

# MSC ASSESSMENT REPORT THE AUSTRALIAN ANTARCTIC MACKEREL ICEFISH FISHERY AT HEARD AND MACDONALD ISLANDS

## Final Report

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<b>3</b>	7/7/05	Final Report after Public Comment Period
<b>4</b>	9/15/05	Final Report amended based on new information provided by client, a re-review of existing information, and input from the MSC.
<b>5</b>	4/5/2006	Action Plan Attached

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## **EXECUTIVE SUMMARY**

The Heard and Macdonald Island Mackerel Icefish Fishery is a small fishery in the subantarctic region around Heard and Macdonald Islands. The fishery uses both midwater and benthic trawling, but in a very limited area that comprises only 120km<sup>2</sup>.

The HIMI Mackerel Icefish Fishery is located in waters that are not only in the Australian EEZ, but also inside the boundaries of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). The fishery is therefore managed by Australian Fisheries Management Authority in accordance with the Fisheries Management Act of 1991 and in accordance with the requirements of other domestic legislation, in particular the Environment Protection and Biodiversity Act 1999, and also in conjunction with the requirements of CCAMLR (Antarctic Marine Living Resources Conservation Act 1981). Antarctic Marine Living Resources Conservation Act 1981 applies where there is a need to do research sampling work. All aspects of the fishery management system including the research, surveys, stock assessments, harvest strategies, and management controls are controlled by these two organizations.

The fishery is managed with both input and output controls. While the fishery could be managed with just input controls, output controls are included to make the management more adaptive and take advantage of the level of scientific information available through CCAMLR.

The assessment of this fishery had 4 key aspects of importance:

1. Stock Boundaries and Definitions,
2. Harvest Strategy and Control Rules,
3. Ecosystem Effects from fishing, and
4. Management System Functionality.

After careful consideration, the assessment team found that the fishery met or exceeded the MSC standards for the majority of performance indicators. In addition, the overall weighted average scores for each MSC Principle were above the required score of 80. Following all MSC required procedures for stakeholder consultation, the assessment team found no direct disagreement or objection to these findings. As a result, SCS has determined that the HIMI Mackerel Icefish Fishery can be certified under the MSC program.

As with all previous fisheries certified under the MSC program, this fishery did have a few places where the assessment team determined (from the information provided by the client and stakeholders) that the client needs to provide further evidence of meeting the performance indicators used in the assessment. The fishery is required to meet the specified “conditions” (also known as corrective action requests or CARs) over the five year period of the certificate. A final certificate will only be issued after the client has submitted and

the certification body (SCS) accepted, an Action Plan for meeting the required conditions.

## 1 INTRODUCTION

The Marine Stewardship Council (MSC) is a non-profit organization dedicated to the long-term protection or “sustainability” of marine fisheries and related habitats. First started as a joint initiative between Unilever and the World Wildlife Fund (WWF), the MSC is now a fully independent organization that is governed by an independent Board of Directors advised by a panel of scientific, economic, and fishery experts.

The MSC’s original mission statement promoted responsible, environmentally appropriate, socially beneficial, and economically viable fisheries practices, as well as the maintenance of biodiversity, productivity and ecological processes of the marine environment. The current MSC mission statement (redrafted in 2001) provides a slightly more focused mission and reads,

*“To safeguard the world’s seafood supply by promoting the best environmental choice”.*

Dedicated to promoting “well-managed” or “sustainable” fisheries, the MSC initiative intends to identify such fisheries through means of independent third-party assessments and certification. Once certified, fisheries will be awarded the opportunity to utilize an MSC promoted eco-label to gain economic advantages in the marketplace. Through certification and eco-labelling, the MSC intends to promote and encourage better management of world fisheries, many of which have been suggested to suffer from poor management.

The Marine Stewardship Council developed standards for sustainable fisheries management in a three-step process (May, Leadbitter, Sutton, and Weber, 2003): 1) Assemble a group of experts in Bagshot (UK) to draft an initial set of Principles and Criteria; 2) Conduct an 18-month process to review the standard in 8 major international venues; and 3) Convene a second set of experts in Warrenton, Virginia (Airlie Conference Center, USA) to revise and finalize the MSC Principles and Criteria.

The final MSC Fisheries Certification standard was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program.

### 1.1 The Fishery Proposed for Assessment

The fishery evaluated in this report is:

Species:	<i>Champscephalus gunnari</i> (Figure 1)
Geographic Area:	Australia’s Heard and McDonald Islands (Subantarctic)
Fishing Method:	Trawl (Bottom and midwater)
Fishery Management:	Australia Fisheries Management Authority, Australia Antarctic Division, and CCAMLR (Commission for Conservation of Antarctic Marine Living Resources).

## 1.2 Key Issues for the Assessment

There were several areas of note in this assessment that needed some additional attention. These are noted below and discussed in greater detail in Section 9, Assessment Team Performance Evaluation:

### 1. Stock Boundaries and Definitions:

In the area of the fishery, there are a number of distinct icefish groupings. Since MSC certification is focused on evaluating and certifying units with discrete, self-sustaining populations, the definition of a stock or self-sustaining unit was considered in this assessment (see Section 7, MSC Principle 1)

### 2. Harvest Strategy and Control Rules:

Under every fishery assessment to date, the interpretation of the MSC Principles and Criteria by certification bodies and assessment teams has included the requirement for fisheries management authorities to demonstrate a harvest strategy that is precautionary and contains the necessary control rules to slow and eventually stop fishing if stocks are in decline. CCAMLR states that it follows a precautionary approach in its management of the various resources for which it is responsible collecting what data it can and then attempts to weigh up and balance the uncertainties associated with such data in a manner consistent with the Convention's objectives. In the HIMI Icefish fishery the harvest strategy and control rules were of particular interest as the fishing area is near a World Heritage site as well as one of the largest Marine Protected Areas in the world, making it important that fish of any kind are not harvested in a manner that negatively affects these areas. The precautionary nature of the harvest strategy thus became a particular focus of this assessment. (see Section 7, MSC Principle 1, MSC Principle 2, and MSC Principle 3).

### 3. Ecosystem Effects from fishing:

The HIMI Mackerel Icefish fishery is a bottom trawl fishery. Few bottom trawl fisheries have been assessed under the MSC program. To date, the only significant bottom trawl fishery certified in the MSC program is South Africa's Hake fishery. Two aspects of bottom trawling which are important to understand ecosystem impacts: first where the bottom trawling is occurring and second the knowledge of the habitats and communities affected by the fishing gear. In the case of the HIMI mackerel icefish fishery, the setting is quite important as the fishing is occurring, as noted above, in areas adjacent to a World Heritage area and a large Marine Reserve. Therefore, knowing the type and extent of impact to the habitat and marine communities has a somewhat increased significance over bottom trawls that may be occurring in areas of less significance. The assessment team spent a good deal of time inquiring into the knowledge base available for the area and the direct effects of fishing.

### 4. Management System Functionality

The management of the HIMI mackerel icefish fishery is not as straightforward as some fisheries as it includes both national and international interests, as well as more than one agency involved in management under Australia's national management arrangement. This is similar to the assessment conducted for the South Georgia Island Patagonia Toothfish fishery, which is also managed by national and international agreements. The interactions between these entities are an essential component of ensuring that the management of the fishery is effective. The assessment team took a significant look at the interactions between the management entities during the assessment.

## **2 THE AUSTRALIAN ANTARCTIC HIMI MACKEREL ICEFISH FISHERY**

A brief description of the HIMI Mackerel Icefish fishery assessed in this project is provided in the following subsections. The descriptions are general in nature and brief, since a good deal of this information is more fully discussed in Section 9, Assessment Team Performance Evaluations.

### **2.1 The Target Species**

The fishery targets Mackerel Icefish, *Champsocephalus gunnari* (see Fig. 1). Juveniles and adults form large aggregations predominantly in the demersal to mid-water range. Sexual maturation occurs between 22 cm to 26 cm (3-4 years). Mackerel Icefish are short lived and fast growing with variable recruitment. Icefish can be found distributed widely in sub-Antarctic latitudes and typically occurs to depths of 200-350 meters in the HIMI region, although it has been found to depths of 700 meters in other areas.

Figure 1. Australian Mackerel Icefish



## 2.2 Overview of Fishery

### 2.2.1 General Area of the Fishery

Mackerel icefish *Champsocephalus gunnari* is found in both the Atlantic (Bouvet Island, South Georgia, South Sandwich, South Orkney, South Shetland Islands and the northern part of the Antarctic Peninsula) and Indian Oceans (Kerguelen and Heard and McDonald Islands) (AFMA, 2001a). The species is now exploited only at South Georgia and in the Heard Island and McDonald Islands fishery, with occasional strong year classes at Kerguelen also being fished. The fishery for mackerel icefish at South Orkney and South Shetland Islands ceased in the mid 1980s and was considerably reduced at South Georgia at about the same time. The focus of this assessment is restricted to the mackerel icefish fishery at Heard Island and McDonald Islands (HIMI), however it is useful to note that the history of other mackerel icefish fisheries demonstrates that they can be difficult to sustain.

Heard Island and McDonald Islands (HIMI) are external territories of Australia located in the Southern Indian Ocean about 4,000 km south-west of Perth (Figure 2). The islands lie within the Antarctic Convergence, and inside the Convention Area of CCAMLR (Figure 3) but outside the Antarctic Treaty Area. The area of the fishery is shown in Figure 4.

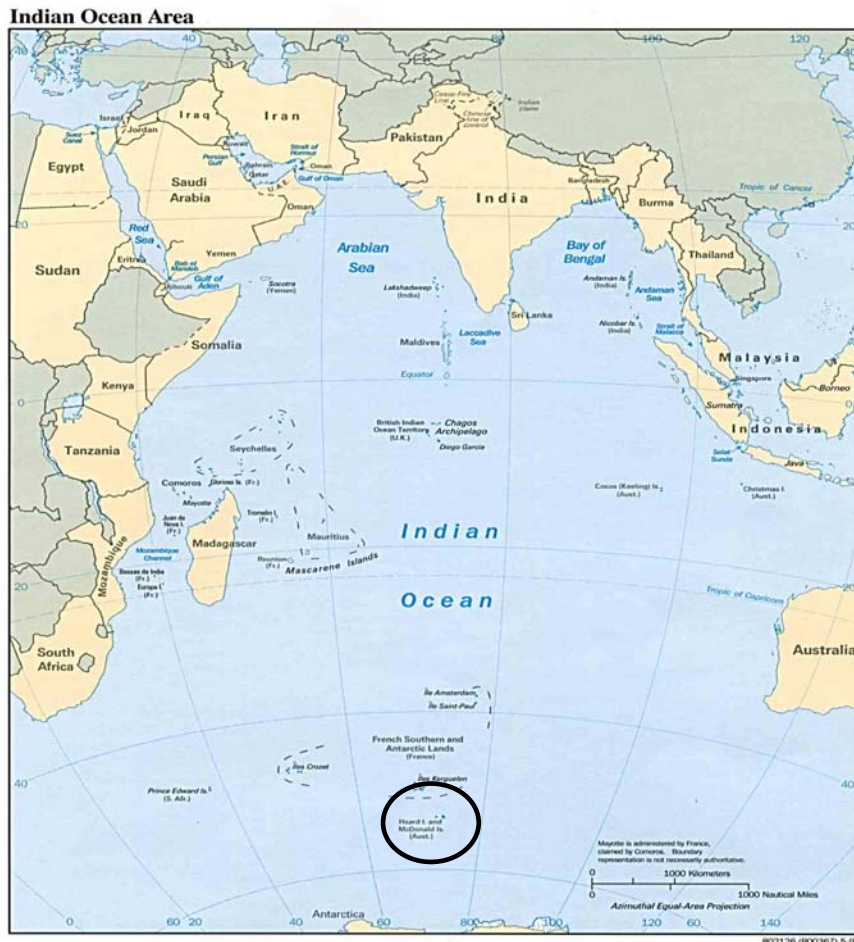


Figure 2. Map showing location of Heard and McDonald Islands (circled) relative to the mainland of Australia

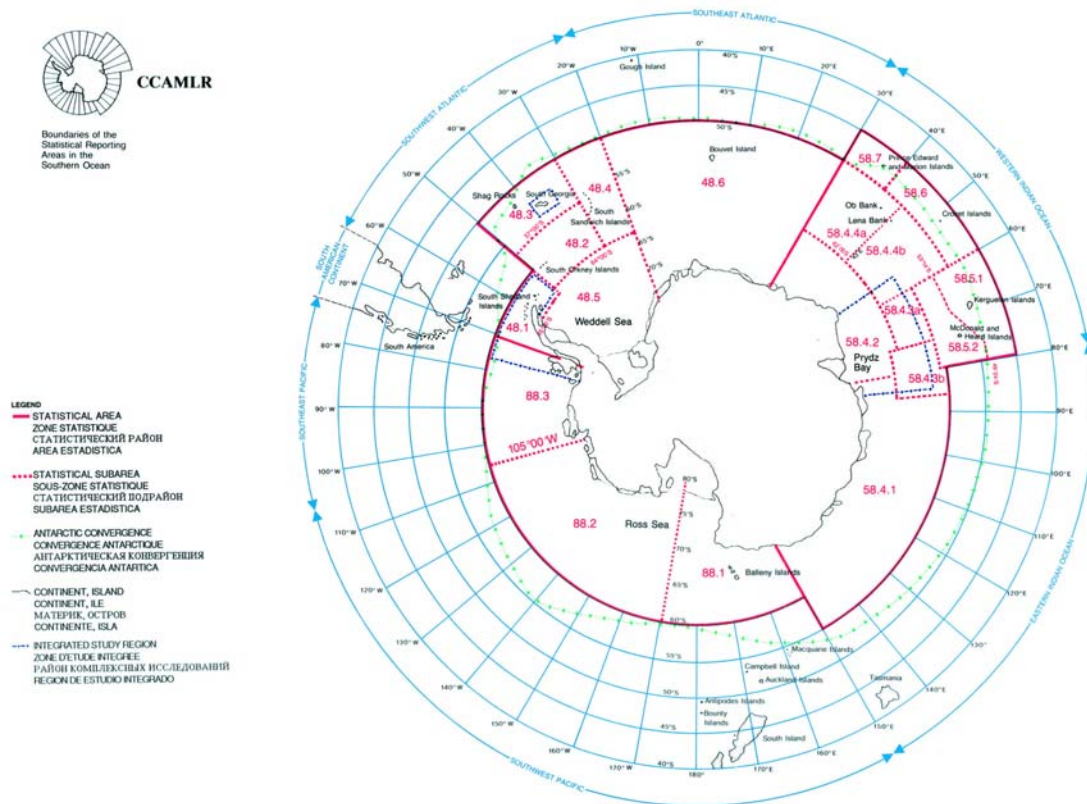


Figure 3. The Convention Area of CCAMLR showing Heard and McDonald Islands in Division 88.5.2

## Area of the Heard Island and McDonald Islands Fishery

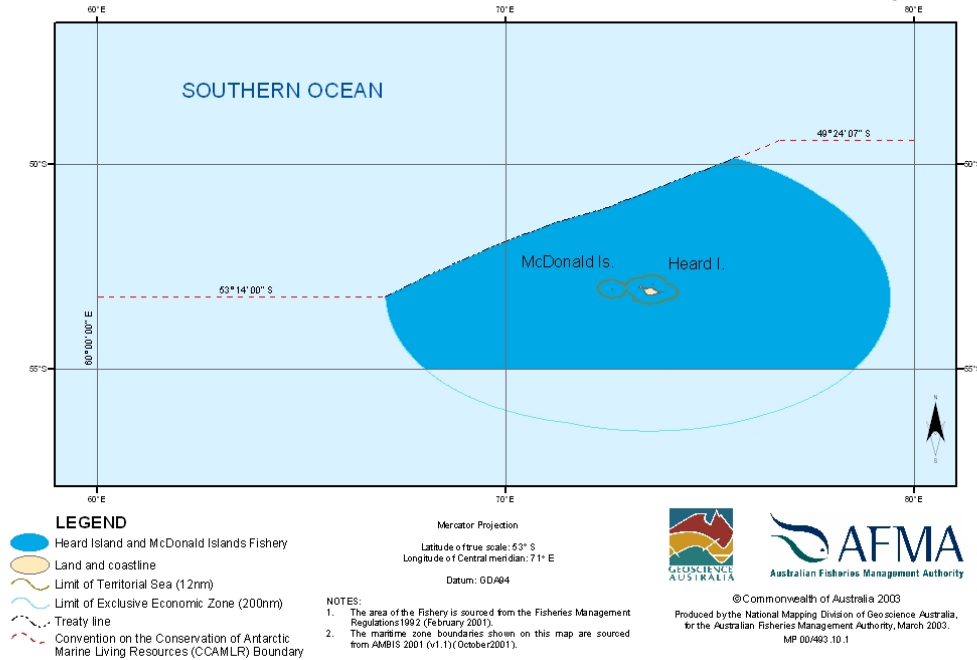


Figure 4. The area of the HIMI fishery

The HIMI fishery, which includes both Patagonian toothfish *Dissostichus eleginoides* and mackerel icefish, operates in shelf areas within the Australian Fishing Zone surrounding HIMI out to 200 nautical miles, and is managed by the Australian Fisheries Management Authority (AFMA). The Australian fishing zone adjoins the French fishing zone at the Kerguelen Islands.

Heard Island and McDonald Islands are the only unmodified example of a Sub-Antarctic island ecosystem in the world. They provide valuable breeding and feeding areas for many species of marine mammals and birds, while supporting a vast array of endemic invertebrates. Both Heard and Macdonald Islands and the territorial sea around the islands (to 12 nautical miles) were declared a Wilderness Reserve in 1992, managed by the Australian Antarctic Division (AAD). Subsequently, in 1997, the Australian Territory of Heard Island and McDonald Islands was added to the World Heritage List. This area is closed to fishing.

### 2.2.2 Fishery Background

While there are records of Soviet and Polish vessels fishing in the region since the 1970s (this activity seems to have ceased by 1978), fishing activity in the region has only concentrated in recent years. Commercial fishing by Australian operators was permitted by

AFMA in 1995 (311 tonnes of Icefish), but did not commence until March 1997. Fishing in the HIMI region has been limited to a maximum of three Australian boats and is subject to stringent management arrangements.

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 area within 13 nautical miles of the islands is protected from fishing. Out to 12 nautical miles the area is listed on the World Heritage List and forms part of the Heard Island Wilderness Reserve. In addition, the islands are on the Register of the National Estate as the only unmodified example of a sub-Antarctic island ecosystem.

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.

The only fishing methods permitted in the fishery are demersal and pelagic trawling. Trawl nets are limited to a minimum mesh size of 90 mm when targeting mackerel icefish to enable juvenile fish to escape the net. The minimum size for legal fish is 24 centimeters.

The following summary table describes the main features of the commercial finfish fisheries that take place in HIMI:

<b>Principal species</b>	Patagonian toothfish ( <i>Dissostichus eleginoides</i> ) Mackerel icefish ( <i>Champscephalus gunnari</i> )
<b>Fishing technique</b>	Demersal and Pelagic otter board trawling & demersal longlining
<b>Number of vessels</b>	3
<b>2003-2004 total allowable catch</b>	2,873 tonnes Patagonian toothfish 292 tonnes Mackerel icefish 80 tonnes Grey rockcod 150 tonnes Unicorn icefish 120 tonnes skates & rays 360 tonnes macrourids 50 tonnes each for other deepwater species
<b>Main Markets</b>	United States of America, Japan, Asia
<b>Stock Status</b>	Fully fished

<b>Management Method</b>	<p>As the islands lie to the south of the Antarctic convergence, they also fall under the jurisdiction of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)</p> <p>CCAMLR determines total allowable catches, which are set to protect the target fish stocks and species that depend upon them. Access to the Fishery is limited and strict operating conditions are imposed to minimise negative effects on the environment, including effects on non-target species</p>
<b>Consultative Forum</b>	<p>Sub-Antarctic Fisheries Management Advisory Committee (SouthMAC)</p>

### 3 FISHERIES MANAGEMENT SYSTEM

#### 3.1 Organization

The HIMI Mackerel Icefish Fishery is located in waters that are not only in the Australian EEZ, but also inside the boundaries of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). The fishery is therefore managed by AFMA in accordance with the Fisheries Management Act of 1991 and in accordance with the requirements of other domestic legislation, in particular the Environment Protection and Biodiversity Act 1999, and also in conjunction with the requirements of CCAMLR (Antarctic Marine Living Resources Conservation Act 1981). Antarctic Marine Living Resources Conservation Act 1981 applies where there is a need to do research sampling work. All aspects of the fishery management system including the research, surveys, stock assessments, harvest strategies, and management controls are controlled by these two organizations.

The fishery is managed with both input and output controls. While the fishery could be managed with just input controls, output controls are included to make the management more adaptive and take advantage of the level of scientific information available through CCAMLR.

##### 3.1.1 CCAMLR

The CCAMLR requirements for management of the Antarctic marine living resources are well recognised as being the world’s leading example of a multi-lateral structure providing an ecosystem-based management framework for fisheries management. In particular, the requirements to make specific allocation of biomass for predators as a measure to protect against impacts of fishing is a strong feature of the management process.

The HIMI Mackerel Icefish Fishery is managed in close accord with the requirements of CCAMLR for precautionary ecosystem-based management of fisheries. The principles of conservation governing all harvesting and associated activity in the Convention Area are set

out in Article II of the CCAMLR Convention<sup>1</sup>. The three principles can be paraphrased as follows (Parkes 2000):

- (i) prevention of population decline to levels which threaten stable recruitment of harvested species,
- (ii) maintenance of ecological relationships between the harvested, dependent and related species, and
- (iii) minimization of the risk of ecosystem changes that are not potentially reversible in 20-30 yrs.

These guiding principles underpin the essential elements of CCAMLR's approach to management. They encompass both the precautionary approach, in that prudent foresight should be exercised in avoidance of the taking of decisions which have a high risk of long term adverse effects, and an ecosystem approach, in the adoption of precautionary catch limits aimed at ensuring that the effects of fishing on prey abundance are limited to a level which will be unlikely to have a major impact on predators.

The CCAMLR process requires interested and responsible nations to come together in an annual multi-lateral forum to debate various scientific, fishing and conservation interests and issues and negotiate agreements on management measures that are enforceable and acceptable to all parties. Like all such international negotiations, specific issues may be used as bargaining chips to secure preferred outcomes for national delegations. However, crucially, CCAMLR operates by consensus<sup>2</sup>. This puts tremendous pressure on nations whose positions might normally lead them to break consensus to reach agreements to which all member nations can agree. In practice this has proved to be a powerful tool in diluting national interests with respect to management measures on specific fisheries. The scientific and conservation requirements of ecosystem-based resource conservation and management are considered to be paramount by CCAMLR, and CCAMLR has an impressive record of agreeing to key measures, such as catch limits, in line with the advice to the Commission from its Scientific Committee.

The Scientific Committee is supported by several constituent working groups that focus on specific areas of science. There are standing working groups on Fish Stock Assessment (WG-FSA), Ecosystem Monitoring and Management (WG-EMM) and Incidental Mortality Arising from Fishing (WG-IMAF). This hierarchical approach (management advice flows up from the working groups to the Scientific Committee to the Commission) means that technical advice is fed into the system at a level where national agendas are potentially less influential. Other than a focus on a specific geographic area and/or fish stock, such as HIMI in the case of Australia, the working group participants are not constrained in their scientific

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<sup>1</sup> Available at [www.ccamlr.org](http://www.ccamlr.org)

<sup>2</sup> Article XII of the convention requires that decisions on all matters of substance shall be taken by consensus. This covers decisions about Conservation Measures covering catch limits, reporting requirements etc. The question of whether a matter is one of substance is itself considered to be a matter of substance.

activities and the techniques they use by their country of origin. In addition, the content of the working groups' reports, which are a matter of public record, are a product solely of the participants at the meeting. There is no subsequent vetting or editing of the content by non-participants, or higher level bodies such as the Commission, that is not subject to the approval of the convener/chair (in the case of editorial changes) or the participants (in the case of any substantive changes reflecting matters of accuracy).

### 3.1.2 AFMA

There are two main components of the Australian Government with management responsibilities for HIMI and its surrounding waters: The **Australian Antarctic Division** (AAD), a part of the Australian Government's Department of the Environment and Heritage, and the **Australian Fisheries Management Authority** (AFMA), a statutory authority with policy input being provided to the Minister via the Department of Agriculture, Fisheries and Forestry - Australia (formerly the Department of Primary Industries and Energy).

AAD manages Australian government activity in Antarctica, provides transport and logistic support, maintains Australian research stations, and conducts and manages scientific research programs both on land and in the Southern Ocean. In this capacity, AAD manages both the land area of HIMI and the territorial sea as a Wilderness Reserve. The territorial sea is therefore closed to fishing. Given its location in the Southern Ocean (i.e. south of the Antarctic Convergence) AAD also carries out scientific research and provides management advice on fisheries within the AFZ around HIMI. AAD's Policy Coordination branch is responsible for developing policies, supporting Australian positions internationally, promoting the Antarctic program, ensuring environment protection requirements are met, and administering Australian Antarctic and Subantarctic territories.

AFMA, established in February 1992, undertakes the day to day management of the fisheries in the AFZ. For administrative purposes, AFMA has grouped the fishery resources in the AFZ into 21 fisheries that are identified by species, fishing method and/or area. The Commonwealth model of fisheries management has a number of features that distinguish it from other countries, the most prominent of which is the partnership approach with industry and other stakeholders. Under this model, the involvement of industry is recognised as being vital to successful fisheries management.

While responsibility for the implementation of fisheries management decisions and AFMA's day-to-day business affairs resides with the Managing Director, AFMA's operations are overseen by an eight member Board of Directors. The Board Members are appointed on the basis of their skill and expertise in areas such as resource management, the fishing industry, finance and research. The Board is responsible for setting the policy framework and for ensuring that adequate resources and expertise are available to meet AFMA's legislative obligations. The board has three committees to assist in the conduct of its business: the Finance and Audit Committee, the Research Committee and the

Environment Committee. The outcomes of board meetings are reported to stakeholders as well as to the public through the AFMA website.

As part of AFMA's partnership approach to fisheries management, it has established Management Advisory Committees (MACs) for each major fishery that it manages. MACs are AFMA's main point of contact with client groups in each fishery and play an important role in helping AFMA to fulfil its legislative functions and pursue its objectives. The Committees provide advice to AFMA on a variety of issues, including on-going measures required to manage the fishery, the development of management plans, research priorities and projects for the fishery. The MACs are also charged with ensuring that processes are in place for industry and other interested stakeholders to receive advice from researchers in a form appropriate to the audience.

The MACs are intended to complement the work of fishery managers by providing a broader perspective on management options and a wide range of expertise, not dissimilar that of the AFMA Board. MACs therefore provide a forum where issues relating to a fishery are discussed, problems identified and possible solutions developed. The outcomes of these deliberations determine the recommendations that the MAC will make to the AFMA Board.

AFMA's legislation limits the number of members on a MAC to seven, in addition to the Chairperson and an AFMA officer. Increasingly, and where appropriate, AFMA has included a broader range of interest groups in this consultative process. The AFMA Board decides on a fishery-by-fishery basis whether membership of a MAC should also reflect these wider community interests. As a general rule, revised membership arrangements are considered upon expiry of terms of appointment of existing members.

The MAC that covers the management of the HIMI fisheries, along with other Antarctic and sub-Antarctic fisheries under Australian jurisdiction is known as SouthMAC (sub-Antarctic Management Advisory Committee). The seven statutory members of SouthMAC comprise four from industry, one from the conservation community (currently from WWF Australia), a research member (the chair of SAFAG – see below), and one from AAD (policy branch). In addition, there is an AFMA representative, an Executive Officer, a Chair and two permanent observers (from the Department of Primary Industries, Water and Environment (DPIWE) and the Department of Environment and Heritage). Several other observers may also attend from time to time. SouthMAC has provided the public forum for the development of the management regime for the HIMI fishery through an extensive public consultation processes. The first meeting of SouthMAC was held on 30 November 1998. The twentieth meeting was held in Canberra on 25 March 2004

Fishery Assessment Groups (FAGs) have been established by the AFMA Board to provide independent advice on fishery and stock status and to achieve transparency in the collection and analysis of data for fisheries management purposes. The HIMI Fishery stock assessment process is reviewed by the sub-Antarctic Fisheries Assessment Group (SAFAG)

which provides advice to SouthMAC. SAFAG is currently composed of is eight government scientists (six from AAD and two from the Commonwealth Scientific and Industrial Research Organization (CSIRO), one each from AFMA, the Australian Bureau of Agricultural and Resource Economics (ABARE) and DPIWE, three industry members, an Executive Officer and a Chair. Observers also attend these meetings.

## **3.2 Legal structure and policy setting,**

### **3.2.1 Legislation**

The principal items of legislation covering fisheries management in the AFZ, and hence the HIMI zone are the Fisheries Administration Act 1991 and the Fisheries Management Act 1991. These laws created a statutory authority model for fisheries management whereby day-to-day management of fisheries was vested in AFMA, with the broader fisheries policy, international negotiations and strategic issues being administered by a smaller group within the Department of Agriculture, Fisheries and Forestry - Australia. The Fisheries Administration Act establishes AFMA to manage commonwealth fisheries and the Fishing Industry Policy Council to provide the fishing industry with a means of input into the process of formulating government policy in relation to the management of fisheries. The overall objectives of the Fisheries Management Act 1991 form the basis for the management of all Commonwealth fisheries. The key Environment Protection and Biodiversity Conservation Act 1999 requirements that apply and are managed by AFMA, relate to the need for a strategic assessment of the fishery management arrangements, and the management of protected areas and species.

### **3.2.2 Management Policy**

The HIMI fishery has been managed under a range of management policies since its inception.

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 30 November 2001. The current management regime for the fishery includes the HIMI Fishery Management Plan 2002 and its supporting framework of regulations, permit conditions and directions. The Management Plan was signed into force on 8 May 2002 following two years of extensive stakeholder

consultation<sup>3</sup>. It is the formal statutory fishery management plan under which the HIMI Fishery operates. It includes provisions that cover:

- The area of the fishery
- The target species
- The setting of Total Allowable Catches
- The Right to fish in the fishery
- The granting of statutory fishing rights (SFRs); and
- The obligations of holders of statutory fishing rights

Australia is one of the 24 members of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and the HIMI zone falls within the area covered by this convention<sup>4</sup>. Management of the HIMI Fishery is therefore also subject to the Conservation Measures set by CCAMLR. CCAMLR is charged with ensuring the conservation of attendant species such as seabirds and marine mammals as well as target fisheries species. 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. While this is true, it does not appear to be explicitly stated in the Fishery Management Plan. The Plan states only that before deciding the total allowable catch for a species in a fishing year, AFMA must take into account the TAC set by CCAMLR. In setting TACs, AFMA must also take into account reference points that are appropriate for maintaining ecologically viable stocks of the target species and an ecologically sustainable fishery, and must also consult and consider the views of SouthMAC and SAFAG. To date, the setting of TACs and other measures within the HIMI zone has at least matched the requirements of CCAMLR.

The HIMI Management Plan was the first to be assessed under the strategic assessment framework of the Environmental Protection and Biodiversity Conservation Act 1999. The Assessment Report for the HIMI Fishery is divided into three Parts: Part I provides an overview of AFMA, Part II provides a description of the HIMI Fishery and Part III provides

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<sup>3</sup> This process is summarised in a document "Development of the Heard and McDonald Islands (HIMI) Fishery Management Plan", made available to the evaluation team. The process began in December 1999 with the release of a Discussion Paper entitled *The Future Management of the Heard and McDonald Islands Fishery*, prepared by SouthMAC. This paper was distributed widely and comments invited. On 29 March 2000, the AFMA Board took several decisions on the management of the HIMI fishery, based on the SouthMAC paper and comments received. The basic approach was to introduce Individual Transferable Quotas (ITQs) coupled with a number of input controls. It was agreed to allow a maximum of three vessels to operate in the fishery at any one time through a system of Minimum Quota Holdings (MQH). That is, a boat is required to be nominated against at least 25.5% of the total number of SFRs granted in the fishery before it can fish.

<sup>4</sup> The HIMI fishery falls within CCAMLR Division 58.5.2, defined as the waters bounded by a line starting at 56°S, 60°E; thence due north to 53° 14'S latitude; thence east to the point 53° 14' 07"S, 67° 03' 20"E; thence to 52° 42' 28"S, 68° 05' 31"E; thence to 51° 58' 18"S, 69° 44' 02"E; thence to 51° 24' 32"S, 71° 12' 29"E; thence to 51° 03' 09"S, 72° 28' 28"E; thence to 50° 54' 23"S, 72° 49' 21"E; thence to 49° 49' 34"S, 75° 36' 08"E; thence to 49° 24' 07"S, 76° 42' 17"E; thence due east to 80°E longitude; thence due south to 56°S latitude; thence due west to the starting point.

an assessment of the management arrangements for the HIMI fishery against the Commonwealth's *Guidelines for assessing the ecologically sustainable management of fisheries*. The draft Strategic Assessment Report was subject to a 30-day public consultation period and SouthMAC has remained involved throughout the process.

Perhaps the most contentious issue to have faced the fishery in recent years has been the allocation of statutory fishing rights SFRs. An SFR is the right to take, from the area of the fishery, in each fishing year and particular proportion of the TAC of a target species. In May 2000 there was an initial allocation of 51% of all future SFRs split evenly between each of the (then) two participants (making them the only two participants eligible to actually take part in the fishery under the MQH system). There followed a protracted period of discussion about how to allocate the remaining 49%, which included consideration of the use of auction, tender and ballot. These approaches were later dropped as options, and in May 2001, following the advice of a specially convened Independent Advisory Panel, the AFMA Board adopted a methodology that granted three lots of 20%, 20% and 9% to each of the three main eligible companies<sup>5</sup>. This allocation coincided with a proposal previously submitted by three industry members of the SouthMAC.

### **3.3 Management Responsibilities**

AFMA's management approach requires a close working relationship with both stakeholders and a number of other Commonwealth and State/Territory Government and non-government agencies, including other resource managers, research providers and key interest groups. A schematic representation of AFMA's relationship with stakeholders and other agencies is presented in Figure 5..

With respect to environmental protection and conservation of biodiversity in the HIMI Marine Reserve and Conservation Zone, the Director of National Parks<sup>6</sup>, has delegated powers and functions under the Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 to the Director of AAD. This is formalised in an Instrument of Delegation signed by Peter Cochrane in 2003.

### **3.4 Management Objectives**

AFMA's objectives are listed in the Fisheries Administration Act 1991 and the Fisheries Management Act 1991 which cover all AFMA's operations.

These objectives are reflected in the Fishery Management Plan of 2002, where they are expressed as follows:

- a. to manage the fishery efficiently and cost-effectively for the Commonwealth; and

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<sup>5</sup> Eligibility was determined based on the extent of risk, commitment to and performance in the HIMI fishery.

<sup>6</sup> Acting under subsection 515(3) of the *Environment Protection and Biodiversity Conservation Act 1999*

- b. to ensure that the exploitation of the resources of the fishery and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle, and in particular, the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and
- c. to maximise economic efficiency in the exploitation of the resources of the fishery; and
- d. to ensure AFMA's accountability to the fishing industry and to the Australian community in management of the resources of the fishery; and
- e. to reach Government targets for the recovery of the costs of AFMA in relation to the fishery; and
- f. to ensure, through proper conservation and management, that the living resources of the AFZ are not endangered by over-exploitation; and
- g. to achieve the best use<sup>7</sup> of the living resources of the AFZ; and
- h. to ensure that conservation and management measures in the fishery implement Australia's obligations under international agreements that deal with fish stocks, and other relevant international agreements.

The Act also adds a note to this that requires, as far as practicable, that measures adopted in pursuit of those objectives must not be inconsistent with the preservation, conservation and protection of all species of whales.

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<sup>7</sup> The wording used in the Act is "optimum utilisation" rather than "best use".

