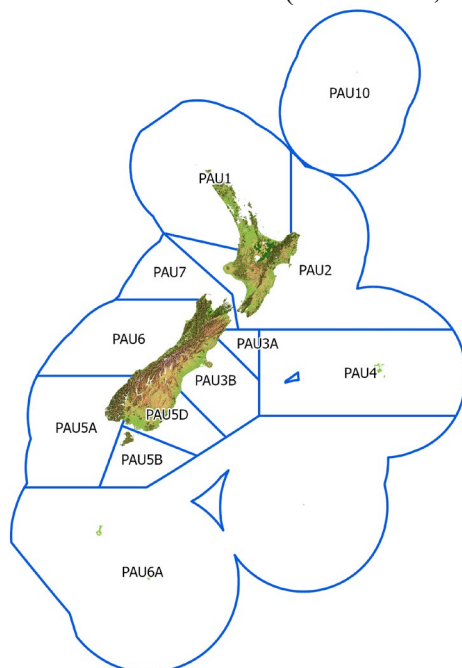


INTRODUCTION – PĀUA (PAU)

(*Haliotis iris*, *Haliotis australis*)



1. INTRODUCTION

Pāua are important shellfish both commercially and for non-commercial fishers. For assessment purposes, individual reports on the largest commercial fisheries have been produced separately:

1. PAU 2 – Wairarapa / Wellington / Taranaki
2. PAU 3A – Kaikoura
3. PAU 3B – Canterbury
4. PAU 4 – Chatham Islands
5. PAU 5A – Fiordland
6. PAU 5B – Stewart Island
7. PAU 5D – Southland / Otago
8. PAU 7 – Marlborough/Nelson

In 1986–87, pāua stocks were introduced into the Quota Management System (QMS) and most Quota Management Areas (QMA) have since been managed with a total allowable catch (TAC) that is made up of total allowed commercial catch (TACC), recreational and customary catch, and other sources of mortality (Table 1).

Table 1: Recreational and Customary non-commercial allowances, other mortality, TACCs and TACs (t) for pāua by Fishstock from 1 October 2024.

Fishstock	Description	Recreational allowance	Customary non-commercial allowance	Other sources of mortality	TACC	TAC
PAU 1*	Auckland	—	—	—	1.93	—
PAU 2	Wairarapa / Wellington / Taranaki	48	12	11	121.19	192.19
PAU 3A	Kaikōura	18	7.5	7	46	78.5
PAU 3B	Canterbury	9	15	10	46	80
PAU 4	Chatham Islands	3	3	2	326	334
PAU 5A*	Fiordland	—	—	—	148.98	—
PAU 5B	Stewart Island	6	7	3	107	123
PAU 5D	Southland / Otago	22	3	20	89	134
PAU 6*	Challenger / Westland	—	—	—	1	—
PAU 7	Marlborough	15	15	10	93.62	133.62
PAU 10*	Kermadec	—	—	—	1	—

* allowances and TAC not set

1.1 Commercial fisheries

The commercial fishery for pāua dates from the mid-1940s. In the early years of this commercial fishery, shell was the main product but the meat was usually sold on the domestic market for paua sausages or for fish and chip market, or used as bait. However, by the late 1950s, both meat and shell were being sold. Since the 1986–87 fishing season, the Quota Management Areas have been managed with an individual transferable quota system with a TAC, allowances for recreational and customary catch, and other sources of mortality and a TACC.

Fishers gather pāua by hand while free diving. The use of underwater breathing apparatus (UBA) is not permitted except in the PAU 4 fishery. Due to safety concerns of great white shark interactions, the use of UBAs has been permitted in the Chatham Island pāua fishery (PAU 4) since 2012. Most of the catch is from the Wairarapa coast southwards: the major fishing areas are in the Chatham Islands (PAU 4), Wairarapa (PAU 2), Marlborough (PAU 7), Stewart Island (PAU 5B), and Fiordland (PAU 5A). Virtually the entire commercial fishery is for the black-foot pāua, *Haliotis iris*, with a minimum legal size for harvesting of 125 mm shell length. A minimum harvest size great than the minimum legal size is used by commercial divers in all QMAs to reflect differences in pāua growth, with the aim to protect a substantial proportion of the spawning biomass to ensure long-term reproduction and sustainability. The yellow-foot pāua, *H. australis* is less abundant than *H. iris* and is caught only in small quantities; it has a minimum legal size of 80 mm. Catch statistics include both *H. iris* and *H. australis*.

Concerns about the status of some stocks, or a desire to increase biomass levels to above B_{MSY} , led to the commercial fishers agreeing to voluntarily reduce their Annual Catch Entitlement (ACE). This management tool is still in place in some QMAs. When relevant, information is available in the individual Working Group reports.

Up until the 2002 fishing year, catch was reported by general statistical areas; however, from 2002 onwards, a finer scale system of pāua specific statistical areas was put in place throughout each QMA (refer to the QMA specific Plenary chapters). The historical landings for the main PAU stocks are shown in Figure 1 (from 1986-87 present). On 1 October 1995 PAU 5 was divided into three separate QMAs: PAU 5A, PAU 5B, and PAU 5D. On 1 October 2021 PAU 3 was divided into two separate QMAs: PAU 3A and PAU 3B.

