



Australian Government

Department of the Environment and Heritage

Assessment of the
Macquarie Island Toothfish Fishery

November 2005

© Commonwealth of Australia 2005

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from the Commonwealth, available from the Department of the Environment and Heritage. Requests and inquiries concerning reproduction and rights should be addressed to:

Assistant Secretary
Marine Environment Branch
Department of the Environment and Heritage
GPO Box 787
Canberra ACT 2601

ISBN: 0 642 55213 4

Disclaimer

This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government Guidelines for the Ecologically Sustainable Management of Fisheries. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 10, 13 and 13A of the Environment Protection and Biodiversity Conservation Act 1999. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

While reasonable efforts have been made to ensure that the contents of this report are factually correct, the Australian Government does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this report. You should not rely solely on the information presented in the report when making a commercial or other decision.

**Assessment of the ecological sustainability of management arrangements for the Macquarie
Island Toothfish Fishery**

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
Background.....	4
Overall assessment.....	6
Recommendations.....	7
PART I - MANAGEMENT ARRANGEMENTS	9
Conclusion	11
PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES.	12
STOCK STATUS AND RECOVERY	12
<i>Maintain ecologically viable stocks.....</i>	<i>12</i>
Information requirements	12
Assessment	13
Management response.....	14
Conclusion	15
<i>Promote recovery to ecologically viable stock levels</i>	<i>15</i>
Conclusion	16
ECOSYSTEM IMPACTS	16
<i>Bycatch protection.....</i>	<i>16</i>
Information requirements	16
Assessment	16
Management response.....	17
Conclusion	17
<i>Protected species and threatened ecological community protection</i>	<i>17</i>
Information requirements	18
Assessment	18
Management response.....	18
Conclusion	19
<i>Minimising ecological impacts of fishing operations</i>	<i>20</i>
Information requirements	20
Assessment	20
Management response.....	21
Conclusion	21
LIST OF ACRONYMS.....	22

EXECUTIVE SUMMARY

Background

The Australian Fisheries Management Authority (AFMA) has submitted documents for assessment of the Macquarie Island Toothfish Fishery (MITF) under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 6 February 2003 the Minister for the Environment and Heritage (the Minister) signed an Agreement with AFMA to initiate the strategic assessment of the fishery. Following public consultation, the *Terms of Reference for the Environmental Assessment of the Macquarie Island Toothfish Fishery* were adopted. The documents: draft *Assessment Report Macquarie Island Toothfish Fishery* (the submission); and the draft *Macquarie Island Toothfish Fishery Management Plan* (the Plan) were received by the Department of the Environment and Heritage (DEH) in September 2005. The documents were released for a thirty-day public comment period that expired on 6 October 2005. One public comment was received. AFMA provided a response to the issues raised and amended the submission where necessary. A final submission for assessment was received on 28 November 2005.

AFMA advised DEH that the draft Management Plan will be submitted to the AFMA Board for endorsement at its 1 and 2 of December 2005 meeting.

The submission reports on the MITF against the Terms of Reference, including the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries* (the Guidelines). The DEH assessment considers the submission and associated documents.

Table 1: Summary of the MITF

Area	Waters surrounding Macquarie Island from 3 to 200 nautical miles outside the Macquarie Island Marine Park and World Heritage Areas.
Fishery status	The target species is considered fully fished.
Target Species	Patagonian toothfish (<i>Dissostichus eleginoides</i>).
Byproduct Species	No byproduct is targeted, however some of the bycatch is retained as a condition of operation and processed into fish-meal.
Gear	Demersal and mid-water trawling. Longlining and other methods may be considered at a future date.
Season	1 July to 30 June.
Commercial harvest 2003/04	Total Allowable Catch (TAC) set at 354 t for the Aurora Trough and 174 t for Macquarie Ridge.
Value of commercial harvest 2003/04	Commercial in Confidence.
Recreational harvest	None.
Commercial licences issued	1 licence issued under the Interim Management Policy
Management arrangements	Output controlled through a TAC. Input controlled through: <ul style="list-style-type: none">• limited entry;• gear restrictions; and• area closures.
Export	Exported primarily to the United States of America (USA), Japan and Asia.

Bycatch	Species specific bycatch limits of 50 t and limit of 200 t. Bycatch comprises 11.5% by weight of the catch and this includes a proportion of rocks, corals and other benthic organisms. Main species groups include rat tails (macrourids), lithoid crabs, antimura, coral and sponges.
Interaction with Threatened Species	Considered low. Possible interactions with seabirds, seals, and cetaceans.

The area of the fishery includes waters surrounding Macquarie Island from the 3 nautical mile boundary out to the 200 nautical mile outer boundary of the Australian fishing zone and excluding those areas classified as a Marine Park Highly Protected Zone (HPZ). Commercial fishing is only allowed in the areas flanking the HPZ subject to a permit from the Director of National Parks. Waters from the high tide mark out to 3 nautical miles are Tasmanian State waters, are closed to fishing and were classified in 2000 as a Nature Reserve under Tasmanian law.

There are two main fishing grounds, the Aurora Trough and the Macquarie Ridge which are approximately 40 nautical miles apart and managed as containing separate fish stocks.

The fishery targets the Patagonian toothfish (*Dissostichus eleginoides*). There are no species classified as byproduct by the fishery. However, under a retention policy some bycatch species that are considered not hardy enough to survive post-release, are retained and processed for sale.