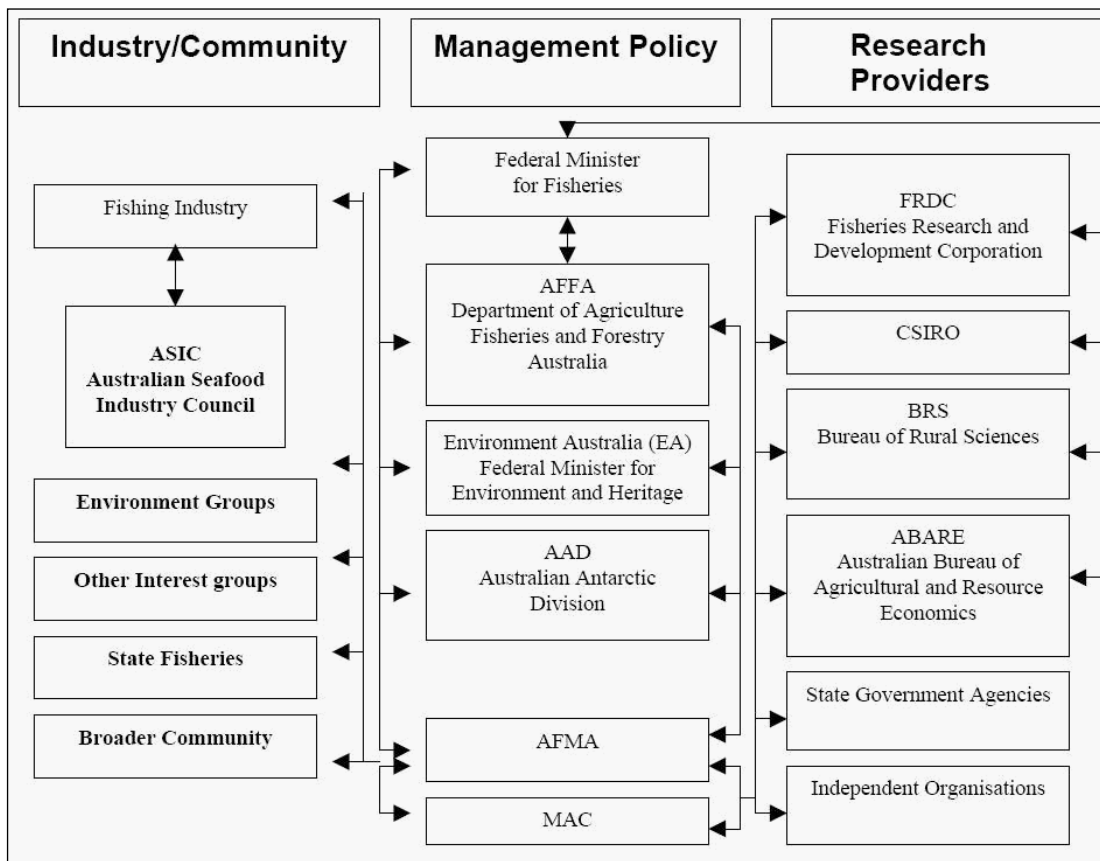


Figure 5. AFMA's relationship with other agencies (Strategic Assessment Report, Dec. 2001)

### 3.5 Management Measures

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 nontarget 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.

Most of these provisions reflect the controls required by the CCAMLR Conservation Measure that applies to the icefish fishery in Division 58.5.2 (Appendix 1).

Before the beginning of each fishing year, AFMA gives the holder of each statutory fishing right a notice stating the TAC for the species to which the right relates and the quota allocated to the right for the fishing year.

SouthMAC meets at least 3 times per year, in November, at the start of the southern summer, in March, and again in July and September. The twentieth meeting was held in Canberra on 25 March 2004. The timing of the November meeting is shortly after the conclusion of the annual CCAMLR meeting at which the various management measures for the coming season are agreed. AFMA's management system is then geared up to implement

those requirements. The July meeting is timed to be after the survey, and the September meeting meetings coincide with preparation for CCAMLR.

Each year, AFMA issues the management arrangements for the HIMI fishery. This includes the Directions Made under the HIMI Management Plan 2002. For example, listed in the Management Arrangements for 2002 2003 (directives dated 30 November 2002) were:

- Permanent closure of the area outside of Heard Island Plateau to mackerel icefish fishing;
- Permanent closure of waters adjacent to Heard Island and McDonald Islands;
- Permanent closure of Shell Bank to mackerel icefish fishing;
- Prohibition of the use of fishing methods other than trawling; and
- Heard Island and McDonald Islands Total Allowable Catch determination.

In addition, the statutory fishing rights for the season are accompanied by a comprehensive series of fishery conditions<sup>8</sup> that include:

- Boat eligibility
- Bycatch limits (set according to CCAMLR regulations)
- Size and move-on provisions (set according to CCAMLR regulations)
- Personal consumption and jelly meat fish (relates to toothfish)
- Gear restrictions (set according to CCAMLR regulations)
- VMS requirements
- Boat marking
- Transshipping and carrying
- Product labelling
- Notification requirements (obtaining an observer, unloading, departure, arrival, foreign port destination)
- CCAMLR inspection
- Carriage of observers (including contingency arrangements for incapacity or illness)
- Data collection officers
- Safety assessment
- Contingency arrangements for breakdown of the meal plant and disposal of fish meal

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<sup>8</sup> These requirements are issues as conditions on SFRs pending the preparation of Regulations for the fishery by AFMA (Minutes of the 19<sup>th</sup> Meeting of SouthMAC).

### 3.6 Compliance measures

Compliance with management measures in the icefish fishery is excellent. At present there is not thought to be a significant threat of illegal fishing of icefish from international vessels (all vessels detected inside the HIMI EEZ to date have been longliners not able to fish for icefish). The licensed Australian vessels have 100% AFMA observer coverage, as well as 100% landing inspections and weighing of catch, as well as regular surveillance patrols to the region.

However, in view of the serious problem of illegal fishing for toothfish in the HIMI zone, the Australian Government has shown a major commitment both to surveillance of HIMI waters and the setting of suitable penalties for illegal activity. Sightings of vessels and/or arrests have taken place regularly since Australia's first apprehension of a vessel in 1997. Since then, a further six fishing vessels that were allegedly targeting Patagonian toothfish illegally in the AFZ have been apprehended. In the 2002/03 season AFMA managed the conduct of two civil charter patrols to the AFZ adjacent to HIMI, the ninth and tenth since first undertaking management responsibility for patrols of the area in 1998. The tenth, in April/May 2003 was an armed patrol carried out in conjunction with the Australian Customs Service (ACS). Dubbed Operation Rushcutter this was the first armed Customs and Fisheries patrol to enforce Australian Fisheries legislation in HIMI. The 8000 tonne displacement Antarctic supply vessel the Aurora Australis carried specially trained officers from the Customs National Marine Unit on a 40 day mission in the Southern Ocean. Their prior training was extensive and included:

- cold climate survival and lifeboat training
- vessel familiarisation
- medical training
- use of force training
- tactical training on boarding and searching illegal vessels.

Following a decision by the Australian Government, this was the last patrol operated under contract to AFMA. In the past, P&O had been contracted by AFMA to conduct patrols in the area, however in the future, HIMI patrols will be managed by the ACS. AFMA will continue to supply officers for patrols and conduct post apprehension activities including the preparation of briefs of evidence and the caretaking and disposal of vessels.

Up to AU\$100 million has been committed for surveillance over two years to launch a permanent armed patrol vessel capable of operating in the Southern Ocean. In March 2004, the Australian Parliament passed legislation to increase the penalties for people found guilty of illegally fishing in the Southern Ocean from \$550,000 to \$825,000 and to amend the bonding provision on any vessel to include the cost of any hot pursuit.

Penalties extend further to the forfeiture of vessels involved in illegal fishing. For example, the fishing vessel Volga found illegally fishing for toothfish in HIMI waters on 7 February 2002 was boarded by Australian Defence Force personnel from the HMAS Canberra and

Australian Fisheries officers and was automatically forfeited to the Commonwealth of Australia. The owners of the vessel, through the Russian Federation, took Australia's right to bond and hold the vessel to the International Tribunal Law of the Sea (ITLOS) in Hamburg in late 2002.

Article II of the convention embodies two concepts that are vital to CCAMLR's approach to management. The first is that management should follow a precautionary approach, according to which decisions taken should have a low risk of long-term adverse effects. The second concept is the ecosystem approach to management. These two concepts include:

1. The conservation of Antarctic marine living resources.
2. Rational use.
3. Harvesting and related activities should:
  - prevent the decrease in size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;
  - maintain the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources and the restoration of depleted populations to appropriate levels; and
  - prevent changes or minimize the risk of changes in the marine ecosystem, which are not potentially reversible over two or three decades.

AFMA also has a set of specific objectives for all of Australia's federally managed fisheries, including Antarctic fisheries. The AFMA objectives are:

1. implement cost-effective fisheries management
2. ensure exploitation consistent with ecologically sustainable development
3. maximize economic efficiency
4. ensure that living resources within the Australian Fishing Zone are not endangered by over-exploitation
5. optimize utilization of living marine resources.

#### **4 HARVEST STRATEGIES**

There are both fishery dependent and fishery independent data collected annually, with the data used in annual assessments. In addition, there are required observers on each vessel ensuring accurate reporting of catch, both target and bycatch species, along with any other environmental information such as fishery interactions with seabirds, seals, and whales.

Assessments have been conducted annually since 1995/96, and are precautionary in nature. The precautionary approach used was adopted by CCAMLR in the mid-1990s and includes the objective of maintaining a stock at a proportion of its pre-exploitation abundance such that:

1. escapement of the spawning stock must be sufficient to avoid the likelihood of declining recruitment
2. abundance under exploitation must maintain a sufficient resource for the needs of dependant species (usually predators).

The assessment approach has been widely reviewed and published in the peer-reviewed literature. In addition, the yearly consultation process within AFMA and CCAMLR ensures that the assessments are fully and formally scrutinized. After AAD conducts its assessment, it is submitted to independent peer review and review by SAFAG (Sub-Antarctic Fisheries Assessment Group). The Australian delegation then submits the finalized assessment to CCAMLR's Working Group on Fishery Stock Assessments, where it is open to further international scrutiny. A final recommendation then goes from the Working Group to the Commission via the Scientific Committee, and then the Commission makes the final determination of the yearly TAC. AFMA then reviews what is adopted by CCAMLR and sets TACs at or below the CAMMLR TACs for the new fishing season.

## **5 PROCESSING AND TRANSHIPMENT**

For the HIMI Icefish fishery, all landings are recorded on board the vessel and reported to the authorities. Landings are recorded when delivered shoreside so all subsequent icefish products can legitimately be tracked back to the point of origin. There have been no transshipments of icefish in the HIMI fishery, and 100% of the fish are weighed with verification and validation of offloadings vs catch recordings undertaken by Australian fisheries officers.

## **6 THE ASSESSMENT PROCESS**

Scientific Certification Systems, Inc. conducted a pre-assessment of the HIMI icefish fishery as required by the MSC program. After review of the pre-assessment, the applicants for certification authorized the formal, full assessment of the fishery. All aspects of the assessment process were carried out under the auspices of Scientific Certification Systems, Inc., an accredited MSC certification body, and in direct accordance with MSC requirements.

In order to ensure a thorough and robust assessment process, and a process in which all interested stakeholders could and would participate, SCS took the approach of allowing additional time as needed for both industry and stakeholders to respond to requests for information and participation.

To be thorough and transparent, SCS provided opportunities for input at all stages of the assessment process, whether required or not by MSC procedures. The general steps followed were:

- **Team Selection**  
At this first step of the assessment process, SCS sought input from interested parties. SCS sent out an advisory through direct email, fax, listing on email listservers, and posting on select web sites requesting comment on the nominations of persons capable of providing the expertise needed in the icefish assessment. Comments were compiled and a second advisory released (through the same mechanisms) listing the final team of 3 scientists for the assessment.
- **Setting Performance Indicators and Scoring Guideposts**  
As required by the MSC assessment process, the assessment team drafted a set of performance indicators and scoring guideposts to correspond to the MSC Principles and Criteria. These were posted for more than the required comment period to allow stakeholders to provide comments.
- **Input on fishery performance**  
Once performance indicators are finalized, SCS requests that the applicants compile and submit written information to the assessment team illustrating the fishery's compliance with the required performance indicators. At the same time, SCS requests that stakeholders submit their views on the fishery management system's functions and performance. In the case of the icefish fishery, the client provided most of the information needed prior to the actual interviewing process. However, a number of documents and/or data were provided on an ongoing basis as the assessment team, the managers, or the applicants found them to be relevant.
- **Meetings with industry, managers, and stakeholders**  
SCS planned for and conducted meetings with stakeholders, industry, fishery managers, and fishery scientists.
- **Scoring fishery**  
The assessment team scored the fishery using the required MSC methodology and without input from the client group or stakeholders.
- **Drafting report**  
The assessment team in collaboration with the SCS lead assessor, Chet Chaffee, drafted the report in accordance with MSC required process.
- **Selection of peer reviewers**  
SCS, as required, released an announcement of potential peer reviewers soliciting comment from stakeholders on the merit of the selected reviewers. No comments were received other than from the client.
- **Public Comment on Draft Report**  
The MSC requirements are that the draft report be made available for public comment for a period of no less than 30 days. There is, under the newest MSC Certification Methodology (version 5, April 2004) a formal requirement that the

public comment period be held after the peer review process. However, the MSC granted SCS a variance for this fishery assessment as the budget was set using the older MSC certification methodology which does not require a sequential process. As a result, SCS released the report for peer review and public comment at the same time.

## **6.1 Evaluation team**

Project Manager:	Dr. Chet Chaffee, SCS (USA)
Assessor MSC Principle 1:	Dr. Norm Hall (Murdoch University, Western Australia)
Assessor MSC Principle 2:	Dr. Trevor Ward (University of Western Australia)
Assessor MSC Principle 3:	Dr. Graeme Paerkes (MRAG, United Kingdom)

## **6.2 Other Fisheries in the area and summary of previous certification evaluations**

Only one other significant fishery operates in the same territorial waters, and it is a fishery for Patagonia toothfish. Icefish are not affected by the fishery for toothfish except in a positive manner. Due to the concerns of illegal fishing on toothfish, the Australian government in conjunction with other governments and Australian fishers provide one of the best monitoring and compliance efforts in the world. This is a benefit to the icefish fishery in that it receives the same compliance and monitoring as a result.

## **7.0 THE MSC EVALUATION PROCESS**

The Marine Stewardship Council standards for sustainable fisheries management were developed through an 18-month process (May, Leadbitter, Sutton, and Weber, 2003). An original draft was developed by an expert working group, which met in Bagshot, UK in 1996. The draft standard was then presented through a series of 8 workshops that lasted 3 days each. Comments from the workshops, and from written submissions to the MSC were compiled and made available to a second expert working group at Airlie House in Virginia, USA.

The final MSC standard (see below) was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program. The Australian HIMI Icefish fishery was evaluated using this standard.

The scope of the MSC Principles and Criteria relates to marine fisheries activities up to but not beyond the point at which the fish are landed. The MSC Principles and Criteria apply at this stage only to marine fishes and invertebrates (including, but not limited to shellfish, crustaceans and cephalopods). Aquaculture, freshwater fisheries, and the harvest of other species are not currently included. Issues involving allocation of quotas and access to marine resources are considered to be beyond the scope of these Principles and Criteria.

## **7.1 MSC Principles and Criteria**

### **MSC PRINCIPLE 1**

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

MSC Criteria

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

### **MSC PRINCIPLE 2**

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent:

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

MSC Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

### **MSC PRINCIPLE 3**

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent:

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

MSC Criteria:

#### **A. Management System:**

The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

1. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process;
2. be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings;
3. observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability;
4. incorporates an appropriate mechanism for the resolution of disputes arising within the system;
5. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
6. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
7. incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion;

8. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;
9. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
10. setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
11. identifying appropriate fishing methods that minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
12. providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
13. mechanisms in place to limit or close fisheries when designated catch limits are reached;
14. establishing no-take zones where appropriate;
15. contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

**B. MSC Operational Criteria:**

Fishing operations shall:

16. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimize mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
17. implement appropriate fishing methods designed to minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
18. not use destructive fishing practices such as fishing with poisons or explosives;
19. minimize operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
20. be conducted in compliance with the fishery management system and all legal and administrative requirements; and
21. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

## **7.2 Interpretation of MSC Principles for Performance Evaluations**

Along with developing a standard for sustainable fisheries management, the MSC also developed a certification methodology that provides the process by which all fisheries are to be evaluated. The MSC accredits certification bodies (businesses) that can show that the expertise and experience necessary to carry out MSC evaluation is present in the organization. In addition, each certification body must demonstrate its fluency with the MSC standards and evaluation methods through the use of these in a fishery evaluation

The methods are provided in great detail through documents that can be downloaded from the MSC website ([www.msc.org](http://www.msc.org)). At present, the Fisheries Certification Methodology is in its 5<sup>th</sup> version, issued April 2004.

The MSC Principles and Criteria are general statements describing what aspects need to be present in fisheries to indicate that they are moving toward sustainable management. The certification approach or methodology adopted by the MSC requires that any assessment of a fishery or fisheries move beyond a management verification program that simply provides third-party assurances that a company's stated management policies are being implemented. The MSC's 'Certification Methodology' is designed to be an evaluation of a fishery's performance to determine if the fishery is being managed consistent with emerging international standards of sustainable fisheries.

Using its expertise in fisheries management, fisheries biology and ecology, ecosystem monitoring, and stock assessments, the assessment team developed a set of performance indicators (see Section 9) to be consistent with the intent and extent of the MSC Principles and Criteria.

The performance indicators developed for MSC Principles 1 and 2 are structured such that all the Subcriteria and Performance Indicators are directly associated with a single MSC Criterion within a Principle. There is no duplication of Performance Indicators among MSC Criteria or MSC Principles.

The structure of the Subcriteria and Performance Indicators developed under MSC Principle 3 is somewhat different. Under MSC Principle 3, the Evaluation Team noted significant difficulty in developing a logical hierarchy of measures that remained unique to each MSC Criterion but also maintained a logical connection between indicators. Much of the difficulty stemmed from the fact that the 17 MSC Criteria under MSC Principle 3 vary in nature from general objectives to specific measures, but are not presented in a hierarchical framework from the very broad to the specific. Instead, the 17 MSC Criteria under MSC Principle 3 describe factors with significant redundancy. As a result, the Evaluation Team felt it would be better to construct a logical hierarchy that incorporates all the requirements spelled out by the 17 MSC Criteria and note the relationship of each Performance Indicator to the various MSC Criteria, as many of the Performance Indicators proposed can be linked to a more than one MSC Criterion.

The performance indicators and scoring guideposts adopted in this evaluation are based on the evaluation team's interpretation of the MSC Principles and Criteria, as applied to the particular case of mackerel icefish fishery at HIMI. The standards set may not be identical to those used for other MSC certified fisheries, although the types of indicators considered are very similar. The MSC has made it clear that each fishery should be judged according to its particular circumstances and requirements, in line with the principles and criteria that they have set. In particular the performance indicators and scoring guideposts used to judge this fishery are meant to be similar to, but not necessarily identical to, those used to judge similar fisheries elsewhere. It is also worth noting that the standards for MSC certification

may not correspond exactly to the standards required by the fishery management plan or by the national legislation under which it operates. Therefore, if the assessment points out areas where the fishery management does not meet the MSC standards, it is not suggestive of poor management, it is only a reflection of how well the fishery management system complies with the standards for well-managed and sustainable fisheries set by the Marine Stewardship Council.

Also, it is important to remember when reading the scoring guideposts under each performance indicator that the scoring criteria established are regarded as cumulative. Thus, the fishery must first satisfy the criteria specified for a score of 60%, before being assessed against those required for the 80% level. In turn, those required for the 80% level must be attained before attempting to assess the fishery against the criteria specified for 100%.

### **7.3 Submission of Data on the Fishery**

One of the most significant, and difficult, aspects of the MSC certification process is ensuring that the assessment team gets a complete and thorough grounding in all aspects of the fishery under evaluation. In even the smallest fishery, this is no easy task as the assessment team typically needs information that is fully supported by documentation in all areas of the fishery from the status of stocks, to ecosystem impacts, through management processes and procedures. In the HIMI icefish fishery, this is further complicated by the fact that the fishery is not managed by a single entity; instead it is managed partly through a large multistakeholder process as it occurs in Antarctic waters that fall under an international treaty.

Under the MSC program, it is the responsibility of the applying organizations or individuals to provide the information required by the assessment team. It is also the responsibility of the applicants to ensure that the assessment team has access to any and all scientists, managers, and fishers that the assessment team identifies as necessary to interview in its effort to properly understand the functions associated with the management of the fishery. Last, it is the responsibility of the assessment team to make contact with stakeholders that are known to be interested, or actively engaged in issues associated with fisheries in the same geographic location.

In the HIMI Icefish fishery the applicants provided a number of documents that outlined the general management of the fishery, the stock status in the fishery, and a review of ecosystem aspects associated with the fishery as required under Australian regulation through the Environmental Protection and Biodiversity Conservation Act. In addition, the client arranged for the assessment team to meet with the appropriate scientists, managers, and enforcement officials.

In contrast to the applicant's role in MSC assessments, the stakeholders in the fishery are under no specific obligation, other than personal responsibility, to provide the assessment team with information. Yet the information provided by stakeholders is often very

important in helping the assessment team understand the full complement of issues surrounding the management of a fishery.

## **8 ASSESSMENT TEAM MEETINGS AND INTERVIEWS**

### **8.1 Justification for selection of items/persons inspected.**

The sites and people chosen for visits and interviews were based on the assessment team's need to acquire information about the management operations of the fisheries under evaluation. Agencies and their respective personnel responsible for fishery management, fisheries research, fisheries compliance, and habitat protection were identified and contacted with the assistance of the client group and stakeholders. In addition, professional fisher's associations and industry associations were identified and contacted.

### **8.2 Fishing industry and fishery management meetings**

The assessment team met with the client on more than one occasion to discuss aspects of the fishery and gather additional information. A number of meetings/phone calls were simply held to organize additional meetings and to clarify issues relating to data submissions to the evaluation team. Table 1 provides a general list of the people and organizations met during the assessment process.

Table 1 Organizations and People Interviewed as part of the HIMI Icefish Assessment Process

**Pre-assessment,**

Stock Assessment  
Ecosystem Impacts  
Management

David Carter (Austral Fisheries)  
Martin Exel (Austral Fisheries)  
Dylan Skinns (Austral Fisheries)  
Andrew Constable (AAD)  
Viki O'Brien (AFMA MAnager)

**Full Assessment**

▪

- Management
- Ecosystem
- Stock Assessment and Stock Status

Viki O'Brien (AFMA)  
John Davis (AFMA)  
Martin Exel (Austral)  
Rohen Wilson (AFMA)  
Peter Neave (AFMA)  
Thim Skousen (AFMA)  
Shane Spence (AFMA)  
Bob Stanley (AFMA)  
Paul Ryan (AFMA)  
Joanna Fisher (AFMA)  
Dick Williams (AAD)  
Rosemary Gales (DPIW)  
Campbell Davies (AAD)  
Astrid Mednis (DEH)  
Sachi Wimmer (AFFA)  
Alistair Hobday (CSIRO)  
Dave Stevenson (CSIRO)  
Barry Watkins (Observer)  
Andrew Constable (AAD)  
Dick Williams (AAD)  
Campbell Davies (AAD)  
Geoff Tuck (CSIRO)  
Keith Sainsbury (CSIRO)  
Alan Butler (CSIRO)  
Victoria Wilkinson (DEH)

Stakeholders attending  
meeting at University of  
Tasmania

Julia Green (IASOS)  
Jo Naylor (IASOS)  
Carl Murray (IASOS)  
Liz Foster (IASOS)  
Diane Erceg (IASOS)  
Marcus Howard (IASOS)  
Donna Roberts (IASOS)  
Mark Stevens (NET)  
Indriani Lutchman (WWF)  
Tilla Roy (ACECRC)

IASOS - [Institute of Antarctic and Southern Ocean Studies](#)

ACECRC - Antarctic Climate & Ecosystems Cooperative Research Centre

NET - National Environmental Trust

WWF - World Wildlife Fund for Nature

CSIRO - Commonwealth Scientific and Industrial Research Organization

DEH – Department of Environment and Heritage

AFMA – Australian Fisheries Management Authority

AAD – Australian Antarctic Division

AFFA – Australian [Department of Agriculture, Fisheries, and Forestry](#)

DPIW – Department of Primary Industries, Water, and Environment (Tasmania)

### 8.3 Stakeholder meetings and interviews

A wide list of persons, organizations, and stakeholders were notified of all aspects of the assessment through direct email (Table 2). During the assessment, few stakeholders showed any specific interest in contacting SCS or members of the assessment team. A few stakeholders in Tasmania for the CCAMLR meetings attended a side meeting held by SCS at the University of Tasmania (see list of stakeholders from meeting in Table 2). The only significant information provided in writing was provided by the World Wildlife Fund for Nature located in Melbourne, Australia (see Appendix 1).

Table 2. Persons, Organizations, and Stakeholders Notified by Email of the Assessment Process for HIMI Icefish Fishery

Alan Butler ( <a href="mailto:alan.butler@csiro.au">alan.butler@csiro.au</a> )
NFA PERTH
Alastair MacFarlane ( <a href="mailto:Alastair@seafood.co.nz">Alastair@seafood.co.nz</a> )
Alistair Graham ( <a href="mailto:alistairgraham@southcom.com.au">alistairgraham@southcom.com.au</a> )
Andrea Kavanagh ( <a href="mailto:akavanagh@net.org">akavanagh@net.org</a> )
Andrew Constable (Andrew Constable)
Angus Nicholls ( <a href="mailto:angus.nicholls@affa.gov.au">angus.nicholls@affa.gov.au</a> )
Anna Willock ( <a href="mailto:awillock@traffico.org">awillock@traffico.org</a> )
Annie Jarrett ( <a href="mailto:annie.jarrett@austarnet.com.au">annie.jarrett@austarnet.com.au</a> )
Averil Bones ( <a href="mailto:averil@hsi.org.au">averil@hsi.org.au</a> )
Barry Baker ( <a href="mailto:barry.baker@aad.gov.au">barry.baker@aad.gov.au</a> )
Barry Weeber ( <a href="mailto:Weeberb@wn.forest-bird.org.nz">Weeberb@wn.forest-bird.org.nz</a> )
Bernard Bowen (Business Fax)
Beth Clark ( <a href="mailto:antarctica@iqc.org">antarctica@iqc.org</a> )
Bill Nagle (Bill Nagle)
Bob Iversen ( <a href="mailto:iversmit@netlink.com.au">iversmit@netlink.com.au</a> )
Bob Kearney ( <a href="mailto:kearney@scides.canberra.edu.au">kearney@scides.canberra.edu.au</a> )
Bob Stanley ( <a href="mailto:Bob.Stanley@afma.gov.au">Bob.Stanley@afma.gov.au</a> )
Brett McCallum ( <a href="mailto:pearler@wafic.org.au">pearler@wafic.org.au</a> )
Brian Jeffriess ( <a href="mailto:austuna@bigpond.com">austuna@bigpond.com</a> )
Bronwyn Harries ( <a href="mailto:capessfms@ozemail.com.au">capessfms@ozemail.com.au</a> )
Bruce Wallner ( <a href="mailto:trysh.stone@afma.gov.au">trysh.stone@afma.gov.au</a> )
Bruce Young (Business Fax)

Bruce Zippel ( <a href="mailto:bruce.zippel@bigpond.com">bruce.zippel@bigpond.com</a> )
Campbell Davies ( <a href="mailto:campbell.davies@aad.gov.au">campbell.davies@aad.gov.au</a> )
Carole Renouf ( <a href="mailto:crenouf@wwf.org.au">crenouf@wwf.org.au</a> )
Cassandra Phillips ( <a href="mailto:cphillips@wwfint.org">cphillips@wwfint.org</a> )
Cath Wallace ( <a href="mailto:Cath.Wallace@vuw.ac.nz">Cath.Wallace@vuw.ac.nz</a> )
Christian Perez Munoz ( <a href="mailto:asoc-la@terra.cl">asoc-la@terra.cl</a> )
Christian Pyke ( <a href="mailto:cpyke@raptis.com.au">cpyke@raptis.com.au</a> )
Christine Soul ( <a href="mailto:christine@oceanwatch.org.au">christine@oceanwatch.org.au</a> )
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Daryl Quinlivan ( <a href="mailto:Daryl.Quinlivan@affa.gov.au">Daryl.Quinlivan@affa.gov.au</a> )
David Agnew (David Agnew)
David Butcher ( <a href="mailto:dbutcher@WWF.org.au">dbutcher@WWF.org.au</a> )
Dennis Witt ( <a href="mailto:Dennis.Witt@dpiwe.tas.gov.au">Dennis.Witt@dpiwe.tas.gov.au</a> )
Denzil Miller ( <a href="mailto:denzil@ccamlr.org">denzil@ccamlr.org</a> )
Dianna Watkins (Dianna)
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Edwina Davies Ward ( <a href="mailto:mccnwa@ozemail.com.au">mccnwa@ozemail.com.au</a> )
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Geoff Tuck (Geoff Tuck); George Kailis
Gerry Geen ( <a href="mailto:ggeen@bigpond.net.au">ggeen@bigpond.net.au</a> )
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Glenn Sant ( <a href="mailto:gsant@traffico.org">gsant@traffico.org</a> );
Graham Patchell ( <a href="mailto:gjp@sealord.co.nz">gjp@sealord.co.nz</a> )
Greg Johansson ( <a href="mailto:gjohansson@sanford.co.nz">gjohansson@sanford.co.nz</a> )
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Guy Leyland (Guy Leyland)
Ian Hay ( <a href="mailto:ian.hay@aad.gov.au">ian.hay@aad.gov.au</a> )
Ian Knuckey (Business Fax)

Ian Poiner ( <a href="mailto:Ian.Poiner@csiro.au">Ian.Poiner@csiro.au</a> );
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Russ Neal ( <a href="mailto:rneal@asic.org.au">rneal@asic.org.au</a> )
Sachi Wimmer ( <a href="mailto:Sachi.Wimmer@affa.gov.au">Sachi.Wimmer@affa.gov.au</a> )
Sarah Dolman (Sarah Dolman)
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Tony Gibson ( <a href="mailto:tjibson@wafic.org.au">tjibson@wafic.org.au</a> )
Tony Press ( <a href="mailto:tony_pre@antdiv.gov.au">tony_pre@antdiv.gov.au</a> )
Tony Smith ( <a href="mailto:tony.smith@marine.csiro.au">tony.smith@marine.csiro.au</a> )
Viki O'Brien ( <a href="mailto:viki.obrien@afma.gov.au">viki.obrien@afma.gov.au</a> )

## 9 ASSESSMENT TEAM PERFORMANCE EVALUATIONS

After completing all the reviews and interviews, the assessment team is tasked with utilizing the information it has received to assess the performance of the fishery. Under the MSC program, the process for assessing the fishery is performed by prioritizing and weighting the indicators relative to one another at each level of the performance hierarchy established when the assessment team developed the set of performance indicators and scoring guideposts for the fishery. Subsequent to this, the assessment team assigns numerical scores between 0 and 100 to each of the performance indicators. All of this is accomplished using decision support software known as Expert Choice, which utilizes a technique known as AHP (Analytical Hierarchy Process). A full description of the AHP process can be found on the MSC web site ([www.msc.org](http://www.msc.org)). In essence, the process requires that all team members work together to discuss and evaluate the information they have received for a given performance indicator and come to a consensus decision on weights and scores. Scores and weights are then combined to get overall scores for each of the three MSC Principles. A fishery must have normalized scores of 80 or above on each of the three MSC Principles to be recommended for certification. Should an individual indicator receive a score of less than 80, a 'Condition' is established that when met, would bring the fishery's performance for that indicator up to the 80 level score representing a well-managed fishery. Below is a written explanation of the assessment team's evaluation of the information it received and the team's interpretation of the information as it pertains to the fishery's compliance with the MSC Principles and Criteria.

## MSC Principle 1

**A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.**

### Intent:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

### Introduction

The purpose of this introduction is to provide the interested reader and potential reviewers with a brief overview of our approach to assessing it under MSC Principle 1, and a summary of our findings. Our evaluation of the fishery against the specific scoring indicators is described in detail following the introduction.

Mackerel icefish *Champsocephalus gunnari*, has been fished in both the Atlantic (Bouvet Island, South Georgia, South Sandwich, South Orkney, South Shetland Islands and the northern part of the Antarctic Peninsula) and Indian Oceans (Kerguelen and Heard and McDonald Islands) (AFMA, 2001a). The species is now exploited only at South Georgia and in the Heard Island and McDonald Islands fishery, with occasional strong year classes at Kerguelen also being fished. The fishery for mackerel icefish at South Orkney and South Shetland Islands ceased in the mid 1980s and was considerably reduced at South Georgia at about the same time.

The focus of this assessment is restricted to the mackerel icefish fishery at Heard Island and McDonald Islands (HIMI). We note the history of other mackerel icefish fisheries here to demonstrate that they have been difficult to sustain given their significant natural variation in recruitment. The fact that Australia has sustained the HIMI icefish fishery to date shows a strong commitment to management.

As noted in previous sections, the responsibility for managing the HIMI fishery lies with the Australian Fisheries Management Authority (AFMA), which has committed to managing the mackerel icefish fishery at HIMI in accordance with advice provided by CCAMLR. The science for the HIMI mackerel icefish fishery is provided by the Australian Antarctic Division (AAD).

The HIMI mackerel icefish fishery is a trawl fishery that operates in shelf areas which lie outside the marine reserve. There is a very strong commitment by fishers, fishery

managers, and fishery scientists to ensuring that the catches of mackerel icefish that are taken from the HIMI stock(s) are set at levels that are considered precautionary. Despite the remoteness of the region, the AAD scientists have undertaken detailed and regular surveys, supported by the commercial fishers, and the quality of their science is very high. Intensive observer coverage and strict reporting requirements have ensured that details of all catches are well known and that biological samples have been obtained.

The mackerel icefish fishery is managed by setting an annual Total Allowable Catch (TAC) based on a very conservative estimate of biomass (the lower 95% limit of the bootstrapped estimates of biomass) derived from a standard research survey and calculated such as to ensure that the projected abundance of the spawning stock after two years of fishing is not less than 75% of that of an unexploited stock. Thus, the fishery differs from most other fisheries as the assessment of the stock relies on the research survey estimate (and statistical model) rather than being derived from a dynamic fishery model. However, a fishery model is still employed when projecting from the survey to the state of the stock two years hence under alternative levels of fishing mortality.

In assessing the performance of the fishery against the standards, the evaluation team has had access to a considerable body of information about all aspects of the fishery. In addition to the written reports, the evaluation team benefited greatly from direct discussions with a wide range of stakeholders about many aspects of the fishery and its impacts. In particular, staff at AFMA, AAD and CSIRO were very helpful in answering questions and clarifying technical issues about the research, monitoring and assessment of these fisheries.

### Summary of findings

The detailed findings of the evaluation team are reported below where the individual scoring indicators are considered. This section of the introduction provides a brief summary of the findings, grouped by five topic areas relevant to Principle 1 considerations.

#### *Science*

The biology, ecology and dynamics of mackerel icefish have been extensively studied. There is a considerable body of published literature on the life history and biology of the species, on its distribution and on its diet and its contribution to the diets of predators. The use of otoliths to provide data on fish ages has proven difficult and growth studies have relied on modal progression. The remoteness of the location and the fact that the fishery is seasonal make it difficult to obtain regular within-year samples. As with many other species, estimates of natural mortality are very uncertain. Recruitment strength is highly variable and this has made it difficult to apply traditional fishery models to stock assessment and management of this species. Stock structure remains uncertain, and CCAMLR scientists have elected to manage the Heard Plateau and Shell Bank fish as separate stocks in order that each unit is sustained.

#### *Monitoring*

Monitoring of the HIMI icefish fishery meets extremely high standards. Research surveys are conducted annually since 1997, using a standardized, stratified trawl survey design. There is 100% observer coverage on all vessels. Sampling of age, length and other biological data is well designed and sample sizes are more than adequate. This fishery clearly meets high standards in this area, since many other fisheries that are substantially larger and less remote have significantly less observer coverage or no observer coverage at all and fewer surveys.

### *Stock assessment*

The quantitative assessment undertaken for HIMI mackerel icefish is also world class. There is proper treatment of both observation and process uncertainty (statistical uncertainty), and the sensitivity of the assessment to a range of uncertainties is routinely undertaken. One concern that we noted, despite the quality of the assessment, is that there appears to be some need to test alternative hypotheses regarding stock structure to ensure a full understanding of the circumstances in the fishery and the predicted survival. This is discussed more specifically in the following sections.