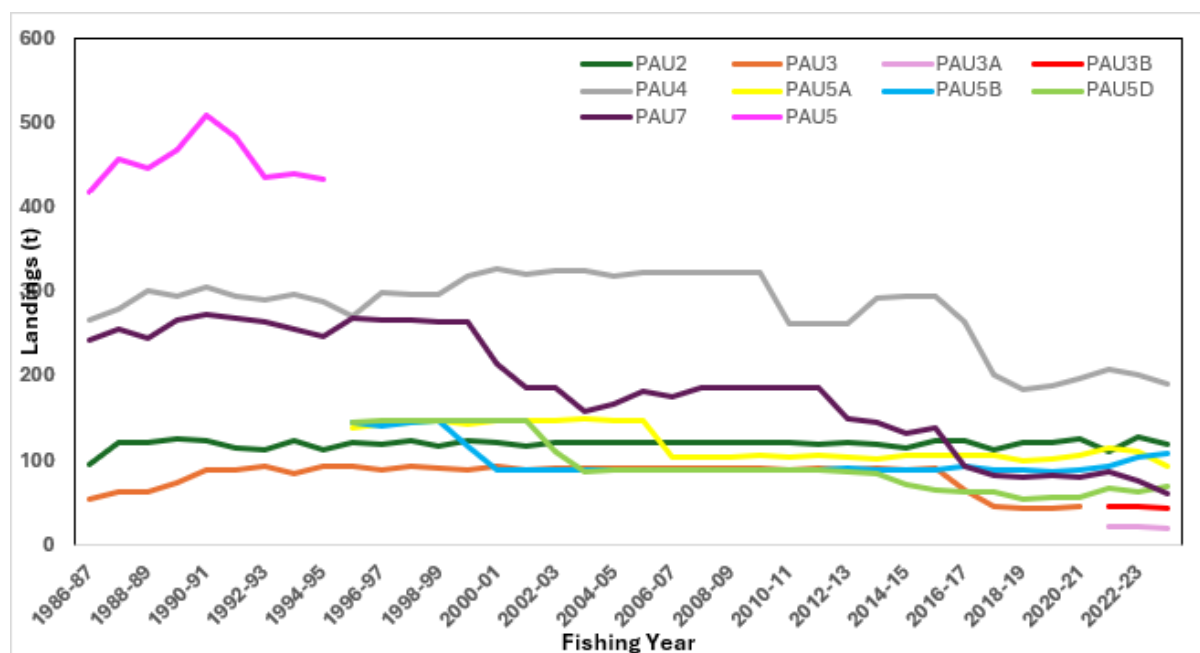


Figure 1: Historical landings for the major pāua QMAs from 1986-87 to present.

Table 2: TACCs and reported landings (t) of pāua by Fishstock from 1983–84 to present. * FSU data. H experimental landings.[Continued on next page]

Fishstock	PAU 1		PAU 2		PAU 3		PAU 3A		PAU 3B		PAU 4		PAU 5		PAU 5A	
	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC
1983–84*	1	–	110	–	114.00	–	–	–	–	–	409.00	–	550	–	–	–
1984–85*	0	–	154	–	92.00	–	–	–	–	–	278.00	–	353	–	–	–
1985–86*	0	–	92	–	51.00	–	–	–	–	–	221.00	–	228	–	–	–
1986–87*	0.01	1.00	96.2	121.19	54.02	91.62	–	–	–	–	267.37	326.54	418.9	492.06	–	–
1987–88*	0.98	1.00	122.11	121.19	62.99	91.62	–	–	–	–	279.57	326.54	465	492.06	–	–
1988–89*	0.05	1.93	121.5	121.19	57.55	91.62	–	–	–	–	284.73	326.54	427.97	492.06	–	–
1989–90	0.28	1.93	127.28	121.19	73.46	91.62	–	–	–	–	287.38	326.54	459.46	492.06	–	–
1990–91	0.16	1.93	125.82	121.19	90.68	91.62	–	–	–	–	253.61	326.54	528.16	492.06	–	–
1991–92	0.27	1.93	116.66	121.19	90.25	91.62	–	–	–	–	281.59	326.54	486.76	492.06	–	–
1992–93	1.37	1.93	119.13	121.19	94.52	91.62	–	–	–	–	266.38	326.54	440.15	443.00	–	–
1993–94	1.05	1.93	125.22	121.19	85.09	91.62	–	–	–	–	297.76	326.54	440.39	443.00	–	–
1994–95	0.26	1.93	113.28	121.19	93.26	91.62	–	–	–	–	282.10	326.54	436.13	443.00	–	–
1995–96	0.99	1.93	119.75	121.19	92.89	91.62	–	–	–	–	220.17	326.54	–	–	139.53	148.98
1996–97	1.28	1.93	118.86	121.19	89.65	91.62	–	–	–	–	251.71	326.54	–	–	141.91	148.98
1997–98	1.28	1.93	122.41	121.19	93.88	91.62	–	–	–	–	301.69	326.54	–	–	145.22	148.98
1998–99	1.13	1.93	115.22	121.19	92.54	91.62	–	–	–	–	281.76	326.54	–	–	147.36	148.98
1999–00	0.69	1.93	122.48	121.19	90.30	91.62	–	–	–	–	321.56	326.54	–	–	143.91	148.98
2000–01	1.00	1.93	122.92	121.19	93.19	91.62	–	–	–	–	326.89	326.54	–	–	147.70	148.98
2001–02	0.32	1.93	116.87	121.19	89.66	91.62	–	–	–	–	321.64	326.54	–	–	148.53	148.98
2002–03	0.00	1.93	121.19	121.19	90.92	91.62	–	–	–	–	325.62	326.54	–	–	148.76	148.98
2003–04	0.05	1.93	121.06	121.19	91.58	91.62	–	–	–	–	325.85	326.54	–	–	148.98	148.98
2004–05	0.27	1.93	121.19	121.19	91.43	91.62	–	–	–	–	319.24	326.54	–	–	148.95	148.98
2005–06	0.45	1.93	121.14	121.19	91.60	91.62	–	–	–	–	322.53	326.54	–	–	148.92	148.98
2006–07	0.76	1.93	121.20	121.19	91.61	91.62	–	–	–	–	322.76	326.54	–	–	104.03	148.98
2007–08	1.14	1.93	121.06	121.19	91.67	91.62	–	–	–	–	323.98	326.54	–	–	105.13	148.98
2008–09	0.47	1.93	121.18	121.19	90.84	91.62	–	–	–	–	324.18	326.54	–	–	104.82	148.98
2009–10	0.20	1.93	121.13	121.19	91.61	91.62	–	–	–	–	323.57	326.54	–	–	104.40	148.98
2010–11	0.12	1.93	121.18	121.19	90.40	91.62	–	–	–	–	262.15	326.54	–	–	106.23	148.98
2011–12	0.77	1.93	120.01	121.19	91.14	91.62	–	–	–	–	262.07	326.54	–	–	105.56	148.98
2012–13	1.06	1.93	122.00	121.19	90.01	91.62	–	–	–	–	263.33	326.54	–	–	102.30	148.98
2013–14	0.71	1.93	120.00	121.19	90.85	91.62	–	–	–	–	291.98	326.54	–	–	106.95	148.98
2014–15	0.47	1.93	115.00	121.19	90.44	91.62	–	–	–	–	295.16	326.54	–	–	106.84	148.98
2015–16	0.13	1.93	123.74	121.19	91.73	91.62	–	–	–	–	294.73	326.54	–	–	106.50	148.98
2016–17	0.25	1.93	123.69	121.19	66.29	91.62	–	–	–	–	264.63	326.54	–	–	107.45	148.98
2017–18	0.00	1.93	113.87	121.19	45.59	45.80	–	–	–	–	203.03	326.54	–	–	99.66	148.98
2018–19	0.22	1.93	122.89	121.19	44.05	45.80	–	–	–	–	185.06	326.54	–	–	103.03	148.98
2019–20	1.36	1.93	122.28	121.19	43.09	45.80	–	–	–	–	188.47	326.54	–	–	106.02	148.98
2020–21	0.64	1.93	126.26	121.19	47.10	45.80	–	–	–	–	196.65	326.54	–	–	114.88	148.98
2021–22	0.93	1.93	110.91	121.19	–	–	22.96	23.00	46.56	46.00	209.10	326.54	–	–	111.51	148.98
2022–23	0.42	1.93	129.39	121.19	–	–	22.71	23.00	46.02	46.00	202.04	326.54	–	–	93.86	148.98
2023–24	0.00	1.93	120.14	121.19	–	–	22.45	23.00	44.40	46.00	191.33	326.54	–	–	104.40	148.98

