

27 Macquarie Island Toothfish Fishery

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FIGURE 27.1 Area of the Macquarie Island Toothfish Fishery, 2011

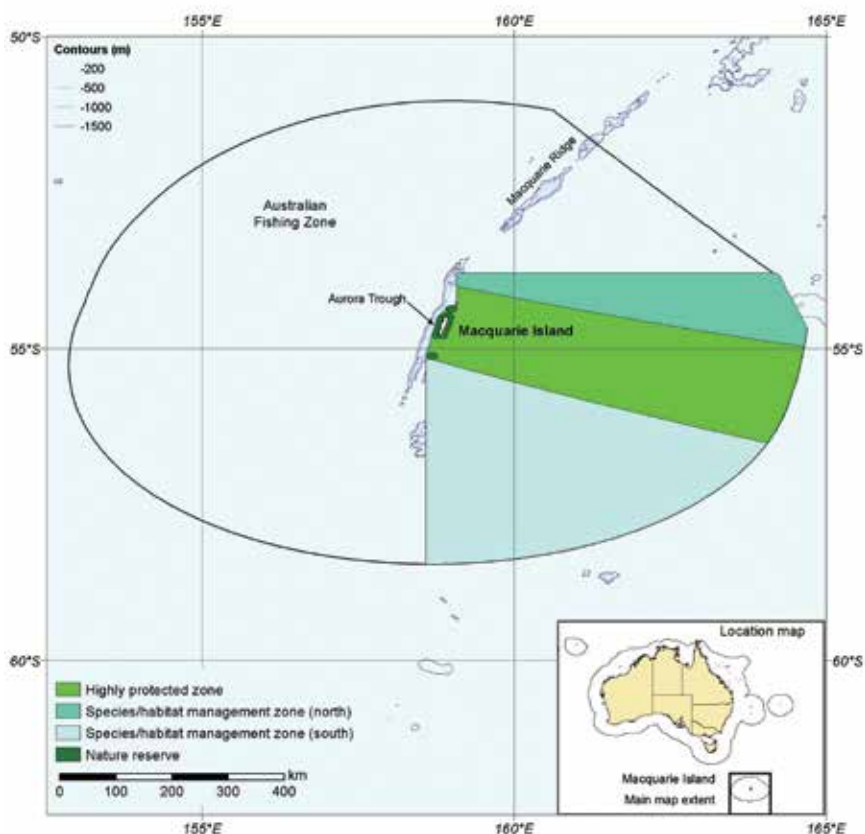








TABLE 27.1 Status of the Macquarie Island Toothfish Fishery

Status	2010		2011		Comments
Biological status	Fishing mortality	Biomass	Fishing mortality	Biomass	
Patagonian toothfish (<i>Dissostichus eleginoides</i>)					TACs are set in accordance with a precautionary harvest strategy. Most recent estimate of biomass is above the limit reference point.
Economic status	Estimates of NER are not available.				NER are likely to have been positive in 2009–10 and 2010–11, given that the TAC for Patagonian toothfish was fully caught.

Notes: NER Net economic returns. TAC Total allowable catch.

Fishing mortality	 Not subject to overfishing	 Subject to overfishing	 Uncertain
Biomass	 Not overfished	 Overfished	 Uncertain

27.1 Description of the fishery

Macquarie Island is a subantarctic island about 1500 km south of Tasmania (Figure 27.1). The island is a nature reserve in the Tasmanian reserve system and is included on the World Heritage List. The waters within 3 nautical miles (nm) of the island are under Tasmanian jurisdiction, while the Australian Government manages waters between 3 nm and the 200 nm outer boundary of the Australian Fishing Zone. The south-eastern quadrant of the Macquarie Island region out to 200 nm is a marine park (Figure 27.1). All extractive industries, including fishing, are prohibited within the central segment of the quadrant. Although the Macquarie Island Toothfish Fishery (MITF) is outside the area of competence of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the ecosystem-based management approach used by the CCAMLR has been adopted for the fishery. The harvest strategy for Patagonian toothfish is consistent with the precautionary approach of the CCAMLR and is considered more precautionary than the guidelines of the Commonwealth Fisheries Harvest Strategy Policy (HSP; DAFF 2007). The TAC is set separately for the two main areas (Aurora Trough and Macquarie Ridge). By-product is generally low in the MITF and is regulated by a 200 t TAC for all byproduct species combined and a 50 t limit for any one species. The byproduct catch, primarily grenadier (*Macrourus carinatus*) and violet cod (*Antimora rostrata*), has never exceeded the 50 t TAC for any one species in a season. In 2011, longlining was made an approved method of fishing in the MITF, along with trawling. This followed a successful longlining trial over four seasons (2007 to 2010), which demonstrated that longlining was an effective method for targeting Patagonian toothfish and that mitigation methods could be implemented to minimise seabird interactions with longline gear (AFMA 2010).