### *Status of resources*

The HIMI mackerel icefish stocks show considerable fluctuations in abundance due to naturally high variability in recruitment (that may be related to environmental factors). The stocks appear to be at low levels, with the Shell Bank stock currently too low to be exploited. The managers set the exploitation level to theoretically ensure that the stock and the associated ecosystem is sustained; however, the abundance of the post-harvest stock does not appear to be compared against predicted levels, nor does it appear that the current stock status relative to that of an unfished stock has been assessed.

### *Harvest strategies*

The HIMI icefish fishery is currently managed by calculating a TAC that is intended to ensure that the exploitation rate does not exceed a specified level. In setting the TACs, there is a stated purpose of retaining biomass of icefish above a critical level (limit reference point) that is required to ensure the sustainability of the icefish stock and that the ecosystem. However, there are some aspects of the TAC setting process that the evaluation team has noted as being of concern in terms of being able to maintain the icefish stocks above the needed levels to sustain the target species and the ecosystem. The decision by AAD and CCAMLR to treat the presumptive stocks of icefish on the Gunnari Plateau, Shell Bank (and Pike and Discovery Banks) as separate stocks when assessing their status (see below for discussion on this assumption), also raised some issues for the assessment team. Both these issues affect a number of scores in the assessment. However, any conditions or corrective actions suggested by the evaluation team may be readily resolved by addressing the two major issues identified in this report, *i.e.* the limit reference point for biomass and the assumption concerning stock identification.

## **MSC Criterion 1**

**The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.**

*The intention of this criterion is to assess whether the management or harvest strategy that has been implemented in the Heard Island and McDonald Islands icefish fishery is appropriate and is likely to ensure that the stock or stocks of icefish are sustained at levels that will maintain” the high productivity of the target population(s)”. The management strategy for the icefish fishery uses a well-defined harvest control rule that determines the allowable catch from survey estimates of available biomass and that is intended to ensure a precautionary estimate of allowable catch. The subcriteria below evaluate various aspects of the management strategy to assess whether it has taken into account and is robust to all uncertainties in the data and assumptions. The indicators need to be considered in combination when assessing the effectiveness of the management strategy.*

### **SubCriterion 1.1.1**

**Scientifically defensible stock units have been defined for the target species and the geographic distribution of each stock is known.**

The management strategy for the icefish fishery applies the harvest control rule separately to the icefish on the Heard Island Plateau and at Shell Bank, in the belief that assessing these as separate stocks will be more precautionary than managing the fish as a single stock. This sub-subcriterion explores whether the management strategy is likely to be robust with respect to knowledge and assumptions regarding stock identity.

#### **Indicator 1.1.1.1**

**The target species is readily identified.**

##### **100 Scoring Guidepost**

The target species is readily identified by all and is recorded appropriately.

##### **80 Scoring Guidepost**

The target species is unlikely to be confused with any other species.

##### **60 Scoring Guidepost**

There is only a moderate degree of confidence in proper identification and reporting of the target species.

SCORE 100

The ability to identify icefish species in the Antarctic is outstanding. There are two species of icefish caught in Heard and McDonald Island fishery, the mackerel icefish *Champtocephalus gunnari* and the unicorn icefish *Channichthys rhinoceratus*. Drawings of these demonstrate that the two species can be readily distinguished (Hureau (1985), cited by Froese and Pauly (2003)). Thus, in combination with the scrutiny provided by observers, there is little doubt that these two icefish are correctly recorded. Identification of these species by scientific observers is further assured by the provision of a species key and drawings of each species in the Scientific Observers Manual (CCAMLR, 2003).

The fishery meets the 100 mark for identification as there is no doubt that all resource users and managers have ready access to information (written and illustrated) that allows direct identification.

#### **Indicator 1.1.1.2**

[The geographic distribution of the target species is known.](#)

##### 100 Scoring Guidepost

The complete geographic range of the target species, including seasonal patterns of movement, is well documented.

##### 80 Scoring Guidepost

A reliable estimate of the geographic range of the target species is available

##### 60 Scoring Guidepost

An estimate of the geographical range of the target species is available.

SCORE 95

Mackerel icefish *Champtocephalus gunnari* is found in both the Atlantic (Subarea 48.3, Bouvet Island, South Georgia, South Sandwich, South Orkney, South Shetland Islands and the northern part of the Antarctic Peninsula) and Indian Oceans (Divisions 58.5.1 Kerguelen and 58.5.2 Heard and McDonald Islands) (AFMA, 2001a). Prior to the recommencement of commercial fishing that followed declaration of the Australian Fishing Zone, random stratified trawl surveys were undertaken at Heard and McDonald Islands in autumn 1990, summer 1992 and spring 1993 by the Australian Antarctic Division (AAD), (Williams *et al.*, 2001). Data from these surveys demonstrated that the main concentration of

*Champscephalus gunnari* in this Division is located on the Heard Island Plateau (*i.e.* the shallower waters of the eastern half of the Southern Plateau, and principally at Gunnari Ridge (Meyer *et al.*, 2000)), while the inner region of the Southern Plateau is used as a nursery area (Meyer *et al.*, 2000). A second concentration of mackerel icefish, considered by CCAMLR to be a separate stock, was located at Shell Bank but, since 1998, the abundance of these fish has been very low (Williams *et al.*, 2001). The biomass estimate calculated for Shell Bank from the 2003 survey was zero (CCAMLR, 2003). Williams *et al.* (2001) note that the densities of *C. gunnari* were high at both Pike and Discovery Banks in the 1970s but icefish are now virtually absent from these regions. Since 1996/97, the abundance of icefish in the Kerguelen Island region has also been low and no commercial catches have been taken since 1995/96 (CCAMLR, 2003).

The species is reported by Williams *et al.* (2001) to occur only in waters less than 500 m deep and “almost without exception” in depths less than 400 m. Water depths in the Southern Plateau range from 200-500 m, Shell Bank from 180-350 m, Pike Bank from 300-500 m, and Discovery Bank from 300-400 m (Meyer *et al.*, 2000). Water depths greater than 500 m separate these regions.

Following the recommencement of fishing in March 1997, further random stratified trawl surveys were conducted by AAD using commercial trawlers. After determination of the age compositions from mixture analysis of the length distributions, the results of these surveys were combined with the earlier surveys to produce maps of the presence of *C. gunnari* in hauls for each season at each location, for each age class from 0+ to 4+ (Williams *et al.*, 2001).

From the above, we conclude that the complete geographical range of the target species is well documented, including a description of the distribution of presence/absence of 0+, 1+, 2+ and older icefish. While data on the spatial distribution of icefish are also available from research surveys for autumn, summer and spring, complete movement of individuals at the Heard and McDonald Islands is still not fully understood. A significant amount of work continues by AAD to better understand the patterns of migration shown by icefish.

### **Indicator 1.1.1.3**

The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

#### 100 Scoring Guidepost

There is an unambiguous description of each stock unit, including its geographic location.

#### 80 Scoring Guidepost

- The stock units are well defined.

- Stock units have been shown to be precautionary for the purposes of conservation, fisheries management and stock assessment.

## 60 Scoring Guidepost

Stock units have been defined.

SCORE        79

CCAMLR's Working Group on Fish Stock Assessment noted that, although direct evidence was limited, differences between the timing of recruitment and spawning (Meyer *et al.*, 2000, citing de la Mare *et al.*, 1998) supported a hypothesis that the aggregations of *C. gunnari* on the Heard Plateau and at Shell Bank might represent separate stocks and that similar data indicated the existence of two stocks at Kerguelen, *i.e.* the Kerguelen Shelf and Skif Bank stocks (CCAMLR, 2001). Unfortunately, data were not available from the icefish once fished at Pike and Discovery Banks to determine whether these fish might have represented additional stocks.

Williams *et al.* (2001) discuss in more detail the data that led to conclusions regarding the timing of recruitment and spawning. Age composition data derived from analyses of length frequencies have been used to calculate the densities of the cohorts from different birth years at Kerguelen, Heard Plateau and Shell Bank, and relatively strong cohorts, which can be tracked through successive years, have been identified subjectively from successive samples (Williams *et al.*, 2001, Table 4). There is a lack of synchrony in the timing of recruitment of these stronger cohorts among age composition data for the Heard Island Plateau, Shell Bank and Kerguelen Plateau regions. Differences in the timing of spawning were identified from the facts that (a) the projected birthdate of the Heard Plateau stock, estimated as the date at which the length at age would be zero when extrapolated from the von Bertalanffy growth curve for data from this region, is January or February, whereas that for Shell Bank fish is September (Williams *et al.*, 2001), and (b) peak spawning of icefish from the Heard Plateau and Gunnari Ridge, as deduced from the monthly proportions of large (and presumably mature fish) fish with gonads at different stages of development, occurs in August and September, whereas it occurs at April and May for fish from Shell Bank (Williams *et al.*, 2001).

In addition to the facts cited above, CCAMLR's Working Group on Fish Stock Assessment also noted that the bathymetry of the Heard and Macdonald Island region and the rare occurrence of mackerel icefish in depths greater than 400 m suggest that movement of juvenile and adult individuals between the different aggregations would be unlikely, thus being consistent with the hypothesis of separate stocks. However, CCAMLR's Working Group also noted that recent DNA analyses indicated that *C. gunnari* in the Indian Ocean might be genetically homogeneous. This suggests either that the separation into various populations was relatively recent or that there is now limited gene flow between populations (CCAMLR, 2001; Williams *et al.*, 2001). Recommendations were made by the working group to collect additional DNA data to further investigate the stock structure of *C. gunnari*.

It was also decided to treat the icefish populations in these regions as separate stocks (CCAMLR, 2001) as this was thought to be even more precautionary. Thus, two stocks of *C. gunnari* are assumed to be present in the Heard and McDonald Island region, i.e. the Heard Plateau and Shell Bank stocks. These stocks are identified on the basis of their geographic location and, since catches of this species are recorded for trawls on a shot-by-shot basis, they can be assigned unambiguously to the stocks from which they were taken.

CCAMLR continues to explore alternative hypotheses regarding stock structure, and oceanographic data collected in research surveys are being used to develop models that may be used to explore the advection of eggs and larvae from the different stocks of icefish (A. Constable, 2004, pers. comm.).

Clearly, the stock units that have been defined by the fishery scientists and managers for the management of this fishery, and the decision to manage the icefish from Heard Plateau and Shell Bank as separate stocks, were intended by CCAMLR to be as precautionary as possible. However, the assessment team was not provided any information on testing alternative hypotheses to see how this was determined. An alternative approach might be to consider the hypothesis that there is a single genetic stock with variable regional recruitment, and that environmental conditions vary among the different locations at Heard and McDonald Islands to produce differences in recruitment times, growth rates and spawning seasons. Under this scenario, the stock of *C. gunnari* might be assessed to be further reduced or even depleted, given the loss of aggregations at Pike, Deception and Shell Banks. Under this hypothesis, different decisions regarding catch quotas might be made, and these might be more conservative and precautionary. The evaluation team believes that both hypotheses should be explicitly tested when assessing the status of the stock to determine which approach would be the most precautionary until further determination about stock structure can be confirmed through research.

### **Condition 1.1**

The client should provide evidence to the certification body contracted for surveillance reports that the current stock designations used for the icefish assessments are the best choice for conservation and more precautionary than alternative stock designations. One approach might be a re-assessment under the alternative assumption that there is a single stock for the Indian Ocean region. This could be used to demonstrate that the management strategies that are currently used under the assumption of separate stocks are robust and ultimately more precautionary than alternative assumptions regarding stock structure. Other approaches may also be used, such as evidence from studies designed to further elucidate stock structure/distribution.

### **SubCriterion 1.1.2**

Reliable data are available for use in stock assessments such that the high productivity of the stocks targeted by the fishery can be maintained.

*SC 1.1.2 is intended to explore whether precise information is available regarding the impact of fishing on the icefish stock, how the fishery is impacting different age or size classes, the distribution of fishing relative to the distribution of the stock and the biology of the species. Stock assessment of the icefish fishery is based on a trawl survey of available biomass and must be interpreted within the context of assumptions regarding trawl selectivity, and the temporal changes in the spatial and vertical distribution of icefish of different age classes. The estimate of available catch then relies on data concerning growth and mortality of the icefish. Data must be available to allow trends in abundance to be assessed and impact of the environment on both indices of abundance and the biological parameters used in the assessment must be known.*

### **Indicator 1.1.2.1**

Estimates exist of the removals from each target stock.

#### 100 Scoring Guidepost

- Statistically rigorous and robust estimates (and their uncertainty) of all catches and discards of the target species for each stock in the fishery, by gear type, are available at a spatial and temporal resolution that is appropriate for stock assessment.
- Reliable estimates of the mortality rates associated with release or discard are available for fish of the target species, caught by each gear type, which are released or discarded.

#### 80 Scoring Guidepost

- Reliable haul-by-haul estimates of the catches and discards are available for each target stock harvested in the fishery and gear type is recorded for each haul.
- Estimates of catches and discards of the target species for the same stocks from outside the fishery are available.
- A mechanism to ensure accurate catch reporting at the haul-by-haul level is in place.

#### 60 Scoring Guidepost

- Catch estimates for each target stock are available.
- A mechanism to ensure accurate catch reporting is in place.

SCORE            100

The estimates on removals associated with the HIMI icefish fishery are excellent. Accurate catch data are recorded for the HIMI fishery, on a haul by haul basis, for the target species and all other species within the HIMI fishery.

Records of the catches of *C. gunnari* from the Heard and Macdonald Island region (FAO statistical area 58.5.2) are reported to be available from 1971/72 (CCAMLR, 2001). Fishing

in the Heard and McDonald Islands region in the early 1970s resulted in annual catches ranging from 2,663 t to 16,166 t, with an average catch in the 5 years that the region was fished of 8,692 t (CCAMLR, 2001). Williams *et al.* (2001) note that the catch statistics for this period were not reported separately for the Kerguelen and HIMI regions, and thus the catches reported for the Heard and McDonald Islands region are best estimates based on historical records. Catches reported for 1979/80 to 1987/88 for Area 58.5 have been attributed to the Kerguelen Islands (Area 58.5.1) by CCAMLR, as Australia declared a 200 nm fishing zone in 1979 (Meyer *et al.* (2000) report that the French EEZ was declared in 1978) and commercial fishing in Area 58.5.2 recommenced in 1996/97. Catches have been recorded for the Kerguelen Islands region from 1969/70 (CCAMLR, 2001).

Since the declaration of Australia's fishing zone in 1979 and following the recommencement of commercial fishing in 1997, accurate catch statistics have been collected. There are a small number of boats fishing (currently two (AFMA, 2001b, p.30)) and, although entitled to use both midwater and demersal trawls (AFMA, 2001b, p.17), these vessels use trawls that are towed on or close to the bottom (CCAMLR, 2001). Catch estimates for the icefish are reported on a haul by haul basis in the log books and in observer reports (AFMA, 2001b, p.35), and the landings of icefish are monitored and validated by AFMA staff (AFMA, 2001b, pp. 25 and 30). In addition, extensive detail is recorded on gear type by haul with full descriptions of each specific net. Moreover, fishing permit requirements have observers collecting and recording specific data on fishing gear (e.g. bobbin sizes, mesh sizes, rockhopper rubbers) for every fishing trip.

The estimated weights recorded in the logbooks are then reconciled with the landings (AFMA, 2001b, p.36). All catches are retained as there is a "no discard" policy in the HIMI fishery. Icefish not included in the catch (either eaten on board or sent to the meal plant because of quality concerns). There is also a 'move-on' provision to minimise catch of undersize fish of the target species (de la Mare *et al.*, 1998). Observers monitor the fishing operations on a 24 hour, round-the-clock basis (AFMA, 2001b, pp. 35-36). Catches are monitored by AFMA and the fishery is to be closed if quotas are exceeded (AFMA, 2001b, p.25). Locations of vessels are monitored using VMS, thereby allowing validation of locations recorded in logbooks (AFMA, 2001b, p.38).

IUU catches affect only the accuracy of the estimated catches of toothfish, as the icefish is not targeted by these fishers (AFMA, 2001b, p.48).

### **Indicator 1.1.2.2**

[The age and size structure of catches \(and discards\) is known.](#)

#### 100 Scoring Guidepost

- Comprehensive data on the age and size structure of all catches and discards from each targeted stock are available at a spatial and temporal resolution that is appropriate for stock assessment.

- Comprehensive data on the age and size structure of catches from fishery independent surveys are available at a spatial and temporal resolution that is appropriate for stock assessment.

### 80 Scoring Guidepost

- Reliable data on the age and size structure of catches and discards of the target stocks in the fishery and estimates of uncertainty are available, with adequate statistical coverage.
- Estimates of the age and size structure of catches of the target species are available for the same stocks outside the fishery.
- Data on the age and size structure of catches from fishery independent surveys and estimates of uncertainty are available, with adequate statistical coverage.

### 60 Scoring Guidepost

Age and/or size data are available.

SCORE            95

Assessment of the icefish stocks of the Heard Island and McDonald Islands fishery rely on the research surveys undertaken by AAD in cooperation with the fishers. These surveys use a random stratified trawl survey design that covers the Heard Plateau and Shell Bank (Constable *et al.*, 1993) and employ standard methodology such that results may be compared (Williams *et al.*, 2001). Surveys are conducted in all areas and for all year classes, with increased emphasis on areas where current icefish populations are known to occur.

Biological data and material, including length frequencies and otoliths, are also collected by independent observers from the catches of icefish taken by the commercial fishery (AFMA, 2001b, p.38). Length compositions from surveys of *C. gunnari* from the Heard and McDonald Island have been subjected to mixture analyses, using the method described by de la Mare (1994), to identify modes that track through successive monthly samples with increasing modal length consistent with a reasonable growth rate (Williams *et al.*, 2001). For this species, the first three to four modes are reported by Williams *et al.* (2001) to be easily separable and this was confirmed by examining the results of the analysis for a data set of icefish from HIMI for 2003. The uncertainties of the parameters of the fitted mixture are estimated by the fitting procedure. Age classes for *C. gunnari* beyond age 5 cannot be reliably separated using this method. There has been no comparison yet with the age readings obtained from otoliths, which are collected but are difficult to read (AFMA, 2001b, p.43) and do not yet provide reliable measures of age (CCAMLR, 2001).

Annual assessments of the icefish fishery, such as those reported by Constable *et al.* (2003), are based on mixture analyses of the trawl survey data. The results of mixture analyses of the commercial catches have not been reported, except in broad form by Williams *et al.*

(2001) who reported on the geographical distribution of different age classes by plotting the presence or absence of each year class in the commercial or research hauls.

### **Indicator 1.1.2.3**

Fishing effort, at an appropriate spatial and temporal resolution and broken down by gear type, is known.

#### 100 Scoring Guidepost

All fishing methods are known. . In-situ observations are made of fishing practices. Comprehensive haul-by-haul records are kept of fishing effort, broken down by gear type.

#### 80 Scoring Guidepost

Accurate estimates of fishing effort by each gear type are available at a level of spatial and temporal resolution appropriate for stock assessment.

#### 60 Scoring Guidepost

- Main fishing methods and gear types used in the fishery, and changes over time, are known.
- Nominal effort data are available.
- A broad description is available of the spatial distribution of the nominal fishing effort and how both this and the total nominal effort change throughout the year.

SCORE: 100

Since the recommencement of commercial fishing in 1997, skippers have completed a shot by shot logbook of fishing operations (AFMA, 2001b, p.35; Antarctic Waters Catch Details Log ANT05-CA) and are required to carry independent observers, who verify the accuracy of the data supplied in the logbooks. The location of each vessel is monitored by VMS, allowing further confirmation of the accuracy of the locations recorded by the skipper in his logbook (AFMA, 2001b, p.38). Details of the trawling gear must be advised to AFMA before trawling commences or within 24 hours of any change in this gear (Antarctic Waters Vessel and Gear Details Log, ANT02-VG), and the report must be endorsed by the Independent Observer. The information collected is entered into an extensive database providing the ability to describe spatial distribution of nominal and/or adjusted fishing effort, and to describe temporal shifts in nominal or adjusted effort distribution.

No details have been reported of values of fishing effort for the period from 1970 to 1978. However, as with catches, it is likely that effort records from this period would not have been as useful as those that became available after 1997.

#### **Indicator 1.1.2.4**

The selectivity of each fishing gear used in the fishery is known.

##### 100 Scoring Guidepost

Selectivities have been accurately estimated for all gears, locations and times of fishing over time.

##### 80 Scoring Guidepost

Broad patterns of selectivity have been estimated for all gears, locations and times of fishing over time.

##### 60 scoring guideline

Some information is available on selectivity (*i.e.*, combination of size/age-dependent availability/vulnerability) and on qualitative changes in selectivity over time.

SCORE            95

The selectivity of icefish for the different net types used in the trawl fishery was investigated for a range of codend mesh sizes from 60 to 129 mm, and was reported by de la Mare *et al.* (1998).

Vulnerability of fish to capture during the fishing operations of the commercial fishery, is affected by the provision introduced by CCAMLR in 1997, *i.e.* CCAMLR Conservation Measure 110/XV, requiring that, should there be more than 10% of the catch of icefish in any haul that is less than 280 mm in length, the vessel must fish at least 5 nm away from the location of that trawl for at least five days (de la Mare *et al.*, 1998). De la Mare *et al.* (1998) advised that the length used to trigger the move on provision was too extreme and recommended that the move-on provision should be triggered by fish with a length smaller than 240 mm, rather than 280 mm. It was pointed out that very few fish of ages 2 and less would have a length greater than 240 mm, and that such a length would reduce the risk of capture of fish of ages 2 and less. The value of total length that triggers the move-on provision was subsequently set to 240 mm TL but became 290 mm TL from 1 May to 30 November, 2004 (for specific management of cohorts moving into the fishery late), and vessels were required to move if the catch of icefish from any haul exceeds 100 kg and more than 10% by number of this catch were less than this length (AFMA, 2001b, p. 51 and 53; AFMA, 2002b, 2003; CCAMLR, 2003).

Recent analysis by Russia and Ukraine of the data collected in 1987 from a joint Soviet-Australian expedition to the Heard Island region has demonstrated that, during daylight hours, young of the year and juvenile fish are found in the pelagic layer whereas adult fish were found in the catches from bottom hauls (CCAMLR, 2003). Thus, younger fish are

less vulnerable to capture by bottom trawl than older fish because of their vertical distribution. The horizontal distribution of fish will also affect the size composition of the icefish that are caught in commercial fishing, as fishing effort is concentrated on areas of higher abundance and larger sizes, and particularly Gunnari Ridge, where fish of ages 2+ and greater are concentrated (Williams *et al.*, 2001).

### **Indicator 1.1.2.5**

Details of the life history of the target species are known.

#### 100 Scoring Guidepost

- There is comprehensive knowledge of the life history characteristics of the target species, including growth rates, proportion mature at length, fecundity, recruitment, habitat interactions and requirements, and factors affecting natural mortality.
- Reliable estimates of the parameters of life history are available and are monitored over time to detect trends and shifts.
- Dependence of life history parameters on density, environment and ecologically related species is well understood and taken into account.

#### 80 Scoring Guidepost

- The life history of the target species is clearly documented and understood. Information is adequate to support an appropriate population model.
- Estimates of proportion mature at length, growth rates and natural mortality are available, together with estimates of the uncertainties of these life history parameters.

#### 60 Scoring Guidepost

- The basis of the life history of the target species is understood.
- There is information available on the maturity, growth and factors causing natural mortality.

SCORE        85

#### *Growth*

The modal lengths estimated from the mixture analysis of the monthly length composition data (see 1.1.2.2) have been plotted against time (months), from September of the year in which the year-class was spawned. Growth curves (von Bertalanffy) have been fitted to the resulting data (Williams *et al.*, 2001). The projected time of spawning has then been estimated as the time at which the predicted length from the extrapolated growth curve is zero. For the survey data that preceded the recommencement of commercial fishing, de la Mare *et al.* (1998), report that the growth curves fitted to the length at age data for the Heard

Plateau and Shell Bank did not differ significantly. Parameters of the von Bertalanffy growth curves fitted to these and later data from the Heard Plateau, Shell Bank and Kerguelen and plots of the fitted curves are reported by Williams *et al.* (2001). However, it should be noted that the value of  $t_0$  reported by Williams *et al.* (2001, Table 3) appears to be relative to the time from September, not the projected birthdate. The low variability of the data around the fitted curves results from the use of modal lengths rather than the lengths of individual fish, however the von Bertalanffy curves fit the data well and the range of data appears adequate for relatively precise estimation of the three parameters of each growth curve.

Interestingly, it is not clear whether the differences between the estimates of the parameters of the growth curves from the three regions, which were reported by Williams *et al.* (2001), are statistically significant. This has implications for the stocks as the information was used at least in part to form the basis for considering that the assemblages of mackerel icefish at Heard Plateau and Shell Banks represent separate stocks. The uncertainty associated with growth is not taken into account when estimating the TAC (although the assessment for 2003 considered an alternative set of von Bertalanffy growth parameters) (Constable *et al.*, 2003).

#### *Spawning season*

The projected date of spawning has been estimated from extrapolation of each von Bertalanffy growth curve to the date at which the expected length was zero, and has been reported by Williams *et al.* (2001) to be January/February for Heard Plateau fish, and September for mackerel icefish from both Shell Bank and Kerguelen. However, trends in the proportions of gonads that are classified to be at each stage of gonadal development indicate that spawning of fish from Heard Plateau and Gunnari Ridge occurs in August and September with the suggestion of a small amount of spawning in April, while fish at Shell Bank revealed a peak of spawning activity in April and May with a smaller peak in August (Williams *et al.*, 2001). Inconsistencies between the birthdates estimated from projections of the von Bertalanffy growth curves and those derived from examination of trends in the monthly proportions of fish with gonads at each developmental stage, as determined from macroscopic examination of gonads, need further resolution.

#### *Age and size at first spawning*

The percentage of fish taken on Shell Bank in the April 1997 survey and from Gunnari Ridge and Heard Plateau in the September 1993 and August 1997 surveys that, on the basis of gonad staging, were classified as mature was plotted against length by de la Mare *et al.* (1998). From these data, the lengths at which 50% of fish were likely to be mature were estimated and the corresponding ages at maturity determined from the von Bertalanffy growth curves fitted to length at age data from these regions. de la Mare *et al.* (1998) report that the lengths at 50% maturity were 258 mm TL at Shell Bank and between 258 and 275 mm TL at Gunnari Ridge and Heard Plateau, while the corresponding age was 3 years.

### *Annual variability of year-class strength*

The use of a standard, random stratified trawl survey allows estimation of relative abundance of year-classes at different ages. Estimates of the density of fish within each age-class are calculated for each stratum from the area swept by the trawl during each haul and the results of the mixture analysis of the length compositions (de la Mare *et al.*, 1998). Examination of the detailed description of the method provided by de la Mare *et al.* (1998) suggests that no adjustment is made for selectivity, and that the method assumes that all icefish in the area swept during the haul are caught. Abundance estimates are calculated as the product of the density of each year class and the area of the stratum, and summed to give an estimate of the total abundance (de la Mare *et al.*, 1998). Estimates of recruitment at age 2 were calculated (for the surveys in years prior to the recommencement of commercial fishing, *i.e.* 1997) from the abundance estimates for each age class by adjusting for natural mortality,  $0.4 \text{ year}^{-1}$ . The data reported by Williams *et al.* (2001) indicate that recruitment of age 0 fish is very variable and with little consistency of recruitment strength among the different aggregations. Poor recruitment appears to occur more frequently at Shell Bank than on the Heard Plateau, and occasional but infrequent strong year-classes occur in all locations. AAD is conducting additional surveys to gain a better understanding of 0+ fish.

### *Natural mortality*

An estimate of  $0.4 \text{ year}^{-1}$  is used as the value of  $M$  that is currently used in the Mathcad and GYM assessments of the icefish fishery (Constable *et al.*, 2003). According to de la Mare *et al.* (1998), this represents the mid-point of the range of values for  $M$  drawn from the review undertaken by Kock *et al.* (1985) that were used in the 1994 WG-FSA assessment. Estimates of the age-dependent survivorship of icefish were calculated from densities at age of fish from the surveys that preceded the re-commencement of commercial fishing in 1997, using Heincke's (1913) method, for ages 2 and 3 by de la Mare *et al.* (1998), yielding estimates of  $M$  of  $0.3 \text{ year}^{-1}$  for age 2 and above and  $0.64 \text{ year}^{-1}$  for age 4. Thus, in their assessment using the General Yield Model, de la Mare *et al.* (1998) used values of  $M$  ranging between  $0.3$  and  $0.64 \text{ year}^{-1}$ . The presence of relatively low number of age 5+ fish and virtual absence of age 6+ fish in either survey or commercial catches was suggested by CCAMLR (2001) to reflect increased natural mortality for fish with ages greater than (presumably) 4 years. CCAMLR (2001) noted that the values of  $M$  were likely to be age-specific and dynamic, varying between areas and years. No allowance for the uncertainty of  $M$  appears to be made in the current assessments to determine the appropriate TAC for the Heard Plateau (Constable *et al.*, 2003).

### **Indicator 1.1.2.6**

There is knowledge of the behavior (movement, migration, feeding, reproduction) of the stocks.

### 100 Scoring Guidepost

There is comprehensive knowledge of the behavior and ecological interactions of the target stocks.

### 80 Scoring Guidepost

The knowledge of the behavioral ecology of the target species is sufficient to undertake precautionary assessments.

### 60 Scoring Guidepost

There is broad knowledge of the behavioral ecology of the target species, which can be incorporated into stock assessment.

SCORE            85

The spatial distributions of mackerel icefish of different age classes have been determined by plotting the presence or absence of the corresponding modes within the length compositions of both commercial and research hauls (Williams *et al.*, 2001). For ages 2 or greater, the data used were only those hauls that contained at least 50 icefish, which were measured. From these data, they show that, after hatching in summer, 0+ fish are located on Heard Plateau, close to the island. By autumn and winter, these fish have become distributed over the shallower parts of the Plateau and, by spring, very few are caught in the bottom trawls. The 1+ fish are located on the plateau in depths less than 300 m, with most occurring in the east and with some present in the northern part of Gunnari Ridge. Williams *et al.* (2001) report that 2+ fish are concentrated in Gunnari Ridge and the eastern portion of the plateau, and appear to have a slightly greater spread in autumn. The 3+ and 4+ groups have a similar distribution to that of the 2+ fish and the centre of their distribution is Gunnari Ridge and Shell Bank. On Shell Bank, 0+ and 1+ fish were both only recorded on one occasion, in summer, while 2+ fish appear at Shell Bank in winter. Movement of icefish must be inferred from these spatial distributions, as tagging is not appropriate for this species (CCAMLR, 2001).

Water depths in the Southern Plateau range from 200-500 m, Shell Bank from 180-350 m, Pike Bank from 300-500 m, and Discovery Bank from 300-400 m (Meyer *et al.*, 2000). Water depths greater than 500 m separate these regions. As noted above in 1.1.1.2., the species is reported by Williams *et al.* (2001) to occur only in waters less than 500 m deep and “almost without exception” in depths less than 400 m. However, it should be noted that research surveys at HIMI have used bottom trawls during daylight and commercial vessels use trawls that are towed on or close to the bottom (CCAMLR, 2001), rather than mid-water trawls.

Recent analysis by Russia and Ukraine of the data collected in 1987 from a joint Soviet-Australian expedition to the Heard Island region has demonstrated that, during daylight hours, young of the year and juvenile fish are found in the pelagic layer whereas adult fish were found in the catches from bottom hauls (CCAMLR, 2003). Frolkina (2002) reported

that, at South Georgia, larvae were found in the upper 100 m of water, young fish (< 6 cm) undertook vertical migrations during daylight and returned to the bottom at night. They were mainly located at the bottom and in depths up to 75 m. Immature fish undertook vertical migrations but were distributed throughout the water column throughout the day. Mature fish were found at the bottom during the day, but were located in the water column at night, but larger fish (>40 cm) did not undertake vertical migrations. Further work is being conducted by CSIRO and AAD using echolistener data collected from a variety of locations in shallow water.

Williams *et al.* (2001), citing Gherasimchuk *et al.* (1998) and Duhamel (1991), reports that the principal species found in the diets of icefish are euphausiids and amphipods, principally *E. vallentini* and *Themisto gaudichaudi*.

CCAMLR (2001) notes that spawning patterns, spawning seasons and reproduction of almost all icefish stocks have been studied, while Williams *et al.* (2001) report details of changing monthly proportions of gonads in various stages of development at Heard Plateau and Shell Bank. No details appear to be available of whether icefish aggregate on specific spawning grounds at Heard Island and McDonald Island, but Kock and Emerson (2003) comment on spawning migrations made by individuals of this species (in at least some stocks) to specific spawning grounds.

#### **Indicator 1.1.2.7**

[There is information on trends in abundance of stocks.](#)

#### 100 Scoring Guidepost

- Comprehensive fishery dependent and independent surveys of abundance covering all significant stocks are undertaken at an appropriate frequency.
- Trends in indices are consistent and there is clear evidence that they are representative of the stock size.
- Time series of surveys extend back prior to the start of significant fishing.

#### 80 Scoring Guidepost

- Fishery independent surveys of abundance, which cover all significant spatial components of the population, are undertaken on a frequent basis.
- Fishery dependent indices of the abundance of each stock, and estimates of uncertainty, are available.
- Survey design and sampling methods are statistically rigorous and robust.

#### 60 Scoring Guidepost

- Fishery independent surveys of abundance are undertaken on an ad hoc basis.
- Fishery dependent indices of abundance are available as indicators of stock size.

Fishery-independent, random stratified trawl surveys have been conducted by AAD since 1990 (Williams *et al.*, 2001), covering the Heard Plateau and Shell Bank. There is limited survey coverage of Pike and Discovery Banks. Although the strata have been modified slightly over the years, the data collected have been re-allocated to the new strata and re-analysed. The surveys have employed the same methodology and thus results are comparable (Williams *et al.*, 2001). Surveys had been conducted in May/June 1990, February 1992, September 1993, August 1997, May 1998, May or June 1999, May 2000, May 2001, May 2002, May 2003 (Williams *et al.*, 2001; Constable *et al.*, 2003). Additional data from from acoustic transects with IYGPT nets used for goundtruthing have been collected in May 2002 and May 2003. Similar studies are available for 2004/2005.

Only bottom trawls have been used in the research surveys (Williams *et al.*, 2001). As noted previously, recent analysis by Russia and Ukraine of the data collected in 1987 from a joint Soviet-Australian expedition to the Heard Island region has demonstrated that, during daylight hours, young of the year and juvenile fish are found in the pelagic layer whereas adult fish were found in the catches from bottom hauls (CCAMLR, 2003). Estimates of biomass calculated from the research surveys are therefore likely to underestimate the size of the icefish stock. However, as the research surveys are conducted using standard methodology, results should be comparable. Nevertheless, values of natural mortality calculated from densities at age derived from these surveys, such as those using the modified Heincke (1913) method described by de la Mare *et al.* (1998), may underestimate the true level of natural mortality for younger age classes.

Excelent and detailed haul by haul logbook catch and effort data have also been collected from commercial fishing vessels since the re-commencement of the commercial fishery in 1997 (AFMA, 2001b, p.35). Independent observers monitor the operations of the vessels and ensure that logbook records are correct. A VMS system is used to validate the recorded locations of the vessel and landed catches are validated against logbook estimates of catch (AFMA, 2001b, pp. 25, 30 and 36).

Trends in abundance are determined from the research surveys and both AFMA and AAD have recognised that regular surveys of icefish are essential for stock assessment of mackerel icefish (AFMA, 2001b, p.49). Estimates of biomass are calculated using both a delta-lognormal maximum likelihood estimator and bootstrapped estimates of mean and confidence intervals (de la Mare *et al.*, 1998), and the latter estimates are then used when assessing the stock and determining the TAC (Constable *et al.*, 2003). Williams *et al.* (2001) have presented plots showing trends in abundance for Heard Plateau and Shell Bank from 1990 to 2001, and Constable *et al.* (2003) have plotted the estimates of abundance and confidence intervals for Heard Plateau between August 1997 and May 2003. In their assessment of the 2002 survey, Constable *et al.* (2002) noted that no icefish had been caught in the survey trawls at Shell Bank, and thus this stratum was excluded from the 2002 assessment. In addition, this area has remained closed to commercial fishing operations.

