2024 SAFE Report for the Pribilof Islands Blue King Crab Fisheries of the Bering Sea and Aleutian Islands Regions

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Summary

The Pribilof Islands blue king crab (PIBKC) assessment is on a biennial cycle until 2025, after which full assessments will be conducted on a quadrennial basis. As 2024 is an "off" year in the current cycle, the next full assessment will occur in 2025. The most recent full assessment was conducted in September, 2023 (Stockhausen 2023). This report updates that assessment with final retained catch and bycatch mortality estimates in the directed fishery, other crab fisheries, and the groundfish fisheries to determine whether overfishing occurred during the 2023/24 crab fishery year (July 1, 2023-June 30, 2024). The 2023 SAFE Report determined the overfishing limit (OFL) for PIBKC to be 1.16 t, with an acceptable biological catch (ABC) of 0.87 t. Following completion of the 2023/24 crab fishery year, data on retained catch and bycatch in the crab fisheries was obtained from the Alaska Department of Fish and Game (ADFG), and from the NMFS Alaska Regional Office (via the Alaska Fisheries Information Network [AKFIN]) for bycatch in the groundfish fisheries. The directed fishery has been closed since 1999/2000 because it has been in an overfished status with mature male biomass estimated to be below $\frac{1}{2} \cdot MSST$; thus no retained catch or bycatch occurred in the directed fishery in 2023/24. Also, no bycatch of PIKBC was observed in other crab fisheries (i.e., snow crab, Tanner crab west of 166^{o}W longitude; Benjamin Daly, ADFG, pers. comm., July 8, 2024). Bycatch in the groundfish fisheries totaled 0.432 t across all gear types in 2023/24 (see Appendix A for details). After applying gear-specific discard mortality rates, this amounted to 0.0906 t total catch mortality. Because total fishery-related mortality (0.0906 t) was less than the OFL for 2023/24 (1.16 t), **overfishing did not occur** on this stock in 2023/24.

The following two tables (the first with units in metric tons, the second with units in thousands of lbs) update the management performance tables presented in the 2023 SAFE Report with the final fishing mortality estimates for 2023/24:

Table A. Management performance; all quatities are in units of metric tons.

Year	MSST	Biomass (MMBmating)	TAC	Retained Catch	Total Catch Mortality	OFL	ABC
2020/21	2,049	181	closed	0	0.0000	1.16	0.87
2021/22	2,098	180	closed	0	0.1020	1.16	0.87
2022/23	2,098	180	closed	0	0.2500	1.16	0.87
2023/24	NA	181	closed	0	0.0906	1.16	0.87
2024/25	NA	181	closed	0	NA	1.16	0.87

Table B. Management performance; all quantities are in units of thousands of lbs.

Year	MSST	Biomass (MMBmating)	TAC	Retained Catch	Total Catch Mortality	OFL	ABC
2020/21	4,517	399	closed	0	0.00	2.56	1.92
2021/22	4,625	397	closed	0	0.22	2.56	1.92
2022/23	4,625	397	closed	0	0.55	2.56	1.92
2023/24	NA	399	closed	0	0.20	2.56	1.92
2024/25	NA	399	closed	0	NA	2.56	1.92

Note that, because this is an "off" year assessment, MSST and Biomass/MMBmating have not been updated from the values determined last year.

Appendix A: Bycatch

Bycatch in the groundfish fisheries

Bycatch estimates of PIBKC in the groundfish fisheries are based on groundfish observer data sampling expanded to total catch. Historical estimates beginning in 1991/92 are available to 2008/09 from AKFIN using results from the old Catch Accounting System database. This data is limited in its spatial resolution to NMFS statistical areas, which do not conform to the PIBKC stock area. As with previous assessments, estimates of blue king crab bycatch in the groundfish fisheries from NMFS statistical area 513 are assumed to account for bycatch within the PIBKC stock area. More recent estimates, 2009/10-present, are available from AKFIN using results from the AKRO's Catch-In-Areas database, which provides standardized spatial resolution using ADF&G statistical areas (among other improvements over the older Catch Accounting System). In 2019, the algorithm used by AKFIN to expand observer data was changed from one based on retained groundfish catch weight to the one currently used by AKRO, which is based on total groundfish catch weight. This was applied retroactively to data from calendar year 2017 forward, affecting estimates for crab starting in crab year 2016.