The target species is found in sub-Antarctic waters on shelves around islands and submarine banks in depths of 300 to 2,000 m. The species is harvested in several trap or pot fisheries throughout its distribution. Patagonian toothfish reach sexual maturity between 70 and 95 cm in length at approximately 10 years of age. Reaching up to 2.2 m in length and 100 kg in weight, it is estimated that they live up to 50 years. Trawl operators target 4 -9 year old fish with an average size of 80 cm and 3.5 kg in weight.

The management of the MIT Fishery has been dynamic and responsive to the need for precautionary setting of TACs, reviewed and set annually, based on stock research and monitoring of the performance of the fishery. The fishery began in 1994 with one exploratory fishing permit issued by AFMA. In 1996 the AFMA Board determined that a single permit would be issued during a 3 year developmental phase. The TAC was set at 1,000 t of which no more than 750 t was to be taken from the Aurora Trough. In 1999 the TAC for the fishery was reduced to 600 t with a limit of 40 t research TAC for the Aurora Trough. For the 2005/06 season, the TAC for the Aurora Trough was reviewed and set at a precautionary 255 t.

Up to 97% of all Patagonian toothfish are exported mainly to the USA, Japan and Asian markets achieving a wholesale price of approximately \$12 kg.

The only fishing methods permitted on future commencement of the Plan are demersal and midwater trawling with gear and method restrictions to be implemented through Directions and Regulations made under the Plan. Current restrictions include minimum mesh size of 120 mm, a prohibition on the use of net monitoring cables and defined dimensions of bobbins and 'rock hopper' rubber disks. The DEH *Longlining Threat Abatement Plan* (TAP) requires that suitable mitigation measures be developed if longlining is to be considered as a permissible method in the vicinity of the island. In 2002, the TAP team, concerned about the potential impact of this method on the small Wandering albatross population on the island, recommended that longlining not be

developed within the Exclusive Economic Zone (EEZ) around Macquarie Island unless extensive mitigation trials elsewhere proved effective in reducing seabird bycatch to zero.

Bycatch in the MITF comprises approximately 11.5% of the total catch. This amount includes fish, a number of benthic organisms, as well as rocks. As a percentage of total catch weight the main bycatch species are coral/sponges, rat tails (*Macrourus spp*), crabs and blue antimora. In the MITF a combined bycatch limit of 200 tonnes applies. Bycatch levels are assessed under Principle Two of this report.

There is no recreational or indigenous take of Patagonian toothfish. Illegal, unreported and unregulated (IUU) fishing is considered to be widespread across the southern ocean, however it is not considered to be a significant issue for management of Patagonian toothfish stocks in the Macquarie Island region. This issue is further discussed in Part TWO of this report.

The fishery is managed under the *Fisheries Management Act 1991*. The Plan incorporates current management arrangements and is being finalised.

Overall assessment

The material submitted by AFMA indicates that the MITF operates in accordance with the Australian Government Guidelines. DEH considers that the MITF is a well managed fishery that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term. Recommendations have been developed to ensure that the risk of impact is minimised in the longer term. Overall, the sophisticated management regime of TAC for the target species and bycatch, limited entry, spatial management and gear restrictions suggests that the fishery is being managed in an ecologically sustainable way.

In making its assessment, DEH considers that the information collection system, risk assessments, management arrangements and objectives as outlined in the Plan are sufficient to ensure that the fishery is conducted in a manner that does not lead to over-fishing and that stocks are not currently overfished. Considering the research programs and management arrangements in place and the particular selective and benign characteristic of the fishery operations, DEH considers that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. Management of this fishery has a history of reacting appropriately to threats to sustainability and DEH is confident that AFMA will continue to provide this high quality management.

The assessment finds that the fishery is managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act. DEH recommends that the export of species taken in the fishery should be exempt from the export requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in 5 years. DEH considers that the fishery, as managed in accordance with the Plan would be unlikely to cause serious or irreversible ecological damage over this period.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

A number of seabird and mammal species are found in the area of the fishery. Protected species in the area of the fishery include, among others, fur seals, sea lions, elephant seals, penguins, petrels and albatrosses. However, the fishery has had only a small number of interactions with these species groups. The actual and potential impact on Part 13 species under the management

arrangements is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the Plan be declared an accredited management plan under sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the Plan relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the Plan requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the Plan, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

Part 10 of the EPBC Act requires that Commonwealth managed fisheries undergo strategic assessment to determine whether actions taken in the fishery have a significant impact on the environment in Commonwealth Marine Areas. Under this Part, the Minister may accredit a management plan to exempt actions taken in accordance with the management plan from further impact assessment approval.

DEH considers, *inter alia*, that there has been adequate assessment of the impacts that actions approved in accordance with the Plan have, will have or are likely to have on the marine environment. DEH also considers that actions approved or taken in accordance with the Plan will not have unacceptable or unsustainable impacts on the marine environment in a Commonwealth area. DEH therefore recommends that, in accordance with Part 10, the Plan be accredited under section 33 of the EPBC Act for the matter of national environmental significance “the marine environment”.

The assessment also considered the possible impacts on the World Heritage values of the Macquarie Island World Heritage area. There are no listed threatened ecological communities.

On this basis DEH considers that an action taken by an individual fisher, acting in accordance with the Plan, would not be expected to have a significant impact on the world heritage values of the Macquarie Island World Heritage Area.

