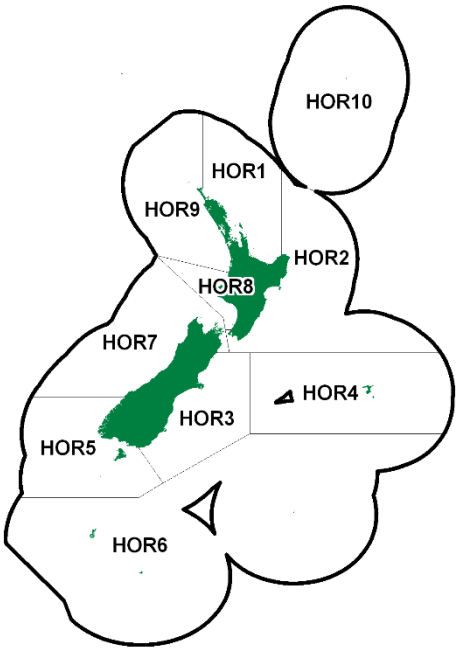
HORSE MUSSEL (HOR)

(*Atrina zelandica*)
Kukuroroa, Kupa, Hururoa



1. FISHERY SUMMARY

1.1 Commercial fisheries

Horse mussels (*Atrina zelandica*) were introduced into the Quota Management System on 1 April 2004, with a combined TAC of 105 t and TACC of 29 t. Customary non-commercial and recreational allowances are 9 t each, and 58 t was allowed for other sources of mortality. The fishing year is from 1 April to 31 March and commercial catches are measured in greenweight. TACCs have been allocated in HOR 1–HOR 9. Most reported landings have been from HOR 1, and, apart from 1994–95 and 2002–03 when catches of about 5 t and 7 t respectively were reported, reported landings have all been small (Table 1). About 90% of the catch is taken as a bycatch during bottom trawling and the remainder is taken as a bycatch of dredge and Danish seine. It is likely that there is a reasonably high level of unreported discarded horse mussel catch.

Table 1: TACCs and reported landings (t) of horse mussel by Fishstock from 1990–91 to present from CELR and CLR data. There have never been any reported landings in HOR 4, 5, 6, or 8. These fishstocks each have a TACC of 1 t and are not reported in Table 1 below. [Continued on next page]

Fishstock	HOR 1		HOR 2		HOR 3		HOR 7	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1990–91	0.834	–	0	–	0	–	0	–
1991–92	0	–	0	–	0	–	0	–
1992–93	0	–	0	–	0	–	0	–
1993–94	0.003	–	0	–	0.016	–	0	–
1994–95	5.525	–	0	–	0	–	0	–
1995–96	0	–	0.019	–	0	–	0	–
1996–97	0.024	–	0	–	0	–	0	–
1997–98	0	–	0	–	0	–	0	–
1998–99	0	–	0	–	0	–	0	–
1999–00	0	–	0	–	0	–	0.81	–
2000–01	0	–	0	–	0	–	0.128	–
2001–02	0	–	0.002	–	0	–	0	–
2002–03	7.153	–	0	–	0	–	0	–
2003–04	0.026	4	0	2	0	2	0	16
2004–05	0.217	4	0	2	0	2	1.017	16
2005–06	0.026	4	0	2	0	2	0	16
2006–07	0	4	0	2	0	2	0.06	16
2007–08	0	4	0	2	0	2	0.451	16
2008–09	0.068	4	0	2	0	2	0	16
2009–10	0.289	4	0	2	0	2	0.112	16

Table 1 [Continued]

Fishstock	HOR 1		HOR 2		HOR 3		HOR 7	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
2010–11	0	4	0	2	0	2	0.857	16
2011–12	0	4	0	2	0	2	0.605	16
2012–13	0	4	0	2	0	2	0	16
2013–14	0	4	0	2	0	2	0.214	16
2014–15	0	4	0	2	0	2	0.117	16
2015–16	0	4	0	2	0.005	2	0.380	16
2016–17	0	4	0	2	0.018	2	0.630	16
2017–18	0	4	0	2	0.018	2	0.211	16
2018–19	0	4	0	2	0.090	2	0	16
2019–20	0	4	0	2	0.500	2	0	16

	HOR 9		Total	
	Landings	TACC	Landings	TACC
1990–91	0	–	0.834	–
1991–92	0	–	0	–
1992–93	0	–	0	–
1993–94	0	–	0.019	–
1994–95	0	–	5.525	–
1995–96	0	–	0.019	–
1996–97	0	–	0.024	–
1997–98	0	–	0.128	–
1998–99	0	–	0	–
1999–00	0	–	0.1	–
2000–01	0	–	0.128	–
2001–02	0	–	0	–
2002–03	0	–	7.155	–
2003–04	0	1	0.026	29
2004–05	0.065	1	1.299	29
2005–06	0.942	1	0.968	29
2006–07	0.261	1	0.321	29
2007–08	0	1	0.451	29
2008–09	0	1	0.068	29
2009–10	0	1	0.401	29
2010–11	0	1	1	29
2011–12	0	1	0.605	29
2012–13	0	1	0	29
2013–14	0	1	0.214	29
2014–15	0	1	0.117	29
2015–16	0	1	0.385	29
2016–17	0	1	0.0648	29
2017–18	0	1	0.329	29
2018–19	0	1	0.090	29
2019–20	0	1	0.500	29

1.2 Recreational fisheries

A. zelandica do not appear in records from recreational fishing surveys (Bradford 1998), but are nevertheless taken from time to time by recreational fishers. There are no estimates of recreational take for this species.

