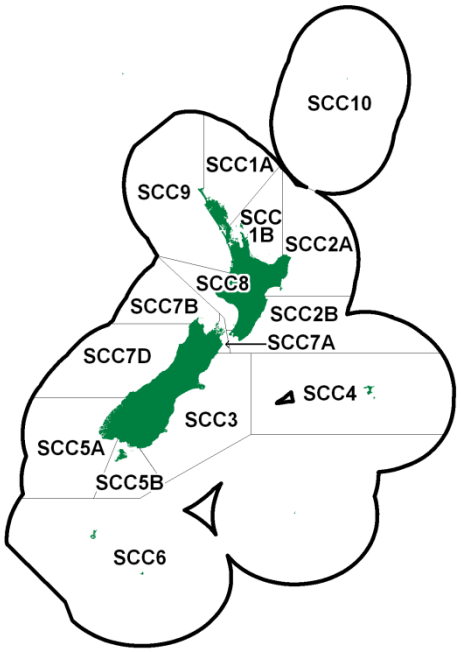
SEA CUCUMBER (SCC)

(*Stichopus mollis*)



1. FISHERY SUMMARY

Sea cucumbers were introduced into the Quota Management System on 1 April 2004. The fishing year is from 1 April to 31 March. A breakdown of each QMA's Total Allowable Catch (TAC) is listed in Table 1. Each TAC is made up of a total allowable commercial catch (TACC), customary, and recreational allocation and has remained unchanged since entering the QMS.

1.1 Commercial fisheries

More than 100 species of sea cucumber are found in New Zealand waters, but *Stichopus mollis* is the only species of commercial value, and the only species for which exploratory commercial fishing has taken place. Sea cucumbers are currently targeted only by diving but they are also a common bycatch of bottom trawl and scallop dredge fisheries. Sea cucumber landings of all species are reported as a single code (SCC), although most reported landings are probably *S. mollis*, as other species have no commercial value.

Table 1: Recreational and customary non-commercial allowances (t), Total Allowable Commercial Catches (TACC, t) and Total Allowable Catch (TAC, t) as declared for SCC on introduction into the QMS in October 2004.

Fishstock	Recreational Allowance	Customary non-commercial Allowance	TACC	TAC
SCC 1A	3	2	2	7
SCC 1B	4	2	2	8
SCC 2A	1	1	2	4
SCC 2B	4	2	5	11
SCC 3	2	1	2	5
SCC 4	1	1	2	4
SCC 5A	1	1	2	4
SCC 5B	1	1	2	4
SCC 6	0	0	0	0
SCC 7A	2	1	5	8
SCC 7B	2	1	5	8
SCC 7D	1	1	2	4
SCC 8	1	1	2	4
SCC 9	1	1	2	4
SCC 10	0	0	0	0
TOTAL	24	16	35	75

Table 2: TACCs and reported landings (t) of sea cucumber by Fishstock from 1990–91 to 2014–15 from CELR and TCEPR data. Until 2003–04 management areas are the same as FMAs, since when FMAs 1, 2, 5, and 7 were subdivided. These landings are reported in the second and third parts of this table.

	SCC 1		SCC 2		SCC 3		SCC 4	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1998–99	0	-	0	-	0.032	-	0	-
1999–00	0	-	0	-	0.04	-	0.01	-
2000–01	0.037	-	0	-	0.652	-	0.001	-
2001–02	0.16	-	0.012	-	1.005	-	1.683	-
2002–03	0.39	-	0.365	-	4.616	-	0.92	-
2003–04	0.07	N/A	N/A	N/A	3.785	2	0.115	2
2004–05	N/A	N/A	N/A	N/A	1.136	2	0.4	2
2005–06	N/A	N/A	N/A	N/A	2.853	2	0	2
2006–07	N/A	N/A	N/A	N/A	2.699	2	0.004	2
2007–08	N/A	N/A	N/A	N/A	3.673	2	0	2
2008–09	N/A	N/A	N/A	N/A	3.795	2	0	2
2009–10	N/A	N/A	N/A	N/A	0.366	2	0.009	2
2010–11	N/A	N/A	N/A	N/A	0.780	2	0.009	2
2011–12	N/A	N/A	N/A	N/A	3.397	2	0.004	2
2012–13	N/A	N/A	N/A	N/A	8.543	2	0.0004	2
2013-14	N/A	N/A	N/A	N/A	6.772	2	0.005	2
2014–15	N/A	N/A	N/A	N/A	2 183	2	0	2