Table 2 [Continued]:

Fishstock	PAU 5B		PAU 5D		PAU 6		PAU 7		PAU 10		Total	
	Land.	TACC	Land.	TACC	Land.	TACC	Land.	TACC	Land	TACC	Land.	TACC
1983–84*	–	–	–	–			330.00	–			853.00	0.00
1984–85*	–	–	–	–			230.00	–			600.00	0.00
1985–86*	–	–	–	–			236.09	–			508.09	0.00
1986–87*	–	–	–	–	0.00	1.00	242.18	–	0.00	1.00	1 078.67	1 302.81
1987–88*	–	–	–	–	0.00	1.00	255.94	–	0.00	1.00	1 180.05	1 302.81
1988–89*	–	–	–	–	0.00	1.00	246.03	–	0.00	1.00	1 177.22	1 302.81
1989–90	–	–	–	–	0.00	1.00	267.05	267.48	0.00	1.00	1 233.82	1 302.81
1990–91	–	–	–	–	0.23	1.00	273.25	267.48	0.00	1.00	1 303.02	1 302.81
1991–92	–	–	–	–	0.00	1.00	268.31	267.48	0.00	1.00	1 252.94	1 302.81
1992–93	–	–	–	–	0.00	1.00	264.80	267.48	0.00	1.00	1 199.09	1 253.75
1993–94	–	–	–	–	0.10	1.00	255.47	267.48	0.00	1.00	1 204.67	1 253.75
1994–95	–	–	–	–	9.29 ^H	1.00	247.11	267.48	0.00	1.00	1 186.45	1 253.75
1995–96	144.66	148.98	167.42	148.98	28.62 ^H	1.00	268.74	267.48	0.00	1.00	1 215.77	1 257.69
1996–97	142.36	148.98	146.6	148.98	0.11	1.00	267.59	267.48	0.00	1.00	1 210.05	1 257.69
1997–98	145.34	148.98	146.99	148.98	0.00	1.00	266.65	267.48	0.00	1.00	1 220.79	1 257.69
1998–99	148.55	148.98	148.78	148.98	0.00	1.00	265.05	267.48	0.00	1.00	1 217.76	1 257.69
1999–00	118.07	143.98	147.66	148.98	1.04	1.00	264.64	267.48	0.00	1.00	1 208.99	1 252.69
2000–01	89.92	112.19	149.00	148.98	0.00	1.00	215.92	267.48	0.00	1.00	1 146.87	1 220.90
2001–02	89.96	112.19	148.74	148.98	0.00	1.00	187.15	240.73	0.00	1.00	1 102.86	1 194.15
2002–03	89.86	90.00	111.69	114.00	0.00	1.00	187.22	187.24	0.00	1.00	1 075.26	1 083.49
2003–04	90.00	90.00	88.02	89.00	0.00	1.00	159.55	187.24	0.00	1.00	1 025.09	1 058.49
2004–05	89.97	90.00	88.82	89.00	0.00	1.00	166.94	187.24	0.00	1.00	1 026.81	1 058.49
2005–06	90.47	90.00	88.93	89.00	0.00	1.00	183.36	187.24	0.00	1.00	1 047.40	1 058.49
2006–07	89.16	90.00	88.98	89.00	1.00	1.00	176.05	187.24	0.00	1.00	995.54	1 058.49
2007–08	90.21	90.00	88.97	89.00	1.00	1.00	186.84	187.24	0.00	1.00	1 010.00	1 058.49
2008–09	90.00	90.00	88.77	89.00	1.00	1.00	186.85	187.24	0.00	1.00	1 008.11	1 058.49
2009–10	90.23	90.00	89.45	89.00	1.00	1.00	187.02	187.24	0.00	1.00	1 010.61	1 058.49
2010–11	89.67	90.00	88.70	89.00	1.00	1.00	186.77	187.24	0.00	1.00	944.39	1 058.49
2011–12	89.59	90.00	89.23	89.00	1.00	1.00	186.98	187.24	0.00	1.00	947.02	1 058.49
2012–13	90.58	90.00	87.91	89.00	1.00	1.00	149.75	187.24	0.00	1.00	911.43	1 058.49
2013–14	88.84	90.00	84.59	89.00	1.00	1.00	145.52	187.24	0.00	1.00	926.16	1 058.49
2014–15	89.45	90.00	71.87	89.00	0.96	1.00	133.58	187.24	0.00	1.00	903.56	1 058.50
2015–16	88.39	90.00	65.95	89.00	0.84	1.00	139.79	187.24	0.00	1.00	912.14	1 058.50
2016–17	92.99	90.00	63.12	89.00	1.06	1.00	93.61	93.62	0.00	1.00	812.15	964.88
2017–18	89.33	90.00	62.48	89.00	1.04	1.00	81.88	93.62	0.00	1.00	704.67	919.06
2018–19	89.03	90.00	55.55	89.00	1.00	1.00	79.70	93.62	0.00	1.00	677.16	919.06
2019–20	87.19	107.00	56.55	89.00	1.00	1.00	81.98	93.62	0.00	1.00	684.97	936.06
2020–21	89.60	107.00	57.78	89.00	1.00	1.00	81.34	93.62	0.00	1.00	706.37	936.06
2021–22	92.97	107.00	67.57	89.00	0.99	1.00	86.79	93.62	0.00	1.00	684.13	890.26
2022–23	105.06	107.00	62.76	89.00	0.00	1.00	76.54	93.62	0.00	1.00	687.73	890.26
2023–24	109.25	107.00	69.18	89.00	0.36	1.00	61.44	93.62	0.00	1.00	645.56	890.26

PAU 1 landings have been below the TACC since its introduction to the QMS in 1986–87 with an average of 0.56 t caught per year and with no landings recorded for 2017–18. Landings increased to 1.36 t in 2019–20, close to the TACC of 1.93 t and at a level not seen since 1992–93. In contrast, PAU 6 landings have been close to the TACC since the fishing year 2006–07, except in 2022–23 when there were no landings. For information on landings specific to other pāua QMAs refer to the specific chapters.

