2021/22 was from January to April and again from August to November.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, flathead sole, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, sablefish, and pollock.

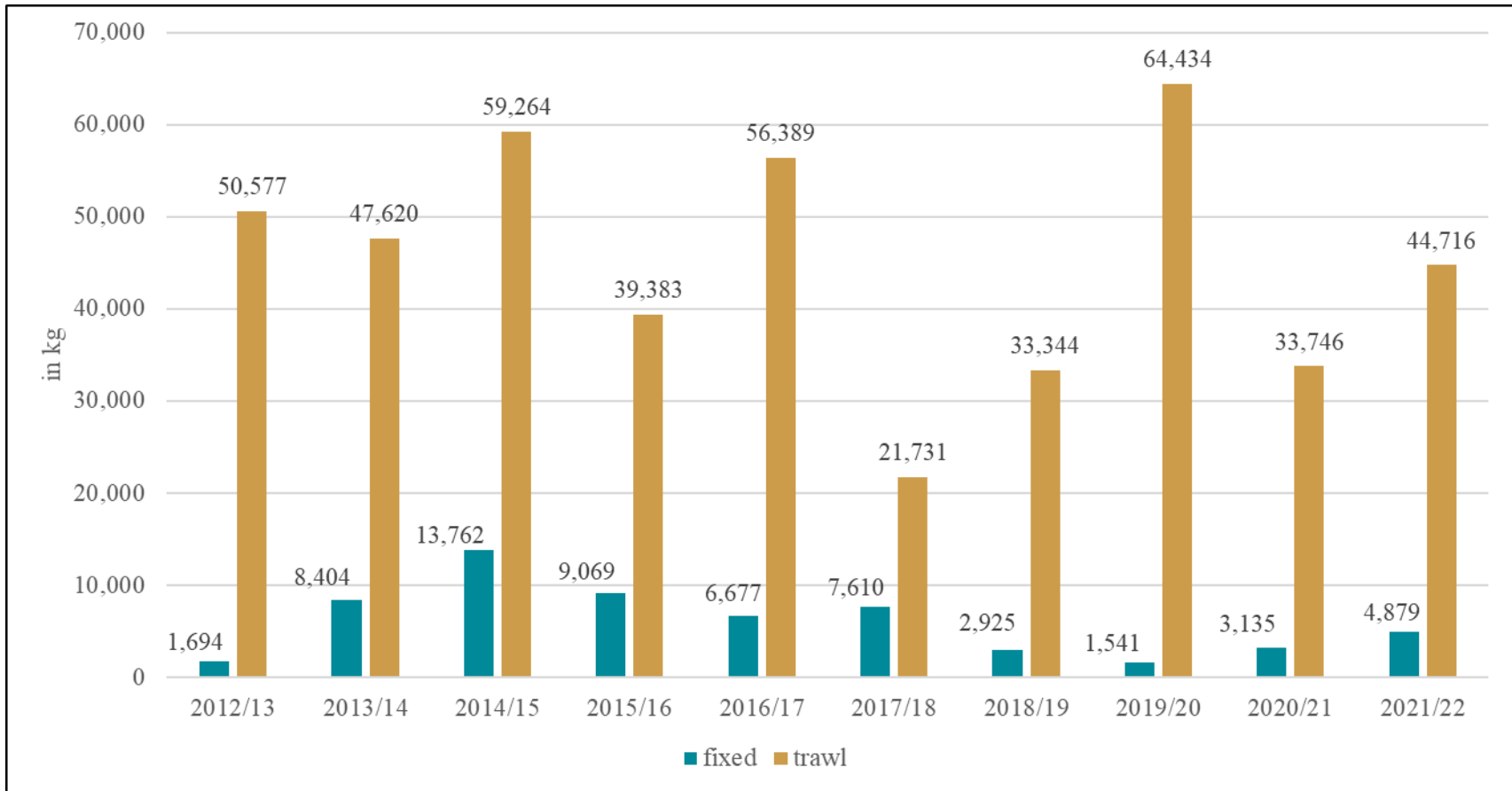


2021/22 estimated EBST bycatch in trawl gear by month



- Bycatch of EBST in trawl gear typically occurs throughout the crab year.
- In 2021/22 bycatch was highest Sept/Oct during the yellowfin sole fishery due to high Tanner crab rates in the stock area.
- Majority of yellowfin harvest in stock area occurred April-May when the crab bycatch rates were lower.

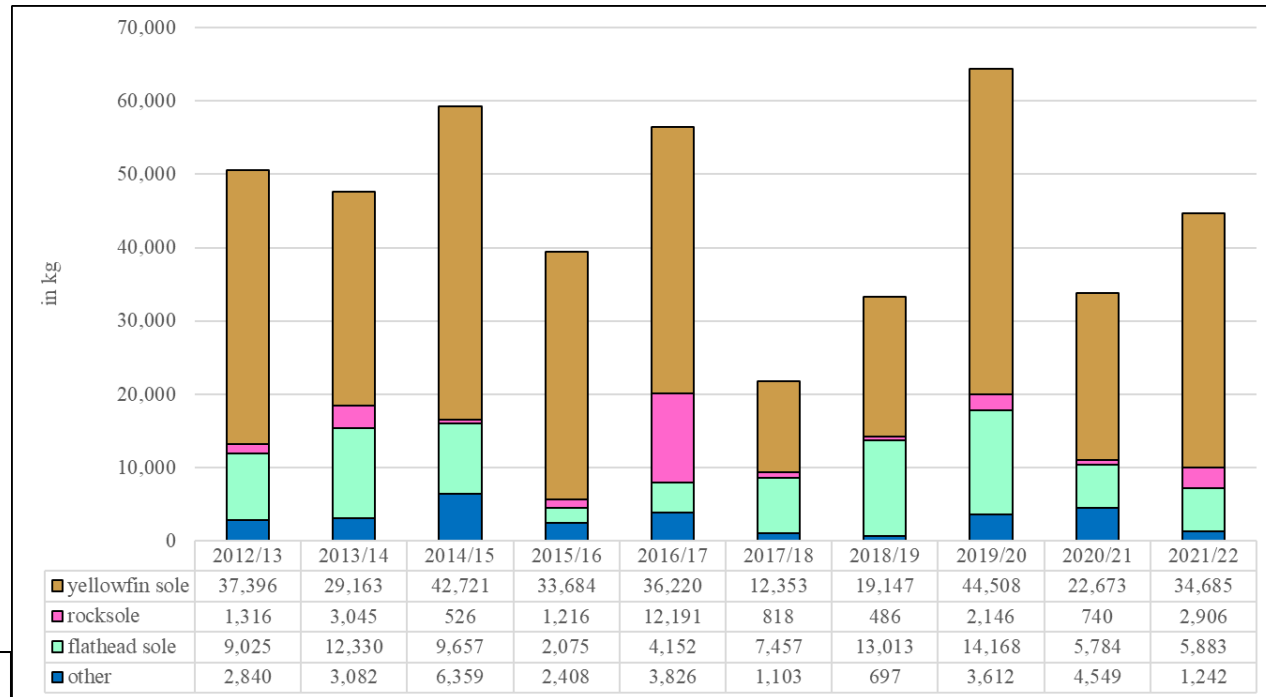
Western Bering Sea Tanner Crab Incidental Catch in Groundfish Fisheries (West of 166° W)



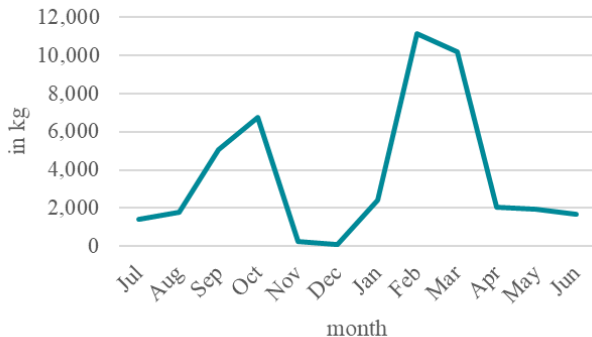
- WBST bycatch in fixed gear is mostly from hook-and-line and pot Pacific cod fisheries.
- Pot catcher vessels do not fish for groundfish in the WBST stock area as much as in the EBST stock area which results in less fixed gear bycatch in the Western area than the Eastern area.

Western Bering Sea Tanner Crab Trawl Incidental Catch by Trip Target (West of 166° W)

- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, sablefish, and Pollock.



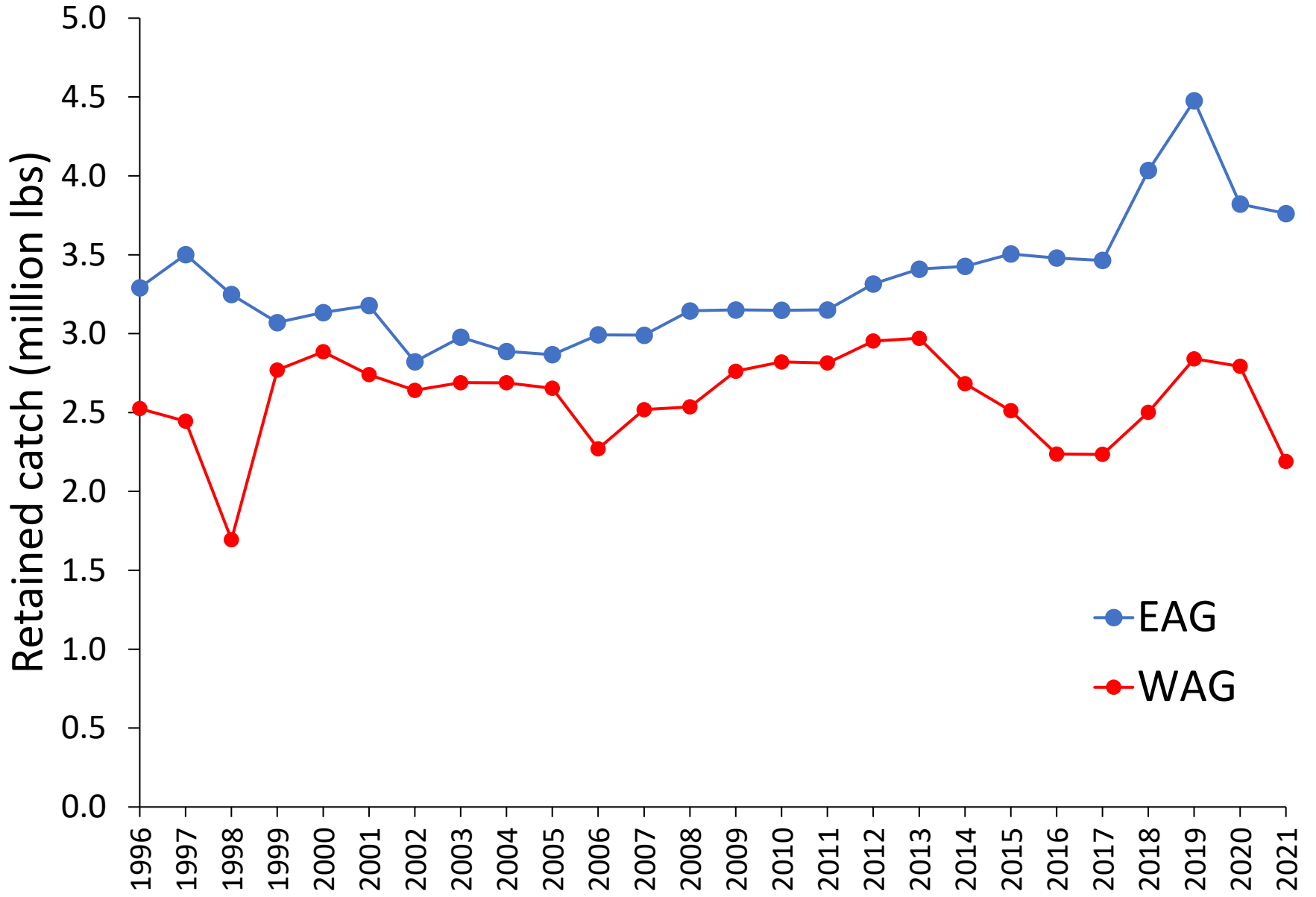
2021/22 estimated WBST bycatch in trawl gear by month