Although commercial catch and effort data are available since the re-commencement of commercial fishing in 1997, no indices of abundance derived from these fishery-dependent data have been presented in the stock assessments for mackerel icefish from the Heard Plateau or Shell Bank. Such data might provide additional information that could assist in assessing trends in abundance of icefish. However, the data that are considered most valuable are those derived from the fishery-independent trawl surveys. These have been collected annually since 1997 using a sound sampling regime, and provide estimates of the biomass sampled by the bottom trawls, together with estimates of the confidence limits of the biomass estimates. The time series extends back to the re-commencement of commercial fishing in 1997.

The underlying distribution of icefish is patchy and patches are small and mobile, and the survey design recognises this. Without such recognition, there would be considerable uncertainty in estimates of abundance and point estimates would likely be biased. The biomass estimates from Heard Plateau and Shell Bank suggests that the patchy distribution of icefish may be influencing these estimates. Everson *et al.* (1996) proposed a combined acoustic and trawl survey design to resolve such problems for mackerel icefish. This is at least in part being accomplished. Consideration has recently been given to survey designs that might allow more precise estimation of abundance (while retaining the ability to compare results with those from earlier surveys).

#### **Indicator 1.1.2.8**

[There is knowledge of environmental influences on stock dynamics.](#)

##### 100 Scoring Guidepost

Impacts of regime shifts and inter-annual variability in environmental conditions are well understood and incorporated in the assessments.

##### 80 Scoring Guidepost

- Impacts of inter-annual variability on stock abundance have been studied and are taken into account in the assessment.
- Impacts on distribution and availability of fish have been studied and inform the stock assessment process.

##### 60 Scoring Guidepost

Impacts of inter-annual variability in environmental conditions on distribution and availability of fish have been studied.

SCORE            79

Kock and Everson (2003) have proposed that the decline in yield of mackerel icefish is due to a combination of fishing pressure and a deterioration in the environment in the northern parts of the distribution of the species. The latter factor (deterioration in the northern parts of icefish distribution) could likely influence the growth, mortality, size at first maturity, fecundity and annual recruitment.

Using random stratified trawling surveys to assess the initial state of each icefish substock in the Heard Island, McDonald Islands region, the impacts of inter-annual variability in environmental conditions on the distribution and abundance of fish are considered (de la Mare *et al.*, 1998). However, while current assessments such as those described by Constable *et al.* (2003) address changes in abundance associated with variable recruitment, they do not consider the uncertainty of growth and mortality, nor the possibility that size at first maturity and fecundity may be affected by environmental factors.

It should be noted that, at least to some extent, the variability in these parameters is accommodated by the decision to use the one-sided lower 95% confidence limit of the survey biomass estimate as the basis for projections and determination of the TAC. However, the data should be investigated to determine sensitivities to the variability in growth, mortality, age/size at first maturity and fecundity and whether there is any relationship between these and the environmental data. The results of such analyses should be incorporated into the assessments of the TAC.

## **Condition 1.2**

The client should provide evidence that the fishery assessments meet the first bullet point under the 80 scoring guidepost – “Impacts of inter-annual variability on stock abundance have been studied and are taken into account in the assessment”. For example, analyses could be provided that show how the fishery assessments factor in uncertainty in growth, mortality, size at first maturity and fecundity, and the influence of the environment on these variables.

### **SubCriterion 1.1.3**

[Appropriate reference points have been set for the management of the stock.](#)

*SC 1.1.3 examines whether the limit and target reference points that have been established for the fishery are appropriate and are likely to ensure that the stocks of icefish will be sustained and that the fishery will produce optimal catches.*

#### **Indicator 1.1.3.1**

[Limit Reference Points \(LRPs\) or operational equivalents have been set.](#)

#### 100 Scoring Guidepost

LRPs for target stocks are justified based on biology, uncertainty, variability, data limitations, knowledge of ecosystem impacts, and statistical simulations of these factors.

### 80 Scoring Guidepost

LRPs for target stocks are justified based on stock biology and take into account available knowledge of fishery impacts on non-target species and the ecosystem.

### 60 Scoring Guidepost

LRPs for target stocks have been chosen and are justified based on standard international practice.

SCORE        75

Section 10 of the Heard Island and McDonald Islands Fishery Management Plan requires that AFMA determines reference points for each target species that are “appropriate for maintaining ecologically viable stocks of the target species and an ecologically sustainable fishery” (AFMA, 2002a). There is no instruction as to whether these reference points should be specified as either limit or target reference points, however the wording adopted by AFMA (2001b, p.43), and as confirmed in subsequent discussions with AFMA staff, indicates that the limit reference points for the icefish fishery are

- The probability that spawning biomass will fall below 20% of the pre-exploitation level over the two year projection period must not exceed 0.1; and
- The median escapement for the fishery of the spawning biomass shall not be less than 75% over a two year projection.

AFMA is required to take into account the TAC determined for icefish by CCAMLR (AFMA, 2002a, Section 11). However, the reference points specified by AFMA, above, are the reference points under which the fishery is managed. Thus, in determining the score, we have based our assessment on the two points listed above. It was noted, however, that AFMA’s reference points as listed on page 43 of the Assessment Report differ from that reported on page 51 (AFMA, 2001b), which advises that the only reference point is that “the median escapement from the fishery of the spawning biomass shall not be less than 75% over a two year projection”.

By itself, a limit reference point such as the latter attempts to ensure that harvest rates are sufficiently low that the stock might be sustained, yet the absolute biomass of the stock is not considered. The reference point only ensures that a specified fraction of the initial biomass is preserved, but does not ensure that the level of initial biomass does not decline. Thus, there is no “bottom line” that specifies an absolute biomass that must remain available to seals and penguins. To ensure that a minimum level of biomass is maintained, a second reference point is required, such as that listed above, requiring that there is a low probability that the spawning biomass will fall to a level below 20% within some specified period. It

should be noted that the lack of a specified lower limit for biomass is also of concern to CCAMLR scientists, who continue to search for an appropriate method by which such a limit might be calculated for a fishery with such highly-stochastic inter-annual recruitment as displayed by icefish (A. Constable, 2004, pers. comm.).

The wordings of the reference points needs greater precision We have assumed that the first reference point is intended to capture the intent of the reference point that CCAMLR had initially adopted, namely that the probability that the spawning biomass of the icefish stock would fall below 20% of the median, pre-exploitation level of spawning biomass must not exceed 0.1. Such a reference point specifies a base level of biomass for the stock, which must be considered when managing the fishery. We have assumed also that the second reference point is intended to specify that the median escapement of icefish following two years of fishing must result in a spawning biomass that is not less than 75% of the median spawning biomass that would have resulted from the same stock if there had been no exploitation over the two year period.

The use of 20% of the unfished stock or spawning biomass as the critical level for such an indicator was first proposed by Beddington and Cooke (1983). Typically, it is also proposed that the probability should not exceed 10% that the indicator will fall below this critical level. This reference point is often used as a biological reference point for fisheries that are assessed using single-species fishery models. Indeed, initially CCAMLR had adopted as a limit reference point for the icefish stock that the probability of the spawning stock falling below 20% of the median unexploited spawning stock biomass should not exceed 10%. However, after analysis of the icefish fishery using the Generalised Yield Model, de la Mare *et al.* (1998) reported that the probability of the spawning stock falling below 20% of the median unexploited stock level was about 0.5, even in the absence of a fishery! With the specified reference point, this result would have implied that the stock should not be exploited. After recognising that their initial reference point failed to consider the reality of a highly-stochastic inter-annual recruitment in the icefish fishery, CCAMLR decided that an appropriate objective would be to ensure that the probability that, over a specified period, the spawning stock might fall below the 20% level was not “substantially increased” by fishing (de la Mare *et al.*, 1998). In their evaluation, de la Mare *et al.* (1998) applied a value of 0.05 as the acceptable upper limit of this increase in probability and projected the fishery over a 20-year period to determine precautionary levels of constant catch that would not increase the probability above this limit. The 20-year time period considered by de la Mare *et al.* (1998) is more appropriate than the two-year time period specified in the first of AFMA’s limit reference points, above. A period of two years is too short, as this fails to consider the impact that fishing might have on subsequent recruitment to the fishery or the long term impact on other species.

The value of 75% selected as the maximum percentage by which the unexploited spawning stock surviving from the initial biomass after two years might be reduced after two years of fishing is arbitrary. This proportional escapement criterion is based on an assessment for krill and, according to de la Mare *et al.* (1998), is considered by CCAMLR to be sufficient to take into account the requirements of dependent predators. Essentially, it was argued that

the best outcome for predators is that the spawning stock is maintained at 100% of its unfished level, *i.e.* no exploitation is permitted, whereas the best outcome for fishers is if the stock is exploited to provide the maximum yield, which would result in a spawning stock biomass that would be approximately 50% of the unfished level. Thus, 75% proportional escapement represents a subjective compromise giving equal weight to both objectives.

From the above, the first reference point appears poorly defined because, as demonstrated by CCAMLR, high variability in annual recruitment results in a probability of 0.5 that the spawning biomass will fall below the critical level, thus exceeding the probability of 0.1 specified in the reference point. Both reference points can be justified as conforming to standard international practice from a single-species perspective, however, AFMA's management plan (and CCAMLR's objectives) requires that reference points are specified for the icefish fishery that are appropriate for maintaining both ecologically viable stocks of the target species and an ecologically sustainable fishery. There is currently a need for an objective assessment of the ability of these reference points to achieve these goals for the icefish fishery.

### **Condition 1.3**

The client should provide evidence that a comprehensive review has been or is being undertaken regarding appropriate Limit Reference Points for the Icefish fishery. Evidence should be provided that the LRPs used meet the AFMA requirements (are appropriate for maintaining both ecologically viable stocks of the target species and an ecologically sustainable fishery), are appropriate for the biology of the icefish stock and takes into account available knowledge of fishery impacts on non-target species and the ecosystem, and ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified maximum level. The results of this review should be published.

#### **Indicator 1.1.3.2**

Target Reference Points (TRPs) or operational equivalents have been set.

##### 100 Scoring Guidepost

TRPs for target stocks are justified based on biology, uncertainty, variability, data limitations, knowledge of ecosystem impacts, and statistical simulations of these factors.

##### 80 Scoring Guidepost

TRPs for target stocks are justified based on stock biology and take into account available knowledge of fishery impacts on non-target species and the ecosystem.

##### 60 Scoring Guidepost

TRPs for target stocks have been chosen and are justified based on standard international practice.

SCORE 75

The wording of the reference points adopted by AFMA (2001b, p.43), and listed at 1.1.3.1, implies that these are limit reference points. However, AFMA has specified that the lower value of catch required to achieve both reference points is to be used as the TAC for the icefish fishery (AFMA, 2001b, p.43). Thus, it appears that the more conservative limit reference point is required to be used as a target reference point. It would also appear that the use of a limit reference point as a target reference point is not all that precautionary. On average, the TAC set in accordance with such a target reference point is likely to cause the associated indicator variable to exceed the limit reference point on 50% of occasions. A target reference point should be defined that is more conservative than the limit reference point, and this target reference point rather than the limit reference point should be used when calculating the TAC.

Section 11 of the Heard Island and McDonald Islands Fishery Management Plan requires that, before the start of each fishing year, AFMA must determine a total allowable catch for each target species (AFMA, 2002a). AFMA must take into account the TAC set by CCAMLR and the reference points that it has set under Section 10 of the HIMI Fishery Management Plan, and must consult and consider the views of both SouthMAC and SAFAG (AFMA, 2002a). However, the TAC that is set for icefish must not exceed that recommended by CCAMLR. In practice, SouthMAC and SAFAG have endorsed the TAC recommended by CCAMLR and this TAC has been adopted subsequently by AFMA (AFMA, 2001b, p.41, p.50 and p.54). According to the assessment described by Constable *et al.* (2003), the CCAMLR reference point that is applied to the icefish fishery when AAD calculates the TAC is that there should be,

“A probability of no more than 0.05 that the spawning stock after fishing would be less than 75% of the level that would have occurred in the absence of any fishing”.

The first of the limit reference points listed in 1.1.3.1 does not appear to be considered when the TAC is calculated. Also, it appears that no target reference point is specified for stock biomass and no calculation is made of an appropriate level of TAC that would be likely to provide a “safety net” of icefish sufficient to meet the demands of predators. As noted above, however, after analysis of the icefish fishery using the Generalised Yield Model, de la Mare *et al.* (1998) reported that, as a result of highly variable recruitment, the probability of the spawning stock falling below 20% of the median unexploited stock level was about 0.5, even in the absence of a fishery! It is interesting to note that the resulting considerable fluctuation in icefish numbers suggests that the predators cannot be entirely reliant on the icefish.

#### **Condition 1.4**

1. A review should be provided about what target reference points, which are based on the biology of the icefish stock and take into account available knowledge of fishery impacts on non-target species and the ecosystem, should be specified for the icefish fishery. The analysis should examine how target reference points considered are more precautionary than the corresponding limit reference points and how they ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified maximum level.
2. The review provided should discuss how the target reference points used or proposed for use by AFMA for the icefish fishery compare with those specified or applied by CCAMLR.

#### **SubCriterion 1.1.4**

There is a robust assessment of the stocks.

#### **Indicator 1.1.4.1**

Assessment models are used and are appropriate to the biology of the stock and the nature of the fishery.

#### 100 Scoring Guidepost

- Assessment models capture all major features appropriate to the biology of the species and the nature of the fishery, and represent the stock at a spatial and temporal resolution that is appropriate to address management needs.
- Natural mortality is time and age specific and takes explicit account of predation mortality.

#### 80 Scoring Guidepost

- Assessment models are available for each stock and take into account the biology of the species.
- The assessment models used are state of the art for single species assessments, and take account of all likely sources of fishing mortality.
- The variability associated with environmental variables and the ecosystem is broadly included in the assessment model.
- Alternative models have been investigated.

#### 60 Scoring Guidepost

Generic assessment models are used for each stock.

SCORE            95

Estimates of the biomass of icefish and of the age composition of the stock for ages classes for ages of 2, 3 and 4 years are obtained for both the Heard Island Plateau and Shell Bank from random stratified trawl survey indices of abundance in combination with the results from the mixture analysis of the length composition data derived from the samples taken from the trawl catches of this survey (AFMA, 2001b, pp. 42-43). A bootstrapping approach is used to determine the distribution of the estimate of biomass and, to allow for the uncertainty of this estimate in subsequent management advice, the one-sided lower 95% confidence bound of the estimate is used as the estimate of current stock biomass in subsequent analysis (Constable *et al.*, 2003). Projections are then made from this estimate of biomass, and associated age composition, using an age-structured model implemented in Matcad and applying different constant levels of fishing mortality, to determine the fishing mortality that, two years later, would result in a residual spawning stock equal to 75% of the spawning stock that would result if no fishing mortality was applied (Constable *et al.*, 2003). That is, the criterion specified by Constable *et al.* (2003) is “*to calculate the fishing mortality which would result in a probability of no more than 0.05 that the spawning stock after fishing would be less than 75% of the level that would have occurred in the absence of any fishing*”. Both AFMA and AAD have recognised that regular surveys of icefish are essential for stock assessment of this species (AFMA, 2001b, p.49).

Reliance on the use of mixture analysis of the length composition and assignment of a presumptive age based on modal lengths may be less reliable than the estimation of age composition from length composition data using an appropriate age-length key derived from reading the otoliths of a calibration sample. It is noted that, in the 2003 assessment, the length range of 2+ fish straddled the size range expected of 2+ and 3+ fish, requiring an assumption regarding the presumptive age of this mode (Constable *et al.*, 2003).

The 2003 assessment included an evaluation of an adjustment to the von Bertalanffy growth parameter  $t_0$  to reconcile the differences between the mean lengths estimated from the length composition and those mean lengths estimated from the growth curve fitted to estimates of length at age from the length compositions from earlier years (Constable *et al.*, 2003). The biomass of the stock is estimated directly from the survey indices, thus accounting for the influence of environmental factors that have affected the stock prior to the survey. To some extent, the possibility that growth has been influenced by the environment, and may continue to be influenced, is recognised by considering the impact on the assessment of this alternative growth parameter. However, the recommendation by Constable *et al.* (2003) that this adjusted value should be used in future assessments suggests that a deterministic approach is still being used rather than one that incorporates the uncertainty in the estimates of the growth parameters. Setting the value of the instantaneous coefficient of natural mortality to  $0.4 \text{ year}^{-1}$  (Constable *et al.*, 2003), assumes that this is an accurate estimate. No consideration has been given to alternative, possibly lower values of  $M$ .

Prior to the development of the approach described above, the fishery was assessed by de la Mare *et al.* (1998) using the Generalised Yield Model (Constable and de la Mare, 1996). Using this model, and incorporating the uncertainties of annual recruitment and natural

mortality for two values of the minimum age of fish selected by the fishery and two growth curves, the effects of a constant catch applied over a 20-year period were projected to assess the escapement of the spawning stock and the probability of depletion to below 20% of the median spawning biomass relative to the values of those indicators prior to exploitation. Precautionary catch limits were selected such that the probability of the spawning stock falling below 20% of the median value prior to exploitation was not increased by more than 0.05. These precautionary catch limits were estimated to be 180 t for Heard Plateau and 18 t for Shell Bank each year. The median levels of escapement were estimated to lie above 75% for the values of constant catch considered by de la Mare *et al.* (1998). Using the approach that has now been adopted by CCAMLR, with annual surveys and assessments, the catch of icefish that is estimated to be available, based on the estimated biomass from the 1997 survey, is 900 t in the first year and 600 t in the second year. This change recognizes the additional information that is now available to allow for a more precise estimate and therefore variable catches over time.

A modified version of the Generalised Yield Model (Constable and de la Mare, 1996) was employed in 2003 to complement the assessment of the icefish data from the 2003 trawl survey. This model was intended to replicate the approach described above, that was used with the one-sided lower 95% confidence bound of the biomass estimate to calculate the fishing mortality that would result in a residual spawning stock equal to 75% of the spawning stock that would result if no fishing mortality was applied. The values of yield estimated using the GYM were slightly higher than those estimated using the Mathcad version. The lower estimate was used in establishing the TAC as it was considered more precautionary.

#### **Indicator 1.1.4.2**

[Stock assessment methods are statistically rigorous, major uncertainties have been considered and assumptions have been evaluated.](#)

#### 100 Scoring Guidepost

- The assessment method has been simulation tested and the results show that major outputs of management interest meet required levels of precision and accuracy.
- The assessment addresses all statistically significant uncertainties in the data and functional relationships and evaluates the assumptions in terms of scope, direction and bias relative to management-related quantities.
- There is a comprehensive evaluation of sensitivities to assumptions, parameters and data for key outputs of interest such as stock abundance.

#### 80 Scoring Guidepost

- The assessment uses parameter estimation procedures that take account of observation and process uncertainty and are recognized to comply with accepted standards of statistical analysis.

- The assessment takes into account major uncertainties in the data and functional relationships.
- The robustness of the management advice to sensitivities in the assessment has been investigated.

## 60 Scoring Guidepost

Sensitivity analyses have been conducted.

SCORE            79

Stock assessments of icefish at Heard Island and McDonald Islands are based on statistical analysis of the data collected using a random stratified trawl survey (de la Mare *et al.*, 1998; Williams *et al.*, 2003). The age structure of the stock is determined by subjecting the length frequency data to mixture analysis, thus identifying the clearly defined components for age classes up to about age 4 years (Williams *et al.*, 2001). Estimates of uncertainty for both the biomass estimate and the parameters of the components in the mixture comprising the length composition are calculated appropriately when analysing these data. Subsequent management advice is determined by calculating a TAC in accordance with a reference point. For this calculation, estimates of the uncertainty in the estimate of initial biomass are taken into account by using as the starting point of the projection, an initial biomass set as the one-sided lower 95% confidence bound of bootstrapped estimates of the biomass estimated from survey results (Constable *et al.*, 2003). The value of natural mortality used in the projection was set at 0.4 year<sup>-1</sup>, a deterministic weight-length relationship was used, length at maturity was set in the GYM such that all fish were considered mature, and growth parameters were selected for the GYM as one of two alternative sets of von Bertalanffy growth parameters with growth being considered deterministic. Yield from the 1+ cohort of fish was excluded from the analysis and the initial biomass used in the projection was adjusted to exclude this cohort. A value of fishing mortality was then calculated such that it satisfied the requirement specified by the reference point. The alternative growth curves, which were considered in the assessment of the 2003 survey results, were used to resolve differences that had been noted between the mean lengths of cohorts determined from the mixture analysis and the mean lengths calculated from the growth curves.

The current approach that is used in determining the recommended TAC does not appear to explicitly take into account the uncertainty in the estimate of natural mortality, the imprecision in the estimates of the parameters of the mixture of components of the length composition data or the uncertainty in the parameters of the growth curve. Notwithstanding this, the uncertainty in these parameters is recognised to some extent by the decision to use the one-sided lower 95% confidence limit of the survey biomass estimate as the basis for projections and determination of the TAC. The natural mortality of icefish is a source of major uncertainty and uncertainty in this parameter should be explicitly assessed. Similarly, variability in growth is likely to be an important factor and should also be considered explicitly when calculating the TAC.

## Condition 1.5

The approach that is used in determining the recommended TAC should be investigated relative to uncertainty in the estimate of natural mortality, the imprecision in the estimates of the parameters of the mixture of components of the length composition data and the uncertainty in the parameters of the growth curve, and alternative stock structures. There should be an explicit report demonstrating the precautionary nature of the approach and how additional information on these parameters is being incorporated.

### SubCriterion 1.1.5

Stocks are not depleted and harvest rates are sustainable.

#### Indicator 1.1.5.1

Current stock sizes are above associated limit reference points.

##### 100 Scoring Guidepost

Stock assessments show the stock to be above the LRP with greater than 90% probability.

##### 80 Scoring Guidepost

Stock assessments show that there is a greater than 80% probability that the stock is above the LRP.

##### 60 Scoring Guidepost

Stock assessments show that there is a reasonable chance that the stock is at or above the LRP.

SCORE        75

Determination of whether the stock size lies above the stock size associated with the limit reference point is somewhat hampered by the current specification of the limit reference point. As noted previously, the status of the stock will also depend upon assumptions relating to the stock structure of icefish in the Heard Island and McDonald Islands fishery. The decision to manage each of the presumptive icefish stocks separately requires that, if a fishery-wide reference point such as that used by AFMA is specified, consideration must be given to how the assessments of the individual stocks are to be weighted and combined to allow assessment against the reference point.

Although there has been no assessment of whether the current stock size is above a specific limit reference point, the results obtained by de la Mare *et al.* (1998) from the Generalised Yield Model indicate that, even for the unexploited stock of mackerel icefish, there is a probability of 0.5 that the current stock size lies below the limit reference point defined by AFMA (2001b, p.43).

### **Condition 1.6**

Meet Condition 1.3. In meeting Condition 1.3, ensure that there is an assessment that shows the probability that the current spawning biomass lies above the chosen limit reference point for the icefish stocks at HIMI. This report should be reviewed by AFMA, AAD, and CCAMLR.

### **Indicator 1.1.5.2**

Current exploitation rates are below associated limit reference points.

#### 100 Scoring Guidepost

Stock assessments show the current exploitation rate to be below the LRP with greater than 90% probability.

#### 80 Scoring Guidepost

Stock assessments show that there is a greater than 80% probability that the current exploitation rate is below the LRP.

#### 60 Scoring Guidepost

Stock assessments show that there is a reasonable chance that the current exploitation rate is at or below the LRP.

SCORE        79

The TAC that is adopted by AFMA for the icefish fishery is the catch calculated by AAD that will ensure a probability of no more than 0.05 that the spawning stock after fishing would be less than 75% of the level that would have occurred in the absence of any fishing (Constable *et al.*, 2003). Thus, theoretically, if the assumptions used in the calculation of the TAC are correct, the TAC should ensure that current exploitation rates are below the associated limit reference point with 95% probability. If the exploitation rates were indeed less than the limit reference point, the resulting survey estimates of the residual spawning biomass following two years of fishing would be expected to lie above the levels of spawning biomass predicted from the survey estimates two years earlier. However, concern was raised during interviews that the proportional escapement goal may not be achieved each year.

## **Condition 1.7**

Meet Condition 1.3. In addition, show with what probability subsequent survey estimates of the biomass of the residual spawning stock exceeded the levels predicted over recent years.

### **SubCriterion 1.1.6**

There is a precautionary harvest strategy to manage the target stocks, including rules for setting catch limits.

#### **Indicator 1.1.6.1**

Clear, well-tested, precautionary harvest control rules have been established and tested and shown to be effective in meeting management objectives.

#### 100 Scoring Guidepost

- The harvest control rule has been thoroughly simulation tested and shown to be effective when taking into account ecological interactions, predator-prey relationships, and regime shifts.
- The agreed harvest strategy is applied without exception.

#### 80 Scoring Guidepost

- The harvest control rule has been simulation tested and shown to be effective with respect to the uncertainty concerning the biology of the stock and the uncertainties associated with stock assessment.
- Decisions about catch limits follow the agreed strategy.

#### 60 Scoring Guidepost

- There is an explicit, well-documented control rule that is effective in achieving the objectives with respect to limit reference points.
- The control rule is being applied.
- Decisions about catch limits generally follow the agreed strategy.

SCORE: 79

The TAC that is set for each stock in the icefish fishery at Heard and McDonald Islands is calculated from the results of an analysis of a random stratified trawl survey of the stock that is available. Using a forward projection from the lower 95% limit of the bootstrapped estimates of biomass, the yield that is likely to be obtained with a specified level of fishing

mortality can be estimated and the biomass of the residual stock following two years of fishing can be estimated. This residual biomass is compared with that which is estimated to be left if no fishing had occurred. The level of fishing mortality is adjusted until the required proportional escapement is achieved, and the resulting yield at this level of fishing mortality in the first year of the projection is recommended as the TAC. Theoretically, provided growth and natural mortality are in accordance with the assumed values and if there is no bias in the initial estimate of the lower 95% confidence limit of the bootstrapped biomass or age composition derived from the mixture analysis, the recommended TAC should achieve the objective that was intended.

Annual trawl surveys are being undertaken and the need to continue these surveys is recognised. The TAC is calculated in accordance with the established procedure (Constable *et. al.*, 2003) and the calculated TAC from CCAMLR is reviewed by SouthMAC and SAFAG before being adopted by AFMA. Observer scrutiny and close monitoring of catches ensure that the TAC is unlikely to be exceeded.

Currently there appears to have been no simulation testing to ensure that the strategy is indeed robust with respect to the assumptions. The possibility exists that the random stratified trawl survey may result in biased estimates of initial biomass when applied to a stock that is likely to be patchily distributed, with small, mobile patches. Simulation of the distribution of the stock and the results from a random stratified survey, in combination with projections employing age-dependent and variable mortality, variability in growth and uncertainty in estimates of age structure, are required to demonstrate that the approach to setting the TAC that has been adopted for the icefish fishery is robust. While the limit reference point has been specified in terms of 75% proportional escapement, the objective is sustainability. There needs to be an evaluation, using simulation, that a fish stock with highly variable annual recruitment and some reasonable range of assumptions concerning the underlying stock-recruitment relationship can be sustained over at least several decades using such an approach as that adopted for the icefish fishery. Stock-recruitment hypotheses that are considered should also include depensatory relationships, thus allowing for the impact of predation and the possibility of a “predator pit”. Essentially, if, as recommended above at 1.1.3.1, a limit reference point is specified that ensures that a minimum level of biomass is maintained, this simulation is simply a test to ensure that the TACs that are set are likely to maintain the biomass above the level specified by this limit reference point.

### **Condition 1.8**

Carry out appropriate simulation testing to consider the harvest strategy in relation to the characteristics of the icefish stock to evaluate the robustness of the reference points and the fishery management model.

### **MSC Criterion 2**

Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

### **Indicator 1.2.1**

There is a well-defined and effective strategy, and a specific recovery plan in place, to promote recovery of the target stock within a reasonable time frame.

#### 100 Scoring Guidepost

- The strategy requires that regular fishery independent monitoring of stock is implemented to monitor progress of the recovery plan.
- The strategy requires that the management response is modified if monitoring demonstrates significant departure of the stock from the expected recovery trajectory.

#### 80 Scoring Guidepost

- There is a well-defined precautionary trigger that initiates the recovery strategy.
- If the recovery strategy allows the fishery to continue operating, but with a reduced level of allowable catch, the fishery-dependent data will be used to monitor the response of the stock. There are comprehensive and pre-agreed management responses to ensure recovery of the depleted stock within a specified and appropriate time frame.
- Through simulation testing, it has been demonstrated that the recovery plan has a high probability of achieving successful recovery.

#### 60 Scoring Guidepost

A recovery plan exists that clearly identifies the conditions under which it will be invoked, identifies a time frame for recovery that is appropriate to the biology of the species, and specifies appropriate controls on the level of exploitation that, at face value, are likely to achieve recovery within the specified time period.

SCORE        79

AFMA has noted that, if assessments indicate that there has been a sustained decline in the estimated spawning biomass below the reference points, then TACs or precautionary catch limits are reduced (AFMA, 2001b, p.55). Zero TACs can, and have been, implemented. The example used to demonstrate that such action is taken is the closure of the Shell Bank fishery for icefish due to assessments indicating that the stock of icefish in this region had fallen to an unacceptable level. A change to this closure can only occur if supported by

CCAMLR and following consultation and advice from SAFAG, SouthMAC, and AFMA (AFMA, 2001b, p.56).

At least implicitly, as demonstrated by the Shell Bank closure, there is a lower limit to the biomass that requires that the fishery must be closed. This limit needs to be explicitly identified, but is likely to be the limit reference point for biomass required to be established as specified in 1.1.3.1. Since the control adopted for the icefish fishery appears to be a complete closure to fishing, the time to recovery is then determined solely by the biology of the stock and environmental variability. However, it is important that the control rules that are to be adopted if the biomass falls below the limit reference point are explicitly stated. If some reduced level of fishing is allowed with, for example, a requirement for greater proportional escapement, simulation studies are needed to ensure that there is a high probability of stock recovery within a specified period.

Despite closure to fishing, there appears to be no recovery of the icefish stocks at Pike and Discovery Banks, nor is there any indication of a recovery at Shell Bank. This raises questions as to whether these stocks were depleted in the late 1970s to too low a level to allow a recovery within the periods that have elapsed, the areas require an influx of recruits from another region, or adverse environmental conditions are impeding recovery.

### **Condition 1.9**

The client only needs to develop and abide by a condition for this indicator if it plans to begin fishing in areas previously described as depleted (i.e. Pike, Discovery, and Shell Banks ). Before commercial harvesting is permitted to recommence on these populations/stocks, the fishery management system would have to:

1. Provide an explicit specification of the conditions that require that the recovery strategy is invoked.
2. Specify precisely how the harvest is to be controlled as the stock recovers, the time period expected for recovery, and the conditions that signal that the stock has recovered.
3. Provide a simulation study that demonstrates that there is a high probability that the stock will recover if the recovery strategy is invoked.

### **MSC Criterion 3**

**Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.**

#### **Indicator 1.3.1**

The age/sex/fecundity/genetic structure of the stock is monitored.

#### 100 Scoring Guidepost

- Population age/sex/maturity/fecundity structure of each target stock is well estimated with only insignificant errors.
- Genetic studies of the target stocks are made at time intervals appropriate to the species.

#### 80 Scoring Guidepost

- Population age/sex/maturity/fecundity structure of each target stock is based on adequate sampling and verification. Ageing errors are estimated.
- Genetic studies of the target stocks have been made.

#### 60 Scoring Guidepost

- Population age/sex/maturity structure of each target stock is based on some sampling and verification.
- Some genetic information is available on the target stocks.

SCORE            80

Biological data are collected from both research and commercial catches of icefish. The sexes of the fish are determined and gonads are classified in accordance with a five-point CCAMLR gonad maturity scale, in which gonads of stage 2 or greater are considered mature (Williams *et al.*, 2001). From the resulting data, the lengths at which 50% of the individuals of each sex become mature have been estimated and, by plotting the monthly percentages of fish with gonads of different stages, the timing and duration of the spawning season has been identified (Williams *et al.*, 2001).

The length composition data from regular random stratified trawl samples have been analysed using a mixture analysis to estimate the proportions of fish within each modal group (de la Mare *et al.*, 1998). These estimates have been combined with bootstrapped estimates of biomass derived from the density of icefish in trawl hauls and the area of the strata to produce estimates of the abundance in each of the first three to four age classes represented in the length compositions (Williams *et al.*, 2001). The densities of the individual cohorts have been tracked through time, and relative strength of successive year classes assessed as strong, moderate or weak (Williams *et al.*, 2001).

Williams *et al.* (2001) record that a mitochondrial DNA study of icefish from Gunnari Ridge, Shell Bank, Discovery Bank and Kerguelen was conducted in 1990 and subsequently reported by Williams *et al.* (1994).

No studies of the fecundity of icefish from the HIMI region are reported by Williams *et al.* (2001). An earlier study by Sosiński (1985) did report on some aspects of the biology, including fecundity, of icefish collected from the Antarctic between 1975 and 1979. Kock (1990) has also reported on some aspects of the fecundity of icefish from stocks in the Atlantic. However, there are no current or verified estimates for the HIMI fishery.

### *Recommendation*

A current analysis or verification of the fecundity of mackerel icefish from the Heard Island McDonald Islands stocks would be very useful and helpful in better management of the fishery.

### **Indicator 1.3.2**

Data and stock assessment indicate no changes in structure that would alter reproductive capacity.

#### 100 Scoring Guidepost

Data and assessments indicate that recruitment and spawning stocks are at robust levels for all genetically identified stocks of the target species.

#### 80 Scoring Guidepost

The extent to which trends in age, sex, genetic structure, recruitment and spawning stock might deviate from the expected trends, allowing for both natural variability and uncertainty, has been specified. The values of the variables remain within these specified, acceptable ranges.

#### 60 Scoring Guidepost

Trends in age, sex, genetic structure, recruitment, and spawning stock are examined and found to be consistent with those trends that would be the expected response of the population to the levels of exploitation experienced by the stock.

SCORE        79

Commercial fishing for icefish at Heard Island and McDonald Islands re-commenced in 1997 and research has focussed on the determination of TACs that would be likely to ensure the sustainability of the stock. However, appropriate data are being collected to determine whether there is any indication of a change in reproductive capacity associated with a change in the length or age at first maturity. No such change has been identified in the documents that we have examined. However, there is a need to examine the available data to determine whether changes in the fishery are those that would be expected as a consequence of the current levels of exploitation, or whether they might be related to an unanticipated change in the reproductive biology of the population of icefish.

### **Condition 1.10**

Estimate the expected changes in size and age at maturity, age composition, and fecundity and establish a routine comparison of observed data with these expected values to ensure that unexpected changes might be detected.

## MSC PRINCIPLE 2

**“Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.”**

*Intent: The intent of this Principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.*

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### Introduction

The Australian Territory of Heard Island and McDonald Islands (HIMI) lies in a remote and stormy part of the globe, near the conspicuous meeting-point of Antarctic and temperate ocean waters. The islands were unknown to humanity until the 19th century. HIMI is an external territory of Australia in the Indian Ocean sector of the Southern Ocean, located around 53° 05' S and 73° 30' E in the sub-Antarctic waters about 1500 km north of Antarctica and over 4000 km south-west of Australia.

### Ecosystem values

The Australian 200 nm Exclusive Economic Zone (EEZ) around Heard Island and McDonald Islands includes a World Heritage Area, including the islands and the 12 nm marine zone around them, and a Marine Reserve. Together the marine zone and the Reserve cover about 17% of the HIMI EEZ, and extend to the edge of the EEZ in two places. The Marine Reserve also contains four areas known as Conservation Zones, where fishing is currently permitted while the fish resources are being assessed, but ultimately these zones may also be included within the Marine Reserve, which excludes fishing.

The area of the Heard Island and McDonald Islands Marine Reserve (65,000 km<sup>2</sup>) contains outstanding and representative ecosystems, geographical features and terrestrial and marine species. The region remains in a relatively pristine state, except for some prior impacts associated with previous high seas fisheries before Australian management. For example, in previous centuries (late 1800s and early 1900s) several important species (elephant seals, fur seals, king penguins) were severely degraded by commercial harvesting on the islands, but these populations (other than elephant seals) appear to be recovering strongly.

