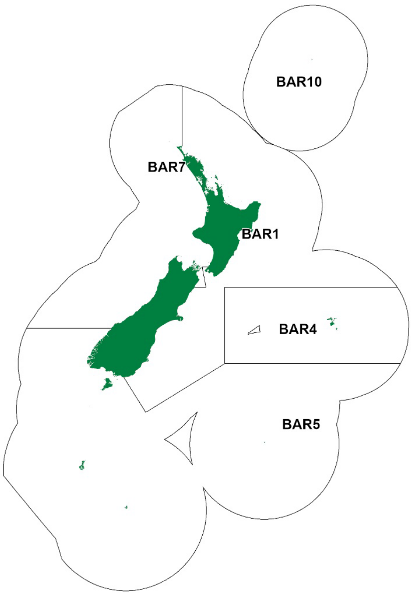
BARRACOUTA (BAR)

(*Thyrsites atun*)
Manga, maka



1. FISHERY SUMMARY

Allowances, TACCs, and TACs are shown in Table 1.

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

Fishstock	Recreational allowance	Customary non-commercial allowance	Other sources of mortality	TACC	TAC
BAR 1*	–	–	–	11 000	–
BAR 4*	–	–	–	3 019	–
BAR 5	3	2	165	8 200	8 370
BAR 7*	–	–	–	11 173	–
BAR 10*	–	–	–	10	–

* allowances and TAC not set

1.1 Commercial fisheries

Barracouta are caught in coastal waters around mainland New Zealand, Snares Islands, and Chatham Islands, down to about 400 m and have been managed under the Quota Management System since 1 October 1986. Historical catch summaries are given in Table 2 and Table 3. Landings by New Zealand vessels increased significantly in the late 1960s and total annual landings peaked at about 47 000 t in 1977, with the addition of foreign vessels around New Zealand. Between 1983–84 and 2019–20, landings fluctuated between 18 000 and 30 000 t per annum (Table 4), at an average 25 000 t. Figure 1 shows the historical landings and TACC values for the main BAR stocks.

Over 99% of the recorded catch is taken by trawlers. Major target fisheries have been developed on spring spawning aggregations (Chatham Islands, Stewart Island, west coast South Island, and northern and central east coast South Island) as well as on summer feeding aggregations, particularly around the Snares Islands and off the east coast of the South Island. Barracouta also comprise a significant proportion of the bycatch in the west coast North Island jack mackerel fishery, Stewart-Snares shelf squid fishery, and the east coast South Island red cod and tarakihi fisheries.

Landings in BAR 1 have been variable, but the lowest landing of the time series was recorded in 2018–19 (4209 t). The TACC in BAR 5 was increased to 8200 t in 2015–16, and landings have continued to fluctuate about the TACC. In BAR 7 the catch limit was exceeded in 2004–05 and 2006–07 (landings nearly reached 15 000 t in 2006–07), but landings have since decreased to well below the TACC, with the lowest landing reported in 2022–23 (1596 t).

Table 2: Reported landings (t) for the main QMAs from 1931 to 1982.

Year	BAR 1	BAR 4	BAR 5	BAR 7	Year	BAR 1	BAR 4	BAR 5	BAR 7
1931–32	4	0	0	0	1957	163	0	20	80
1932–33	55	0	0	77	1958	146	0	15	78
1933–34	5	0	1	0	1959	139	0	18	71
1934–35	36	0	0	52	1960	117	0	13	90
1935–36	1	0	0	0	1961	187	0	22	68
1936–37	26	0	0	35	1962	104	0	25	44
1937–38	21	0	0	26	1963	63	0	4	20
1938–39	91	0	22	55	1964	66	0	4	21
1939–40	107	0	27	50	1965	111	0	1	76
1940–41	153	0	53	30	1966	62	0	1	116
1941–42	212	0	86	17	1967	53	0	1	178
1942–43	371	0	151	20	1968	10 113	0	3	1 196
1943–44	192	0	79	7	1969	8 499	0	2	5 756
1944	247	0	97	50	1970	12 984	0	2	3 960
1945	306	0	114	32	1971	11 327	0	191	4 006
1946	391	0	125	63	1972	29 307	2	86	3 487
1947	590	0	213	45	1973	14 856	0	79	4 698
1948	466	0	172	27	1974	23 420	0	106	9 028
1949	425	0	169	40	1975	8 985	0	855	6 257
1950	430	0	153	76	1976	19 124	5	495	6 795
1951	266	0	95	47	1977	6 981	9 095	2 041	33 266
1952	190	0	56	68	1978	6 833	17	1 162	6 918
1953	202	0	41	77	1979	6 474	4 057	3 380	5 263
1954	166	0	35	38	1980	5 649	1 854	7 867	5 146
1955	139	0	14	58	1981	6 993	2 030	8 311	11 141
1956	165	0	16	45	1982	5 393	787	6 909	7 064

Notes:

1. The 1931–1943 years are April–March but from 1944 onwards are calendar years.
2. Data up to 1985 are from fishing returns: data from 1986 to 1990 are from Quota Management Reports.
3. Data for the period 1931 to 1982 are based on reported landings by harbour and are likely to be underestimated as a result of under-reporting and discarding practices. Data includes both foreign and domestic landings. Data were aggregated to FMA using methods and assumptions described by Francis & Paul (2013).

Table 3: Reported landings (t) by nationality from 1977 to 1987–88.

Fishing	New Zealand		Foreign			Total	
Year	Domestic	Chartered	Japan	Korea	USSR	(FSU)	(QMS)
1977	4 697	0	34 357	8 109	0	47 163	-
1978–79	5 335	58	4 781	2 481	0	12 655	-
1979–80	7 748	6 679	4 339	3 879	47	22 922	-
1980–81	10 058	4 995	4 227	15	60	19 355	-
1981–82	12 055	11 077	2 813	373	0	26 328	-
1982–83	10 814	7 110	1 746	1 888	31	21 589	-
1983–83*	7 763	2 961	803	1 115	0	12 642	-
1983–84	12 390	10 226	1 786	4 355	0	28 757	-
1984–85	7 869	10 425	1 430	5 252	0	24 976	-
1985–86	8 427	7 865	1 371	815	0	18 478	-
1986–87	9 829	13 732	1 575	742	0	25 878	27 660†
1987–88	9 335	12 077	896	609	0	22 971	26 607†

* 6 month changeover in fishing years.
† The discrepancies between QMS and FSU total landings are due to under-reporting to the FSU.

Table 4: Reported landings (t) of barracouta by Fishstock from 1983–84 to present and actual TACCs (t) from 1986–87 to present. QMS data from 1986-present. * FSU data [Continued on next page]

Fishstock	BAR 1		BAR 4		BAR 5		BAR 7	
FMAs	1, 2, 3		4		5 & 6		7, 8, 9	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1983–84*	7 805	–	1 743	–	11 291	–	7 222	–
1984–85*	5 442	–	1 909	–	12 487	–	4 425	–
1985–86*	5 395	–	1 509	–	6 380	–	4 536	–
1986–87	8 877	8 510	3 084	3 010	7 653	9 010	8 046	10 510
1987–88	9 256	8 837	1 775	3 010	6 457	9 011	9 117	10 603
1988–89	5 838	9 426	946	3 010	5 323	9 011	8 071	10 702
1989–90	9 209	9 841	1 349	3 016	5 960	9 282	7 050	10 925
1990–91	9 401	9 957	1 399	3 016	8 817	9 282	7 138	10 925
1991–92	6 733	9 957	1 156	3 016	6 897	9 282	7 326	10 925
1992–93	9 032	9 969	2 251	3 016	7 019	9 282	10 141	10 925
1993–94	7 299	9 969	606	3 016	3 410	9 282	8 030	10 925
1994–95	10 023	9 969	331	3 016	2 645	9 282	9 345	10 925
1995–96	11 252	9 969	2 234	3 016	4 255	9 282	8 593	10 925
1996–97	11 873	11 000	1 081	3 016	2 839	9 282	10 203	10 925
1997–98	11 543	11 000	1 966	3 016	6 167	9 282	8 717	10 925
1998–99	9 229	11 000	459	3 016	7 302	7 470	4 427	10 925
1999–00	10 032	11 000	1 911	3 016	6 205	7 470	3 288	10 925
2000–01	7 118	11 000	2 122	3 016	6 101	7 470	6 890	10 925
2001–02	6 900	11 000	1 160	3 019	5 883	7 470	7 655	11 173
2002–03	7 595	11 000	573	3 019	7 843	7 470	9 025	11 173
2003–04	5 949	11 000	477	3 019	6 919	7 470	9 114	11 173

Table 4 [Continued]:

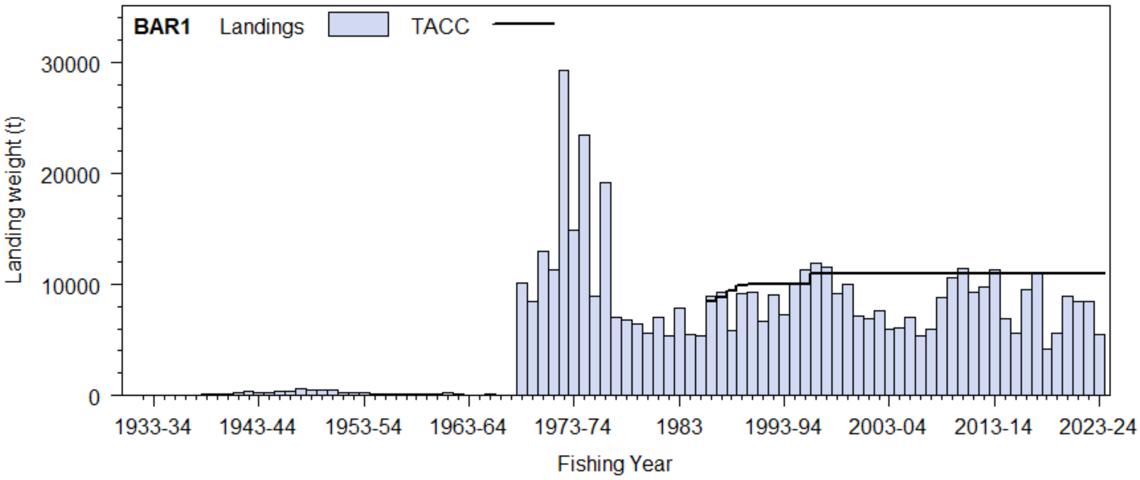
Fishstock	BAR 1		BAR 4		BAR 5		BAR 7	
FMAs	1, 2, 3		4		5 & 6		7, 8, 9	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
2004–05	6 085	11 000	98	3 019	8 593	7 470	12 156	11 173
2005–06	7 030	11 000	687	3 019	9 479	7 470	10 685	11 173
2006–07	5 351	11 000	3 233	3 019	6 334	7 470	14 698	11 173
2007–08	5 987	11 000	2 969	3 019	8 561	7 470	10 451	11 173
2008–09	8 861	11 000	968	3 019	7 659	7 470	8 955	11 173
2009–10	10 635	11 000	1 223	3 019	6 951	7 470	9 641	11 173
2010–11	11 420	11 000	1 190	3 019	8 199	7 470	6 128	11 173
2011–12	9 305	11 000	1 423	3 019	7 071	7 470	8 643	11 173
2012–13	9 740	11 000	706	3 019	7 931	7 470	6 897	11 173
2013–14	11 309	11 000	1 482	3 019	6 886	7 470	6 637	11 173
2014–15	6 902	11 000	3 671	3 019	6 779	7 470	6 974	11 173
2015–16	5 568	11 000	2 893	3 019	7 557	8 200	5 493	11 173
2016–17	9 520	11 000	2 606	3 019	8 916	8 200	7 127	11 173
2017–18	11 110	11 000	2 479	3 019	7 126	8 200	8 356	11 173
2018–19	4 209	11 000	2 016	3 019	8 141	8 200	4 053	11 173
2019–20	5 603	11 000	1 532	3 019	8 838	8 200	6 831	11 173
2020–21	8 918	11 000	775	3 019	8 638	8 200	3 066	11 173
2021–22	8 500	11 000	3 860	3 019	6 939	8 200	2 442	11 173
2022–23	8 427	11 000	493	3 019	6 975	8 200	1 596	11 173
2023–24	5 489	11 000	2 352	3 019	4 933	8 200	2 995	11 173