In the MITF 2011–12 fishing season, the available TAC for Patagonian toothfish on the Macquarie Ridge was not taken due to operational issues. These included a serious breakdown of the Australian longliner *Janas*, which had to be towed to safety near Macquarie Island and then to the Auckland Islands for repairs by the research vessel *Aurora Australis*. In addition, very rough sea conditions and strong currents resulted in loss of a significant amount of gear. The vessel concerned spent considerable time attempting to retrieve the gear, rather than fishing, which is reflected in the large increase in effort days (Table 27.2).

TABLE 27.2 Main features and statistics for the MITF

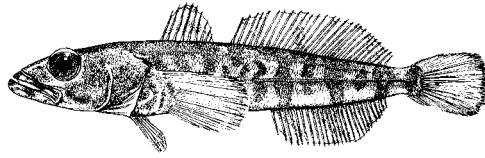
Fishery statistics a		2010–11 fishing season		2011–12 fishing season		
Stock name	TAC	Catch (t)	Real value (2009–10)	TAC	Catch (t)	Real value (2010–11)
Aurora Trough	140	125	Confidential	150	148	Confidential
Macquarie Ridge	150	139	Confidential	360	196	Confidential
Total	290	264	Confidential	510	344	Confidential
Fishery-level statistics						
Effort (longline days) b	29			86		
Fishing permits	2 quota SFR holders; 1 scientific permit			2 quota SFR holders		
Active vessels	1			2		
Observer coverage c	100% vessel coverage			100% vessel coverage		
Fishing methods	Demersal longline, demersal trawl, pot (fish trap)					
Primary landing ports	Port Louis (Mauritius), Albany (Australia), New Zealand					
Management methods	Input controls: limited entry, gear restrictions, closures Output controls: TACs, ITQs					
Primary markets	International: United States, Japan—frozen					
Management plan	Macquarie Island Toothfish Fishery management plan 2006 (AFMA 2006; amended 2011)					

a Fishery statistics are provided by fishing season, unless otherwise indicated. The fishing season is 15 April to 14 April. Real value statistics provided by financial year. b In 2010–11 and 2011–12, all effort in the fishery used longline. c All vessels carry two observers on each trip.

Notes: ITQ Individual transferable quota. SFR Statutory fishing right. TAC Total allowable catch.

27.2 Biological status

27.2.1 Patagonian toothfish

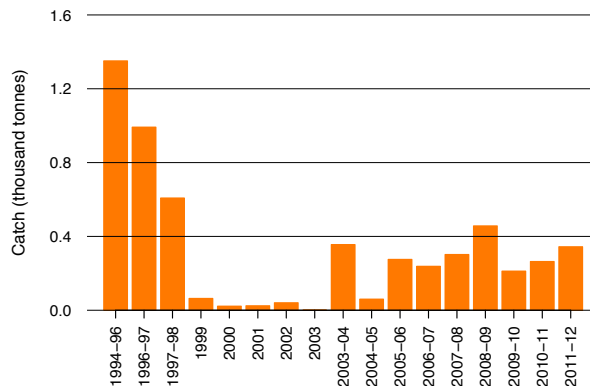


Line drawing: FAO

Stock assessment

In 2011, Stock Synthesis 3 software was used to assess the Patagonian toothfish stock under the CCAMLR control rules (Fay et al. 2011). This integrated, two-area assessment takes into account parameters such as natural mortality, sex-specific growth curves, length at 50 per cent maturity and tag recaptures. The assessment estimates that the current spawning biomass (2010) was 72 per cent of unfished spawning biomass ($0.72SB_0$), well above the target reference point of $0.50SB_0$. This assessment, unlike the assessment done in the previous year, was able to fit the model to both fishing areas (Aurora Trough and Macquarie Ridge) as a result of inclusion of data from the four seasons of the longline trial that ended in 2010–11. It was therefore possible to set a TAC for the Macquarie Ridge based on the assessment and using the CCAMLR control rules, rather than adopting a precautionary TAC of 150 t, as was done for the 2010–11 fishing season. The catch of Patagonian toothfish in the MITF (Figure 27.2) has been relatively stable within the TACs.

FIGURE 27.2 Catch of Patagonian toothfish in the MITF, 1994–96 to 2011–12



Stock status determination

Given the relatively high estimate of current spawning biomass and the robust nature of the assessment, the stock is classified as **not overfished**. The conservative TAC-setting process based on the application of precautionary CCAMLR control rules, as well as the catch being within the TAC, result in the stock being classified as **not subject to overfishing**.

27.3 Economic status

27.3.1 Key economic trends

Nearly all the TAC for the Aurora Trough sector has been caught in recent years. A reduced TAC of 60 t was fully caught in 2009–10. In 2010–11, an increase of 76 t (126 per cent) in the effective TAC was associated with an increased but still relatively low level of latent (or unused) quota, of 9.3 per cent. In 2011–12, quota latency levels again remained low, at 1.3 per cent. This suggests that profitability in the fishery is likely to be positive.