The Heard and McDonald Islands World Heritage Property was inscribed on the World Heritage List in 1997 for its outstanding natural universal values:

- as outstanding examples representing major stages of the earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features
- as outstanding examples representing significant on-going ecological and biological processes

Heard Island (area 368 km<sup>2</sup>) is the principal island of the HIMI group. Mawson Peak, at 2745 m, is the summit of Big Ben, an active, towering volcano that dominates the group, with a thick mantle of snow and glacial ice contrasting black volcanic rocks in an array of forms and shapes.

McDonald Island (area 1 km<sup>2</sup>), 43.5 km due west of Heard Island, is the major island in the McDonald Islands group, which also includes Flat Island and Meyer Rock. At its highest point it rises to about 230 m. The McDonald Islands, also volcanic in origin and, like Heard Island, undisturbed habitat for sub-Antarctic plants and animals, consists of two distinct parts joined by a narrow central isthmus.

The HIMI group has been described by the Department of Environment and Heritage in its nomination for World Heritage status ([www.deh.gov.au/heritage/worldheritage/sites/antarct/values.html](http://www.deh.gov.au/heritage/worldheritage/sites/antarct/values.html)) as perhaps the wildest place on earth: a smoking volcano under a burden of snow and glacial ice rising above some of the world's stormiest waters. On the horizon to the west, smaller volcanic fragments rise precipitously out of huge Southern Ocean swells. From a distance the land is a striking monochrome-black rock and sand, white snow and ice, leaden grey seas and skies. When the sun does appear the islands light up in the clear air to a rare brilliance: verdant vegetation and multi-coloured bird colonies in sharp relief against the dazzling white of snow and ice and the grey-black of volcanic rock. The elements—hurricane-force winds, driving rain, vast amounts of snow, dense clouds and fogs—have conspired with the landforms to create a world of high drama and savage beauty at HIMI. The driving westerly winds of the Southern Ocean in these latitudes create unique weather patterns when they encounter Big Ben, including spectacular cloud formations around the summit and very rapid changes in winds, cloud cover and precipitation.

The other extraordinary landforms on the islands include: the flutes of Cape Pillar on McDonald Island and the lonely pinnacle of Meyer Rock; the caves and other lava formations of the northern Heard Island peninsulas; the smoking caldera of Mawson Peak above the palaeocaldera of Big Ben; the western sea cliffs of McDonald Island; the shifting sands of the Nullarbor Plain; and the extensive, dynamically changing Spit.

The vast numbers of penguins and seals that occupy the beaches here are one of the great wildlife features of the world. Throughout the year the islands are home to a wide array of animals; seals, flying birds and penguins, including the world's largest macaroni penguin colonies, each containing an estimated two million birds. When the

wind has died and the skies have cleared, these congregations are described by DEH as creating an incomparable cacophony of natural sound.

Permanent snow and ice cover 80% of Heard Island. Its steepness combines with very high snow fall at high altitudes to make the glaciers fast-flowing—in the order of 250 m a year—thus the ice and snow in the glaciers has a relatively short turnover period, around 100 years, and the glaciers respond quickly to changes in climate by advancing or retreating.

HIMI is the only sub-Antarctic island group that has an intact ecosystem. It is the only sub-Antarctic island group to contain no known species introduced directly by humans, which makes it invaluable for having an intact set of interrelated ecosystems; terrestrial, freshwater, coastal and marine, in which the ongoing evolution of plants and animals occur in their natural state.

The islands host a range of seabird species. The extreme isolation and the lack of introduced predators provide an excellent location for investigating the effects of geographic isolation and climate on the evolution of species. Active speciation is clearly present. For example, the Heard shag (*Phalacrocorax nivalis*) is found only on Heard Island. The beetle populations on HIMI show unique evolutionary adaptations to the environment and several other invertebrate groups provide valuable opportunities to study evolutionary processes in undisturbed populations at the southern limits of their distribution.

The seal and penguin populations provide excellent opportunities to monitor the health and stability of the larger Southern Ocean ecosystem. HIMI is one of the best sites in the world to study the ecological and biological processes of recolonisation of the Antarctic fur seal and the king penguin populations. It is also one of the best land-based sites in the world to study the leopard seal and its role in the sub-Antarctic ecosystem

In addition to World Heritage status, the conservation values and the management arrangements for the HIMI region have been recognized by WWF as outstanding. In 2003 the HIMI Marine Reserve was accorded the status of ‘Gift to the Earth’, WWF’s highest recognition for a globally significant conservation achievement, which addresses WWF’s global conservation priorities by:

- Advancing conservation of biodiversity, especially forest, freshwater and marine ecosystems, or enhancing the prospects for survival of threatened species
- Addressing global threats posed by climate change, toxic chemicals and unsustainable use of resources such as timber, freshwater and fisheries.

Key conservation values for the marine waters of the HIMI area have been defined by Australia’s Department of Environment and Heritage as:

- only sub-Antarctic island group without introduced plants or animals;

- diverse and distinctive benthic habitats supporting a range of slow growing and vulnerable benthos such as corals and sponges;
- several endemic fish and benthic species;
- nursery areas for a range of fish stocks including commercially harvested Patagonian toothfish;
- highly productive nutrient rich areas due to the confluence of key oceanographic fronts such as the Antarctic Circumpolar Current;
- prime foraging areas for a number of land-based marine predators, including threatened albatross and seal species.

### Ecosystem-Based Fishery Management

The World Heritage status and the HIMI Marine Reserve acknowledge the outstanding and universal natural values of the HIMI region. The outstanding natural values mean that a substantive information base has been developed on terrestrial (island) biodiversity and many of the icon marine predator species (island-based) in the region. This covers to some extent the dietary preferences and foraging areas of the main icon species of the region (penguins, seals, some seabirds). For the marine ecosystems more generally, the report and assessment by AAD (Meyer et al 2000) is an important analysis that summarises the ecosystems, species and conservation values of the region as a basis for determining areas recommended for the Marine Reserve. Few continental shelf fisheries have ever been so well placed with an understanding of the marine ecosystems where they fish, and almost none have such detail available to them in the early developmental stages of their fishery.

In order to protect these recognised natural values, the area also includes the world's largest marine preserve as well as a no take zone 12 nm zone around the islands and a 1 nm buffer zone, together all covering about 17% of the Australian HIMI EEZ (subject to resolution of the controls in the 'Conservation Zones'). These reserves provide a most important offset that, at least potentially, restrains the impacts of the fishery on the various shelf habitats, and to a large extent eliminates impacts from the inshore habitats (although subject to connections between the inshore and offshore habitats).

The islands of HIMI region have a substantial history of exploitation of the icon species. Southern elephant seals, Antarctic fur seals and king penguins were virtually extirpated from the HIMI area in the 1800s and early 1900s. Thanks to Australia's management most of these are now considered to be in strong recovery, except that elephant seals have suffered recent Antarctic-wide declines from unknown causes, although not likely related to fishing. The icefish fishery must therefore be assessed in the context of providing a suitable source of ration to any such dependant population of land-based marine predator species that are in recovery. At this stage there are little reliable data on the need for icefish by fur seals or king penguins (considered to be their major predators from amongst the high priority predator species).

The Mackerel Icefish Fishery is managed with full understanding that there are potential impacts of the fishery on the conservation values of the reserves. For purposes of this assessment, the evaluation team examined the available evidence of ecosystem based fishery management at HIMI to determine if it is in line with the standards set by the MSC. This means that along with evaluating the assessments and management strategies as they apply to the target species, the evaluation team also inquired about how the strategies protected ecosystem functions.

The 75% escapement rule is explicitly established to provide for the needs of predators. It is applied as an estimator, as there is no direct empirical basis for this level of escapement (or indeed for the alternative 20% biomass rule). This is one of the most assertive approaches known in terms of limiting extraction in order to protect ecosystem functions. This approach is precautionary to the extent that the calculations are based on the one sided lower 95% confidence limit of the estimate of survey biomass. Operated by this rule alone, it appears the fishery might be able to reduce the minimum biomass to levels below predator's needs, and, theoretically at least, could manage the stock down to levels below commercial and ecological viability. We therefore do not consider this rule to be precautionary if applied in isolation from the second rule (20% biomass). Both are important aspects of the MSC requirements for a well-managed fishery. Therefore application of the 'three-part rule' (Constable et al 2000) or a more precautionary approach is critical for meeting conservation requirements in the HIMI region.

The question arises as to how precautionary these strategies are for the HIMI icefish stocks now managed. If any of the stocks are depleted, the predators may rely more heavily on the remaining stocks for their ration, and this would need to be incorporated into the predator allocation rule. The foraging areas of some of the HIMI predators include areas within the France EEZ, and presumably vice versa, (Figure 11, page 38, Meyer et al 2000 depicts trans-national foraging locations of selected predators). If one considers the Kerguelen stocks of icefish depleted (which can be debated), the needs of predators may not be able to be assumed to be met by considering only the population needs for the HIMI predator species within the areas defined for HIMI stock management or by an uncritical application of the 75% rule.

Similarly, if the currently recognised fishery 'stocks' change, the harvest strategies may not be as precautionary as first anticipated. For example, if the HIMI stocks are part of a broader Kerguelen Plateau population of Icefish, the HIMI icefish stocks may in fact be substantially depleted from their historic position (which may also be contributing to the observed variability in various biological parameters). In this circumstance, where the current biomass is depleted from its pre-exploitation level, the ration of icefish required by predators may have no relationship to the current biomass. Therefore a different approach may be necessary to ensure precaution such as:

- manage the stock as a single trans-national stock with resolved sub-stocks,
- ensure that predator foraging areas for both French and Australian predators are well represented, and

- ensure that the 20% biomass rule is applied to an established and agreed benchmark biomass that approximates pre-exploitation biomass.

### Interaction with Toothfish Fishery

The HIMI Icefish Fishery is conducted from vessels that are also part of the HIMI Toothfish Fishery. There are several potential issues this raises, in terms of the sustainability of the icefish stocks. During the assessment process, we asked and considered whether there was any evidence that the interaction with the toothfish fishery has led or is leading to inherent instability or ecological decline in the area. We asked questions about the economics and logistics of the toothfish fishery as it could adversely impact icefish, by enabling fishing vessels to fish down icefish stocks beyond their minimum economic level. We asked if it is possible to conduct substantial high-grading of icefish. We also inquired about potential interactions between the icefish fishery vessels and toothfish IUU fishing.

After inquiring about all of these possibilities, the assessment team found no evidence that would suggest any of these are, or have, occurred. We also found no evidence to suggest adverse interactions between these two fisheries given the comprehensive observer system and output controls in place. Similarly, there is no evidence of any lack of compliance of the current operators in the HIMI Icefish fishery.

Overall, there seems little risk of a negative interaction between these two fisheries. On the contrary, having the HIMI fishery vessels operating in the region may offer additional protection for the marine ecosystems and icon species by deterring IUU fishing vessels. Also, the existence of an IUU fishery for toothfish and the response measures that are in place and being developed by Australia to detect and prevent IUU fishing suggest that the same measures would act to deter an IUU fishery developing for icefish, should the value of the fish increase to such a level as to warrant IUU fishing activity.

### Benthic impacts

The main gear type used in the Icefish fishery is benthic trawling. The specific gear used has been adapted (by use of larger bobbins) so the net rides just above the substrate surface, to minimise damage to the seabed and the amount of bycatch. The Assessment Report indicates that there have been no assessments of the impact of this gear in the fishing grounds, and this is a substantive issue that needs to be addressed. Meyer et al (2000), the AAD research plan for studies and the 5-Year Strategic Research Plan indicate that the impact of the benthic trawling will be a continued priority in research.

The extensive no-take areas in the marine reserve will provide an important potential opportunity to protect the HIMI marine conservation values. However, studies showing this are still lacking due to the recent nature of the protected areas. We therefore consider that comprehensive studies of the actual impact of the fishing gear on benthic habitats are important to understanding the impact of the fishery on these ecologically important areas. Given the establishment of these areas and the assertion that they can and will help protect

ecological functions, the assessment team would expect to see evidence as to the impact of the HIMI icefish fishery in the areas being fished (or historically fished) and the effectiveness of the existing set of closed areas in mitigating such impacts.

### Management Plan Implementation

As part of the assessment, the evaluation team looked for evidence of how the management plan for the fishery is implemented to protect ecological functions and minimize impacts. For example, Section 9 of the HIMI Fishery Management Plan specifies in section 2 (b): “adequate monitoring of the direct impact of the fishery on non-target species and the ecosystem in the area of the fishery”. The assessment team also looked for evidence of AFMA’s mandatory responsibilities in the fishery and how these are met. We also looked for how AFMA interacts with the CCAMLR process, and the institutional complexities associated with Australia’s international commitments to this process.

### Information Base

The main documentary information base used for this assessment includes:

- *Australia Fisheries Management Act 1991* as amended
- AFMA Annual Report 2002-2003
- The AFMA Icefish Fishery Management Plan
- Management Arrangements for the Heard Island and the McDonald Islands Fishery, 2002/2003; AFMA
- Conservation of marine habitats in the region of Heard Island and the McDonald Islands; Meyer, Constable and Williams, 2000
- Working Group reports to CCAMLR meetings (particularly the Working Group on Fish Stock Assessment)
- Assessment report - Heard Island and the McDonald Islands Fishery, AFMA December 2001
- Assessment of the Heard Island and the McDonald Islands Fishery, for the purposes of part 10, Part 13 and Part 13A of the EP&BC Act 1999; Environment Australia, April 2002
- Heard Island and the McDonald Islands Marine Reserve Proposal, Environment Australia, May 2002
- Observer Cruise reports (various)
- Supplementary Instructions Benthos Sampling and RSTS Survey Notes for Southern Champion, April-May 2003. AFMA (undated)
- List of all bycatch species/taxa recorded in HIMI Fishery by Observers, Dec 2001 to Nov 2002 (AFMA unpublished list)
- Fishery Assessment Groups – roles, responsibilities and relationship with Management Advisory Committees, AFMA Fisheries Administration Paper Series, FAP No. 12, February 2003

- Towards the development of a management plan for the Mackerel Icefish (*Champsocephalus gunnari*) in subarea 48.3; Agnew, Everson, Kirkwood and Parkes. CCAMLR Science 5, 63-77. 1998
- Heard Island and McDonald Islands 2002/03 Season Fishery Assessment Plan; AFMA (undated)
- Antarctic Fisheries Bycatch Action Plan 2003-2005 (Draft); AFMA (undated)
- Heard and McDonald Islands World Heritage; accessed 21 October 2003  
[www.ea.gov.au/heritage/awh/worldheritage/sites/antarct/heard.html](http://www.ea.gov.au/heritage/awh/worldheritage/sites/antarct/heard.html)
- The 5-year Strategic Research Plan for the fishery (as attached to the Assessment Report)
- Unpublished map of trawl tracks targeting icefish.
- Unpublished description of an AAD research project application #2388
- Unpublished SAFAG-AAD protocol for handling seal bycatch

### Assessment and Scoring

Our assessment of impacts of the Mackerel Icefish Fishery considers the effects of fishing on the ecosystems, habitats and species of the HIMI region and particularly those in the area being fished; the status of the knowledge-base; and the procedures that are used to determine the nature and extent of any potential impacts. The assessment includes the extent and nature of available and relevant information, the extent to which this information has been used to correctly establish the risks that the fishery may pose to the environment and ecosystems, the existence and effectiveness of strategies that may have been implemented within the fishery management system to address and restrain any impacts, and finally, the assessment considers if the outcomes of the management system have led to an acceptable level of fishery impacts.

The assessment of the ecological impacts of the fishery under this MSC Principle for the MSC Criterion 1 (impacts on ecosystems) and Criterion 2 (impacts on protected species) uses indicators organised within a sequence of 5 (connected) performance sub-criteria:

- There is adequate knowledge of the ecosystems, habitats, species, productivity and functional interactions amongst these;
- There is adequate knowledge of the fishery operations and characteristics that is relevant to determining the ecological impacts of the fishery;
- The ecological risks posed by the fishery have been identified, and the nature of these risks determined;
- Strategies have been implemented to address and restrain the impacts;
- Evidence shows that the impacts are maintained within acceptable limits.

MSC Criterion 3 (depleted populations of the exploited species) is considered to apply in this fishery only to the extent that strategies are available for the rebuilding of populations of ecologically associated or dependent species, or those of threatened, protected or icon species, should such species have populations that are depleted, or recovery is being prevented, through actions of the fishery.

## **MSC Criterion 1**

“The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.”

*This Criterion is interpreted to mean that the fishery should be conducted so that natural functional relationships in ecosystems, habitats and non-target species where the fishery operates are maintained, and that trophic cascades or ecosystem state changes are unlikely to result from the fishing activities.*

We have divided this MSC Criterion into 5 Sub-criteria following the sequence described above:

- 2.1.1 Knowledge of the ecosystems, habitats and species where the fishery operates is adequate to enable an assessment of the impacts of the fishery on natural functional relationships, trophic changes, and ecosystem state changes.
- 2.1.2 The nature of the fishing activities and characteristics of the fishery are adequately known for the purposes of ecosystem assessments.
- 2.1.3 The general risk factors in the fishery have been adequately determined.
- 2.1.4 Strategies have been developed within the fisheries management system to effectively address and restrain any important impacts of the fishery on the ecosystem, habitats or non-target species.
- 2.1.5 There are no unacceptable impacts on the structure or function of ecosystems or habitats, or on the populations of associated or ecologically dependent species.

Each of these 5 Sub-criteria has at least one associated Performance Indicator, for which the performance of the fishery is assessed and assigned a numerical score. The Scoring Guideposts shown here for each Indicator are the basis for establishing the numerical scale of scoring that will be applied by the Assessment Team in assigning a score to each Indicator.

### **SubCriterion 2.1.1**

Knowledge of the ecosystems, habitats and species where the fishery operates is adequate to enable an assessment of the impacts of the fishery on natural functional relationships, trophic changes, and ecosystem state changes.

#### **Indicator 2.1.1.1**

The nature and distribution of the species, habitats and ecosystems relevant to the fishing operations.

*Intent*

*The intent of this indicator is to assess the adequacy of the available knowledge-base for the purposes of determining risks the fishery may pose to species, habitats, or ecosystems, for designing mitigation strategies, and for monitoring of the condition of these aspects of biodiversity and the outcomes of any management response that may need to be implemented in the fishery.*

### 100 Scoring Guidepost

- The major habitat types have been determined and mapped across the areas where the fishery operates, using a comprehensive and fine-scale biophysical habitat classification.
- There is comprehensive quantitative data on species assemblages, diversity, population structures and the natural trophic (predator-prey) relationships among the main species, including the target species.
- The conservation status of all the main species and assemblages has been determined.
- The dominant natural large-scale factors responsible for structuring the marine ecosystems and their composition are known, and the dominant ecological effects of the major ocean currents on primary and secondary production, have been established.
- The nature, spatial and temporal extent of major natural variation in the ecosystem is understood.
- Major research programs are underway to further evaluate the nature and values of species, assemblages and habitats where the fishery operates.

### 80 Scoring Guidepost

- There is good knowledge (general mapping) of the distribution of the major types of habitat and species assemblages in the area of the fishery, and aspects of their distribution.
- There is a basic knowledge of the main trophic relationships amongst species in the region.
- There is good knowledge of the conservation status of the main assemblages and important species
- The natural variability in the ecosystem, including natural physical forcing factors such as dominant currents and seasonal patterns in oceanographic conditions and ocean production, is broadly understood.
- Research projects are underway to develop improved knowledge of habitats, major species assemblages and trophic relationships in the region where the fishery operates.

### 60 Scoring Guidepost

- There is some knowledge of the major types of habitat in the area of the fishery.

- Research initiatives have been or are being identified on the predators and preys of the target species, trophic (predator-prey) relationships and the natural variability in the ecosystem.

SCORE 85

There is good knowledge (general mapping) of the distribution of the major types of habitat and species assemblages in the area of the fishery, and aspects of their distribution.

The sampling programs conducted by AAD (Meyer et al 2000), including pre-fishery surveys, and the terrestrial information on predators, provide important knowledge of the habitats in the HIMI region. While there is only limited distributional information on species of marine invertebrates, fish species are better known and habitats are broadly delineated through these surveys and provide a reasonable initial basis of knowledge of the major habitats and species distributions in the HIMI area.

There is a basic knowledge of the main trophic relationships amongst species in the region

Studies of the diets of icefish, toothfish, penguins, some other birds, and seals have provided a broad understanding of the nature of the main likely trophic relationships at HIMI. This is supported, and contrasted in some instances, by studies of other Antarctic ecosystems at Macquarie Island and at South Georgia (such as in Agnew et al 1998).

There is good knowledge of the conservation status of the main assemblages and important species

The main benthic and pelagic assemblages are not well known, but there has been some data collection and analysis to determine that there are several endemic fish and benthic species amongst the HIMI benthic assemblages, and most are restricted to the Antarctic and sub-Antarctic region. Given the isolated circumstances, with more data, it is likely that many more species would be found to be locally endemic. The conservation status of only few exclusively marine species (other than protected species – covered in Criterion 2 below) have been studied, mainly the commercial species such as toothfish and krill.

The natural variability in the ecosystem, including natural physical forcing factors such as dominant currents and seasonal patterns in oceanographic conditions and ocean production, is broadly understood.

Studies of the oceanographic conditions indicate that the HIMI region is one of high natural variability in a range of oceanographic parameters, including water temperature, ocean production, and climatic systems. The major Polar Front is congruent with HIMI at times, and its local variability may drive considerable variability in local ocean production and linked biological systems. Whilst this is as yet not fully understood, there is a broad basis of knowledge in HIMI and probably sufficient to enable managers to be confident that natural dynamics and environmental variability will play an important part in managing the

ecosystems and fisheries at HIMI, even if the detail of the dynamics of the ocean systems are not well documented or understood.

Research projects are underway to develop improved knowledge of habitats, major species assemblages and trophic relationships in the region where the fishery operates

AAD has a major collaborative program of research underway to study, amongst other things, the diets of the major terrestrial predator species, some of which (fur seal, king penguin) may have some dependence on icefish in their diets. Specific surveys are also proposed for the benthic ecosystems of the Conservation Areas within the MPA, and the fish populations of these areas. In addition, the 5-year Strategic Research Plan for the fishery specific elements of this area, and presumably provides the strategic basis for research funding of the AAD collaborative program.

### **Indicator 2.1.1.2**

The functional roles and importance of the target species in the trophic relationships of the region.

#### *Intent*

*The intent of this indicator is to assess the adequacy of the information base for the trophic role and relationships of Mackerel Icefish in the HIMI area, and in particular the role in diets of the key predators.*

#### 100 Scoring Guidepost

- The structure of the regional foodwebs is well understood
- There is a good quantitative knowledge of the trophic (predatory-prey) relationships between the main species
- The trophic role and functional relationships of the target species is well known at each of its main life stages.
- There is a range of ongoing research programs designed to evaluate the natural dynamics and productivity in regional foodwebs.

#### 80 Scoring Guidepost

- The basic structure of the regional foodwebs have been determined
- The trophic role (predator-prey relationships) of the target species at each of its main life stages is broadly understood.
- Research is underway to study the nature and extent of foodwebs in the region, including the functional relationships of the target species.

#### 60 Scoring Guidepost

- The key prey, predators and competing species are broadly understood

- There is a basic knowledge of feeding relationships of some of the main species.
- Research is being designed to study foodwebs in the region.

Score 85

The basic structure of the regional foodwebs have been determined

The nature of the HIMI foodwebs and trophic relationships have not been well studied, but are considered to be broadly similar to other Antarctic plateau groups. A more limited role of krill in icefish diet compared to other places is suspected, which sets HIMI apart from other areas where Mackerel Icefish are found. The knowledge of the broad trophic functions of other Antarctic systems is an appropriate level of basic knowledge to inform the precautionary management of the HIMI ecosystem and the icefish fishery. There is limited knowledge of the foodwebs that do not directly involve the major commercial species or predators, and this needs to be considerably better developed in relation to ecosystem management needs, including direct trophic interactions with icefish.

The trophic role (predator-prey relationships) of the target species at each of its main life stages is broadly understood

The role of icefish in the HIMI foodwebs has been assumed through limited studies of gut contents of toothfish, icefish and some land-based predators. However, the detailed trophic relationships of the various age classes of icefish are not well understood, and the important functional relationships of icefish at each of its main population stages are only poorly understood.

Research is underway to study the nature and extent of foodwebs in the region, including the functional relationships of the target species

AAD has a major current collaborative research program underway to study, amongst others, the trophic role of icefish in the HIMI foodwebs of the major predators. There is however, limited effort devoted to study of the benthic habitats in relation to icefish habitat and trophic needs of land-based predators. The trophic needs of marine predators (such as toothfish and sharks) are not well understood.

**SubCriterion 2.1.2**

The nature of the fishing activities and characteristics of the fishery are adequately known for the purposes of ecosystem assessments.

**Indicator 2.1.2.1**

The nature of the fishing activities and characteristics of the fishery are adequately known for ecosystem assessment purposes.

### *Intent*

*The intent of this indicator is to assess the adequacy of the information-base about the fishing activities for the purposes of determining the impacts of the fishery, and being able to design and implement effective mitigation responses should they be needed.*

### 100 Scoring Guidepost

- There is a detailed knowledge of the types of gear used in the fishery, including fine-scale details of places and times of gear deployment of each type, for use in management
- The gear deployment procedures are well documented and consistently applied
- Fishing effort is documented using independent observers and VMS.

### 80 Scoring Guidepost

- Gear types used in the fishery and their deployment characteristics are well understood
- Details of gear deployment are monitored at fine scales of space and time using independent observers and systematically reported for use in ecosystem assessment

### 60 Scoring Guidepost

- Only a limited number of gear types are approved for use in the fishery
- Gear deployment is self-monitored and reported.

SCORE        95

There is a detailed knowledge of the types of gear used in the fishery, including fine-scale details of places and times of gear deployment of each type, for use in management.

The system of two observers applied in the HIMI fishery is comprehensive and ensures that there is a shot-by-shot record of locations, types etc of fishing gear used. The observer system is well managed by AFMA to provide data on fishing effort for archiving, analysis and subsequent use in the management of the fishery.

The gear deployment procedures are well documented and consistently applied.

The observer system provides comprehensive reporting and documentation on the gear deployment. The fishery has a code of practice for gear deployment that specifically recognises potential interactions with icon species. The limited number of vessels used in this fishery (2) means that there is a strong commitment and experience amongst the regular sea-going crew of the circumstance and procedures needed to avoid adverse interactions. The low level of bycatch documented for the fishery indicates that such procedures may not need to be formalised in this fishery.

Fishing effort is documented using independent observers and VMS.

The fishing effort is fully documented using independent observers both placed in the fishery under contract and AFMA employed observers, and VMS is mandatory.

### **Indicator 2.1.2.2**

The nature and extent of fishing gear, fishing wastes and discards lost or disposed to the environment.

#### *Intent*

*The intent of this indicator is to determine the adequacy of the information-base about lost fishing gear, wastes and other forms of discards, including process wastes from meal plants.*

#### 100 Scoring Guidepost

- There is a comprehensive and detailed monitoring and reporting program of all lost and disposed fishing gear, fishery wastes and discards, in terms of type, place, amount and condition when lost/disclosed
- Monitoring and reporting of gear, fishery wastes and discards loss and disposal at sea is conducted by independent observers, with incident-based reporting
- There is a comprehensive gear reconciliation program, which is designed to track and validate the life-cycle fate of all fishing gear used in the fishery
- The fishery has an agreed code of practice to minimise loss of gear, at-sea wastes and discards, which is fully independently audited.

#### 80 Scoring Guidepost

- There is a comprehensive monitoring and reporting program of all lost and disposed fishing gear, fishing wastes and disposal in terms of type, place, amount
- The fishery has an agreed code of practice to minimise loss of gear, at-sea wastes and discards
- Monitoring and reporting of gear loss, fishing wastes and discards at sea is conducted by independent observers

#### 60 Scoring Guidepost

There is a self-monitoring and reporting program for lost and disposed fishing gear, wastes or discards

SCORE            95

There is a comprehensive monitoring and reporting program of all lost and disposed fishing gear, fishery wastes and disposal in terms of type, place, and amount.

The fishery observer program provides detailed reports on gear loss, any materials disposed at sea, and all other forms of waste. In addition, there are regulatory requirements for reporting all non-biodegradable losses, all interactions with marine mammals and seabirds, and any waste disposal.

The fishery has an agreed code of practice to minimise loss of gear, at-sea wastes and discards.

The fishery operates to generally accepted high standards in respect of wastes and loss of fishing gear. For example, there are regulatory requirements to minimize waste and to have zero discards or offal disposed at sea.

Monitoring and reporting of gear loss, wastes and discards at sea is conducted by independent observers.

The fishery observer program is conducted by both independent contracted observers and by AFMA employed observers.

### **SubCriterion 2.1.3**

The general risk factors in the fishery have been adequately determined

#### **Indicator 2.1.3.1**

The ecological risks and potential ecological impacts of the fishery.

##### *Intent*

*The intent of this scoring indicator is to assess if there has been an adequate process for determining the risks that the fishery may pose to the ecosystems, habitats and species of the HIMI region. The land-based marine predators and protected and icon species are covered in later indicators (MSC Criterion 2). This indicator covers those general habitat and marine species issues not included within the specific risks to icon species (see Indicator 2.2.3.1).*

##### 100 Scoring Guidepost

- The potential effects of the fishery have been determined by detailed, comprehensive, scientific and peer reviewed analysis of risks based on comparative studies between fished and non-fished but otherwise comparable ecosystems, across large space and time scales, and using precautionary threshold levels of effect of the fishery for a broad range of ecological attributes/indicators.

- The potential impacts of the fishery are established in consultation with stakeholders and a range of relevant experts
- Causes and effects in the fishery are well known, comprehensive across habitats and regions and use ecologically relevant attributes and statistically robust designs.
- There are ongoing research programs designed to assess impacts, and include space and time across a range of scales up to the scale of the fishery.
- The impact-detection designs include and control for the effects of factors outside the fishery in determining fishery impacts.

### 80 Scoring Guidepost

- The potential effects of the fishery have been determined by detailed, scientifically defensible and peer reviewed analysis of risks using existing data, and based on comparative studies between fished and non-fished but otherwise comparable ecosystems, considering space and time scales that are relevant to the scale of the fishery
- The potential impacts of the fishery are established in consultation with stakeholders and a range of relevant experts
- Causes and effects in the fishery are broadly known and include the range of habitats in the fishery and use ecologically relevant attributes and statistically robust designs.
- A program of research targeting the main ecological risks posed by the fishery is underway

### 60 Scoring Guidepost

- The potential effects of the fishery have been determined by internal fishery analysis
- The potential impacts of the fishery are established in consultation with a limited range of stakeholders and experts, and based on literature data from other fisheries or regions

SCORE        75

The potential effects of the fishery have been determined by detailed, scientifically defensible and peer reviewed analysis of risks using existing data, and based on comparative studies between fished and non-fished but otherwise comparable ecosystems, considering space and time scales that are relevant to the scale of the fishery.

There are multiple references (SAFAG, Assessment Report, Marine Reserve Proposal, and more) to a CSIRO Risk Assessment of the HIMI fishery that is underway. CSIRO provided some information about the process being followed, but was unable to provide details of the actual assessment outcomes at the time of the assessment. CSIRO did provide a briefing and a completed Risk Assessment for another fishery as a model of what might be available in due course for HIMI. An earlier risk assessment is reputed to have been conducted by

AAD for sleeper sharks in the HIMI fishery, but this also has not been made available for use in this assessment. There are a number of other documents/studies made known to the assessment team, and these all seem to be dealing with specific interactions. The CSIRO study appears to be the only document that is laying out a comprehensive risk assessment over all aspects of the fishery and the ecosystem.

The potential impacts of the fishery are established in consultation with stakeholders and a range of relevant experts.

As for the previous guidepost, we are unable to access the specific outcomes from the CSIRO assessment. Again, we were provided with a basic outline of the assessment process that is being undertaken in the CSIRO Risk Assessment for the HIMI fishery, but are unable to verify the nature of any risk rankings and their basis. Nonetheless, the SAFAG SouthMAC and CCAMLR process of review and assessment of the fishery would assist to identify specific risks.

Causes and effects in the fishery are broadly known and include the range of habitats in the fishery and use ecologically relevant attributes and statistically robust designs.

There is a variety of information available about potential impacts in the fishery. However, there are few direct studies relating cause and effects. This is partly because there are few apparent impacts, and there has been little incentive to study cause-effect linkages. Key areas that have been highlighted for attention are the impacts of benthic trawling within the fishing grounds, and the impact of removal of icefish on land-based marine predator populations. Both these areas are under active consideration (and some research) but there is as yet only limited knowledge. A program of research targeting the main ecological risks posed by the fishery is underway (outlined in the 5-year Strategic Research Plan for the Fishery) and is intended to address the effects of bottom trawling and the extent to which this is mitigated by the full protection of habitats (no fishing) within the Marine Reserve.

### **Condition 2.1**

The fishery must complete a comprehensive scientifically robust assessment of the ecological risks of the fishery (such as the one started by CSIRO), including potential impacts on benthic systems, key land-based marine predators, and sharks, skates and rays, that is already underway. The report should be sure to include the range of stakeholder views/inputs and meet peer review standards for scientific assessments.

### **Condition 2.2**

Should any risks identified under the risk assessment be rated as moderate or high, the fishery would have to provide data and/or information showing what measures are being taken to mitigate the risks and analyses of why the measures are sufficient.

### **Indicator 2.1.3.2**

The availability of information on bycatch in the fishery.

#### *Intent*

*The intent of this indicator is to assess if there is adequate information about bycatch in the fishery, including at-sea procedures to monitor and document bycatch, and reporting and analysis mechanisms.*

#### 100 Scoring Guidepost

- Fine scale details of bycatch, including species composition, numbers and size of retained species and discards, in each fishing operation (trawl) is monitored and reported for management response
- Monitoring is conducted by independent observers, and frequently reported to fishery managers
- Data on bycatch is routinely synthesised and assessed by fishery managers, with summaries for public release
- Bycatch data is routinely used in models for assessing impacts on populations of bycatch species, with summaries for public release
- There is an ongoing research program designed to better understand the impacts of bycatch in the fishery.

#### 80 Scoring Guidepost

- the species composition and numbers of bycatch (retained species and discards) in each fishing operation (trawl) is monitored and reported to fishery managers
- Monitoring is conducted by independent observers, and reported to fishery managers at the end of each fishing trip
- Data on bycatch are routinely synthesised and assessed by fishery managers, with summaries for public release
- Models of bycatch populations are under development, for the specific purpose of determining fishery impacts.

#### 60 Scoring Guidepost

- the species composition of bycatch is monitored and reported for management response on an ad hoc basis
- Data on bycatch is archived by management agencies, but not routinely synthesised and assessed for management response, or summarised for public release
- Research projects on bycatch populations are under development, in relation to fishery impacts.

SCORE        90

Fine scale details of bycatch, including species composition, numbers and size of retained species and discards, in each fishing operation (trawl) is monitored and reported for management response.

The monitoring of all forms of bycatch is comprehensive in the fishery, with much of the data comprising weight and numbers for each field-recognisable taxon of landed bycatch. All data is shot-by-shot, and there is normally complete coverage of all shots.

Monitoring is conducted by independent observers, and frequently reported to fishery managers.

The fishery observer program consists of both contracted independent observers and AFMA employee observers. Bycatch is reported to AFMA on a 10-day cycle during fishing operations using an AFMA format form (ANT-05 CA). Similar data is also reported to CCAMLR. Moreover, haul by haul data is provided to AFMA for every fishing trip.

Data on bycatch is routinely synthesised and assessed by fishery managers, with summaries for public release.

The data on non-commercial bycatch is synthesised and made available for public review in certain forums.

Bycatch data is routinely used in models for assessing impacts on populations of bycatch species, with summaries for public release.

Preliminary assessments of safe catch limits have been established for several bycatch species taken routinely in the fishery. This data is reviewed in CCAMLR process to ensure that notional limits, established by reference to existing practice, are not exceeded. This data is made available through SAFAG to stakeholders for their consideration.

There is an ongoing research program designed to better understand the impacts of bycatch in the fishery.

Aspects of the biology of selected bycatch species are identified in the 5-Year Strategic Research Plan.

