



Assessment of the
Heard Island and McDonald Islands Fishery
for the purposes of
Part 10, Part 13 and Part 13A
of the
*Environment Protection and Biodiversity Conservation
Act 1999*

**Marine and Water Division
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This document is an assessment carried out by Environment Australia of a commercial fishery against the Commonwealth's 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 EPBC. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Commonwealth Government.

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Assessment of the ecological sustainability of management arrangements for the Heard Island and McDonald Islands Fishery

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Executive Summary

Background

The Australian Fisheries Management Authority (AFMA) has submitted a document addressing the *Terms of Reference for the Environmental Assessment of the Heard Island and McDonald Islands (HIMI) Fishery* for assessment under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 31 May 2001, the Minister for the Environment and Heritage (the Minister) signed an Agreement with AFMA for the strategic assessment of the HIMI Fishery. Following public consultation, draft Terms of Reference for the fishery were adopted for the strategic assessment. The draft *Strategic Assessment Report – Heard Island and McDonald Islands Fishery* and the draft *Heard Island and McDonald Islands Fishery Management Plan 2001* (the draft Plan) were released for public comment on 1 September 2001. The public comment period ended on 1 October 2001 with a number of substantial submissions received, which prompted amendment of the Strategic Assessment Report. A final *Assessment Report – Heard Island and McDonald Islands Fishery* (the submission) and the draft Plan were submitted for assessment on 19 December 2001. This document reports on the assessment of the HIMI Fishery against the Terms of Reference, including the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*.

The fishery operates in sub-Antarctic waters adjacent to Heard Island and the McDonald Islands. The Islands are listed on the Register of the National Estate as the only unmodified example of a sub-Antarctic island ecosystem. In addition, the Islands and the 12 nautical mile territorial sea around them, are on the World Heritage List and form part of the Heard Island Wilderness Reserve. In recognition of the Islands' importance, fishing is prohibited within 13 nautical miles of the Islands, providing a buffer zone of one nautical mile. The fishery extends from 13 nautical miles offshore to the edge of the 200 nautical mile Australian Economic Exclusive Zone (EEZ) around the Islands. The fishery lies in Statistical Division 58.5.2 of the area of application of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), which has a strong influence over the management of the fishery.

The HIMI fishery targets Patagonian toothfish (*Dissostichus eleginoides*) and mackerel icefish (*Champsocephalus gunnari*) in water depths of up to 1000 metres. Patagonian toothfish are targeted using demersal trawl methods, whilst demersal and midwater trawl methods are used to target mackerel icefish. Patagonian toothfish is also fished using longline methods in other jurisdictions and on the High Seas, and is heavily targeted by illegal, unreported and unregulated (IUU) fishers.

The number of operators in the fishery at any one time is restricted to three. Statutory Fishing Rights (SFRs) govern access to the fishery with each operator requiring a minimum quota holding of 25.5 % of the total number of SFRs. The fishing season extends from 1 December to 30 November each year and has been in operation since 1997 when exploratory fishing in the region began.

The HIMI Fishery is currently managed under the *Fisheries Management Act 1991* and the *Heard Island and McDonald Island Fishery Management Policy 1998-2000* (extended to November 2001) pending the adoption of the draft *Heard Island and McDonald Islands Management Plan 2001*. On 1 December 2001, AFMA implemented management arrangements, which mirror those proposed under the draft Plan through a system of fishing Permits. The draft Plan defines clear objectives, has established performance criteria and provides for a regular review of the Plan and its elements. The draft Plan is supported by a range of instruments including regulations, conditions on SFRs and management Directions. The management regime is based around an annually set total allowable catch, bycatch limits and move-on provisions, a range of input controls and a vessel monitoring system and catch documentation scheme. CCAMLR Conservation Measures are a minimum requirement under the draft Plan and the HIMI management regime incorporates additional measures.

The strong influence of CCAMLR provides a sound management platform and access to high level, internationally scrutinised assessments of the fishery and its target species. This element, combined with the fishery dependent and independent data collected by industry and AFMA, provides sound capacity for monitoring and assessment of the target species and ecosystem sustainability.

Bycatch in the HIMI Fishery is relatively low, especially for a trawl fishery, and a range of measures to minimise bycatch has been implemented. The principal bycatch species are grey rock cod (*Lepidonotothen squamifrons*), unicorn icefish (*Channichthys rhinoceratus*) and *Macrourus* species. Other bycatch species include skates and rays, sleeper sharks, cephalopods, jellyfish and other marine invertebrates.

Overall assessment

This assessment is conducted on the basis that the HIMI Fishery is a trawl fishery and comments only on the extent to which the fishery currently impacts on target and non-target species, and the broader marine environment. As different fishing methods have different types and levels of impact on the marine environment and its components, a change in fishing method would require an assessment of the environmental impact of such a change.

The material submitted by AFMA for assessment of the HIMI Fishery suggests the fishery is well managed and operates in accordance with the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*.

The management regime is considered sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery, whilst ensuring the stocks are fished sustainably. The management regime ensures that removals of the target species are sustainable and there are mechanisms in place to ensure that stock levels do not fall below a defined reference point. The draft Plan also contains a series of performance measures, performance criteria against which these measures may be assessed, and environmental requirements of individuals operating in the fishery. These elements of the draft Plan are crucial to the overall environmental performance of the fishery and strongly influenced the ecological assessment of this fishery.

The HIMI Fishery is conducted in a manner that poses only limited risk to bycatch species, protected species and the broader marine ecosystem. Whilst current bycatch levels are low by weight there is some uncertainty as to the impacts of the fishery on bycatch species, in particular sleeper sharks, skates and rays, and benthic communities. Environment Australia (EA) considers that the management arrangements in place are sufficiently precautionary and work is ongoing to further minimise the overall risk to bycatch species. Interaction with protected species is minimal and there are some measures in place to minimise the impact of trawling on benthic communities and the marine environment. The combination of management arrangements, data gathering and proposed research, provides confidence in the fishery's ability to maintain low bycatch levels and minimise interaction with protected species and the ecosystem.

IUU fishing for Patagonian toothfish is the most significant risk to the long term sustainability of the fishery. The issue extends well beyond the boundaries of the HIMI Fishery and the very nature of IUU fishing means it cannot be resolved through management arrangements in this fishery alone. AFMA, and other Commonwealth Government agencies, currently address the issue to the best of their ability and work is ongoing at the national and international level to combat IUU fishing in the region. EA strongly supports the maintenance of current strategies and urges AFMA and other agencies to remain diligent in their pursuit of measures to combat IUU fishing in the region.

The impact of trawling on benthic communities is considered a medium level ecological risk for the fishery. Fundamental to the assessment of the HIMI Fishery is the degree to which management arrangements can minimise this risk. Current management arrangements provide some benthic habitat protection. Establishment of a substantial Category IA Marine Protected Area (MPA) in the HIMI region is fundamental to the assessment of the ecological sustainability of the fishery. The Commonwealth Government is currently running a process to establish a large Category IA MPA in the HIMI area. The establishment of an MPA would be a substantial step in the precautionary management of the region, minimise the risk of significant impact on the benthos, provide reference areas for ongoing impact monitoring, and afford added protection to land-based predators and protected species.

EA strongly supports the range of management initiatives currently in train aimed at minimizing the environmental impacts of fishing in the HIMI Fishery. With the exception of the risks identified above, there are no other major risks associated with the HIMI Fishery. In light of this, EA believes that completion of current management, research and bycatch mitigation activities should be a priority. The assessment report identifies a number of key areas requiring ongoing attention focusing on ensuring continuation of good management practices.

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. 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. The submission adequately addresses all aspects of the *Terms of Reference for the Environmental Assessment of the Heard Island and McDonald Islands Fishery* and provides a comprehensive account of the

impact of the fishery on the marine environment. EA is satisfied that there has been an adequate assessment of the impacts that activities taken in accordance with the management regime, have, will have or are likely to have, on the marine environment. EA considers that actions taken in this fishery will not have an unacceptable or unsustainable impact on the marine environment. It is therefore recommended that the draft *Heard Island and McDonald Islands Fishery Management Plan 2001* be accredited under section 33 of the EPBC Act.

As the fishery operates in Commonwealth waters, consideration under Part 13 of the EPBC Act is required *vis-a-vis* the impact of the fishery on threatened species, migratory species, cetaceans and listed marine species. Assessment of the impact on protected species considered the entire HIMI Fishery management regime, including the management plan, regulations, permit conditions and the sub-Antarctic Fisheries Bycatch Action Plan (BAP).

A number of protected species occur in the fishery area. However, the fishery has minimal interaction with these species and the impact on Part 13 species is considered low. There is adequate protection afforded Part 13 species in the HIMI Fishery. Active management of seabird and marine mammal bycatch and fishery interactions have been effective in minimising the risk to these species. As all reasonable steps are taken to avoid the killing or injuring of protected species, and the fishery is unlikely to have significant impact on the species, a declaration under sections 208A, 222A, 245 and 265 of the EPBC Act would be appropriate. Such a declaration would serve to accredit the HIMI Fishery management plan and provide individual fishers, operating in accordance with the plan, with an exemption from permit requirements if they are at risk of taking or injuring listed species in Commonwealth waters.

The assessment also concludes that the HIMI Fishery is managed in an ecologically sustainable way. As a consequence, it is recommended that the export of products from this fishery, including Patagonian toothfish (*Dissostichus eleginoides*), mackerel icefish (*Champsocephalus gunnari*), grey rock cod (*Lepidonotothen squamifrons*), unicorn icefish (*Channichthys rhinoceratus*) and *Macrourus* species, should be exempt from the export controls (Part 13A) of the EPBC Act for a period of up to five years.

The HIMI Fishery is managed under a comprehensive, adaptable, precautionary and ecologically based regime. To further strengthen the effectiveness of the management arrangements for the HIMI Fishery, and to contain the environmental risks in the medium to long term, a series of recommendations have been developed. The implementation of these recommendations and other commitments made by AFMA in the submission will be reviewed as part of the next Commonwealth review of the fishery in five years time.