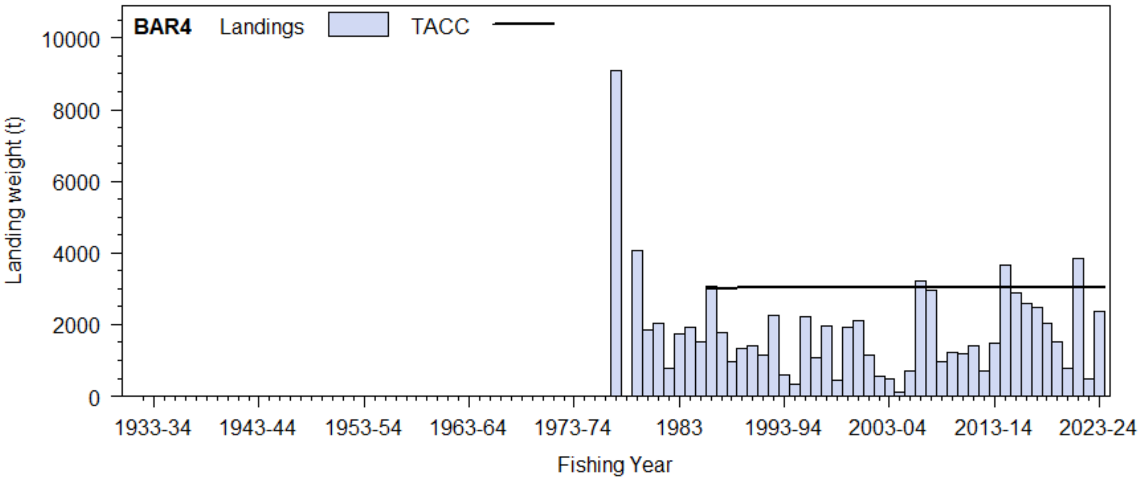
Table 4 [Continued]: Reported landings (t) of barracouta by Fishstock from 1983–84 to present and actual TACCs (t) from 1986–87 to present. QMS data from 1986-present. * FSU data

Fishstock	BAR 10			
FMAs	10		Total	
	Landings	TACC	Landings	TACC
1983–84*	0	–	28 061	–
1984–85*	0	–	24 263	–
1985–86*	0	–	17 820	–
1986–87	0	10	27 660	31 050
1987–88	0	10	26 605	31 471
1988–89	0	10	20 178	32 159
1989–90	0	10	23 568	33 073
1990–91	0	10	26 755	33 190
1991–92	0	10	22 212	33 190
1992–93	< 1	10	28 443	33 202
1993–94	0	10	19 345	33 202
1994–95	0	10	22 345	33 202
1995–96	0	10	26 334	33 202
1996–97	0	10	25 996	34 233
1997–98	0	10	28 393	34 233
1998–99	0	10	21 417	32 421
1999–00	0	10	21 436	32 421
2000–01	0	10	22 231	32 421
2001–02	0	10	21 598	32 672
2002–03	0	10	25 036	32 672
2003–04	0	10	22 459	32 672
2004–05	0	10	26 919	32 672
2005–06	0	10	27 881	32 672
2006–07	0	10	29 617	32 672
2007–08	0	10	27 968	32 672
2008–09	0	10	26 444	32 672
2009–10	0	10	28 451	32 672
2010–11	0	10	26 937	32 672
2011–12	0	10	26 442	32 672
2012–13	0	10	24 973	32 672
2013–14	0	10	26 313	32 672
2014–15	0	10	24 327	32 672
2015–16	0	10	21 511	33 402
2016–17	0	10	28 169	33 402
2017–18	0	10	29 071	33 402
2018–19	0	10	18 419	33 402
2019–20	0	10	22 804	33 402
2020–21	0	10	21 397	33 402
2021–22	0	10	21 741	33 402
2022–23	< 1	10	17 491	33 402
2023–24	0	10	15 768	33 402

1.2 Recreational fisheries

Barracouta are commonly encountered by recreational fishers in New Zealand, more frequently in the southern half of BAR 7 and BAR 1. Barracouta are typically harvested as bait for other fishing rather than for consumption. They are predominantly taken on rod and reel (97.9%) with a small proportion taken by net methods (1.7%). The catch is taken predominantly from fishers on boats (95.5%) with a small proportion from land based fishers (4.5%).





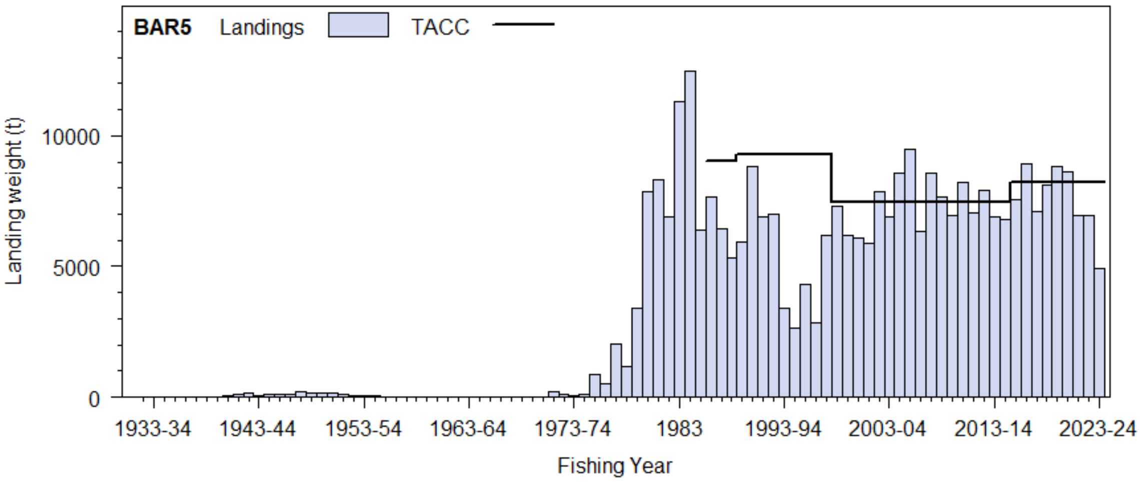


Figure 1: Reported commercial landings and TACC for the four main BAR stocks. From top to bottom: BAR 1, BAR 4 (Chatham Rise) and BAR 5 (Southland). **[Continued on next page]**

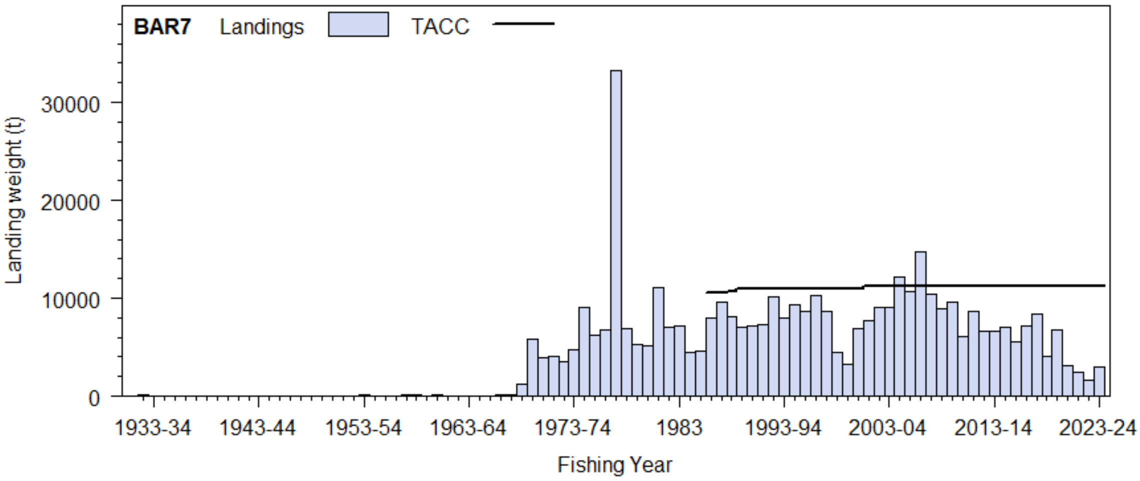


Figure 1 [Continued]: Reported commercial landings and TACC for the four main BAR stocks. BAR 7 (Challenger).

1.2.1 Management controls

The main method used to manage recreational harvests of barracouta is daily bag limits. General spatial and method restrictions also apply. Fishers can take barracouta as part of their combined daily bag limit, which varies around the country

1.2.2 Estimates of recreational harvest

There are two broad approaches to estimating recreational fisheries harvest: the use of onsite or access point methods where fishers are surveyed or counted at the point of fishing or access to their fishing activity; and offsite methods where some form of post-event interview and/or diary are used to collect data from fishers.

The first estimates of recreational harvest for barracouta were calculated using an offsite approach, the offsite regional telephone and diary survey approach. Estimates for 1996 came from a national telephone and diary survey (Bradford 1998). Another national telephone and diary survey was carried out in 2000 (Boyd & Reilly 2002). The harvest estimates provided by these telephone diary surveys (Table 5) are no longer considered reliable.

In response to the cost and scale challenges associated with onsite methods, in particular the difficulties in sampling other than trailer boat fisheries, offsite approaches to estimating recreational fisheries harvest have been revisited. This led to the development and implementation of a national panel survey for the 2011–12 fishing year (Wynne-Jones et al 2014). The panel survey used face-to-face interviews of a random sample of 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 catch 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 5. Note that national panel survey estimates do not include recreational harvest taken on charter vessel trips or under s111 general approvals.

1.3 Customary non-commercial fisheries

Quantitative information on the current level of customary non-commercial take is not available.

1.4 Illegal catch

Quantitative information on the level of illegal catch is not available.

1.5 Other sources of mortality

There may have been considerable amounts of barracouta discarded prior to the QMS, either because of quota restrictions under the deepwater policy, low value, or undesirable small size fish. There is also likely to be some mortality associated with escapement from trawl nets. Some discarding may also have occurred in BAR 1 because of the lack of quota availability and the high deemed value in relation to the low value of the fish.

2. BIOLOGY

Barracouta spawn mainly in late-winter/spring (August–September) off the east coast of the North Island and west coasts of both the main islands, in late spring (October–December) off the east coast of the South Island and Southland, and in summer (December–February) on the Chatham Rise and around the Chatham Islands (Ballara & Holmes 2020). Sexual maturity is reached at about 50–60 cm fork length (FL) at about 2–3 years of age.

Juvenile barracouta have been recorded from inshore areas (less than 100 m depths) all around New Zealand and the Chatham Islands, although they appear to be less common off the west coast of the South Island. Adult fish are found down to about 400 m depth. Tagging experiments indicated that mature fish from the east coast South Island waters migrate after June to northern waters off the east coast North Island to spawn during August–September; research survey results and commercial fishing patterns show some consistency with this movement (see Hurst et al 2012).

Table 5: Recreational harvest estimates for barracouta stocks. Early surveys were carried out in different years in the regions: South in 1991–92, Central in 1992–93, and North in 1993–94 (Teirney et al 1997). The estimated Fishstock harvest is indicative in these surveys and made by combining estimates from the different years. Some early survey harvests are presented as a range to reflect the considerable uncertainty in the estimates. The telephone/diary surveys ran from December to November but are denoted by the January calendar year. The national panel surveys ran throughout the October to September fishing year but are denoted by the January calendar year. Mean weights of 2.14 kg, 2.40 kg and 2.13 kg were used for the 2011–12, 2017–18 and 2022–23 national panel surveys respectively.

Fishstock	Year	Survey	Number	CV	Total Survey harvest (*t*)
BAR 1	1992	South	27 000	47%	30–90
BAR 7	1992	South	2 100	44%	–
BAR 1	1993	Central	17 000	22%	25–35
BAR 7	1993	Central	15 600	24%	25–35
BAR 1	1996	National	68 000	8%	160–190
BAR 7	1996	National	74 000	15%	160–220
BAR 1	2000	National	156 000	35%	182–377
BAR 5	2000	National	2 000	51%	2–7
BAR 7	2000	National	35 000	28%	68–120
BAR 1	2012	Panel survey	21 117	28%	45.3
BAR 5	2012	Panel survey	666	51%	1.4
BAR 7	2012	Panel survey	16 442	24%	35.3
BAR 1	2018	Panel survey	10 631	24%	25.5
BAR 5	2018	Panel survey	648	62%	1.6
BAR 7	2018	Panel survey	6 088	21%	14.6
BAR 1	2023	Panel survey	3 883	53%	8.3
BAR 5	2023	Panel survey	453	63%	1.0
BAR 7	2023	Panel survey	3 090	43%	6.6

No age data are available for the period prior to the onset of commercial fishing, which developed rapidly from 1968. Ageing studies carried out in the mid-1970s showed that the maximum age rarely exceeded 10 years.