To further strengthen the effectiveness of the management arrangements for the MITF, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. The implementation of these and other commitments made by AFMA in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 5 years time.

Recommendations

Recommendation 1

AFMA to advise DEH of any material change to the MITF management arrangements that could affect the criteria on which EPBC Act decisions are based, within 3 months of that change being made.

Recommendation 2

AFMA to identify and implement management responses to fishing impacts identified from the ecological risk assessment (ERA) process, with the timeframe for implementation commensurate with the level of risk identified by the era or other relevant research on target, byproduct, bycatch or protected species interactions.

Recommendation 3

AFMA to monitor interactions with protected species, in particular seabirds, to ensure that risk of interactions do not increase due to changes in the levels of effort, fishing capacity or methods such as additional boats entering the fishery or the use of longlines. In the event that risk levels increase or cumulative effects are detected then AFMA should develop and implement further mitigation measures as a matter of highest priority. In the event of an interaction occurring with a Critically Endangered species then additional mitigation measures should be immediately adopted to prevent further interactions.

Recommendation 4

AFMA to continue to pursue best practice in the mitigation of interactions with protected species by monitoring the effectiveness of mitigation measures, in all sectors, and implement where relevant, any new mitigation measures in the MITF that may be developed in other fisheries.

PART I - MANAGEMENT ARRANGEMENTS

The MITF is managed by AFMA. The management regime is described in the following documents, all of which are, or will be publicly available:

- The *Fisheries Management Act 1991*;
- The *Fisheries Administration Act 1991*;
- The *Macquarie Island Fishery Interim Management Policy*;
- The draft *Macquarie Island Toothfish Fishery Management Plan* (the Plan); and
- Relevant Gazetted notices and licence conditions.

A number of other documents, including research reports, scientific literature and discussion papers are integral to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the draft management plan and documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of the assessment and decisions stemming from it. Decisions resulting from this assessment relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

Recommendation 1:

AFMA to advise DEH of any material change to the MITF management arrangements that could affect the criteria on which EPBC Act decisions are based, within 3 months of that change being made.

Management of the fishery incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. DEH considers the level of consultation to be adequate and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

The Sub-Antarctic Fisheries Management Advisory Committee (SouthMAC) consists of an independent chair, representatives from AFMA, the Australian Antarctic Division (AAD), industry, conservation groups and the Tasmanian Department of Primary Industries and Water and Environment. The executive officer is provided by AFMA. DEH participates in a Permanent Observer capacity.

The Sub-Antarctic Resource Assessment Group (SARAG) advises SouthMAC on stock status and issues as required and includes representation from AFMA, AAD, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), industry, expertise based scientists and an economist from the Australian Bureau of Agricultural and Resource Economics (ABARE). Both SouthMAC and SARAG meet several times a year.

The fishery is managed according to the policy regime described in the Plan. This document contains a number of objectives relating to harvest of the target species, namely maintaining biomass and fish recruitment, managing commercial fishing interactions, sustaining yield and reducing incidental fishing mortality, providing socio-economic benefits to the community and providing high quality produce. Each objective has a number of management strategies.

Performance indicators and trigger points are specified in the policy document. An assessment of the effectiveness of these measures is included in Part Two of this report.

Management of the fishery is based on a mixture of input and output controls. Such controls include:

- a TAC;
- bycatch TAC;
- limited entry to three vessels at any one time with 1 licence current under the Interim Management Policy;
- gear restrictions; and
- area closures.

The Plan includes measures to monitor and ensure compliance with management arrangements. These include prior reporting when entering or exiting from the fishery; the requirement to carry an Integrated Computer Vessel Monitoring System (ICVMS); the presence of 2 observers on board all fishing trips; at port monitoring of all catch unloads; requirement to complete the toothfish Catch Documentation Scheme (CDS) paperwork and submission to AFMA of shot-by-shot daily logbooks. DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

The objectives contained in the Plan are included in the Plan which was released for public comment concurrently with the Submission and is scheduled to be endorsed by the AFMA Board by the end of 2005. The Plan incorporates provisions for its periodic review by AFMA and SouthMAC (no less than once every five years) and a process for its amendment if required. Research needs for the MITF are identified by the Antarctic Fisheries Five Year Strategic Research Plan which is reviewed annually by SARAG. This plan provides for the ongoing research towards the annual stock assessment and collection of biological and ecological data. DEH considers that a five year review of the entire fishery policy framework is suitable while critical aspects are reviewed annually through the stock assessment, and while AFMA continues to monitor for any adverse signals in the fishery. The annual reviews are discussed more fully in Part Two of this report.

Fishery-dependent data relating to the target species is collected on a regular basis in the fishery. Some fishery independent information is also collected. Discussion of the information collection system can be found in Part Two of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle Two of this report.

Patagonian toothfish are distributed across the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Convention area and waters to the north of the Antarctic convergence. Genetic data indicate the existence of a single Macquarie Island (MI) stock while tag and recapture trials have not recorded movement of fish between MI and Heard Islands and McDonald Island (HIMI) region. This lends to the theory that MI stocks tend to be restricted to specific areas with little or no interchange across large areas. Therefore foreign fishing effort outside the MI EEZ is unlikely to have an impact on MI stocks.

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action

strategies developed under that policy. DEH expects that AFMA will also ensure compliance with any future plans or policies as they are developed.

