

Chapter 25

Macquarie Island Toothfish Fishery

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FIGURE 25.1 Area of the Macquarie Island Toothfish Fishery, 2021

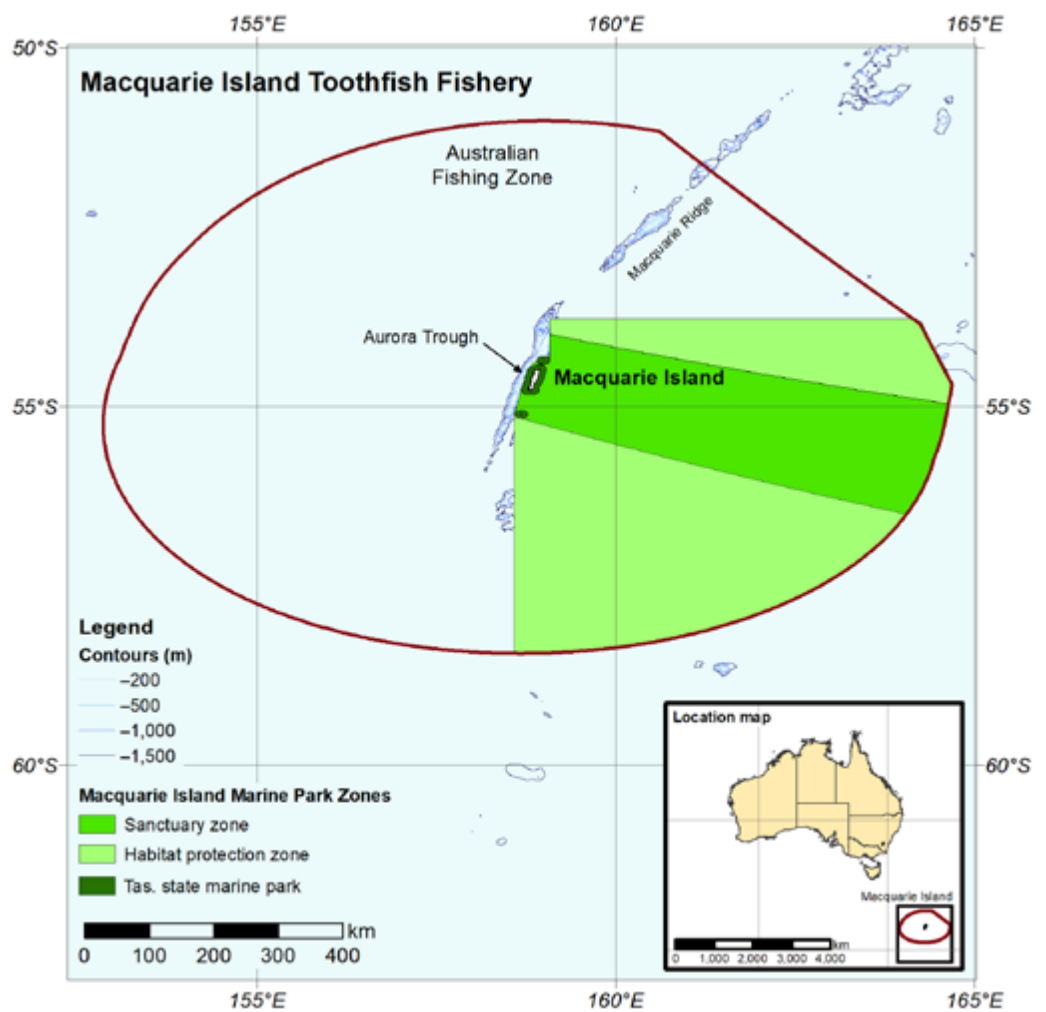


TABLE 25.1 Status of the Macquarie Island Toothfish Fishery

Biological status					
Stock	2020		2021		Comments
	Fishing mortality	Biomass	Fishing mortality	Biomass	
Patagonian toothfish (<i>Dissostichus eleginoides</i>)					TACs are set in accordance with a harvest strategy. Most recent estimate of biomass is above the limit reference point.

