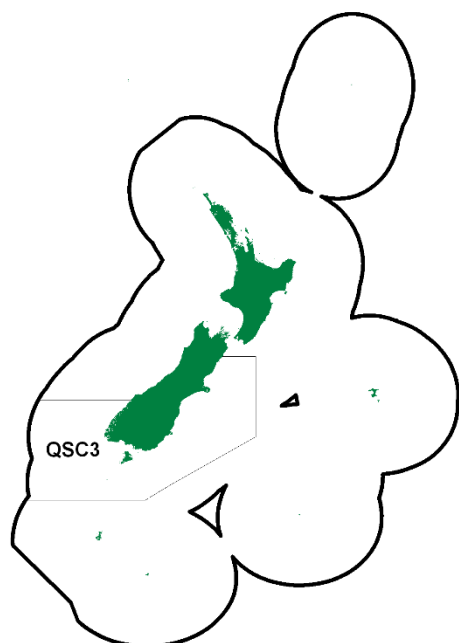


## QUEEN SCALLOPS (QSC)

(*Zygochlamys delicatula*)



### 1. FISHERY SUMMARY

Queen scallops were introduced into the QMS in October 2002, with a current TACC (unchanged since its introduction) of 380 t and a 20 t allowance for other sources of fishing related mortality. The fishing year runs from the 1 October to the 30 September and the catch is reported in greenweight.

#### 1.1 Commercial fisheries

The QSC 3 fishery initially developed in the 1984–85 fishing year; it is a small-scale fishery with only a few fishing vessels involved (Michael & Cranfield 2001). Queen scallops (*Zygochlamys delicatula*) are predominantly harvested commercially off the Otago coast, in depths of 130–200 m (predominately 150–200m) near the edge of the continental shelf. Reported landings from this fishery peaked at 711 t in the 1985–86 fishing year (not shown in the table below). Annual landings in most recent years have been less than 200 t, although this is more likely to be associated with economic, rather than biological, factors. The TACC was set in 2002 at a slightly higher level than recent landings but lower than the non-QMS competitive catch limit of 750 t which applied to FMA 3 from 1990–91. Reported landings of queen scallops are given in Table 1, and Figure 1 shows historical landings and the TACC for QSC 3. The queen scallop fishery is a trawl fishery using specialised gear (including a relatively light ‘tickler’ chain or wire to induce swimming) and the catch is sorted both mechanically and by hand (Michael & Cranfield 2001, R. Belton pers. comm.).

#### 1.2 Recreational fisheries

There is no known recreational fishery for queen scallops.

#### 1.3 Customary fisheries

There is no known customary harvest of queen scallops.

#### 1.4 Illegal catch

Current levels of illegal harvest are not known.

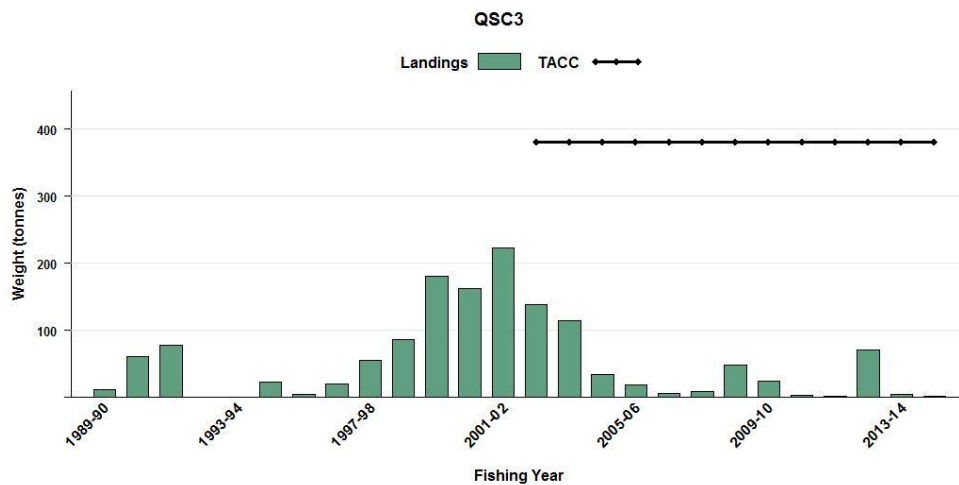
#### 1.5 Other sources of mortality

No quantitative estimate of other sources of mortality is available. Some grading of catch may occur (queen scallops may be returned to the sea) and an allowance of 20 t for potential mortality has been set within the current TAC.