Here, bycatch in the groundfish fisheries during 1991/92-2023/24 is documented. The data were downloaded from AKFIN on July 15, 2024 for the current assessment. In order to apply gear-specific discard mortality rates to the bycatch data, trawl gear types (pelagic and non-pelagic) have been aggregated as "trawl" gear, while hook-and-line (longline) and pot gear have been aggregated as "fixed" gear. As in previous assessments, discard mortality rates of 0.2 and 0.8 have subsequently been applied by gear type (fixed and trawl, respectively) to the estimated bycatch biomass to estimate fishing-related mortality for the discarded crab (Stockhausen 2021, 2023). Since 2009/10, the maximum annual bycatch of PIBKC in the groundfish fisheries was 1.552 t in 2015/16, while the maximum total discard mortality was 0.795 t in 2015/16. In contrast, the average bycatch over the last 5 years is 0.320 t, while the average discard mortality is 0.172 t.

Bycatch by gear type

Annual estimates of bycatch abundance, biomass, and discard mortality of PIBKC in the groundfish fisheries are presented in Table 1 and Figures 1 and 2 by (aggregated) gear type. In general, trawl gear takes more PIBKC than fixed gear, and with higher mortality, although exceptions occur (e.g., 2011/12, 2013/14, 2014/15, and 2023/24). The average mortality on PIBKC taken by trawl gear over the last five years is 0.145 t while that taken by fixed gear is 0.028 t.

Bycatch by target type

Annual estimates of bycatch abundance, biomass, and discard mortality of PIBKC in the groundfish fisheries are presented by groundfish target type in Tables 2-4 and Figure 3. Groundfish targets with less than 10 kg bycatch over the 2009/10-2023/24 period have been dropped. PIBKC is primarily taken as bycatch in fisheries targeting flathead sole, yellowfin sole, northern rock sole, and Pacific cod. Although the Pacific cod fishery accounted for the highest bycatch of PIBKC by weight (in 2015) across the time series, it generally ranks below the other fisheries as a source of mortality because the bycatch occurs primarily with fixed gear. In 2023/24, however, it was the target fishery that accounted for the largest source of PIBKC mortality (Table 4, Figure 3).

Spatial patterns of bycatch

Spatial patterns of PIBKC bycatch, by ADF&G stat area, in the groundfish fisheries are illustrated by gear type in Figures 4 and 5. Bycatch taken with trawl gear tends to be concentrated along and to the northeast of the eastern boundary of the Habitat Conservation Zone (non-pelagic trawl gear is excluded from the Zone), although 2012 was an exception in which bycatch was concentrated along the western edge of the Zone. In contrast, bycatch taken by fixed gear is typically dispersed along the shelf edge, although it was concentrated within and near the Pribilof Islands Habitat Conservation Zone (area outlined in red in Figures 4 and 5) in 2015/16 and again in 2023/24.

References

Stockhausen, W.T. 2021. 2021 Stock Assessment and Fishery Evaluation Report for the Pribilof Islands blue king crab fisheries of the Bering Sea and Aleutian Islands regions. *In* Stock Assessment and Fishery Evaluation Report for the KING AND TANNER CRAB FISHERIES of the Bering Sea and Aleutian Islands regions 2021 final crab SAFE. North Pacific Fishery Management Council, Anchorage, AK. p. 83. Available from https://meetings.npfmc.org/CommentReview/DownloadFile?p=6b1606ce-3b55-4273-935a-8ec90b8d5295.pdf&fileName=5%20Priblof%20Island%20Blue%20King%20Crab%20SAFE.pdf.

Stockhausen, W.T. 2023. 2023 Stock Assessment and Fishery Evaluation Report for the Pribilof Islands blue king crab fisheries of the Bering Sea and Aleutian Islands regions. *In* Stock Assessment and Fishery Evaluation Report for the KING AND TANNER CRAB FISHERIES of the Bering Sea and Aleutian Islands regions 2023 Final Crab SAFE. North Pacific Fishery Management Council, Anchorage, AK. p. 112. Available from https://meetings.npfmc.org/CommentReview/DownloadFile?p=05baad65-e92f-4998-8655-a076b17b7af3.pdf&fileName=Priblof%20Island%20Blue%20King%20Crab%20SAFE.pdf.

