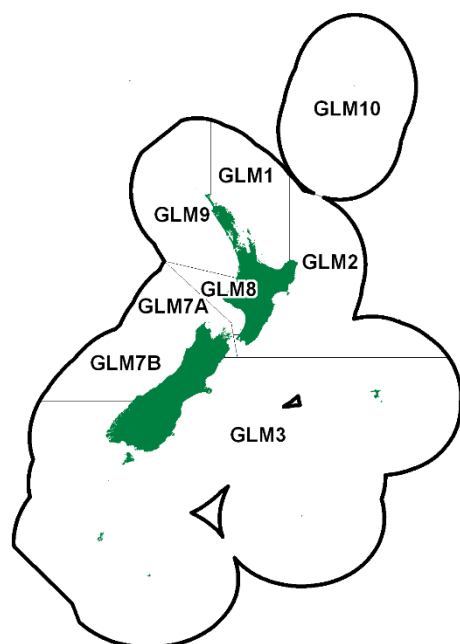


GREEN-LIPPED MUSSEL (GLM)

(Perna canaliculus)

Kuku, Kutai



1. FISHERY SUMMARY

1.1 Commercial fisheries

Commercial harvesting of green-lipped mussels began with handpicking of inter-tidal beds in the late nineteenth century, and expanded in 1927 with the development of a dredge fishery for sub-tidal mussels in the Hauraki Gulf. Following a brief decline in catch rates from 1935–45, landings increased steadily to peak in 1961 at more than 2000 tonnes. Overexploitation of the Hauraki Gulf beds caused the fishery to close in 1966. A second dredge fishery developed in Tasman Bay and Kenepuru Sound in 1962; however, under an open access regime this fishery also declined within five years. Since 2004 reported landings have been dominated by GLM 7A and GLM 9. Total landings have been low and declining compared to the total TACC. Recent estimated landings of green-lipped mussels are shown in Table 1, while Figure 1 shows the historical landings and TACC for the three main GLM stocks.

Table 1: Reported landings (t) of Green-lipped mussel and actual TACCs (t) from 2004–05 to the present.

| Fishstock (QMA) | GLM 1 | | GLM 2 | | GLM 3 | | GLM7A | | GLM 9 | | Total | |
|--------------------|----------|------|----------|------|----------|------|----------|-------|----------|------|----------|-------|
| | Landings | TACC | Landings | TACC | Landings | TACC | Landings | TACC | Landings | TACC | Landings | TACC |
| 2004–05 | 6.2 | 10 | 0 | 10 | 0.19 | 10 | 410.9 | 1 500 | 121 | 180 | 539 | 1 720 |
| 2005–06 | 12.4 | 10 | 0.2 | 10 | 0.176 | 10 | 229.0 | 1 500 | 93 | 180 | 335 | 1 720 |
| 2006–07 | 7.8 | 10 | 0 | 10 | 0 | 10 | 84.3 | 1 500 | 137 | 180 | 229 | 1 720 |
| 2007–08 | 3.5 | 10 | 0 | 10 | 0.04 | 10 | 7.4 | 1 500 | 142 | 180 | 153 | 1 720 |
| 2008–09 | 6.7 | 10 | 0 | 10 | 0.04 | 10 | 0.07 | 1 500 | 68 | 180 | 75 | 1 720 |
| 2009–10 | 4.4 | 10 | 0 | 10 | 0.02 | 10 | 0.03 | 1 500 | 183 | 180 | 187 | 1 720 |
| 2010–11 | 1.0 | 10 | 0 | 10 | 0 | 10 | 1.4 | 1 500 | 78 | 180 | 80 | 1 720 |
| 2011–12 | 0.5 | 10 | 0 | 10 | 0 | 10 | 0.06 | 1 500 | 162 | 180 | 163 | 1 720 |
| 2012–13 | 0.6 | 10 | 0 | 10 | 0 | 10 | 0 | 1 500 | 129 | 180 | 130 | 1 720 |
| 2013–14 | 0.1 | 10 | 0 | 10 | 0 | 10 | 8.29 | 1 500 | 159 | 180 | 167 | 1 720 |
| 2014–15 | 0.1 | 10 | 0 | 10 | 0 | 10 | 8.29 | 1 500 | 207 | 180 | 215 | 1 720 |
| 2015–16 | 0.06 | 10 | 0 | 10 | 0 | 10 | 0 | 1 500 | 203 | 180 | 203 | 1 720 |

Spat collecting is the other commercial venture with green-lipped mussels. Until green-lipped mussels were introduced into the QMS a permit was required to harvest spat attached to beach cast seaweed.

Green-lipped mussels were introduced into the Quota Management System on 1 October 2004 with TAC and TACC listed in Table 2.