Recommendations

- AFMA, in conjunction with other relevant agencies, is investigating the extent to which the HIMI Fishery and neighboring Island groups, including Iles Kerguelen, share a single, or straddling, Patagonian toothfish stock. Completion of this work should be a high priority. In the event that a shared, or straddling, stock is confirmed, AFMA should ensure that the HIMI Fishery stock assessment of the species will take into account removals from neighboring areas with which the HIMI stock is shared.
- AFMA, in conjunction with other relevant agencies, is conducting risk assessments of sleeper shark, skates and rays. Completion of this work should be a high priority. Investigation of potential bycatch mitigation strategies in conjunction with this research should be undertaken. In the event that significant risks are identified, AFMA should implement appropriate mitigation measures.
- Prior to the introduction of longlining in the HIMI Fishery:
 - suitable seabird bycatch mitigation measures will be developed in accordance with the Threat Abatement Plan, for implementation by AFMA;
 - AFMA will conduct an evaluation, limited to assessing the deleterious effects of longlining on the environment; and
 - approval for the introduction of longlining from the Minister for the Environment and Heritage will be obtained.
- AFMA is monitoring seal interactions, with a view to determining if seals are beginning to habituate to the fishing vessels. In the event that seal interactions increase, AFMA should review existing mitigation measures and implement appropriate responses in a timely manner.

Part I - Management arrangements

The HIMI Fishery is managed by the Australian Fisheries Management Authority (AFMA). The fishery has been managed under a range of management policies since its inception and has been continually improved over time. The overall objectives of the *Fisheries Management Act 1991* form the basis for the management of all Commonwealth fisheries. Access to the HIMI fishery was first allowed through fishing and scientific permits issued under the *HIMI Exploratory Fishery Interim Management Policy November 1996 to August 1997*. This policy was replaced in 1998 by the *HIMI Fishery Management Policy 1998 to 2000*, which was later extended to November 2001. The current management regime for the fishery includes the draft *HIMI Fishery Management Plan 2001* (the draft Plan) and its supporting framework of regulations, permit conditions and directions. The draft Plan is being assessed in conjunction with the assessment report and once finalised will become the formal statutory fishery management plan under which the HIMI Fishery operates.

Management of the HIMI Fishery is also subject to the Conservation Measures set by the Commission established under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). Australia's international obligations under the Convention require that the HIMI Fishery is, as a minimum, managed in accordance with these measures but AFMA may impose additional measures.

The management regime is publicly available and has been developed through extensive public consultation processes that provided sufficient opportunity to all interested and affected parties. The regime was developed through the sub-Antarctic Management Advisory Committee (SouthMAC) who provides management advice to the AFMA Board and Environment Committee. Representatives on SouthMAC include individuals from industry, conservation groups, scientists, the Tasmanian Government, the Australian Antarctic Division (AAD) and AFMA. Environment Australia (EA) provides a permanent observer to this Committee. The HIMI Fishery stock assessment process is reviewed by the sub-Antarctic Fisheries Assessment Group (SAFAG) who provide advice to SouthMAC. SAFAG includes representatives from government, conservation groups, industry and the scientific community. The draft Plan and Strategic Assessment Report were subject to a 30-day public consultation period and SouthMAC has remained involved throughout the process.

The management regime contains clear objectives for the management of the fishery and identifies performance criteria by which the effectiveness of the management arrangements are measured. The management objectives provide for the protection of target species, bycatch species and the broader marine environment, and adequately address the objectives of the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*. The draft Plan also contains a series of performance measures, performance criteria against which these measures may be assessed, and environmental requirements of individuals operating in the fishery. These elements of the draft Plan are crucial to the overall environmental performance of the fishery and strongly influenced the ecological assessment of this fishery.

The draft Plan is subject to a full review at least every five years to determine the effectiveness of the objectives and performance measures. The extent to which the

performance criteria are met is reviewed annually by AFMA and SouthMAC. The strong links to CCAMLR also ensure that a number of key management arrangements are reviewed at CCAMLR's annual meeting.

The management arrangements for the HIMI Fishery provide for the establishment and implementation of a range of measures aimed at achieving and maintaining ecological sustainability. The fishery is managed under a comprehensive system of input and output controls capable of controlling the level of managed take of the target and non-target species, including:

Input controls

- maximum number of vessels accessing the fishery at any one time restricted to three through a system of minimum quota holdings, that is, to access the fishery, operators must have a minimum quota holding of 25.5 % of the total number of statutory fishing rights.
- move-on provisions for bycatch species.
- mesh size restriction for trawl nets.
- other bottom gear restrictions.

Output controls

- annually set and reviewed total allowable catches (TACs) for Patagonian toothfish and mackerel icefish divided among Statutory Fishing Right (SFR) holders in proportion to their holdings for each species.
- catch limits for all fish bycatch species.
- once 50% of the catch limit for any one non-target species is taken, AFMA will review the operating practices of SFR holders.
- carryover provision for Patagonian toothfish - each operator may inadvertently exceed their catch by 20t. Any overcatch will be carried into the subsequent fishing year and deducted from that operator's quota, prior to the allocation of quota for the new fishing season. The disincentive to overcatch in one year is that two kilograms will be deducted from the operator's quota allocation the next year for every one kilogram (up to the maximum of 20 tonnes) taken as overcatch.

Whilst the management regime is capable of controlling the activities of licensed operators in the fishery, there are significant concerns about the impact of illegal, unreported and unregulated (IUU) fishing on the HIMI Patagonian toothfish stocks. The management regime ensures that the best estimate of IUU catch is factored into the stock assessment process. In the event of indications that IUU catch has led to the stock falling below one or more of the biological reference points, the stock assessment process would result in the prescription of a zero total allowable catch for toothfish, but the nature of IUU fishing means these estimates may have wide confidence limits. This issue and its implications are discussed in greater detail under Principle 1 of the Guidelines.

The HIMI Fishery has a sound stock assessment process underpinned by species specific precautionary biological reference points. The stock assessment process is conducted annually by CCAMLR and adopted by AFMA for the HIMI Fishery. Precautionary biological reference points are used in calculating the TAC for each

target species and are designed to maintain stock at a proportion of its median pre-exploitation abundance and ensure the longterm sustainability of the species.

Adequate measures to address compliance and enforcement of management arrangements are in place for the HIMI Fishery. These measures include:

- mandatory reporting when entering and exiting the fishery;
- mandatory use of an Integrated Computerised Vessel Monitoring System (ICVMS), providing real time surveillance of fishing activity;
- mandatory carriage of two observers on board on all voyages;
- completion of shot-by-shot daily logbooks and provision of those data to AFMA and AAD;
- at port monitoring of all catch by an independent officer; and
- completion of the toothfish Catch Documentation Scheme on unloading and export of all toothfish product.

EA is confident that the compliance and enforcement measures in the HIMI Fishery are effective and sufficient.

The management regime is capable of assessing, monitoring and avoiding any adverse impacts on the wider marine ecosystem in which the fishery operates. A comprehensive set of bycatch management arrangements is in place, including monitoring and ongoing research programs, bycatch precautionary catch limits, gear restrictions and move-on provisions. A series of environmental requirements place restrictions on fishers to minimise the impact of the fishery on the environment and are considered adequate and effective. In the event that significant impact on the environment, bycatch or protected species occurs, the management regime includes measures to ensure that no further impact is made, for example through closure of the fishery.

The HIMI Fishery is influenced by a range of domestic programs and policies, in addition to the formal management arrangements already discussed.

The *Threat Abatement Plan for the Incidental Capture (or bycatch) of Seabirds during Oceanic Longline Fishing Operations* (TAP) is of significant importance to any future use of longlining methods in the HIMI Fishery. Licensed fishing around HIMI is currently restricted to trawling operations despite the widespread use of longlining for Patagonian toothfish elsewhere in the region. The TAP prohibits the establishment of a longline fishery in the HIMI area until suitable mitigation methods can be developed to ensure the protection of seabirds. Longlining will be formally prohibited through directions established under the draft Plan. A process will be conducted to evaluate the deleterious effects of longlining on the environment before longlining is legally permitted in the fishery. This process is outlined in Attachment 7 of the submission and includes a requirement for approval by the Minister, the AFMA Board and endorsement by CCAMLR.

Also of significance is the *Recovery Plan for Albatrosses and Giant Petrels*. The HIMI region is important to the breeding and foraging of a number of protected seabirds. The Recovery Plan has recently been finalised and the fishery is managed in accordance with the measures contained in the Recovery Plan.

The *Commonwealth Policy on Fisheries Bycatch* requires the development of bycatch action strategies. Strategies to minimise bycatch in the HIMI fishery are well established. The draft Plan requires that AFMA implement a bycatch action plan (BAP) and clearly defines the requirements of the BAP. AFMA have developed the sub-Antarctic Fisheries BAP, which is assessed under Principle 2 of the Guidelines.

A range of international agreements also influence the management of the HIMI Fishery. The draft Plan contains an objective and a performance measure designed to ensure that the fishery is managed in accordance with Australia's international obligations. The draft Plan also requires that the relevant CCAMLR Conservation Measures be complied with. The management regime also takes into account other international agreements including, the United Nations Fish Stocks Agreement, the Food and Agriculture Organisation's (FAO) International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, the FAO Code of Conduct for Responsible Fisheries and the Convention on the International Trade of Endangered Species.

The remote locality of the HIMI Fishery limits interaction with other Australian jurisdictions, however as the fishery lies in the CCAMLR Area (Statistical Division 58.5.2), activities in adjoining CCAMLR Areas and on the High Seas, have the potential to impact upon the fishery. Fisheries for various species, including Patagonian toothfish, operate within the CCAMLR Area. The HIMI Exclusive Economic Zone (EEZ) joins the French EEZ around the Iles Kerguelen where longlining fishing for Patagonian toothfish occurs. There is growing concern that the stock targeted by each fishery may be shared, introducing uncertainty about the appropriateness of TACs set under the current process, which assumes that the HIMI and Kerguelen fisheries target separate stocks. Further complicating the issue is the prevailing high level of IUU fishing in the Kerguelen area and the uncertainty about the exact level of licensed French harvest of Patagonian toothfish from a potentially shared stock and whether France's TACs are sustainably based. It is also possible that the HIMI toothfish stock may extend into the adjoining high seas, thus constituting a straddling stock. This issue and its implications are discussed in greater detail under Principle 1 of the Guidelines.