1.2 Recreational fisheries

There is a large recreational fishery for pāua. Estimated catches from telephone and diary surveys of recreational fishers (Teirney et al 1997, Bradford 1998, Boyd & Reilly 2004, Boyd et al 2004) are shown in Table 3.

Table 3: Estimated annual harvest of pāua (t) by recreational fishers from telephone-diary surveys*.

Fishstock	PAU 1	PAU 2	PAU 3	PAU 5	PAU 5A	PAU 5B	PAU 5D	PAU 6	PAU 7
1991–92	–	–	35–60	50–80	–	–	–	–	–
1992–93	–	37–89	–	–	–	–	–	0–1	2–7
1993–94	29–32	–	–	–	–	–	–	–	–
1995–96	10–20	45–65	–	20–35	–	–	–	–	–
1996–97	–	–	–	N/A	–	–	22.5	–	–
1999–00	40–78	224–606	26–46	36–70	–	–	26–50	2–14	8–23
2000–01	16–37	152–248	31–61	70–121	–	–	43–79	0–3	4–11

*1991–1995 Regional telephone/diary estimates, 1995/96, 1999/00, and 2000/01 National Marine Recreational Fishing Surveys.

The harvest estimates provided by telephone-diary surveys between 1993 and 2001 are no longer considered reliable for various reasons. A Recreational Technical Working Group concluded that these harvest estimates should be used only with the following qualifications: a) they may be very inaccurate; b) the 1996 and earlier surveys contain a methodological error; and c) the 2000 and 2001 estimates are implausibly high for many important fisheries. In response to these problems and the cost and scale challenges associated with onsite methods, a national panel survey was conducted for the first time throughout the 2011–12 fishing year. The panel survey used face-to-face interviews of a random sample of 30 390 New Zealand households to recruit a panel of fishers and non-fishers for a full year. The panel members were contacted regularly about their fishing activities and harvest information collected in standardised phone interviews. The national panel survey was repeated during the 2017–18 and 2022–23 fishing years using very similar methods to produce directly comparable results (Wynne-Jones et al 2019; Heinemann & Gray 2024). Recreational catch estimates from the three national panel surveys are given in Table 4. Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals. These estimates are very uncertain for some stocks because of the small number of fishers reporting catch, and more precise estimates of recreational harvest are provided by on site approaches (e.g. PAU 3A).

Table 4: Recreational harvest estimates for pāua stocks from the national panel survey in 2011–12 (Wynne-Jones et al 2014), 2017–18 (Wynne-Jones et al 2019) and 2022–23 (Heinemann & Gray 2024). Mean weights from boat ramp surveys (Hartill & Davey 2015, Davey et al 2019, 2024). [Continued on next page].

Stock	Fishers	Events	Number of pāua	CV	Total weight (t)	CV
2011–12 (national panel survey)						
PAU 1	39	63	43 480	0.27	12.16	0.27
PAU 2	157	376	285 038	0.15	81.63	0.15
PAU 3	35	67	60 717	0.31	16.98	0.31
PAU 5A	2	3	1 487	0.76	0.42	0.76
PAU 5B	4	4	2 729	0.54	0.76	0.54
PAU 5D	41	84	80 290	0.3	22.45	0.3
PAU 7	19	41	50 534	0.34	14.13	0.34
2017–18 (national panel survey)						
PAU 1	26	40	26 393	0.35	8.32	0.35
PAU 2	151	365	281 472	0.15	82.7	0.15
PAU 3	21	46	28 140	0.35	8.79	0.35
PAU 5A	2	3	2 293	0.8	0.71	0.81
PAU 5B	10	21	15 361	0.45	4.88	0.45
PAU 5D	48	88	55 141	0.21	19.28	0.21
PAU 6	3	7	3 076	0.6	0.95	0.61
PAU 7	11	16	10 576	0.36	3.02	0.36
2022–23 (national panel survey)						
PAU 1	8	14	28 178	0.87	8.12	0.87

Table 4 [Continued]:

Stock	Fishers	Events	Number of pāua	CV	Total weight (t)	CV
PAU 2	72	143	114 522	0.17	33.01	0.17
PAU 3A	9	12	1 979	0.68	0.57	0.68
PAU 3B	19	23	8 277	0.33	2.39	0.33
PAU 5A	3	5	5 489	0.68	1.58	0.68
PAU 5B	12	26	11 989	0.33	3.46	0.33
PAU 5D	31	62	71 650	0.30	20.65	0.30
PAU 7	9	15	9 908	0.35	2.87	0.35

1.3 Customary fisheries

Pāua is a taonga species and as such there is an important customary use of pāua by Māori for food, and the shells have been used extensively for decorations and fishing devices. Pāua forms an important fishery for customary non-commercial, but the total annual catch is not known.

Māori customary fishers utilise the provisions under both the recreational fishing regulations and the various customary regulations. Many tangata whenua harvest pāua under their recreational allowance and these are not included in records of customary catch. Customary reporting requirements vary around the country. Customary fishing authorisations issued in the South Island and Stewart Island would be under the Fisheries (South Island Customary Fishing) Regulations 1999. Many rohe moana / areas of the coastline in the North Island and Chatham Islands are gazetted under the Fisheries (Kaimoana Customary Fishing) Regulations 1998 which require reporting on authorisations. In the areas not gazetted, customary fishing permits would be issued would be under the Fisheries (Amateur Fishing) Regulations 2013, where there is no requirement to report catch.

The information on Māori customary harvest under the provisions made for customary fishing can be limited (Table 5). These numbers are likely to be an underestimate of customary harvest as only the catch approved and harvested in kilograms and numbers are reported in the table.

1.4 Illegal catch

There are qualitative data to suggest significant illegal, unreported, unregulated (IUU) activity in this fishery. Current quantitative levels of illegal harvests are not known. In the past, annual estimates of illegal harvest for some Fishstocks were provided by MFish Compliance based on seizures. In the current pāua stock assessments, nominal illegal catches are used.