Tables

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Table 1. Bycatch of PIBKC in the BSAI groundfish fisheries, by gear type. Biomass and (discard) mortality are in kilograms. Bycatch in numbers is only available after 2008/09. Discard mortality rates of 0.2 and 0.8 for fixed and trawl gear, respectively, were applied to the biomass estimates to obtain discard mortalities for all years.

			fixed gear			trawl gear
year	number	biomass	mortality	number	biomass	mortality
1991/92	– –	67	13	– –	6199	4959
1992/93	– –	879	176	– –	60791	48633
1993/94	– –	0	0	– –	34232	27385
1994/95	– –	35	7	– –	6856	5485
1995/96	– –	108	22	– –	1284	1028
1996/97	– –	31	6	– –	67	54
1997/98	– –	1462	292	– –	130	104
1998/99	– –	19800	3960	– –	79	64
1999/0	– –	795	159	– –	20	16
2000/1	– –	116	23	– –	23	19
2001/2	– –	833	167	– –	29	24
2002/3	– –	71	14	– –	297	238
2003/4	– –	345	69	– –	227	181
2004/5	– –	816	163	– –	2	1
2005/6	– –	353	71	– –	1339	1071
2006/7	– –	138	28	– –	74	59
2007/8	– –	3993	799	– –	132	106
2008/9	– –	141	28	– –	473	379
2009/10	87	216	43	193	207	165
2010/11	16	44	9	35	56	45
2011/12	54	112	22	8	7	6
2012/13	72	170	34	340	669	535
2013/14	41	65	13	0	0	0

(continued)

year	number	biomass	fixed gear mortality	number	biomass	trawl gear mortality
2014/15	65	144	29	0	0	0
2015/16	352	744	149	257	808	646
2016/17	63	93	19	524	455	364
2017/18	2	4	1	265	378	303
2018/19	24	38	8	398	466	373
2019/20	10	18	4	226	522	418
2020/21	5	7	1	0	0	0
2021/22	22	30	6	46	109	87
2022/23	126	215	43	91	266	213
2023/24	260	425	85	0	7	5

Table 2. Estimated bycatch (numbers of crab, rounded to whole numbers) of PIBKC in the groundfish fisheries, by target type (avalable only after 2008/09). Discard mortality rates have not been applied.

year	Flathead Sole number	Pacific Cod number	Pollock - bottom number	Rock Sole number	Yellowfin Sole number
2009/10	54	87	20	0	119
2010/11	35	14	0	0	0
2011/12	0	62	0	0	0
2012/13	12	72	0	0	328
2013/14	0	41	0	0	0
2014/15	0	64	0	0	0
2015/16	58	351	0	0	199
2016/17	0	63	0	432	92
2017/18	95	2	0	0	170
2018/19	0	24	97	0	300
2019/20	0	10	0	55	170
2020/21	0	5	0	0	0
2021/22	0	22	0	0	46
2022/23	0	126	0	23	68
2023/24	0	260	0	0	0

Table 3. Estimated bycatch (biomass, in kg) of PIBKC in the groundfish fisheries, by target type (avalable only after 2008/09). Discard mortality rates have not been applied.

year	Flathead Sole biomass	Pacific Cod biomass	Pollock - bottom biomass	Rock Sole biomass	Yellowfin Sole biomass
2009/10	71	216	7	0	129
2010/11	56	42	0	0	0
2011/12	0	119	0	0	0
2012/13	24	170	0	0	645
2013/14	0	64	0	0	0
2014/15	0	143	0	0	0
2015/16	147	742	0	0	661
2016/17	0	91	0	368	87
2017/18	227	4	0	0	151
2018/19	0	38	23	0	442
2019/20	0	18	1	189	332
2020/21	0	7	0	0	0
2021/22	0	30	0	0	109
2022/23	0	215	0	106	160
2023/24	0	425	0	0	6

Table 4. Estimated discard mortality (in kg) of PIBKC in the BSAI groundfish fisheries, by target type.Discard mortality rates of 0.2 and 0.8 for fixed and trawl gear, respectively, were applied to bycatch estimates to obtain discard mortalities for all years.

year	Flathead Sole mortality	Pacific Cod mortality	Pollock - bottom mortality	Rock Sole mortality	Yellowfin Sole mortality
2009/10	57	43	5	0	103
2010/11	45	8	0	0	0
2011/12	0	28	0	0	0
2012/13	19	34	0	0	516
2013/14	0	13	0	0	0
2014/15	0	29	0	0	0
2015/16	117	148	0	0	529
2016/17	0	18	0	294	70
2017/18	182	1	0	0	121
2018/19	0	8	19	0	354
2019/20	0	4	1	151	265
2020/21	0	1	0	0	0
2021/22	0	6	0	0	87
2022/23	0	43	0	84	128
2023/24	0	85	0	0	5