Economic status

Estimates of NER are not available. The primary target species, Patagonian toothfish, has historically low levels of latency and a high landed value, indicating positive NER for the fishery. NER likely declined in 2020 and 2021 due to the impact of the COVID-19 pandemic on the demand for and supply of toothfish, with likely short-term negative impacts on NER. A precautionary approach to the management of the stock, the setting of TACs under an ITQ, and target stock above the target biomass level should ensure that NER remain positive over the longer term.

Notes: **ITQ** Individual transfer quota. **NER** Net economic returns. **TAC** Total allowable catch.

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

25.1 Description of the fishery

Area fished, fishing methods and key species

Macquarie Island is a subantarctic island about 1,500 km south of Tasmania (Figure 25.1). The island is a nature reserve in the Tasmanian reserve system and is included on the World Heritage List (UNESCO 1998). The waters within 3 nautical miles (nm) of the island are under Tasmanian jurisdiction, while waters between 3 nm and the 200 nm outer boundary of the Australian Fishing Zone are managed by the Australian Government. The south-eastern quadrant of the Macquarie Island region out to 200 nm is a marine reserve (Figure 25.1). The Macquarie Island Toothfish Fishery (MITF) is outside the area covered by the Convention on the Conservation of Antarctic Marine Living Resources; however, the ecosystem-based management approach used by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has been adopted for the fishery, including comprehensive observer coverage and precautionary harvest control rules (Constable et al. 2000).

Historically, trawling was the main fishing method used in the MITF. In 2011, longlining was added as an approved fishing method (AFMA 2010). This followed a longlining trial over 4 seasons (2007 to 2010) that demonstrated longlining as an effective method for targeting Patagonian toothfish (*Dissostichus eleginoides*) and showed that mitigation methods could be implemented to minimise seabird interactions with longline gear (AFMA 2010). Since the 2010–11 season, toothfish in the MITF have been solely taken using longline, except for a trial of pots in the 2013–14 fishing season. Bycatch is generally low, and is regulated by a 50 t limit for any single species. The bycatch, primarily grenadier (*Macrourus* spp.) and violet cod (*Antimora rostrata*), has never exceeded the 50 t limit for any single species in a season. In 2021–22, 2.4% of the total retained catch was accounted for by other species, primarily grenadier and violet cod.

Management methods

The harvest strategy for Patagonian toothfish is consistent with the guidelines of the Commonwealth Fisheries Harvest Strategy Policy (Department of Agriculture and Water Resources 2018). For Patagonian toothfish, the CCAMLR reference points, which are applied to the MITF, dictate that median escapement of the spawning biomass at the end of a 35-year projection period is 50% of the median pre-exploitation level and that the probability of the spawning biomass dropping below 20% of its pre-exploitation median level is less than 10% over the projection period. The total allowable catch (TAC) was previously set separately for the 2 main areas (Aurora Trough and Macquarie Ridge). However, the management plan was amended in January 2012 to merge the 2 areas and set a single TAC for the entire fishery, based on evidence that Patagonian toothfish is a single stock around Macquarie Island (see 'Stock structure', below). The MITF was recertified as sustainable by the Marine Stewardship Council in July 2017.

TABLE 25.2 Main features and statistics for the MITF

Fishery statistics a		2020–21 fishing season			2021–22 fishing season		
Stock	TAC (t)	Catch (t)	GVP (2020–21)	TAC (t)	Catch (t)	GVP (2021–22)	
Patagonian toothfish	555	539	Confidential	635	458	Confidential	
Total	555	539	Confidential	635	458	Confidential	
Other spp. b	n/a	6	Confidential	n/a	11	Confidential	
Total fishery	n/a	545	Confidential	n/a	469	Confidential	
Fishery-level statistics							
Effort (longline days)	99			129			
Fishing permits	2 quota SFR holders			2 quota SFR holders			
Active vessels	1			1			
Observer coverage c	50% vessel coverage			100% vessel coverage			
Fishing methods	Demersal longline, demersal trawl						
Primary landing ports	Hobart; Nelson (New Zealand)						
Management methods	Input controls: limited entry, gear restrictions, closures Output controls: TACs, ITQs						
Primary markets	International: China, Japan, United States – frozen						
Management plan	Macquarie Island Toothfish Fishery Management Plan 2006 (amended 2012)						