The Macquarie Ridge sector has also experienced low quota latency in recent years. Since the introduction of the longline trial in 2007–08, quota latency has consistently been less than 10 per cent. The 2011–12 fishing season experienced a much higher quota latency level of 45.6 per cent. However, this was associated with a 210 t (140 per cent) increase in the TAC, as well as the operational issues mentioned above (i.e. rough seas)—these are a more likely cause of the higher quota latency than issues with stock size or management settings.

The move from trawling to longlining in the Macquarie Ridge sector appears to have increased average vessel economic performance. The initial demersal longline trial in 2007 found a number of benefits, including reduced gear loss, increased access to Patagonian toothfish in deeper waters and reduced levels of bycatch (AFMA 2010), which are likely to have resulted in improvements in productivity and profitability. This is supported by the low levels of quota latency in the fishery. However, net economic returns (NER) are likely to have been negatively affected in the 2011–12 fishing season, relative to 2010–11, by very rough sea conditions and strong currents, which required additional resources to be employed in the fishery (as indicated by the increase in days fished).

The small number of participants in this fishery means that profit-maximising decisions by individual operators are more likely to be aligned with optimum use of the resource (subject to the fishery's precautionary objective) than in a fishery with many competing participants. This is because a fishery with a small number of large operators can gain efficiency through economies of scale at the vessel level. There is also little incentive to race to fish with fewer vessels in the fishery. Therefore, the problem of excess investment in capital is also avoided.

27.3.2 Management arrangements

The harvest strategy for this fishery is conservative, reflecting the CCAMLR ecosystem-based management approach. Therefore, catch limits aim to maintain stock biomass at levels that are higher than recommended target reference points for other Commonwealth fisheries managed under the HSP. With a higher density of fish in the water, catch rates are expected to be higher, reducing the relative cost of fishing. Consistent with the precautionary ecological objectives, positive NER are likely to be generated in the fishery; this is confirmed by the low levels of quota latency.

27.4 Environmental status

The MITF is exempt from fishery export controls under the *Environment Protection and Biodiversity Conservation Act 1999* until 7 April 2016. There were no additional recommendations under this exemption, beyond standard recommendations pertaining to reporting.

The ecological risk assessment process was completed to a Level 3 Sustainability Assessment for Fishing Effects for trawling and demersal longline. The Level 3 assessment for trawling indicated that no species were at high risk from fishing in the MITF (Zhou et al. 2009). The Level 3 assessment for demersal longlining used data from 2007 to 2010 and is considered preliminary (Zhou & Fuller 2011). Two species—southern lanternshark (*Etmopterus baxteri*) and southern sleeper shark (*Somniosus antarcticus*)—had mean fishing mortality estimates that were slightly higher than the instantaneous fishing mortality rates corresponding to the maximum number of fish that can be removed in the long term. However, the authors acknowledge that the assessment tends to be overly precautionary, and it is likely that the mortality rate was overestimated. Given the low catch record for the two species (two southern lantern sharks and nine southern sleeper sharks) over the three years, it is also likely that the mortality estimates would be highly uncertain. Further analyses should take place as data become available. The MITF ecological risk management reports for trawling and demersal longline both outline how the Australian Fisheries Management Authority will continue to monitor bycatch and interactions with threatened, endangered and protected species, in a manner consistent with CCAMLR principles (AFMA 2009, 2011).

All the catch in the MITF is now taken by longline. No seabird or marine mammal interactions were noted in the longline trial or in the 2011–12 season. In 2011, one porbeagle shark (*Lamna nasus*) was hooked, but was cut off the line and swam away.



Toothfish
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27.5 Literature cited

AFMA (Australian Fisheries Management Authority) 2006, *Macquarie Island Toothfish Fishery management plan 2006*, Federal Register of Legislative Instruments F2006L00933, DAFF, Canberra.

—2009, *Ecological risk management: report for the Macquarie Island Toothfish Fishery—demersal trawl sub-fishery*, AFMA, Canberra.

—2010, *Assessment of longline fishing in the Macquarie Island Toothfish Fishery*, AFMA, Canberra, <www.environment.gov.au/coasts/fisheries/commonwealth/macquarie-toothfish/pubs/afma-assessment.pdf>.

—2011, *Ecological risk management: report for the Macquarie Island Toothfish Fishery—demersal longline sub-fishery*, AFMA, Canberra.

DAFF (Australian Government Department of Agriculture, Fisheries and Forestry) 2007, *Commonwealth Fisheries Harvest Strategy: policy and guidelines*, DAFF, Canberra.

Fay, G, Tuck, G & Haddon, M 2011, *Stock assessment for the Macquarie Island fishery for Patagonian toothfish (Dissostichus eleginoides), using data up to and including June 2010—addendum*, report to the Sub-Antarctic Resources Assessment Group, CSIRO Marine and Atmospheric Research, Hobart.

Zhou, S & Fuller, M 2011, *Sustainability assessment for fishing effect on fish bycatch species in the Macquarie Island Toothfish Longline Fishery: 2007–2010*, report to AFMA, Canberra.

—, Fuller, M & Smith, T 2009, *Rapid quantitative risk assessment for fish species in seven Commonwealth fisheries*, report to AFMA, Canberra.