Figures

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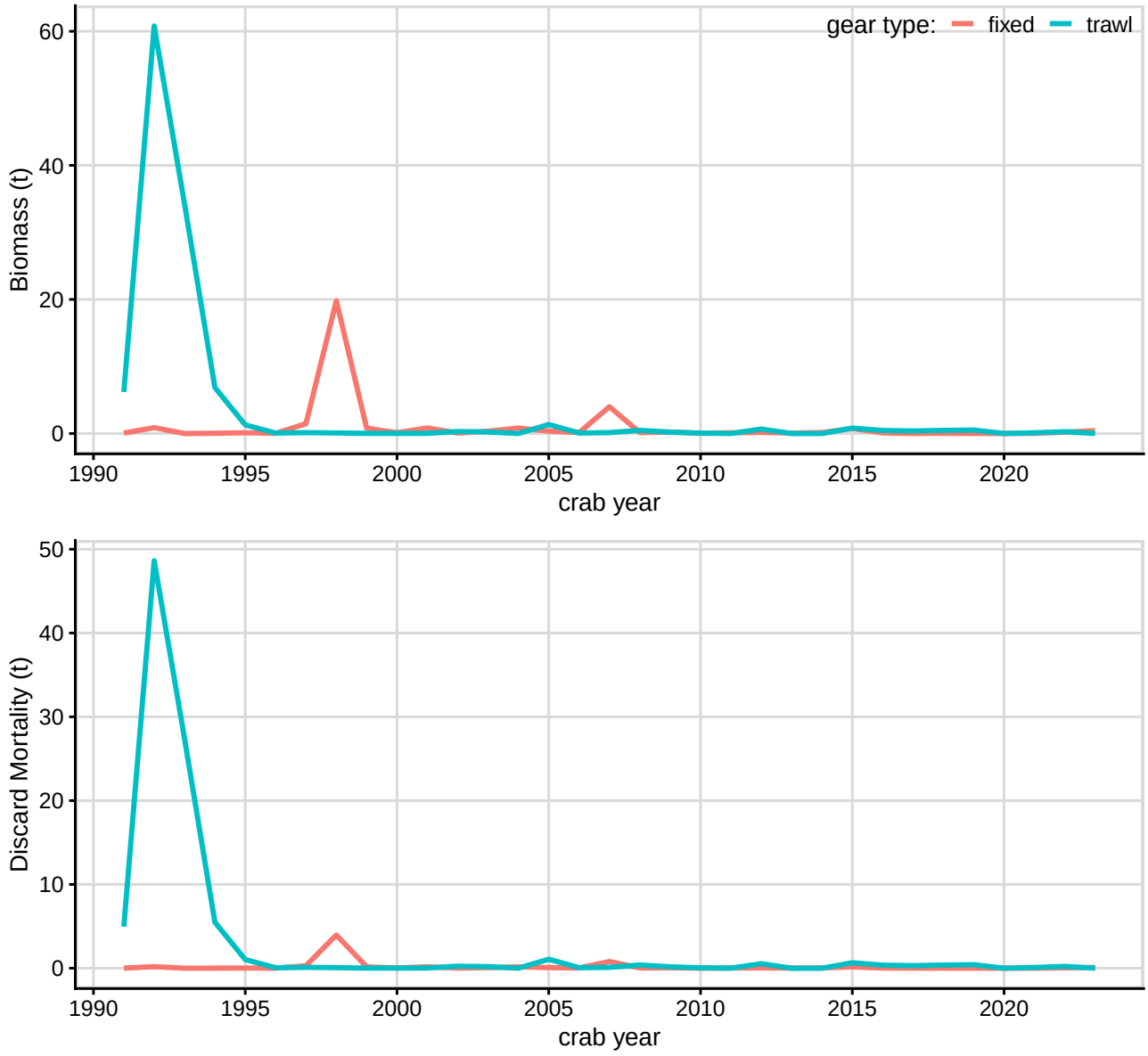

Figure 1. Upper plot: Bycatch of PIBKC in the groundfish fisheries since 1991/92 by gear type (no mortality applied). Lower plot: Discard mortality of PIBKC in the groundfish fisheries since 1991/92 by gear type. Gear-specific discard mortality rates of 0.2 and 0.8 were applied to bycatch from fixed and trawl gear, respectively.