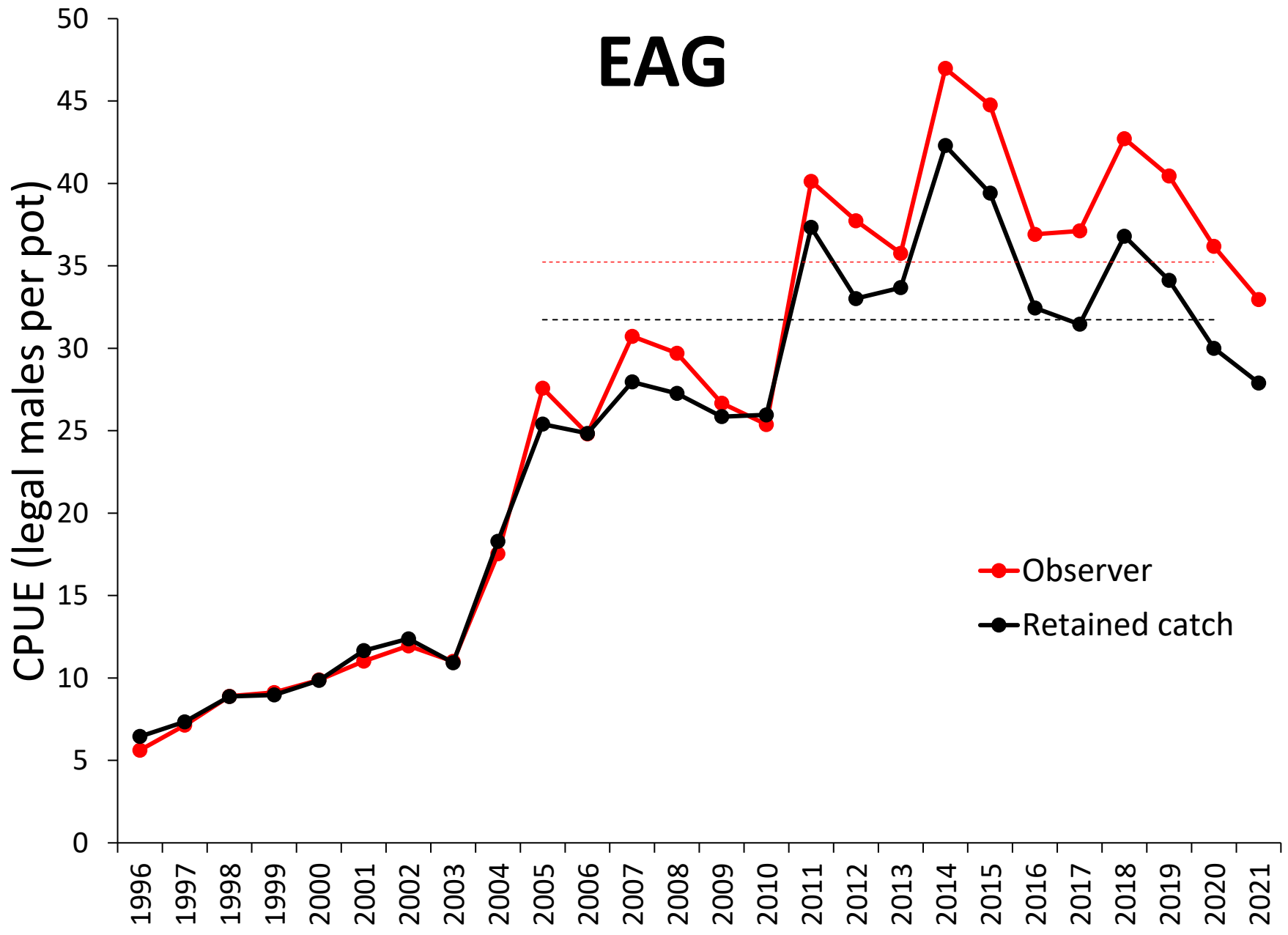
- Bycatch of WBST in trawl gear typically occurs throughout the crab year.
- In 2021/22 bycatch was highest Feb/March during the yellowfin sole fishery.
- Rates are more consistent throughout the year.
- Majority of yellowfin/flathead harvest in stock area occurred Feb-March

A dense crowd of crabs, likely in a market or processing area, with a central text box. The crabs are packed closely together, filling the entire frame. They have a mottled brown and purple coloration. The background is a light, hazy blue, suggesting an outdoor or semi-outdoor setting. A black rectangular box is centered over the image, containing the text "AIGKC" in a bold, black, sans-serif font.