The submission indicates that scientific evidence to date suggests that the two separate mackerel icefish stocks fished in the HIMI Fishery are confined to the HIMI region. Therefore, management of the mackerel icefish stock does not need to consider activities outside the HIMI region.

Conclusion

The submission asserts that the management regime for the HIMI Fishery is sufficiently precautionary and effective. On balance, EA considers the HIMI Fishery is well managed and operates in accordance with the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*.

The management regime is developed through a consultative process, subject to international management standards via CCAMLR. The regime is underpinned by sound objectives, performance measures and criteria aimed at managing the fishery in

an ecologically sustainable manner. The management arrangements in place are adaptable, have the ability to control the level of legal take from the fishery and are reviewable and enforceable.

Of greatest concern is the impact of IUU fishing and a potentially shared or straddling toothfish stock on the management of the fishery and the target species. These concerns are dealt with under Principle 1 of the Guidelines.

A more in depth analysis of the management regime is contained in the section addressing the Guidelines.

Part II - Guidelines for the ecologically sustainable management of fisheries

Principle 1: Stock assessment

"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"

Objective 1: maintain ecologically viable stock levels

"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

The information collection system in place for the HIMI Fishery is appropriate to the scale of the fishery and incorporates a sound mix of fishery dependent and independent research and monitoring.

The primary means of collecting fishery dependent data is through a shot by shot catch and effort logbook that records an estimated weight of each species caught in each trawl shot. Information is also collected on the fishing gear, effort and environmental conditions. These requirements exceed those of CCAMLR.

The submission indicates that the fishery dependent data are highly reliable due to the mandatory carriage of two independent, fully trained observers on all vessels at all times. Almost complete observer coverage (90 %) of trawl shots allows verification of vessel supplied information, which is validated against independent observer records. Fishery dependent data are further verified by scientists at AAD where they are integrated with biological data on the target and bycatch species, factory records, and unloading documentation. The accuracy of the data collected is high and EA concurs with the assessment that the data collected are highly reliable.

Further information is collected by the two observers. Samples from target and bycatch species are routinely taken to improve scientific understanding of the species in the HIMI region and aid future management. Information is also collected on seabird and marine mammal interactions.

A number of research surveys have been conducted in the fishery, providing a sound data set of fishery independent information to complement the fishery dependent data. A series of trawl surveys were undertaken by AAD in the early 1990's, which provided distribution and biomass data for all commercial and principal bycatch species prior to the commencement of the fishery.

There is also a compulsory research contribution from industry. Random stratified trawl surveys of Patagonian toothfish and mackerel icefish are regularly undertaken by commercial vessels under direction from AAD. These surveys collect information on

distribution and abundance, length and age structure, sex and reproductive stage for both species, and collect information on bycatch. Acoustic surveys are also conducted by AAD with the cooperation of industry.

Further fishery independent information is collected on Patagonian toothfish through a tagging program coordinated by the AAD. Patagonian toothfish caught in the fishery have been tagged, released and recaptured since 1997. Information at the time of tagging and recapture is recorded and data are used for determining growth and movement patterns of toothfish. There has been a large number of releases of tagged fish and a significant number of recaptures. The tagging program is considered a successful means of collecting fishery independent data and EA has confidence in its reliability. Material has also been collected for the analysis of toothfish DNA from the various fishing grounds to determine the extent of genetic separation of the populations.

The results of these surveys are provided to AAD, the CCAMLR Working Group on Fish Stock Assessments (WG-FSA) and the SAFAG where it receives national and international scientific scrutiny. The information collected to date has been used in refining the stock assessment model and as the basis for the stock assessment process.

The Fisheries Assessment Plan, developed under the draft Management Plan, aims to secure resources to implement the continuation of an adequate fisheries independent monitoring program to further improve the fishery independent data collection system. This Plan is reviewed annually by SAFAG and SFR holders.

Assessment

HIMI Patagonian toothfish and mackerel icefish stocks are subject to robust annual assessments that receive international scrutiny at the CCAMLR Working Group on Fish Stock Assessments (WG-FSA).

The stock assessment approach for toothfish relies on abundance estimates of juvenile fish from surveys and information collected from the HIMI Fishery to estimate long term annual catches. The annual catch must meet the CCAMLR decision rules for stock sustainability and take into account uncertainties in biological and fisheries parameters. The information collection system outlined above also feeds into the stock assessment process and includes age and sex composition data. As new information is collected the assessment approach is reviewed and refined.

The submission states that the stock assessment approach is accepted by the CCAMLR and broader international scientific community and is considered the most appropriate methodology for the species given the extent of knowledge about the species' biology and stock size.

The assessment approach is considered sufficiently precautionary, as the objective is to maintain a stock at a proportion of its median pre-exploitation abundance such that escapement of the spawning stock is sufficient to avoid declining recruitment and a sufficient stock resource is maintained for the needs of ecologically dependent species. From these objectives, biological reference points that form the basis for decision rules are produced and a Total Allowable Catch (TAC) for each species can be determined.

Target species stocks are currently considered to be in a state consistent with the stock assessment decision rules (A. Constable *pers. comm.*)

TACs for the species are recommended by WG-FSA to CCAMLR, which are then set out in CCAMLR Conservation Measures for the coming fishing season. SouthMAC then reviews these TACs and makes recommendations to the AFMA Board for endorsement. SouthMAC may recommend a more precautionary TAC than the CCAMLR TAC but cannot prescribe a TAC that is less precautionary (i.e. higher) than that set by CCAMLR.

EA considers the assessment process to be sufficiently robust and is confident in its ability to set precautionary and ecologically based TACs for the two target species. The information collection systems in place, combined with the precautionary based assessment approach, provide a sound but conservative estimate of the potential productivity of the stocks. The stock assessment process is an essential feature of the HIMI target species' management regime and it is important that the process remains effective and adequate. An important feature is that the process is reviewed and modified as new information on target species is obtained to ensure that the process remains appropriate for the species.

The removal of stocks by licensed commercial fishers is factored into the stock assessment process. The data collection system in place provides reliable and verifiable information on the amount of target stock removed by commercial fishers. Licensed removals of Patagonian toothfish and mackerel icefish are precisely known and verified through the quota management system by observers, vessel unloads, and for Patagonian toothfish, the Catch Documentation Scheme, which also offers some insight into IUU catches of toothfish. Catches of both species taken in the course of research are also factored into the stock assessment process.

Due to the location of the fishery there are no indigenous or recreational fishers operating in the region. There is however an active and increasing IUU fishing industry for toothfish operating in and around the HIMI Fishery. Significant concerns were raised during the public consultation period that IUU removals from the HIMI Fishery area are not adequately incorporated into the stock assessment process.

IUU fishing has been steadily increasing within CCAMLR and the HIMI Fishery area for the last twelve to eighteen months and has significant implications for the management of the fishery. Even short periods of uncontrolled IUU fishing have the potential to significantly deplete toothfish stocks and cause heavy mortality of seabirds, especially albatrosses. The CCAMLR Scientific Committee annually estimates illegal catches of Patagonian toothfish and, whilst estimates have wide confidence levels, these estimates are used in the stock assessment and TAC setting process.

IUU levels are estimated from a range of sources, including reports from Australian fishing vessels, regular surveillance of the area, recovery of illegal fishing gear, international trade figures, knowledge of port calls and vessel unloads. The submission expresses confidence in the accuracy of the IUU estimates and the stock assessment process' ability to adequately take account of these estimates. It is, however, recognised that accurately estimating IUU fishing is very difficult and is a perennial

issue for CCAMLR; further improvement is needed in such estimates, especially with respect to determining where IUU catches were taken.

The very nature of IUU fishing means that estimates of IUU harvest will be uncertain. EA believes that the management arrangements in place for the HIMI Fishery employ best practice when dealing with removals of stock by IUU fishing. The stock assessment process includes the best available estimate of IUU and would result in the setting of a zero TAC if the inclusion of estimated IUU catch indicate that stock has fallen below the predetermined biological reference points. These key features of the stock assessment process ensure that if IUU fishing continues to increase in the fishery, appropriate measures will be taken to reduce the impact on Patagonian toothfish and may result in closure of the HIMI Fishery. Further details on how AFMA manage IUU fishing in the HIMI fishery are contained in the following section.

There is a sound understanding of the distribution of the two target species. Mackerel icefish is restricted to habitats within the HIMI EEZ and consists of two separate stocks. Management arrangements are in place that take account of the species distribution and spatial stock structure. The stock situated over Shell Bank is closed to fishing under CCAMLR Conservation Measure 195/XIX, as the stock is considered too small to support commercial fishing. Fishing of the Heard Island Plateau stock is permitted. These arrangements will be reflected in Directions under the draft Plan.

Patagonian toothfish are distributed throughout the CCAMLR area except those waters closest to the Antarctic Continent and to varying distances to the north of the CCAMLR Area, as far north as the Subtropical Convergence in some longitudes. The current assumption is that the toothfish stock targeted in the HIMI Fishery is a single stock, separate from the stock fished in the adjoining French EEZ around Iles Kerguelen. However, one toothfish tagged in the HIMI Fishery has been caught in waters around Iles Kerguelen, and a further three have been recaptured around the Archipel Crozet, another French island group further to the north west than Kerguelen. This has opened up debate over the degree of stock sharing between HIMI and Kerguelen and Crozet. While such limited data does not confirm a shared stock, it suggests the possibility, and more tags may be retrieved in the next few years as more tagged fish reach 'harvestable' age. There is a risk that, in the event that stocks are shared, the current stock assessment process may underestimate the removal of toothfish from the population and prescribe a TAC that is too high for long term stock sustainability. Conversely, such a situation could also lead to an underestimate of recruitment to the stock and result in a lower than necessary TAC. The real situation is likely to be a mixture of the two effects. This uncertainty and the high level of IUU fishing undertaken in the French EEZ has prompted a review of the spatial structure of Patagonian toothfish in the region.

Investigation into the degree of stock sharing between HIMI and Iles Kerguelen, and other island groups in the area, such as Archipel Crozet and Marion/Prince Edward Islands, is being actively pursued on the domestic and international fronts. This will be used to further assess the potential effects of IUU fishing in other regions on the HIMI fisheries and provide the opportunity to develop appropriate management models. Such models will be assessed as to the relative merits of managing the HIMI stock in isolation or as a shared fishery across the Kerguelen Plateau.

