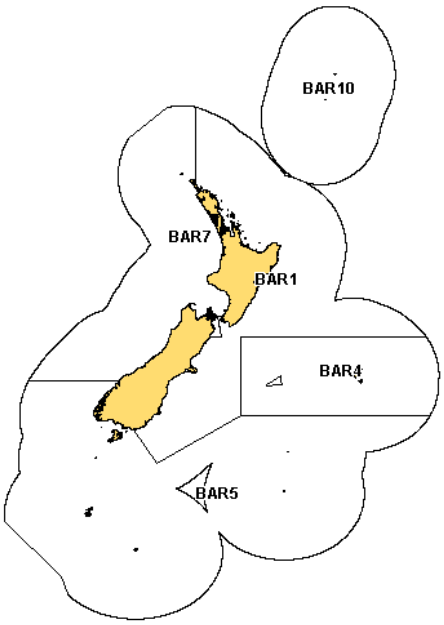
BARRACOUTA (BAR)

(*Thyrsites atun*)



1. FISHERY SUMMARY

(a) Commercial fisheries

Barracouta are caught in coastal waters around mainland New Zealand, The Snares and Chatham Islands, down to about 400 m. Catches increased significantly in the late 1960s and peaked at about 47 000 t in 1977. Since 1983–84, catches appear to have fluctuated between 18 000 and 28 000 t per annum (annual average about 24 000 t) (Tables 1 & 2).

Table 1: Reported landings (t) by nationality from 1977 to 1987–88. –, no data.

Fishing	New Zealand		Foreign			Total	
Year	Domestic	Chartered	Japan	Korea	USSR	(FSU)	(QMS)
1977	4697	0	34 357	8109	0	47 163	–
1978–79	5335	58	4781	2481	0	12 655	–
1979–80	7748	6979	4339	3879	47	22 922	–
1980–81	10 058	4995	4227	15	60	19 355	–
1981–82	12 055	11 077	2813	373	0	26 318	–
1982–83	10 814	7110	1746	1888	31	21 589	–
1983–83*	7763	2961	803	1115	0	12 642	–
1983–84	12 390	10 226	1786	4355	0	28 757	–
1984–85	7869	10 425	1430	5252	0	24 976	–
1985–86	8427	7865	1371	815	0	18 478	–
1986–87	9829	13 732	1575	742	0	25 878	27 660 †
1987–88	9335	12 077	896	609	0	22 917	26 607 †

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

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 and on the east coast of the South Island. Barracouta also comprise a significant proportion of the bycatch in the west coast North Island jack mackerel and The Snares squid fisheries. From 1994–95 to 1997–98 the catches exceeded the TACC in BAR 1; however, in the last 6 years catches have been well below the TACC of 11 000 t. Catches in BAR 4 have fluctuated at levels well below the TACC but declined to only 98 t in 2004-05. In BAR 5 the catch limt was exceeded in 2005-06 and total landings in New Zealand were nearly 28 000 t (the highest for 8 years).

Table 2: Reported landings (t) of barracouta by Fishstock from 1983–84 to 2005–06 and actual TACCs (t) from 1986–87 to 2005–06.

Fishstock	BAR 1		BAR 4		BAR 5		BAR 7		BAR 10			
FMA (s)	1, 2, 3		4		5 & 6		7, 8, 9		10		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1983–84*	7805	–	1743	–	11 291	–	7222	–	0	–	28 061	–
1984–85*	5442	–	1909	–	12 487	–	4425	–	0	–	24 263	–
1985–86*	5395	–	1509	–	6380	–	4536	–	0	–	17 820	–
1986–87†	8877	8510	3084	3010	7653	9010	8046	10 510	0	10	27 660	31 050
1987–88†	9256	8837	1775	3010	6457	9011	9117	10 603	0	10	26 605	31 471
1988–89†	5838	9426	946	3010	5323	9011	8071	10 702	0	10	20 178	32 159
1989–90†	9209	9841	1349	3016	5960	9281	7050	10 925	0	10	23 568	33 073
1990–91†	9401	9957	1399	3016	8817	9282	7138	10 925	0	10	26 755	33 190
1991–92†	6733	9957	1156	3016	6897	9282	7326	10 925	0	10	22 212	33 190
1992–93†	9032	9969	2251	3016	7019	9282	10 141	10 925	0	10	28 443	33 202
1993–94†	7299	9969	606	3016	3410	9282	8030	10 925	0	10	19 345	33 202
1994–95†	10 023	9969	331	3016	2645	9282	9345	10 925	0	10	22 345	33 202
1995–96†	11 252	9969	2234	3016	4255	9282	8593	10 925	0	10	26 334	33 202
1996–97†	11 873	11 000	1081	3016	2839	9282	10 203	10 925	0	10	25 996	34 233
1997–98†	11 543	11 000	1966	3016	6167	9282	8717	10 925	0	10	28 393	34 233
1998–99†	9229	11 000	459	3016	7302	7470	4427	10 925	0	10	21 417	32 421
1999–00†	10 032	11 000	1911	3016	6205	7470	3288	10 925	0	10	21 436	32 421
2000–01†	7118	11 000	2122	3016	6101	7470	6890	10 925	0	10	22 231	32 421
2001–02†	6900	11 000	1160	3019	5883	7470	7655	11 173	0	10	21 598	32 672
2002–03†	7595	11 000	573	3019	7843	7470	9025	11 173	0	10	25 036	32 672
2003–04†	5949	11 000	477	3019	6919	7470	9114	11 173	0	10	22 459	32 672
2004–05†	6085	11 000	98	3019	8593	7470	12 156	11 173	0	10	26 919	32 672
2005–06†	7030	11 000	687	3019	9479	7470	10 685	11 173	0	10	27 881	32 672