	SCC 1A		SCC 1B		SCC 2A		SCC 2B		SCC 5A	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
2003–04	0	2	0	2	0	2	0	5	0	2
2004–05	0	2	1.503	2	0	2	0	5	0.005	2
2005–06	0	2	1.429	2	0	2	0	5	0	2
2006–07	0	2	2.089	2	0	2	0	5	0	2
2007–08	0.120	2	2.176	2	0	2	0	5	0	2
2008–09	0.122	2	0.531	2	0	2	0	5	0.001	2
2009–10	0.176	2	1.780	2	0	2	0.190	5	0	2
2010–11	0.012	2	1.403	2	0	2	0.047	5	0	2
2011–12	1.468	2	2.013	2	0	2	0.666	5	0.307	2
2012–13	0.361	2	1.680	2	0	2	0.107	5	0	2
2013–14	0	2	1.614	2	0	2	0.193	5	0	2
2014–15	0.695	2	1.842	2	0	2	2.367	5	0.702	2

	SCC 5B		SCC 6		SCC 7A		SCC 7B		SCC 7D	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
2003–04	0.005	2	0	0	0	5	0	5	0	2
2004–05	0.102	2	5	0	3.194	5	1.076	5	0	2
2005–06	0.002	2	0.310	0	5.467	5	0.122	5	0	2
2006–07	0	2	0	0	0.17	5	0.04	5	0	2
2007–08	0.004	2	0	0	8.341	5	0	5	0.023	2
2008–09	0.018	2	0.011	0	4.190	5	0	5	0	2
2009–10	0	2	0	0	4.314	5	1.357	5	0	2
2010–11	0.014	2	0	0	5.086	5	5.458	5	0	2
2011–12	0.366	2	0.042	0	4.768	5	4.700	5	2.146	2
2013–13	0.109	2	0	0	4.973	5	4.274	5	0	2
2013–14	1.806	2	0	0	5.097	5	5.228	5	0	2
2014–15	2.141	2	0	0	4.965	5	5.061	5	0	2

	SCC 9		SCC 10		Total	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC
1990–91	0	-	0	-	4.653[+]	-
1991–92	0	-	0	-	3.843[+]	-
1992–93	0	-	0	-	0.682[+]	-
1993–94	0	-	0	-	2.5[+]	-
1994–95	0	-	0	-	2.41[+]	-
1995–96	0	-	0	-	2.679[+]	-
1996–97	0	-	0	-	1.415[+]	-
1997–98	0.05	-	0	-	0.148	-
1998–99	0	-	0	-	0.032	-
1999–00	0	-	0	-	0.052	-
2000–01	0	-	0	-	1.659	-
2001–02	0	-	0	-	8.954	-
2002–03	0	-	0	-	16.847*	-
2003–04	0	2	0	0	21.861	35
2004–05	0.016	2	0	0	12.213	35
2005–06	0	2	0	0	10.183	35
2006–07	0.01	2	0	0	5.012	35
2007–08	0.001	2	0	0	14.315	35
2008–09	0.074	2	0	0	8.731	35
2009–10	0.029	2	0	0	8.221	35
2010–11	0.137	2	0	0	12.946	35
2011–12	0.141	2	0	0	20.249	35
2012–13	0.126	2	0	0	21.082	35

Table 2 [continued]

	SCC 9		SCC10		Total	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC
2013–14	0	2	0	0	21.778	35
2014–15	0.162	2	0	0	22.162	35

*In 2002–03 50 kg were reportedly landed, but the QMA is not recorded. This amount is included in the total landings for that year,
+In 1990–1997, catch was reported, but no QMA was, therefore only the total is shown.