The issue was recognised at the CCAMLR XX meeting held in October 2001. Australia is bilaterally pursuing a cooperative research agreement with France and an agreement appears near to conclusion. The agreement seeks to promote joint research to determine questions about sharing of fish stocks, and is a key step in developing joint management arrangements. There is already some informal scientific exchange between Australian and French scientists on the shared stock issue and prey/predator interactions with the fishery

Irrespective of the outcomes of the Australia/France research agreement, Australia is actively seeking to resolve the issue. CSIRO and the AAD have undertaken an Fisheries Research and Development Corporation (FRDC) project, "Population structure of Patagonian toothfish (*Dissostichus eleginoides*) in Australian waters". While this programme has not aimed to determine the link or otherwise with Kerguelen, it has investigated the genetic variability of toothfish within the HIMI and Macquarie fisheries (none significant) and between these two locations and South Georgia (very strong differences). In an attempt to determine the extent to which the Patagonian toothfish stock fished in the HIMI Fishery is shared with the adjoining French EEZ around Iles Kerguelen, further work is in train by the AAD, with CSIRO assistance, to test the difference between HIMI, Kerguelen, Crozet and Marion/Prince Edward Islands. This research is not yet complete but is expected to provide greater scientific clarity about the distribution of the stock. The tagging program has already yielded informative results, indicating that the majority of recaptured fish have moved only very small distances (less than 40 kms).

EA recognises that should results of these investigations indicate there is a single or straddling Patagonian toothfish stock between HIMI and Iles Kerguelen, AFMA will implement appropriate management responses. EA considers resolution of this issue important to the long term sustainability of the HIMI Fishery and encourages joint research and stock assessment with France as soon as possible.

Management response

The current management regime for the HIMI Fishery aims to maintain ecologically viable stock levels through a comprehensive system of output and input controls capable of controlling the level of take, underpinned by sound biological reference points.

Biological reference points for the two target species have been established to satisfy the objective of the assessment approach. The objective is to maintain a stock at a proportion of its median pre-exploitation abundance such that: (1) escapement of the spawning stock is sufficient to maintain recruitment; and (2) a sufficient stock resource is maintained for the needs of ecologically dependent species. These criteria are generally referred to as the "recruitment criterion" and the "predator criterion" and form the basis for the biological reference points (Constable et al, 2000).

The biological reference points for the two target species are articulated below:

Patagonian toothfish:

- the probability that the spawning biomass will fall below 20% of the median pre-exploitation level over the 35 year projection period must not exceed 10%; and
- the median escapement from the Fishery of the spawning biomass shall not be less than 50% over a 35-year projection period.

Mackerel icefish

- the median escapement from the Fishery of the spawning biomass shall not be less than 75% over a two year projection period.

The predator criterion for the two species is different because studies indicate that the Patagonian toothfish is not a significant prey species for higher order predators, whilst species such as seals are dependent to some extent upon mackerel icefish. The difference in projection periods is due to the difference in lifespan of the two species.

In the case of toothfish, the lower figure derived from each calculation is taken as the TAC for that species. For each species there is capacity for a zero TAC to be set if the reference points are not achieved.

Whilst targeting of bycatch species is prohibited in the fishery, biological reference points have been established for some species. Following assessments of unicorn icefish, grey rock cod and deep water skates, precautionary catch limits for these species were reviewed by CCAMLR. The biological reference points for these species are:

- the probability that the spawning biomass will fall below 20% of the median pre-exploitation level over the 20 year projection period must not exceed 10%; and
- the median escapement from the Fishery of the spawning biomass shall not be less than 75% over a 20-year projection period.

These biological reference points are considered sufficiently precautionary as they incorporate recruitment and escapement needs for each species, are reviewable and contain a biological bottom line beyond which the species must not be taken.

Scientific data on other bycatch species are insufficient for the development of individual catch limits. In response, CCAMLR has established precautionary 50 tonne limits for all other species and considers this limit sufficient to conserve stocks.

The HIMI fishery is managed through a system of input and output controls designed to regulate the level of harvest from the fishery.

The primary input control restricts the number of vessels allowed to operate in the fishery at any one time to three. Under the draft Plan, to access the fishery operators

must have a minimum quota holding (MQH) of 25.5 % of the total number of Statutory Fishing Rights (SFRs) nominated against their vessel, for the period they wish to fish. Restricting access to the fishery provides greater control over the environmental impacts of fishing in the area and is considered a key feature of the management regime for this fishery.

Further input controls include measures designed to minimise the take of juvenile fish and bycatch species. Mesh size of trawl nets must not be less than 120 mm and 90 mm when targeting toothfish and mackerel icefish, respectively. Bobbin and rubber disc size restrictions also apply to minimise the catch of sessile benthic organisms.

The principal output control on the harvest of Patagonian toothfish and mackerel icefish in the HIMI Fishery is an annually set total allowable catch (TAC). The Patagonian toothfish and mackerel icefish stocks are assessed annually as part of the TAC setting process. The draft Plan requires that AFMA must take into account the catch limits set out in CCAMLR Conservation Measures but cannot set a TAC higher than that prescribed by CCAMLR.

The current TACs for Patagonian toothfish and mackerel icefish for the 2001/02 fishing season are 2815 and 885 tonnes, respectively. The TACs are divided among SFR holders in proportion to the SFRs they hold for each species.

To allow for inadvertent overcatch of target species due to at-sea conversion errors, which are only detected upon accurate weighing ashore, and unintended catch at the end of the season, an operator may exceed their catch by 20 tonnes. Under these circumstances overcatch may be carried over into the following fishing year and decremented against their TAC at a penalty of two kilograms for every one kilogram taken as overcatch. The penalty is important to safeguard against deliberate over catching at the end of the fishing season. EA considers this arrangement reasonable, recognising that there is a disincentive to overcatch but allowing for genuine errors to be accounted for.

Another output control for mackerel icefish is the minimum legal size of 240 mm total length. A move-on provision has been developed under Conservation Measure 195/XIX to prevent fishing vessels targeting juvenile pre-spawning mackerel icefish. The rule requires that where any haul contains more than 100 kg of mackerel icefish, and more than 10 % of those are smaller than 240 mm, the vessel must not fish within five nautical miles of that site for at least five days.

The amount of bycatch taken from the fishery is also controlled under the management regime through precautionary catch limits and move-on provisions. These measures are described under Principle 2 of the Guidelines.

As outlined in the previous section, the management regime has the capacity to control the level of take from the licensed fishery, however it cannot control removals by IUU fishers. The high level of IUU fishing in the CCAMLR Area, including the HIMI EEZ, poses significant risks to Patagonian toothfish stocks and has implications for the management of the toothfish fisheries within the CCAMLR Area, including HIMI. IUU fishing around HIMI and across the CCAMLR Area is being addressed at the national and international level with varying degrees of success.

The issue is considered in detail by CCAMLR at its annual meetings, which has established a range of strategies aimed at combating IUU in the CCAMLR Area. CCAMLR estimates illegal catches for CCAMLR Areas, including HIMI, on an annual basis, using a range of sources, and incorporates these estimates into stock assessments.

The CCAMLR Catch Documentation Scheme (CDS) became mandatory for all members in May 2000 and is a useful mechanism for assisting in the identification of IUU catches. The CDS is designed to track trade and landings of Patagonian toothfish and to ensure that toothfish are being caught in accordance with CCAMLR Conservation Measures.

International action is also being taken through the United Nations Food and Agriculture Organisation endorsed International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU). Australia played a significant role in the Plan's development and will establish a National Plan of Action to Prevent, Deter and Eliminate IUU Fishing in line with its international obligations. The IPOA-IUU is yet to be fully implemented and is voluntary, hence its effectiveness is currently unknown.

The Australian Government has invested significant resources in surveillance and enforcement operations in the HIMI region in an attempt to combat illegal fishing in our waters. Surveillance activities aim to deter, detect and pursue illegal fishers in the HIMI EEZ under the direction of an Operations Group and AFMA's Foreign Compliance Section. AFMA have also provided fishing operators and observers with guidelines on collecting information on suspected IUU vessels if sighted. The adequacy of Australia's surveillance and enforcement activities is continually challenged by IUU fishers and is closely monitored by AFMA in conjunction with other government agencies. Enforcement activities have resulted in the successful apprehension of a number of illegal vessels and provided access to records of illegal catches and intelligence on IUU fishing operations.

There is also concern about the impact of IUU fishing on Patagonian toothfish stocks outside Australian waters. A particular concern, highlighted through the CDS, is misreporting of catch origins. There is circumstantial evidence that thousands of tonnes of illegal catch from other areas, including some from HIMI and Iles Kerguelen, is "laundered" by misreporting it as having come from Area 51 (outside the CCAMLR Area). This affects the accuracy of estimates of illegal catch for individual stock assessment purposes. At its October 2001 meeting, CCAMLR agreed to require mandatory use of VMS data to independently verify reporting of catch origins by all vessels fishing on the high seas in, or outside of, the CCAMLR Area. The submission indicates that Australia is likely to seek approval of a centralised VMS, run by the CCAMLR Secretariat rather than individual flag States, at the next CCAMLR meeting in October 2002. If approved, such a measure would further alleviate the impacts of misreporting.

Whilst estimates of IUU fishing in the CCAMLR Area may be underestimated, AFMA assert that estimates for the HIMI fishery are relatively reliable due to Australia's more effective surveillance and enforcement activities. EA recognises that there is an

inherent risk in using IUU estimates that may be imperfect, and the nature of IUU fishing makes quantifying illegal catches very difficult. However, the management regime in place to deal with this uncertainty is considered broadly appropriate and EA notes that ways to improve its accuracy are being pursued. The TAC setting process for toothfish in the HIMI Fishery takes account of estimates of IUU removals. Estimates of illegal catches are considered reliable due to the high level and success of surveillance and enforcement activities and the catch information acquired from apprehended vessels.

Significantly, if IUU catches were not factored into the stock assessment process, the TAC for toothfish in the HIMI Fishery would be higher. The current approach appears sufficiently precautionary and provides as high a level of stock security as can be reasonably provided at present.