* FSU data.
† QMS data.

(b) Recreational fisheries

Estimates of recreational catch from the Ministry of Fisheries recreational catch and effort surveys are shown in Table 3.

Table 3: Estimated number and weight of barracouta harvested by recreational fishers by Fishstock and survey. Surveys were carried out in different years in the Ministry of Fisheries regions: South in 1991–92, Central in 1992–93, North in 1993–94 (Teirney et al., 1997) and nationally in 1996 (Bradford, 1998) and 1999/2000 (Boyd & Reilly, 2002). The estimated Fishstock harvest is indicative and made by combining estimates from the different years. *, data not available.

		Total		
Fishstock	Survey	Number	CV	Survey harvest (t)
1991–92				
BAR 1	South	27 000	47%	30–90
BAR 7	South	2100	44%	–
1992–93				
BAR 1	Central	17 000	22%	25–35
BAR 7	Central	15 600	24%	25–35
1993–94				
BAR 1	North	*		–
BAR 7	North	*		–
1996				
BAR 1	National	68 000	8%	160–190
BAR 7	National	74 000	15%	160–220
1999–2000				
BAR 1	National	156 000	35%	182 -377
BAR 5	National	2000	51%	2-7
BAR 7	National	35 000	28%	68-120

A key component of the estimating recreational harvest from diary surveys is determining the proportion of the population that fish. The Recreational Working Group has concluded that the methodological framework used for telephone interviews produced incorrect eligibility figures for the 1996 and previous surveys. Consequently the harvest estimates derived from these surveys are considered to be considerably underestimated and not reliable. However relative comparisons can be made between stocks within these surveys. The Recreational Working Group considered that the 2000

survey using face-to-face interviews better estimated eligibility and that the derived recreational harvest estimates are believed to be more accurate. FMA 2 catches are nevertheless considered to be over-estimate, probably because of an unrepresentative diarist sample. The 1999/2000 Harvest estimates for each Fishstock should be evaluated with reference to the coefficient of variation.

(c) Maori customary fisheries

Quantitative information on the current level of Maori customary take is not available.

(d) Illegal catch

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

(e) 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) on the east and west coasts of both of the main islands, and in late spring (November-December) in Southland and in the Chatham Islands. Some spawning activity may also extend into summer/autumn. 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 (< 100 m) all around New Zealand and the Chatham Islands, although they appear to be less common on the west coast of the South Island. Adult fish are found out to about 400 m depth. Tagged barracouta have moved considerable distances to spawn (up to 500 nautical miles).

There are no age data available 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. Data have been validated for fish up to 3 years old by following modal progressions over time.

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 4. Note that von Bertalanffy growth parameters for BAR 4 given in the 1992 Plenary Report have been withdrawn and need to be reassessed.

Table 4: Estimates of biological parameters.

Fishstock	Estimate				Source
1. Natural mortality (M)					
All-both sexes	Less than 0.46 M = 0.30 considered best estimate for all areas for both sexes				Hurst (unpub. data)
2. Weight = a (length) (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	2.90	0.0075	2.90	Hurst & Bagley (1994)
3. von Bertalanffy growth parameters					
	Both sexes combined				
	K	**t**	**L∞**		
Tasmania	0.45	0.166	91.17	(unconstrained)	Grant et al. (1978)
	0.42	–0.25	91.01	(constrained, t_0 fixed)	

3. STOCKS AND AREAS

There are no new data which would alter the stock boundaries given in previous assessment documents.

Four barracouta management areas were established in 1983, based on knowledge at the time: EEZ areas E+F, G+H, B+C and D. Stock boundaries are not well understood, but the Chatham Islands stock is probably separate. However, 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. However, there is not enough data at this stage to alter the existing stock boundaries.

4. STOCK ASSESSMENT

There are no new data which would alter the yield estimates given in the 1997 Plenary Report. The obsolete MCY estimates based on biomass estimates from trawl surveys have been removed and yield estimates are based on commercial landings data only. These estimates have not changed since 1992.

(a) Estimates of fishery parameters and abundance

The results from trawl surveys done 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.