a Fishery statistics are provided by fishing season, unless otherwise indicated. The 2021–22 fishing season was 4 April 2021 to 3 April 2022. Value statistics are provided by financial year. **b** There is a 50 t limit for each species, other than Patagonian toothfish, taken in the fishery. **c** All vessels are required to carry 2 observers on each trip, and 100% of hauls are observed. However, due to travel restrictions imposed during the COVID-19 pandemic, it was not possible to place observers on all trips in the 2020–21 season, and only 1 of 2 trips had an observer. However, electronic monitoring was used when an observer could not be placed on the vessel.

Notes: **GVP** Gross value of production. **ITQ** Individual transferable quota. **n/a** Not applicable. **SFR** Statutory fishing right. **TAC** Total allowable catch.

Fishing activity

The effort in the fishery has been relatively consistent over time, with 1 or 2 vessels active in the fishery for most years since the fishery began in 1994.

25.2 Biological status

Patagonian toothfish (*Dissostichus eleginoides*)



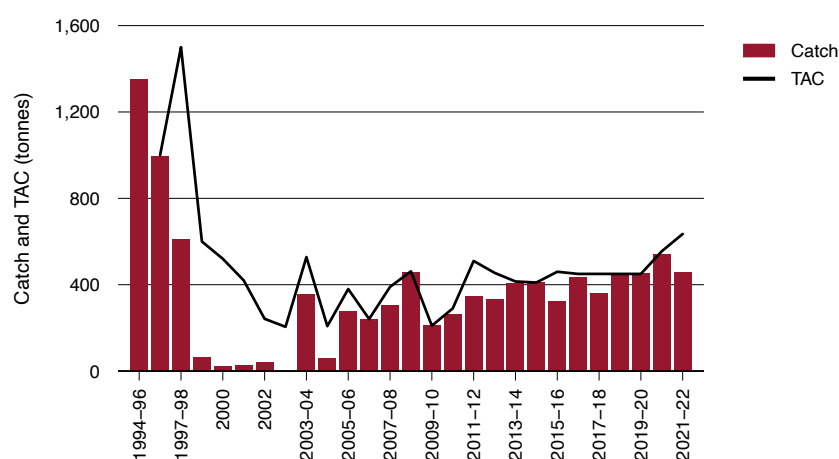
Line drawing: FAO

Stock structure

The Patagonian toothfish stock at Macquarie Island is considered to be distinct from other regional toothfish populations in the Southern Ocean (Appleyard, Ward & Williams 2002). Genetic studies (for example, Appleyard, Ward & Williams 2002) and toothfish tagging programs (for example, Williams et al. 2002) indicate that there is a single stock in the MITF.

Catch history

The catch of Patagonian toothfish in the MITF (Figure 25.2) has been variable over time and generally below, but close to, the TAC. Initial catches in the fishery were relatively high, but decreased from 1999 to 2003 when the Aurora Trough was effectively closed to commercial fishing, and only a single vessel was permitted to fish to maintain the tagging program and conduct experimental acoustic surveys. Catch in the 2021–22 season was below the TAC.

FIGURE 25.2 Catch and TAC of Patagonian toothfish in the MITF, 1994–95 season to 2021–22 season

Note: **TAC** Total allowable catch.

Source: AFMA

Stock assessment

The most recent stock assessment, using a model coded in Template Model Builder, estimated the 2020 female spawning biomass to be 85% of unfished levels ($0.85SB_0$; 95% confidence interval 0.78–0.92) (Hillary & Day 2021). In 2019, a new bespoke model structure was adopted (Hillary & Day 2019). This model was used to update the assessment with catch data, tag-recapture data and length composition data up to 2020, and age-at-length data up to 2019. It also used a revised maturity-at-length relationship, estimated using the maturity information from the extensive tagging data, because the old estimates (pre-2019) were considered too high (Hillary 2019).