Table 5: Fisheries New Zealand records of customary harvest of pāua (approved and reported as weight (kg) and in numbers), since 1998-99. – no data. These numbers are likely to be an underestimate of customary harvest as only the catch approved and harvested in kilograms and numbers are reported in the table [Continued on next three pages]

Fishing year	PAU 1		PAU 2	
	Approved	Weight (kg) Harvested	Approved	Weight (kg) Harvested
1998-99	–	–	–	–
1999-00	–	–	–	–
2000-01	–	–	–	–
2001-02	–	–	–	–
2002-03	–	–	–	–
2003-04	–	–	–	–
2004-05	–	–	–	–
2005-06	125	100	40	40
2006-07	705	581	2 175	1 925
2007-08	460	413	2 155	1 618
2008-09	491	191	2 915	2 228
2009-10	184	43	2 825	2 225
2010-11	154	129	5 915	3 952
2011-12	25	8	470	470
2012-13	20	20	1 305	1 193
2013-14	–	–	–	–
2014-15	45	33	700	536
2015-16	50	9	1 425	756
2016-17	–	–	2 190	618
2017-18	15	15	4 632	3 162
2018-19	–	–	1 368	710
2019-20	60	20	120	115
2020-21	40	0	375	176
2021-22	40	40	–	–

PĀUA (PAU) – May 2025

Table 5 [Continued]:

Fishing year	PAU 1		PAU 2	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
2022–23	–	–	–	–
2023–24	–	–	655	251
Fishing year	PAU 3*		PAU 3A	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
1998–99	–	–	–	–
1999–00	–	–	–	–
2000–01	–	–	300	230
2001–02	–	–	6 239	4 832
2002–03	–	–	3 422	2 449
2003–04	–	–	–	–
2004–05	–	–	–	–
2005–06	–	–	1 580	1 220
2006–07	–	–	5 274	4 561
2007–08	–	–	7 515	5 790
2008–09	–	–	10 848	8 232
2009–10	–	–	8 490	6 467
2010–11	–	–	8 360	7 449
2011–12	–	–	5 675	4 242
2012–13	–	–	15 036	12 874
2013–14	–	–	10 259	7 566
2014–15	–	–	8 761	7 035
2015–16	–	–	14 801	11 808
2016–17	–	–	11 374	9 217
2017–18	–	–	2 708	1 725
2018–19	–	–	480	278
2019–20	–	–	30 288	21 527
2020–21	–	–	11 462	8 609
2021–22	–	–	–	–
2022–23	–	–	–	–
2023–24	–	–	–	–
Fishing year	PAU 3B		PAU 4	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
1998–99	–	–	–	–
1999–00	–	–	–	–
2000–01	–	–	–	–
2001–02	–	–	–	–
2002–03	–	–	–	–
2003–04	–	–	–	–
2004–05	–	–	–	–
2005–06	–	–	–	–
2006–07	–	–	–	–
2007–08	–	–	–	–
Fishing year	PAU 3B		PAU 4	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
2008–09	–	–	–	–
2009–10	–	–	635	635
2010–11	–	–	–	–
2011–12	–	–	–	–
2012–13	–	–	–	–
2013–14	–	–	110	110
2014–15	–	–	150	150
2015–16	–	–	320	120
2016–17	–	–	366	366
2017–18	–	–	53	85
2018–19	–	–	330	330
2019–20	–	–	–	–
2020–21	–	–	–	–
2021–22	–	–	6 041	4 013
2022–23	–	–	2 160	1 086
2023–24	–	–	–	–

Table 5 [Continued]:

Fishing year	PAU 5A		PAU 5B	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
1998–99	–	–	–	–
1999–00	–	–	–	–
2000–01	–	–	50	50
2001–02	–	–	610	590
2002–03	–	–	–	–
2003–04	–	–	–	–
2004–05	–	–	–	–
2005–06	–	–	140	90
2006–07	–	–	485	483
2007–08	–	–	2 685	2 684
2008–09	–	–	3 520	3 444
2009–10	–	–	2 680	2 043
2010–11	–	–	2 053	1 978
2011–12	–	–	495	495
2012–13	–	–	1 875	1 828
2013–14	–	–	130	130
2014–15	–	–	–	–
2015–16	–	–	2 195	2 003
2016–17	–	–	75	75
2017–18	–	–	2 245	2 245
2018–19	–	–	1 405	1 337
2019–20	–	–	835	815
2020–21	–	–	2 645	2 495
2021–22	–	–	70	70
2022–23	–	–	–	–
2023–24	–	–	–	–

Fishing year	PAU 5D		PAU 6	
	Approved	Weight (kg) Harvested	Approved	Numbers Harvested
1998–99	–	–	–	–
1999–00	–	–	–	–
2000–01	–	–	–	–
2001–02	–	–	–	–
2002–03	–	–	–	–
2003–04	–	–	–	–
2004–05	–	–	–	–
2005–06	–	–	–	–
2006–07	–	–	100	100
2007–08	–	–	60	60
2008–09	–	–	–	–
2009–10	–	–	–	–
2010–11	–	–	230	130
2011–12	–	–	–	–
2012–13	–	–	–	–
2013–14	–	–	–	–
2014–15	–	–	–	–
2015–16	–	–	50	50
2016–17	–	–	80	80
2017–18	–	–	–	–
2018–19	–	–	–	–
2019–20	–	–	–	–
2020–21	–	–	–	–
2021–22	–	–	–	–
2022–23	–	–	–	–
2023–24	–	–	–	–

Fishing year	PAU 7	
	Approved	Numbers Harvested
1998–99	–	–
1999–00	–	–
2000–01	–	–
2001–02	–	–
2002–03	–	–
2003–04	–	–
2004–05	–	–
2005–06	–	–
2006–07	–	–
2007–08	–	–
2008–09	–	–
2009–10	–	–
2010–11	–	–

Table 5 [Continued]:

Fishing year	Approved	Weight (kg) Harvested	Approved	PAU 7 Numbers Harvested
2011–12	–	–	20	20
2012–13	–	–	–	–
2013–14	–	–	–	–
2014–15	–	–	–	–
2015–16	–	–	–	–
2016–17	–	–	–	–
2017–18	–	–	–	–
2018–19	–	–	–	–
2019–20	–	–	–	–
2020–21	–	–	–	–
2021–22	–	–	–	–
2022–23	–	–	–	–
2023–24	–	–	–	–

* Data before 2010–11 exclude the area between the Hurunui River and the South Shore (just north of Banks Peninsula), as Tangata Tiaki were not appointed there until November 2009.

1.5 Other sources of mortality

Pāua may die from wounds caused by removal desiccation or osmotic and temperature stress if they are brought to the surface. Sub-legal pāua may be subject to handling mortality by the fishery if they are removed from the substrate to be measured. Further mortality may result indirectly from being returned to unsuitable habitat or being lost to predators or bacterial infection. Gerring (2003) observed pāua (from PAU 7) with a range of wounds in the laboratory and found that only a deep cut in the foot caused significant mortality (40% over 70 days). In the field this injury reduced the ability of pāua to right themselves and clamp securely onto the reef and consequently made them more vulnerable to predators. The tool generally used by divers in PAU 7 is a custom-made stainless-steel knife with a rounded tip and no sharp edges. This design makes cutting the pāua very unlikely (although abrasions and shell damage may occur). Gerring (2003) estimated that in PAU 7, 37% of pāua removed from the reef by commercial divers were undersized and were returned to the reef. His estimate of incidental mortality associated with fishing in PAU 7 was 0.3% of the landed catch. Incidental fishing mortality may be higher in areas where other types of tools and fishing practices are used. Mortality may increase if pāua are kept out of the water for a prolonged period or returned onto sand. To date, the stock assessments developed for pāua have assumed that there is no mortality associated with capture of undersized animals. The level of mortality for sub-legal pāua caught and returned to sea by amateur fishers is unknown.