### **Indicator 2.1.3.3**

[The potential for ecosystems, habitats and species that may be affected by the fishery to recover from any fishery impacts, or to have impacts mitigated.](#)

#### *Intent*

*The intent of this indicator is to assess the adequacy of knowledge about the potential for ecosystems, habitats and species that may be affected by the fishery to recover from such impacts, or to have such potential impacts hedged using other appropriate mitigation techniques.*

### 100 Scoring Guidepost

- robust estimates of resilience to fishery impacts and recovery potential have been determined for all the documented bycatch and major potentially affected dependent species by removal of the target species, bycatch or habitat impacts
- research projects, including modelling and field measurements, are underway to improve estimates of impacts and the recovery potential for the most important impacts
- models and estimates of resilience and recovery potential take full account of ecosystem dynamics, environmental uncertainty and other factors external to the fishery
- closed areas (permanent no-take reserves) are used to provide adequate offset for otherwise unavoidable impacts of the fisher.

### 80 Scoring Guidepost

- adequate estimates of resilience to fishery impacts and recovery potential have been determined for the main bycatch species and habitats
- research projects, including modelling and field measurements, are underway to improve estimates of impacts and the recovery potential for dependent species that may be potentially affected by the fishery, either through removal of target species, bycatch or habitat impacts
- models and estimates of resilience and recovery potential take account of important aspects of ecosystem dynamics, environmental uncertainty and other factors external to the fishery
- areas closed to fishing are used to provide support for addressing the fishery impacts.

### 60 Scoring Guidepost

- resilience to fishery impacts and recovery potential have been estimated for the main bycatch species and habitats
- research projects are underway to improve estimates of impacts and the recovery potential for bycatch species, dependent species or habitats

SCORE        75

Adequate estimates of resilience to fishery impacts and recovery potential have been determined for the main bycatch species and habitats.

Some estimates of risk of the fishery to bycatch species are reported to have been conducted by AAD, although we did not receive these reports to verify the nature and robustness of these assessments. The CSIRO Risk Assessment project will presumably include this matter.

Research projects, including modelling and field measurements, are underway to improve estimates of impacts and the recovery potential for dependent species that may be potentially affected by the fishery, either through removal of target species, bycatch or habitat impacts.

The 5-year Strategic Research Plan identifies intended research in this area, and there is an AAD research plan for 2003-2004. Preliminary research plans seem appropriate, although the specific aspects of survey design etc could not be verified in our assessment because we were unable to have access to the detailed technical specifications of intended research to determine impacts in the fishing grounds. If the survey designs were similar to those used in previous years, then there is some indication that they will be reasonably robust.

Models and estimates of resilience and recovery potential take account of important aspects of ecosystem dynamics, environmental uncertainty and other factors external to the fishery.

Some of these matters are likely to be considered in the CSIRO Risk Assessment project, and in the planned research of AAD. Of particular importance here will be the studies of ocean productivity as it relates to the trophic requirements of icefish and predator species. We are aware that AAD and CSIRO are looking at these issues, but no completed models or assessments were available.

Areas closed to fishing are used to provide support for addressing the fishery impacts.

A substantive no-take MPA is in place, chosen specifically as a measure to mitigate any possible adverse region-wide impacts of the fishery. However, there is as yet no confirmation that this is an effective strategy, although the AAD research program is intending to address this issue. Given the broad approach taken to choosing the MPA it is likely that it will be an effective hedge.

### **Condition 2.3**

Conditions 2.1 and 2.2 apply.

#### Sub-criterion 2.1.4

Strategies have been developed within the fisheries management system to effectively address and restrain any important impacts of the fishery on the ecosystem, habitats or non-target species.

#### **Indicator 2.1.4.1**

Management objectives and limits in relation to important aspects of ecosystems, habitats, species and productivity.

### *Intent*

*The intent of this indicator is to assess the extent to which the fishery has established an appropriate set of objectives and limits in relation to the ecosystems, habitats and species, and productivity, to enable the fishery management system to restrain impacts.*

### 100 Scoring Guidepost

- Management objectives, limits and strategies designed to adequately (precautionarily) protect ecosystems, habitats, populations and productivity from degradation are included in the fisheries management plan and procedures
- Fisheries operations use the objectives and limits for ecological change to control the fishery and direct operational practices
- Variables related to ecosystems, habitats and populations of non-target species are included within the fisheries monitoring program and in the management plan, and these data are used to guide and revise fishery management practices
- When limits are approached, there are agreed impact mitigation procedures that can be put in place by the fishery to avoid exceeding any ecological limit, and there is evidence that these procedures are effective.

### 80 Scoring Guidepost

- The fisheries management system includes management objectives, limits and strategies for key aspects of the ecosystem, including habitats, species diversity and productivity
- The fisheries management system has the appropriate monitoring and response arrangements to adjust/control fishery operations if adverse ecological impacts of the fishery are detected
- There is evidence that these fishery controls are effective

### 60 Scoring Guidepost

- The fisheries management system includes elements to identify and address environmental issues
- The fisheries management system has the capacity to act upon environmental issues.

SCORE        90

The fisheries management system includes management objectives, limits and strategies for key aspects of the ecosystem, including habitats, species diversity and productivity.

Objectives and limits are defined for some bycatch species in the management system, and there is a strong commitment to these expressed in the Antarctic Fisheries Bycatch Action Plan. The 75% escapement rule is implemented to establish a limit for remaining Icefish biomass, to provide for the needs of marine predators. While there are no specific limits established in relation to habitats or other forms of productivity, there are substantial areas

set aside for protection from fishing and other activities. What is still unavailable are studies showing the effectiveness of the marine reserves in protecting habitats, species, and the general productivity of the area.

The fisheries management system has the appropriate monitoring and response arrangements to adjust/control fishery operations if adverse ecological impacts of the fishery are detected.

The management system has a robust provision for ‘move-on’ should adverse impacts be detected in real-time fishing operations. Should other impacts be detected as a result of bycatch monitoring, the fishery has strong controls that can limit fishing to constrain any adverse impacts.

There is evidence that the fishery controls are effective.

Observer reports indicate that the controls in the fishery are effective; their reports show that move-on procedures have been carried out before there is a formal requirement. Also, observer data verify the low levels of bycatch, interactions with seabirds and marine mammals in the fishery, waste minimization, and proper gear utilization,

### **SubCriterion 2.1.5**

There are no unacceptable impacts on the structure or function of ecosystems or habitats, or on the populations of associated or ecologically dependent species.

#### **Indicator 2.1.5.1**

The impact of the removal of the target species or other direct fishery activities on ecosystems, habitats, associated or dependent species, or on biological productivity of the region

##### *Intent*

*The intent of this indicator is to assess the impacts of the removal of icefish by the fishery on ecosystems, habitats, associated or dependent species, or on the productivity of the region, and the extent to which such impacts are mitigated. The impacts of removal of bycatch species and the physical impacts of fishing gear on habitats are assessed in subsequent indicators.*

##### 100 Scoring Guidepost

- all the likely impacts of the fishery resulting from removal of the target species are identified and quantified
- the ecological impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are always maintained within the agreed limits

- there is a fishery-independent monitoring program that provides robust data on the levels of all the important impacts, with high intensity reporting to fishery managers
- an ongoing program of research is designed to model and evaluate all impacts, to develop predictive cause-effect models, and to improve mitigation measures
- key impacts of the fishery that may be unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

### 80 Scoring Guidepost

- the important direct impacts of the fishery resulting from removal of the target species have been identified
- the main impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are generally within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits
- there is a fishery-independent monitoring program that provides robust data on the levels of the main impacts, with frequent reporting to fishery managers
- an ongoing program of research is designed to model and evaluate a range of the potential impacts and to further develop mitigation measures
- key impacts of the fishery that may be unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

### 60 Scoring Guidepost

- some direct impacts of the fishery through removal of the target species have been identified
- existing evidence does not suggest that impacts are exceeding limits
- there is a fishery-independent monitoring program of some impacts
- an ongoing program of research is designed to model and evaluate a range of the potential impacts and to explore mitigation measures

SCORE        75

The important direct impacts of the fishery resulting from removal of the target species have been identified.

The potential direct impacts of the fishery have yet to be assessed; preliminary indications are that there are likely to only few direct impacts, and that these are not of importance, but there is as yet no verification of this. While obtaining this information, the fishery is managed to keep the TAC in line with available biomass on a precautionary basis. This limits the amount of extraction of the target species in the area of the fishery. In addition, the marine preserve provides potential refuge for icefish, although this has not been formally verified.

The main impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are generally within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits.

The 75% escapement rule has been established as a limit to protect dependent species, which is an excellent start. However, we found no specific evidence that specific limits have been established for direct application to any dependent species. The populations of the main predators that may be dependent on icefish (fur seal, king penguin) appear to have been growing substantially, so it seems that the fishery has not had a detrimental impact on these species. However, the population monitoring data is limited, and the dynamics of the fishery and the predator populations are very different, so it may be too soon in the limited history of the fishery for a clear cause-effect signal to be expressed in a limited program of population monitoring. The impacts are presumed to be hedged through the establishment of the marine reserve, particularly the World Heritage Area 12 nm closure, but this is yet to be verified.

There is a fishery-independent monitoring program that provides robust data on the levels of all the main impacts, with frequent reporting to fishery managers.

Research is proposed in the 5-Year Strategic Research Plan, and by AAD, to investigate this issue. There has been some work on seabird and marine mammal interactions, but additional work is needed and planned. Data on benthic impacts from gear are limited.

An ongoing program of research is designed to model and evaluate a range of the potential impacts and to further develop mitigation measures.

Research is proposed in the 5-Year Strategic Research Plan, and by AAD, to investigate this issue. There is a major program of research underway to study the potential impacts of the fishery on land-based predators, but the benthic impacts research that would consider the role of icefish in the local ecosystem is still limited.

Key impacts of the fishery that may be unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

The potential impacts of the fishery are likely to be substantially offset through the creation of the marine reserve, and possibly the addition of the conservation zones. This is a major contribution to the likely offset of fishery impacts. The effectiveness of these areas on protecting benthic habitats and species is commencing, but there are no outcomes to verify the level of impact at this time. To the extent possible, the fishery does appear to restrict its operations to the same areas each year to limit widespread benthic impacts. While there are yet no specific outcomes from direct studies, the limitation of fishing areas coupled with the protected areas provides great potential. Research is underway to study this issue.

## **Condition 2.4**

Conditions 2.1 and 2.2 apply.

### **Indicator 2.1.5.2**

The impact of the removal of bycatch or non-target species on ecosystems, habitats, associated or dependent species, or on biological productivity of the region

#### *Intent*

*The intent of this indicator is to assess the impacts of the removal of bycatch species by the fishery on the ecosystems, habitats or dependent species, or on the productivity, and the extent to which such impacts are mitigated.*

#### 100 Scoring Guidepost

- all important impacts of the fishery through removal of bycatch and non-target species are identified and quantified
- the ecological impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are always maintained within the agreed limits
- there is a fishery-independent monitoring program that provides robust data on the levels of all the important impacts, with high intensity reporting to fishery managers
- an ongoing program of research is designed to model and evaluate all impacts, to develop predictive cause-effect models, and to improve mitigation measures
- key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

#### 80 Scoring Guidepost

- the important impacts of the fishery through removal of the bycatch and non-target species have been identified
- the main impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are generally within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits
- there is a fishery-independent monitoring program that provides robust data on the levels of the main impacts, with frequent reporting to fishery managers
- an ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts and to improve mitigation measures
- key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

#### 60 Scoring Guidepost

- Some impacts of the fishery resulting from the removal of the bycatch and non-target species have been identified

- Existing evidence does not suggest that impacts are exceeding indicative limits
- There is a fishery-independent monitoring program of some of the impacts
- an ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts and to explore mitigation measures

SCORE 85

The important impacts of the fishery through removal of the bycatch and non-target species have been identified.

The main bycatch species that are likely to be impacted by the fishery are sharks, skates and rays. The amount of bycatch of these groups is well documented and within limits set by CCAMLR. Full assessments for each species are not available, but for species where assessments have been completed, limits are set based on the assessment.

The main impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are generally within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits.

Limits have been established for a number of commercial bycatch species, and these are not exceeded in the fishery. Limits have also been set for sharks, skates and rays, but formal assessments for each species are not available. Research is underway on many species and completed for a few like sleeper sharks.

There is a fishery-independent monitoring program that provides robust data on the levels of all the main impacts, with frequent reporting to fishery managers.

The level of bycatch is documented to the species level wherever possible and reported in a robust monitoring program with reports to managers. Managers also receive data on each fishing trip for interactions with seabirds, marine mammals, and benthic fauna (corals, sponges, etc.).

An ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts and to improve mitigation measures.

The 5-Year Strategic Research Plan provides details of the intended research program that will be used to address these matters.

Key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

The impacts on bycatch species (other than the large migratory animals) are probably well mitigated through the creation of the marine reserve and the 12 NM closure, although direct verification of the effectiveness of the marine reserve is still underway. The fact that the

marine preserve is large, greatly enhances the chances that the area will be found to be useful in protecting major habitat types around HIMI.

### **Indicator 2.1.5.3**

The impact of the use of benthic fishing gear on ecosystems, habitats, associated or dependent species, or on biological productivity of the region

#### *Intent*

*The intent of this indicator is to assess the impacts of the use of benthic fishing gear on ecosystems, habitats, dependent species, or on productivity, and the extent to which this has been mitigated.*

#### 100 Scoring Guidepost

- all potential impacts of the fishery that may result from the use of benthic fishing gear have been identified and quantified
- the ecological impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are always maintained within the agreed limits
- there is a fishery-independent monitoring program that provides robust data on the levels of all the important impacts, with high intensity reporting to fishery managers
- an ongoing program of research is designed to model and evaluate all impacts, to develop predictive cause-effect models, and to improve mitigation measures
- key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

#### 80 Scoring Guidepost

- the potential impacts of the fishery resulting from the use of benthic fishing gear have been assessed
- the main identified impacts on ecosystems, habitats, productivity and ecologically associated or dependent species are generally within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits
- there is a fishery-independent monitoring program that provides robust data on the levels of the main impacts of the benthic fishing gear, with frequent reporting to fishery managers
- an ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts and to improve mitigation measures
- key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

#### 60 Scoring Guidepost

- Some impacts of the fishery resulting from the use of fishing gear have been identified
- Existing evidence does not suggest that impacts are exceeding indicative limits
- There is a fishery-independent monitoring program assessing benthic impacts
- an ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts of the benthic fishing gear and to explore mitigation measures

SCORE            80

Some impacts of the fishery resulting from the use of fishing gear have been identified.

The impact of the demersal trawl gear on benthic fauna has been identified as an impact of the fishery. There has also been good work on identifying the impact/interaction of gear on seabirds and marine mammals, as well as fish. Lesser, but still ample information has been gathered about the benthic invertebrate assemblages in the area. While no directed studies on fished versus unfished areas had been conducted when setting up the HIMI reserve, there were qualitative and quantitative analyses conducted as part of the reserve planning. Meyer et al. (2000) classified the entire HIMI region into 13 biological units. From trawl maps provided by AAD and the client (confidential information that cannot be released as part of this report), it appears that fishing occurs in a small area northeast of the islands which may occur partially in 2 of the 13 biological units (the Southern Plateau Inner, and the Southern Plateau Outer). Meyer et al. described and compared the faunal components associated with each of the biological units so there is some knowledge of the benthic fauna in the areas of fishing, as well as information on how these faunal components relate to the rest of the HIMI region. The comparisons by Meyer et al. suggest that there are not significant unique assemblages in the areas of fishing that cannot be found in other areas in the HIMI region. In biological units that do appear to have unique faunal assemblages, no fishing occurs.

Existing evidence does not suggest that impacts are exceeding indicative limits.

There are a number of measures be taken to try and mitigate impacts to species and habitats. There are measures in place to limit bird and mammal interactions with fishing gear, measures to reduce gear effects on the benthos, and measures to reduce excessive organic inputs to the system (no offal requirements). In addition, the largest marine reserve in the world was established to preserve the ecology of the entire region. In the planning of the reserve, fishing was identified as having potential impacts. Therefore, biological regions were described and the reserve placed to capture significant portions of habitat that are similar to or the same as the habitats in fished areas. This was done in part to mitigate the effects of fishing.

The client also provided the assessment team with further evidence to support the notion that trawled areas are having limited impacts on the benthos in the HIMI region. The assessment team was provided with a comparison of how much habitat by area is protected

versus fished, a comparison of similarity in biology of fished and unfished areas, and a historical account of benthic impacts in the area.

The area trawled encompasses about 120km<sup>2</sup>. As noted above, fishing occurs at most in 2 biological units as described by Meyer et al. Using the information in the report (Table 16 of Meyer et al.) one can see that the biological unit known as the Southern Plateau Inner area is 11,304 km<sup>2</sup> and the biological unit known as the Southern Plateau Outer has a total area of 15,145 km<sup>2</sup>. This means the area trawled (even using a very conservative approach and considering all trawling as occurring in a single biological unit) would only be 1.06% of the inner plateau and 0.79% of the outer plateau. Given that the similarity in habitat is enough to define biological units; it appears that 99% or more of each biological unit is not impacted by fishing.

To add to the argument that fishing is not having significant impacts, one can also look at the amount of similar habitat that is in the reserve and never available to be fished even in the future. The same report shows that for the inner plateau 4,386 km<sup>2</sup> is set aside in the MPA (38.8% of that biological unit) and for the outer plateau 4,202 km<sup>2</sup> is set aside in the MPA (27.7% of that biological unit). Even if fishing were having significant local impacts, the amount of similar habitat in permanent preservation would more than ensure that the ecological settings where fishing occurs will always occur in the HIMI region.

Additionally, the history of trawling in the area suggests that the impacts from fishing that may have been most significant to the area occurred many years previous by foreign fleets in the HIMI region. Both the French and the Russians fished in the area using benthic fishing gear. It is very likely that much greater impact to the benthos occurred during these previous years. Now, the only fishing in the area is conducted by one organization, and it is limited in area. More importantly, the area trawled is the same each year. The fishers make a concerted effort to keep fishing in the same areas in part to avoid further impact. This coupled with the fact that trawling for icefish is not an intensive effort, would suggest that impacts would be kept under control and minimized to the extent possible. In poor fishing years, such as 2003/2004, the number of trawls (know as shots by the fishers) would have been around 20. In good years, such as 2004/2005, the number of trawls would have been less than 200 (50% of which are not benthic). This compares favorable to other benthic fisheries where thousands of trawls occur each year.

While available data indicate that there is not currently a major effect of trawling, Meyer et al. (2000) point out that further work is needed to determine if there are any significant local impacts occurring that simply may be overlooked. Meyer et al. suggest that directed studies would be worthwhile in maintaining and improving the effectiveness of the marine reserve as well as ensuring that impacts from fishing are mitigated to the fullest extent possible.

There is a fishery-independent monitoring program assessing benthic impacts.

There are programs in place to monitor the benthic impacts of the fishing gear. There is 100% observer coverage and reporting of all bycatch, benthic fauna included. In addition, there is directed research to look at fished and unfished areas (see below for further information).

An ongoing program of research is designed to model and evaluate a range of the potential direct and indirect impacts of the benthic fishing gear and to explore mitigation measures.

AAD has designed and started a research program to better understand the impacts of fishing on the benthos. The program is designed to supplement the existing information by looking at direct comparison between fished and unfished areas. The program was implemented by AAD in 2004. Due to funding irregularities, AAD could not conduct the sampling on its own, so Austral fishing was contracted to conduct the benthic sampling. In addition, there is a FRDC (Fisheries Research and Development Corporation) grant proposal in progress to extend this project for another 3 years.

Key impacts of the fishery that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

As pointed out throughout this section, the world's largest marine reserve is in place in the HIMI region. There is no argument that at least a portion of the planning and implementation of this reserve deals directly with the potential impacts of fishing and their mitigation. An extremely large area around HIMI is now under permanent protection. Moreover, the areas, or biological units, where fishing occurs have significant portions dedicated to the reserve to ensure protection of the same habitats being utilized for fishing.

## **Recommendations**

Recommendations are not required actions under the MSC program. Instead, they are simply suggestions that one or more team members believe are worthwhile when considering the management of the fishery – and as such, may or may not be followed by the client and the fishery managers.

The data compiled and used to establish a large marine protected area in the HIMI region provides reasonable assurances that the potential impacts of trawling are being mitigated. Evidence was presented that shows that the marine protected areas preserve similar general habitats as found in the areas of trawling, and that trawling occurs in very limited space and time. However, the limited data does not permit a full and comprehensive evaluation of the biodiversity in the local areas of bottom trawling. As one peer reviewer pointed out, the client needs to provide an analysis of the current fishing intensity, distribution in time, annual swept area in defined grids of the fishing zone to see whether a large or small part of the shelf and slope area is impacted on an annual basis (see NRC report “Effect of Trawling and Dredging on Seafloor Habitat” as an example). The client responded to the peer reviewer comments by providing the team with a portion of that analysis (as noted above)

showing that the overall area fished is rather small in comparison to the total area in the region or even the area under preservation.

Given the information provided, we strongly recommend that the studies on fished and unfished areas continue and are put in the public domain for stakeholders to review as quickly as possible. Since this information was crucial to receiving a score of 80, the lack of continued research into potential benthic impacts would be seen to weaken the case for the fishery and may cause the assessment team to alter the score during subsequent surveillance visits to a point lower than where it stands in this report. We would also recommend that the client urge the management agencies to complete a full analysis as described by Dr. Alverson in his peer review. These analyses could be very beneficial in informing stakeholders and future management discussions as to the potential for any significant local impacts.

## **MSC Criterion 2**

“The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.”

*This Criterion is interpreted for the Mackerel Icefish Fishery to mean that the fishery should be conducted so that it does not cause any important impacts on threatened, protected or ‘icon’ species that may occur or have important habitats within the fished areas, or be otherwise ecologically dependent on the target species or any bycatch species affected by the fishery.*

*Threatened species are those other than the target species that have been declared Threatened under the IUCN criteria, and include species that are declared as Critically Endangered, Endangered or Vulnerable under IUCN Red List criteria.*

*Protected species are defined as those identified under any law or legal instrument that has national or international jurisdiction in the area where the fishery operates.*

*Icon species are defined as species of particular public interest that do not qualify under the terms ‘endangered, threatened, or protected’.*

*In summary form, we refer to species that may be classified as threatened, protected or ‘icon’ species as ‘high priority’ species.*

*This Criterion is, like MSC Criterion 1, also divided into 5 sub-criteria, following the sequence described for Criterion 1.*

### **SubCriteria 2.2.1**

Knowledge of the ecosystems, habitats and species where the fishery operates is adequate to enable an assessment of the impacts of the fishery on threatened, protected or 'icon' species.

### **Indicator 2.2.1.1**

The populations, distributions and habitats of the threatened, protected or 'icon' species, relevant to the fishing operations.

#### *Intent*

*The intent of this indicator is to assess the adequacy of knowledge about the high priority species that live in the areas, or depend on resources, where the fishery operates.*

#### 100 Scoring Guidepost

- The threatened, protected or 'icon' species in the region have been identified
- The distributions, main habitats, feeding, nesting, reproduction and resting requirements of populations of any threatened, protected or 'icon' species are comprehensively known
- The natural dynamics of any such populations have been monitored and are continually under assessment
- There is an ongoing and effective program of research that is focused on improving the knowledge base about the populations of the threatened, protected or 'icon' species, and in particular to determine conservation status and threats

#### 80 Scoring Guidepost

- The threatened, protected or 'icon' species in the region have been identified
- The main aspects of distributions, main habitats, feeding, nesting, reproduction and resting requirements of populations of all threatened, protected or 'icon' species are known
- There is an ongoing and effective program of research that is focused on improving the knowledge base about the populations of the threatened, protected or 'icon' species, and in particular to determine conservation status in relation to potential impacts of the fishery

#### 60 Scoring Guidepost

- There is a program in place to identify threatened, protected or 'icon' species in the region
- The important aspects of distributions, main habitats, feeding, nesting, reproduction and resting requirements of populations of any known threatened, protected or 'icon' species have been studied

SCORE            90

The threatened, protected or 'icon' species in the region have been identified.

The AAD report (Meyer et al 2000) assesses and identifies the high priority species in the HIMI region.

The main aspects of distributions, main habitats, feeding, nesting, reproduction and resting requirements of populations of all threatened, protected or 'icon' species are known.

The characteristics of the land-based predators are reasonably well understood. However, less is known of the sharks, skates and rays, for which there is also considerable stakeholder concern. Some work has been completed on sleeper sharks.

There is an ongoing and effective program of research that is focused on improving the knowledge base about the populations of the threatened, protected or 'icon' species, and in particular to determine conservation status in relation to potential impacts of the fishery.

The 5-Year Strategic Research Plan is a strong basis for improving the knowledge base of high priority species, and the AAD research program planned to commence in 2003/04 will provide quality data in respect of the high priority species.

#### **Indicator 2.2.1.2**

[The functional roles and importance of the target species in the trophic network of any threatened, protected, or 'icon' species in the region.](#)

##### *Intent*

*The intent of this indicator is to assess the adequacy of knowledge about the functional roles of icefish in the foodwebs of any high priority species that live in the HIMI ecosystem, or are at times dependent on areas or resources where the fishery operates.*

##### 100 Scoring Guidepost

- The structure of the regional foodwebs is well understood
- There is a good quantitative knowledge of the trophic relationships and requirements of the threatened, protected, or 'icon' species
- The trophic role of the target species is well known at each of its main life stages in relation to the trophic requirements of the threatened, protected, or 'icon' species.
- There is a range of ongoing research programs designed to evaluate the natural dynamics and productivity in regional foodwebs, and to model and assess the impacts of the fishery on the trophic requirements of the threatened, protected, or 'icon' species.

##### 80 Scoring Guidepost

- The basic structure of the regional foodwebs have been determined

- There is a good basic knowledge of the trophic relationships and requirements of the main threatened, protected, or ‘icon’ species
- The trophic role of the target species at each of its main life stages is broadly understood in relation to the trophic requirements of the main threatened, protected, or ‘icon’ species.
- There is an ongoing research program designed to evaluate the natural dynamics and productivity in regional foodwebs, and to model and assess the impacts of the fishery on the trophic requirements of the main threatened, protected, or ‘icon’ species.

### 60 Scoring Guidepost

- The key prey, predators and competing species are broadly understood
- There is a basic knowledge of feeding relationships of some of the main threatened, protected, or ‘icon’ species
- Research is being designed to study foodwebs in the region and trophic requirements of some of the threatened, protected, or ‘icon’ species

SCORE        75

The basic structure of the regional foodwebs have been determined.

The nature of the HIMI foodwebs and trophic relationships have not been well studied, but are considered to be broadly similar to other Antarctic plateau groups. There appears to be a more limited role of krill in icefish diet than in other places, which sets HIMI apart from other areas where mackerel icefish are found. The knowledge of the broad trophic functions of other Antarctic systems is an appropriate level of basic knowledge to inform the precautionary management of the HIMI ecosystem and the icefish fishery, although much of the detail, in particular the dynamics, have yet to be determined.

There is a good basic knowledge of the trophic relationships and requirements of the main threatened, protected, or ‘icon’ species.

There is a good basic knowledge of the foodwebs that involve the major commercial species and predators. This is adequate in the first instance for the purposes of managing the fishery. However, the data on trophic relations between the target species and protected, threatened, or icon species needs to be improved to ensure that mitigation measures are working or properly modified.

The trophic role of the target species at each of its main life stages is broadly understood in relation to the trophic requirements of the main threatened, protected, or ‘icon’ species.

The role of icefish in the HIMI foodwebs is based on continuing studies of gut contents of toothfish, icefish and some land-based predators (birds and marine mammals. Detailed trophic relationships of the early age classes or fish in nearshore habitats are less well

understood. This is especially important since the inshore areas (not fished) are considered to be important habitat for both pre-fishery recruiting icefish and as feeding grounds for many of the land-based predators. The derivation and application of the 75% rule (described under Principle 1) results in an allocation of icefish available for the (unspecified) dependent predators. While empirical evidence is lacking for all predator requirements, this is an good start and more than most other fisheries worldwide. The key gap in knowledge that will improve the empirical basis for the predator allocation is knowledge of the trophic role of the target species in relation to populations of the key predator species.

There is an ongoing research program designed to evaluate the natural dynamics and productivity in regional foodwebs, and to model and assess the impacts of the fishery on the trophic requirements of the main threatened, protected, or 'icon' species.

AAD has a major current collaborative research programs underway (e.g. with the French government, with CSIRO, with CCAMLR) to study, amongst others, the trophic role of icefish in the HIMI foodwebs of the major predators. This is an important contribution to this problem, and will most likely provide high quality data for fishery management purposes in due course.

### **Condition 2.5**

The client should provide evidence that AAD research on the trophic role of icefish in predator diets either has been or is being conducted. The AAD research should be properly peer reviewed and published. Once available, this information should be used in Condition 2.1.

### **SubCriterion 2.2.2**

The nature of the fishing activities and characteristics of the fishery are adequately known to determine the impact of the fishery on threatened, protected, or 'icon' species

#### **Indicator 2.2.2.1**

The nature and distribution of fishing effort, including gear types, in space and time in relation to any threatened, protected, or 'icon' species and their ecological requirements.

#### *Intent*

*The intent of this indicator is to assess the knowledge of fishing effort in relation to the information needed to be able to assess the impact of fishing on the high priority species.*

#### 100 Scoring Guidepost

- There is a detailed knowledge of the types of gear used in the fishery, including fine-scale details of places and times of gear deployment of each type, for use in

management to reduce the risk of fishing impacts on threatened, protected, or 'icon' species

- The gear deployment procedures are well documented within an agreed code of practice, and they are consistently applied
- Fishing effort is documented using independent observers and VMS with special emphasis on places and times where interactions with threatened, protected, or 'icon' species may occur.

### 80 Scoring Guidepost

- Gear types used in the fishery are well understood
- Details of deployment are monitored at fine scales of space and time using independent observers and systematically reported to fishery managers, with special emphasis on places and times where interactions with threatened, protected, or 'icon' species may occur.

### 60 Scoring Guidepost

- Gear types used in the fishery are well understood
- Gear deployment is self-monitored and reported

SCORE 95

There is a detailed knowledge of the types of gear used in the fishery, including fine-scale details of places and times of gear deployment of each type, for use in management to reduce the risk of fishing impacts on threatened, protected, or 'icon' species.

The observer program and gear logs provide reports on the details of fishing effort at a high level of resolution in space and time.

The gear deployment procedures are well documented within an agreed code of practice, and they are consistently applied.

Given only two vessels operate in the fishery, the deployment of gear is consistent and under full coverage by observers. Gear deployment is well documented, and mitigation measures in place for high priority species.

Fishing effort is documented using independent observers and VMS with special emphasis on places and times where interactions with threatened, protected, or 'icon' species may occur.

The observer program documents all interactions with high priority species. There are regulatory requirements that compel fishers to report any interactions with icon species within a 24-hr timeframe. In addition, all other aspects of gear deployment and ecological interactions are reported to fishery managers at least each 10 days during fishing operations.

### **SubCriterion 2.2.3**

The specific risk factors in the fishery for any threatened, protected or 'icon' species have been adequately determined.

#### **Indicator 2.2.3.1**

The ecological risks and the range of potential ecological impacts of the fishery on any threatened, protected, or 'icon' species.

##### *Intent*

*The intent of this indicator is to assess the adequacy with which the risks posed by the fishery to any threatened, protected or icon species have been determined.*

##### 100 Scoring Guidepost

- The potential effects of the fishery have been determined by detailed, comprehensive, scientific and peer-reviewed analysis of risks, across large space and time scales, and using precautionary threshold levels of effect of the fishery on populations of all the threatened, protected, or 'icon' species.
- Robust estimates of resilience to fishery impacts and recovery potential have been determined for the all the threatened, protected, or 'icon' species
- The potential impacts of the fishery are established in consultation with stakeholders and a range of relevant experts
- Research projects, including modelling and field measurements, are underway to improve estimates of impacts and the recovery potential for the most important impacts on all the threatened, protected, or 'icon' species
- Models and estimates of resilience and recovery potential take full account of ecosystem dynamics, environmental uncertainty and other factors external to the fishery
- Studies of causes and effects in the fishery are comprehensive across habitats and regions across a range of scales up to the scale of the fishery, and use a range of species-specific attributes and statistically robust designs
- Closed areas (permanent no-take reserves) are used to provide adequate offset for otherwise unavoidable potential impacts of the fishery on threatened, protected, or 'icon' species.

##### 80 Scoring Guidepost

- The potential effects of the fishery have been determined by detailed, scientifically defensible and peer reviewed analysis of risks based on existing data, using precautionary threshold levels of effect of the fishery on populations of all threatened, protected, or 'icon' species.

- Adequate estimates of resilience to fishery impacts and recovery potential have been determined for the main threatened, protected, or ‘icon’ species
- The potential impacts of the fishery are established in consultation with stakeholders and a range of relevant experts
- Research projects, including modelling and field measurements, are underway to improve estimates of impacts and recovery potential
- Models and estimates of resilience and recovery potential take account of important aspects of environmental uncertainty and other relevant factors external to the fishery
- Studies of risks in the fishery are comprehensive across habitats and regions and use statistically robust designs.
- Areas closed to fishing are used to provide support for addressing potential fishery impacts on threatened, protected, or ‘icon’ species.

### 60 Scoring Guidepost

- The potential effects of the fishery have been determined by internal fishery analysis
- The potential impacts of the fishery are established in consultation with a limited range of stakeholders and experts, and based on literature data from other fisheries or regions
- Resilience to fishery impacts and recovery potential have been estimated for the main threatened, protected, or ‘icon’ species

SCORE            75

The potential effects of the fishery have been determined by internal fishery analysis.

The potential effects of the fishery have been determined by preliminary analysis by fishery managers, informed by working group information of CCAMLR. In addition, AFMA management processes also provide input from ornithologists, geologists, marine mammal experts, and fisheries experts through management advisory committees. The CSIRO Risk Assessment Project may also make major contribution to this indicator.

The potential impacts of the fishery are established in consultation with a limited range of stakeholders and experts, and based on literature data from other fisheries or regions.

The risks of the fishery have been established through comparison with risks identified for similar fisheries and Antarctic situations, where shelf ecosystems and high-priority land-based marine predators may interact with the fishery. The CCAMLR working group process has provided a forum for technical input, and the SouthMAC process has enabled stakeholder input to the fishery risks.

Resilience to fishery impacts and recovery potential have been estimated for the main threatened, protected, or ‘icon’ species.

The resilience of the high priority species and their habitats to potential fishery impacts has been considered by the fishery managers, and is assumed to be hedged using the marine reserve closed areas. In addition, current research plans include data collection on high priority species impacted (even slightly) by the fishery.

## **Condition 2.6**

Condition 2.1 applies.

## **SubCriterion 2.2.4**

Strategies have been developed within the fisheries management system to effectively address and restrain any important impacts of the fishery on the threatened, protected, or 'icon' species

### **Indicator 2.2.4.1**

Management objectives and limits in relation to threatened, protected, or 'icon' species.

#### *Intent*

*The intent of this indicator is to assess the extent to which the fishery management system has established objectives and limits for the high priority species that are appropriate and implemented.*

#### 100 Scoring Guidepost

- Management objectives, limits and strategies designed to adequately (precautionarily) protect populations of threatened, protected, or 'icon' species from degradation, are established in conjunction with stakeholders and independent expert advisors, and maintained through annual consultative processes
- These objectives, limits and strategies are included in the fisheries management plan and procedures
- Fisheries operations use the objectives and limits for environmental change to control the fishery and guide operational practices
- Variables related to threatened, protected, or 'icon' species are included within the fisheries monitoring program and in the management plan, and these data are used to guide and revise fishery management practices
- When limits are approached, there are agreed impact mitigation procedures put in place by the fishery to avoid exceeding any environmental limit.
- There is an ongoing program of research to determine the effectiveness of the limits, and to model population responses to specific fishery pressures for all the threatened, protected, or 'icon' species.

#### 80 Scoring Guidepost

- The fisheries management system includes management objectives, limits and strategies to ensure protection of the populations of the threatened, protected, or 'icon' species, established in conjunction with stakeholders and independent expert advisors.
- The fisheries management system has the appropriate monitoring and response arrangements to adjust/control fishery operations if adverse ecological impacts of the fishery are detected on any threatened, protected, or 'icon' species.
- A research program is underway to improve estimates of safe limits for the impacts of the fishery on all threatened, protected, or 'icon' species.

