

28 Macquarie Island Toothfish Fishery

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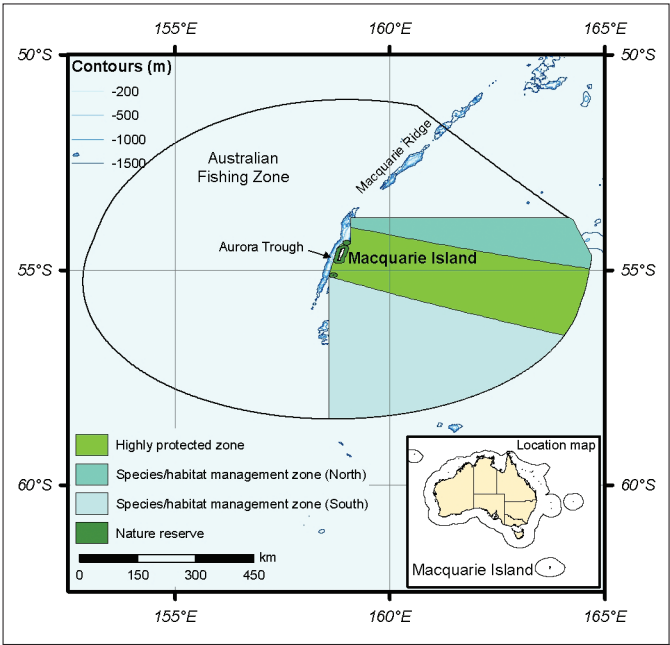


FIGURE 28.1 Area of the Maquarie Island Toothfish Fishery (MITF)

TABLE 28.1 Status of the fishery

| Fishery status | 2007 | | 2008 | | Comments |
|---|--|------------|-------------|------------|--|
| Biological status | Overfishing | Overfished | Overfishing | Overfished | |
| Patagonian toothfish (<i>Dissostichus eleginoides</i>) | | | | | Level of available biomass estimated to be high for Aurora Trough. Total allowable catches set at conservative levels. |
| Economic status Fishery level | Net economic return (NER) estimates not available. | | | | Latent quota high in Aurora Trough, low in Macquarie Ridge. NER for whole fishery is uncertain. |

NOT OVERFISHED / NOT SUBJECT TO OVERFISHING OVERFISHED / OVERFISHING UNCERTAIN NOT ASSESSED

TABLE 28.2 Main features and statistics of the MITF

| Feature | Description | | | |
|---|--|----------------------------|--|---------------------------------|
| Target species | Patagonian toothfish (<i>Dissostichus eleginoides</i>) | | | |
| Byproduct species | Grenadier (<i>Macrourus carinatus</i>) Violet cod (<i>Antimora rostrata</i>) | | | |
| Fishing methods | Demersal otter board trawling, trial demersal longlining | | | |
| Primary landing ports | Port Louis (Mauritius), Albany | | | |
| Management methods | Input controls: limited entry, gear restrictions and closures Output controls: TAC | | | |
| Management plan | <i>Macquarie Island Toothfish Fishery Management Plan 2006</i> (DAFF 2006) | | | |
| Harvest strategy | Aurora Trough—harvest strategy Limit reference point: 66.5% of the 1995 trawl available biomass | | | |
| Consultative forums | Sub-Antarctic Fisheries Management Advisory Committee (SouthMAC), Sub-Antarctic Resource Assessment Group (SARAG) | | | |
| Main markets | International: United States, Japan—frozen | | | |
| EPBC Act assessments: listed species (Part 13) international movement of wildlife specimens (Part 13A) | — Current accreditation (exempt) dated 28 November 2005; expires 28 November 2010 | | | |
| Ecological risk assessment: trawl | Level 1: Scale Intensity Consequence Analysis (SICA) completed on 168 species— unpublished Level 2: Productivity Susceptibility Analysis (PSA) completed on 168 species—unpublished. Ecological risk assessment not initiated | | | |
| longline | | | | |
| Bycatch workplans | <i>Antarctic Fisheries Bycatch Action Plan 2003</i> (AFMA 2003) | | | |
| Fishery statistics | 2006–07 | | 2007–08 | |
| Fishing season | 1 July 2006 – 30 June 2007 | | 1 July 2007 – 30 June 2008 | |
| TAC and catch by area | TAC | Catch | TAC | Catch |
| Aurora Trough | 241 t (trawl) | 238 t (trawl) ^a | 390 t (trawl) | 223 t (trawl) ^a |
| Macquarie Ridge | 100 t (an increase to 264 t possible for the trawl fishery) | <1 t (trawl) | 86 t (an increase to 228 t possible for the trawl fishery) | <1 t (trawl) 79 t (longline) |
| Effort | 15 trawl days | | 21 trawl days 167 000 hooks | |
| Fishing permits | 2 quota SFR holders | | 2 quota SFR holders 1 scientific permit | |
| Active vessels | 2 | | 2 | |
| Observer coverage | 100% vessel coverage | | 100% vessel coverage | |
| Real gross value of production (2007–08 dollars) | Confidential (<5 vessels) | | Confidential (<5 vessels) | |
| Allocated management costs | \$0.19 million | | \$0.20 million | |

EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*; SFR = statutory fishing right; TAC = total allowable catch;
— = not applicable

a Australian operators have given permission for their catch figures to be made public, despite fewer than five vessels operating.

28.1 BACKGROUND

Macquarie Island is a sub-Antarctic island about 1500 km south of Tasmania (Fig. 28.1). The island is a nature reserve in the Tasmanian reserve system and is listed on the World Heritage List. The waters within 3 nautical miles (nm) are under Tasmanian jurisdiction, whereas the Commonwealth 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. All extractive industries, including fishing, are prohibited within a central segment of the quadrant. Although outside the area of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the ecosystem-based management model used by the CCAMLR has been adopted for the Macquarie Island Toothfish Fishery (MITF).

Apart from historical whaling and sealing, there was little fishing in the Macquarie Island sector of the Australian Fishing Zone until 1994, when exploratory trawling for Patagonian toothfish commenced in the Aurora Trough. Two years later, a large aggregation of toothfish was discovered on the Macquarie Ridge north of the island, but no such

aggregations have since been found, despite continued searching. Although trawling has been the main method of fishing since 1994, a three-year longline trial began in August 2007, primarily on the Macquarie Ridge north and south of the island. The trial is due to be completed in August 2009, and a review of the trial to determine whether longlining will become an approved fishing method is expected before the start of the 2009–10 fishing season.

28.2 HARVEST STRATEGY

Aurora Trough

Limit reference point: 66.5% of the 1995 trawl available biomass (assumed to represent B_0 for the trawl fishery).

Control rules: if the estimate of available biomass is greater than the limit reference point, then the annual total allowable catch (TAC) is 10% of the current estimate of available biomass. These control rules are expected to allow at least 50% escapement of the spawning biomass, which is consistent with the principle established by the CCAMLR for toothfish and with the *Commonwealth Fisheries Harvest Strategy Policy*.

TABLE 28.3 History of the MITF

| Year | Description |
|--------------|--|
| 1994–95 | A single-vessel, exploratory demersal-trawl fishery began in the Aurora Trough. |
| 1995–96 | A continuing tag–recapture study initiated, forming the basis of stock assessment. |
| 1996–97 | A developmental trawl fishery established in the Aurora Trough. Fishing grounds on Macquarie Ridge discovered, with large catches of toothfish initially taken from a large aggregation. |
| 1999 | South-eastern quadrant of Macquarie Island region declared a marine park under the <i>National Parks and Wildlife Conservation Act 1975</i> . |
| 1999 to 2003 | Aurora Trough effectively closed to commercial fishing; fishing limited to a single licensed trawler to maintain tag-release and -recapture work and undertake experimental acoustic surveys. |
| 2003–04 | Commercial trawling in the Aurora Trough resumed. |
| 2007 | <i>Macquarie Island Toothfish Fishery Management Plan 2006</i> commenced in July, replacing the Macquarie Island Fishery Interim Management Plan. A 3-year longline trial commenced, primarily on the Macquarie Ridge grounds. |

Macquarie Ridge

In the absence of tag-based stock assessments, the control rule applied to the Macquarie Ridge has been to assume no recruitment to the fishery, and then reduce the previous season's estimate by the catch and one year of natural mortality.