M was estimated using the equation $M = \log_e 100/\text{maximum age}$, where maximum age is the age to which 1% of the population survives in an unexploited stock. Using 10 years for the maximum age suggests an M of up to 0.46. The effect of fishing on age structure prior to the mid-1970s is unknown, but M is unlikely to be less than 0.3, which has been assumed in previous stock assessments.

Biological parameters relevant to the stock assessment are shown in Table 6.

Table 6: Estimates of biological parameters.

Fishstock			**Estimate**			**Source**
1. Natural mortality (*M*)						Hurst (unpub. data)
All-both sexes			Less than 0.46 *M* = 0.30 considered best estimate for all areas for both sexes			

2. Weight = a(length)^b (Weight in g, length in cm fork length).

	Females		Males		
	a	b	a	b	
BAR 4	0.0074	2.94	0.0117	2.82	Hurst & Bagley (1992)
BAR 5	0.0075	2090	0.0075	2.90	Hurst & Bagley (1992)

3. von Bertalanffy growth parameters

	Both sexes				
	K	t_0	L_∞		
Tasmania	0.45	0.166	91.17	(unconstrained)	Grant et al (1978)
	0.42	-0.25	91.01	(constrained, t_0 fixed)	
Southland	0.336	-0.35	81.1	Male	Horn (2002)
	0.259	-0.60	89.3	Female	Horn (2002)

3. STOCKS AND AREAS

There are thought to be at least four main stocks, based on known spawning locations and movements. Stock boundaries are not well understood, but the Chatham Islands stock is probably separate. There may be some overlap between mainland stock management areas as currently defined from analysis of tagging data, commercial fishery data, biological data (i.e., length frequencies, otoliths, parasites, spawning areas, and seasons) and from seasonal relative biomass estimates. In particular, it appears that there is considerable overlap of Southland fish with other areas, probably the west coast of the South Island and possibly the east coast as well.

Spatial temporal changes in barracouta size, sex ratio, and spawning supported earlier hypotheses on population boundaries (Devine et al 2022). The barracouta around the Chatham Islands do not appear to be connected to the populations around the main islands, whereas fish on the western Chatham Rise are clearly connected to barracouta along the east coast of the South Island. Barracouta off Southland appear to be connected to fish off both the east and west coast of the South Island, and fish off the west coasts of both islands are not likely to be separate stocks (Devine et al 2022, Langley & Bentley 2002).

4. STOCK ASSESSMENT

There are no stock assessments available for any barracouta stocks and TACCs have remained constant in all stocks since 2001–02. Hurst et al (2012) provided a comprehensive characterisation of all barracouta stocks and provided CPUE indices for BAR 1 (east coast South Island), BAR 7 (west coast South Island), and BAR 5 for 1989–90 to 2007–08. McGregor (2020) characterised the fisheries and estimated CPUE indices for the WCNI and WCSI (BAR 7) fisheries and the southern Snares fishery (BAR 5). Baird (2016) provided indices for 1989–90 to 2013–14 for the ECNI and ECSI parts of BAR 1. Marsh & McGregor (2021) updated CPUE indices for BAR 5 to 2015. Ballara & Holmes (2020) updated the characterisation and CPUE indices from 1989–90 to 2017–18 for WCSI and WCNI (BAR 7) and developed a CPUE index for the 'Chatham East' area of BAR 4; no index for 'Chatham Rise West' was possible because effort was too sporadic.

4.1 BAR 1 Auckland (E), Central (E), South-East (Coast)

4.1.1 Estimates of fishery parameters and abundance

The results from trawl surveys carried out during the mid 1980s (sometimes from a variety of different vessels) were used to provide an approximate estimate of minimum absolute biomass. This approach required an assumption about catchability to convert the trawl survey catches to estimates of absolute biomass. This method is now considered obsolete and the estimates of absolute biomass have not been included.

4.1.2 Biomass estimates

There is no trawl survey series for BAR 1 off the east coast of the North Island. The trawl survey information discussed below is for the east coast of the South Island.

The ECSI winter surveys from 1991 to 1996 in 30–400 m were replaced by summer trawl surveys (1996–97 to 2000–01) which also included the 10–30 m depth range, but these were discontinued after the fifth in the annual time series because of the extreme fluctuations in catchability between surveys (Francis et al 2001). The winter surveys were reinstated in 2007 and this time included additional 10–30 m strata in an attempt to index elephant fish and red gurnard which were added to the list of target species. Only the 2007, 2012, 2014, 2016, and 2018 surveys provide full coverage of the 10–30 m depth range.

The 2014 barracouta biomass estimate was the highest recorded in the east coast South Island winter trawl survey time series core strata (30–400 m). Biomass in the east coast South Island winter trawl survey time series core strata steadily increased until 2014 when it was more than four-fold larger than the average biomass of the early 1990s, before a 57% decline in 2016 (Figure 2, Table 7). Biomass increased for the most recent (2018) survey and is close to the time series mean of 22 176 t. Biomass in the 10–30 m depth range accounted for 6% of the total biomass (core plus shallow, 10–400 m) but has at times accounted for up to 15% of the total biomass, indicating that shallow strata should continue to be monitored for this species.

A comparison of the pre-recruit and recruited biomass (where recruited fish are over 60 cm FL) for the ECSI winter survey, based on the core strata, is shown in Figure 3. During the 1991–93 surveys, the pre-recruit and recruited estimates were similar, but in 1994 and 1996 most of the total biomass was from recruited fish. For the renewed series, from 2007, the main increase has come from the recruited fish, with significantly higher biomass for recruited fish compared with pre-recruits in the 2009 and 2012 surveys. The 2014 survey indicated an increase in the pre-recruit biomass, although the uncertainty around this estimate is high, and in 2016 both recruited and pre-recruited biomass declined substantially. In 2018 both recruited and precrecruited fish have increased in abundance, with recruited fish accounting for most of the total biomass (MacGibbon et al 2019).

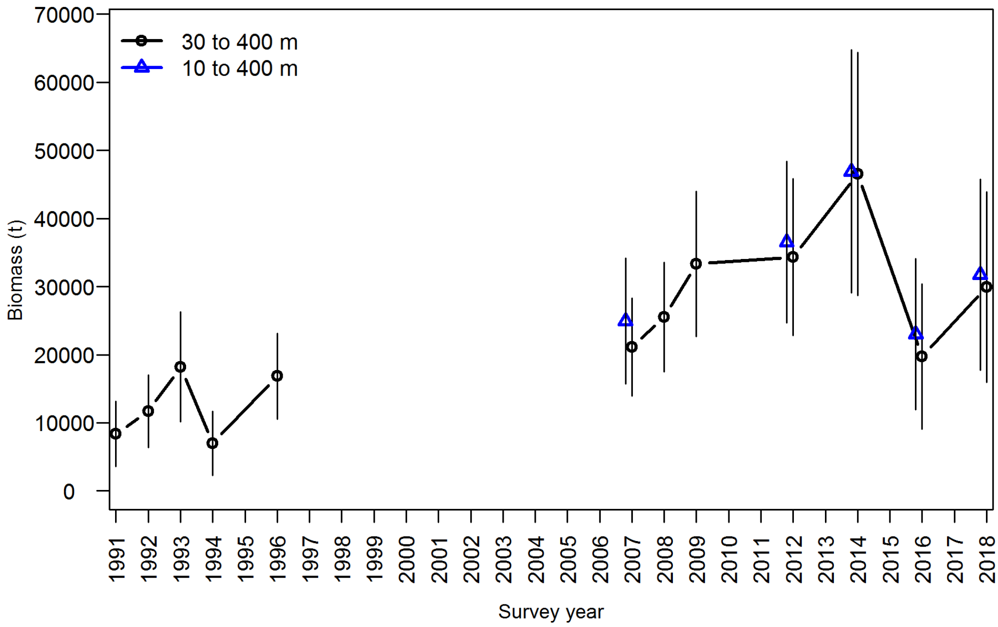


Figure 2: Barracouta total biomass and 95% confidence intervals for the all ECSI winter surveys in core strata (30–400 m) and core plus shallow strata (10–400 m) in 2007, 2012, 2014, 2016, and 2018.

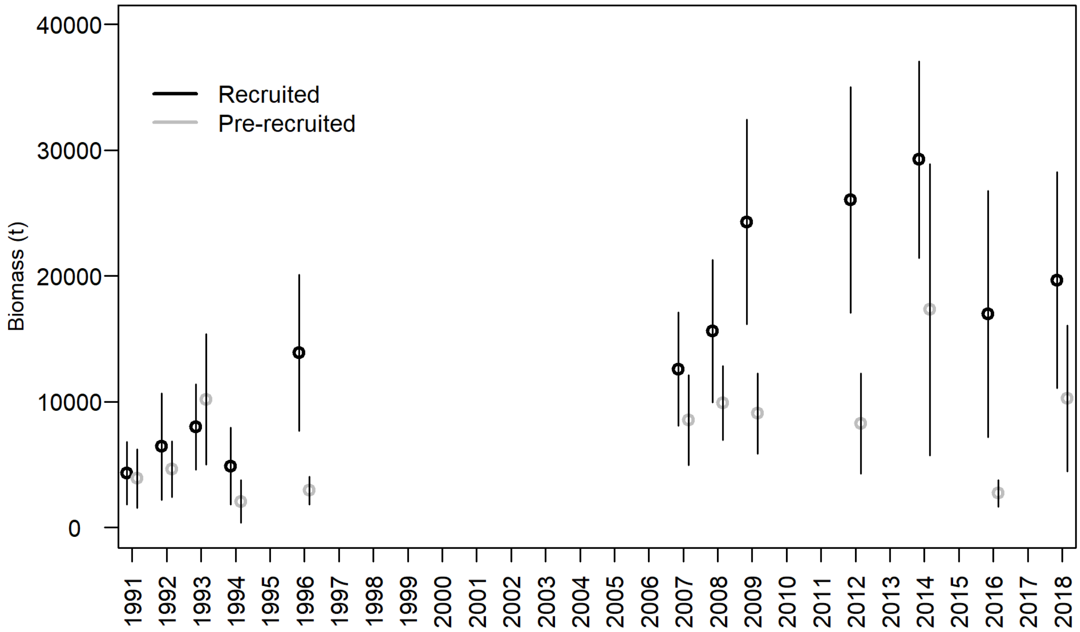


Figure 3: Barracouta pre-recruit and recruited biomass estimates and associated confidence intervals from the ECSI winter trawl survey core strata (30–400 m). Recruited fish were defined as fish over 60 cm fork length.

Table 7: Relative biomass indices (t) and coefficients of variation (CV) for barracouta for east coast South Island (ECSI) in winter, east coast North Island (ECNI), west coast South Island (WCSI), and Southland survey areas. Biomass estimates for ECSI in 1991 have been adjusted to allow for non-sampled strata (7 & 9 equivalent to current survey strata 13, 16, and 17) (see MacGibbon et al 2019). – , not measured; NA, not applicable.