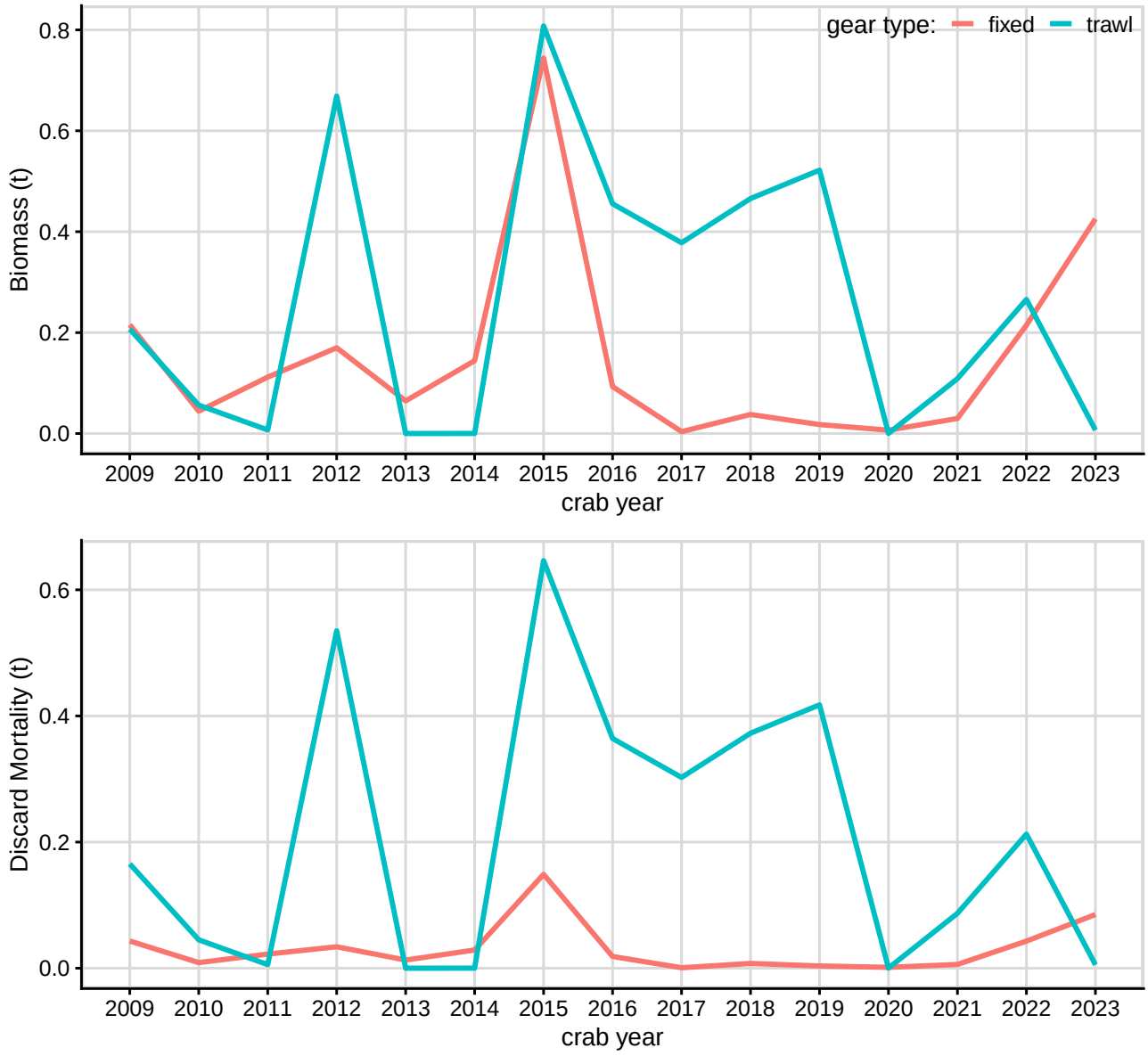

Figure 2. Upper plot: Bycatch of PIBKC in the groundfish fisheries since 2009/10 by gear type (no mortality applied). Lower plot: Discard mortality of PIBKC in the groundfish fisheries since 2009/10 by gear type. Gear-specific discard mortality rates of 0.2 and 0.8 were applied to bycatch from fixed and trawl gear, respectively.