The MITF is outside the area of the CCAMLR Convention but is managed in a manner consistent with CCAMLR by AFMA. No other regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea (UNCLOS). The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the Submission, the fishery's compliance with their requirements can be assessed by examination of Part Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Under the EPBC Act, a person may not take an action that has, will have or is likely to have a significant impact on the world heritage values of a declared World Heritage (WH) property. People that are taking actions that are a lawful continuation of a use of land, sea or seabed, that was occurring immediately before the commencement of the EPBC Act, may continue to take those actions. An enlargement, expansion or intensification of a use is not a continuation of a use. The MITF operates outside the MI WH area. SouthMAC membership includes representatives from DEH and AAD which helps ensure the fishery operates in accordance with requirements of the World Heritage Convention 1972. For this reason, and the outcomes of the assessment as listed throughout Part Two of this assessment report, DEH considers that fishing activities as currently practiced in this fishery are unlikely to have a significant impact on the world heritage values of MI in the next five years. Any significant change to existing practices, which is likely to significantly impact on MI WH values, may require approval by the Commonwealth Minister for the Environment and Heritage.

Conclusion

DEH considers that the MITF management regime is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime takes into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements.

DEH considers that there is scope to further refine the management arrangements and has provided a recommendation for improvements in the longer term.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *‘A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover’*

Maintain ecologically viable stocks

Objective 1: *‘The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability’*

Information requirements

Fishery dependent data are obtained through compulsory logbooks with shot by shot catch and effort entries which include a weight estimate of each species caught per shot. AFMA requires that observers participate in all cruises and the observer program has collected information on over 90% of all trawl shots between 1999 and 2004 well above the 70% target of the program. Observers verify information from the vessel on shot by shot catch estimates and conversion ratios. Data collected on target and bycatch species on logbooks and by observers exceeds CCAMLR standards and is provided to both CSIRO and AAD for stock assessment and bycatch monitoring. Observers also collect biological samples from target and bycatch species and interactions with protected species. AFMA receives 10 day reports to allow for catches against TACs while under the Toothfish CDS, copies of reports are provided to CCAMLR. The ICVMS allows for the recording of precise information on the location of trawl shots. Operators are not permitted to discard fish or discharge fish waste and operators are required to account for and record every kilogram of Patagonian toothfish landed. Observers work with the crew to ensure that any portion of the catch not processed is also accounted for (discarding is discussed in greater detail under Principle Two of this report). DEH believes that data reliability for target species is reasonable and that compliance and enforcement activities have the capacity to ensure the ongoing reliability of data in the fishery.

Since the 1995/96 fishing season AAD has undertaken a tag and release research project with the aim of tagging 500 fish per year per fishing ground. This research program assists in estimating the populations of the main fishing regions of Macquarie Island. This independent data has strongly supported the fishery dependent data and suggest highly localised aggregations.

Biological oceanography data was collected from research surveys undertaken by the CSIRO vessel the “Southern Surveyor” in 1999 and in conjunction with the commercial fishing vessel “Austral Leader” collected extensive acoustic and trawl surveys.

Research needs for the fishery are identified in the Antarctic Fisheries Five Year Strategic Research Plan which is reviewed annually by SARAG. The research plan identifies future work in stock assessments, collection of fisheries and biological data as well ecological and economic assessment of the fishery.

DEH notes the high level of participation by the operator, in coordination with AAD, in research and monitoring.

Under the Plan, a Fishery Assessment Plan (FAP) will be developed each year which will support securing resources for ongoing fisheries independent monitoring. The FAP will also allocate

monitoring responsibilities to operators in accordance with their holdings of Statutory Fishing Rights (SFRs) to be allocated once the Plan is in force.

Overall, given the range of fishery dependent and independent data gathered by AFMA and the mechanisms for regularly reviewing the data requirements, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery. Continuation of existing data collections and research programs, combined with some extension and refinement of such activities through the implementation of the FAP will be important for the future management of the fishery.

Assessment

The submission states that the status of the fishery is assessed against the performance measures every year, using fishery dependent and independent information. These annual assessments are prepared by SARAG and submitted in the first instance to AFMA. The Plan requires that SouthMAC review the performance of the MITF once a year and AFMA must include in its report a statement of the extent to which the performance criteria were met for the fishery.

The primary management tool for the fishery is a yearly set TAC. An annual performance assessment of the fishery is conducted. The outcomes of the assessment are then used to determine the most appropriate TAC for the fishery.

Formal stock assessments have been conducted regularly since 1997 and incorporate information available from international fisheries operating in the sub-Antarctic. The assessments are in accordance with the precautionary approach adopted by CCAMLR in the mid 1990s. The objective is to maintain stocks at a sufficiently high proportion of its pre-exploitation abundance that avoids a decline in recruitment.

The assessment of MI toothfish stocks is based on data from tag-recapture research started in the 1995/96 fishing season. This research suggests that the assumption that the Aurora Trough and the Macquarie Ridge regions are distinct is correct based on the lack of detected movement between regions. Data collected through tag recapture is analysed by AAD and incorporated into the stock assessments conducted by CSIRO. CSIRO assessments are subject to review by SARAG. In turn SARAG and SouthMAC review TACs and endorse them to AFMA for approval before the start of the fishing season from July of each year.