2. BIOLOGY

Pāua are herbivores which can form large aggregations on reefs in shallow subtidal coastal habitats. Movement is over a sufficiently small spatial scale that the species may be considered sedentary. Pāua are broadcast spawners and spawning is usually annual. Habitat related factors are an important source of variation in the post-settlement survival of pāua. Growth, morphometrics, and recruitment can vary over short distances and may be influenced by factors such as water temperature, wave exposure, habitat structure and the availability of food. Naylor & Fu (2016) analysed demographic variation in pāua in New Zealand. They concluded that there were large differences in the growth rates and maximum size over a large latitudinal range. Their analysis indicated that water temperature, as indicated by sea surface temperature, was an important determinant of these. Pāua become sexually mature when they are about 70–90 mm long, or 3–5 years old.

The Intrinsic Productivity Level is categorised as Low for this species.

A summary of generic estimates for biological parameters for pāua is presented in Table 6. Parameters specific to individual pāua QMAs are reported in the specific Working Group report chapters.

Table 6: Estimates of biological parameters for pāua (*H. iris*).

Fishstock	Estimate	Source
<u>1. Natural mortality (<i>M</i>)</u>		
All	0.02–0.25	Sainsbury (1982)
<u>2. Weight = $a(\text{length})^b$ (weight in kg, shell length in mm)</u>		
$a = 2.99\text{E}^{-08}$	$b = 3.303$	Schiel & Breen (1991)

3. STOCKS AND AREAS

Using both mitochondrial and microsatellite markers Will & Gemmell (2008) found high levels of genetic variation within samples of *H. iris* taken from 25 locations spread throughout New Zealand. They also found two patterns of weak but significant population genetic structure. Firstly, *H. iris* individuals collected from the Chatham Islands were found to be genetically distinct from those collected from coastal sites around the North and South islands. Secondly a genetic discontinuity was found loosely associated with the Cook Strait region. Genetic discontinuities within the Cook Strait region have been previously identified in sea stars, mussels, limpets, and chitons and are possibly related to contemporary and/or past oceanographic and geological conditions of the region. This split may have some implications for management of the pāua stocks, with populations on the south of the North Island and the north of the South Island potentially warranting management as separate entities; a status they already receive under the zonation of the current fisheries regions, PAU 2 on the North Island and PAU 7 on the South Island.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

This section was updated for the 2021 Fishery Assessment Plenary. A more detailed summary from an issue-by-issue perspective is available in the Aquatic Environment and Biodiversity Annual Review 2021 (Fisheries New Zealand 2021), online at <https://www.mpi.govt.nz/dmsdocument/51472-Aquatic-Environment-and-Biodiversity-Annual-Review-AEBAR-2021-A-summary-of-environmental-interactions-between-the-seafood-sector-and-the-aquatic-environment>.

4.1 Ecosystem role

McCowan (2019) conducted a review of all relevant literature about the role of pāua in ecosystems and the environmental factors (natural and human-induced) affecting pāua distribution, abundance, and behaviour.

Pāua are eaten by a range of predators, and smaller pāua are generally more vulnerable to predation. Smaller pāua are consumed by blue cod (Carbines & Beentjes 2003), snapper (Francis 2003), banded wrasse (Russell 1983), spotties (McCardle 1983), triplefins (McCardle 1983), and octopus (Andrew & Naylor 2003). Large pāua are generally well protected by their strong shells but are still vulnerable to rock lobsters (McCardle 1983) and the large predatory starfishes *Astrostele scabra* and *Coscinasterias muricata* (Andrew & Naylor 2003). Large pāua are also vulnerable to predation by eagle rays (McCardle 1983), but Ayling & Cox (1982) suggested that eagle rays feed almost exclusively on Cook's turban. There are no known predators that feed exclusively on pāua.

Pāua feed preferentially on drift algae, but at high densities they also feed by grazing attached algae. They are not generally considered to have a large structural impact upon algal communities, but at high densities they may reduce the abundance of algae. There are no recognised interactions with pāua abundance and the abundance or distribution of other species, except for kina which, at very high densities, appear to exclude pāua (Naylor & Gerring 2001). Research at D'Urville Island and on Wellington's south coast suggests that there is some negative association between pāua and kina (Andrew & MacDiarmid 1999).

4.2 Fish and invertebrate bycatch

Because pāua are harvested by hand gathering, incidental bycatch is limited to epibiota attached to or within the shell. The most common epibiont on pāua shell is non-geniculate coralline algae, which,

along with most other plants and animals which settle and grow on the shell, such as barnacles, oysters, sponges, bryozoans, and algae, appears to have general habitat requirements (i.e., these organisms are not restricted to the shells of pāua). Several boring and spiral-shelled polychaete worms are commonly found in and on the shells of pāua. Most of these are found on several shellfish species, although within New Zealand's shellfish, the onuphid polychaete *Brevibrachium maculatum* has been found only in pāua shell (Read 2004). This species, however, has also been reported to burrow into limestone or attach its tube to the holdfasts of algae (Read 2004). It is also not uncommon for pāua harvesters to collect predators of pāua (mainly large predatory starfish) while fishing and to effectively remove these from the ecosystem. The levels of these removals are unlikely to have a significant effect on starfish populations (nor, in fact, on the mortality of pāua caused by predation).

4.3 Incidental catch (seabirds, mammals, and protected fish)

There is no known bycatch of threatened, endangered, or protected species associated with the hand gathering of pāua.

4.4 Benthic interactions

The environmental impact of pāua harvesting is likely to be minimal because pāua are selectively hand gathered by free divers. Habitat contact by divers at the time of harvest is limited to the area of pāua foot attachment, and pāua are usually removed with a blunt tool to minimise damage to the flesh. The diver's body is also seldom in full contact with the benthos. Vessels anchoring during or after fishing have the potential to cause damage to the reef depending on the type of diving operation (in many cases, vessels do not anchor during fishing and, if they do, they will try to anchor on sand where possible). Damage from anchoring is likely to be greater in areas with fragile species such as corals than it is on shallow temperate rocky reefs. Corals are relatively abundant at shallow depths within Fiordland, but there are seven areas within the sounds with significant populations of fragile species where anchoring is prohibited.