Stock sustainability is afforded some added security with the stock assessment's capacity to set a zero TAC if removals of toothfish exceed sustainable levels. If IUU fishing increases, and the biological reference points for the species are not achieved, AFMA has the ability through directions, or a zero TAC, to close the fishery until such time that the reference points can be achieved. However, closing the licensed fishery will not itself prevent further stock declines from continued IUU fishing. EA is confident that AFMA has taken all reasonable and available steps to combat IUU fishing and take into account its impact on the HIMI Fishery.

The HIMI Fishery is also conducted in manner that does not threaten stocks of byproduct species. Whilst the HIMI Fishery does not use the term 'byproduct' there are three bycatch species processed for human consumption; unicorn icefish, grey rock cod and the large rat tail (*Macrourus carcinatus*). These species are subject to continuing population assessment and monitoring and are managed by precautionary catch limits and move-on provisions.

Following assessment of unicorn icefish and grey rock cod, it was found that the HIMI fishery is unlikely to affect these stocks and precautionary catch limits were determined for each species. The limits were set at 150 tonnes for unicorn icefish and 80 tonnes for grey rock cod. Move-on provisions also apply to ensure that stocks of these species are not threatened. Under the draft Plan, if the bycatch in any one haul of unicorn icefish or grey rock cod is equal to or greater than two tonnes then the vessel must not use that method of fishing within 5 nautical miles of that site for at least five days.

It is understood that the TACs set for unicorn icefish and grey rock cod were set in conjunction with the move-on provisions and are tightly coupled. The TAC level is based upon the assumption that the move-on provision protects against localised depletion of the species whilst the TAC protects against global depletion. The current TACs for these species may only be sustainable when used in conjunction with the move-on provisions. In the absence of the move-on provisions, a lower TAC would be appropriate. It is important that the relationship between the current TAC and the move-on provisions is well understood and maintained.

The submission states that the prohibition of targeting bycatch species, combined with the move-on provisions, make it unlikely that catches of these species will approach the precautionary catch limits.

Conclusion

EA is satisfied that the information collection system, stock assessment process and management arrangements are sufficient to maintain ecologically viable stock levels within acceptable levels of probability. With the exception of removals by IUU fishing practices, the management regime is capable of controlling the level of take from the fishery, and includes viable, precautionary reference points that trigger sound management actions.

The resolution of uncertainty about the degree of stock sharing between HIMI and Iles Kerguelen is a high priority for fisheries management. Potential stock sharing has significant implications for the stock assessment process and subsequent quota management system.

IUU fishing was raised as a significant area of concern in a number of public submissions and EA considers IUU fishing the most serious threat to the long term sustainability of the HIMI Fishery. Australia is combating IUU fishing in international fora and on the domestic front. Notwithstanding these steps, IUU fishing in the HIMI area has increased in the last eighteen months and there is now less “margin for error” in stock assessments than in previous years. If unchecked, the continuation of present levels of IUU catches has the potential to reduce stocks below biological reference points, ultimately causing the closure of the HIMI Fishery.

EA recognises that as IUU fishing is an issue that extends well beyond the boundaries of the HIMI Fishery, it cannot be resolved through management arrangements in this fishery alone. It is also recognised that Australian fishers operating in accordance with the HIMI management regime, are, in effect, penalised for the actions of IUU fishers when the TAC setting process already takes into account the impact of illegal fishing on target species stock, but to do otherwise could result in unsustainable TACs being set. EA supports AFMA in continuing to vigorously pursue all available options to combat IUU fishing and maintain management controls to factor illegal catches into the HIMI Fishery management regime.

Recommendation

- AFMA, in conjunction with other relevant agencies, is investigating the extent to which the HIMI Fishery and neighboring Island groups, including Iles Kerguelen, share a single, or straddling, Patagonian toothfish stock. Completion of this work should be a high priority. In the event that a shared, or straddling, stock is confirmed, AFMA should ensure that the HIMI Fishery stock assessment of the species will take into account removals from neighboring areas with which the HIMI stock is shared.

Objective 2: Promote recovery to ecologically viable stock levels

"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"

Stocks of the HIMI Fishery target species are not considered to be below the defined reference points specified in the CCAMLR decision rules. EA is satisfied that mechanisms are in place to respond appropriately if stocks fall below the agreed level. The precautionary decision rules on which the CCAMLR TAC setting process is based, and the mechanisms in the draft Management Plan, have the capacity to introduce zero catch limits, closures, gear restrictions and move-on provisions if stocks fall below the pre-determined biological reference points. EA is confident that appropriate management arrangements are in place to promote the recovery of stocks to ecologically viable levels in the event that stock levels fall below biological reference points.

Principle 2: Ecosystem impacts

"Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem"

Objective 1: Bycatch protection

"The fishery is conducted in a manner that does not threaten bycatch species"

Information requirements

There is a comprehensive system in place for the collection of information on bycatch caught in the HIMI Fishery. Information is collected by the independent observers and through the vessel's bycatch logbooks.

Quantitative and qualitative information is obtained by observers for a high proportion (98%) of commercial and research trawl shots. All bycatch data are integrated with trawl shot information, total catch data, and target species information for later analysis. The information collected is considered reliable and appropriate to the scale of the fishery.

Whilst the level of information collected on bycatch is high, there remains, as with any fishery, a number of unanswered questions. In particular, a paucity of biological information on certain species (eg sleeper sharks, skates and rays) makes determining catch limits for these species difficult. In many cases, determining a sustainable level of take and developing bycatch mitigation measures requires substantially more information.

The sub-Antarctic Fisheries Bycatch Action Plan (BAP) adopts a range of strategies and actions designed to obtain more information on bycatch species and the impacts of the fishery on those species. Specifically, the BAP requires that:

- all information on each bycatch species is reviewed annually with the aim of developing species specific bycatch limits;
- a risk assessment of sleeper sharks is conducted;
- the tag and release of sleeper sharks is monitored; and
- the introduction of tagging programs for other species, including skates and rays are examined.

The BAP also identifies further areas of research on protected species and ecosystem interactions. These are discussed under Objectives 2 and 3 of this report.

EA encourages the intended research identified in the BAP but notes that there is no indication of priorities or timeframes by which such research must be completed. The exact nature and extent of the proposed research is also unclear.

Assessment

A range of species are taken as bycatch in the HIMI Fishery, including grey rock cod, unicorn icefish, macrourids, other finfish species, skates, rays, sleeper sharks, jellyfish, coral/sponges, cephalopds, echinoderms and other invertebrates.

Formal risk assessments to determine the vulnerability of bycatch species to fishing has been conducted for grey rock cod, unicorn icefish and skates, resulting in the establishment of precautionary catch limits and move-on provisions for grey rock cod and unicorn icefish. It is accepted that, under current fishing levels in the HIMI fishery, these two species are unlikely to be negatively affected.

The submission indicates that bycatch in this fishery is not considered significant as it forms a small proportion of the total catch by weight of the fishery (1 %). It should be noted that small amounts of bycatch in comparison to the total catch may not necessarily be sustainable. EA does however recognise that bycatch levels are relatively low for a trawl fishery and research is ongoing to determine sustainable levels of take for bycatch species.

Of particular concern are sleeper sharks. The lack of scientific understanding of the species and its life history characteristics (long-lived, slow growing, low fecundity) puts it potentially at risk of depletion. Bycatch of sleeper sharks in the fishery is low and carefully monitored. All available information on sleeper sharks is reviewed annually by SAFAG with a view to developing a species specific bycatch limit. Further work is underway through the sleeper shark risk assessment and tagging program conducted by AFMA's, in conjunction with other agencies.

EA has similar concerns about the impact of the fishery on skates and rays. The submission states that skates and rays constitute a significant proportion of the small bycatch in both the toothfish and mackerel icefish fisheries. A risk assessment for skates and rays has also been planned and a tagging program has commenced. It is

important to note that bycatch of skates and rays may significantly increase if longlining methods are introduced to the fishery.

EA recognises that AFMA are taking steps to address the uncertainty of impact of the fishery on these species but suggests that mitigation measures be investigated in conjunction with research. As research begins to provide more insight into the species, potential mitigation measures should be investigated and developed if significant risks to the species are identified. These initiatives will play a vital role in determining the exact impact of the fishery on this species. EA also encourages the completion of the sleeper shark, skates and rays risk assessments as a priority.

The submission indicates that the sustainability risks for all bycatch species taken in the fishery will be further analysed through the CSIRO project “Ecological risk assessment for Commonwealth fisheries”, which is assessing all Commonwealth managed fisheries. The project is expected to be completed by August 2003, and in the event that significant risks to bycatch species are identified, AFMA will develop appropriate measures to mitigate the threat. EA looks forward to the outcomes of the assessment.

As the level of catch of all bycatch species is monitored and reviewed by SAFAG and there are a range of current and proposed programs to further increase understanding of bycatch species and their susceptibility to fishing, assessment of the impact of the fishery on bycatch is considered adequate.

Management response

There is a comprehensive and effective system of measures in place to minimise the impact of the fishery on bycatch species. These measures are contained in the draft Plan and its supporting framework of regulations, Directions and licence conditions.

Of significant importance is the mandatory carriage of two observers on board vessels at all times. This requirement provides an effective means of encouraging compliance with the management arrangements and provides an independent source of information on bycatch species.

Key features of the bycatch management regime are the precautionary catch limits and move-on provisions required by CCAMLR and formally set down in the management arrangements for the HIMI Fishery.

A precautionary catch limit of 50 tonnes has been established for all fish bycatch species, with the exception of unicorn icefish and grey rock cod, which have a limit of 80 and 150 tonnes respectively. Formal stock assessments of these two species have been conducted and concluded that the HIMI Fishery is unlikely to negatively affect these stocks at current levels of harvest. Under the draft Plan, AFMA are required to close the fishery if any of the catch limits are reached. In the event that the catch of any one bycatch species reaches 50 % of the precautionary catch limit AFMA are required to review the bycatch management arrangements.

The move-on provisions require that if the bycatch in any one haul of unicorn icefish or grey rock cod is equal to, or greater than two tonnes, the vessel must not use that

method of fishing within 5 nautical miles of that site for at least five days. Similarly, if the bycatch in any one haul of any other bycatch species is equal to or greater than one tonne then the same rule applies. These measures are designed to limit the likelihood of successive large hauls of bycatch species and are considered effective.