The outcomes were accepted by the Sub-Antarctic Resource Assessment Group. Following the CCAMLR control rule (which uses a target of $0.50SB_0$ rather than $0.48SB_0$), a 2-year TAC of 635 t was calculated for the MITF for 2022–23 and 2023–24, which was robust to a wide array of catch distributions spread among the different fishing areas.

Stock status determination

The relatively high estimate of current female spawning biomass and the robust nature of the assessment result in the stock being classified as **not overfished**. The TAC derived from the CCAMLR control rule is conservative, and the catch in 2021–22 was below the TAC. The stock is therefore classified as **not subject to overfishing**.

25.3 Economic status

Key economic trends

Survey estimates of net economic returns (NER) are not available for this fishery. Low levels of latency from the mid-2000s onwards suggest that there is incentive to participate in the fishery. This, along with high stock levels, indicates that positive NER are being generated. NER likely declined in 2020 and 2021 due to the impact of the COVID-19 pandemic on the demand for toothfish. Moreover, operational constraints as a result of border restrictions and enhanced quarantine requirements are likely to have contributed to an increased level of quota latency in 2021, with the TAC being more undercaught than previous seasons. This effect on NER is likely to be short term, with recovery expected after easing of pandemic conditions from 2022.

Performance against economic objective

Conservative TAC setting, reflecting the CCAMLR ecosystem-based management approach, combined with an estimated biomass above the targeted level of $0.50SB_0$, helps to lower fishing costs in this distant fishery. Given few operators in the MITF in recent years, it is likely that optimum use of the resource is occurring, within the constraints of the fishery's precautionary management. Given these factors, it is likely that NER for the MITF are positive and sustainable over the longer term.

25.4 Environmental status

EPBC Act approvals

The MITF was accredited under part 13 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 2 October 2016. The MITF also has export approval under part 13A of the Act until 9 October 2026. No additional recommendations apply under this approval, beyond standard recommendations related to reporting.

Ecological risk assessments

Demersal trawl subfishery

A scale, intensity, consequence analysis (SICA) of the demersal trawl subfishery in 2007 identified that one or more species within the target, byproduct and bycatch and threatened, endangered and protected (TEP) species categories may be at moderate or higher risk from the direct impact of fishing (Daley et al. 2007), requiring either direct management of identified risks or further risk assessment. Communities were also assessed in 2007. Results indicate this component may be at moderate or higher risk from the direct impact of fishing.

Also in 2007, a productivity susceptibility analysis (PSA) of the subfishery considered 1 target, 74 byproduct, 3 bycatch and 90 TEP species (Daley et al. 2007). Of these, 42 species were categorised at high risk under the level of fishing effort considered, with the remainder at medium (108 species) and low (18 species) risk. A residual risk assessment of the high-risk species has not been undertaken.

In 2009, a base sustainability assessment for fishing effects (SAFE) of the subfishery found that, of the 54 species assessed, only 1 was categorised as being at high risk from the level of fishing effort considered (Zhou & Fuller 2011).

Demersal longline subfishery

In 2011, a base SAFE of the subfishery found that, of the 56 species assessed, 9 species had an estimated fishing mortality rate (F) either at or higher than the minimum F required to drive the stock below the maximum sustainable mortality level (F_{MSM}) (Zhou & Fuller 2011).

Ecological risk management

In managing the ecological risks identified for its fisheries, AFMA implements ecological risk management (ERM) strategies for species identified as being at high risk. Fishery-specific ERM strategies can be found on the AFMA website.

Threatened, endangered and protected species interactions

In accordance with accreditation under the EPBC Act (see Chapter 1), the Australian Fisheries Management Authority publishes and report quarterly on interactions with protected species on behalf of Commonwealth fishing operators to the Department of Climate Change, Energy, the Environment and Water (DCCEEW). Eleven interactions with porbeagles (*Lamna nasus*; all dead) were reported in the MITF in 2021.

These reported interactions with protected species form part of the ongoing monitoring by DCCEEW of the performance of fisheries within their accreditation under the EPBC Act.

25.5 References

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Patagonian toothfish
Australian Longline Pty