Region	Fishstock	Year	Trip number	Total Biomass estimate	CV (%)	Total Biomass estimate	CV (%)
					30–400 m		10–400 m
ECSI (winter)	BAR 1	1991	KAH9105	8 361	29	–	–
		1992	KAH9205	11 672	23	–	–
		1993	KAH9306	18 197	22	–	–
		1994	KAH9406	6 965	34	–	–
		1996	KAH9608	16 848	19	–	–
		2007	KAH0705	21 132	17	24 939	19
		2008	KAH0806	25 544	16	–	–
		2009	KAH0905	33 360	16	–	–
		2012	KAH1207	34 325	17	36 526	16
		2014	KAH1402	46 563	19	46 903	19
		2016	KAH1605	19 708	27	23 007	24
		2018	KAH1803	29 917	23	31 723	22
ECNI	BAR 1	1993	KAH9304	2 673	15	–	–
		1994	KAH9402	8 433	33	–	–
		1995	KAH9502	2 103	29	–	–
		1996	KAH9602	2 495	23	–	–
WCSI	BAR 7	1992	KAH9203	2 478	14	–	–
		1994	KAH9404	5 298	16	–	–
		1995	KAH9504	4 480	13	–	–
		1997	KAH9701	2 993	19	–	–
		2000	KAH0004	1 787	11	–	–
		2003	KAH0304	4 485	20	–	–
		2005	KAH0503	2 763	13	–	–
		2013	KAH1305	3 423	16	–	–
		2015	KAH1503	2 662	21	–	–
		2017	KAH1703	4 153	30	–	–
		2019	KAH1902	2 568	15	–	–
Southland	BAR 5	1993	TAN9301	11 587	18	–	–
		1994	TAN9402	6 151	20	–	–
		1995	TAN9502	4 539	17	–	–
		1996	TAN9604	7 693	19	–	–

4.1.3 Length frequency distributions

The length distributions from the east coast South Island winter trawl survey show at least three clear pre-recruit modes at about 20 cm, 35 cm, and 50 cm (combined males, females, and unsexed) consistent with ages of 0+, 1+, and 2+ (Figure 4). Length frequency distributions are consistent among the surveys, showing the presence of the pre-recruited cohorts, with indications that these could be tracked through time (modal progression) (Beentjes et al 2015, 2016). The addition of the 10–30 m depth range does not change the shape of the length distributions (not shown in Figure 4). The 0+ mode in 2018 is the strongest in the time series (Figure 4).

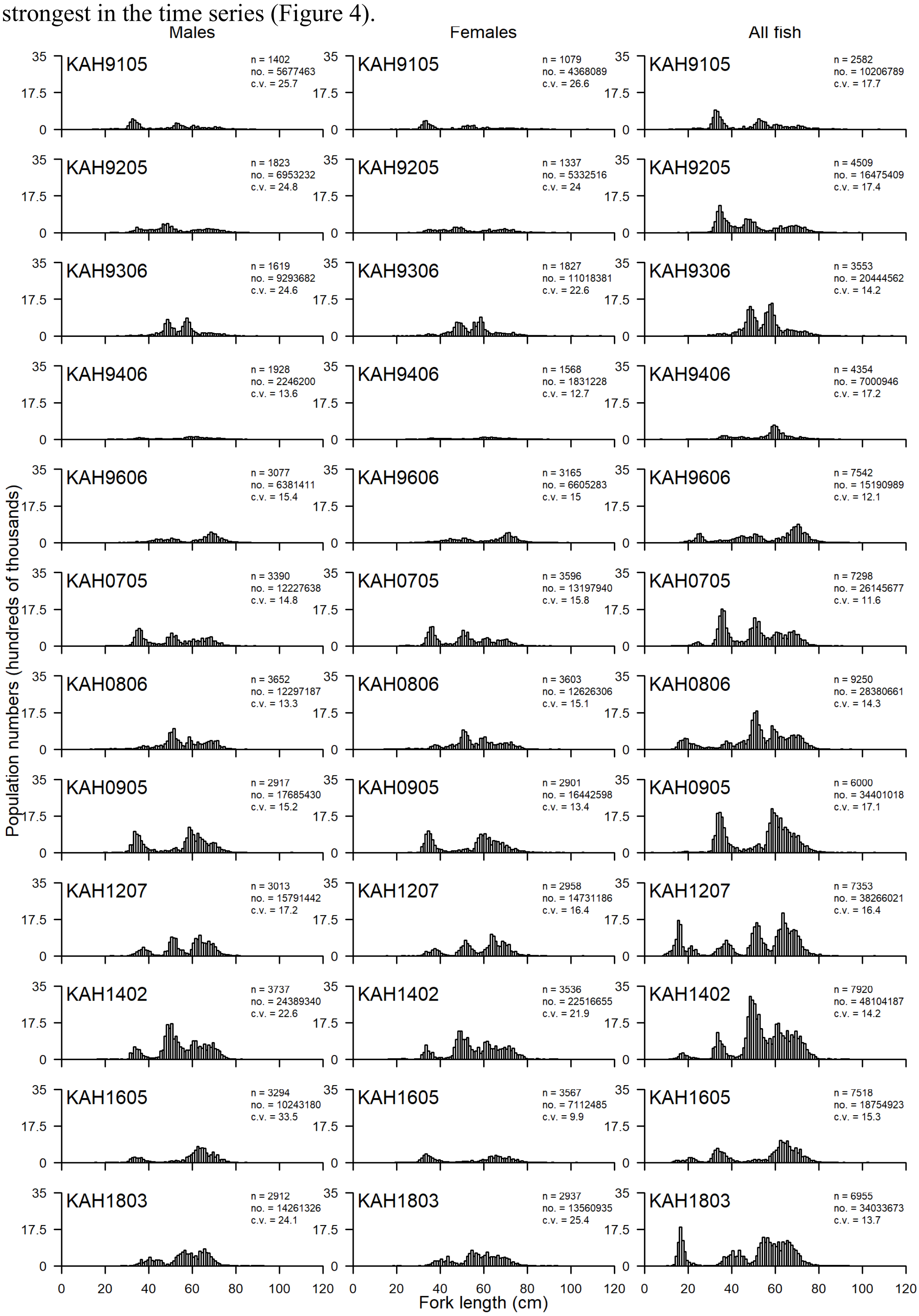


Figure 4: Scaled length frequency distributions for barracouta in core strata (30–400 m) for the ECSI winter surveys. n, number of fish measured; no., core strata population estimates; c.v., coefficient of variation.

4.1.4 CPUE indices

Two sets of standardised CPUE indices were derived for BAR 1: one for the northern waters off the east coast of the North Island (ECNI) and one for the east coast South Island, ECSI (Baird 2016). Each set had three CPUE series defined by form type: a merged CELR/TCER day-level model for 1989–90 to 2013–14; a TCER tow-level model for 2007–08 to 2013–14; and a TCEPR tow-level model for 1989–90 to 2013–14. All ECNI series were rejected by the Working Group because of shifts in targeting through time, high inter-annual variability, and unacceptably low levels of data. Thus, the following sections on CPUE pertain to the ECSI waters only.

Three standardised CPUE series for the east coast South Island part of BAR 1 were prepared, as outlined above, using data from 1989–90 to 2013–14, with each series based on the catch of barracouta in bottom trawl fisheries defined by different target species, including barracouta (Baird 2016). Two CPUE series were rejected by the Southern Inshore (SINS) Working Group: the CPUE index based on the TCEPR data (targeting barracouta, red cod, and arrow squid), primarily because of inter-annual inconsistencies in the underlying catch and effort data; and the short TCER series with only seven years of data.

The INS Working Group accepted the combined index (delta lognormal model) series based on the 1989–90 to 2013–14 daily data from CELR and TCER forms (bottom trawls targeting barracouta, red cod, and tarakihi) as an index of abundance for BAR 1. This series has been updated to include data up to 2017 and combines the daily data from CELR, TCER, and TCEPR forms from vessels < 28 m (Figure 5). After a peak period during 1996–97 and 1997–98, there was a period of relatively lower CPUE from 1998–99 to 2008–09, followed by an increase up to 2012–13, to a level similar to the earlier peak. In the following two years, the indices dropped to about the series mean. Subsequently, there was an increase and in 2016–17 the index was similar to that seen in 2013–14. The TCER tow-level CPUE series, for which additional explanatory variables were incorporated into the model, was similar to the CELR/TCER/TCEPR day-level series for the overlapping period (2007–08 to 2016–17). Figure 6 provides a comparison of the ECSI indices with the ECSI winter trawl survey indices. The increase in abundance measured by the trawl survey for 2007 onwards follows a similar trajectory to that for the ECSI CELR/TCER/TCEPR indices.

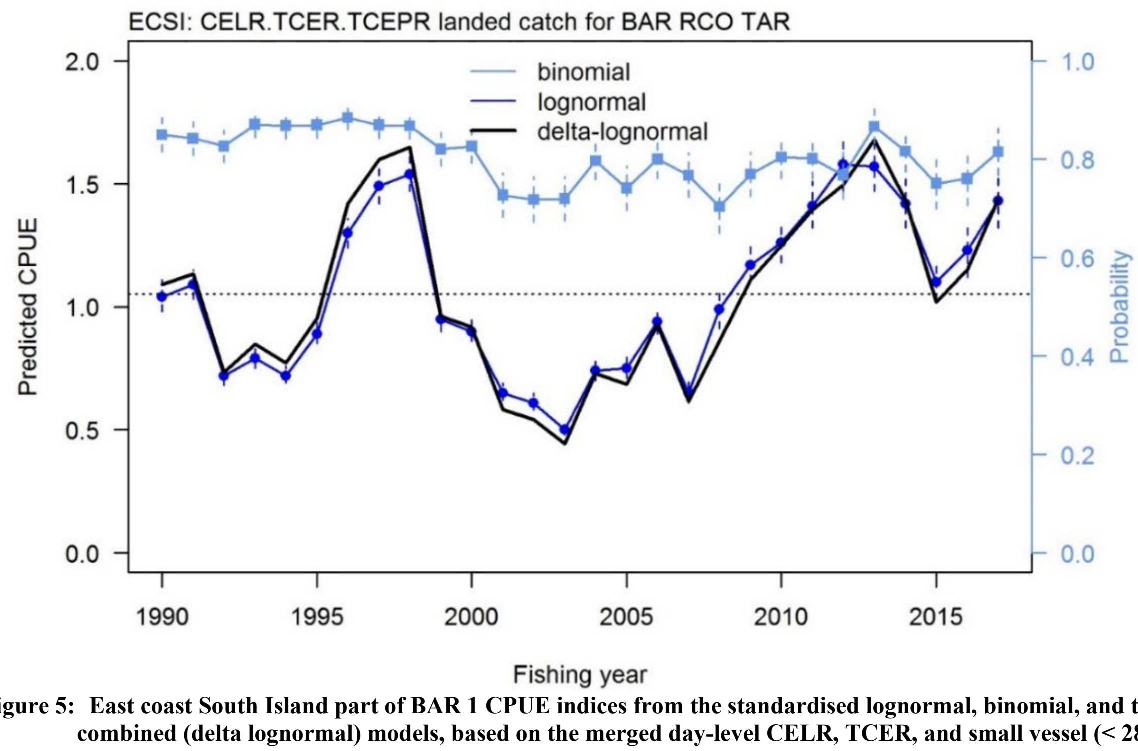


Figure 5: East coast South Island part of BAR 1 CPUE indices from the standardised lognormal, binomial, and the combined (delta lognormal) models, based on the merged day-level CELR, TCER, and small vessel (< 28m) TCEPR data for 1989–90 to 2016–17.

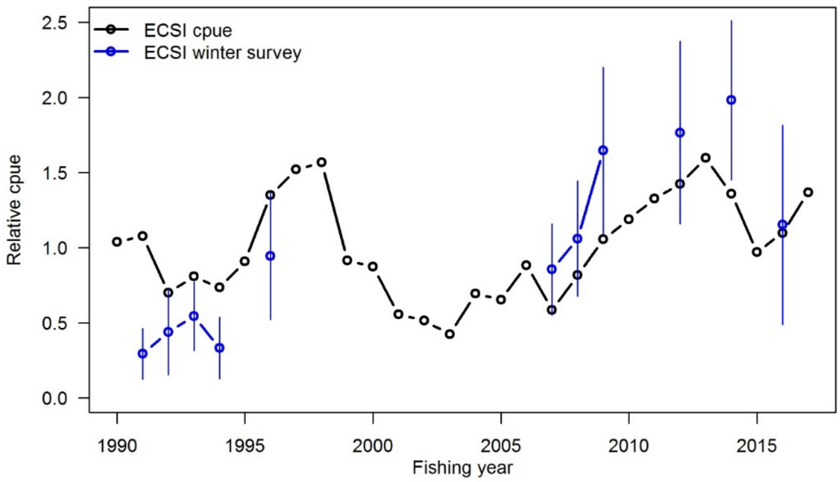


Figure 6: Comparison of the BAR 1 ECSI delta-lognormal CPUE series for 1990–2017 and the recruited biomass (and associated variance) from the ECSI winter trawl survey series from 1991–2016. The recruited biomass is based on fish over 60 cm fork length. Each series has been standardised to the mean for concurrent years.