1.3 Customary non-commercial fisheries

A traditional food of Māori, this mussel is probably under-represented in midden shell counts because of the fragile and short-lived nature of the shell. Limited quantitative information on the level of customary take on HOR 1 is available from Fisheries New Zealand (Table 2). These numbers are likely to be an underestimate of customary harvest because only the catch in numbers and kilograms are reported in the table.

1.4 Illegal catch

There is no known illegal catch of this mussel.

1.5 Other sources of mortality

There is no quantitative information on other sources of mortality, although widespread die-offs appear to be characteristic of this species. Storm scour, shell damage and subsequent predation, and exceeding carrying capacity have been suggested as possible reasons for this.

Table 2: Fisheries New Zealand records of customary harvest of horse mussel (reported as weight (kg) and numbers) since 2005–06. – no data.

		Weight (kg)		Numbers	
Stock	**Fishing year**	**Approved**	**Harvested**	**Approved**	**Harvested**
HOR 1	2005–06	–	–	2 000	150
	2006–07	220	220	150	150
	2007–08	200	150	–	–
	2008–09	150	70	90	90
	2009–10	–	–	–	–
	2010–11	–	–	100	0
	2011–12	–	–	50	0
	2012–13	–	–	–	–
	2013–14	–	–	–	–
	2014–15	–	–	–	–
	2015–16	–	–	–	–
	2016–17	100	50	80	0
	2017–18	40	40	–	–
	2018–19	–	–	–	–
	2019–20	–	–	–	–

2. BIOLOGY

The horse (or fan) mussel, *Atrina zelandica*, is a widespread endemic bivalve that lives mainly on muddy-sand substrates in the lowest inter-tidal and sub-tidal shallows of mainly sheltered waters. Horse mussels are also found in deeper waters (to 50 m) off open coasts. The horse mussel is a flattened, emergent, filter-feeding mollusc, particularly conspicuous because of its size and abundance. Although more usually 260–300 mm long (110–120 mm wide) it can reach 400 mm in length and is New Zealand's largest bivalve. Horse mussels often live in groups, forming patches of up to 10 m^2 or more. The shell remains firmly embedded in the substrate by its pointed anterior end, the animal anchored to particles in the sediment by its byssus. The crenellated posterior edge projects a few centimetres above the substrate, keeping the water intake clear of surface deposits and providing attachment for an array of algae and invertebrates such as sponges and sea squirts.

Horse mussels are dioecious broadcast spawners. Although spawning may take place throughout much of the year it is probably mainly during summer. There is no information on the size or age at which breeding begins. A pelagic larva is free swimming for several days or weeks but nothing is known of its primary settlement locations, which may not necessarily be within the adult beds (some bivalves including soft sediment ones such as pipi settle in one area but later migrate to another where adult beds develop). Recruitment events can be sporadic and short-lived.

There is little published information on age, growth, and mortality for horse mussels. It appears that *Atrina* grows rapidly for at least the first 2–4 years: shells about 120 mm long in a northern bed increased about 40 mm per year until 166 mm, after which growth slowed dramatically (Hay C. pers. comm. in Hayward et al. 1999). Large shells are at least 5 y and possibly up to 15 y old. Widespread die-offs seem to be a feature of this species (Allan & Walshe 1984, Hayward et al. 1999). For example, in the Rangitoto Channel, densities of 200–300 per m^2 reduced to 1–35 per m^2 over 2–3 y, with storm scour, shell damage and subsequent predation, and exceeding carrying capacity being possible reasons (Hayward et al 1999).

Horse mussels have widespread effects on ecosystem structure and function (Lohrer et al. 2013). They provide shelter and refuge for invertebrates and fish (Townsend et al. 2015) and act as substrata for the settlement of epifauna such as sponges and soft corals. They also affect boundary layer dynamics and facilitate productivity and biodiversity by depositing pseudofaeces. The horse mussel community in most northern harbours is almost entirely subtidal, in medium to fine muddy, but fairly stable, sand with moderate current velocities and no wave action. Similar communities have been observed in the Hauraki Gulf and Marlborough Sounds. Scallops, dredge oysters, and green lipped mussels are the main commercial shellfish species with beds that sometimes broadly overlap with the horse mussel distribution.

3. STOCKS AND AREAS

For management purposes stock boundaries are based on FMAs; however, there is no biological information on stock structure, recruitment patterns, or other biological characteristics which might indicate stock boundaries.

4. STOCK ASSESSMENT

4.1 Estimates of fishery parameters and abundance

There are no estimates of fishery parameters or abundance for any horse mussel fishstock.

4.2 Biomass estimates

There are no biomass estimates for any horse mussel fishstock.

4.3 Yield estimates and projections

There are no estimates of *MCY* for any horse mussel fishstock.

There are no estimates of *CAY* for any horse mussel fishstock.

5. STATUS OF THE STOCKS

There are no estimates of reference or current biomass for any horse mussel fishstock. It is not known whether horse mussel stocks are at, above, or below a level that can produce *MSY*.

6. FOR FURTHER INFORMATION

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