Table 2: Recreational and Customary non-commercial allowances, TACC and TAC for green-lipped mussel.

| Fishstock | Recreational allowance | Customary non-commercial allowance | TACC | TAC |
|-----------|------------------------|------------------------------------|-------|-------|
| GLM 1 | 162 | 243 | 10 | 415 |
| GLM 2 | 10 | 15 | 10 | 35 |
| GLM 3 | 58 | 87 | 10 | 155 |
| GLM 7A | 19 | 29 | 1 500 | 1 548 |
| GLM 7B | 5 | 8 | 100 | 23 |
| GLM 8 | 17 | 26 | 0 | 43 |
| GLM 9 | 39 | 59 | 180 | 278 |
| GLM 10 | 0 | 0 | 0 | 0 |
| Total | 310 | 467 | 1 720 | 2 497 |

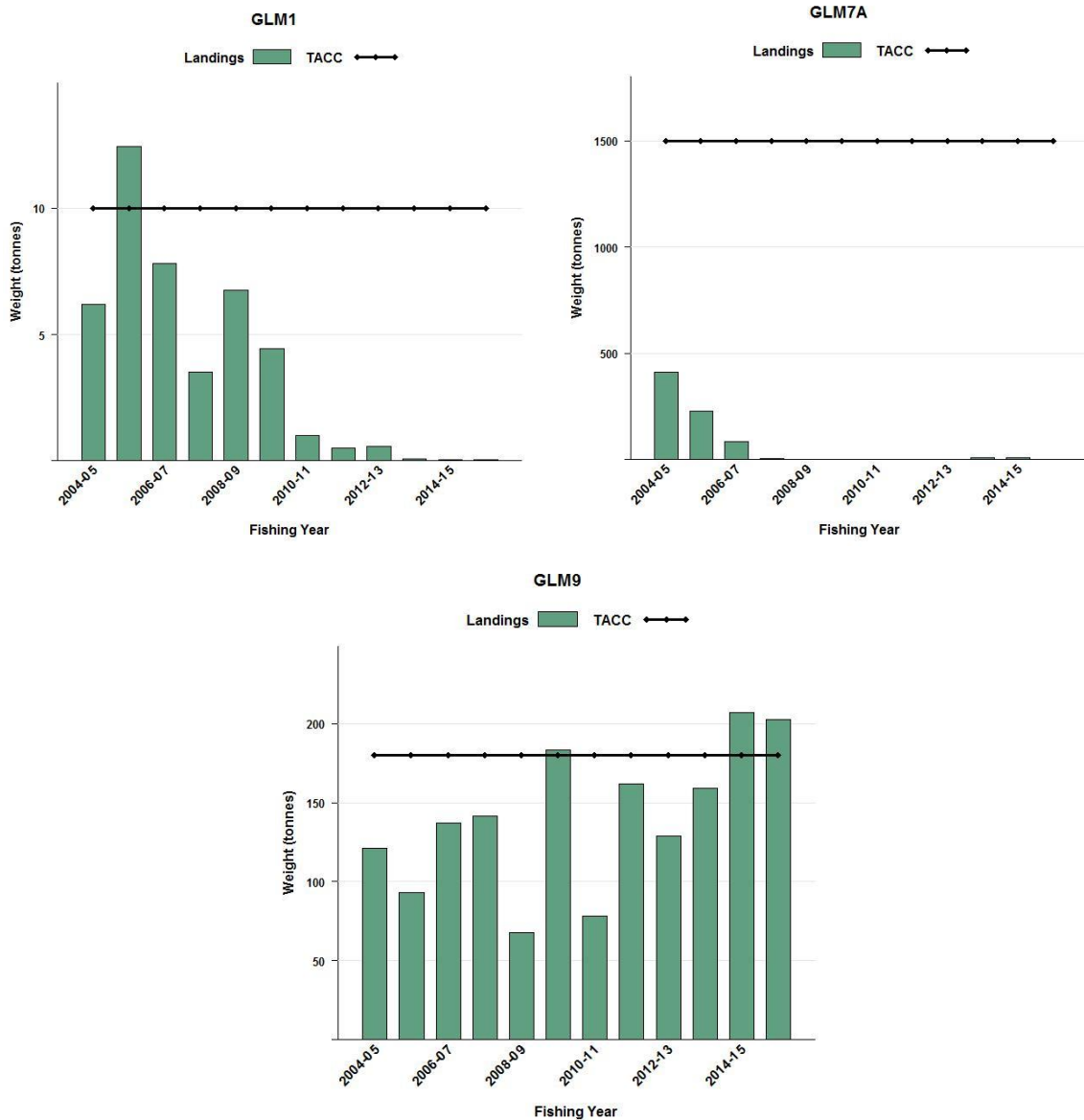


Figure 1: Reported commercial landings and TACC for the four main GLM stocks. From top left: GLM 1 (Auckland East), GLM 7A (Nelson Marlborough), and GLM 9 (Auckland West). Note that these figures do not show data prior to entry into the QMS.