### 60 Scoring Guidepost

- The fisheries management system includes elements to identify and address issues in relation to threatened, protected, or 'icon' species
- The fisheries management system has the capacity to act upon environmental issues.
- A research program is being designed to establish safe limits for threatened, protected or 'icon' species.

SCORE        80

The fisheries management system includes management objectives, limits and strategies to ensure protection of the populations of the threatened, protected, or 'icon' species, established in conjunction with stakeholders and independent expert advisors.

Specific objectives and limits have been established for the high priority species. Regulation requires that the fishers report any significant interactions with priority (icon) species, and the EPBC Act specifies zero capture. For other species such as sharks, skates, and rays there are limits on bycatch set both by CCAMLR and AFMA. While none of these limits is set with express and direct data on the impacts of fishing, they do provide some protection for the species in the fishery. It is likely that if adverse population changes were observed in any of these species, the impacts of the fishery would come under intense scrutiny, both within Australia and within CCAMLR.

The fisheries management system has the appropriate monitoring and response arrangements to adjust/control fishery operations if adverse ecological impacts of the fishery are detected on any threatened, protected, or 'icon' species.

The Management Plan and operational arrangements (as documented in observer reports) indicate that the management system has a robust set of mechanisms to control the fishery should any adverse impacts on high priority species be detected. This would include both limiting of entry to the fishery (the management system provides for the fishery to be closed if circumstances warrant such action), and the operational 'move-on' provisions.

A research program is underway to improve estimates of safe limits for the impacts of the fishery on all threatened, protected, or 'icon' species.

There are some bycatch limits in place already. The 5-Year Strategic Research Plan and the intended program of AAD research will make a major input to setting additional and more precise limits for sharks, rays, and skates. Limits on land-based predators remain at zero-tolerance, requiring fishers to report any interaction and provide proof that it was not from reckless actions.

#### **Indicator 2.2.4.2**

Fishery management strategies that will enable rebuilding of populations of any threatened, protected or 'icon' species that may be affected in the future by the fishery.

##### *Intent*

*The intent of this indicator is to assess the adequacy of the management strategies in the fishery that could be implemented should there be any evidence in the future of any adverse impacts of the fishery on high priority species. The adequacy of strategies to correct adverse impacts on broader aspects of the HIMI ecosystems are covered in MSC Criterion 3 (Indicator 2.3.1.1).*

##### 100 Scoring Guidepost

- The fishery management system detects all important impacts of the fishery on all threatened, protected, or 'icon' species.
- The fishery contains suitable agreed response measures that have been tested and would act to mitigate any detected impacts in an effective and timely manner
- There is a detailed and ongoing research program that is focused on improving understanding of the impacts of the fishery on threatened, protected, or 'icon' species, on developing cause-effect models, and on determining the optimum requirements for population rebuilding.

##### 80 Scoring Guidepost

- The fishery management system detects all important impacts of the fishery on all threatened, protected, or 'icon' species.
- The fishery contains suitable agreed response measures that have been tested and would act to mitigate any detected impacts in an effective and timely manner

##### 60 Scoring Guidepost

- The fishery management system detects impacts of the fishery on the main threatened, protected, or 'icon' species.
- The fishery contains response measures designed to mitigate any detected impacts on threatened, protected, or 'icon' species.

SCORE            90

The fishery management system detects all important impacts of the fishery on all threatened, protected, or 'icon' species.

There is no specific monitoring of the populations of high priority species, in relation to the indirect impacts of this fishery, but there is a detailed program of bycatch monitoring that indicates that the fishery has only limited bycatch on marine high priority species. There is a program for monitoring interactions with mammals and birds such that all interactions, as few as they are, are well understood. Also, there is evidence from collaborative research that suggests that the populations of the main land-based marine predators that may be associated with icefish (fur seal, king penguin) have been recovering (from the radical exploitation of previous centuries). While there is no specific fishery-related monitoring in place for indirect impacts, this is because there are no impacts. Nonetheless, full assurance that such effects are lacking will require further research and verification.

The fishery contains suitable agreed response measures that have been tested and would act to mitigate any detected impacts in an effective and timely manner.

The fishery has a strong set of control measures, and systems to ensure that such controls are implemented. Experience from other fisheries indicates that such controls (including move-on provisions, area-based closures, setting of TAC for target and bycatch species, mesh sizes etc) can be effective in mitigating the types of threats this fishery potentially may have otherwise posed to high priority species that live in the HIMI region.

There is a detailed and ongoing research program that is focused on improving understanding of the impacts of the fishery on threatened, protected, or 'icon' species, on developing cause-effect models, and on determining the optimum requirements for population rebuilding.

The 5-Year Strategic Research Plan and the intended program of AAD research will make a major input to understanding the impacts of the fishery on many of the high priority species, and on the nature of mitigation strategies that might be required.

### **SubCriterion 2.2.5**

There are no unacceptable impacts of the fishery on threatened, protected or 'icon' species.

#### **Indicator 2.2.5.1**

The impact of the removal of the target, non-target or bycatch species on populations of threatened, protected or icon species, or on their foodwebs.

#### *Intent*

*The intent of this indicator is to assess if the fishery has an acceptable level of impacts on the high priority species.*

### 100 Scoring Guidepost

- The important direct and indirect impacts of the fishery on threatened, protected, or 'icon' species through removal of the target species, bycatch or non-target species, or use of fishing gear are identified and quantified
- The ecological impacts on threatened, protected, or 'icon' species are always within the agreed limits
- There is a fishery-independent monitoring program that provides robust data on the levels of all the important impacts, with high intensity reporting to fishery managers
- an ongoing program of research is designed to model and evaluate all impacts, to develop predictive cause-effect models, and to improve mitigation measures
- key potential impacts of the fishery on threatened, protected, or 'icon' species that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

### 80 Scoring Guidepost

- The important direct impacts of the fishery on threatened, protected, or 'icon' species through removal of the target species, bycatch or non-target species, or use of fishing gear have been identified
- the main impacts on threatened, protected, or 'icon' species are always within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits
- There is a fishery-independent monitoring program that provides robust data on the levels of the main impacts, with high-intensity reporting to fishery managers
- an ongoing program of research is designed to model and evaluate a range of the potential impacts on threatened, protected, or 'icon' species and to improve mitigation measures
- key potential impacts of the fishery on threatened, protected, or 'icon' species that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

### 60 Scoring Guidepost

- Based on existing evidence there is a low probability that impacts are exceeding limits
- There is a fishery-independent monitoring program, with occasional reporting to fishery managers
- an ongoing program of research is designed to model and evaluate a range of the potential impacts and to explore mitigation measures

The important direct impacts of the fishery on threatened, protected, or 'icon' species through removal of the target species, bycatch or non-target species, and use of fishing gear have been identified

There appear to be no direct impacts on high priority species from extraction of target or bycatch species, There is good information on gear and boat interactions and these are controlled through a number of management measures with great success.

The main impacts on threatened, protected, or 'icon' species are always within the agreed limits, and other existing evidence does not suggest other impacts are exceeding limits.

The apparent impacts of the fishery appear to be of a minor nature on protected, threatened, or icon species. This in large part is due to regulation that requires reporting of all interactions so a determination can be made about the severity of the interaction. The trophic impacts on fur seal or king penguin populations have yet to be determined, but both populations appear (although yet to be confirmed) to be growing, suggesting only a limited impact from the fishery.

There is a fishery-independent monitoring program that provides robust data on the levels of all the main impacts, with frequent reporting to fishery managers

The bycatch is comprehensively documented, although the impact on the species taken in bycatch (such as the sharks) are not always fully understood. There are no direct impact monitoring programs, and this is related to the lack of apparent direct impacts of the fishery as well as the costs for continuous direct monitoring in a fishery from Australia.

An ongoing program of research is designed to model and evaluate a range of the potential impacts on threatened, protected, or 'icon' species and to improve mitigation measures

The intended program of AAD research will probably make a major input to understanding the impacts of the fishery on many of the high priority species, and on the nature of mitigation strategies that might be required.

Key potential impacts of the fishery on threatened, protected, or 'icon' species that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

The extensive areas that are closed to fishing provide a strong basis for a precautionary mitigation of any possible direct fishery impacts on high priority species. While the total effectiveness of the marine protected areas have yet to be verified, the size of the marine protected areas alone is expected to provide significant mitigation.

### **Indicator 2.2.5.2**

The impacts of the fishery on the structure or function of habitats of the region that are important to threatened, protected or icon species.

*Intent*

*The intent of this indicator is to assess the impact of the fishery on habitats of importance to high priority species.*

100 Scoring Guidepost

- The important direct and indirect impacts of the fishery on the habitats of importance to threatened, protected, or ‘icon’ species are identified and quantified
- The ecological impacts on these habitats are always within the agreed limits
- There is a fishery-independent monitoring program that provides highly robust data on the levels of all the habitat impacts, with high intensity reporting to fishery managers
- An ongoing program of research is designed to model and evaluate all habitat impacts, to develop predictive cause-effect models, and to improve mitigation measures
- Key potential impacts of the fishery on these habitats that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

80 Scoring Guidepost

- The important direct impacts of the fishery on habitats of importance to threatened, protected, or ‘icon’ species have been identified
- The main impacts on these habitats are always within the agreed limits
- There is a fishery-independent monitoring program that provides good data on the levels of all the main habitat impacts
- An ongoing program of research is designed to model and evaluate a range of the potential impacts on habitats and to improve mitigation measures
- Key potential impacts of the fishery on habitats that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis

60 Scoring Guidepost

- Existing evidence does not suggest that habitat impacts are exceeding limits
- There is a monitoring program of fishing effort in relation to habitat impacts
- An ongoing program of research is designed to model and evaluate a range of the potential habitat impacts

SCORE        90

The important direct impacts of the fishery on habitats of importance to threatened, protected, or 'icon' species have been identified.

The client in conjunction with then management authorities provided the assessment team with information on specific trawl tracks for the fishery. Based on the map of trawl tracks, and the presumed areas of importance for the high priority species, there appear to be no major impacts on habitats of importance to high priority species.

The main impacts on these habitats are always within the agreed limits.

To the extent that there are limits, the impacts are in compliance.

There is a fishery-independent monitoring program that provides good data on the levels of all the main habitat impacts.

There are no major impacts, and consequently there is no continuous habitat monitoring required for this purpose. Other research in the area provides irregular but useful checks on habitat impacts and is used as appropriate to adjust management practices.

An ongoing program of research is designed to model and evaluate a range of the potential impacts on habitats and to improve mitigation measures.

The intended program of AAD research, and the 5-Year Strategic Research Plan, will probably make a major input to understanding the impacts of the fishery on the HIMI habitats, and on the nature and need for any mitigation strategies that might be required.

Key potential impacts of the fishery on habitats that are unavoidable through gear or deployment modifications are mitigated on a precautionary basis through the use of closed areas (no-take reserves) on a regional basis.

The closed areas were established for this purpose, and to the extent that they are effective, they will fully satisfy this requirement. As yet there is no verification of the effectiveness of the closed areas for this purpose, but, at the habitat level, they are likely to make an important contribution given the sheer size of the protected areas.

### **MSC Criterion 3**

“Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.”

*The intent of this Criterion is to assess the extent to which the fishery management system contains appropriate strategies that will be able to ensure recovery and rebuilding of any dependent, ecologically associated or bycatch populations that may be depleted by the fishery in the future.*

### **SubCriterion 2.3.1**

There is a well-defined and effective strategy to ensure that ecological impacts of the fishery would be restrained to permit recovery and rebuilding of populations of impacted species if they become adversely affected through any actions of this fishery.

#### **Indicator 2.3.1.1**

Management strategies that include provision for restrictions to the fishery to enable recovery of populations of impacted species.

##### *Intent*

*The intent of this indicator is to assess if the fishery management system has adequate strategies available to permit and encourage rebuilding of any affected populations of species should, in the future, it be shown that the fishery has adversely affected, or is preventing the recovery of, any such populations. This includes high priority species, bycatch species and non-commercial species more generally.*

##### 100 Scoring Guidepost

- The management system has control mechanisms and strategies to reduce impacts on depleted species, to allow them to recover and rebuild.
- There is evidence from within the fishery that these mechanisms and strategies will be effective.

##### 80 Scoring Guidepost

- The management system has control mechanisms and strategies to reduce impacts on depleted species, to allow them to recover and rebuild.
- There is evidence from other fisheries that these mechanisms and strategies can be effective.

##### 60 Scoring Guidepost

- Management meets statutory requirements to protect threatened, protected or icon species.
- Fishing is restricted at times and places where fishing will seriously affect the recovery of depleted populations of protected species

SCORE        95

The management system has control mechanisms and strategies to reduce impacts on depleted species, to allow them to recover and rebuild.

The fishery management system is well developed and has a robust set of controls that could be brought into effect in the event that populations were found to be depleted and a fishery response was required. The only uncertainty here is the lack of properly prescribed triggers (no limits for impact have been set because the management system does not recognize any species as being adversely impacted by the fishery), and so to this extent the strategies for rebuilding impacted populations are not fully developed.

There is evidence from within the fishery that these mechanisms and strategies will be effective.

The evidence from this fishery is that where controls need to be applied, such as area closure, they will be fully effective. Since few controls have had to be applied, there are only few documented examples of this occurring, but there is no reason to doubt that controls applied in the future would be any less effective than those in the past.

### MSC Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

*Intent:* The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

MSC Principle 3 reflects a recognition that among other things, a sustainable fishery is predicated on the development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects; and compliance with relevant local and national local laws and standards and international understandings and agreements.

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

The organisation of the scoring criteria under Principle 3 for the HIMI Icefish fishery is outlined in Figure 6.

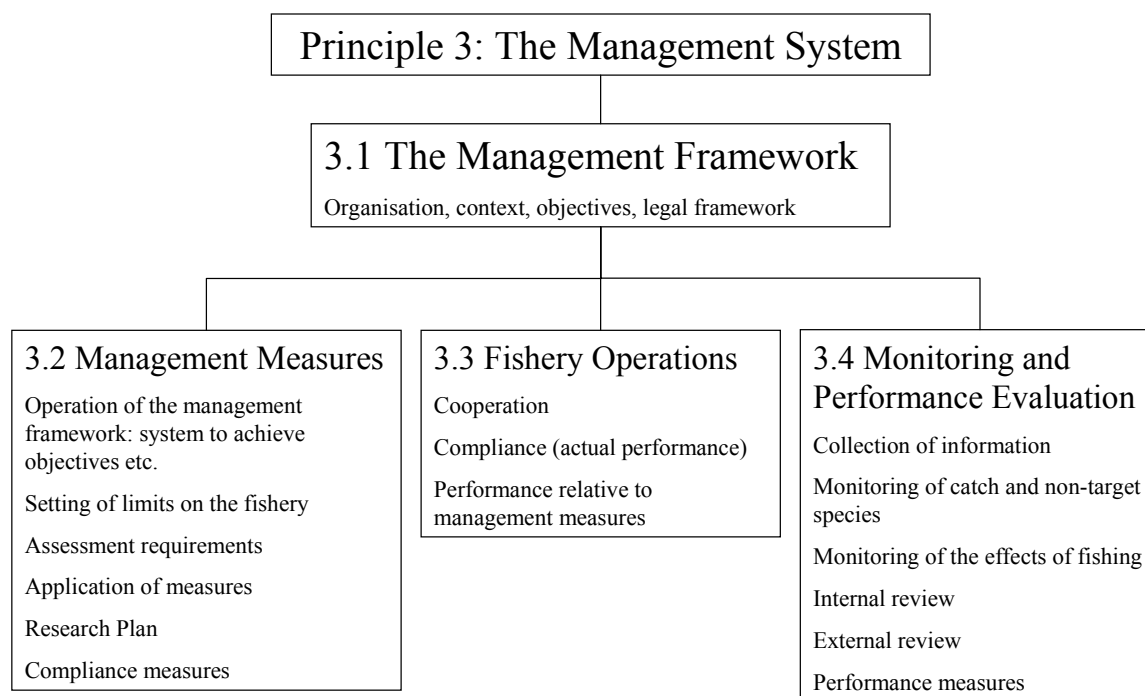


Figure 6. Summary structure of the scoring criteria for Principle 3

A description of the HIMI mackerel icefish fishery management system with specific reference to the components is provided in Section 3. Principle 3 is, of necessity, a complex mixture of concepts that do not always lend themselves easily to quantitative analysis based on unambiguous empirical evidence. The products of a management system are very diverse. The quality of a management system is measured, therefore, in a mixture of qualitative and quantitative, objective and subjective terms. On the one hand, the system's products can be measured in biological or economic units. On the other hand, a management system also produces results that are measured against highly subjective substantive and procedural values.

### Management

Between 1990 and 1993, AAD conducted random stratified trawl surveys of the area with the research vessel *Aurora Australis* to assess the abundance and distribution of fish stocks in the area and identified commercial quantities of both mackerel icefish and Patagonian toothfish. On the basis of the results of these surveys, in 1994 CCAMLR determined a precautionary total TAC for mackerel icefish in Statistical Sub-division 58.5.2 of 311 tonnes. AFMA granted a fishing permit to take 311 tonnes of mackerel icefish between March 1995 and June 1996 under a competitive TAC arrangement. However, the permit was not fished, due to the limited time available for operators to prepare and conduct fishing operations, and the uncertain cost/return ratio (icefish was at that time a new product for the company involved).

In 1997, AFMA released the *HIMI Exploratory Fishery Interim Management Policy – 2 November 1996 to 31 August 1997*, which provided for three scientific Permits to operate in the area. This Policy was designated under the *Environment Protection (Impact of Proposals) Act 1974*. The Minister for Environment decided that no Public Environment Report or Environmental Impact Statement was required for the Fishery. Only two Permits were granted, with conditions designed to minimise the impact of fishing on the environment and to collect data on the fisheries. Requirements included the use of an automated Vessel Monitoring System, compliance with CCAMLR reporting systems and the carriage of two observers. During the 1996/7 season four voyages to the fishery were undertaken for both mackerel icefish and Patagonian toothfish under these scientific Permits.

In 1998, AFMA released the *HIMI Fishery Management Policy 1998-2000*, which implemented a two-boat policy and an individual transferable quota management arrangement. Boats were required to again operate under a number of conditions designed to minimise the impact of fishing on the environment and to collect data on the Fishery. AFMA did not formally designate this Policy under the *Environment Protection (Impact of Proposals) Act 1974*, as in AFMA's view, management arrangements in place under this Policy were essentially a continuation of previous arrangements.

In December 1999 AFMA released a discussion paper entitled *The Future Management of the HIMI Fishery* for public comment, as a precursor to the development of a Management Plan for the Fishery. In May 2000 this was followed by the AFMA Board's decision that under the Management Plan, 51% of SFRs should be granted to current participants, in recognition of the extent, risk, commitment to and performance in the Fishery subject to the satisfactory completion of all current Policy requirements.

In November 2000, The *HIMI Fishery Management Policy 1998 – 2000* was extended for one year, until 30 November 2001 and the two current operators were granted continued access to the Fishery.

In December, 2000 an Independent Advisory Panel was established to provide the AFMA Board with advice on the allocation of the remaining 49% of access rights to the Fishery. The Terms of Reference for this Panel were to provide the AFMA Board with advice on:

- An appropriate basis for determining eligible operators for the balance (49%) of the quota SFRs in the HIMI fishery; and
- appropriate formulae for allocating the balance (49%) of the Patagonian toothfish and mackerel icefish quota SFRs to operators determined to be eligible for the HIMI fishery.

The Panel provided a report to AFMA in April 2001 which recommended the grant of the remaining 49% of access rights to the HIMI Fishery to four operators (two of whom were the existing Permit holders). This recommendation was unanimously supported by the eligible industry participants and adopted by the AFMA Board in May 2001. The Draft HIMI Fishery Management Plan and draft Strategic Assessment Report was released for public comment between 1 Sept and 1 Oct 2001.

A number of comments were received by AFMA on the draft Management Plan and the draft Strategic Assessment. These were from three conservation groups (TRAFFIC, Greenpeace and Humane Society International), three fishing companies (Austral Fisheries, TasSea and HIMILL) a lawyer and a fisheries consultant. Most of the comments related in one way or another to the toothfish component of the fishery and were not directly of concern to the icefish operation. These included concern from conservation groups over IUU catches of toothfish, and dissatisfaction from fishing companies that were not considered eligible operators with the restriction of access to the fishery.

The main concerns expressed that had some relevance to the icefish fishery were:

- that the SAR made too little mention of the impact of fisheries on the region's ecosystem, e.g. impact on the food chain of removing target and non-target species;
- the levels of bycatch of some species, such as sleeper sharks; and

- the potential for bottom trawls (used for both icefish and toothfish) to adversely impact the benthic ecology of the area.

Both AFMA and SouthMAC provided comments in response to these concerns.

Regarding food chain impacts, it was pointed out that the icefish assessment includes a specific, albeit arbitrary, allowance for predator needs in adopting a limit reference point of 75% escapement after two years fishing following a survey.

Regarding the impacts on bycatch species, SouthMAC noted that undertaking a risk assessment for this sleeper sharks was the highest priority identified in the 2002 edition of the AFMA Bycatch Action Plan. AFMA has since comprehensively updated this document<sup>9</sup>, including an evaluation of the risk to sleeper shark populations. These are monitored through a programme of tag and release and, based on information from other fisheries the survivorship of specimens that are caught and released is believed to be high (although this is not yet backed up by direct evidence from the HIMI fishery). A risk assessment has been undertaken on sleeper sharks, which concluded that, at present catch rates the risk to sleeper sharks in the HIMI fishery is not high<sup>10</sup>. AFMA has undertaken to continue monitoring the catch of sleeper sharks, and continue collecting biological information and tag and release individuals.

A range of bycatch mitigation measures are in place to reduce the bycatch of other species, including bycatch limits, bycatch move-on provisions and a minimum mesh size (in accordance with CCAMLR requirements).

Regarding the impacts of bottom trawling, there has been no formal direct assessment of the impacts of bottom trawling on the seabed around the HIMI islands. AFMA noted, however, that the HIMI wilderness reserve already protects a large part of the HIMI shelf from fishing. In addition AFMA noted that the CSIRO Ecological Risk Assessment is considering the broader ecological impacts of the fishery, but this may or may not include the benthic environment. AFMA considers that based on current knowledge, the fishery does not significantly impact the benthos. SouthMAC drew attention to management arrangements that are intended to mitigate the impacts of trawling on the benthos, including:

- Limiting the number of vessels in the fishery;
- Closure of all waters within 1 nm of the 12 nm territorial sea (already closed to fishing);
- Consideration of the development of an MPA (by Environment Australia) based in part on benthic survey work undertaken during research cruises in 1990, 1992 and 1993.

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<sup>9</sup> Antarctic Fisheries Bycatch Action Plan 2003. Developed by AFMA in consultation with SouthMAC. ISBN 1-877044-17-2.

<sup>10</sup> The evaluation team has not been provided with a copy of the original source for this work, and cannot therefore make an assessment of the veracity of this conclusion.

Interim management arrangements were implemented on 1 Dec 2001, which mirrored those proposed under the draft HIMI Fishery Management Plan. In early 2002 accreditation of the HIMI Fishery Management Plan was sought under the EPBC Act from the Minister for Environment. On 21 May 2002, the Manager of the Business/Licensing section of AFMA officially declared the intent to grant SFRs under the Fisheries Management Act 1991, stating that these will be in force for the duration of the Fishery Management Plan, unless they are surrendered sooner.

### Setting of limits on the fishery

Section 10 of the Heard Island and McDonald Islands Fishery Management Plan requires that AFMA determines reference points for each target species that are “appropriate for maintaining ecologically viable stocks of the target species and an ecologically sustainable fishery” (AFMA, 2002). This has been operationalised for the HIMI icefish fishery as a catch control rule, which can be expressed as follows:

- The catch limit is set at a level which is equivalent to a level of fishing mortality that does not result in more than a 5% probability that the median escapement of the spawning biomass will be reduced to less than 75% over a two year projection.

This control rule is implemented by CCAMLR and annual catch limits set accordingly. For the purposes of implementing the rule, the initial spawning biomass is taken from a survey estimate – potentially a random stratified trawl survey, a pelagic survey, an acoustic survey or a combination of all three. In practice, the biomass estimates have come from a random stratified bottom trawl survey. Hence there needs to be a survey undertaken at least every two years for the catch control rule to be applied.

### Application of management measures

Section 6 of the HIMI Fishery Management Plan 2002 lists the following measures by which the management objectives are to be achieved:

- determining reference points for maintaining ecologically sustainable stocks of each target species;
- setting the total allowable catch for each target species and each year in the fishery, as needed, to manage the species, taking account of information from SAFAG, SouthMAC and CCAMLR on appropriate harvest levels;
- granting transferable statutory fishing rights for the fishery to eligible persons;
- developing and implementing a management strategy to ensure that fishing is conducted in an ecologically sustainable way;
- implementing long-term management arrangements that pursue economic efficiency for the fishery;
- developing, implementing and reviewing the bycatch action plan mentioned in section 8 [of the Plan];

- ensuring that a fisheries assessment plan is developed and reviewed in accordance with section 9 [of the Plan];
- monitoring the impact of fishing on target species, species that are caught as bycatch, ecologically-related species and the marine environment, and implementing any related strategies that are necessary to ensure the sustainability of those species and the marine environment, and to ensure that bycatch limitations are not exceeded;
- continually evaluating the mechanisms that have been put into place to monitor fishing against statutory fishing rights and the total allowable catch, and modifying those mechanisms, as necessary, to improve the monitoring;
- periodically checking the accuracy and consistency of information kept in relation to the fishery;
- issuing directions under subsection 31 (1) [of the Plan] prohibiting the use of the fishery, or part of the fishery, during specified periods, telling the holders of statutory fishing rights about those directions, and requiring the holders to comply with the directions;
- preparing an annual budget of costs associated with managing the fishery, and setting and collecting levies and fees for the fishery;
- periodically evaluating whether the range and extent of management services provided by AFMA are consistent with cost-effective management;
- managing fishing operations in the fishery in a way that implements relevant CCAMLR Conservation Measures and complies with other relevant international agreements.

The following table shows that over the period 1999/2000 to 2002/2003, the SAFAG, SouthMAC and the AFMA board have consistently recommended and set TACs at or below the level set by CCAMLR, and that the reported catches of icefish have been below the TAC.

Season	CCAMLR TAC	SAFAG/SouthMAC Advice	AFMA Board TAC	Reported Catch
1999/2000	916	916	916	<b>140</b>
2000/2001	1159	1150	1150	<b>1137</b>
2001/2002	885	885	885	<b>868</b>
2002/2003	2980	2980	2980	<b>2366</b>
2003/2004	292	292	292	<b>51<sup>11</sup></b>

### Research Plan

The Antarctic Fisheries Strategic Research Plan which identifies areas of high priority research for Sub-Antarctic Fisheries was updated in May 2003 by SAFAG to identify research requirements and priorities for the period 2003 – 2008. A comprehensive data acquisition program is in place to collect catch, biological and effort data on both target and bycatch species. The Fishery Assessment Plan 2002 – 2003 for the HIMI Fishery (a

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<sup>11</sup> up to 25 September 2004

component of the Fishery Management Plan) was finalised to meet the monitoring needs of the fishery, which includes the tagging and survey requirements to be undertaken by the SFR holders. The data collected from these programs are reviewed and analysed annually and used in the stock assessments for target and bycatch species.

A number of projects involving routine assessment and management activities for icefish at HIMI are funded throughout the period of the Research Plan. These projects are funded through various means, as indicated in the following list:

- Stock assessment (AAD work feeding into CCAMLR meetings, core AAD funding);
- Random stratified trawl surveys (up to the end of 2006/07, core AAD funding and funding from industry);
- Acoustic monitoring of juvenile icefish (research provision by industry and core AAD funding);
- Collection of catch and effort data using logbooks (industry funded, AAD and SAFAG analysis);
- Monitoring by observer programme (industry funded, AFMA and AAD managed);
- Collection and reading of otoliths (observer programme; industry funding, core AAD funding, and AAD funding of the Central Ageing Facility);
- Monitoring of bycatch and bird and marine mammal interactions (observer programme);
- Effects of trawling on benthic ecosystems (observer programme, research provision by industry and core AAD support); and
- AFMA surveillance (AFMA funding).

In addition, the Research Plan includes a number of special projects that will contribute to the management of the fishery. These include:

- Comparative study of MPA regions for benthic habitat condition (funded through AAD for the 2003/04 season)
- Risk assessment of incidental bycatch species of skates and rays (tagging project funded by AAD and industry in the 2002/03 and 2003/04 seasons)
- Ecology of the HIMI marine ecosystem (AAD study to address predator prey interactions, benthic ecology and biological oceanography. Planning phase began in 2001/02, funded through 2003/04 and 2004/05);
- Exploratory fishing survey to assess resource status in conservation zones (industry funded through 2003/04)

Although not funded at the time of preparation, the Research Plan indicates that AAD and CSIRO will allocate some core funds over the entire period of the Plan to design an evaluation of the benefits of observer data to the assessment of target stocks, bycatch species and the environment of sub-Antarctic fisheries.

The Australian Bureau of Agricultural and Resource Economics (ABARE) has also funded, through 2003/04, the development of a bioeconomics model for Sub-Antarctic fisheries to examine options for managing the move to Statutory Management Plans including an economic assessments of fisheries, consideration of mechanisms for allocating access rights, and application of economic performance indicators.

### Fishery operations

#### *Cooperation between fishers and managers*

The number of vessels and hence the number of operators in the icefish fishery is relatively small. The cooperation between these operators and both AFMA and AAD seems to be very good. Industry is afforded ample opportunity to participate in management decisions, with representation on both SAFAG and SouthMAC. The record shows that industry had substantial input into the decisions leading up to the granting of statutory fishing rights, and aside from complaints from operators found to be ineligible for the fishery (and these operators were seeking access to the toothfish fishery, not the icefish fishery) the process appears to have been both inclusive and sensitive to the needs of fishers.

Vessels are required to carry both an AFMA observer and a data collection officer during their fishing trips to HIMI, both of which are paid for by the industry. Cooperation with these individuals in the performance of their duties appears to be good.

As shown by the funding arrangements for the research plan, industry has made a further financial commitment to the assessment of the fishery, in terms of the stock assessment surveys. The industry's contribution to the survey was in the region of AUS\$940,000 in 2003 (Minutes of the 19<sup>th</sup> Meeting of SouthMAC).

#### *Performance of the fishery*

Since the start of the fishery under AFMA's management system, and the allocation of TACs by CCAMLR, in 1996/97, the reported catches have not exceeded the allowable catch.

Data collected by observers indicates a high level of compliance by licensed vessels with all management measures (AFMA 2001 – Strategic Assessment Report). There is no evidence of illegal fishing for icefish in the HIMI fishery. The problem of illegal fishing for toothfish, however, has been well documented and the Australian Government has mounted a major operation to address this threat (see Section **Error! Reference source not found.**).

### Monitoring and Performance Evaluation

#### *Data collection*

There are substantial and comprehensive reporting requirements for operators in the HIMI icefish fishery comprising haul by haul data submitted in electronic logbooks, and reported within-season every month, within-season reporting of catch every 10 days to monitor progress against catch limits, a vessel monitoring system and observers on every vessel to record catch, biological data and incidental mortality.

The main details of this catch/effort and biological data recording systems are listed below. The format for reporting haul by haul data from trawl fisheries which forms the basis for the electronic logbook is available on the CCAMLR web site (formats C, version 1 and C1 version 5 in the CCAMLR Fishery Data Manual 1999).

***Ten-day catch and effort reporting system:***

- (i) for the purpose of implementing this system, the calendar month shall be divided into three reporting periods, viz: day 1 to day 10, day 11 to day 20 and day 21 to the last day of the month. The reporting periods are hereafter referred to as periods A, B and C;
- (ii) at the end of each reporting period, each Contracting Party participating in the fishery shall obtain from each of its vessels information on total catch and total days and hours fished for that period and shall, by cable, telex, facsimile or electronic transmission, transmit the aggregated catch and days and hours fished for its vessels so as to reach the Executive Secretary no later than the end of the next reporting period;
- (iii) a report must be submitted by every Contracting Party taking part in the fishery for each reporting period for the duration of the fishery, even if no catches are taken;
- (iv) the catch of *Champscephalus gunnari* and of all by-catch species must be reported;
- (v) such reports shall specify the month and reporting period (A, B and C) to which each report refers;
- (vi) immediately after the deadline has passed for receipt of the reports for each period, the Executive Secretary shall notify all Contracting Parties engaged in fishing activities in the division of the total catch taken during the reporting period and the total aggregate catch for the season to date;
- (vii) at the end of every three reporting periods, the Executive Secretary shall inform all Contracting Parties of the total catch taken during the three most recent reporting periods and the total aggregate catch for the season to date.

***Monthly fine-scale (haul-by-haul) catch, effort and biological data reporting system (implemented by observers):***

- (i) the scientific observer(s) aboard each vessel shall collect the data required to complete the CCAMLR fine-scale catch and effort data form C1, latest version. These data shall be submitted to the CCAMLR Secretariat not later than one month after the vessel returns to port;
- (ii) the catch of *Champscephalus gunnari* and of all by-catch species must be reported;
- (iii) the numbers of seabirds and marine mammals of each species caught and released or killed must be reported;
- (iv) the scientific observer(s) aboard each vessel shall collect data on the length composition from representative samples of *Champscephalus gunnari* and by-catch species:
  - (a) length measurements shall be to the nearest centimetre below;
  - (b) representative samples of length composition shall be taken from each fine-scale grid rectangle (0.5° latitude by 1° longitude) fished in each calendar month;
- (v) the above data shall be submitted to the CCAMLR Secretariat not later than one month after the vessel returns to port.

*Performance Evaluation*

Internal AFMA review

The HIMI Management Plan was the first to be assessed under the strategic assessment framework of the Environmental Protection and Biodiversity Conservation Act 1999 (the EPBC Act). Strategic assessment involves assessing fishing activity at the Management Plan or policy level rather than assessment of each individual action or permit. Once the assessment is complete, the Minister for Environment and Heritage may then “accredit” the Management Plan or policy and make a declaration under the EPBC Act that actions under the accredited Plan/policy do not require further impact assessment approval.

The Strategic Assessment was actually conducted on the Draft Fishery Management Plan as published in 2001. Following the receipt of comments on the Plan and the Strategic Assessment, the Plan was revised and issued in final form in 2002.

The Strategic Assessment describes AFMA’s management of the HIMI fisheries in detail. It concluded that the approach taken, and AFMA’s involvement in CCAMLR, provides a high level of confidence that the HIMI fishery and the broader marine environment within the area of the fishery are being managed in a sustainable and precautionary manner.

The 2002 Fishery Management Plan itself includes the following performance criteria against which measures to meet its objectives may be assessed:

- (a) that the target species meet the sustainable reference points set for each target species; and
- (b) that a total allowable catch is set for each target species for each fishing year, and that (unless provision is made for corresponding reductions in subsequent years) the amount of fish that may be taken in a fishing year is not exceeded in the year; and
- (c) that transferable statutory fishing rights are granted to eligible persons; and
- (d) that no more than 3 boats operate in the fishery at any time; and
- (e) that effective strategies are in place to ensure that stocks of any depleted fish resources are being rebuilt; and
- (f) that the catch of non-target species is reduced to, or kept at, a minimum, and below a level that will allow stocks of the species to be maintained at ecologically-sustainable levels; and
- (g) that cost-effective and high quality research is carried out in relation to the fishery in accordance with a 5-year strategic research plan, the results of which are:
  - i. included in the assessment process of the fishery; and
  - ii. published in the assessment reports of the fishery; and
  - iii. taken into consideration in determining the total allowable catch, and other management arrangements, in a fishing year; and
- (h) that the monitoring required by the fisheries assessment plan developed under section 9 has been undertaken; and
- (i) that data is collected and analysed in a timely manner to enable:
  - i. evaluation of the effectiveness of the strategies to maintain or rebuild the resources of the fishery at, or to, an acceptable level; and
  - ii. modification of those strategies; and
- (j) that the cost-effectiveness of management is assessed periodically; and
- (k) that the economic efficiency of the fishery is assessed periodically using economic data provided, on request, by statutory fishing right holders; and
- (l) that the budgetary objectives of the fishery are achieved.