A range of other input and output controls are in place to ensure bycatch levels remain within sustainable limits, including:

- restriction to three boats operating in the fishery at any one time;
- formal prohibition of the targeting of non-target species;
- mesh size restrictions to limit the bycatch; and
- bobbin and disc size requirements to minimise bycatch of benthic organisms and benthic impacts.

In addition to collecting more information on bycatch as outlined above, the BAP also commits AFMA to adopting more stringent management arrangements and developing appropriate bycatch mitigation measures if the proposed research identifies significant risks. The BAP requires that AFMA, in conjunction with SAFAG, will assess the impact of trawl gear modifications on bycatch, but states that additional gear modifications are a low priority as bycatch in the fishery is minimal. Monitoring of bycatch is continuing and AFMA is committed to developing bycatch mitigation devices should bycatch monitoring identify areas of concern.

At present no indicator group of bycatch species identified. The submission indicates that an indicator group is not required because of low bycatch levels and the collection of data on all bycatch species. Bycatch information is reviewed annually with a view to determining any changes in bycatch quantity or composition.

EA strongly supports the range of initiatives, in particular the catch limits and move-on provisions, implemented by AFMA for the minimisation of bycatch in the HIMI Fishery. All reasonable steps are taken to avoid the capture and mortality of bycatch species and appear to be effective, as demonstrated by the low bycatch levels. Whilst there is some uncertainty about the level of fishing certain bycatch species can sustain in the long term, EA is satisfied that the management arrangements are sufficiently precautionary and research is ongoing to further reduce uncertainty.

Conclusion

Following analysis of the submission and supporting documents, EA considers that the HIMI Fishery meets Objective 1 and is conducted in a manner that does not threaten bycatch species. Current bycatch levels are relatively low for a trawl fishery and the combination of management arrangements, information collection and proposed research provides high confidence in the fishery's ability to minimise the impact on bycatch species.

There is some concern about the impact of the fishery on sleeper sharks, skates and rays. EA encourages the completion of the sleeper shark, skates and rays risk assessments as a priority, and suggests that mitigation measures be investigated in conjunction with ongoing research.

EA recognises the significant work already undertaken to minimise the impact of the fishery on bycatch species, including protected species and ecosystem interaction. Management arrangements are precautionary and adequately address areas of uncertainty.

The BAP identifies significant areas of current and future research to further address bycatch in the HIMI Fishery. Whilst the BAP provides an adequate description of the bycatch management arrangements in place, it does not provide priorities and timeframes for future bycatch actions. It would be helpful if AFMA identified the priority of BAP actions and clear timeframes within which these actions will be undertaken. AFMA should also identify contingency arrangements in the event that funding cannot be obtained for all research actions identified in the BAP.

Recommendation

- AFMA, in conjunction with other relevant agencies, is conducting risk assessments of sleeper shark, skates and rays. Completion of this work should be a high priority. Investigation of potential bycatch mitigation strategies in conjunction with this research should be undertaken. In the event that significant risks are identified, AFMA should implement appropriate mitigation measures.

Objective 2: Listed species and threatened ecological community protection

"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

The submission states a high level of confidence in the reliability of information collected on protected species interactions in the HIMI Fishery. A range of information gathering systems are in place, including mandatory reporting of interactions to AFMA and reports by the two independent observers. Observers are also required to monitor the deployment and retrieval of trawl gear and observe a high percentage of trawling operations. Information is collected on abundance of species in the vicinity of the vessel, the nature of interaction and the results of interactions. Reports from the observers are provided to AAD for analysis. The submission indicates that compliance with the management arrangements relating to protected species interactions is very high.

Under the EPBC Act fishers are also required to report all interactions with endangered, threatened or protected species to EA. To avoid duplication in reporting requirements, fishers must submit a report to AFMA who then forward the reports to EA. Operators in the HIMI Fishery have an excellent reporting record with reports received within statutory timeframes. The high compliance with reporting

requirements, combined with the mandatory carriage of two independent observers, results in significant, high quality information on protected species interactions in the HIMI Fishery. EA is satisfied that the information collection system is reliable and adequate.

It is also recognised that the CSIRO report “Ecological risk assessment for Commonwealth fisheries”, will provide additional information about the risk to endangered, threatened or protected species that interact with the fishery.

There are currently no threatened ecological communities identified in the fishery area, consequently no information collection system or assessment is required.

Assessment

The submission indicates that SAFAG has reviewed interaction data from the HIMI Fishery and considers that the current fishing activities do not pose a significant threat to seabird or marine mammal populations. This is confirmed by Wienecke and Robertson (2000), who undertook a review of interaction data and concluded that the current licence conditions and management arrangements ensure minimal interaction and pose minimal risk to seabirds and seals.

Black-browed albatross, light-mantled albatross and southern giant petrel breed on the Islands. These albatross and giant-petrel species typically forage within a few hundred kilometres of the colony during the early chick-rearing (brooding) period. This area has significant overlap with the fishery area, making the likelihood of interaction with fishing vessels potentially high. Interactions between seabirds and trawl fisheries elsewhere have resulted in significant mortalities, primarily as the result of collision with net sonde cables, a type of monitoring gear not used on Australian trawlers (including in the HIMI Fishery) and prohibited by CCAMLR.

Whilst interactions have been low in the HIMI Fishery there has been a small number of seabirds injured or killed during fishing operations. During the five years of operation, there have been eight interactions with seabirds, only three of which resulted in death due to fishing activity. All interactions were reported to EA and considered unavoidable accidents. The low numbers and nature of these interactions suggests that current fishing operations do not pose a direct significant threat to seabird populations in the area.

Longline fishing is the principal method used for targeting Patagonian toothfish in areas outside the HIMI EEZ, however fishing is currently restricted to trawl methods in the HIMI Fishery. This restriction is a direct result of concern over the impact of longline fishing on seabird populations and the development of the *Threat Abatement Plan for the Incidental Catch (or By-catch) of Seabirds during Oceanic Longline Fishing Operations* (TAP). The TAP requires that before longlining may be used in the HIMI Fishery there must be suitable and effective seabird bycatch mitigation measures in place.

It is important to note that whilst interaction with seabirds is low under current management arrangements and fishing operations, the future introduction of longline methods may have a different impact on protected species, in particular seabirds. As

different fishing methods have different types and levels of impact on the marine environment and its components, a change in fishing method would require an assessment of the environmental impact of such a change. A rigorous process is required to ensure that an assessment of the deleterious effects of longlining on the environment will be undertaken before longlining is legally permitted in the fishery. This process is outlined in Attachment 7 of the submission and includes a requirement for approval by the Minister, the AFMA Board and endorsement by CCAMLR. The BAP also commits AFMA to conducting an assessment of the impact of longlining on the benthic environment, bycatch species and the effectiveness of bycatch mitigation measures developed under the TAP.

Trawl fisheries are noted for their interaction with seals and trawling operations are potentially a source of food and a cause of mortality for some species (Shaugnessy and Davenport, 1996). Antarctic fur-seals, sub-Antarctic fur-seals and southern elephant seals are known to occur in the region of the fishery (Shaugnessy, 1999).

Since the commencement of the fishery in 1997 a total of six seals (Antarctic fur-seals) have been caught in the HIMI Fishery, all of which were considered unavoidable accidents. As the species is a listed marine species under section 248 of the EPBC Act it is an offence to kill or injure such species. To date, there has been a general low level of interaction with seals and a range of seal mitigation measures have been successfully implemented. Vessels operating in the fishery also adhere to a code of conduct for the minimisation of seal interaction.

Of the six reports of seal captures received to date, three reports of Antarctic fur seal (*Arctocephalus gazella*) deaths in the HIMI Fishery were received in September and October 2001. All three deaths were the result of trawling operations. The recent increase in seal deaths raises concerns about the possibility that seals in the HIMI region may be beginning to habituate to the fishing vessels. If this is the case interaction with seals would be expected to increase as fishing continues. This behaviour has been observed in other fisheries and usually begins after a fishery has been in operation for a number of years.

We understand that industry has adopted a modified code of conduct to prevent further seal captures. Current and proposed management arrangements, including the nil offal discharge rule, and the lack of bycatch caught in the fishery has ensured that seals are not readily attracted to the vessels. The improved code of conduct is expected to further ensure that seals do not become habituated to the vessels. Current interactions are considered minimal and there is no direct threat to the HIMI seal populations.

It is currently too early to predict if the recent increase in seal captures is the beginning of seal habituation to the vessels but the potential for this to occur exists. It is essential that the level of seal interactions are carefully monitored to identify any increase in interaction and that prompt management action is taken to mitigate any impact on seals should interaction levels increase.

Management response

There is a comprehensive system of management strategies in place to minimise the impact of the fishery on endangered, threatened or protected species.

The draft Management Plan requires operators to take all reasonable steps to minimise interaction with and harm to protected seabirds and marine mammals. Fishers are required to adopt the following measures to reduce the potential injury to, or death of, protected species during fishing operations:

- nil offal discharge rule – no waste products from fish processing or unwanted dead fish may be discharged from the vessel. This minimises the attraction of the marine mammals and seabirds and reduces interaction with these species;
- 100 % observer coverage – mandatory carriage of 2 observers at all times. Observers and Masters collect and report data on marine mammal and seabird interactions which are monitored by AFMA and AAD;
- TAC setting process for the target species takes account of predator-prey relationships and makes provision for escapement to meet the needs of predators;
- the Strategic Research Plan includes projects aimed at increasing understanding of protected species interactions;
- AFMA have commissioned CSIRO to undertake an ecological risk assessment of all Commonwealth fisheries, which will be completed in August 2003. This project will include an analysis of the impact of the fishery on protected species;
- reduced lighting on board vessels to minimise attraction of and injury to seabirds;
- prohibition of the use of net sonde cables to minimise seabird mortality;
- care in the splicing of wires to reduce the level of harmful interactions caused by protruding wire ends;
- handling and non-disposal requirements for all plastic packaging on board vessels; and
- prohibition of the disposal of poultry products to minimise the possibility of the introduction of disease and pests to the seabird populations on the islands.