Figure 3. Upper plot: Bycatch of PIBKC in the groundfish fisheries since 2009/10 by target type (no mortality applied). Lower plot: Discard mortality of PIBKC in the groundfish fisheries since 2009/10 by target type. Gear-specific discard mortality rates of 0.2 and 0.8 were applied to bycatch from fixed and trawl gear, respectively.

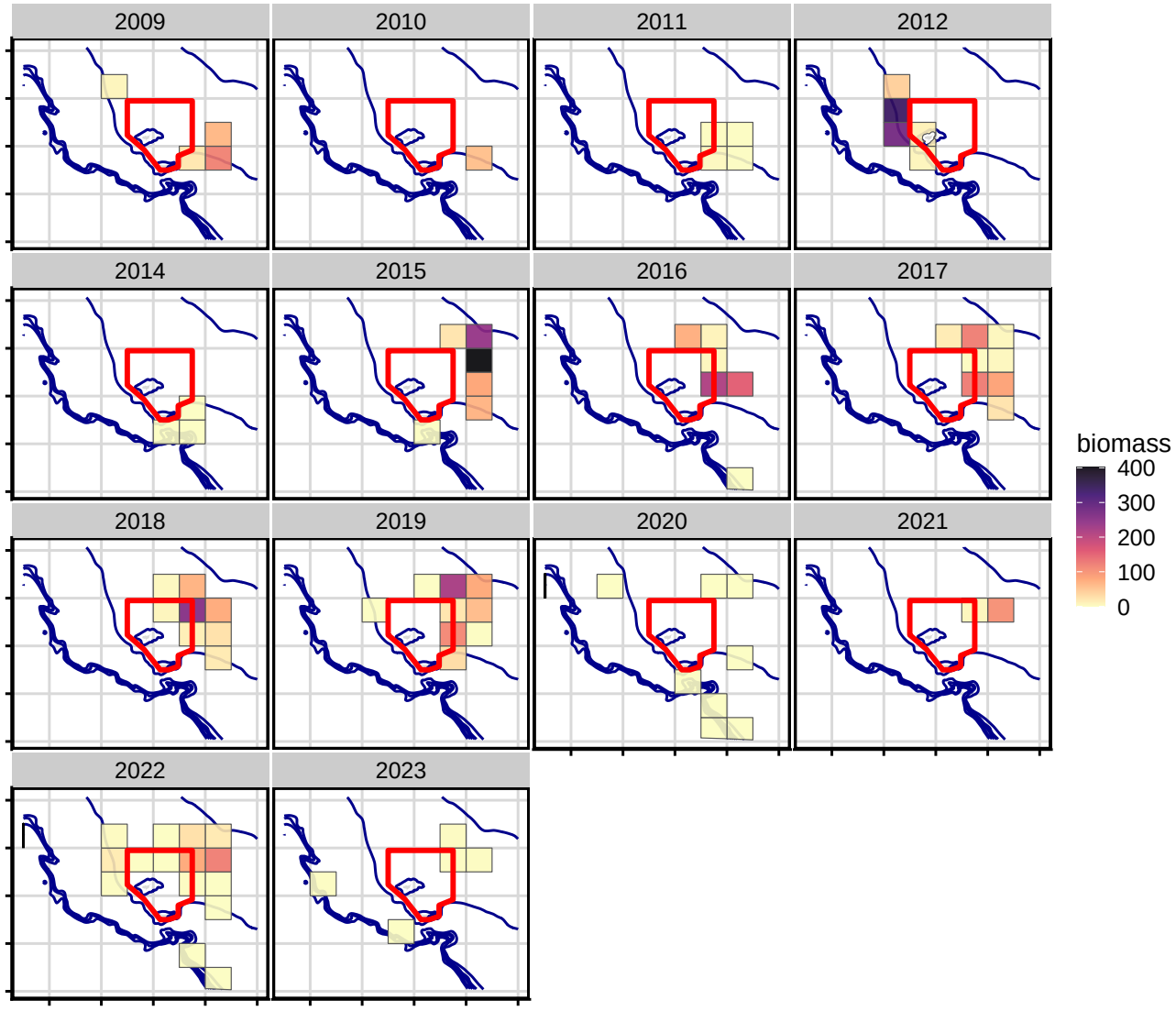

Figure 4. Estimated bycatch of PIBKC in the groundfish trawl gear fisheries by ADF&G stat area, expanded from groundfish observer reports. Red line: boundary of the PIHCZ.