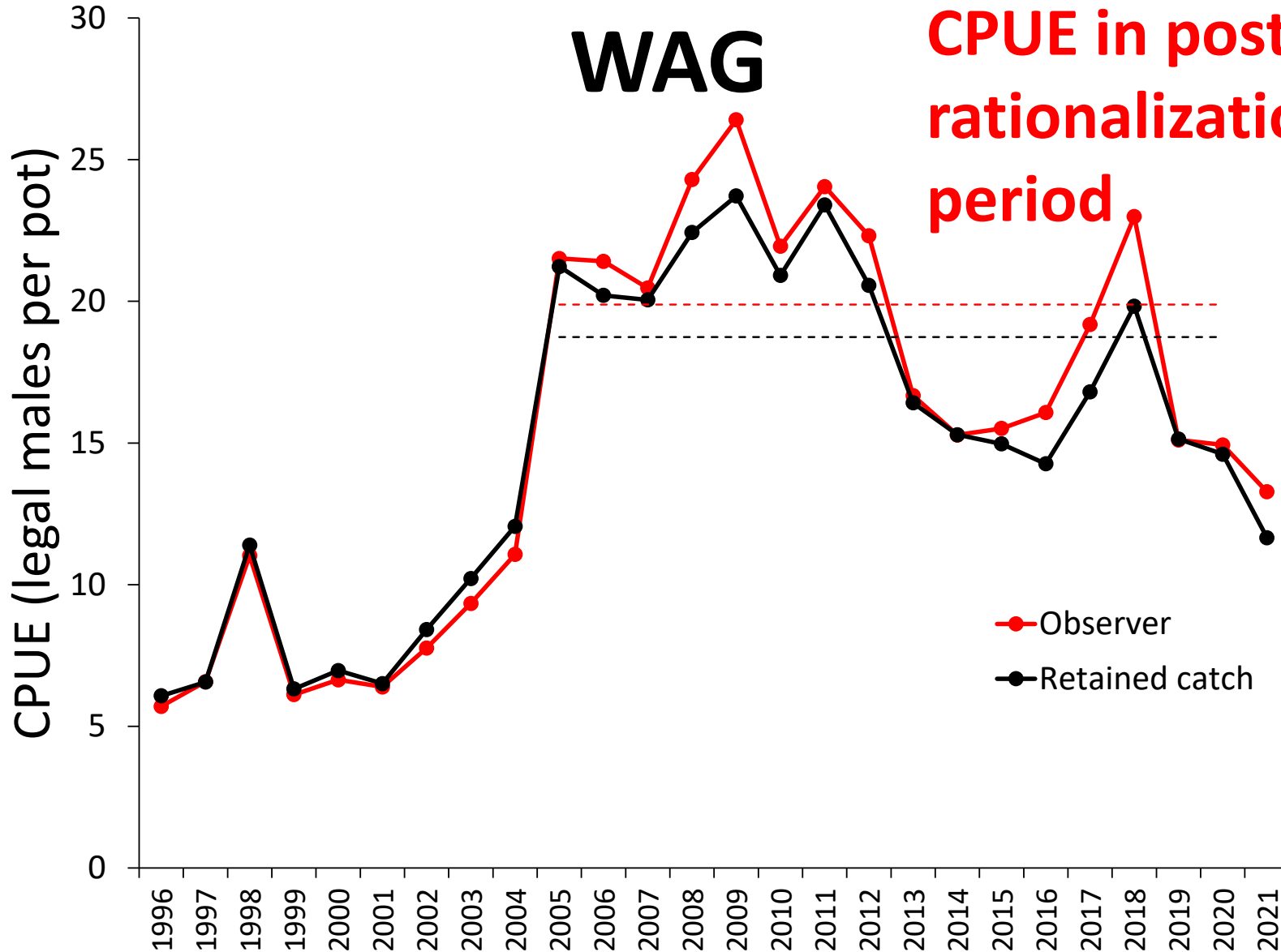
AIGKC



EAG



WAG

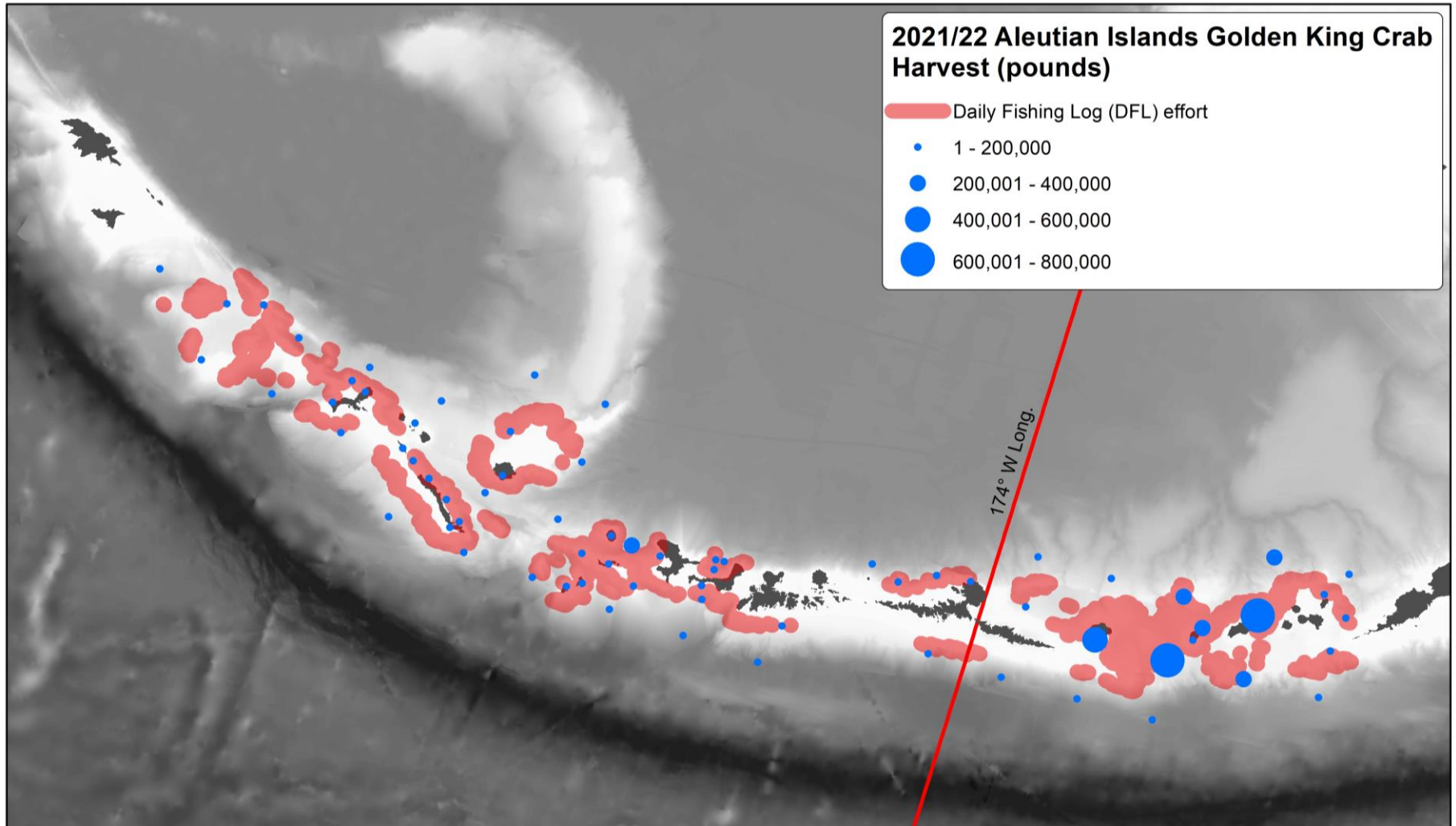


2021/22 lowest
CPUE in post-
rationalization
period

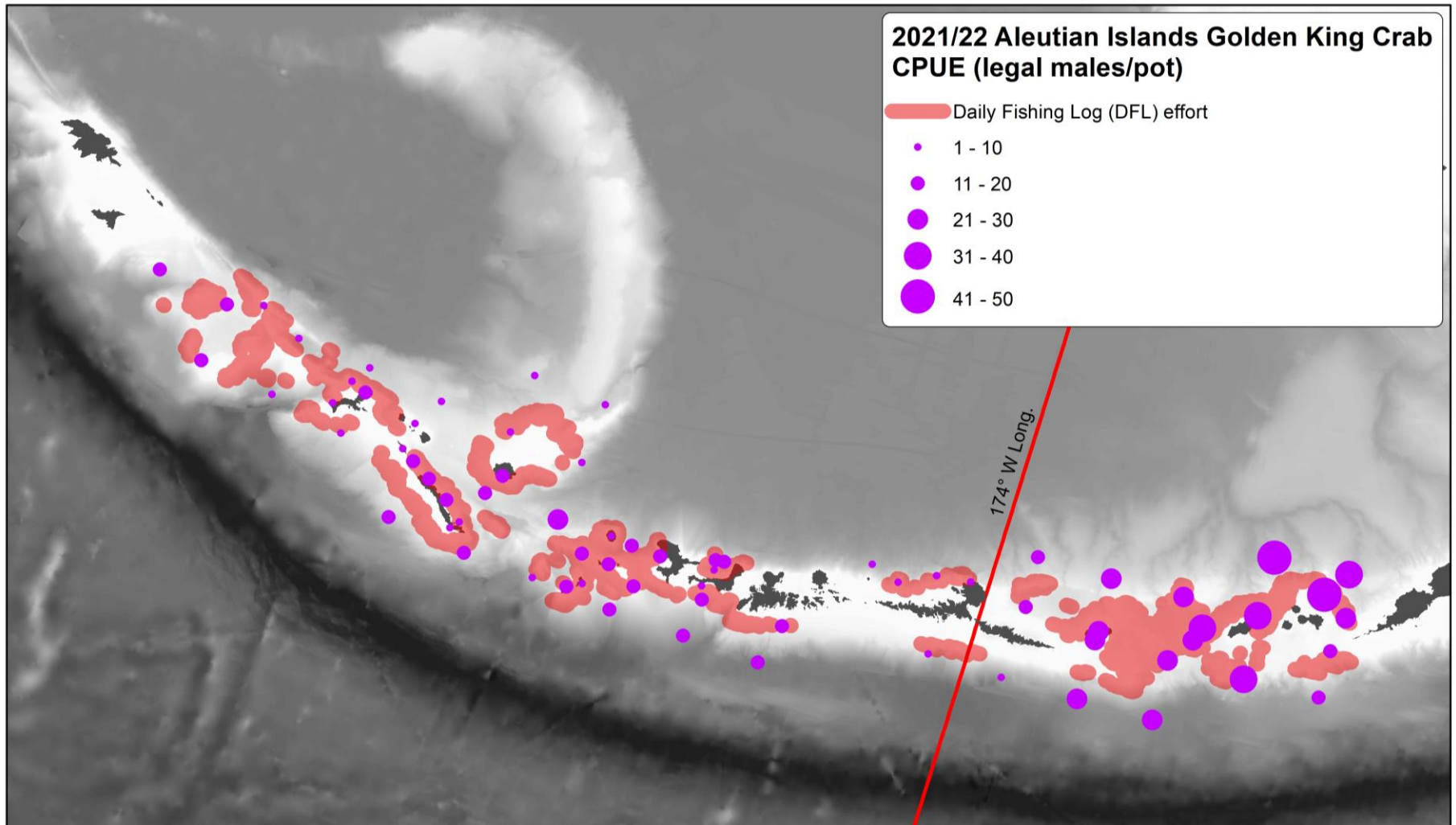
WAG

● Observer
● Retained catch

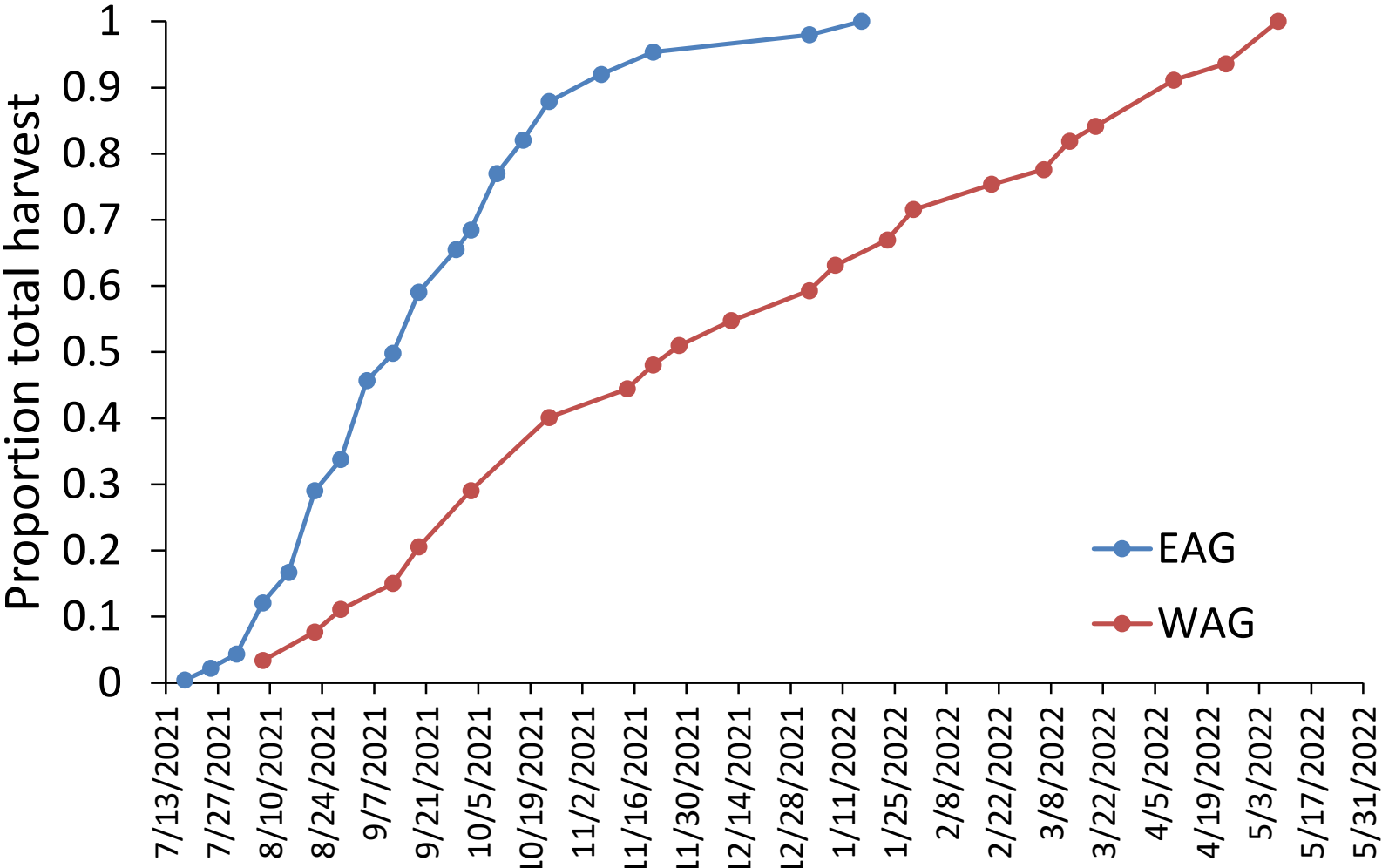
2021/22 Harvest Spatial Distribution



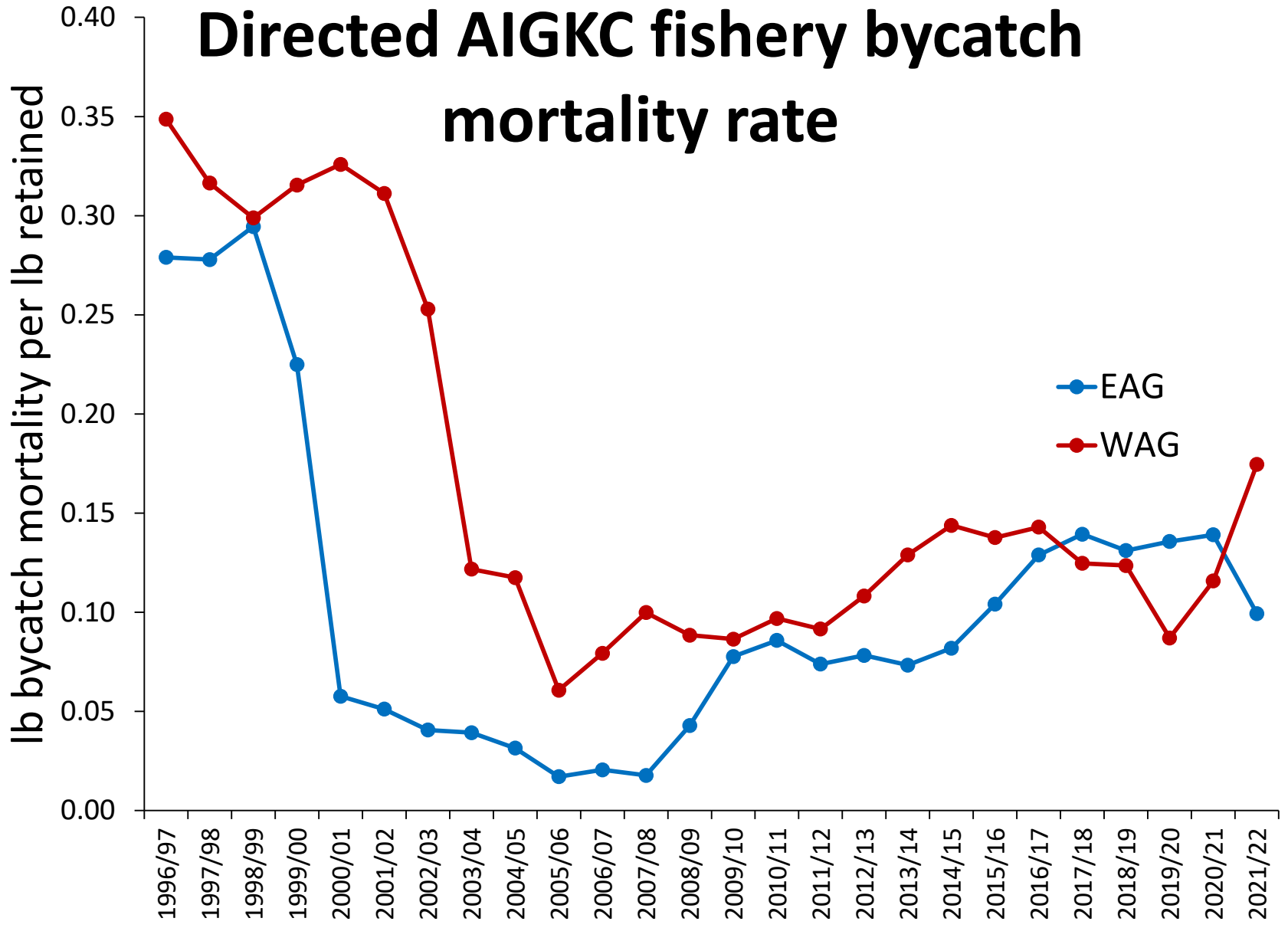
2021/22 CPUE Spatial Distribution



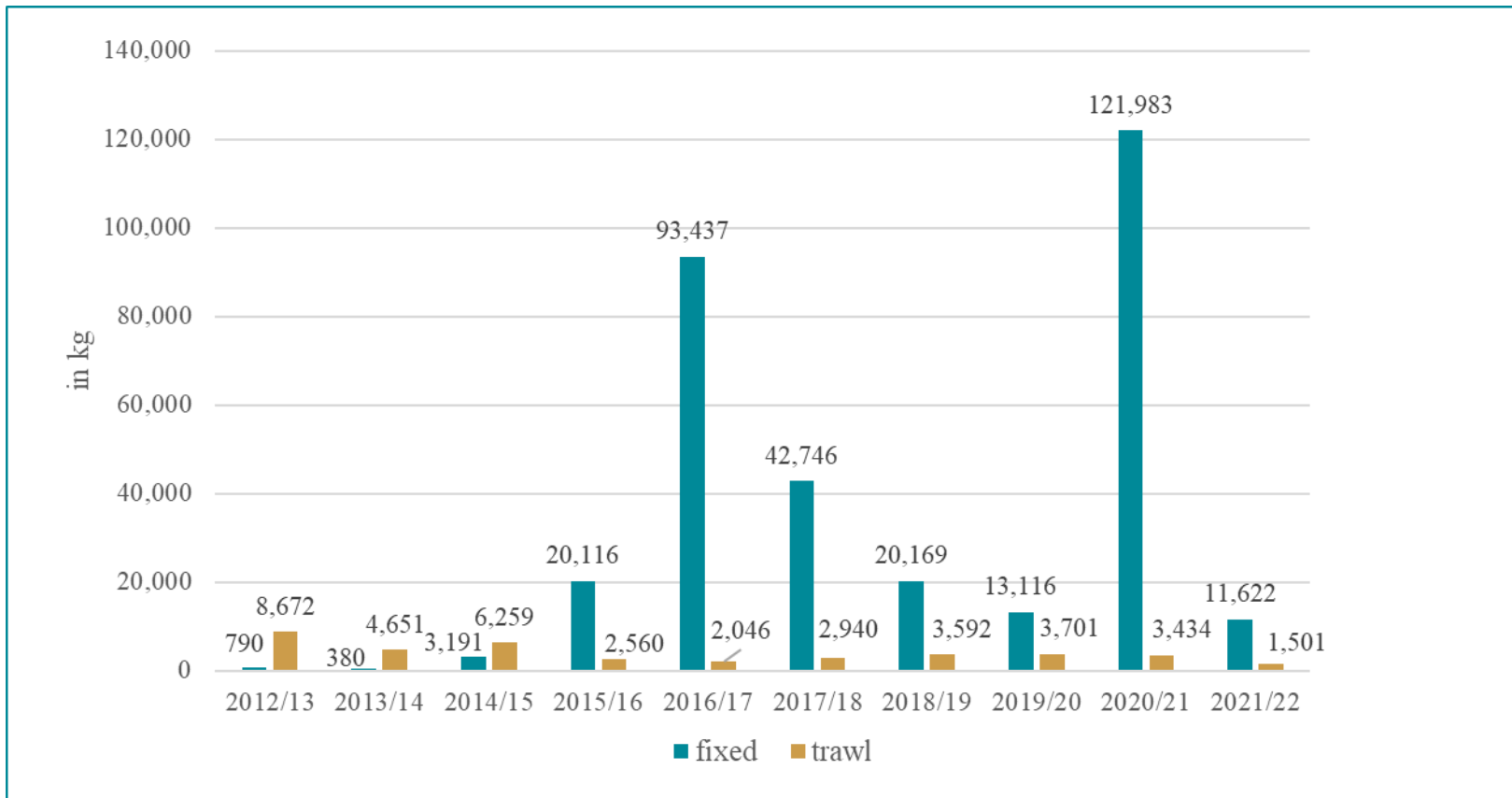
2021/22 AIGKC



Directed AIGKC fishery bycatch mortality rate

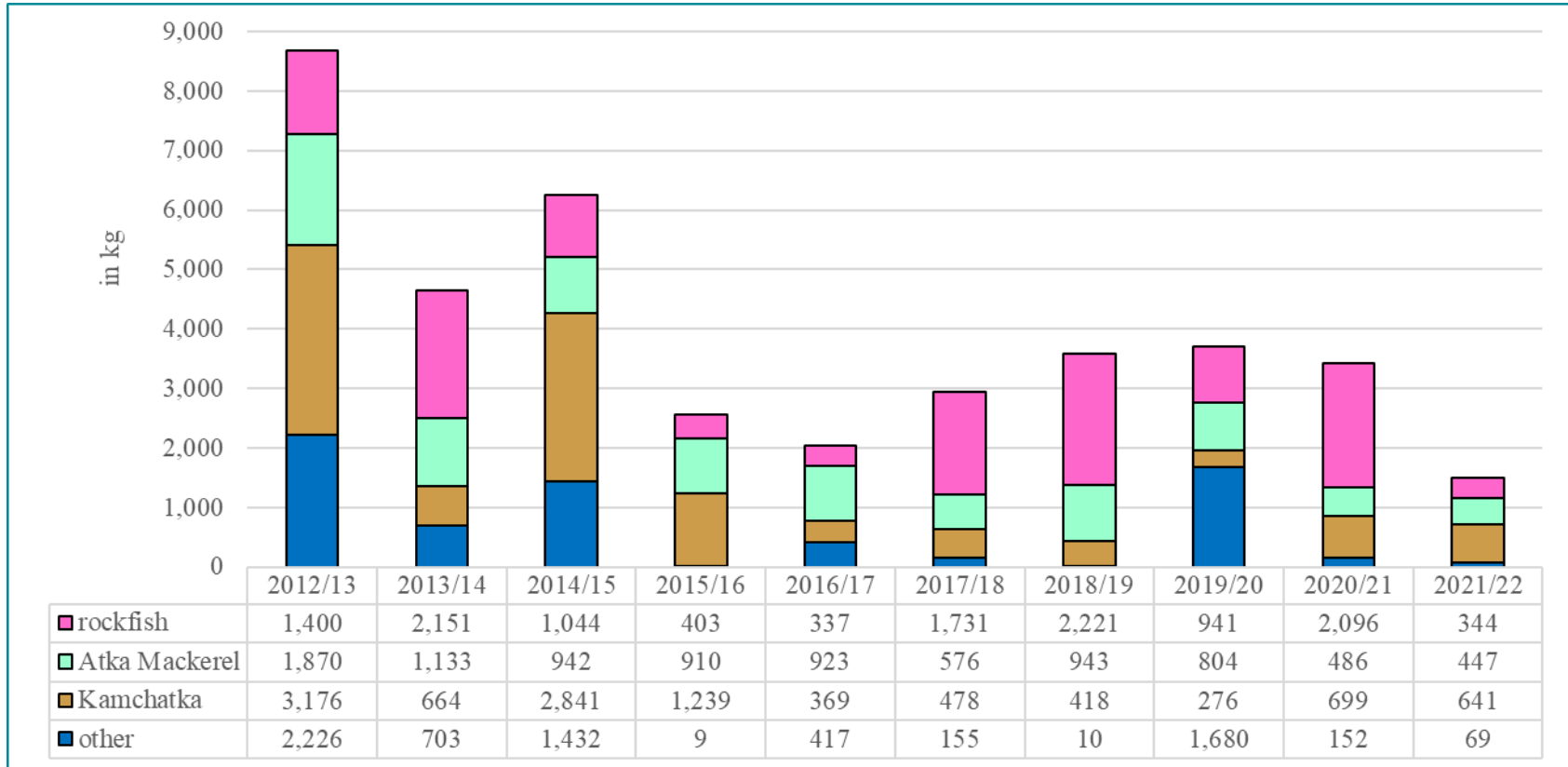