It is considered that initial fishing pressure in the Aurora Trough may have been too high and has contributed to the decline in the stock. Estimates indicate a decline of 30% of pre-tagging available abundance during 1998 before increasing to over 50% by 2000 with a possible even greater decrease in Macquarie Ridge. The submission argues that the marked reduction in available biomass may have been due to emigration of a “transient” population exceeding immigration. However there is little evidence from tag recapture data to support this theory although AFMA highlights the broad scale toothfish migrations that have been detected in the Indian Ocean. Following consultation with SARAG, AFMA closed the Aurora Trough from 1 January 1999 to 30 June 2003 allowing only a research TAC of 40 tonnes each season to maintain the integrity of the tagging program. The Macquarie Ridge TAC was also reduced although the operator did not take the available amount due to low availability of the fish and economic constraints of operating in the region.

AFMA reopened the Aurora Through with a commercial TAC set at 354 tonnes for the 2003/04 season. A commercial TAC was not set in the following season as the model showed that the available biomass was less than the 66.5% of the initial biomass and a research quota of 60 tonnes was set and taken by the sole operator. Based on this data, the Aurora Trough was considered to be

above the minimum threshold of biomass and using the precautionary approach of harvesting 10% of the estimated available biomass adopted in previous years this would equate to an annual TAC of 255 tonnes for the 2005/06 season in the Aurora Trough. Due to limited information for the Macquarie Ridge in 2003/04, 2004/05 and 2005/06, TACs were set on the basis of previous assessments. For the 2005/06 the Macquarie Ridge TAC was set at 125 tonnes.

DEH notes that AFMA has established a formal process to review and set TACs based on an analysis of the performance of the fishery and tag recapture data collection and analysis.

In addition to tag recapture research, genetic studies have been conducted on the MI toothfish stocks. These indicated that MI toothfish are differentiated from those found at HIMI, and that these in turn were differentiated from toothfish found in Shag Rocks/South Georgia. New genetic data does not re-enforce the differentiation of stocks theory however, as precautionary measure, AFMA continues to manage the MI stocks and those from HIMI as separate stocks.

All removals in the fishery are accounted for through the requirement for operators not to discard fish or discharge fish waste and records must be kept of every kilogram of Patagonian toothfish landed. Independent validation is provided by observers required on all cruises. Observers monitor landed catches, collect factory records, compare estimated whole weights and back calculated whole weights and report on the accuracy with which the vessel maintains its logbooks and factory records. They also assist in recording any portion of the catch that is not processed in the usual way including damaged fish or that portion of the catch consumed by the crew which is also deducted from the TAC. Scientific records are kept of tagged fish which are not decremented from the stock TAC.

Landed fish is monitored by Fisheries Officers who must certify the accuracy of records. Observer reports indicate that industry reports have a high degree of reliability.

The CDS for *Dissostichus spp*, as required for all CCAMLR members, has been implemented since 2000. The CDS is designed to track landings and trade flows for all toothfish caught in the CCAMLR Convention Area and waters including MI. The CDS has been developed to also assist in identifying trade in IUU catch of Patagonian toothfish.

There has been only one reported incursion by a suspected IUU vessel into waters surrounding Macquarie Island. AFMA considers that the proximity of the fishing grounds to the island may help as a deterrent to IUU fishing. However, if IUU take develops then an estimate on the level of catch would be incorporated in the stock assessment process.

There is no known recreational or indigenous take of Patagonian toothfish or of any bycatch species and given the remote location of MI it is unlikely that any will develop.

DEH considers the ongoing catch data collection program and the verification process is an important component in providing confidence in the TAC.

Management response

The current Macquarie Island Fishery Interim Management Policy aims to maintain ecologically viable stock levels through a range of input and output controls. These measures are outlined in Table 1 and Part I of this report.

DEH considers that the combination of the input controls should ensure adequate protection of the target stocks, but notes that this is contingent upon the TAC being set at a sustainable level. DEH is concerned that there is still a degree of uncertainty on the level of IUU take.

The Plan includes objectives and performance criteria relating to the harvest of Patagonian toothfish and includes sustainable reference points below which population numbers must not fall. DEH notes that reference points are to be revised on a yearly basis to ensure that they are appropriate to maintain ecologically viable stocks.

The current regime includes a prohibition on the targeting of bycatch and any that is taken must be retained with the exception of some groups of sharks and rays which can be returned with a high probability of survival. Precautionary catch limits are set for retained bycatch on an annual basis. The retention of bycatch measure is to reduce the possible interaction with marine mammals and seabirds. All retained bycatch is processed into fishmeal or other products. AFMA monitors catch levels of all species taken in the fishery as the basis to determine bycatch limits.

The *Ecological Risk Assessment for Commonwealth Fisheries* (ERA) project being undertaken jointly by AFMA and CSIRO for the MITF (and other Commonwealth-managed fisheries) involves qualitative assessment of the risks to the sustainability of the fishery, biodiversity and the environment. This project will move towards a full quantitative risk assessment that includes modelling of risk management strategies based on levels of risk and uncertainty. DEH strongly endorses the ERA project as a significant tool to assist AFMA in achieving ecosystem based fisheries management, tailoring management measures to ensure those species identified as being at risk are given appropriate protection. DEH considers that the implementation of measures to mitigate high risks identified through the ERA must be a priority for management of the fishery, as well as reviewing and continuing with the Antarctic Fisheries Bycatch Action Plan (BAP).