Future research considerations

Review of the ECSI trawl survey for monitoring abundance of barracouta off the east coast of the South Island. This review should included an investigation of the timing of the survey in relation to a possible seasonal northward migration of barracouta off the east coast of the South Island.

4.2 BAR 4 Chatham Rise

Data available from fisheries on the Chatham Rise showed a clear separation of catches between the east and west, allowing a clearly defined split of the catches (see Ballara & Holmes 2020). A delta lognormal standardised CPUE index was derived for BAR 4 for the Chatham Rise East fishery, based on TCEPR and ERS-trawl tow-level data, restricted to the four statitistical areas immediately surrounding the Chatham Islands where barracouta are fished (Figure 7). The data included catches from bottom and midwater trawls and were not restricted based on target species. The CPUE series shows a slight increase until 2010, although the series is highly variable, with a slight decline in recent years. A fisheries-independent abundance index derived from the eastern strata of the *Tangaroa* Chatham Rise trawl survey is very noisy (Figure 8). Barracouta are a schooling species that are often found at depths shallower than the survey operates (200 m), which means that the bottom trawl survey does not adequately capture trends in abundance for this species. Therefore, it is not possible to make a meaningful comparison between the two series.

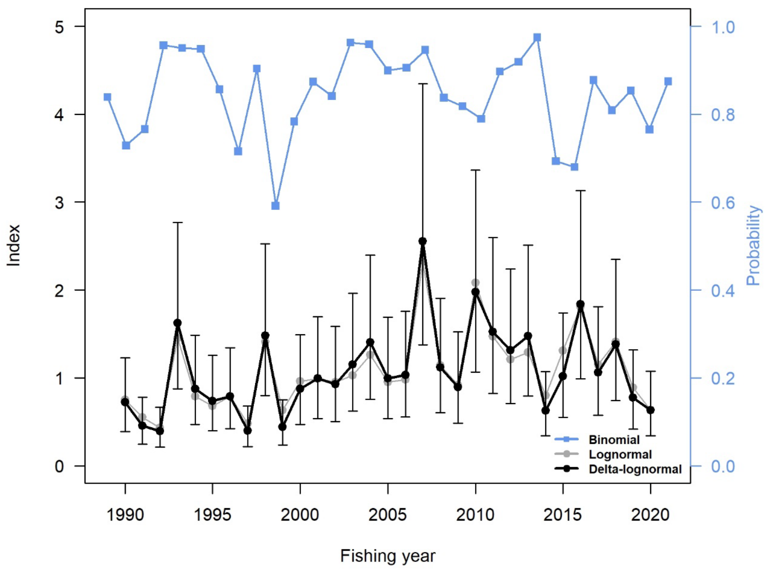


Figure 7: East Chatham Rise BAR 4 CPUE indices from the standardised lognormal (grey), binomial (blue), and the combined (delta lognormal) models with 95% confidence interval (black), based on the tow-by-tow TCEPR and ERS-trawl data for 1989–90 to 2019–20.

The Chatham Rise West is considered to be part of the BAR 1 Fishstock (Devine et al 2022). Creating an index for the Western Chatham Rise stock in BAR 4 was not considered appropriate without including data from the ECSI.

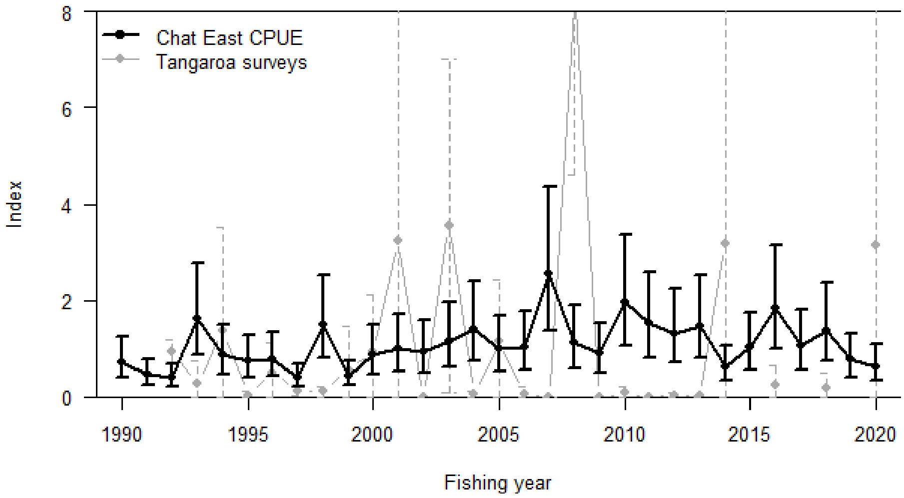


Figure 8: Comparison of Chatham Rise East CPUE standardised delta lognormal index (scaled to mean 1) and the *Tangaroa* survey index for the Chatham Rise East area. The fishing year is from October to September; 1990 is 1989–90 fishing year.

4.3 BAR 5 Southland, Sub-Antarctic

4.3.1 CPUE indices

A delta lognormal CPUE index for barracouta was created based on the squid target, tow-by-tow, TCEPR and ERS-trawl data (Devine et al 2022). Unlike the previous analysis (Marsh & McGregor 2021), data were not restricted to Statistical Area 028, but included from surrounding statistical areas, around the Auckland Islands group, and to the west of Stewart Island (Stewart-Snares shelf). The area for the analysis was expanded because, though barracouta are attracted to and prey upon squid in the directed fishery operating in Statistical Area 028, they are distributed throughout the Southland area. The index is variable, with several spikes (e.g., 1996, 2001), but has shown a general increase since 2007 (Figure 9). CPUE indices may be affected by fisher avoidance behaviour so as not to exceed ACE holdings.

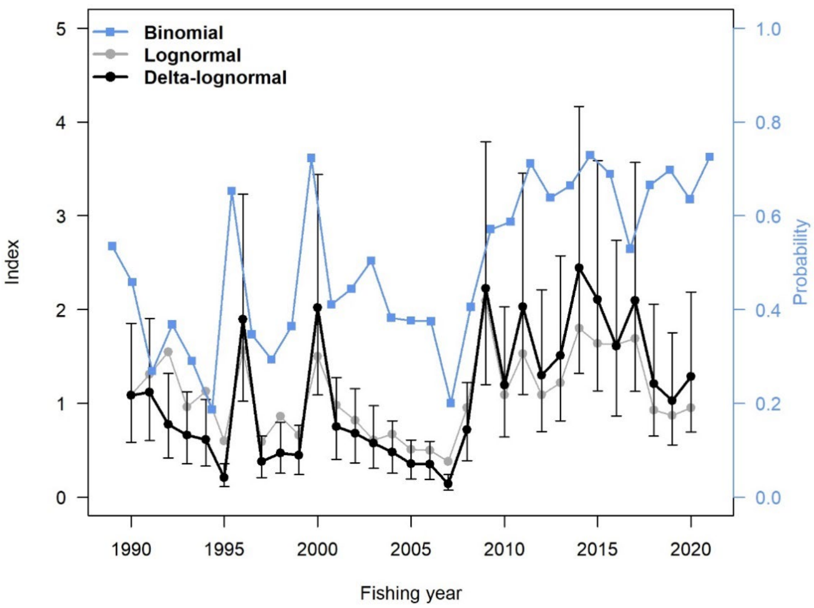


Figure 9: BAR 5 CPUE indices from the standardised lognormal (grey), binomial (blue), and the combined (delta lognormal) with 95% confidence interval (black), based on the tow-by-tow TCEPR and ERS-trawl data for 1989–90 to 2019–20.

Trawl surveys were carried out in the Southland area (QMA 5) in February–March from 1993 to 1996 and the Sub-Antarctic (deeper than 300 m) in November–December from 1991 to 1993 and then again from 2000 using *Tangaroa* (Table 7). The February–March series may have been able to provide additional information, had it not been discontinued, but the current survey does not adequately survey barracouta, most likely due to the depth of operation (300 m) and behavioral characteristics of barracouta (Figure 10). Trawl surveys off the east and west coasts of the South Island in autumn using *Kaharoa* may help interpret trends in biomass around the South Island because there are linkages in biological properties between fish off Southland and both coasts of the South Island (Devine et al 2022).

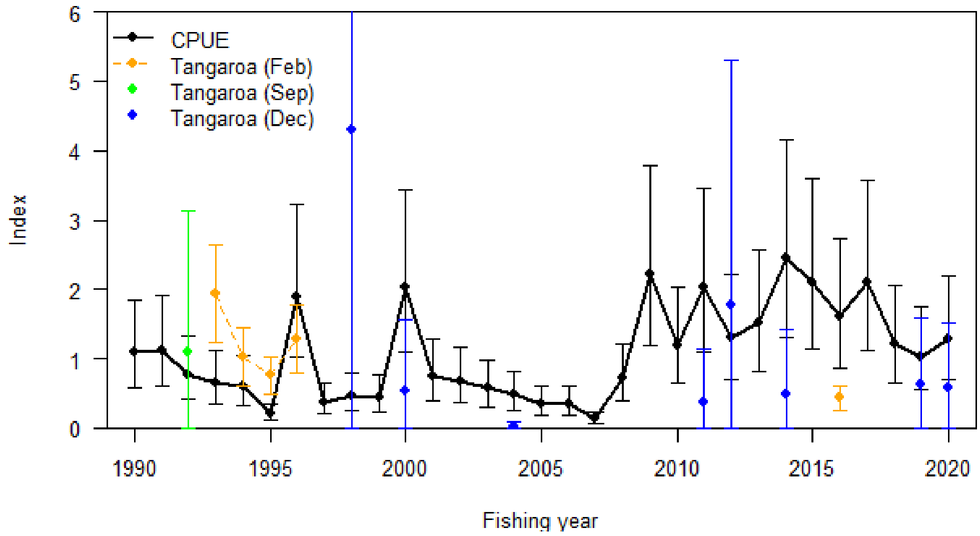


Figure 10: Comparison of BAR 5 CPUE standardised delta lognormal index (scaled to mean 1) and the *Tangaroa* surveys in the area. *Tangaroa* November–December surveys in 1991–1993 did not record any barracouta and were not included in the figure. The fishing year is from October to September; 1990 is 1989–90 fishing year.

4.4 BAR 7 Challenger, Central (W), Auckland (W)

4.4.1 Survey indices

Barracouta are a common catch of the west coast South Island (WCSI) inshore trawl surveys, with most tows containing barracouta. The biomass has varied almost three-fold during the time series but has not shown any consistent trend (Figure 11). More biomass has always come from the west coast strata compared with Tasman Bay and Golden Bay. Stevenson (2007) reviewed the WCSI time series up to 2007 and believed that the survey likely monitors juvenile and adult abundance of barracouta. The survey covers almost all of the species depth range, CVs are relatively precise, and biomass and length frequencies are reasonably consistent across years.

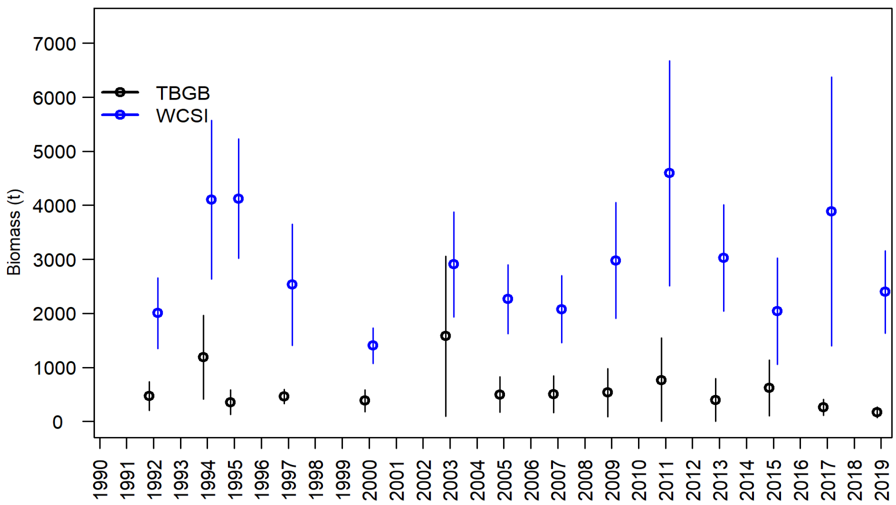


Figure 11: Barracouta biomass estimates from the WCSI inshore trawl survey core strata (20–400 m) for west coast strata and Tasman Bay and Golden Bay.