Eastern Aleutian Islands Golden King Crab Incidental Catch in Groundfish Fisheries (East of 174° W)



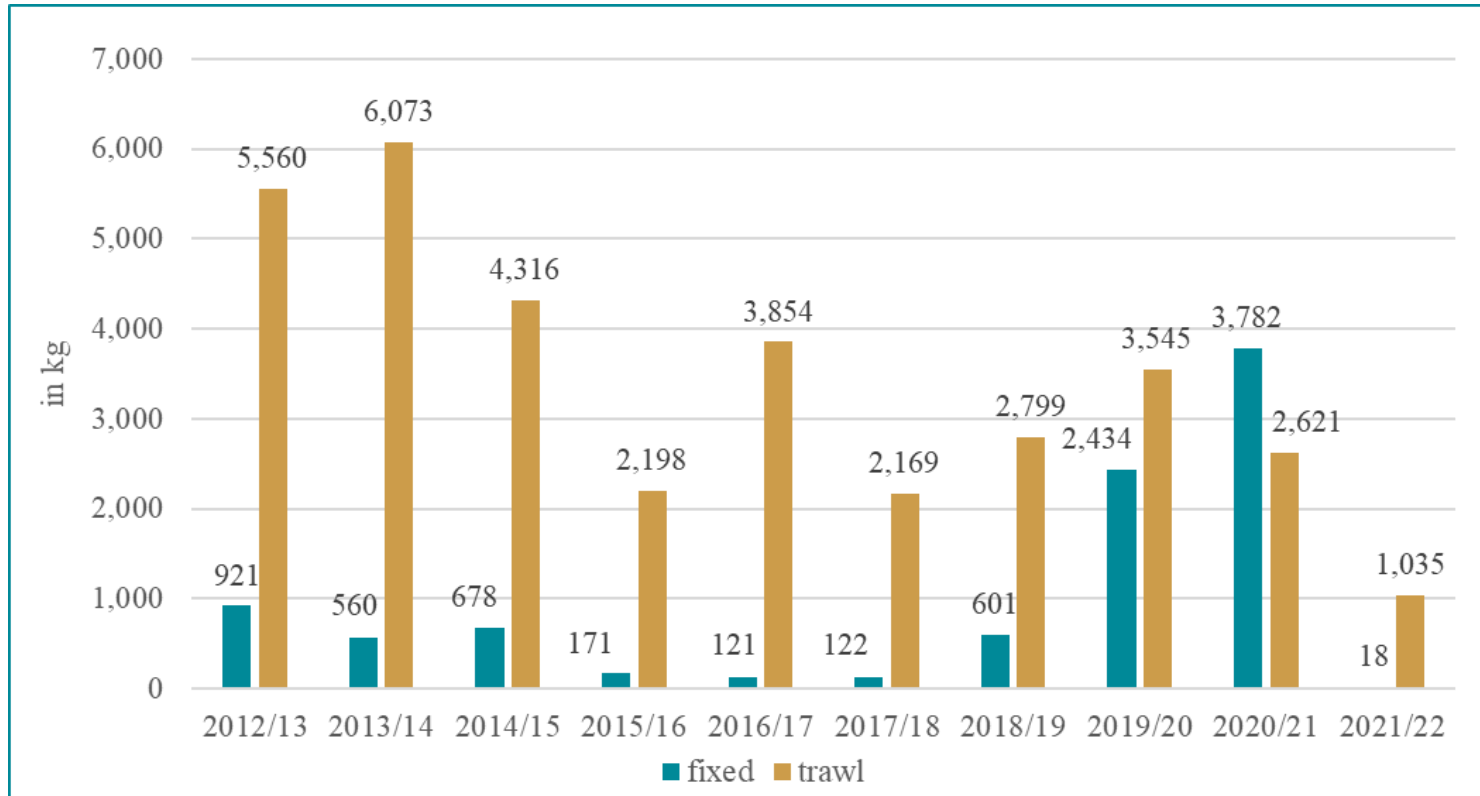
- The EAG stock area includes federal groundfish areas from the WGOA, BS, and AI.
- When there is no federal pot Pcod observer/EM coverage in the stock area the State pot vessels get an extrapolation rate based on all observed/EM groundfish targeted with pot gear in the stock area, including sablefish. This is typically the cause of the “spike” years.

Eastern Aleutian Islands Golden King Crab Trawl Incidental Catch by Trip Target (East of 174° W)