Recommendation 2

AFMA to identify and implement management responses to fishing impacts identified from the Ecological Risk Assessment (ERA) process, with the timeframe for implementation commensurate with the level of risk identified by the ERA or other relevant research on target, byproduct, bycatch or protected species interactions.

Conclusion

DEH considers that the management regime in the MITF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH considers that the information collection system and stock assessment and management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a recommendation for improvement in the longer term.

Promote recovery to ecologically viable stock levels

Objective 2: *‘Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes’*

This objective is not applicable to the fishery at present. Reference points and management responses are in place to avoid the risk of overfishing toothfish off MI. As a result of the decline in stock abundance during the early stages of the fishery in the 1990s, the fishery was closed for a

period of 4 years with precautionary TACs established since then. A precautionary management strategy, aimed at rebuilding the stock abundance, is in place.

Conclusion

DEH considers that the MI Patagonian toothfish stock is not below a defined reference point but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stock would recover to ecologically viable stock levels within nominated timeframes.

Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

Information requirements

A comprehensive system is in place for the collection of information on bycatch caught in the MITF. Information is collected through the vessels' bycatch logbooks and on-board research programs. The master of the vessel is required to record information on bycatch on a shot by shot basis as well as any interaction with protected species in the compulsory logbooks and trained observers quantify and qualify the composition of bycatch.

Based on logbooks and observer reports considerable data has been collected on the nature of bycatch in the fishery. Bycatch constitutes a low proportion of the total catch by weight (11.5%) with an average 8.2% comprised of fish such as rat tails and other macrourids and invertebrates mostly large stone crabs. The majority of fish bycatch is of common and widespread species and therefore this level of take is not considered a threat to their populations locally.

The fishery has taken 55 sleeper sharks over a ten year period (1994 – 2004) of which 35 were released alive. A risk assessment in 2002 by AAD on sleeper sharks concluded that, at present catch rates, the risk to sleeper sharks in the HIMI and MI fisheries was not great. AFMA will continue to monitor and collect biological information and tag and release individuals.

The fishery dependent data collection program is considered robust. Validation of fishery dependent data is sound and the data collected is considered reliable. Reports from observers are considered highly reliable. The fishery has a strong history of using data and research findings to improve management when needed.

Assessment

AFMA has engaged CSIRO to conduct the project ERA. The MITF ERA is due to be completed by 2006 and will be a crucial step in the future management of bycatch and fishing impacts in the fishery.

The lack of information on sleeper sharks has been raised by SARAG as an issue requiring attention however AFMA has not indicated any proposals for additional research based on the risk assessment by AAD indicating that the current level of take was not serious.

SARAG monitors the level of catch of bycatch species to ensure that it is within the 200 tonne catch limit set for all finfish, crab, shark and ray species combined. Given the small number of species encountered the total of any generic bycatch limit applied to each species (such as the 50 t limit per species applied by CCAMLR) is unlikely to exceed the 200 t total bycatch limit. To date the largest amount of bycatch taken in one year for all species has been 34.2 t. AFMA stresses that SARAG will continue to review bycatch annually with the aim of developing specific bycatch limits based on population assessments.

Management response

The prohibition on targeting bycatch species (e.g anything except Patagonian toothfish) is the principal approach to maintaining bycatch take in the fishery to a minimum. In addition to this there is a catch limit for all types of bycatch set at 200 t, which if reached, triggers a closure of the fishery for the remainder of the season. Further, AFMA points out that the limit of a maximum of three boats in the fishery is an important factor in limiting bycatch.

Additional measures include gear restrictions such as minimum mesh sizes to preclude the capture of undersized toothfish and of small bycatch species, bobbin diameter and rubber disk sizes to reduce the catch of sessile benthic organisms, the prohibition on discharge of offal to prevent the attraction of bycatch species to the area and the return of shark and skates as soon as practicable to reduce mortality.

Due to the low level of bycatch in the fishery and the high reliability of observer reports on bycatch take it has not been considered necessary to develop or focus on a specific group as indicator species, rather all bycatch species are monitored.

Logbook data, observer reports and information from research in the fishery is reviewed by SARAG in order to detect changes to trends in bycatch species' composition and abundance. AFMA considers that due to the low level of bycatch no specific indicators are required at this time however, AFMA has committed to review bycatch management arrangements if the take of bycatch species reaches 50% of the precautionary catch limit. The BAP outlines objectives and strategies being undertaken in relation to bycatch management and reduction for the fishery. The MITF ERA will help identify risks for bycatch in the fishery and it is expected that AFMA will introduce appropriate management response to any risks identified.

There are no listed ecological communities in the fishery area.

Conclusion

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change or a risk assessment process indicate otherwise, DEH expects that AFMA would undertake appropriate actions to ensure that bycatch species are not threatened by this fishery.

Recommendations have been developed to ensure that the risk of unacceptable impact on bycatch species is detected and minimised in the longer term.

Protected species and threatened ecological community protection

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

Information requirements

Information on interactions with protected species is collected by operators who must submit a report to AFMA within 24 hours and in turn AFMA notifies DEH within 7 days of the receipt of that report. Observers are also required to submit an independent report to AFMA and where possible freeze the specimen for later analysis by AAD.

Observers monitor the deployment and retrieval of the trawl gear and quantify any interactions with seabirds or marine mammals in addition to taking counts of seabirds and mammals within 300 m of the vessel during each observation period. The prevailing environmental conditions are also recorded and this information is forwarded to AAD for analysis.