Current operators in the HIMI Fishery have adopted a code of conduct for the minimisation of seal interactions. Following the recent capture of three seals in the fishery, current operators voluntarily modified their code of conduct. The code of conduct now includes, in addition to the measures outlined above, the following:

- winch must not be stopped whilst shooting net and bridles. If the winch is stopped the net must be hauled back to the boat to ensure that no seals have been trapped;
- the net must be checked for gilled fish and all fish removed before shooting the net; and
- deployment of the net is not to take place from one hour before civil twilight until one hour after civil twilight.

As discussed under Objective 1, the sub-Antarctic Fisheries BAP prescribes a range of actions aimed at identifying and mitigating the impacts of fishing on bycatch species. The BAP prescribes similar actions for the minimisation of incidental take of seabirds and marine mammals. In addition to those measures already in place, the BAP requires that AFMA review mechanisms to reduce protected species interaction if interactions substantially increase. The submission states that should interactions with protected species increase, observer coverage of trawl shots will increase to monitor the level of interactions and appropriate management responses will be developed as required.

The management arrangements in place to minimise the impact of fishing on protected species are considered adequate and effective. Mechanisms are available to impose more stringent requirements if monitoring identifies increases in the level of protected species interaction.

Conclusion

EA is satisfied that the HIMI 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. AFMA have successfully implemented a comprehensive and effective system of measures aimed at minimising the impact of the fishery on protected species.

It is recognised that interactions causing injury or death to protected species have been extremely low in the HIMI Fishery. There are no threatened ecological communities identified in the fishery area and therefore there is no risk of impact from the fishery on such communities.

EA recognises the fishery's low level of interaction with seabirds. Under current management arrangements and fishing operations EA considers the risks to seabird populations to be very low. There is potential for longline methods to be introduced to the fishery, however, before longlining may be introduced, suitable seabird bycatch mitigation measures should be developed, in conjunction with EA and the TAP Team. An evaluation, limited to assessing the deleterious effects of longlining on the environment should also be conducted and approval from the Minister for the Environment and Heritage should be obtained.

A recent increase in the number of seals caught in the fishery has raised concerns about the potential for seals to become habituated to fishing vessels operating in the HIMI fishery. Adherence to the current environmental requirements of operators is essential and monitoring of seal interactions should be continued. If interactions with seals increase AFMA should be prepared to implement prompt management action to mitigate the threat.

The CSIRO ecological risk assessment is expected to be a useful tool for confirming the level of risk this fishery poses to endangered, threatened and protected species and communities. Environment Australia looks forward to the results and any management actions developed in response to its findings.

Recommendations

- Prior to the introduction of longlining in the HIMI Fishery:
 - suitable seabird bycatch mitigation measures will be developed in accordance with the Threat Abatement Plan, for implementation by AFMA;
 - AFMA will conduct an evaluation, limited to assessing the deleterious effects of longlining on the environment; and
 - approval for the introduction of longlining from the Minister for the Environment and Heritage will be obtained.
- AFMA is monitoring seal interactions, with a view to determining if seals are beginning to habituate to the fishing vessels. In the event that seal interactions increase, AFMA should review existing mitigation measures and implement appropriate responses in a timely manner.

Objective 3: Ecosystem protection

"The fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally"

Information requirements

Information relating to ecosystem processes operating in the region and the impact of the HIMI Fishery on key aspects of the environment is obtained from a range of sources.

The current and planned data collection system in place for key elements of the ecosystem and environment are considered adequate. The Research Plan identifies a number of current and future research projects designed to collect more information on the impact of the fishery on the broader environment. In addition, the CSIRO ecological risk assessment should provide further information on key environmental risks.

The impact of the fishery on benthic communities is of greatest concern due to the nature of fishing methods used. It is recognised that bottom, or demersal trawl fisheries pose a significant risk to the benthic communities over which they fish.

EA recognises that information on the HIMI benthic communities has been collected through the three trawl surveys conducted by the Australian Antarctic Division in the early 1990's and through quantitative benthic bycatch data from the fishery. The benthic communities of the region were broadly classified into biophysical units by Meyer, Constable and Williams (2000), providing a sound base from which to assess the impact of fishing.

EA also recognises that AFMA have undertaken a preliminary assessment of benthic impacts and further research is planned through AFMA's five year Strategic Research Plan. Determining the nature and extent of the impact of trawling on the HIMI Fishery benthic communities is also formally required under the sub-Antarctic Fisheries BAP. Whilst the impacts of the fishery on the benthos are limited to a few areas within the fishery, these remain largely unknown and it is considered essential that this research be conducted as soon as practicable.

Assessment

The submission states that the impact of the fishery on the benthos in the HIMI region is not significant due to the small proportion of the HIMI EEZ that is actively fished, the low benthic bycatch rates in these areas, and the use of trawl gear designed to minimise impact. It is also believed that there are sufficient unfished areas containing adequate representation of each biophysical category of invertebrate assemblages.

As stated above, benthic impacts are a concern due to the fact that trawling is the method used in the fishery. Whilst recognising that large areas of the fishery are not subject to demersal trawling, and the impact in these areas can be assumed to be minimal, the impact of trawling on the remainder of the fishery is still uncertain and remains a concern. A useful tool for monitoring impacts on an area is to create closed areas for reference. The HIMI management regime does not currently contain closed areas to monitor the impacts of fishing on the environment; however, the Plan has the power to close areas immediately if warranted. The establishment of a marine protected area (MPA) in the HIMI area is currently under consideration by the Commonwealth Government and would further strengthen precautionary management of the region and create a reference area to monitor, in particular, the impacts of fishing on the benthos. The proposed MPA is discussed in greater detail in the following section.

The impact of the fishery on food chains, ecologically related species and water column communities is considered by AFMA to be low. This is due to the small degree of interaction between Patagonian toothfish and other major predators, combined with consideration of ecological overlaps into the stock assessment and catch limit setting processes for all species.

EA concurs with AFMA's assessment. There appears to be an understanding of predator-prey relationships operating in the region and the ability to factor these relationships into stock assessment modelling and the setting of catch limits. The biological reference points for Patagonian toothfish and mackerel icefish have different minimum escapement levels of spawning biomass allowing for reproduction and trophic interactions within the ecosystem. The food web linkages between toothfish, seals and seabirds are considered to be weak (He, Constable, Sainsbury and De la Mare, 2001).

The impact of the fishery on the physical environment is not considered significant, however, as previously raised, there is some uncertainty over the impact of the fishery on the benthic environment. Impact on the adjacent Wilderness Reserve on Heard Island is actively avoided through specific arrangements for the disposal of brassicas and poultry products from the fishing vessels and within the 13 nm exclusion zone.

Water quality and air quality are not considered at risk from fishing in the region due to the limited number of vessels permitted in the fishery at any one time and management arrangements governing the discharge of offal. There is also stringent control of adherence to MARPOL regulations to minimise pollution from oil and other substances.

Management response

The HIMI Fishery is subject to a comprehensive and effective range of environmental requirements designed to minimise the impact of the fishery on the ecosystem. The majority of these requirements are expressed in the draft Management Plan.

Key features of the HIMI Fishery management regime are the limitation to no more than three vessels operating in the fishery at any one time and the carriage of two independent observers on all voyages. This minimises potential impact through reducing effort in the fishery and provides independent reports on vessels' environmental performance.

Specific management arrangements are in place to minimise the impact of fishing activities on benthic communities. These include the mandatory use of a minimum bobbin diameter and rubber disc size to minimise contact of the fishing gear with the benthic substrate.

A number of measures are in place to avoid interactions with protected and other species and minimise bycatch, including a nil offal discharge policy, fishmeal disposal restrictions, and restrictions on the use and disposal of plastic packaging material.

Consideration is also given to predator-prey relationships. Trophic interactions are taken into account in the fishery's stock assessment model, ensuring that adequate levels of the target and bycatch species remain to maintain ecosystem function.

The World Heritage status, the presence of the Heard Island Wilderness Reserve, and the high conservation value of the Islands' flora and fauna, prompted the introduction of strategies to minimise the impact of the fishery on the Islands and its biota. The following measures have been implemented to protect these values and EA considers them appropriate for the management of a fishery operating in close proximity to a World Heritage Area:

- To minimise impact on the general area, fishing is prohibited within 13 nautical miles of the Islands. This restriction excludes fishing from the Wilderness Reserve with a further one nautical mile buffer zone and limits the impact of the fishery on water quality, benthic communities and provides a refuge for target and non-target species.
- To minimise impact of the fishery on the Islands' biota, the draft Management Plan requires that no brassicas (eg broccoli, cabbage, cauliflower, brussel sprouts or kale) and poultry products are discharged from the fishing vessels. These measures are designed to help prevent the introduction of avian diseases and non-native plants, and their pests and diseases, to the Islands.

- To minimise the impact on land-based foraging animals in the region, the target species stock assessment decision rules take account of ecosystem requirements and allow for escapement of stock from the fishery, thereby taking account of predator prey relationships.

As stated earlier, the Commonwealth Government is considering the establishment of an MPA - the Heard Island and McDonald Islands Marine Reserve. The original proposal for the Marine Reserve is currently under review and may be modified following further consultation with key stakeholders. The proposed reserve covers approximately 16.8 % of the HIMI EEZ.

If the Marine Reserve is established it would significantly enhance the precautionary management of the region, and should, on currently available data, afford sufficient benthic habitat protection. An MPA will also assist in determining the impact of the fishery on benthic communities by creating reference areas, and may also benefit the fishery, as some reserved areas are likely to be nursery and juvenile areas that will aid stock recruitment.

EA considers an MPA essential for the future protection of benthic communities. In the event that the MPA were not established, AFMA should be prepared to establish an area within the fishery that is closed to fishing to protect the area from the benthic impacts of trawling.

Conclusion

EA concludes that the fishery operates in accordance with Objective 3 and is conducted in a manner that minimises the impact of fishing operations on the ecosystem.

The uncertain impact of the fishery on benthic communities is considered a risk to the ecological sustainability of the fishery. This risk is not considered high due to the fishing gear specifications, limited demersal trawl grounds and representation of invertebrate assemblages elsewhere in the fishery, adjacent Wilderness Reserve and the proposed MPA. Nevertheless, EA considers it desirable that an assessment of the impact of the fishery on benthic communities within the fishing grounds be conducted.