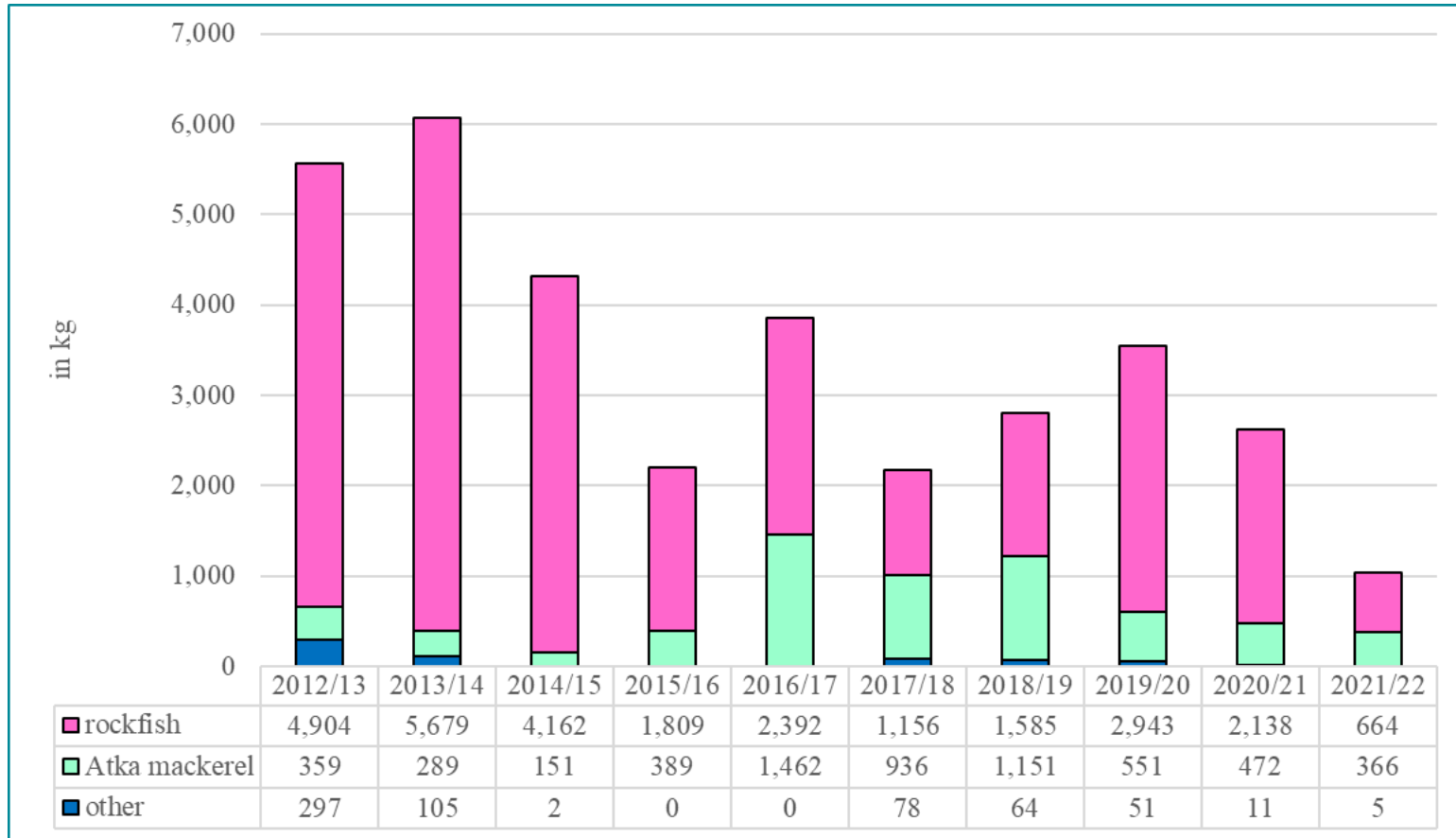
- The EAG stock area includes federal groundfish areas from the WGOA, BS, and AI.
- Amendment 80 is targeting a variety of species during the same trip in this stock area.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Greenland turbot, other flatfish, Pacific cod, flathead sole, rock sole, yellowfin sole, sablefish, and pollock.

Western Aleutian Islands Golden King Crab Incidental Catch in Groundfish Fisheries (West of 174° W)



- Not much federal fixed gear fishing in this area.
- Not very much fixed gear observer coverage.
- When there is no federal pot Pcod observer/EM coverage in the stock area the State pot vessels get an extrapolation rate based on all observed/EM groundfish targeted with pot gear MF22 stock area, including sablefish. This is typically the cause of the “spike” years.

Western Aleutian Islands Golden King Crab Trawl Incidental Catch by Trip Target (West of 174° W)



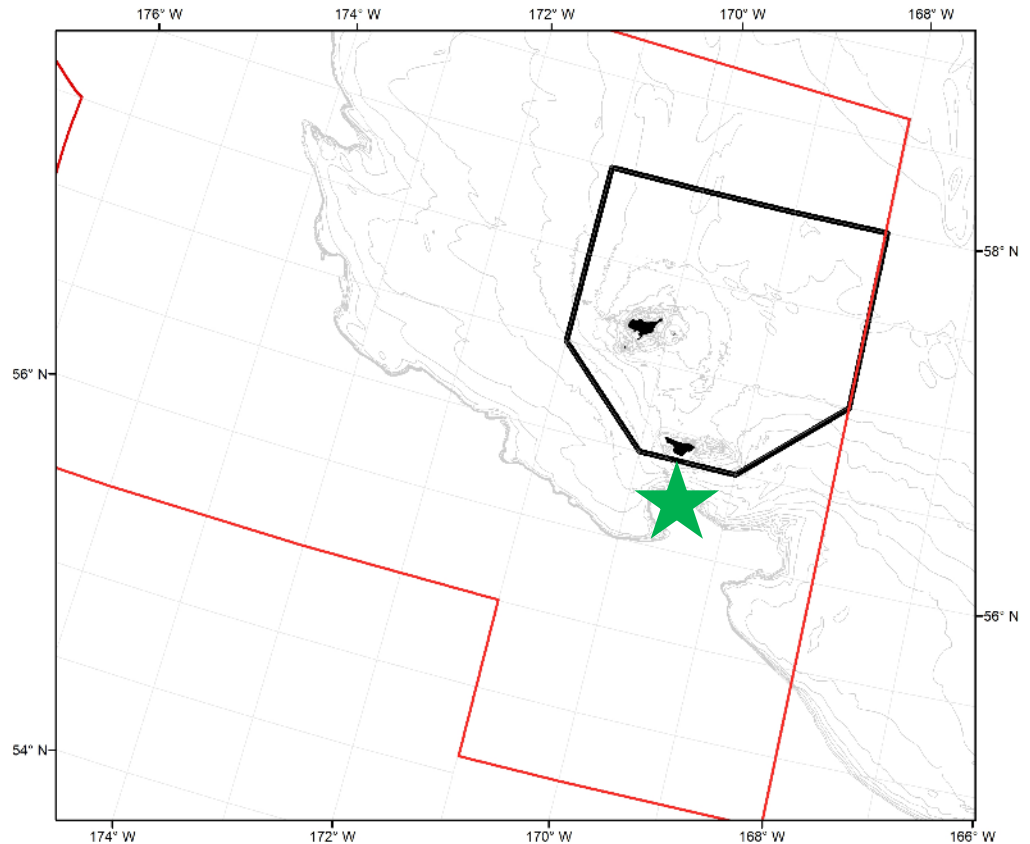
- Most trawl bycatch accrues in the summer months.
- “Other” species includes: Kamchatka flounder, Pacific cod, and pollock.

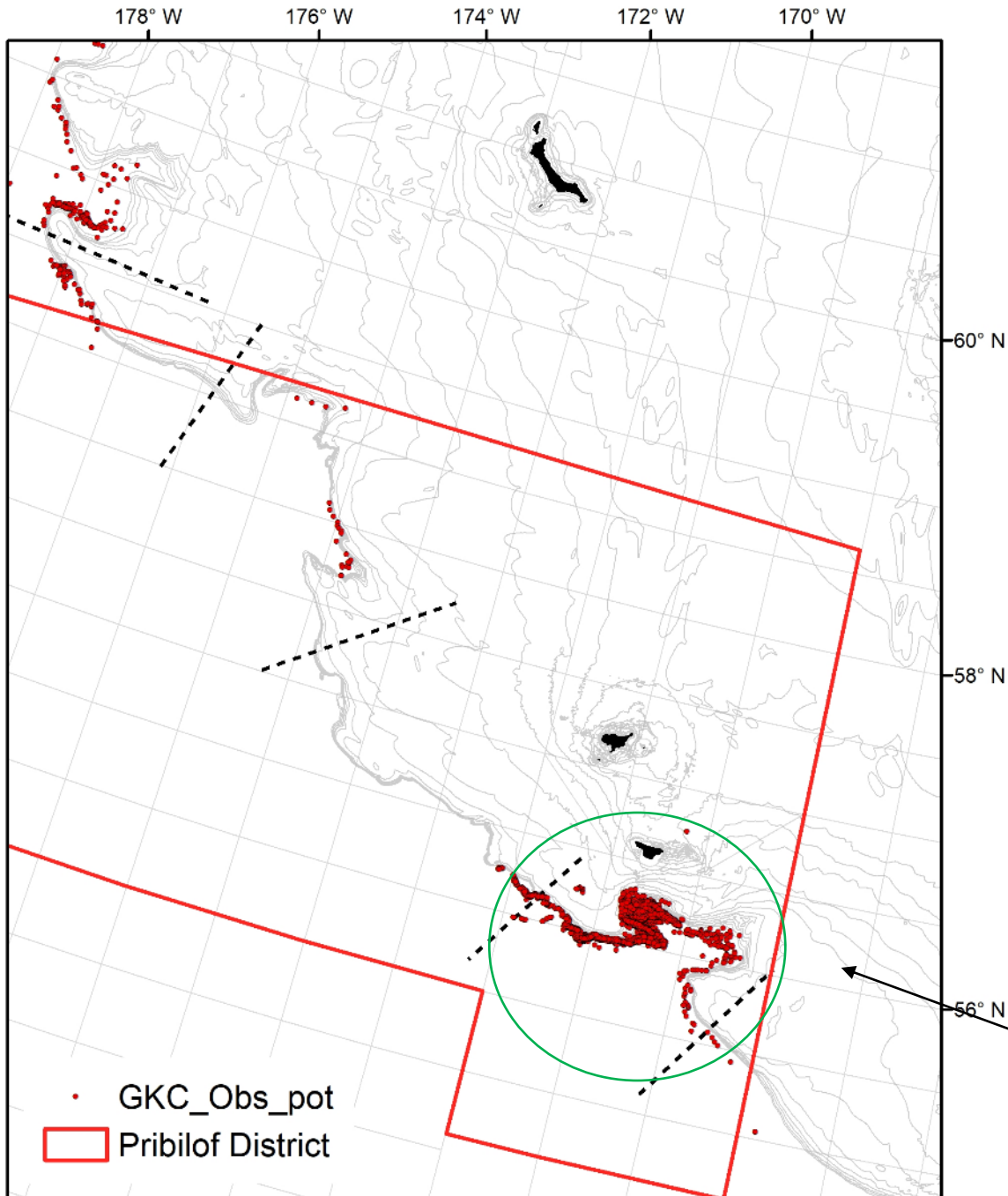
A large pile of cooked crabs, likely King Crab, is shown in a metal tray. The crabs are piled together, with their legs and shells visible. A black rectangular box is superimposed over the center of the image, containing the text "PIGKC" in white, bold, sans-serif font. The background is a light-colored metal surface.

PIGKC

2021 Pribilof GKC

- Fishery conducted by calendar year
- 4 vessels participated in the 2021 fishery
 - GHL = 130,000 lb (59 t)
 - Harvest = 34,216 lb





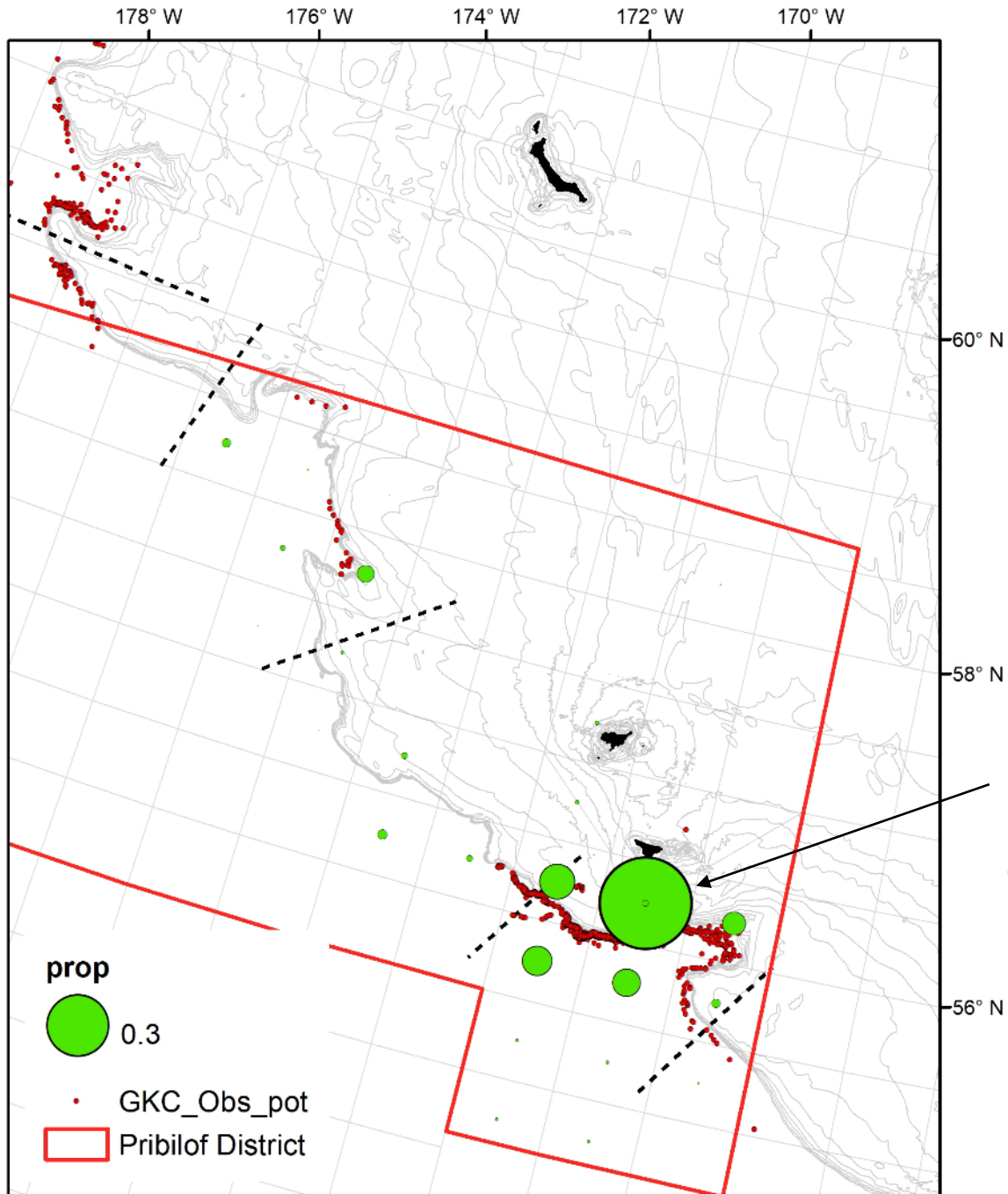
Observer pot location during Bering Sea golden king crab fisheries from 1992-2021 (n=7,977).