4.5 Other considerations

4.5.1 Genetic effects

Fishing, and environmental changes, including those caused by climate change or pollution, could alter the genetic composition or diversity of a species and there is some evidence to suggest that genetic changes may occur in response to fishing of abalones. Miller et al (2009) suggested that, in *Haliotis rubra* in Tasmania, localised depletion may lead to reduced local reproductive output which may, in turn, lead to an increase in genetic diversity because migrant recruitment will contribute more to total recruitment. Enhancement of pāua stocks with artificially-reared juveniles has the potential to lead to genetic effects if specific lineages of broodstock are used.

4.5.2 Biosecurity issues

Undaria pinnatifida is a highly invasive opportunistic kelp which spreads mainly via fouling on boat hulls. It can form dense stands underwater, potentially resulting in competition for light and space which may lead to the exclusion or displacement of native plant and animal species. *Undaria* may be transported on the hulls of pāua dive tenders to unaffected areas. Bluff Harbour, for example, supports a large population of *Undaria* and is one of the main ports of departure for fishing vessels harvesting pāua in Fiordland, which appears to be devoid of *Undaria* (R. Naylor pers. comm.). In 2010, a small population of *Undaria* was found in Sunday Cove in Breaksea Sound, and attempts to eradicate it appear to have been successful (see <https://www.mpi.govt.nz/biosecurity/marine-pest-disease-management/fiordland-marine-biosecurity-programme/>). There is also in place an EnviroSouth-developed code of practice applicable to fishing vessels to prevent unwanted pest transfers.

4.5.3 Kaikōura Earthquake

Research was undertaken to investigate the influence of the November 2016 Kaikōura earthquake on pāua stocks along the Kaikōura coastline. The results estimated that the seabed uplift led to a loss of up to 50% of the pre-earthquake fished area across PAU 3 statistical areas. Annual biomass surveys have showed a recovery of the stock which has led to the reopening of the fishery in 2021–22 for 3 months. More details can be found in the PAU 3A Working Group report chapter.

4.5.4 Marine heatwave

A baseline report summarising trends in climatic and oceanographic conditions in New Zealand that are of potential relevance for fisheries and marine ecosystem resource management in the New Zealand region was completed by Hurst et al (2012). There is also an updated chapter on oceanic trends in the Aquatic Environment and Biodiversity Annual Review 2021 (Fisheries New Zealand 2021). Any effects of recent warmer temperatures (such as the high surface temperatures off the WCSI during the 2016 and 2017 spawning seasons, marine heatwaves, and general warming of the Tasman Sea (Sutton & Bowen 2019) on fish distribution, growth, or spawning success have yet to be determined.

Shellfish fisheries have been identified as likely to be vulnerable to ocean acidification (Capson & Guinotte 2014). A recent project that has just reached completion describes the state of knowledge of climate change-associated predictions for components of New Zealand's marine environment that are most relevant to fisheries (Cummings et al 2021). Past and future projected changes in coastal and ocean properties, including temperature, salinity, stratification and water masses, circulation, oxygen, ocean productivity, detrital flux, ocean acidification, coastal erosion and sediment loading, wind and waves are reviewed. Responses to climate change for these coastal and ocean properties are discussed, as well as their likely impact on the fisheries sector, where known.

A range of decision support tools in use overseas were evaluated with respect to their applicability for dissemination of the state of knowledge on climate change and fisheries. Three species, for which there was a relatively large amount of information available were chosen from the main fisheries sectors for further analysis. These were pāua, snapper, and hoki (shellfish, inshore, and middle-depths/deepwater fisheries, respectively). An evaluation of the sensitivity and exposure of pāua to climate change-associated threats, based on currently available published literature and expert opinion, assessed pāua vulnerability to climate change effects as 'very high' (Cummings et al 2021).

5. STOCK ASSESSMENT

The dates of the most recent survey or stock assessment for each QMA are listed in Table 7.

5.1 Estimates of fishery parameters and abundance

For further information on fishery parameters and abundance specific to each pāua QMA refer to the specific Working Group report chapter.

In QMAs where quantitative stock assessments have been undertaken, standardised CPUE is used as input data for the Bayesian length-based stock assessment model. There is however a large amount of literature on abalone which suggests that any apparent stability in CPUE should be interpreted with caution and CPUE may not be proportional to abundance because it is possible to maintain high catch rates despite a falling biomass. This occurs because pāua tend to aggregate and, to maximise their catch rates, divers move from areas that have been depleted of pāua to areas with higher density. The consequence of this fishing behaviour is that overall abundance is decreasing while CPUE is remaining stable. This process of hyperstability is believed to be of less concern in most commercial areas because fishing in these QMAs is consistent across all fishable areas. Further, the single study of CPUE as a proxy of abundance for pāua demonstrated a near linear relationship between CPUE and available biomass, indicating it is a useful tool (Abraham & Neubauer 2015). An exception are the D'Urville Island and Northern Faces areas of PAU 7, where catches have declined substantially, and CPUE now only reflects a few remaining areas. Other areas may be highly depleted but fishery dependent CPUE does not reflect abundance in these areas any longer.

Table 7: Recent survey and stock assessment information for each pāua QMA.