4.4.2 Length frequency distributions

There are distinct length modes that can be tracked through time in the WCSI time series (Figure 12). In most years that have a strong 0+ mode (centred around 20 cm), a large proportion of these fish were from the Tasman Bay and Golden Bay (TBGB) region, but in some years (e.g., 2000 and 2013) this small mode almost entirely comprised fish from off the west coast.

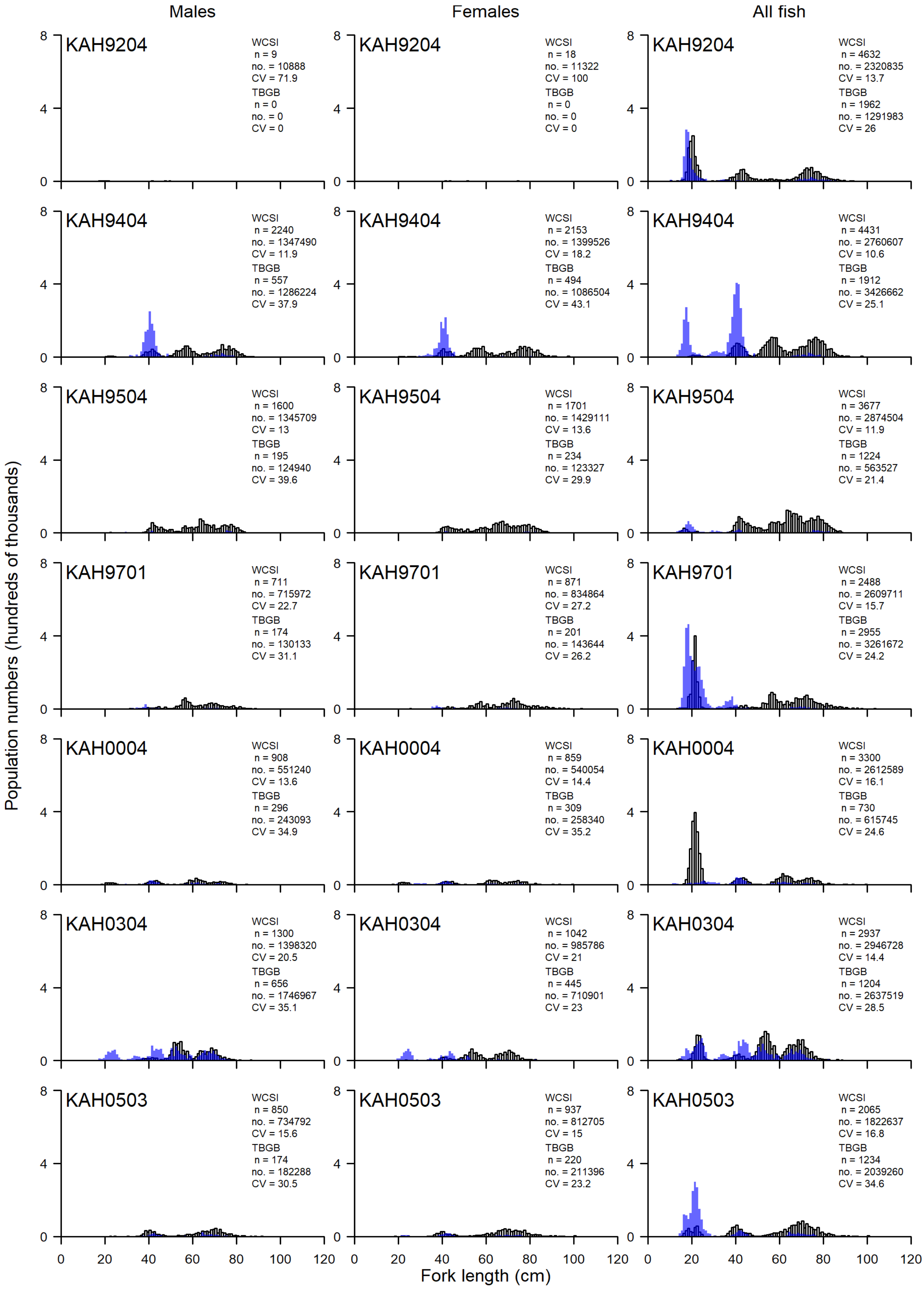


Figure 12: Length frequencies of barracouta from the WCSI (WCSI and TBGB) from *Kaharoa* (KAH) surveys, 1992-2005. Blue: TBGB; black: WCSI. The first two digits of the voyage code refer to the survey year. [Continued next page]

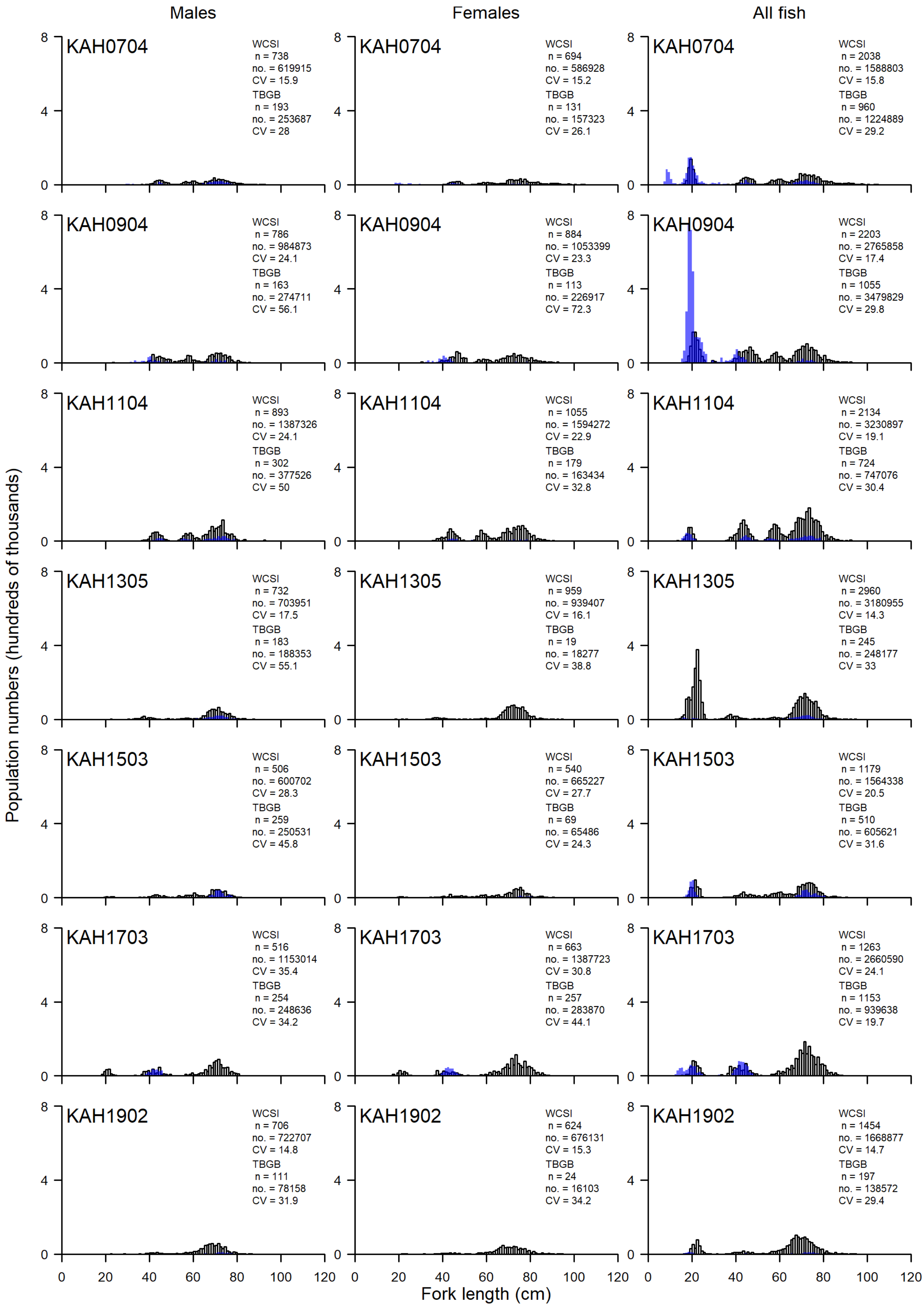


Figure 12 [Continued]: Length frequencies of barracouta from the WCSI (WCSI and TBGB) from *Kaharoa* (KAH) surveys, 2007-2019. Blue: TBGB; black: WCSI. The first two digits of the voyage code refer to the survey year.

4.4.3 CPUE indices

Ballara & Holmes (2020) separated fisheries on the WCNI and WCSI. For WCNI, CPUE trends depended on the selection of input data. The model using tow-level TCEPR/ERS-trawl data (model 1) and the model using merged trip level TCEPR, TCER, CELR, and ERS-trawl (model 3) gave opposing long-term trends. The model using TCER data (model 2) showed the same pattern as model 3 between 2008–13, but then showed an increase in CPUE not seen from model 3, and opposite in direction to model 1. The TBGB *Kaharoa* trawl survey index shows large spikes in 1994 and 2003, and there is little agreement between the survey and any of the estimated CPUE indices. However, the survey in TBGB catches predominantly juveniles (Figure 13). There is a general rising trend in standardised CPUE up to 2010 and a subsequent decline (Figure 13). The DWWG considered that the TCEPR/ERS-trawl tow-level CPUE (model 1) comprised the best data to monitor this stock.

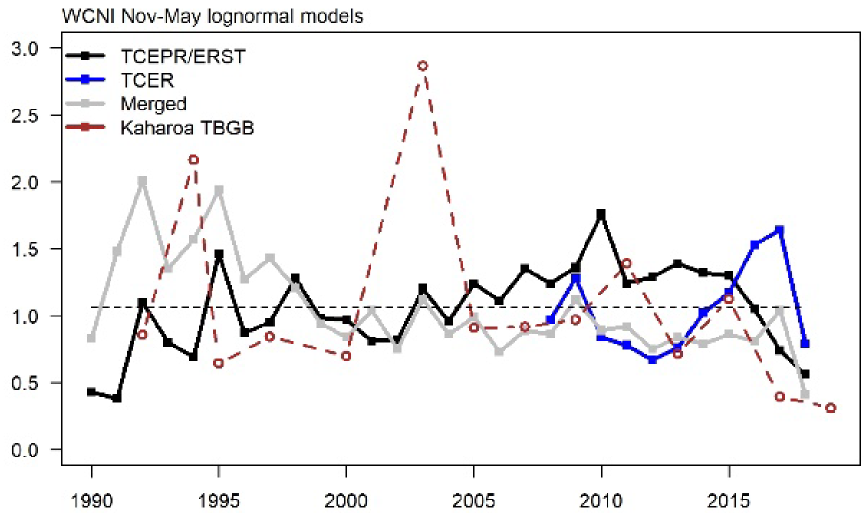


Figure 13: Comparison of WCNI CPUE indices (scaled to mean 1) for CPUE indices and *Kaharoa* survey indices for Tasman Bay, Golden Bay area. TCEPR/ERST:TCEPR and ERS-trawl tow level Nov–May (model 1); TCER: TCER tow level Nov–May (model 2); Merged: TCEPR, TCER, CELR, ERS-trawl trip level Nov-May (model 3).

CPUE indices for the WCSI fishery (from either tow- or trip-level models) were similar to the WCSI *Kaharoa* trawl survey series (Figure 14) and showed no long-term trend. The CPUE models were based on data from November to May, and the trawl survey takes place in April–May, the non-spawning season.