Establishment of a substantial Category IA Marine Protected Area (MPA) in the HIMI region is fundamental to this assessment of the ecological sustainability of the fishery. The establishment of an MPA would be a substantial step in the precautionary management of the region, minimise the risk of significant impact on the benthos, provide reference areas for ongoing impact monitoring and afford added protection to land-based predators and protected species.

EA considers the risk of impact of the fishery on food webs, ecologically related species and water column communities to be very low. Similarly, there is no significant risk to the physical environment. The comprehensive management arrangements and information collection systems should ensure the impact of the HIMI Fishery on the ecosystem remains minimal.

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List of acronyms

AAD	Australian Antarctic Division
AFMA	Australian Fisheries Management Authority
BAP	Bycatch Action Plan
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CDS	Catch Documentation Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EA	Environment Australia
EEZ	Exclusive Economic Zone
EPBC	Environment Protection and Biodiversity Conservation Act 1999
FRDC	Fisheries Research and Development Corporation
HIMI	Heard Island and McDonald Islands
ICVMS	Integrated Computerised Vessel Monitoring System
ITQ	Individual Transferable Quota
IUU	Illegal, unreported and unregulated (fishing)
MPA	Marine Protected Area
SAFAG	sub-Antarctic Fisheries Assessment Group
SFR	Statutory Fishing Right
SouthMAC	sub-Antarctic Fisheries Management Advisory Committee
TAC	Total Allowable Catch

Summary table of the assessment of the Heard Island and McDonald Islands Fishery

Terms of Reference	Satisfactory / Needs Improvement	comments
<p>1. Description of the Fishery</p> <p>A comprehensive description of the Fishery and its characteristics including (but not limited to) the agency responsible for management of the fishery, species caught, fishing methods, the area fished (including a map), the number of operators and historic and current fishing effort.</p>	S	
<p>2. The environment likely to be affected by the Fishery</p> <p>A detailed description of the environment likely to be affected by the Fishery. This description must identify significant environmental characteristics of the area likely to be affected by the fishery: for example; marine protected areas, components of biodiversity, threatened and other protected species, a description of seagrass and benthic communities, important features such as coral reefs, seamounts and estuaries, and other aspects of the biophysical environment potentially affected by the operation of the fishery.</p>	S	
<p>3. Proposed management arrangements for the Fishery</p> <p>A description of legislation, and policies, that are relevant to the management of the Fishery and its environmental impacts and the agencies that are responsible for administration of relevant legislation and the policies. International agreements that affect the management of the fishery should also be identified.</p> <p>The assessment must set out the specific management arrangements that will be applied to the fishery. Accordingly, the assessment must identify (amongst other things) any management plan for the fishery, any bycatch action plan, relevant regulations and any strategic research plan for the fishery.</p>	S	

The assessment must specifically identify elements of the management regime for the fishery that are intended to ensure that the fishery operates in an ecologically sustainable manner (See item 5 below).	S	
4. Environmental assessment of the Fishery The assessment must include a comprehensive analysis of the potential impacts of the Fishery on the environment. The assessment must specifically address all aspects of the <i>Guidelines for the Ecologically Sustainable Management of Fisheries</i>	S	
Guidelines for the Ecologically Sustainable Management of Fisheries		
MANAGEMENT REGIME		
The management regime must meet principles 1 and 2 of the Guidelines	S	
The management regime must take into account arrangements in other jurisdictions.	NI	Potentially shared stock with Iles Kerguelen and other adjacent island groups, which has implications for the stock assessment process
The management regime must comply with any relevant international or regional management regime to which Australia is a party.	S	
The management regime does not have to be a formal statutory fishery management plan as such, and may include non-statutory management arrangements or management policies and programs. The regime should:	S	
• be documented, publicly available and transparent;	S	
• be developed through a consultative process providing opportunity to all interested and affected parties, including the general public;	S	
• ensure that a range of expertise and community interests are involved in individual fishery management committees and during the stock assessment process.	S	

<ul style="list-style-type: none"> • be strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements are measured; 	S	
<ul style="list-style-type: none"> • be capable of controlling the level of harvest in the fishery using input and/or output controls; 	NI	IUU fishing is a significant concern
<ul style="list-style-type: none"> • contain the means of enforcing critical aspects of the management arrangements; 	NI	As above
<ul style="list-style-type: none"> • provide for the periodic review of the performance of the fishery management arrangements and the management strategies, objectives and criteria; 	S	
<ul style="list-style-type: none"> • be capable of 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 	S	
<ul style="list-style-type: none"> • require compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. 	S	

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 .		
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.		
<i>Information requirements</i> 1.1.1 There is a reliable information collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate mix of fishery independent and dependent research and monitoring.	S	
<i>Assessment</i> 1.1.2 There is a robust assessment and periodic review of data collected on the dynamics and status of the species/fishery that should include, where relevant, an assessment of the status and trends in age and sex composition. Assessment should be with a view to identification of reduction in biological diversity and/or reproductive capacity. Review should take place at regular intervals but no greater than three years should elapse between reviews. 1.1.3 The distribution and spatial structure of the stock(s) has been established and factored into management responses. 1.1.4 There are reliable estimates of all removals, including commercial (landings and discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels. 1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.	S NI NI S	 The impact of potential stock sharing and removals of Patagonian toothfish through IUU fishing is a concern. As above
<i>Management response</i> 1.1.6 There are reference points (target and/or limit), that trigger management actions including a biological and/or effort bottom line beyond which the stock should	S	

not be taken.		
1.1.7 There are management strategies in place capable of controlling the level of take.	S	
1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species. (Guidelines 1.1.1 to 1.1.6 should be applied to byproduct species to an appropriate level).	S	
1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.	S	
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.		
<i>Management response</i>		
1.2.1 A precautionary recovery strategy is in place specifying management actions, or staged management responses, which are linked to reference points. The recovery strategy should lead to the recovery of the stock within a specified period of time, or until the species recovers.	S	
1.2.2 If the stock is estimated as being at or below the biological and / or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.	S	
PRINCIPLE 2.		
Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. ¹		
Objective 1. The fishery is conducted in a manner that does not threaten bycatch species.		
<i>Information requirements</i>		
2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance	NI	The sub-Antarctic Fisheries Bycatch Action Plan identifies a number of areas for further research. Need to identify timeframes and an indication of priorities.

¹ The issues addressed under the principle are those that define components of ecosystem integrity

of bycatch.		
<i>Assessments</i> 2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.	NI	Completion of the sleeper shark, skates and rays risk assessments should be considered a priority.

<p><i>Management responses</i></p> <p>2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.</p> <p>2.1.4 An indicator group of bycatch species is monitored.</p> <p>2.1.5 There are decision rules that trigger additional management measures when there are significant perturbations in the indicator species numbers</p> <p>2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.</p>	<p>S</p> <p>S</p> <p>S</p> <p>S</p>	
<p>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.</p>		
<p><i>Information requirements</i></p> <p>2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities</p>	<p>S</p>	
<p><i>Assessments</i></p> <p>2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species.</p> <p>2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.</p>	<p>S</p> <p>S</p>	
<p><i>Management responses</i></p> <p>2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.</p> <p>2.2.5 There are measures in place to avoid impact on threatened ecological communities</p> <p>2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.</p>	<p>S</p> <p>S</p> <p>S</p>	

Objective 3. The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.		
<p><i>Information requirements</i></p> <p>2.3.1 Information appropriate for the analysis in 2.3.2 is collated and/or collected covering the fisheries impact on the ecosystem and environment generally.</p>	NI	Recommend a full analysis of the impact of the fishery on benthic communities be undertaken as a matter of priority.
<p><i>Assessment</i></p> <p>2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery.</p> <ul style="list-style-type: none"> ● Impacts on ecological communities ● Benthic communities ● Ecologically related, associated or dependent species ● Water column communities ● Impacts on food chains ● Structure ● Productivity/flows ● Impacts on the physical environment ● Physical habitat ● Water quality 	S	
<p><i>Management responses</i></p> <p>2.3.3 Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1.</p> <p>2.3.4 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.</p> <p>2.3.5 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective</p>	S S S	

<p>5. Management measures and safeguards to ensure ecological sustainability</p> <p>A detailed analysis of the specific elements of the proposed management regime for the Fishery that are designed to ensure the fishery is ecologically sustainable. In particular, this section of the assessment must demonstrate that the management arrangements for the fishery are consistent with the requirements of the <i>Guidelines</i>.</p>	S	
<p>The assessment must identify and describe the specific measures intended to prevent, minimise or compensate for the potential environmental impacts of the fishery, and any measures to rehabilitate damage to the environment. The assessment should include an analysis of the expected or predicted effectiveness of these measures. (The assessment should distinguish between those measures designed to protect target species, and those measures designed to protect the ecosystem generally including non-target species and habitat).</p> <p>A consolidated list of relevant measures should be included.</p> <p>The assessment should identify the basis (eg, statutory or policy) for implementation of each measure and the agency or authority responsible for ensuring implementation. The assessment must also identify how the relevant agency or authority will ensure compliance with these measures, and what steps will be taken in the event of non-compliance.</p> <p>The assessment should identify the mechanisms for reviewing the environmental impact of the fishery during the life of the proposed management arrangements, and for adjusting the life of the proposed management arrangements, and for adjusting elements of the management arrangements as necessary in response to the outcome of these reviews.</p> <p>The assessment must also identify any program that is proposed to be put in place to monitor the impacts of the fishery on the environment in the short and long term.</p>	<p>S</p> <p>S</p> <p>S</p> <p>S</p>	

<p>Any proposed independent environmental auditing mechanism should be identified.</p> <p>The assessment should, to the extent reasonably practicable, describe any feasible alternatives to the proposed management arrangements (or elements of those arrangements). The alternatives should be discussed in sufficient detail to make clear the reasons for preferring certain options and rejecting others. Discussion should cover matters such as alternative fishing methods and technologies, increasing or reducing permitted levels of effort, alternative mechanisms for controlling effort, and other alternative measures for preventing or minimising environmental impact.</p>	<p>S</p> <p>S</p>	
<p>6. Information Sources</p> <p>For information in the assessment, the assessment must state:</p> <p>the source of the information;</p> <p>how recent the information is;</p> <p>how the reliability of the information was tested; and</p> <p>what uncertainties (if any) are in the information.</p>	<p>S</p>	