28.3 THE 2008 FISHERY

In 2007–08, the total trawl catch in the Aurora Trough was 223 t (Fig. 28.2), at an average catch rate of approximately 10 t per km², which was lower than the catch rates of the previous four fishing seasons. Average daily catch rates were around 17 t per km² for the first nine days of fishing, but declined to an average of 5 t per km² before the vessel departed the ground. These catch rates were down from the 2006–07 average of 25 t per km². A single trawl shot on the Macquarie Ridge captured 0.06 t toothfish at a catch rate of 0.35 t per km².

Two observers tagged 317 toothfish in the Aurora Trough, and 46 tagged fish were recaptured, including one tagged in 1996–97. No toothfish were tagged or recaptured by trawl on the Macquarie Ridge (Tuck & Lamb 2008).

In August 2007, a single vessel completed the first year of the three-year longline trial, catching 79 t of an 86 t TAC. The trial was research oriented, with the vessel fishing as widely as possible along the Macquarie Ridge and exploring new areas as opportunity permitted. Two observers tagged 216 toothfish, and two tagged fish were recaptured. The second year of the trial was completed in July 2008 (the 2008–09 fishing season), catching approximately 148 t of a 150 t TAC. Observers tagged 465 toothfish, and 18 tagged fish were recaptured.

The gross value of production of the fishery is confidential (two active vessels).

28.4 BIOLOGICAL STATUS

PATAGONIAN TOOTHFISH

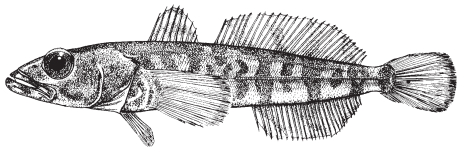


Table 28.4 Biology of Patagonian toothfish

| Parameter | Description |
|-----------------|--|
| General | Benthic-pelagic; slow growing, late maturing and with low reproductive capacity. Vulnerable to overfishing |
| Range | Marine plateaus and continental shelves of sub-Antarctic islands, 33–66°S |
| Depth | Shelf and upper slope, 300–2000+ m |
| Longevity | 30+ years |
| Age at maturity | 6.5–8 years, 70–110 cm TL |
| Spawning season | June–September |
| Size | Maximum: ~2 m TL (~100 kg) Recruitment into the fishery: 12–15 cm TL (size at which semi-pelagic juveniles become demersal), though toothfish <20 cm are rare in research or commercial catches |

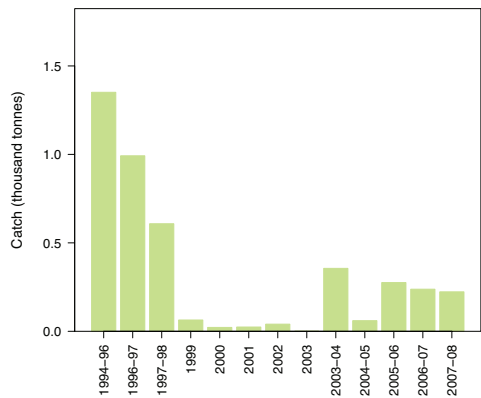


FIGURE 28.2 Patagonian toothfish catch history, 1994–96 to 2007–08

NOTE different administrative periods throughout history of the fishery.