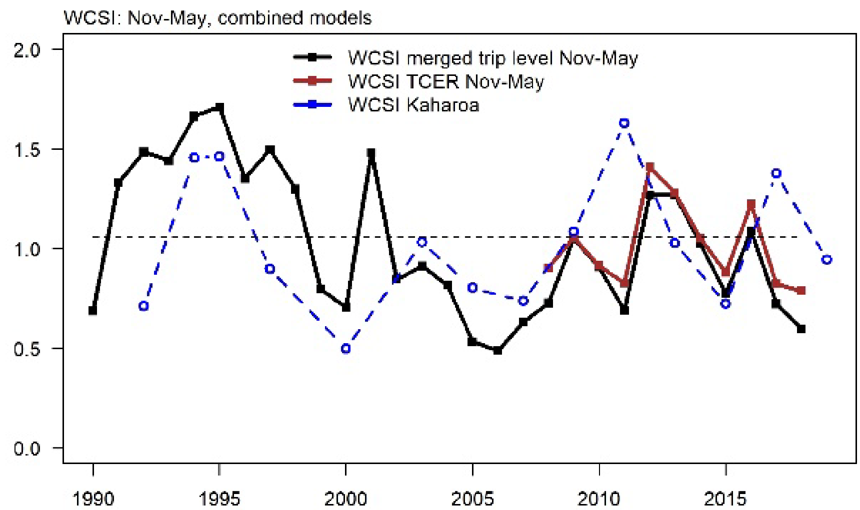


Figure 14: Comparison of WCSI CPUE indices (scaled to mean 1) and and *Kaharoa* survey indices for the WCSI area. TCER: TCER tow level Nov–May (model 2); Merged: TCEPR, TCER, CELR, ERS-trawl trip level Nov–May (model 3).

4.5 Yield estimates and projections
No estimates of biomass are available for any of the barracouta stocks.

4.6 Other factors
Barracouta are part of the shelf (30–300 m) mixed fishery and are usually the dominant catch species in these depths around the South Island (except perhaps in good red cod catch years in the Canterbury Bight). Any increase or decrease in barracouta quotas will have overflow effects onto bycatch species. The economics of targeting barracouta is likely to be affected by market demand and its availability relative to other more preferred species and this will, in turn, affect fishing patterns.

An analysis of trends in biomass of the Southland fishery suggests that recruitment may have been relatively low in the years after 1989 and that biomass may have declined between surveys by the *Shinkai Maru* (1981 and 1986) and the *Tangaroa* (annually 1993 to 1996). The scale of decline appeared to be greater than could be explained by different catching efficiencies of the two vessels.

4.7 Future research considerations
Recognising that CPUE will probably not provide a reliable relative abundance indicator for barracouta in isolation, and with the goal of developing a quantitative stock assessment in the future, the research and data collection needs for barracouta are as follows:

1. Development of age-based stock assessments for BAR 5 and BAR 7, incorporating inshore trawl survey biomass indices (and potentially survey length frequencies), commercial CPUE, and catch-at-age. Alternatively, length-based assessments could be attempted if no catch-at-age data are available.
2. Further investigation of stock relationships, focusing on the possible inter-relationship between BAR 5 with BAR 7 and BAR 1
3. Optimised otolith sampling and development of catch-at-age for BAR 5 and BAR 7 (focusing on the main fisheries areas - WCSI, WCNI, and South).
4. Further investigation of the linkages between the western part of BAR 4 and BAR 1 ECSI.
5. Continuation of development of spatio-temporal analyses to support further development of the CPUE time series and future stock assessments.
6. Ageing analysis of fish appropriate to the development of the stock assessment.
7. Collection of otolith samples from trawl surveys as well as the commercial fishery.

5. STATUS OF THE STOCKS

- **BAR 1**

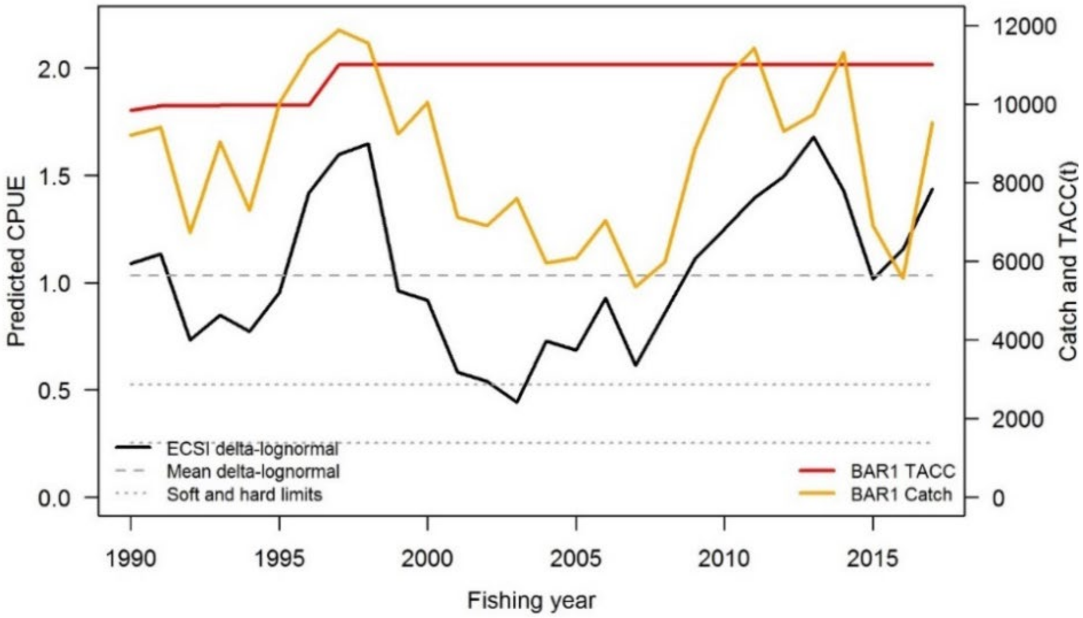
The current understanding of the BAR 1 stock is that adult barracouta undertake an annual northward migration from the east coast of the South Island to spawn off the east coast of the North Island during July/August–September (see Hurst et al 2012). For the purposes of this analysis, barracouta in BAR 1 are assumed to comprise a single stock.

Stock Status		
Most Recent Assessment Plenary Publication Year	2018	
Intrinsic Productivity Level	Medium	
Catch in most recent year of assessment	Year: 2016–17	Catch: 9 520 t
Assessment Runs Presented	BAR 1 ECSI CELR/TCER/small vessel TCEPR day-level series (target species BAR, RCO, TAR)	
Reference Points	Interim Target: B_{MSY}-compatible proxy based on CPUE (average from 1989–90 to 2013–14 of the BAR 1 ECSI CELR/TCER/TCEPR model as defined by Baird (2019) Soft Limit: 50% of target Hard Limit: 25% of target Overfishing threshold: F_{MSY} (assumed)	

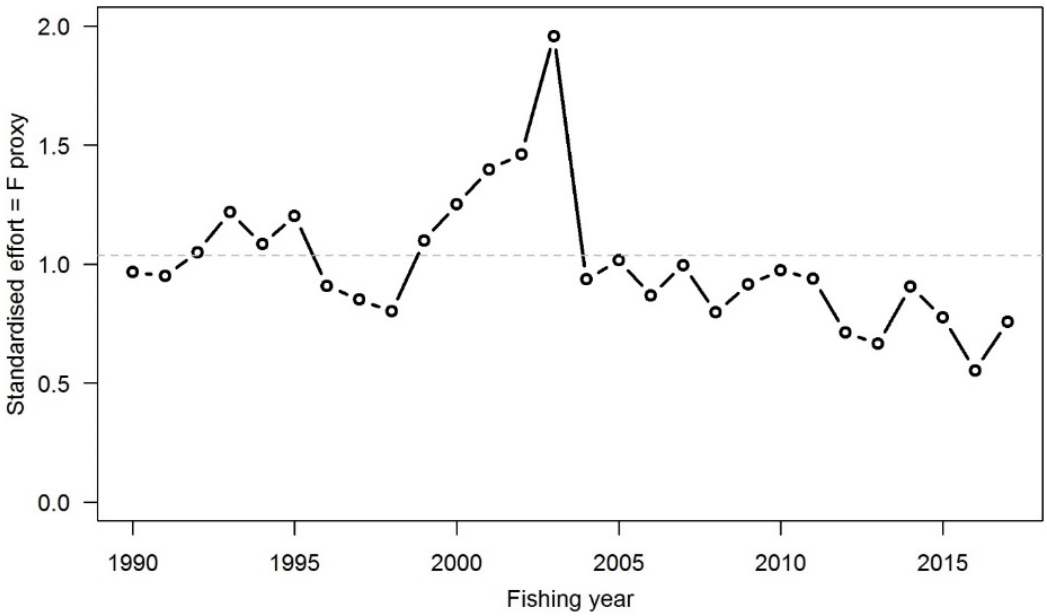
Status in relation to Target	Likely (> 60%) to be at or above the target
Status in relation to Limits	Soft Limit: Very Unlikely (< 10%) to be below Hard Limit: Very Unlikely (< 10%) to be below
Status in relation to Overfishing	Overfishing is Unlikely (< 40%) to be occurring

Historical Stock Status Trajectory and Current Status

CPUE, Catch and TACC Trajectories



Comparison of the ECSI CPUE series with the trajectories of catch (BAR 1 (QMR/MHR)) and TACCs from 1989–90 to 2016–17. Compare with the trawl survey trajectory shown in Figure 6.



Annual relative exploitation rate (catch/CPUE) for barracouta ECSI. The dotted line represents mean relative

Fishery and Stock Trends	
Recent trend in Biomass or Proxy	The BAR 1 CPUE series increased steeply from 2002–03 to a peak in 2012–13, dropped to the series mean in 2014–15, then increased.
Recent trend in Fishing Mortality or Proxy	Relative exploitation rate has declined gradually since 2005, and has been below the series mean (target) since 2012.

Other Abundance Indices	The winter ECSI trawl survey series for recruited fish has a trend that is similar to the BAR 1 CPUE index, with a peak in 2014 and a subsequent drop in 2016
Trends in Other Relevant Indicator or Variables	Recent landings (2008–09 to 2013–14) are at a similar level to those recorded during 1994–95 to 1999–2000.

Projections and Prognosis	
Stock Projections or Prognosis	Low pre-recruit biomass from the 2016 ECSI trawl survey suggests biomass may decline
Probability of Current Catch or TACC causing Biomass to remain below or decline below Limits	Soft Limit: Unlikely (< 40%) Hard Limit: Unlikely (< 40%)
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Unknown

Assessment Methodology and Evaluation		
Assessment Type	Level 2 - Partial Quantitative Stock Assessment	
Assessment Method	Standardised CPUE series	
Assessment Dates	Latest assessment Plenary publication year: 2018	Next assessment: Unknown
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Catch and effort data - Trawl survey biomass indices and associated length frequencies	1 – High Quality 1 – High Quality (used as supporting information)
Data not used (rank)	- TCEPR CPUE Series (ECSI) - Standardised CPUE series (ECNI) - Summer ECSI trawl survey data	3 – Low Quality: few vessels and highly variable CPUE 3 – Low Quality: insufficient data and high interannual variability 3 – Low Quality: variable catchability between years
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments
-

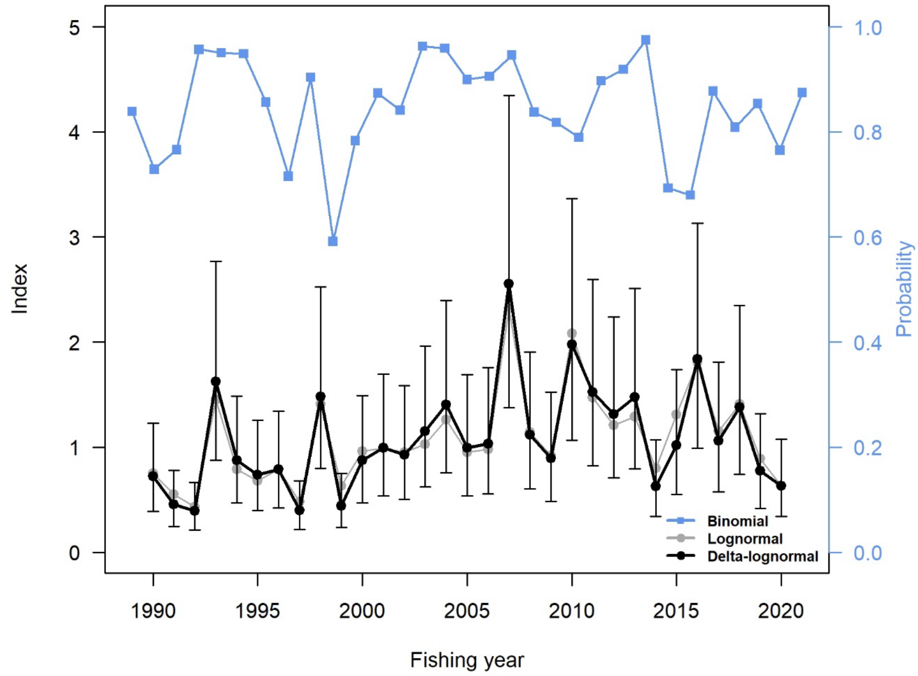
Fishery Interactions
Barracouta in the ECSI part of BAR 1 are taken as bycatch by inshore bottom trawl fisheries targeting, amongst others, red cod and tarakihi, and red cod and arrow squid by deepwater vessels. ECSI bycatch also comes from midwater effort targeting jack mackerels. In the ECNI part of BAR 1, most barracouta bycatch is from tarakihi and red gurnard effort; currently, there is little targeting of barracouta in this area.