1.2 Recreational fisheries

Recreational harvest estimates for green-lipped mussels have been obtained from the 1996, 2000 and 2001 national telephone diary surveys of recreational fishers (Table 3). Estimates of green-lipped mussels from the 1996 survey are only available for FMA 1. No weights were available from the surveys to estimate recreational harvest by tonnage. The Recreational Technical Working Group has reviewed the harvest estimates from the national telephone diary surveys and considered that the estimates from

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the 1996 survey are unreliable because the survey contained a methodological error. The estimated number of green-lipped mussels from the 2000 and 2001 surveys is also considered to be unreliable.

Table 3: Harvest estimates of mussels (000s of individuals of *P. canaliculus* combined) from the 1996, 2000 and 2001 national recreational surveys, by FMA (Bradford 1998, Boyd et al 2004).

| FMA | 1996 Harvest | 2000 Harvest | 2001 Harvest |
|-----|--------------|--------------|--------------|
| 1 | 818 | 1 308 | 949 |
| 2 | | 8 | 22 |
| 3 | | 402 | 187 |
| 5 | | 1 | 36 |
| 7 | | 3 | 363 |
| 8 | | 242 | - |
| 9 | | 25 | 148 |

1.3 Customary non-commercial fisheries

Green-lipped mussels are very important to customary fishing. This species was used extensively by Māori, appearing in middens throughout the country. The species continues to be important to Māori and, anecdotally, a number of customary fishers have noted its importance as a resource in a number of areas. While no information is available, the green-lipped mussel remains an important element of customary fishing throughout many parts of New Zealand.

2. BIOLOGY

The green-lipped mussel is a filter-feeding mollusc. While distributed throughout New Zealand, it is most common in central and northern parts where it frequently forms dense beds of up to 100 m². This species is absent from the Chatham Islands and other offshore islands. It is typically a bivalve of the lower shore and open coast and is found from the mid-littoral to depths of over 50 m. The species can grow to over 240 mm in shell length (anterior-posterior axis).

The green-lipped mussel is a dioecious (uni-sexual) broadcast spawner. Gonadal development takes place at temperatures above 11°C and is also related to food availability. Most spawning occurs in late spring to early autumn, but larvae can be present all year. Sexual maturity has been observed in some populations to begin from 27 mm shell length, with most individuals sexually mature by 40 mm shell length. Sexual maturity is reached in the first year, and females can produce up to 100 million eggs per season. Fertilisation is largely dependent on the proximity of adults.

Settlement processes associated with marine farms have been well studied, but less is known about natural settlement. The planktonic stage (pediveligers) of the green-lipped mussel is ready to settle at 220–350 µm in length, after a three to five week larval phase. The larvae swim only vertically but they can be transported large distances by currents and tides. Settlement is most intense from late winter to early summer, but is highly variable spatially and temporally. In the wild, larvae settle over a wide range of depths, preferring fine filamentous substrata including hydroids, bryozoans, and filamentous and turfing algae. Settlement is completed with the attachment of byssus threads and subsequent metamorphosis.

Primary settlement onto beds of adult mussels is uncommon, but can take place on surrounding algae and on the byssi of adults. Secondary settlement, after a form of byssopelagic migration or mucous drifting, is thought to be the means by which most juveniles recruit into mussel beds. The spat detaches from the substrate by severing the byssus threads and the secreted mucous strand, this enables it to swim or drift to new areas for attachment. Juvenile mussels may move numerous times like this before settling on adult mussel beds. This drifting ability is lost once spat reach about 6 mm in shell length.

There is little information on age, growth and natural mortality, particularly for wild populations. Green-lipped mussels in suspended culture typically grow from 10 to 75 mm shell length in six months, to 111–115 mm in one year, and to 195 mm in three and a half years. Growth is typically faster in cultured situations compared with natural beds, which are often overcrowded, are on exposed coasts, and are not constantly submerged so feeding is discontinuous. At Piha and West Tamaki Head, green-lipped mussel growth is variable, with individuals reaching 20–70 mm shell length in their first year.

3. STOCKS AND AREAS

Green-lipped mussels are distributed in seven of the ten FMAs (1–3, 5 and 7–9) but are most common in the central and northern parts of New Zealand.

There is little information on stock structure, recruitment patterns, or other biological characteristics. There appears to be strong genetic structuring of the New Zealand green-lipped mussel population, with a northern and southern group being differentiated by frequency shifts in common haplotypes, and the occurrence of a unique haplotype in the south island west coast population. The southern-northern population split occurs south of Cook Strait.

4. STOCK ASSESSMENT

There are no stock assessments or biomass estimates for green-lipped mussels.

5. STATUS OF THE STOCKS

No estimates of reference or current biomass are available for any green-lipped mussel fishstock. It is not known whether green-lipped mussel stocks are at, above, or below a level that can produce *MSY*.

6. FOR FURTHER INFORMATION

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