Previous assessment

The MITF stock assessment has been based on data from the tag–recapture experiment initiated in 1995–96 and repeated on an annual basis. The assessment uses a population model that includes the dynamics of tagged and not-tagged fish, daily tag releases, tag recaptures, total commercial catches, an estimate of natural mortality and an estimate of the annual net change in available biomass between seasons. The assessment is limited to data from the trawl fishery, and separate assessments are conducted for the Aurora Trough and the Macquarie Ridge.

The 2007 assessment (for the 2007–08 fishing season) was conducted for the Aurora Trough only, because little fishing and no tagging had been conducted on the Macquarie Ridge since the 2005–06 assessment. The 2006–07 catch rates were indicative of a large available biomass, well above the limit reference point and a substantial increase on estimates for the preceding three seasons. An increase in the number of toothfish captured and a concurrent reduction in tag recoveries, possibly consistent with a large pulse in recruitment, contributed to the estimate. A TAC of 241 t was determined for the Aurora Trough for 2007–08.

A conservative TAC for the Macquarie Ridge was based on the 2005–06 assessment, taking into account the 2006–07 catch and an additional year's natural mortality, and

assuming no recruitment. A TAC of 86 t was determined for 2007–08, increasing to 228 t for the trawl fishery if catch rates exceeded 10 t per km² over three consecutive fishing days.

2008 update

The 2008 stock assessment was not completed before determination of the TAC in July 2008. A TAC of 390 t for the Aurora Trough was maintained for 2008–09 from the previous season, and a TAC of 150 t (with an increase to 198 t for the trawl fishery should catch rate thresholds be exceeded) was considered precautionary for the Macquarie Ridge. The completed 2008 assessments indicated that TACs of 312 t for the Aurora Trough and 75 t for the Macquarie Ridge would satisfy the control rules (Tuck & Lamb 2008). These assessments did not include data from the longline trial.

Although the 2008–09 TAC was not set in accordance with the control rule of the existing harvest strategy for the Aurora Trough, the level of available biomass is currently very high (approximately 94% of the 1995 available trawl biomass), and the stock was determined to be neither overfished nor subject to overfishing.

Reliability of the assessment

The tag-based assessment does not explicitly take into consideration the length frequency of the catch or standardised catch rates. Furthermore, because separate assessments have been conducted for the Aurora Trough and the Macquarie Ridge, movement of the stock between the grounds has not been taken into account to date. Because of very limited trawl activity and a lack of tagging data, there is no recent reliable assessment for the Macquarie Ridge, and there was no scientific basis for selecting 150 t as a precautionary TAC for the Macquarie Ridge in 2007–08. The selection of 150 t followed an approach adopted for the CCAMLR's new and exploratory fisheries.



Electronic measuring board, Patagonian toothfish

PHOTO: AFMA OBSERVER PROGRAM

TABLE 28.5 Quota latency in the MITF

| Area | Catch (tonnes) | | TAC (tonnes) | | Percentage of quota unfilled | |
|-----------------|----------------|------------|--------------|------------|------------------------------|-------------|
| | 2006–07 | 2007–08 | 2006–07 | 2007–08 | 2006–07 | 2007–08 |
| Aurora Trough | 238 | 223 | 241 | 390 | 1.2 | 42.8 |
| Macquarie Ridge | <1 | 79 | 100 | 86 | – | 8.1 |
| Total | 238 | 302 | 341 | 476 | 30.2 | 36.6 |

– = not applicable; TAC = total allowable catch

Future assessment needs

Recognising the limitations of the existing assessment method, a multigear, spatially explicit assessment, based on the Stock Synthesis 3 (SS3) model, is under development. This assessment will incorporate both trawl and longline catch and tagging data, accounting for different selectivities by fishing gear and between the main fishing grounds. Development of the SS3 assessment is due for completion in December 2010.