- **BAR 4 (East Chatham Rise only)**

The relationships between the stock taken in this fishery and other barracouta stocks is uncertain.

Stock Status		
Most Recent Assessment Plenary Publication Year	2021	
Intrinsic Productivity Level	Medium	
Catch in most recent year of assessment	Year: 2019–20	Catch: 1 532 t
Assessment Runs Presented	Standardised CPUE Chatham East (tow-level)	
Reference Points	Target: 40% B_0 Soft Limit: 20% B_0 Hard Limit: 10% B_0 Overfishing threshold: $F_{40\%B0}$	
Status in relation to Target	Unknown	
Status in relation to Limits	Unknown	
Status in relation to Overfishing	Unknown	

Historical Stock Status Trajectory and Current Status



Comparison of Chatham Rise East CPUE indices from the standardised lognormal (grey), binomial (blue), and the combined (delta lognormal) models with 95% confidence interval (black), based on the tow-by-tow TCEPR and ERS-trawl data for 1989–90 to 2019–20.

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Recent trend is highly variable with no strong indication of an increase or decrease.
Recent Trend in Fishing Intensity or Proxy	-
Other Abundance Indices	-
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	-

Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Soft Limit: Unknown Hard Limit: Unknown
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Unknown

Assessment Methodology and Evaluation		
Assessment Type	Level 2 - Partial Quantitative Stock Assessment	
Assessment Method	Standardised CPUE	
Assessment Dates	Latest assessment Plenary publication year: 2021	Next assessment: Unknown
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	Commercial CPUE (East)	2 – Medium or mixed Quality: the highly variable nature of this fishery makes interpretation of standardised CPUE difficult
Data not used (rank)	*Tangaroa* Chatham Rise trawl survey	3 – Low Quality: high interannual variability, doesn't cover depth range of species
Changes to Model Structure and Assumptions	-	
Major sources of Uncertainty	Changes in fish targeting have likely resulted in fluctuating catchability affecting the CPUE index over time.	

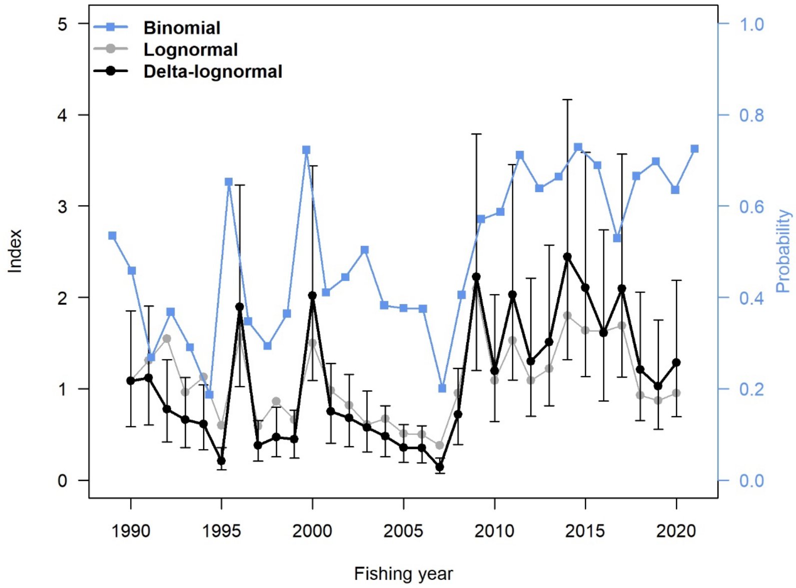
Qualifying Comments
-

Fishery Interactions
Barracouta from Chatham Rise East are caught sporadically all year, but mainly in May–June, September, and/or December–January, by bottom or midwater trawls, mainly targeting barracouta. The trawl fishery in the ECSI area is subject to management measures designed to reduce interactions with endemic Hector's dolphins and seabirds. There is also a risk of incidental capture of sea lions from Otago Peninsula south.

- **BAR 5**

The relationship between these southern fisheries and the both coasts of the South Island is uncertain.

Stock Status		
Most Recent Assessment Plenary Publication Year	2021	
Intrinsic Productivity Level	Medium	
Catch in most recent year of assessment	Year: 2019–20	Catch: 8 838 t
Assessment Runs Presented	Standardised CPUE Sub-Antarctic (tow level)	
Reference Points	Target: 40% B_0 Soft Limit: 20% B_0 Hard Limit: 10% B_0 Overfishing threshold: $F_{40\%B0}$	
Status in relation to Target	Unknown	
Status in relation to Limits	B_{2021} is Unlikely (< 40%) to be below the soft limit B_{2021} is Very Unlikely (< 10%) to be below the hard limit	
Status in relation to Overfishing	Unknown	

Historical Stock Status Trajectory and Current Status

BAR 5 CPUE indices from the standardised lognormal (grey), binomial (blue), and the combined (delta lognormal) with 95% confidence interval (black), based on the tow-by-tow TCEPR and ERS-trawl data for 1989–90 to 2019–20.

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Recent trend is highly variable with no strong indication of an increase or decrease.
Recent Trend in Fishing Intensity or Proxy	-
Other Abundance Indices	-
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	-
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Soft Limit: Very Unlikely (< 10%) Hard Limit: Very Unlikely (< 10%)
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Unknown

Assessment Methodology and Evaluation		
Assessment Type	Level 2 - Partial Quantitative Stock Assessment.	
Assessment Method	Standardised CPUE	
Assessment Dates	Latest assessment Plenary publication year: 2021	Next assessment: Unknown
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Commercial CPUE	1 – High Quality
Data not used (rank)	N/A	
Changes to Model Structure and Assumptions	-	
Major sources of Uncertainty	Changes to the squid fishery have likely resulted in fluctuating catchability, which affects the CPUE index.	

Qualifying Comments

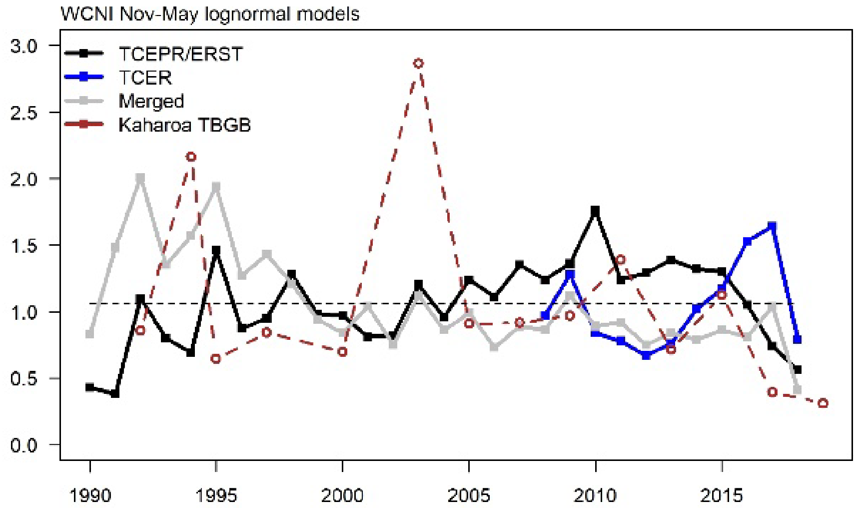
Fishery Interactions
Barracouta are taken mainly as a target species in BAR 5 and as bycatch in the squid fishery, but are also taken as bycatch in the jack mackerel, and warehou target fisheries.

- **BAR 7**

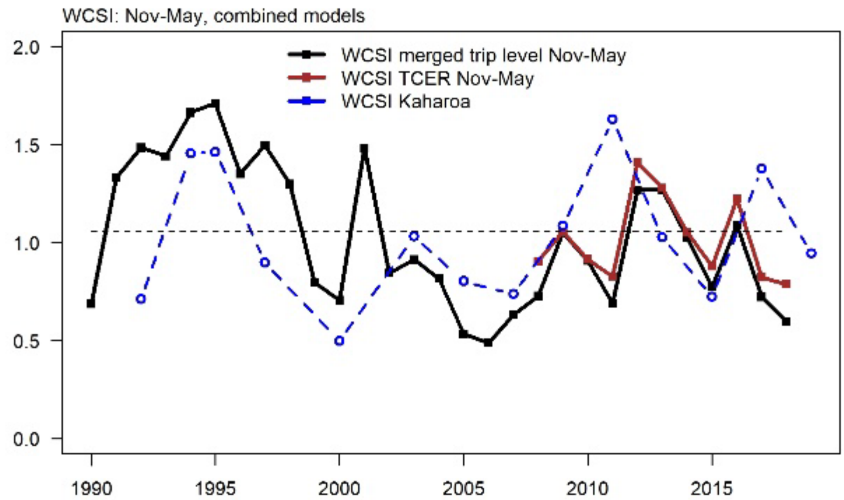
The relationship between the WCSI and the fisheries in BAR 5 is uncertain.

Stock Status		
Most Recent Assessment Plenary Publication Year	2020	
Intrinsic Productivity Level	Medium	
Catch in most recent year of assessment	Year: 2018–19	Catch: 4 053 t
Assessment Runs Presented	Standardised CPUE (tow level)	
Reference Points	Target: 40% B_0 Soft Limit: 20% B_0 Hard Limit: 10% B_0 Overfishing threshold: $F_{40\%B0}$	
Status in relation to Target	Unknown	
Status in relation to Limits	Unknown	
Status in relation to Overfishing	Unknown	

Historical Stock Status Trajectory and Current Status



Comparison of WCNI CPUE indices (scaled to mean 1) for CPUE indices and *Kaharoa* survey indices for Tasman Bay, Golden Bay area. TCEPR/ERST: TCEPR and ERS-trawl tow level Nov–May (model 1); TCER: TCER tow level Nov–May (model 2); Merged: TCEPR, TCER, CELR, ERS-trawl trip level Nov-May (model 3).



Comparison of WCSI CPUE indices (scaled to mean 1) and and *Kaharoa* survey indices for the WCSI area. TCER: TCER tow level Nov–May (model 2); Merged: TCEPR, TCER, CELR, ERS-trawl trip level Nov-May (model 3). Trawl survey is based on fishing year.

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	On the WCSI, CPUE is fluctuating with no clear trend. On the WCNI, CPUE has declined since 2010.
Recent Trend in Fishing Intensity or Proxy	-
Other Abundance Indices	The estimated biomass has varied almost three-fold during the *Kaharoa* WCSI time series but has not shown any consistent trend
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	-
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Soft Limit: Unknown Hard Limit: Unknown
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Unknown

Assessment Methodology and Evaluation		
Assessment Type	Level 2 - Partial Quantitative Stock Assessment	
Assessment Method	Standardised CPUE	
Assessment Dates	Latest assessment Plenary publication year: 2020	Next assessment: Unknown
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Commercial CPUE - *Kaharoa* WCSI trawl survey biomass indices and associated length frequencies	1 – High Quality 1 – High Quality (used as supporting information)
Data not used (rank)	WCSI *Tangaroa* survey	3 – Low Quality: does not cover appropriate depth range
Changes to Model Structure and Assumptions	-	
Major sources of Uncertainty	-	

Qualifying Comments
Potential stock movement between FMA 5 and FMA 7 (or FMA 3) is unresolved. It is possible barracouta from other areas move into WCSI to spawn in winter.

Fishery Interactions
Barracouta in BAR 7 are taken both as a target in the WCSI fishery and as bycatch in the WCNI jack mackerel and WCSI hoki fisheries.

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