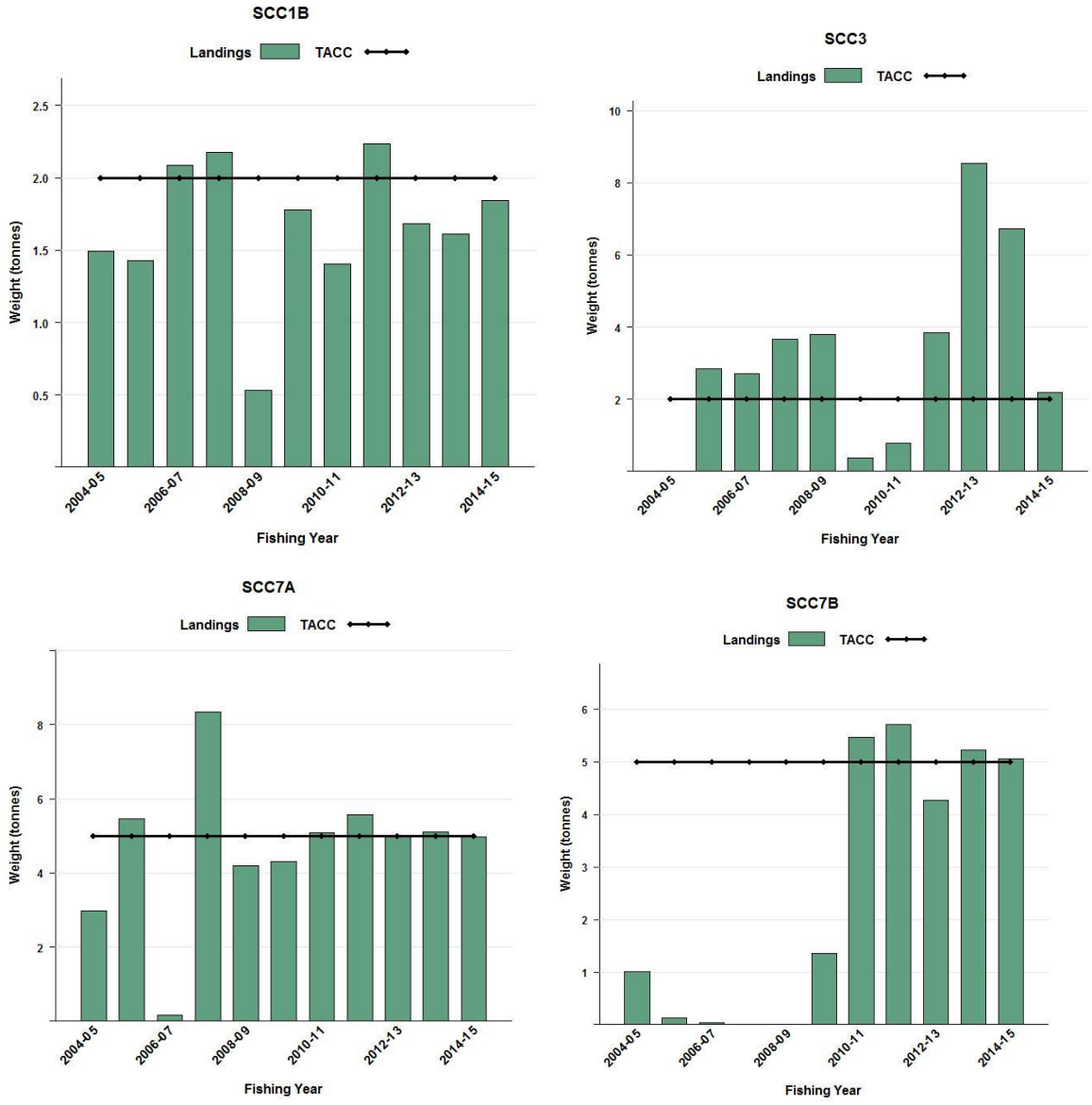


Figure 1: From Top Left: Reported commercial landings and TACC for SCC 1B (Hauraki Gulf, Bay of Plenty), SCC 3 (South East Coast), SCC 7A (Challenger Marlborough Sounds) and SCC 7B (Challenger Nelson). Note that these figures do not show data prior to entry into the QMS.

Between 1990 and 2001 about 45% of the catch was taken as bycatch in scallop dredging in Tasman and Golden Bays. About 13% was taken as bycatch in bottom trawling around the Auckland Islands, and about 38% was taken by diving. The remainder of the bycatch has been reported from mid-water trawls, rock lobster pots and bottom longlining.

Reported landings have generally been small except for the period between 2001–2002 and 2005–2006, when they ranged between about 9 and 22 t (Table 2). Most of this catch was bycatch from bottom trawling in SSC 6. The catches taken by diving were from Fisheries Statistical Area 031 (Fiordland) in 1990–91 (when a special permit was being operated) and 1995–96. The historical landings and TACC for the main SCC stocks are depicted in Figure 1.

1.2 Recreational fisheries

Recreational fishing surveys indicate that sea cucumbers are not caught by recreational fishers. It is likely that members of the Asian community harvest sea cucumber, but their fishing activity is poorly represented in the recreational surveys.