To date there has been only 4 recorded interactions with protected species in the MITF. A dead elephant seal was landed in 1997 and was in a state of decomposition and therefore unlikely to have been killed because of fishing activity. The remaining interactions with seabirds resulted in their death or injury and there is doubt whether these incidents were caused by the fishing gear or with the boat.

Assessment

AFMA quotes a review by Wienecke and Robertson (2000) of observed interactions in the HIMI fishery which concluded that, at current level of fishing operations, harmful interactions between wildlife and fishing gear were considered rare and the physical risk to seabirds and seals minimal, as evidence that at the lower level of activity in the MITF this conclusion would also apply. SARAG routinely assess any interactions in the fishery and has also indicated that there are no immediate risks to seabird or mammal populations. DEH notes that the MITF ERA will also identify any sustainability risks to protected species.

There are no listed ecological communities in the fishery area. The MI region is an important habitat for five species of seals and 38 species of seabirds, a number of which are listed under State and Commonwealth legislation and/or in the International Union for the Conservation of Nature (IUCN) Red List Criteria. The MI Marine Park, straddling the south-eastern quadrant of the island, also has three IUCN categorised areas including a HPZ and two Habitat/Species Management Zones.

Management response

There are a number of measures in place under the current management regime, or to be introduced under the MITF Plan, to manage the impact of the fishery on protected species. Specific gear (e.g. prohibition of net sonde cables) and operational restrictions (e.g. nil offal discharge, minimum light level guidelines) are in place. In addition to gear restrictions and other specific measures under regulations, the MITF Plan requires operators to take reasonable measures to ensure that the catch of non target species and impacts on the environment are kept to a minimum. The *Recovery Plan for Albatrosses and Giant Petrels* developed under the EPBC Act will apply to operators in the MITF.

Since 1997 the MITF has only had 4 interactions with protected species. One in the form of hauling a dead elephant seal (decomposition had begun and therefore its death can not be attributed to fishing); two with Prion birds observed on deck with broken wings and one of a desiccated petrel next to the engine exhaust.

Of particular concern is the potential risk of interactions with seabirds including Wandering, Black browed and Grey headed albatross and Blue petrels. Both the Wandering albatross and the Blue

petrel are classified as Critically Endangered under the IUCN criteria while Black browed and Grey headed albatross are classified as Vulnerable. The populations of these seabirds at MI are very small and even very low levels of human induced mortality may be unsustainable, for those species classified as Critically Endangered, for example the population of Wandering albatross is made up of only fifty mature individuals of which approximately only a third reproduce each year. Since mitigation measures have been implemented, there has been no interaction with the seabirds. However, this situation may change if the fishery is allowed to expand to its maximum of three vessels or if new types of gear are introduced. DEH considers that the high level of observer coverage in the fishing fleet will continue to provide valuable data on interactions and if any increase in interactions with protected species is detected AFMA should, in conjunction with the SARAG, the SouthMAC, the TAP Working Group and DEH, review the adequacy of current mitigation measures and, as appropriate, develop and implement additional mitigation measures before the start of the following fishing season. In the event of an interaction occurring with a Critically Endangered species, additional mitigation measures should be immediately adopted to prevent further interactions.

Recommendation 3

AFMA to monitor interactions with protected species, in particular seabirds, to ensure that risk of interactions do not increase due to changes in the levels of effort, fishing capacity or methods such as additional boats entering the fishery or the use of longlines. In the event that risk levels increase or cumulative effects are detected then AFMA should develop and implement further mitigation measures as a matter of highest priority. In the event of an interaction occurring with a Critically Endangered species then additional mitigation measures should be immediately adopted to prevent further interactions.

Recent interactions resulting in the death of Black browed albatrosses and White-chinned petrels (both EPBC listed threatened migratory birds) in the HIMI fishery has resulted in prompt modification of trawl fishing practices by the operator to minimize the level of risk or re-occurrence. It is therefore important that AFMA continue to pursue best practice in the mitigation of interactions with protected species by monitoring the effectiveness of mitigation measures, in all sectors, and implement where relevant, any new mitigation measures in the MITF that may be developed in other fisheries.

Recommendation 4

AFMA to continue to pursue best practice in the mitigation of interactions with protected species by monitoring the effectiveness of mitigation measures, in all sectors, and implement where relevant, any new mitigation measures in the MITF that may be developed in other fisheries.

Conclusion

DEH notes that interactions with protected species in this fishery are minimal and considers that the fishery is conducted in a manner that avoids mortality of or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities. Should this situation change or a risk assessment process indicate otherwise, DEH expects that appropriate actions will be undertaken to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

Recommendations 3 and 4 have been developed to ensure that the risk of unacceptable impact on protected species is minimised in the longer term.

Minimising ecological impacts of fishing operations

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

Information requirements

A range of data has been collected in the MITF since its establishment in the mid 1990s. Information collected includes spatial and temporal distribution of catch and effort, habitat and community distribution, sediment types and distributions, benthic dredge surveys, environmental information, acoustic data and diet information for target species and bycatch fish, shark and ray species. Considerable work has also been undertaken on the quantification of environmental interactions including seabirds and mammals.

Catches of benthic organisms and substrate are recorded and quantified by observers with the aim of achieving 70% coverage of all trawl shots. Collected samples are forwarded to AAD and CSIRO as a valuable source of information. Current understanding of the distribution of benthic invertebrates mostly stems from a survey undertaken in 1999 which highlighted the complexity of the MI assemblage.