A time series of trawl surveys was carried out in the Southland area (QMA 5) in February-March from 1993 to 1996 using *Tangaroa* (Table 5). Trawl surveys on the east and west coasts of the South Island in autumn using *Kaharoa* may help interpretation of trends in biomass around the South Island.

Table 5: Biomass indices (t) and coefficients of variation (CV) (Assumptions: areal availability, vertical availability and vulnerability = 1).

Area	Vessel	Trip code	Date	Biomass	% CV
Southland	*Tangaroa*	TAN9301	Feb-Mar 93	11 587	18
		TAN9402	Feb-Mar 94	6151	20
		TAN9502	Feb-Mar 95	4539	17
		TAN9604	Feb-Mar 96	7693	19
East coast					
South Island	*Kaharoa*	KAH9105	May-Jun 91	12 936	29
		KAH9205	May-Jun 92	11 672	23
		KAH9306	May-Jun 93	18 197	22
		KAH9406	May-Jun 94	7451	32
		KAH9618	May-Jun 96	16 845	19
West coast					
South Island	*Kaharoa*	KAH9203	Mar-Apr 92	2478	14
		KAH9404	Mar-Apr 94	5298	16
		KAH9504	Mar-Apr 95	4480	13
		KAH9701	Mar-Apr 95	2993	19
		KAH0004	Mar-Apr 00	1787	11
		KAH0304	Mar-Apr 03	4485	20
		KAH0503	Mar-Apr 05	2763	13
East coast					
North Island	*Kaharoa*	KAH9304	Mar-Apr 93	2673	15
		KAH9402	Feb-Mar 94	8433	33
		KAH9502	Feb-Mar 95	2103	29
		KAH9602	Feb-Mar 96	2495	23

(b) Biomass estimates

Estimates of current and reference biomass are not available.

(c) Estimation of Maximum Constant Yield (MCY)

It is not feasible to estimate MCY from commercial landings data for most Fishstocks (except for BAR 1), as the amount of effort has varied considerably since the beginning of the fishery in the late 1960s, i.e. foreign licensed access has declined, effort was encouraged by subsidies in 1979 and 1981, an unknown amount of fish has been and may still be dumped, and effort is related to availability of more preferred, higher value species. These, and other factors, also result in CPUE data being of limited use.

(i) Auckland (East), Central (East) and South–East (Coast) (BAR 1)

MCY was estimated using the equation MCY = cY_{av} (Method 4), where Yav average estimated catch from 1968–1975 and c = 0.7. The estimated average catch includes 2000 t which is assumed to have been caught and either dumped or not reported. Fishing activity is assumed to have been on the total stock, even though the entire area was not fished. Due to problems with QMA boundaries not corresponding to the fishing history boundaries, 500 t is subtracted and added to BAR 7.

$$MCY = 0.7 * (12\,000\ t - 500\ t) = 8050\ t.$$

The level of risk to the stock by harvesting the population at the estimated MCY value cannot be determined. However, the risk is probably low given the sustainability of catches at about the MCY level since 1970.

MCY has not been determined for the other Fishstocks.

(d) Estimation of Current Annual Yield (CAY)

Estimates of current biomass are not available and CAY cannot be estimated.

(e) Other yield estimates and stock assessment results

None available.

(f) Other factors

The relationship of the southern area stock to the east and west coast South Island stocks is uncertain, so these areas have been treated separately as in the past. However, if fish from BAR 5 overlap significantly with other South Island stocks, then the MCYs for all Fishstocks on the South Island may all need adjusting downward.

Barracouta are part of the shelf (30–300 m) mixed fishery and are usually the dominant species in these depths around the South Island (except perhaps in good red cod years in Canterbury Bight). Any increase or decrease in barracouta quotas will have overflow effects onto bycatch species. The economics of targeting on barracouta is probably affected by 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 efficiency of the two vessels.

5. STATUS OF THE STOCKS

Estimates of current and reference biomass are not available.

In the last five years, catches have been below the estimated MCY in BAR 1, which suggests that the current catch levels are sustainable. However, it is not known if catches at the level of the current TACC (11 000 t) will allow the stock to move towards a size that will support the maximum sustainable yield.

Catches in BAR 5 were above the TACC in 2005–06. It is not known if current TACCs and recent catches in this area are sustainable or whether they are at levels which will allow the stock to move towards a size that will support the maximum sustainable yield.

Table 6: Summary of yields (t), TACCs (t), and reported landings (t) for Barracouta for the most recent fishing year.

Fishstock		QMA	MCY	2005–06 Actual TACC	2005–06 Reported landings
BAR 1	Auckland (East), Central (East), South–East (Coast)	1, 2, & 3	8050	11 000	7030
BAR 4	South–East (Chatham)	4	–	3019	687
BAR 5	Southland, Sub–Antarctic	5 & 6	–	7470	9479
BAR 7	Challenger, Central (West), Auckland (West)	7, 8, & 9	–	11 173	10 685
BAR 10	Kermadec	10	–	10	0
Total				32 662	27 881

6. FOR FURTHER INFORMATION

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