Pots north of the Pribilof District northern boundary were fished during the Northern District – Saint Matthew island Section fishery.

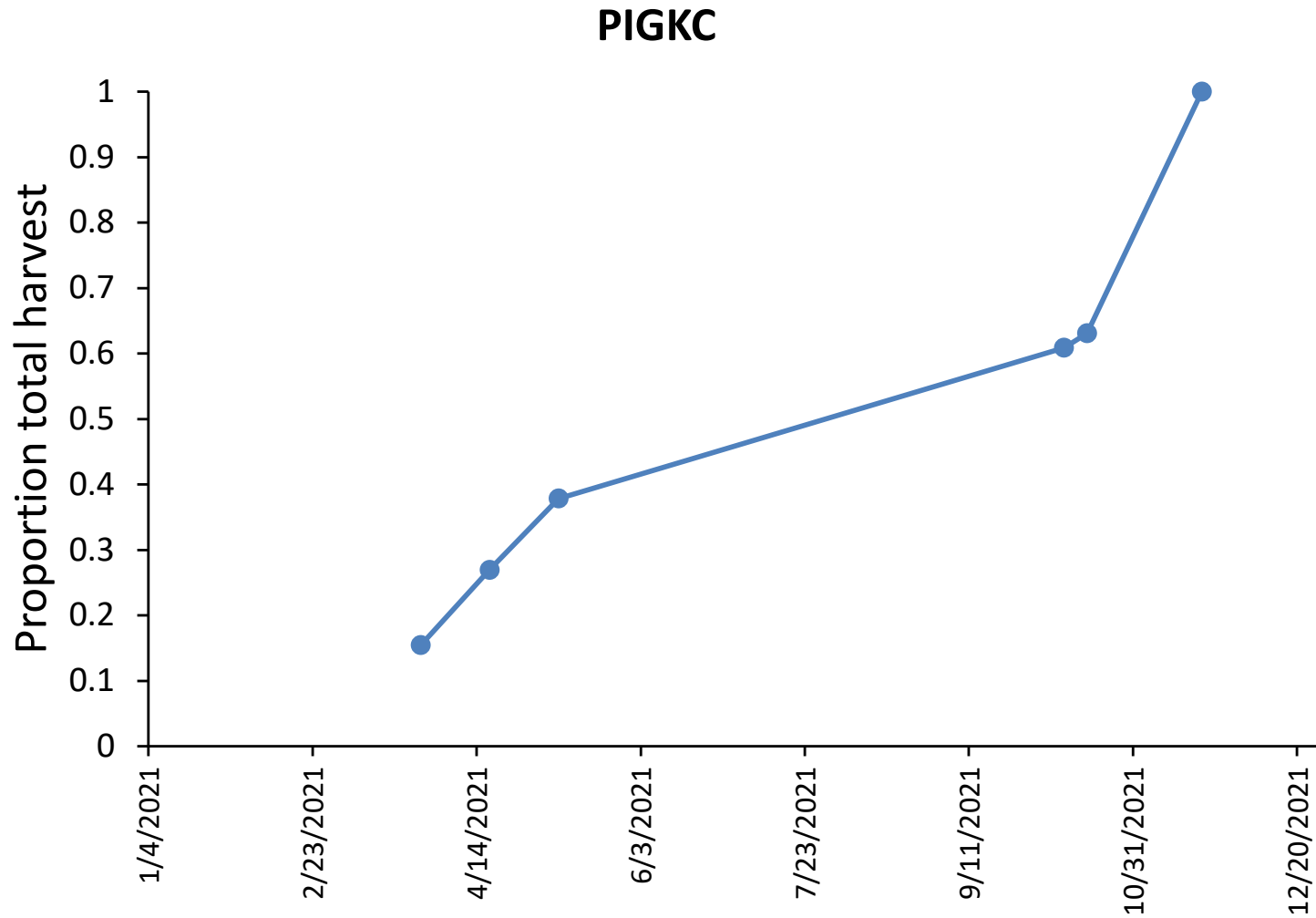
~95% of all observer pots

• GKC_Obs_pot
□ Pribilof District

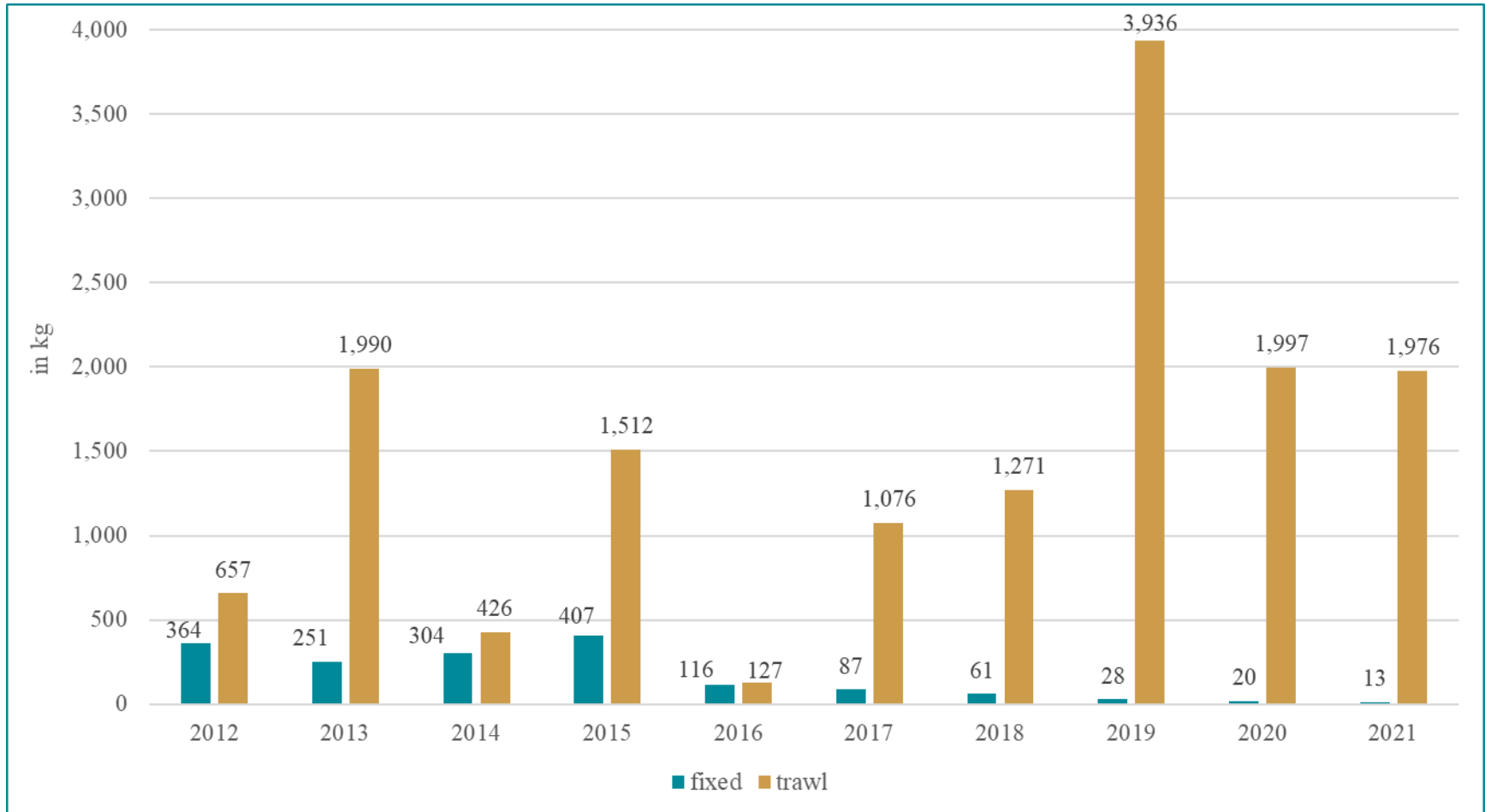
Proportion of historical catch by stat_area



2021 PIGKC

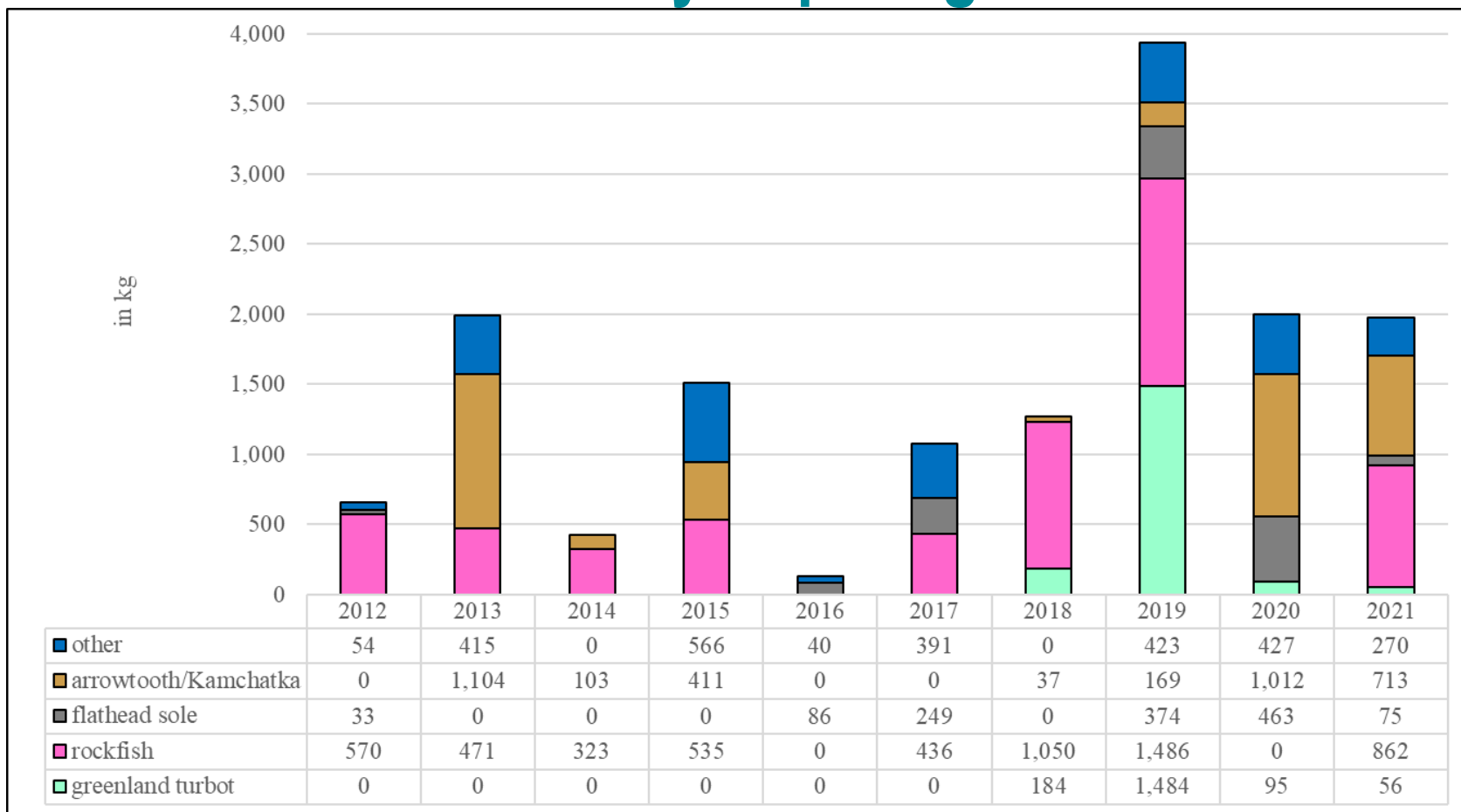


Pribilof Island Golden King Crab Incidental Catch in Groundfish Fisheries



- Most fixed gear GKC bycatch is from hook-and-line Pacific cod fishing.