AFMA indicates that in addition to environmental and fishery data collection observers report on compliance by domestic vessels with MARPOL and additional waste management requirements under MITF Plan.

DEH is concerned at the lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

Assessment

As part of the information required for the management of MITF, AFMA collects for analysis information on predators, prey and the environment. AFMA considers that this methodical approach to collection and analysis of data informs management decisions such as the setting of biological reference points for the target species which include a minimum escapement of biomass allowing not only for reproduction but also to allow trophic interactions within the food chain in the MI region.

AFMA considers that the impacts to the benthic communities, by physical contact of trawl fishing, are not significant due to the limited area of operation of the fishery (1% of the MI EEZ) in comparison to the size of the MI Marine Park (34.5 % of the MI EEZ); the low percentage of bycatch (11% of catch by weight) and trawl gear restrictions designed to minimize impact on the sea floor. AFMA recognizes that the majority of the MI EEZ is not trawled because it is unsuitable trawl ground and that operators tend to focus on areas known to hold assemblages of the target species. Concerns exist that this concentration of effort into trawlable areas may in effect be compounding the impact on the benthos in the form of potential localised depletion or longer term impacts on slow growth sessile invertebrates. A benthic survey conducted in 1999, revealed a mostly barren seabed with sparse benthic fauna inhabiting a predominantly rocky and steep substrate with species that are likely to have a wide distribution. However, sediment filled valleys are targeted by trawlers and the impacts on species that occupy this kind of muddy substrate are not well understood. DEH understands that this issue will be considered by the MITF ERA however AFMA should consider collecting data to inform this process especially in the event that effort increases through the entry of additional boats into the fishery.

AFMA refers to the findings of the report “Ecologically sustainable development of the fishery for Patagonian toothfish (*Dissostichus eleginoides*) around Macquarie Island” by He et al, 2001¹, that indicate that the impact of MITF on food chains and the wider ecology is low due to the low overlap between toothfish and other predators in the environment and between the fishery and other marine predators such as seals and seabirds. AFMA notes that in spite of the indications on level of overlap, these types of interaction in the food chain are considered in setting precautionary catch limits. DEH supports this approach and recommends that the MITF research development plan incorporate this as an area of research if the MITF ERA identifies areas of potential risk in the food chain links.

Discharge of offal from the vessel as well as brassicas and poultry products is prohibited and operators must comply with MARPOL requirements on waste disposal minimising any potential impact on water quality in the region or the risk of disease outbreaks.

Management response

AFMA has implemented a range of management measures that minimise the risk of significant impact of fishing on ecosystems and their components. Most management measures were established to protect target species and their habitats, although some actions are specifically designed to protect the broader environment. Further work to improve management of ecosystem impacts is also proposed.

AFMA recognises the unique environment in which the MITF operates and has implemented a number of specific management measures that complement CCAMLR’s ecosystem management principles. In addition to a comprehensive management regime for the fishery, the MI region receives further buffering from any potential impacts from the MITF from the extensive areas closed to fishing classified as reserves or Marine Parks. Limited entry into the fishery, to a maximum of 3 boats, is considered an important limitation to the amount of bycatch and the impact of fishing on benthic communities.

Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL legislation. Operators are required to comply with the legislation and must retain any plastic waste and dispose of it only when the vessel returns to port.

The MITF industry and AFMA have a history of addressing sustainability and impact issues in the fishery. Their record of incorporating research results into management is excellent. DEH is confident that the fishery will continue to be managed in a manner that aims to minimise ecosystem and broader environmental impacts.

Conclusion

DEH considers that the fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally.

¹ He, Xi; A. and D.M. Furlani Eds. 2001. Ecologically sustainable development of the fishery for Patagonian toothfish (*Dissostichus eleginoides*) around Macquarie Island: Population parameters, population assessment and ecological interactions.

LIST OF ACRONYMS

AAD	Australian Antarctic Division
ABARE	Australian Bureau of Agricultural and Resource Economics
AFMA	Australian Fisheries Management Authority
BAP	Antarctic Fisheries Bycatch Action Plan
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources (also refers to the Commission)
CDS	Catch Documentation Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry.
DEH	Department of the Environment and Heritage
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Ecological Risk Assessment for Commonwealth Fisheries
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organisation
FAP	Fishery Assessment Plan
HIMI	Heard Island and McDonald Islands
HPZ	Highly Protected Zone
ICVMS	Integrated Computerised Vessel Monitoring System
IUCN	International Union for the Conservation of Nature
IUU	Illegal, unreported and unregulated fishing
MAC	Management Advisory Committee
MARPOL	International Convention for the Prevention of Pollution from Ships
MI	Macquarie Island
MITF	Macquarie Island Toothfish Fishery
SARAG	Sub-Antarctic Resource Assessment Group

SouthMAC	Sub-Antarctic Fisheries Management Advisory Committee
SFRs	Statutory Fishing Rights
TAC	Total Allowable Catch
TAP	Threat Abatement Plan for the Incidental Catch (or Bycatch) of Seabirds during Oceanic Longline Fishing Operations
UNCLOS	United Nations Convention On The Law Of The Sea
USA	United States of America
WH	World Heritage
WHA	World Heritage Area
WTO	Wildlife Trade Operation