**Table 1: Reported landings (t greenweight) of queen scallops (QSC) by FMA, QMA and fishing year by all methods (trawl and dredge) 1989–90 until the present day from Quota Management Reports (QMR), Monthly Harvest Returns (MHR) and Catch Effort Landing Returns (CELR landed and CELR estimated).**

| Fishing year | QSC 3           |       | FMA 3                        |                     | FMA 5               |
|--------------|-----------------|-------|------------------------------|---------------------|---------------------|
|              | Catch (QMR/MHR) | TACC* | Estimated catch (TCEPR/CELR) | Landings (CELR/CLR) | Landings (CELR/CLR) |
| 1989–90      | 11.9            | -     | 288.1                        | -                   | -                   |
| 1990–91      | 61.8            | -     | 238.3                        | -                   | 22.9                |
| 1991–92      | 77.4            | -     | 193.7                        | -                   | -                   |
| 1992–93      | 0.4             | -     | 104.7                        | -                   | -                   |
| 1993–94      | 1.1             | -     | 133.6                        | -                   | -                   |
| 1994–95      | 23.6            | -     | 146.9                        | -                   | -                   |
| 1995–96      | 4.5             | -     | 149.5                        | -                   | 0.2                 |
| 1996–97      | 20.9            | -     | 118.0                        | -                   | 6.6                 |
| 1997–98      | 56.0            | -     | 208.3                        | -                   | 6.0                 |
| 1998–99      | 85.9            | -     | 81.7                         | -                   | -                   |
| 1999–00      | 180.2           | -     | 176.8                        | -                   | -                   |
| 2000–01      | 162.2           | -     | 162.1                        | -                   | -                   |
| 2001–02      | 223.7           | -     | 168.9                        | -                   | -                   |
| 2002–03      | 139.0           | 380   | -                            | -                   | -                   |
| 2003–04      | 114.0           | 380   | -                            | -                   | -                   |
| 2004–05      | 35.1            | 380   | -                            | -                   | -                   |
| 2005–06      | 18.6            | 380   | -                            | -                   | -                   |
| 2006–07      | 6.5             | 380   | -                            | -                   | -                   |
| 2007–08      | 9.5             | 380   | -                            | -                   | -                   |
| 2008–09      | 48.7            | 380   | -                            | -                   | -                   |
| 2009–10      | 25.3            | 380   | -                            | -                   | -                   |
| 2010–11      | 2.8             | 380   | -                            | -                   | -                   |
| 2011–12      | 1.9             | 380   | -                            | -                   | -                   |
| 2012–13      | 70.5            | 380   | -                            | -                   | -                   |
| 2013–14      | 5.024           | 380   | -                            | -                   | -                   |
| 2014–15      | 1.788           | 380   | -                            | -                   | -                   |

\* QMS introduction 1 October 2002



**Figure 1: Reported commercial landings and TACC for QSC 3 (South East Coast, Southland).**

## 2. BIOLOGY

The New Zealand queen scallop (*Zygochlamys delicatula*) is also known as the southern queen scallop, southern fan scallop, and gem scallop. This small pectinid species is distributed on the outer continental shelf along the east coast of the South Island, from Kaikoura down to Macquarie Island. There are nine other species in the genus, none of which have attracted commercial interest, probably because of their small size. Similar species such as *Chlamys islandica* and *Chlamys varia* support important fisheries in other countries. New Zealand queen scallops are distributed from Kaikoura to the southern islands including the Snares, Bounty, Antipodes, and Macquarie Islands. There are no records of live queen scallops being caught north of Kaikoura, or on the west coast of the South Island.

A dredge survey off Otago in October 1983 showed that queen scallops were distributed in long patches orientated along the slope of the continental shelf. They were most abundant in depths beyond 130 m, on the plateau between the Taiaroa and Papanui Canyons, and south. North of the Taiaroa Canyon

## QUEEN SCALLOPS (QSC)

catches diminished steadily towards the Karitane Canyon; few were caught north of the canyon. Only low numbers of queen scallops were caught in depths shallower than 110 m.

Juvenile queen scallops are frequently found attached to fragments of bryozoa and other biogenic debris, including the shells of other scallops and the dredge oyster. Height frequency distributions of samples show that the size composition of the population differs with area, and it is inferred that settlement probably varies spatially and temporally. The estimated 40–50 days larval life may result in queen scallop larvae being well mixed, both vertically and horizontally, in the water column. Predation of newly settled spat may also affect the pattern of recruitment and add to the variability in year class representation.