Pribilof Island Golden King Crab Trawl Incidental Catch by Trip Target

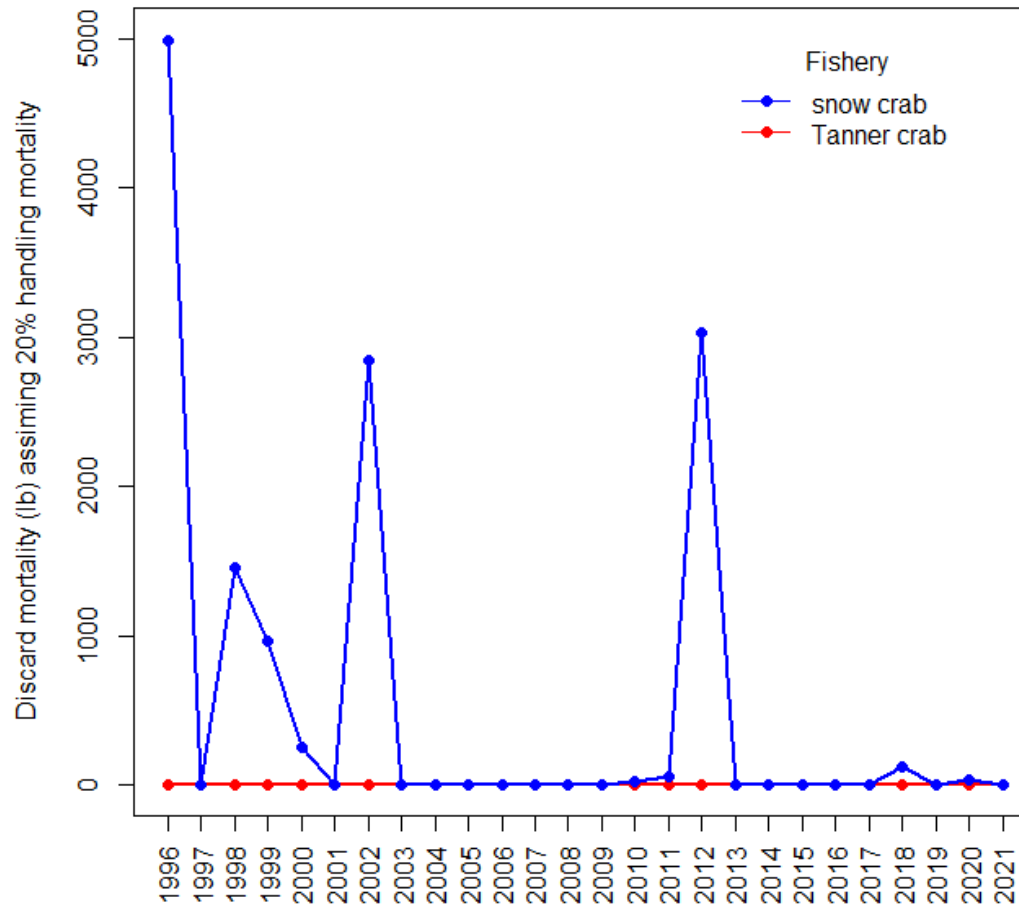


- Majority of bycatch occurred from June through August in 2021.
- “Other” species includes: Alaska plaice, Atka mackerel, other flatfish, Pacific cod, rockfish, rock sole, yellowfin sole, sablefish, and pollock.

Other BSAI crab stocks

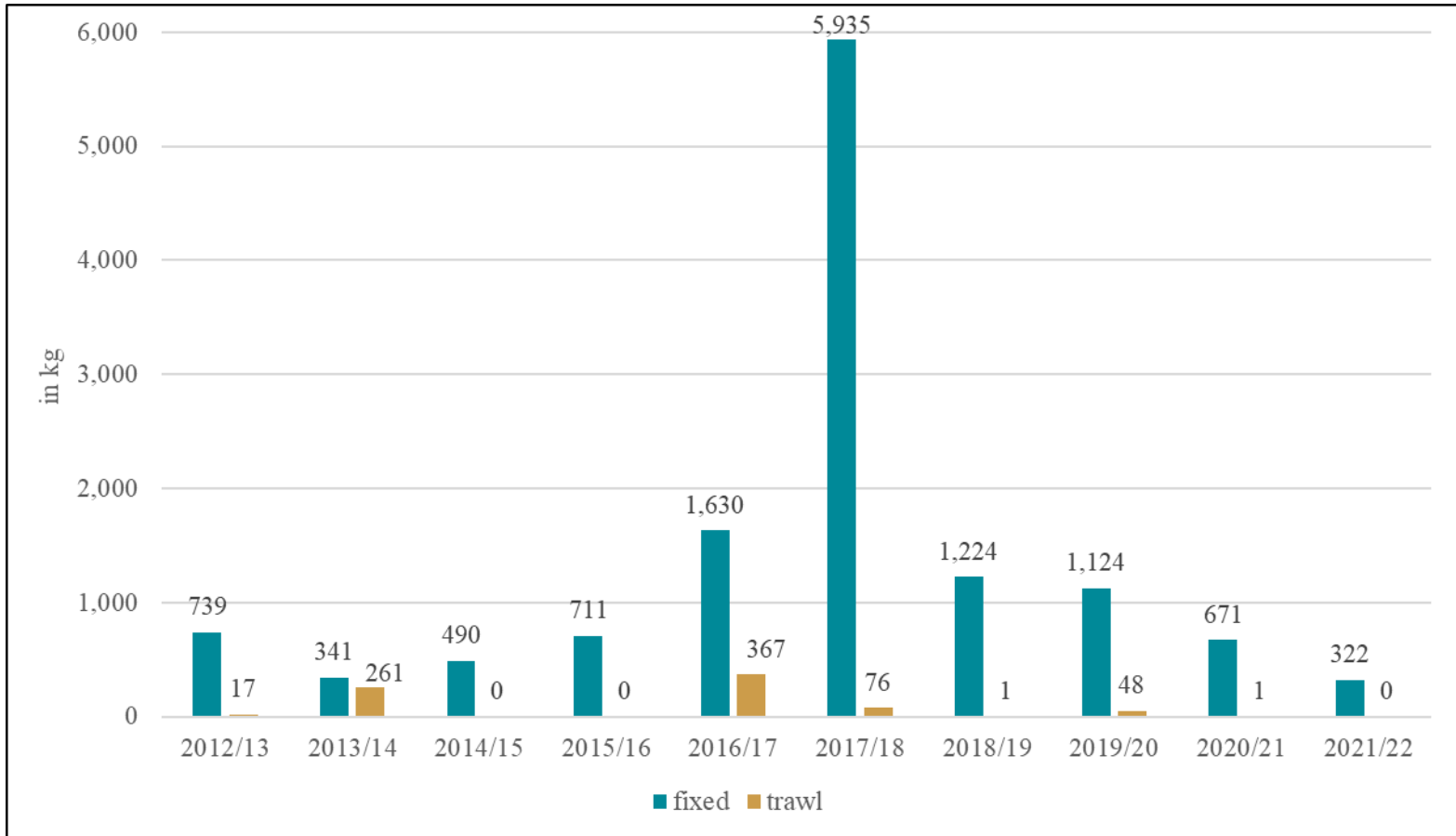
SMBKC: non-directed crab fishery bycatch

SMBKC discard mortality in non-directed crab fisheries

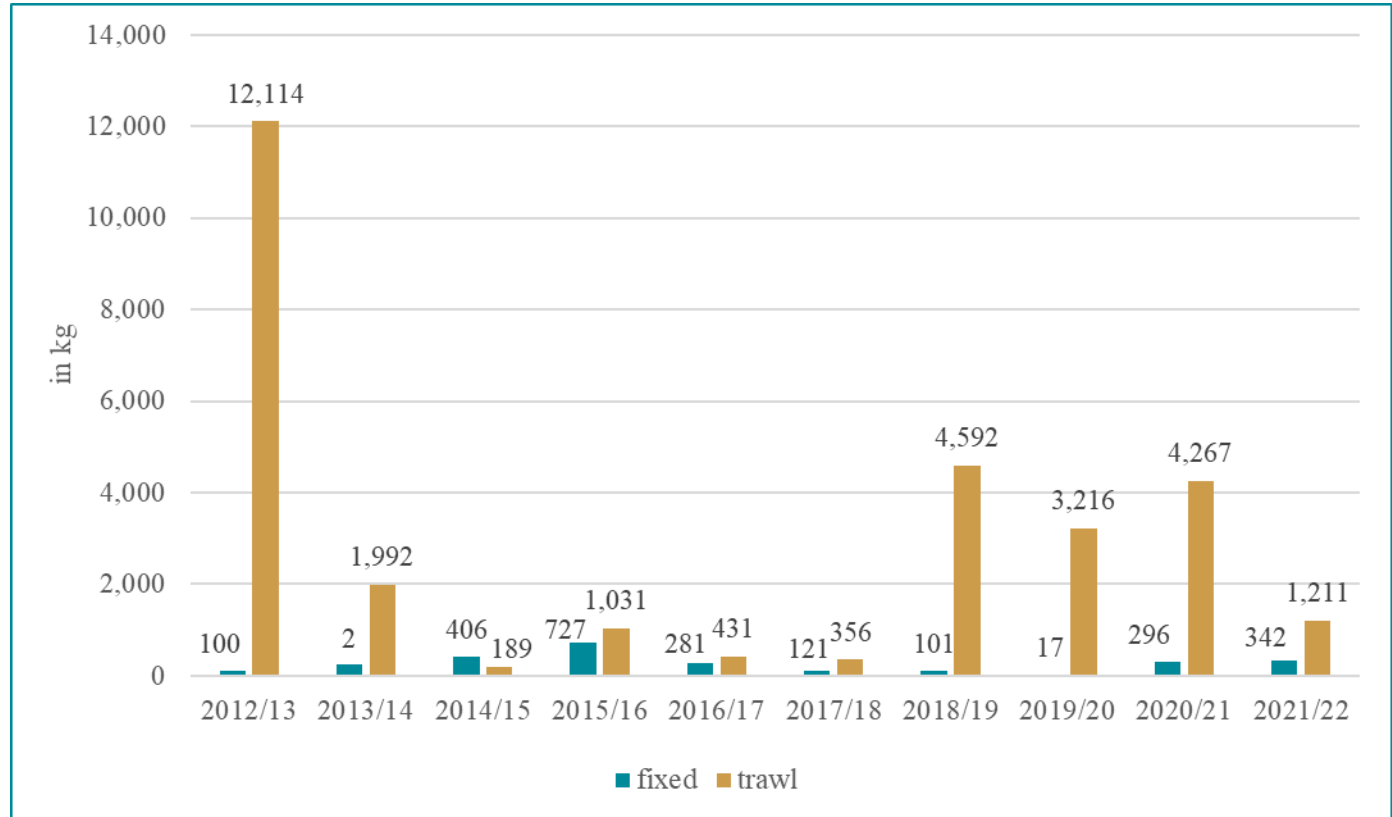


Saint Matthew Islands Blue King Crab Incidental Catch in Groundfish Fisheries

- Overfished stock.
- Very little trawling in this stock area due to trawl closure areas.
- Fixed gear trip targets in this area include halibut, Greenland turbot, sablefish, and Pacific cod.
- BKC is usually seen in the Pacific cod trip target for fixed gear (hook-and-line and pot).