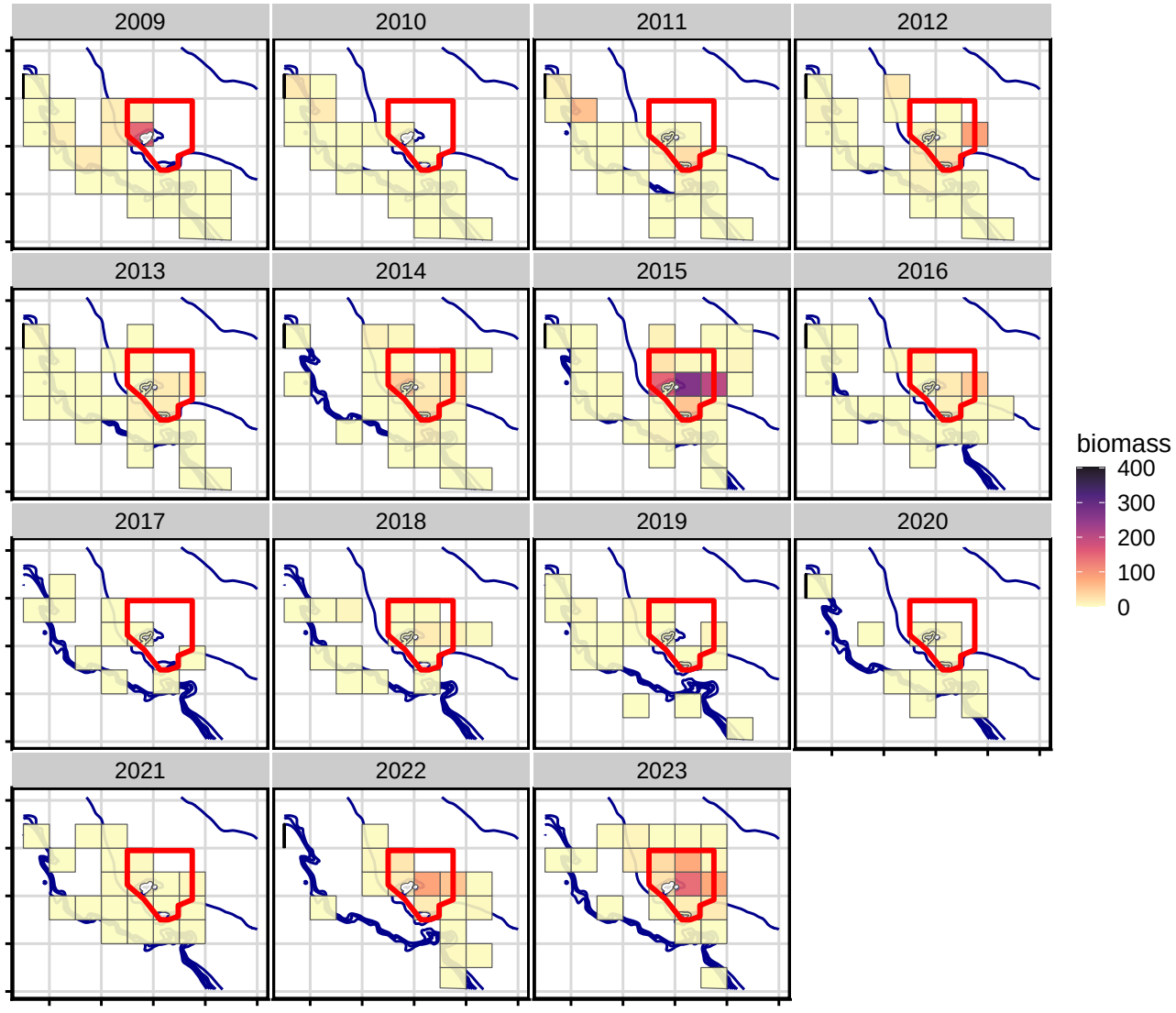

Figure 5. Estimated bycatch of PIBKC in the groundfish fixed gear fisheries by ADF&G stat area, expanded from groundfish observer reports. Red line: boundary of the PIHCZ.