Estimates of growth for New Zealand queen scallops suggest that they become sexually mature at four years for males and five years for females. As length is slightly less than height, queen scallops are estimated to reach the minimum takeable size of 50 mm at about eight years. However, growth estimates are uncertain, with information from tagging studies suggesting that queen scallops enter the fishery much earlier, at three to five years.

### 3. STOCKS AND AREAS

Queen scallops are distributed throughout the QSC 3 area. From harvest records the scallops inhabit waters between 130 and 200 m depth. The extent to which various beds or populations are separate reproductively or functionally is not known.

### 4. STOCK ASSESSMENT

#### 4.1 Estimates of fishery parameters and abundance

No estimates of fishery parameters or abundance are available at present.

#### 4.2 Biomass estimates

A trawl survey, (Jiang et al 2005) carried out in February–April 2004, provided estimates of total and recruited biomass (shells at least 50 mm) available from the fished area of QSC 3, from Moeraki to just north of the Nuggets within the depth range 130 to 200 m, which covers 90% of the fished area within QSC 3 (Table 2). These estimates assumed that the efficiency of the survey trawl was 100%. However trawl efficiency is unlikely to be 100% and in other scallop fisheries can vary significantly depending on dredge and substrate type. Consequently estimates of current absolute biomass cannot be estimated. The Shellfish Working Group had concerns over methodology and conduct of the survey, and that the reported survey CVs may not be reliable.

**Table 2: Estimated scallop biomass (recruit and pre-recruit) (t) in fished areas of QSC 3 February–April 2004.**

| Biomass Recruit (CV) | Biomass (CV) Pre-recruit | Total Biomass (CV) |
|----------------------|--------------------------|--------------------|
| 1 950.8 (18.2)       | 363.6 (21.48)            | 2 314.4 (18.22)    |

#### 4.3 Yield estimates and projections

As absolute biomass has not been estimated, *MCY* cannot be estimated

*CAY* cannot be estimated.

**5. STATUS OF THE STOCKS**

**Stock structure assumptions**

QSC 3 is assumed to be a single stock.

- QSC - *Zygochlamys delicatula*

|  |   |
|--|---|
| <b>Stock Status</b>  |   |
| Year of Most Recent Assessment                               | 2004  |
| Assessment Runs Presented                                    | Recruited biomass (shells $\geq$ 50 mm)   |
| Reference Points   | Target: Undefined<br>Soft Limit: 20% $B_0$<br>Hard Limit: 10% $B_0$<br>Overfishing threshold: - |
| Status in relation to Target                                 | -   |
| Status in relation to Limits                                 | Unknown   |
| <b>Historical Stock Status Trajectory and Current Status</b> |   |
| -  |   |

|  |   |
|--|---|
| <b>Fishery and Stock Trends</b>                  |   |
| Recent Trend in Biomass or Proxy                 | Unknown   |
| Recent Trend in Fishing Mortality or Proxy       | Unknown   |
| Other Abundance Indices                          | -   |
| Trends in Other Relevant Indicators or Variables | Landings are less than a quarter of the TACC and have generally been declining since 2002–03. |

|   |  |
|---|--|
| <b>Projections and Prognosis</b>  |  |
| Stock Projections or Prognosis  | Unknown                                    |
| Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits | Soft Limit: Unknown<br>Hard Limit: Unknown |
| Probability of Current Catch or TACC causing Overfishing to continue or to commence             | -  |
| <b>Assessment Methodology</b>   |  |
| Assessment Type   | -  |
| Assessment Method   | -  |
| Assessment Dates  | -   Next assessment: Unknown               |
| Overall assessment quality rank   | -  |
| Main data inputs (rank)   | -  |
| Data not used (rank)  | -  |
| Changes to Model Structure and Assumptions  | -  |
| Major Sources of Uncertainty  | -  |

|   |  |
|---|--|
| <b>Qualifying Comments</b>  |  |
| Landings are thought to have been declining in recent times due to economic rather than biological factors. |  |

|                             |
|-----------------------------|
| <b>Fishery Interactions</b> |
|-----------------------------|

|  |
|--|
| Concerns over interactions between dredge fishing and complex habitats |
|--|

## 6. FOR FURTHER INFORMATION

- Jiang, W; Gibbs, M; Hatton, S (2005) Stock assessment of the queen scallop fishery in QSC3. Final Research Report for Ministry of Fisheries project QSC2002/01. (Unpublished report held by Ministry for Primary Industries, Wellington.)
- Michael, K P; Cranfield, H J (2001) A summary of the fishery, commercial landings, and biology of the New Zealand queen scallop, *Zygochlamys delicatula* (Hutton, 1873). *New Zealand Fisheries Assessment Report 2001/68*. 25p.