28.5 ECONOMIC STATUS

The Australian Bureau of Agricultural and Resource Economics has not conducted economic surveys of the fishery. The only available indicator of economic performance is the level of latency of quota. Between 2003–04 and 2006–07, the fishery's TAC for the Aurora Trough sector was close to filled. However, latency in quota for the Aurora Trough rose to 42.8% in 2007–08 (Table 28.5). The increase in quota latency in the fishery can be attributed to an increase in the TAC from 241 t in 2006–07 to 390 t in 2007–08, and a small decrease in catch, from 238 t to 223 t.

The TAC for the Macquarie Ridge was unfilled in 2006–07 because longlining, the only viable fishing method for this ground, was not permitted during the season. When longlining began in 2007–08, the TAC was close to filled.

Overall economic status

There was a small increase in latent quota in the MITF from 30.2% in 2006–07 to 36.6% in 2007–08. However, this small increase in quota latency was coincident with a 62% increase in the Aurora Trough TAC (to 390 t), and thus does not directly reflect economic performance. The low level of quota latency for the Macquarie Ridge suggests that economic returns in this part of the fishery are being generated; however, because the Macquarie Ridge TAC is small, latency as an indicator of economic performance is not highly reliable.

28.6 ENVIRONMENTAL ISSUES

Two observers have been present on all vessels since 1997–98. No seabird or marine mammal interactions have been observed in the trawl sector since 2003, and no wildlife interactions were observed in the first year of the longline trial in 2007. However, during the second year of the trial (July 2008, in the 2008–09 fishing season), a New Zealand fur seal was hooked through a flipper and later observed to swim away.

A catch limit of 200 t applies to all non-target species combined, with a 50 t limit on any one species. In July 2008 (2008–09 fishing season), skates were caught for the first time in the history of the fishery, in deep waters off the Macquarie Ridge outside the main fishing areas. Skates are a common byproduct of toothfish fisheries elsewhere, but were previously not thought to occur in the vicinity of Macquarie Island.

Patagonian toothfish was nominated for listing as a threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in 2008. In May 2009, the Minister for the Environment, Heritage and the Arts, on advice from the Threatened Species Scientific Committee, determined that toothfish was not eligible for listing. The Macquarie Island population of the grey-headed albatross (*Thalassarche chrysostoma*), which is currently threatened by habitat reduction caused by intense rabbit grazing on the island, has been nominated for listing as endangered under the EPBC Act. Although this and other albatross are vulnerable to capture in longline fisheries, the trial longline fishery operates in accordance with strict mitigation measures to minimise seabird bycatch. The MITF trial longline fishery operates under stricter mitigation measures than outlined by the Department of the Environment, Water, Heritage and the Art's threat abatement plan to reduce the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations.

Macquarie Island has not been subject to the intensive illegal fishing pressure experienced in the Heard Island and McDonald Islands or Antarctic waters regions, due largely to its remote location and the close proximity of the fishery to the inhabited island.

28.7 HARVEST STRATEGY PERFORMANCE

The harvest strategy for the Aurora Ridge trawl grounds has been used since the mid-1990s, pre-dating the *Commonwealth Fisheries Harvest Strategy Policy* (HSP). However, there is currently no formal harvest strategy for the Macquarie Ridge, which is likely to be an important fishing ground for the longline fishery in the future. Since a new multigear, spatially explicit assessment method is being developed for this fishery, a review of the existing harvest strategy and its application to the Macquarie Ridge should be conducted in the near future, taking into account the principles of the HSP.

28.8 LITERATURE CITED

- AFMA (Australian Fisheries Management Authority) 2003, *Antarctic Fisheries Bycatch Action Plan 2003*, AFMA, Canberra.
- DAFF (Department of Agriculture, Fisheries and Forestry) 2006, *Macquarie Island Toothfish Fishery Management Plan 2006*, DAFF, Canberra, Federal Register of Legislative Instruments F2006L00933.
- Tuck GN & Lamb T 2008, *Abundance estimation and TAC setting for Patagonian toothfish* (*Dissostichus eleginoides*) at Macquarie Island: 2008, report to the Sub-Antarctic Resources Assessment Group, Hobart, <www.afma.gov.au>.