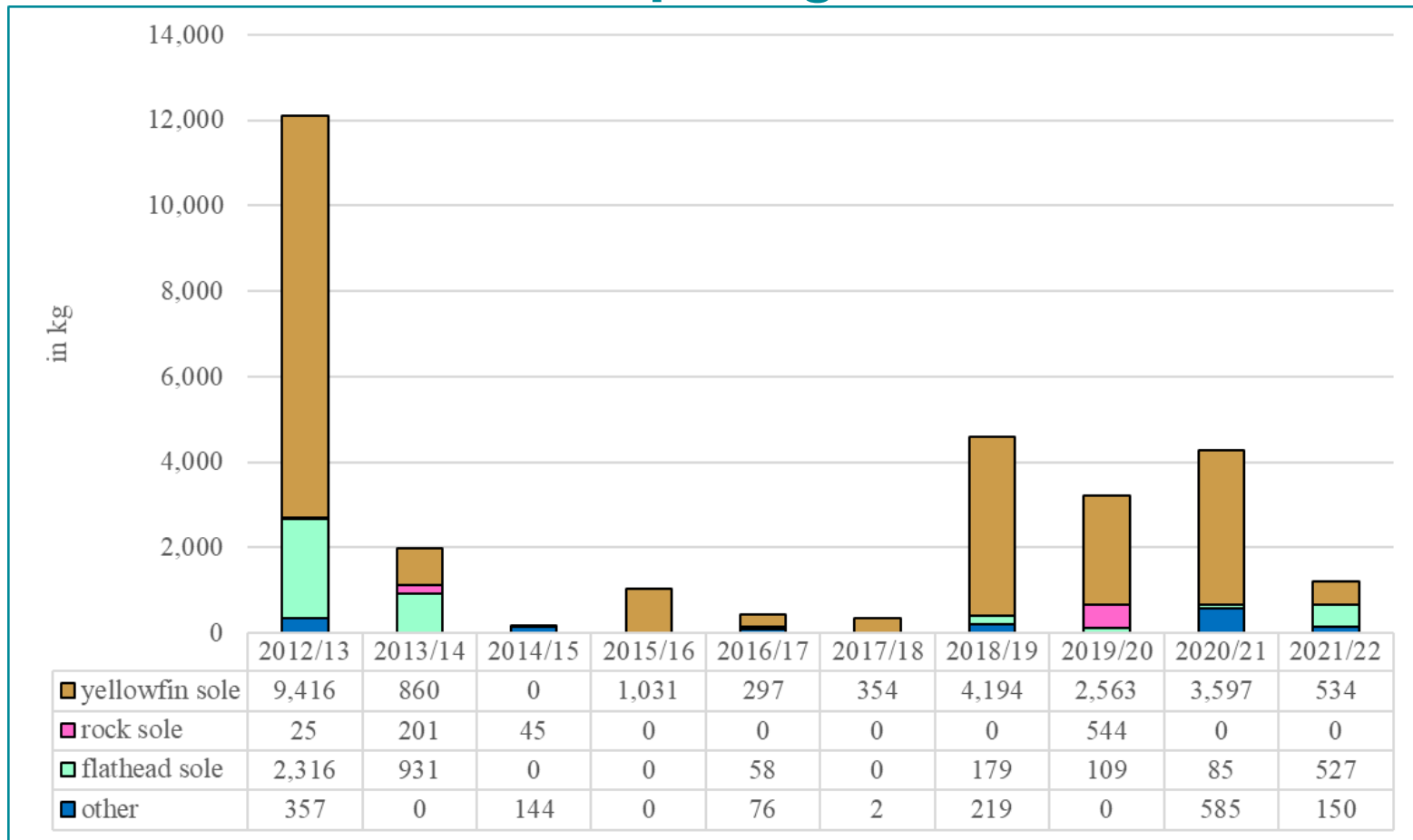


Pribilof Islands Red King Crab Incidental Catch in Groundfish Fisheries



- Pot and trawl gear are prohibited in the Pribilof Islands Habitat Conservation Zone which is in place to protect blue king crab.
- Most fixed gear fishing in this area is with hook-and-line gear targeting Pacific cod.

Pribilof Islands Red King Crab Trawl Incidental Catch by Trip Target

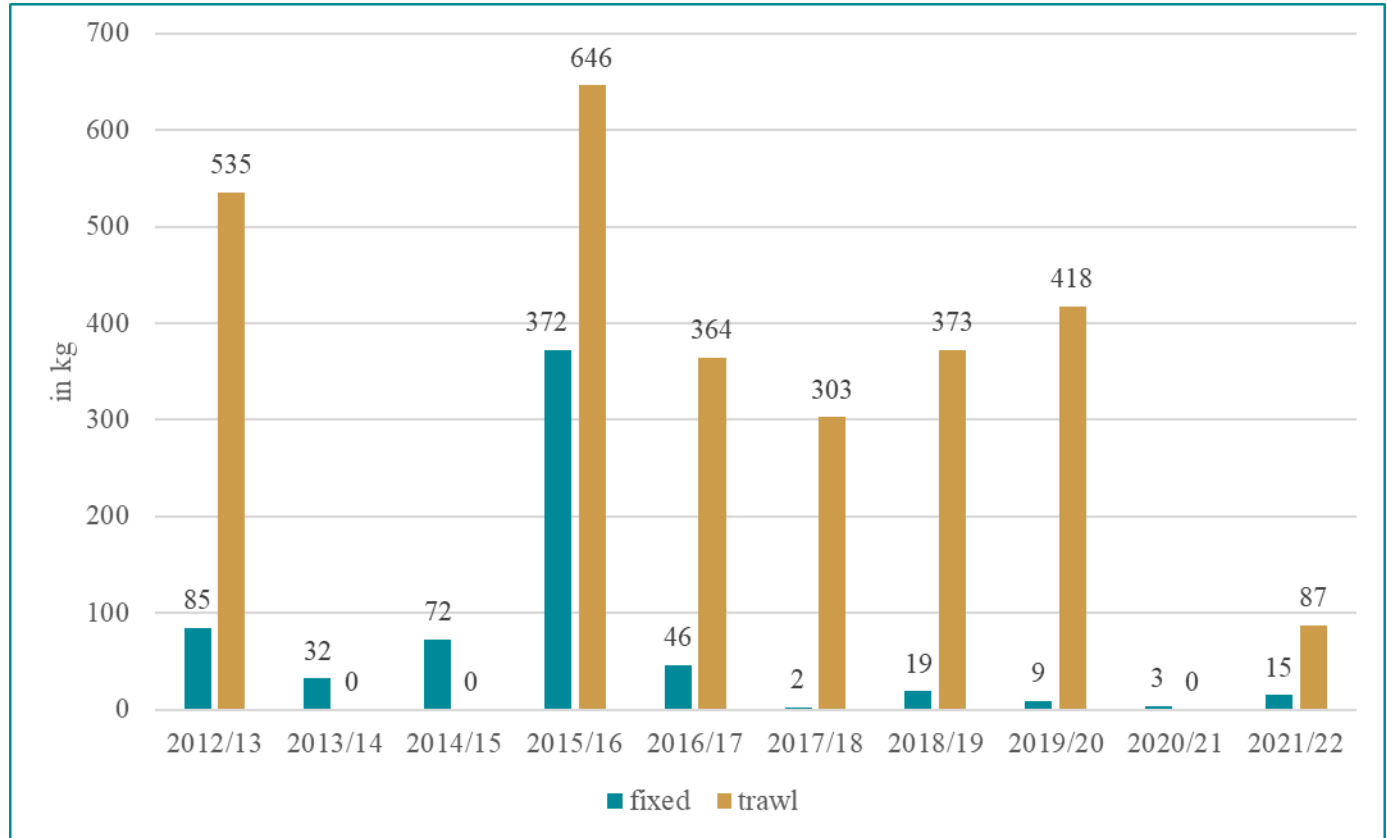


- Majority of 2021/22 bycatch was from yellowfin sole and flathead sole fishing in September.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, and pollock.

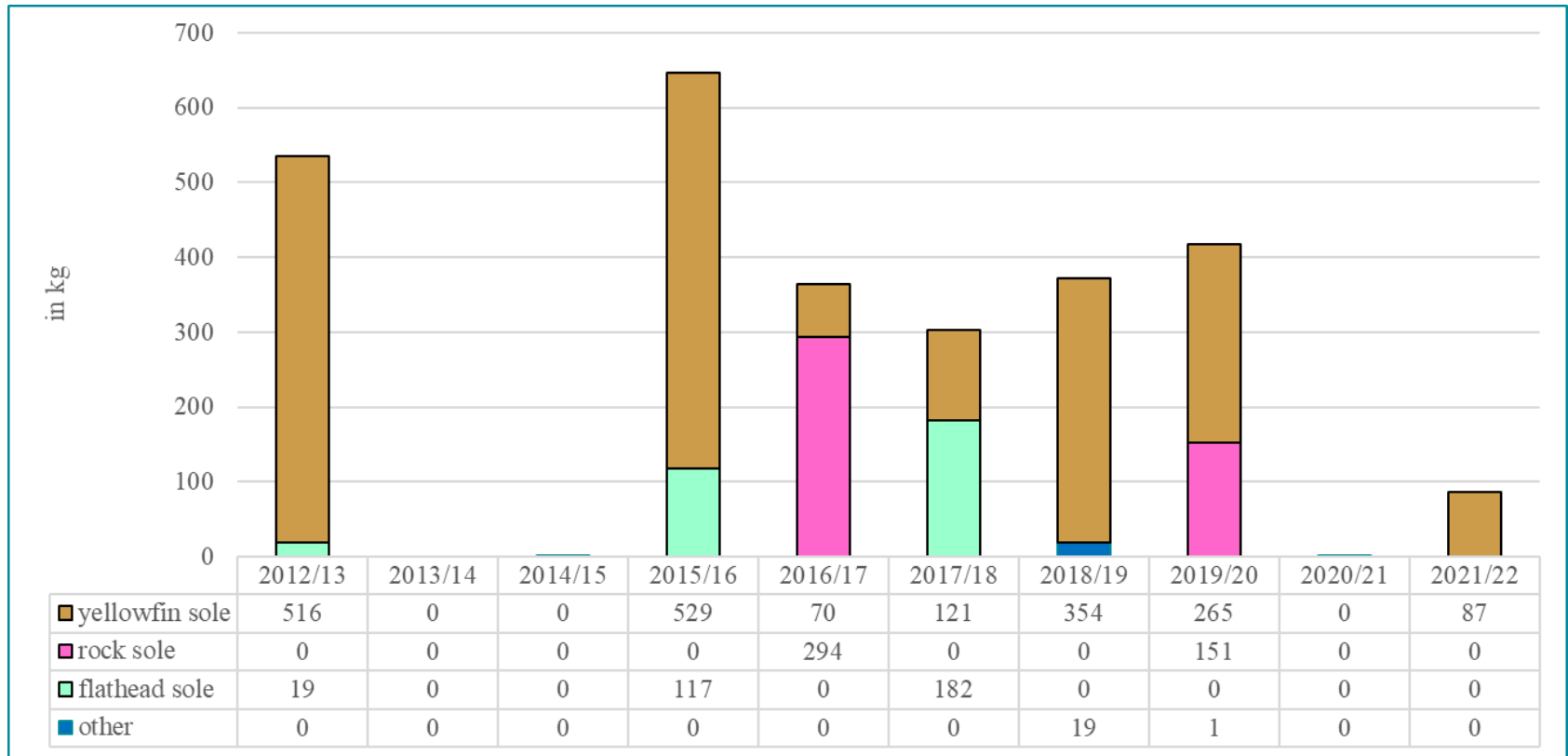
Pribilof Islands Blue King Crab Incidental Catch in Groundfish Fisheries



- Pot and trawl gear are prohibited in the Pribilof Islands Habitat Conservation Zone which is in place to protect blue king crab.
- Overfished stock.
- Overfishing occurred in the 2015/16 crab year.
- Most fixed gear fishing in this area is with hook-and-line gear targeting Pacific cod.



Pribilof Islands Blue King Crab Trawl Incidental Catch by Trip Target



- During the 2020/21 crab year, trawling occurred in same areas as previous years but no BKC was reported by observers.
- Majority of bycatch in 2021/22 crab year occurred in May in the yellowfin sole fishery.
- “Other” species includes: Alaska plaice, arrowtooth flounder, Atka mackerel, Greenland turbot, Kamchatka flounder, other flatfish, Pacific cod, rockfish, and pollock.

Norton Sound Red King Crab Incidental Catch in Groundfish Fisheries

- 2009 – 2017: no RKC bycatch in NSRKC stock area
- In 2018: 8 kg of RKC bycatch (mortality applied)
- In 2019: 13 kg of RKC bycatch (mortality applied)
- In 2020 and 2021: less than 1 kg of RKC bycatch



Thank you



Photo courtesy of Sam Zmolek