1.3 Customary non-commercial fisheries

There is no documented customary non-commercial use of sea cucumbers.

1.4 Illegal catch

There is no known illegal catch of sea cucumbers.

1.5 Other sources of mortality

There is no quantitative information on other sources of mortality, although sea cucumbers are often taken as a bycatch in bottom trawl and dredge fisheries.

2. BIOLOGY

Stichopus mollis is distributed throughout New Zealand, and as far south as the Snares Islands. It also occurs off west and south Australia. It is found in shallow water between 5 and 40 m in a wide range of habitats from rocky shores to sandy bottoms. It is common in north-east New Zealand, Fiordland, the Marlborough Sounds, and Stewart Island, and displays a preference for sheltered coastline with complex and diverse habitats. *S. mollis* is less common on exposed coasts, but if present, tends to be in deeper water.

Sea cucumbers are mobile and form part of the benthic epifaunal community where they are detritus feeders. If disturbed, they can eviscerate their entire gut which can then be regenerated. They tend to be sedentary in suitable habitat, but are able to move away relatively quickly if stressed.

Little is known about the biology of *S. mollis*. They have an annual reproductive cycle, spawning between November and February. The sexes are separate and develop synchronously. They are broadcast spawners, eggs and sperm are released into the water column, and following fertilization, they undergo a 3 to 4 week larval phase before settlement. Populations from sheltered areas such as fiords and sheltered bays may be largely 'self seeding', while larvae released on open coasts may disperse more widely.

There is some evidence that recruitment and growth are both patchy and variable. Recruited fish appear in the adult population at about 10–12 cm (40–60 g) and adults grow to about 18–20 cm (180 g). During an exploratory fishing survey in Fiordland (SCC 5A) in 1989, divers observed small *S. mollis* under rubble, suggesting that pre-recruit sea cucumbers may have different habitat preferences to adults. By contrast, comprehensive surveying in the Mahurangi harbour (SCC 1B) showed the substratum at sites with high densities of juveniles to be dominated by silt and mud with large shell fragments (over 10 cm) of the horse mussel *Atrina zelandica* (Morrison 2000). The restricted distribution of juveniles at this locality was shown to be unrelated to sediment type, and theorized to be a consequence of localised effects such as predation or larval settlement (Slater & Jeffs 2010). Caging studies comparing growth at different densities underneath and away from a Coromandel mussel farm (SCC 1B) showed that growth ranged from a 15.4% increase in weight over 6 months, at a density of 2.5 per m^2 under a mussel farm, to a 13.9% decrease in weight over 2 months, at a density of 15 per m^2 away from the mussel farm (Slater & Carton 2007). Age at maturity is thought to be about 2 years, and the life span of *S. mollis* is thought to be between 5 and 15 years.

3. STOCKS AND AREAS

The management of sea cucumbers is based on 15 QMAs, which are a combination of existing and sub-divided FMAs. Although there is currently little biological or fishery information which could be used to identify stock boundaries, the QMAs recognise that sea cucumbers are a sedentary shallow water species, and that many sheltered populations may be isolated and vulnerable to localised depletion. Finer scale QMAs therefore provide a mechanism whereby stocks can be managed more appropriately. Also, because it is likely that the same group of commercial fishers will be targeting kina and sea cucumbers, and because there are some similarities in their respective habitats, the QMAs for sea cucumber are the same as those for kina.

4. STOCK ASSESSMENT

4.1 Estimates of fishery parameters and abundance

There are no estimates of fishery parameters or abundance for any sea cucumber fishstock.

4.2 Biomass estimates

There are no biomass estimates for any sea cucumber fishstock, although estimates exist for some discrete areas. For Fiordland, crude biomass estimates of 59, 89, 97 and 134 t for Thompson, Bradshaw, Charles and Doubtful Sounds respectively are reported by Mladenov & Gerring (1991), and Mladenov & Campbell (1998). Their survey did not include the outer coastline, but extrapolating to all fiords between Puysegur Point and Cascade Point, they estimate a total biomass of 1937 t in the 0 to 20 m depth range.

4.3 Yield estimates and projections

There are no estimates of *MCY* for any sea cucumber fishstock.

There are no estimates of *CAY* for any sea cucumber fishstock.

5. STATUS OF THE STOCKS

There are no estimates of reference or current biomass for any sea cucumber fishstock.

6. FOR FURTHER INFORMATION

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