QMA	Type of survey or assessment	Date	Comments
PAU 1	No surveys or assessments have been undertaken		
PAU 2	Qualitative evaluation	2025	A large proportion of PAU 2, including the Wellington south coast and west of Turakirae, is either a Marine Reserve or voluntarily closed to commercial fishing. The data collected from the commercial fishery and assessment only applies to the south east component of PAU 2 (Wairarapa), about 20% of PAU 2. A qualitative assessment was conducted in 2025 on the basis of a standardised CPUE series of recent ERS data, which is declining in all areas of the commercial fishery.
PAU 3A	Length based Bayesian integrated assessment	2024	The PAU 3A stock assessment used the length-based population dynamics model described by Breen et al (2003). Although the overall population-dynamics model remained unchanged, the 2024 assessment of the PAU 3A stock used a number of changes from previous models used in PAU 3, including that the 2024 model is spatially explicit. The high CSLF weight (highCSLFW) model without explicit earthquake impacts was accepted as the base assessment model, noting that recent estimated recruitment was low and likely proxying for earthquake impacts. The estimated stock status for the model was 46% of unfished spawning biomass and very low risk of being below limit reference points, reflecting a large rebuild of biomass post-earthquake from below target levels.
PAU 3B	CPUE Standardisation	2022	A stock assessment for the PAU 3B area was attempted in 2021–22, based on estimates of historical catches, CPUE trends and commercial length frequency data. CPUE trends were found to be stable despite steady increases in catch over the past decades.
PAU 4	Operating model and harvest control rule	2022	A series of projects developed spatial length-based operating models (pāua statistical areas scale), and tested management procedures to formalise statistical-area scale industry management initiatives. Unreliable catch and CPUE series meant stock assessment models could not be fitted statistically, but were conditioned on assumed catch series. Conditioned models suggested a range of outcomes across individual statistical areas; differences were attributed to conditioning assumptions. While application of control rules led to variable outcomes at the statistical area scale, the spatial variability averaged out, leading to highly stable trends at the QMA scale for an implementation window of 5 years, and indicating low risk of further declines under the trialed preliminary harvest control rules
PAU 5A	Qualitative evaluation	2025	A qualitative assessment was conducted in 2025 on the basis of a standardised CPUE series of recent ERS data, which is declining in all areas of the commercial fishery.
PAU 5B	Quantitative assessment using a Bayesian length-based model	2018	The 2018 Plenary accepted this assessment as best scientific information. The status of the stock was estimated to be 47% B_0 .
PAU 5D	Quantitative assessment using a Bayesian length-based model	2023	The base case model suggested a recent increase from low levels in spawning stock biomass over the past seven years, following a slow downwards trend from 2010 to 2015. The base case also indicated that the stock is currently as likely as not to be at the interim target spawning stock biomass of 40% SSB , it is very unlikely to be below the soft limit. Relative available biomass was markedly lower than the spawning stock biomass, meaning that a considerable part of the spawning biomass was below the minimum harvest size and is therefore not accessible to the fishery. Projections suggested increasing SSB for scenarios of current catch, with relatively stable stock levels expected with fishing at the current TACC.
PAU 6	Biomass estimate	1996	This fishery has a TACC of 1 t.
PAU 7	Quantitative assessment using a Bayesian length-based model	2022	The PAU 7 assessemnt applies to the Cook Strait. Currently, spawning stock biomass is estimated to be 33% B_0 and is Unlikely to be at or above the target. It is also Very Unlikely to be below the soft and hard limits. Overfishing is About as Likely as Not to be occurring.
PAU 10	No surveys or assessments have been undertaken		

In PAU 4, 5A, 5B, 5D, and 7 the relative abundance of pāua was also estimated from independent research diver surveys (RDS) for a number of years. In PAU 7, seven surveys have been completed over a number of years but only two surveys were conducted in PAU 4. In 2009 and 2010 several reviews were conducted (Cordue 2009, Haist 2010) to assess: i) the reliability of the research diver survey index as a proxy for abundance; and ii) whether the RDS data, when used in the pāua stock assessment models, result in model outputs that do not adequately reflect the status of the stocks. The reviews concluded that:

- Due to inappropriate survey design the RDS data appear to be of very limited use for constructing relative abundance indices.
- There was clear non-linearity in the RDS index, the form of which is unclear and could be potentially complex.
- CVs of RDS index ‘year’ effects are likely to be underestimated, especially at low densities.
- Different abundance trends among strata reduces the reliability of RDS indices, and the CVs are likely to be uninformative about this.
- It is unlikely that the assessment model can determine the true non-linearity of the RDS index-abundance relationship because of the high variability in the RDS indices.
- The non-linearity observed in the RDS indices is likely to be more extreme at low densities, so the RDSI is likely to mask trends when it is most critical to observe them.
- Existing RDS data is likely to be most useful at the research stratum level.

For these reasons, RDS data are not used in any recent PAU stock assessments.

5.2 Biomass estimates

Biomass was estimated for PAU 6 in 1996 (McShane et al 1996). However, the survey area was limited to the area from Kahurangi Point to the Heaphy River.

Biomass has been estimated, as part of the stock assessments, for PAU 2, 5A, 5B, 5D, and 7 (Table 7). Biomass surveys have been conducted in PAU 3A since 2017, following the 2016 Kaikōura earthquakes. For further information on biomass estimates specific to each pāua QMA refer to the specific Working Group report chapter.

5.3 Yield estimates and projections

Yield estimates and projections are estimated as part of the stock assessment process. Both are available for PAU 2, PAU 5A, PAU 5B, PAU 5D, and PAU 7. For further information on yield estimates and projections specific to each pāua QMA refer to the specific Working Group report chapter.

5.4 Other factors

In the last few years, the commercial fisheries have been implementing voluntary management actions in the commercial fished QMAs. These management actions include raising the minimum harvest size, subdividing QMAs into smaller management areas, and effort spreading through a system of capping catch in the different areas and in some QMAs, not catching the full Annual Catch Entitlement (ACE) in a particular fishing year.

6. FUTURE RESEARCH CONSIDERATIONS

- Aging of pāua and developing more robust growth studies that allow for good spatio-temporal coverage and estimating of growth trends. This is especially relevant given strong temperature dependent growth.
- Improve information on recreational harvest across all stocks.
- Further develop the CPUE standardisation, including:
 - incorporating statistical area variation and MHS differences back into CPUE;
 - exploring the sensitivity to the use of diver and client effects, including fisher learning and evidence of potential diver statistical area interactions and the consistency of diver (or other relevant) effects between PCELR and ERS models;
 - exploring sensitivity to the inclusion of only core statistical areas in CPUE series.

- Investigate density dependence in growth and potential consequences for assessment models and in the context of increasing MHS and changing biomass levels in some areas.
- Further development of stock assessment/operating models, including:
 - investigating issues with recent recruitment estimates in models, and poor fit to recent CPUE indices;
 - investigating the most appropriate way to handle the large amounts of length frequency information in recent years which has caused problems with models in some areas (PAU7);
 - incorporating changes in productivity in pāua stocks;
 - evaluating which MPs are relevant for each stock.
- Validate the use of clean flat shells as a measure of the size at maturity.
- Further develop management procedures, including:
 - consideration of other size metrics (e.g., mean size above MHS) or other alternative stock status indicators (RH limb indicators?);
 - explore sensitivity of MPs to the choice of CPUE CV and the validity of the assumption of 10%;
 - explore how LBSPR metrics relate to other reference points or thresholds;
 - explore potential environmentally driven changes in productivity.

7. STATUS OF THE STOCKS

The status of pāua stocks PAU 2, PAU 3A, PAU 3B, PAU 4, PAU 5A, PAU 5B, PAU 5D, and PAU 7 are given in the relevant Working Group report chapters.

8. FOR FURTHER INFORMATION

- Abraham, E R; Neubauer, P (2015) Relationship between small-scale catch-per-unit-effort and abundance in New Zealand abalone (pāua, *Haliotis iris*) fisheries. PeerJ PrePrints 3:e1388v2 <https://doi.org/10.7287/peerj.preprints.1388v2>
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- Andrew, N L; MacDiarmid, A B (1999) Sea urchin fisheries and potential interactions with a kina fishery in Fiordland. *Conservation Advisory Science Notes No. 266*. Department of Conservation, Wellington.
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