AFMA and SouthMAC must, at least once every 5 years, assess the effectiveness of the Fishery Management Plan including the measures taken to achieve the objectives by reference to these performance criteria. Each year, SouthMAC must assess and AFMA must include in its annual report a statement of the extent to which these performance criteria were met in the year.

The following extracts from the 2002/03 Annual Report provides AFMA's view of their effectiveness relative to their objectives at that time:

Performance Criteria	Level of Achievement as at 30/6/03
Target species meet sustainable reference points set for each target species.	This was achieved in 2002 – 2003.
A total allowable catch is set for each target species for each fishing year, and that (unless provision is made for	This was achieved. The catch limits for both target and bycatch species were not exceeded for the fishing season, which ended on 30 November 2002.

Performance Criteria	Level of Achievement as at 30/6/03
<p>corresponding reductions in subsequent years) the amount of fish that may be taken in a fishing year is not exceeded in the year.</p>	
<p>Transferable statutory fishing rights are granted to eligible persons.</p>	<p>Achieved. Statutory fishing rights were granted to eligible persons and are fully tradable.</p>
<p>No more than 3 boats operate in the fishery at any time.</p>	<p>Achieved. Three boats operated in the fishery during the year.</p>
<p>Effective strategies are in place to ensure that stocks of any depleted fish resources are being rebuilt.</p>	<p>Strategies are not required, as no depleted fish stocks have been identified in the fishery.</p>
<p>Catch of non-target species is reduced to, or kept at, a minimum, and below a level that will allow stocks of the species to be maintained at ecologically sustainable levels.</p>	<p>Achieved. The bycatch of the fishery has remained well below defined reference points. A review procedure was established by SouthMAC to examine fishing operations if bycatch limits approached an agreed trigger level (these are well below the actual limit).</p>
<p>Cost-effective and high quality research is carried out in relation to the fishery in accordance with a five year strategic research plan, the results of which are</p> <ul style="list-style-type: none"> <li>• included in the assessment process of the fishery</li> <li>• published in the assessment reports of the fishery</li> <li>• taken into consideration in determining the total allowable catch (TAC), and other management arrangements, in a fishing year.</li> </ul>	<p>Achieved. A comprehensive research, data gathering and survey program is in place in line with the five year strategic research plan for the fishery. The data gathered is analysed and reviewed annually by SAFAG and CCAMLR</p> <p>The results of this work form the basis for setting the TACs for the fishery and other management arrangements.</p> <p>Reports on the fishery are published annually. The results are fed into the annual SAFAG, SouthMAC and CCAMLR process and are reflected in the TACs.</p>
<p>Monitoring required by the fisheries assessment plan has been undertaken.<sup>12</sup></p>	<p>The survey and tagging requirements of the HIMI Fishery Assessment Plan were successfully completed by operators.</p>
<p>Data are collected and analysed in a timely manner to enable</p> <ul style="list-style-type: none"> <li>• evaluation of the effectiveness of the strategies to maintain or rebuild the resources of the fishery to an acceptable level</li> <li>• modification of those strategies.</li> </ul> <p>The cost-effectiveness of management is</p>	<p>Comprehensive survey, logbook and observer data was gathered on the fishery throughout the year. This data was analysed in a timely manner and formed the basis of management decisions in relation to the setting of catch limits.</p> <p>The fisheries stocks are currently maintained at sustainable levels.</p>
<p>The cost-effectiveness of management is</p>	<p>In March 2003 the draft budgets for the fishery were</p>

<sup>12</sup> We note also that Observer and cruise reports are required to be produced. According to the annual report, all reports were completed as required despite double the anticipated sea days to 560 (due to an increase in the fishing effort associated with higher catch in 2002/03). An annual summary for the Heard Island and McDonald Islands (HIMI) Fishery was completed by June 2003

Performance Criteria	Level of Achievement as at 30/6/03
assessed periodically.	reviewed and supported by the SouthMAC. Throughout the year SouthMAC regularly reviewed AFMA's expenditure against the budget.
Economic efficiency of the fishery is assessed periodically using economic data provided, on request, by statutory fishing right holders.	ABARE is currently reviewing the economic efficiency of the fishery. The holders of statutory fishing rights have provided information to assist with this study.
Budgetary objectives of the fishery are achieved.	The costs of managing the fishery were lower than that budgeted.
AFMA and SouthMAC must, at least once every 5 years, assess the effectiveness of the plan including the measures taken to achieve the objectives of this plan by reference to the performance criteria mentioned above.	Not applicable given that the plan was determined in May 2002. Statutory Fishing Rights took effect and operators commenced fishing under the plan on 1 December 2002.
AFMA must include in its annual report for a financial year a statement of the extent to which the performance criteria mentioned above were met in the year.	Achieved
Each year, SouthMAC must assess the extent to which the performance criteria mentioned above have been met in that year.	SouthMAC will review the success of the first year of operation of the HIMI Fishery Management Plan at its November 2003 meeting <sup>13</sup>

### External (non-AFMA) review

<sup>13</sup> It is not evident from the Minutes of the 19th meeting of SouthMAC that a substantive review took place. Under agenda item 8 (Annual review of the HIMI Fishery Management Plan 2002), the only comment relevant to such a review is:

*“SouthMAC considered the information presented on the HIMI Fishery Management Plan in the 2002/03 AFMA Annual Report, and agreed in future that reference should be made to the IUU catch from the Fishery and the possibility of the HIMI [toothfish] stock being a shared or straddling stock with adjacent waters. SouthMAC agreed to consider a draft of the material for the annual review at its next meeting”. (cont.)*

There is no mention of a review of the success of the Fishery Management Plan in primary objectives of the meeting, which are listed as:

- discuss the outcomes of the twenty-second meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR XXII);
- recommend catch limits for the Heard Island and McDonald Islands (HIMI) Fishery and New and Exploratory fisheries for the 2003/04 season;
- discuss the requirements for longlining in the HIMI Fishery in the 2003/04 season; and
- discuss the scope of the proposed Macquarie Island Fishery Management Plan.

## *Australian Government*

In 2001, the Australian National Audit Office (ANAO) reported on a follow up audit of AFMA<sup>14</sup> to assess the extent to which AFMA addressed the issues that gave rise to the recommendations of ANAO Report Audit Report No. 32 1995-96, and the related recommendations of the House of Representatives Standing Committee Report 1997, that were supported by the Australian Government.

In response to the findings in the 1995-96 Audit, AFMA had developed more structured guidance for MACs and staff to facilitate consistent and effective implementation of key operational matters. AFMA provides detailed stipulations regarding MACs, including their composition, the obligations and responsibilities of members, procedures for reaching decisions, and particularly what to do in the event of conflicts of interest. Given the expertise-based nature of MACs, AFMA recognises that it is inevitable that Members may, from time to time, face potential or direct conflicts of interest. A level of general conflict may result, for example, from the fact that an Industry Member is a participant in a particular fishery. Members are encouraged to recognise the potential for conflict to occur and be aware that, in cases of direct conflict, the operations of the MAC will be affected by an undisclosed conflict of interest. Accordingly, a commonsense approach is advocated. If there is any doubt, a specific conflict of interest and its nature should be declared and recognised in the MAC's discussions. Where the MAC determines that a direct conflict of interest exists, and that this conflict is likely to interfere with the MAC's consideration of a particular issue or issues, the MAC may determine that the Member who has disclosed his/her interest may participate in the discussions relating to the matter but not in formalising a decision on the matter.

The follow-up Audit in 2001 found that MAC members varied in their views about the adequacy of support structures, with some considering current arrangements inadequate. For example, some members emphasised that to fulfil their role effectively, they needed to acquire broader skills and knowledge in areas of fisheries management outside of their expertise. This has to be acquired 'on the job', limiting their ability to contribute effectively to the advisory process, at least initially. Some MAC members understood (incorrectly) their role to be representative, while others considered that there were often unintended conflicting messages about the consultative aspect of their role when matters affecting industry were being considered. Since that time, AFMA has published a detailed document called *How MACs Work*, a guide to new members on AFMA's Management Advisory Committees (AFMA 2003).

Apart from anecdotal industry feedback, and the presence of an AFMA member on each MAC, the ANAO found in 2001 that AFMA and the Board do not have performance information on MACs or any regular means of assessing the effectiveness of MACs'

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<sup>14</sup> Commonwealth Fisheries Management: Follow-up Audit AFMA, Commonwealth of Australia 2001 ISSN 1036-7632 ISBN 0 642 44306 8

performance. The ANAO proposed a systematic assessment of their performance in a cost effective manner, including a client survey of stakeholder perceptions.

## ***CCAMLR***

The assessment and management of the HIMI icefish fishery received considerable more attention from the international scientific community than most. This is because the fishery falls within the Convention Area of CCAMLR. The performance of the fishery relative to management targets is therefore reviewed annually by representatives from all of the member countries of CCAMLR (currently 24). The stock assessment and implementation of the catch control rule also receive substantial scrutiny from the Commission's Scientific Committee, or more specifically the Committee's Working Group on Fish Stock Assessment (WG- FSA). At its annual meeting in Hobart in October, WG-FSA reviews background papers that may include provisional assessments of stock status and potential yield. It then proceeds to undertake assessments based on CCAMLR standard methods, the results of which form the basis for management advice passed to the Scientific Committee for further review. The Scientific Committee then makes recommendations on catch limits and other management measures to the Commission.

In the case of the HIMI icefish fishery, it has been common practice in recent years for AAD to prepare and submit reports to WG-FSA on the results of stock assessment surveys and stock assessments. The methods used in these papers are commonly the CCAMLR standard methods. Hence the Working Group is generally familiar with the approaches used and is well placed to make a rapid and accurate appraisal of the work undertaken.

### Assessment and Scoring

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable

## **3.1 Management Framework**

### **SubCriterion 3.1.1**

A management system containing an institutional and operational framework exists that is appropriate to the cultural context, scale and intensity of the fishery with clear lines of responsibility.

#### **Indicator 3.1.1.1**

The degree of clarity in the definition of organisations with management responsibility, including areas of responsibility and interactions.

### 100 Scoring Guidepost

Organisations with management responsibility are clearly defined including all areas of responsibility and interaction.

### 80 Scoring Guidepost

Organisations with management responsibility have been defined including key areas of responsibility and interaction.

### 60 Scoring Guidepost

Organisations with management responsibility are known. Responsibilities and interactions are to be determined.

SCORE            80

The management of HIMI and its surrounding waters is implemented by two separate organisations: the Australian Antarctic Division (AAD), a part of the Australian Government's Department of the Environment and Heritage, and the Australian Fisheries Management Authority (AFMA), a part of the Australian Government's Department of Agriculture, Fisheries and Forestry – Australia (formerly the Department of Primary Industries and Energy). For the most part their respective roles and responsibilities are well defined. The responsibilities of AAD in relation to HIMI can be broadly described as scientific and technical, while those of AFMA are primarily related to the management of the commercial fisheries. However, there is some apparent uncertainty about the interaction and division of responsibilities between AFMA and AAD with respect to policy development and implementation on commercial fisheries, including the fishery for icefish. Attempts to clarify this have not revealed any formally agreed text or instrument that could provide clarification for third parties, such as participants in the fishery who are not familiar with the entities and individuals involved, or the public. Rather it seems to rely on good cooperation and mutual understanding between senior members of staff in the two organisations. There is no indication presently that this gives rise to any specific major deficiencies in the management process, however, it is an important area of uncertainty and potential vulnerability since it apparently relies on individual relationships and implicit practices that might change with staff movements or other institutional relationship changes. In particular it is unclear how the AFMA responsibilities for management of the fishery to minimize impacts on predator species or benthic impacts are assessed, prioritized, or are supported by research. SouthMAC has identified a number of research projects, but otherwise makes only a cursory contribution to these important issues. AAD has important plans and programs in place, but their objectives in relation to the AFMA responsibilities are unclear.

### Recommendation

The assessment team was apprised that some of the AFMA responsibilities for fishery management are delegated in practice to AAD. The formal delegation of authority, if it exists, together with specific arrangements for identifying management priorities, funding/implementation arrangements of research and management for individual responsibilities, and development of measures of success to assess the relationships between the two organizations should be made publicly available in a clear and concise manner such that all interested parties can review it.

### **Indicator 3.1.1.2**

The extent to which the management system is consistent with the cultural context, scale and intensity of the fishery.

#### 100 Scoring Guidepost

The system is entirely consistent with the cultural context, scale, and intensity of the fishery.

#### 80 Scoring Guidepost

The system is consistent with key elements of the cultural context, scale, and intensity of the fishery.

#### 60 Scoring Guidepost

A programme is in place to address inconsistencies that arise in key areas.

SCORE            95

The management system is consistent with the cultural context of the fishery. The administrative burden on participants is possibly a little top heavy given the scale and intensity of the fishery. This arises primarily because the management system covers not just the icefish fishery, but also the fishery for Patagonian toothfish, which is substantially more valuable and has a substantial problem with illegal fishing, and because of the World Heritage status of the HIMI area. Overall, the management system is consistent with the sensitivity of the area in which the fishery is conducted.

### **SubCriterion 3.1.2**

The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral, and explicit basis.

Elements considered in scoring include:

- Consistency and quality of compliance with federal law (efforts to assure compliance, reasons for incidents of non-compliance, severity of consequences of non-compliance)
- Integration of compliance requirements among the multiple domestic legal regimes that apply to the fishery
- Recognition of and respect for applicable private property rights
- Recognition of and respect for applicable subsistence and /or customary rights.

### **Indicator 3.1.2.1**

The extent to which the fishery is managed and conducted in a manner that respects international conventions and agreements.

#### 100 Scoring Guidepost

- The management system is in full compliance with all aspects of applicable international law, including but not limited to international law on species and ecosystem protection, indigenous cultures, property, labour, law enforcement, communications, and jurisdictional boundaries.
- The management system does not employ or in any manner seek to operate within any exemption to otherwise applicable international law.
- The management system regularly and consistently seeks and uses appropriately the advice of experts in international law, including independent experts.

#### 80 Scoring Guidepost

- The management system is normally in compliance with international fisheries and environmental law.
- The management system does not operate under any controversial exemption to an international fisheries or environment-related agreement but may occasionally seek exemptions that are non-controversial.
- The management system has access to and normally makes use of experts in international law.

#### 60 Scoring Guidepost

Vessels operating in the fishery are all flagged by countries party to applicable international agreements.

SCORE        95

The management system and the conduct of the fishery are fully compliant with the conservation measures set by CCAMLR. There are no controversial exemptions in place. The only concern in this respect is regarding the observers placed on board vessels fishing for icefish. AFMA does not use CCAMLR Observers in the HIMI icefish fishery. In

fisheries for icefish other parts of the CCAMLR Area (e.g. Subarea 48.3, South Georgia) observers are required to be appointed in accordance with the CCAMLR Scheme of international Scientific Observation. The CCAMLR Conservation Measure for icefish in Division 58.5.2 (HIMI) uses the wording that each vessel participating in this fishery shall have at least one scientific observer, and *may* include one appointed in accordance with the CCAMLR Scheme of International Scientific Observation. AFMA are therefore not on contravention of the conservation measure, but that is essentially because they have requested the measure to be drafted in this way for this express purpose. The question remains, therefore as to why they do not want to use CCAMLR observers when this is regarded as the norm in other fisheries in the CCAMLR Area where observers are deemed to be necessary<sup>15</sup>.

Both AFMA and AAD are known to have legal experts on their staff. This score could be increased if the review team received evidence that AFMA and AAD regularly and consistently seek and use appropriately the advice of *independent* experts in international law.

### **Indicator 3.1.2.2**

The extent to which the fishery is managed and conducted in compliance with domestic law.

#### 100 Scoring Guidepost

- The management system is in compliance with all aspects of applicable domestic law.
- The management system, including its component institutional entities, has not been found at any time to be in wilful violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the icefish fishery.
- No officer or agent of the management system, including its component entities, has at any time been found to be in contempt of any domestic court of jurisdiction on any matter related to performance of official duties on behalf of the management system concerning the icefish fishery.
- The management system regularly and consistently seeks and uses appropriately the advice of experts in domestic law, including independent experts.

#### 80 Scoring Guidepost

- The management system is normally in compliance with all substantive and procedural aspects of applicable domestic law related to protection of the human or natural environment, individual species, ecosystems, or fishery dependent communities.

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<sup>15</sup> The only explanation provided during interviews with AFMA staff was cost.

- The management system has access to and normally makes use of experts in domestic law.

### 60 Scoring Guidepost

The management system makes consistent, good faith efforts to be in compliance with all substantive and procedural aspects of applicable domestic law.

SCORE            90

To the extent that the evaluation team has been able to determine from documentary evidence, the management system is in compliance with all aspects of applicable domestic law. Both AFMA and AAD are known to have legal experts on their staff. This score could be increased if the review team received evidence that AFMA and AAD regularly and consistently seek and use appropriately the advice of *independent* experts in domestic law.

### **Indicator 3.1.2.3**

[The extent to which the fishery is managed and conducted in a manner that observes and respects legal and customary rights of people dependent on fishing.](#)

### 100 Scoring Guidepost

- The fishery management system makes affirmative efforts to enhance the security and value of applicable property rights in the fishery.
- The fishery management system makes affirmative efforts to enhance the security and value of applicable subsistence and customary rights in the fishery.
- The fishery management system provides a fair, efficient, predictable means to avoid and reconcile conflicts between legal and customary rights.

### 80 Scoring Guidepost

- The management and conduct of the fishery observes and respects applicable property rights in the fishery.
- The management and conducts of the fishery recognizes and respects applicable subsistence and customary rights in the fishery.
- The fishery management system provides a means to avoid and reconcile conflicts between legal and customary rights.

### 60 Scoring Guidepost

The fishery management system makes some provision for understanding and recognizing property, subsistence, and customary rights, if any, in the fishery.

SCORE            100

By issuing Statutory Fishing Rights, AFMA has made an affirmative effort to enhance the security and value of applicable property rights in the fishery. Given the relatively recent development of the fishery and the lack of an indigenous population, to our knowledge there are no applicable subsistence customary rights in the fishery. Some controversy has arisen over the criteria used to identify eligible persons who can apply for and hold Statutory Fishing Rights, but this has been challenged only with respect to the toothfish fishery and not the icefish fishery. Nevertheless if the value of the icefish fishery were to increase in the future then this might become an issue here also. The management system does provide a fair, efficient, predictable means to avoid and reconcile such conflicts.

### **SubCriterion 3.1.3**

The management plan incorporates an appropriate mechanism for stakeholder involvement and the resolution of disputes arising within the system.

Elements considered in scoring:

- Composition of decision-making and advisory bodies and terms of service
- Process for appointment to standing or ad hoc bodies, criteria for selection and rejection
- Quality of advance notice of meetings, availability of information, and other elements of management process
- Established, routine system available to all
- Objective decision maker
- Explanation of decision

### **Indicator 3.1.3.1**

The extent of stakeholder involvement in the management system.

#### 100 Scoring Guidepost

- The management system provides for direct representation of all significant public and private stakeholder interests.
- The management system shows no evidence of discrimination against significant stakeholder interests.
- The management system produces decisions that take fully into account and address all significant stakeholder interests.

#### 80 Scoring Guidepost

- The management system provides for consideration of the interests of all significant public and private stakeholders.

- The management system operates pursuant to stable, predictable and objective procedures.
- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests.

### 60 Scoring Guidepost

- The management system acknowledges the need for stakeholder involvement in the decision-making process.
- The management system has unofficial or informal decision making procedures with respect to stakeholder involvement.

SCORE        90

Through SAFAG, SouthMAC, and the AFMA Board, the management system provides for direct representation of all significant public and private stakeholder interests. The management system also shows no specific evidence of discrimination against significant stakeholder interests. However, improvements could be made in the extent to which the management system responds to issues that do not conform to the *status quo*. All management advice seems to be derived from the SAFAG and SouthMAC, which would both benefit from additional independent expertise. Despite the well developed structure for debate and stakeholder input, it does appear that some suggestions for improvements, for example on environmental issues, are relatively easily resisted. AFMA should provide greater opportunity for independent researchers to contribute to the process, for example on environmental issues such as predator requirements and benthic impacts.

The final period for which the draft Fishery Management Plan and Strategic Assessment was open for public comment was relatively short (one month), although the Management Plan in particular had a long gestation (about two years) that included input from a variety of stakeholders through the SAFAG and SouthMAC process. Nevertheless, of the considerable number of comments made in response to the draft 2001 Fishery Management Plan and Strategic Assessment, a large proportion were dismissed with no action being taken. Whether or not these positions were justified, it suggests at the very least that there is a need for AFMA to be as transparent as possible in responding to comments to make sure there is not a perception of intentional bias.

### **Indicator 3.1.3.2**

[The mechanism for the resolution of disagreements.](#)

### 100 Scoring Guidepost

- The management system has established mechanisms for resolution of disputes at the principal levels of, and for major issues arising within, the system.

- The management system provides for appropriate documentation of the nature and resolution of disputes.
- The management system actively encourages conflict resolution.
- The management system's dispute resolution procedures do not discriminate against any participants or significant stakeholder interest.

### 80 Scoring Guidepost

- The management system has established mechanisms for resolution of significant disputes arising within the system.
- The management system demonstrates meaningful progress toward resolution of outstanding conflicts and disputes.
- The management system's dispute resolution procedures show evidence of being open to a variety of participants and stakeholders.
- The management system's dispute resolution procedures show no evidence of a pattern of discrimination against any participants or significant stakeholder interest.

### 60 Scoring Guidepost

Dispute resolution mechanisms are in place

SCORE        95

The dispute resolution mechanism fulfils all of the requirements at the 100 scoring guidepost level, but it is unclear that the management system actively encourages the resolution of conflicts. However, there is little evidence of conflicts within the icefish fishery at this stage.

### **SubCriterion 3.1**

The management system includes a management plan with short and long-term objectives, including:

- objectives for the status of the target fish stock(s)
- objectives for the economic and socio-economic condition of the fishery
- objectives for the status of the ecosystem.

Elements considered in scoring include:

- Clear long-term objectives
- Application of precautionary approach

### **Indicator 3.1.4.1**

Incorporation in the management system of objectives for the status of the target fish stock.

### 100 Scoring Guidepost

The management plan includes long-term objectives for the target fish stock that are explicit and supported by appropriate control rules.

### 80 Scoring Guidepost

Management objectives seek clearly to maintain target stocks at high levels of productivity.

### 60 Scoring Guidepost

Some management objectives exist that seek to restore from or maintain the status of the target stock(s) in a non-overfished state.

SCORE        90

The objectives for the status of the target stock are well articulated in the Fisheries Administration Act 1991, the Fisheries Management Act 1991 and the Fishery Management Plan of 2002. Specifically:

to ensure that the exploitation of the resources of the fishery and the carrying on of any related activities are conducted in a manner consistent with the principles of ecologically sustainable development and the exercise of the precautionary principle, and in particular, the need to have regard to the impact of fishing activities on non-target species and the long term sustainability of the marine environment; and to ensure, through proper conservation and management, that the living resources of the AFZ are not endangered by over-exploitation

The control rule currently in place for icefish, however, is based on a short term projection method supported by frequent (annual) surveys. While these surveys provide a useful reality check for the status of the stock, there is no explicit formulation in the control rule that takes account of the long term effects of fishing. The reasons for this have been explained and are further discussed under Principle 1 (very high variability in recruitment to the fishery leading to large fluctuations in spawning biomass and the fishable stock size, even in the absence of fishing), however, the issue of long term effects needs to be addressed as a high priority.

### **Indicator 3.1.4.2**

[Incorporation in the management system of objectives for the economic and socio-economic condition of the fishery.](#)

### 100 Scoring Guidepost

- The management system includes objectives for the economic and socio-economic condition of the fishery that are shown to contribute to sustainable and economically efficient exploitation of the resource.

#### 80 Scoring Guidepost

- The management system includes objectives for the economic and socio-economic condition of the fishery.

#### 60 Scoring Guidepost

- The management system acknowledges the need to consider the economic and socio-economic condition of the fishery when addressing objectives for managing the target fish stock and the effects of fishing on the ecosystem.

SCORE            100

The objectives for the economic and socio-economic condition of the fishery are well articulated in the Fisheries Administration Act 1991, the Fisheries Management Act 1991 and the Fishery Management Plan of 2002. Specifically:

- to maximise economic efficiency in the exploitation of the resources of the fishery;
- to ensure AFMA's accountability to the fishing industry and to the Australian community in management of the resources of the fishery; and
- to achieve the best use of the living resources of the AFZ

The allocation of Statutory Fishing Rights in the fishery can be shown to have contributed to sustainable and economically efficient exploitation of the resource. There are some parts of the industry who consider the mechanism of allocating these rights has not been sufficiently inclusive, but these concerns relate to the toothfish component of the HIMI fishery rather than the icefish component.

#### **Indicator 3.1.4.3**

[Incorporation in the management system of objectives for the status of the ecosystem.](#)

#### 100 Scoring Guidepost

- The management system includes explicit objectives for managing the effects of fishing on the ecosystem that are shown to promote ecologically sustainable fishing.
- The objectives lead to the mitigation of the impacts of fishing on the ecosystem.

#### 80 Scoring Guidepost

- The management system contains objectives for the mitigation of ecosystem impacts.

### 60 Scoring Guidepost

- The management plan acknowledges the need to consider ecosystem effects when meeting other management objectives.

SCORE            90

The objectives described above under indicator 3.1.4.1 apply here. There remain concerns, however, over the effects of bottom trawling on the benthic ecology of the HIMI shelf and impacts on dependent predators. This is discussed in more detail under Principle 2.

## **3.2 Management Measures**

### **SubCriterion 3.2.1**

The management system operates in a timely and adaptive fashion on the basis of the best available information using a precautionary approach, particularly when dealing with scientific uncertainty, to achieve the:

- objectives for the status of the target fish stock(s)
- objectives for the economic and socio-economic condition of the fishery; and the
- objectives for the status of the ecosystem.

Elements considered in scoring include:

- application of precautionary approach;
- use of best scientific information;
- explicit catch control rule (e.g., ABC, TAC); and
- regular assessment of stock status with appropriate frequency.

### **Indicator 3.2.1.1**

The exploitation strategy for the target stock.

### 100 Scoring Guidepost

- The exploitation strategy, including catch control rule, is explicitly precautionary, accounting for uncertainties in stock size estimates and other scientific advice, and other risk factors.
- Annual assessments are undertaken for all components of the population, based on sound long-term data, including data developed prior to inception of the icefish fishery, if any.

## 80 Scoring Guidepost

- The exploitation strategy includes an explicit catch control rule
- The exploitation strategy, including catch control rule, can be shown to be precautionary.
- Annual assessments are based on best available information from ongoing data collection efforts.
- The exploitation strategy takes account of uncertainties in stock status.
- The catch control rule is applied consistently and is not overridden routinely.

## 60 Scoring Guidepost

- The exploitation strategy includes an implicit catch control rule
- Application of the catch control rule implicitly takes into account some sources of uncertainty

SCORE        90

The catch control rule can be articulated as follows:

*The catch limit is set at a level which is equivalent to a level of fishing mortality that does results in no more than a 5% probability that the median escapement of the spawning biomass will be reduced to less than 75% over a two year projection.*

This can be shown to be precautionary in the context of the icefish fishery. The catch limit is set according to the results of a short term (two year) projection which is repeated annually using the most recent survey results and catch data. Frequent (at least every two years) surveys are undertaken to make direct assessments of the status of the icefish population for the purposes of making these projections. In the absence of a sufficiently recent survey (i.e. less than 2 years old), the catch limit would be set to zero.

The trawl survey estimate of biomass is treated as an absolute estimate, and not calibrated in an assessment as it would be in many other parts of the world. This is because the dynamics of the icefish fishery do not appear to lend themselves to a longer term assessment that might yield a better estimate of absolute stock size, due to apparently highly variable stock size, even in the absence of fishing, that may be the result of episodic and (currently) unpredictable changes in natural mortality, and/or migrations. Research is aimed at solving these problems, to enable a more long term assessment to be attempted, but currently this does not appear to be possible. In the absence of such an assessment, the short term approach is reasonable, given that it is supported by frequent reality checks in the form of the surveys. However, it is important that the potential longer term effects of fishing are considered in greater depth. To guard against the danger of a shifting baseline for these short term projections, there is a need to assess an absolute lower limit on biomass, both

from the perspective of icefish recruitment and predator requirements, below which a recovery plan would be put in place.

### **Indicator 3.2.1.2**

The degree to which catch levels are set in relation to the productivity of the target population and the ecosystem.

#### 100 Scoring Guidepost

- Catch levels are set regularly in a manner directly tied to, and limited by, target species population objectives, including objectives for population subcomponents.
- Catch levels are set regularly in a manner directly tied to, and limited by, specific ecosystem objectives, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs.

#### 80 Scoring Guidepost

- Catch levels are regularly set in a manner that considers ecosystem objectives, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs.
- Catch levels are set in accordance with a precautionary approach to management.

#### 60 Scoring Guidepost

- Catch levels and/or catch arrangements are regularly set in a manner directly tied to objectives for the status of target species population(s).

SCORE        90

Catch limits are reviewed annually by AAD and CCAMLR. The catch control rule takes implicit account of predatory requirements by setting the limit reference point to 75% escapement over a two year period (assuming no recruitment) for 2+ aged fish and requiring this limit not be exceeded by a very high probability level (95%). For fish from age 0 – 2+ there is no fishing permitted, as well as move on provisions to avoid accidental capture. The 75% level of escapement for 2+ aged fish, however, is essentially arbitrary and is not based on a specific study of predator requirements. It is a proportional escapement and does not guarantee a specific quantity biomass will be available for predators. This is considered in more detail in Principle 2.

### **Indicator 3.2.1.3**

[The application of fishery closures or restrictions or when catch limits are reached](#)

### 100 Scoring Guidepost

- The management system has demonstrated a consistent ability to close or restrict the fishery in a manner that effectively prevents catch limits being exceeded.
- The management system has a record of identifying and eliminating factors in season that impair the effectiveness of catch limit-related closures or restrictions.

### 80 Scoring Guidepost

- The management system has demonstrated a willingness to close or restrict the fishery to prevent catch limits being exceeded
- The management system has a record of identifying and addressing factors that impair the effectiveness of catch limit-related closures or restrictions.

### 60 Scoring Guidepost

- The management system has the option to close or restrict the fishery to prevent catch limits being exceeded
- The management system has a record of identifying factors that impair the effectiveness of catch limit-related closures or restrictions

SCORE 95

There is a perfect record in terms of fishery closures being implemented to prevent catch limits being exceeded. There is a specific penalty for even small overages of quota limits (for every kg over, 2kg are taken off the following year's limit). The only concern here is whether the reporting timeframe is sufficiently sensitive to enable managers to make accurate predictions of when the catch limit will be reached. If catch rates are particularly good, a vessel trawling for icefish could take 200 tonnes or more in a short space of time. The fact that catch information is recorded on a haul by haul basis should facilitate a quick turn around and time sensitive monitoring when quotas are being reached.

#### **Indicator 3.2.1.4**

[The provision within the management system for rebuilding and recovery of depleted stocks](#)

### 100 Scoring Guidepost

- The management system sets and has demonstrated a trend toward achieving rebuilding and recovery goals of all over-fished stocks.
- The management system does not allow fishing on any stock impacted by the fishery that has declined below limit reference points until the fishery can be demonstrated to be significantly above the limits imposed.

### 80 Scoring Guidepost

The management system has effective provisions for achieving targets for rebuilding and recovery of overfished stocks within a specified time frame.

### 60 Scoring Guidepost

The management system has targets for rebuilding and recovery of overfished stocks.

SCORE            70

Currently there is no obviously explicit means of identifying when the icefish stock is overfished. There is no published minimum stock size threshold below which a recovery plan would be put in place. However, there is evidence that an implicit system operates. For example, Shell Bank has been closed to fishing since 2000 on the basis of survey results (there was a small fishery there in 1997/98). During the May 2003 survey, no icefish were caught there. The fishery currently operates only on the Heard Island Plateau. It is unclear whether the lack of fish on Shell Bank is a result of past fishing activity or the natural variability of the stock, in terms of both biomass and distribution. Evidence from this fishery and from South Georgia suggests that the latter plays an important part in this. The “recovery” plan therefore is to not fish in this area at all. The “recovery” of the stock, or perhaps more accurately the “reappearance” of the stock in this area will be monitored by the surveys. Nevertheless, there is a need to make explicit in the management plan the procedure for assessing when the fishery is overfished, and the conditions under which a closed area would be re-opened.

### **Condition 3.1**

The management system must be improved to contain criteria for assessing when a stock within the fishery is overfished, the strategies to be adopted when the stock is classified as overfished, and the conditions under which an overfished (stock or) fishery is considered to have recovered. This is considered in more detail under Principle 1. To the extent possible, this condition should be informed by or be coincident with conditions in Principle 1.

### **Indicator 3.2.1.5**

The strategy to achieve the management objectives for the economic and socio-economic status of the fishery

### 100 Scoring Guidepost

- The management system demonstrates a record of understanding and integration of all economic and socio-economic consequences of management decisions.
- The fishery is free from subsidies that directly or potentially contribute to unsustainable fishing practices.

### 80 Scoring Guidepost

- The management system includes specific strategies for achieving objectives for the economic and socio-economic status of the fishery.
- The fishery is free from subsidies that directly and substantially promote overfishing or ecosystem degradation.

### 60 Scoring Guidepost

The fishery management system seeks to understand the social and economic consequences of decision-making in an adaptive manner.

SCORE            90

This is a small fishery with relatively few economic consequences to consider at a management level. That the fishery exists at all is testament to the commitment and tenacity of the industry participants. The management system has proved itself sensitive to this by issuing secure Statutory Fishing Rights that are appropriate to the sporadic and uncertain nature of the fishery. Given the relatively small and uncertain returns from icefish and the high cost of deployment to the fishery, it seems likely that the industry participants rely heavily on the returns from the toothfish fishery to make their trips worthwhile, while the icefish component is perhaps more of a bonus than a viable fishery in its own right. One could argue, therefore, that the icefish fishery is effectively subsidised by the toothfish fishery. However, even if this is regarded as a direct subsidy (which is questionable), we have seen no specific evidence that this subsidy substantially promotes unsustainable fishing practices.

AFMA operates on a system of cost recovery from industry and the industry has also made substantial investment in research (formalised in the Fisheries Assessment Plan, a component of the Fishery Management Plan). There is, however, substantial government expenditure over and above the industry contribution for both research and surveillance, although the latter is directed almost totally at the toothfish fishery.

### **Indicator 3.2.1.6**

The programme to avoid catch of non-target species, minimise mortality of this catch, and promote the productive use of non-target species that cannot be released alive.

### 100 Scoring Guidepost

- The programme to minimise catch of non-target species is established and widely accepted.
- The management system provides for productive economic or social uses of non-target species that cannot be released alive.

### 80 Scoring Guidepost

- The programme to minimise catch of non-target species is actively implemented
- The programme to minimise catch of non-target species includes specific thresholds that are not routinely exceeded and are precautionary.

### 60 Scoring Guidepost

A programme exists to minimise catch of non-target species.

SCORE            90

AFMA has developed a comprehensive Bycatch Action Plan that applies to all Australian fishers operating in the Antarctic. There are specific precautionary limits on the catch of grey rockcod (*Notothenia squamifrons*), unicorn icefish (*Channichthys rhinoceratus*), skates & rays (as a group), macrourids and all other deepwater species (separately by species). This program to minimize catch of non-target species has been established by CCAMLR and is widely accepted. Any fish that are not frozen are reduced to fishmeal. A risk assessment has been undertaken on sleeper sharks, which concluded that, at present catch rates the risk to sleeper sharks in the HIMI fishery is not high. There is a need, however, to make better assessment of the effects of bottom trawling on non-target benthic organisms. This need while present, is somewhat lessened in importance by the fact that the fishery operates in an area where the world's largest marine protected area is in place to protect the overall ecology of the area. Additional detail of these matters is considered further in Principle 2.

#### **Indicator 3.2.1.7**

[The program to prevent, mitigate, or minimize adverse impacts on habitat caused by fishing.](#)

### 100 Scoring Guidepost

- There is continuing, comprehensive effort to identify, document, and assess the risks to habitat from fishery impacts.
- There is a demonstrated a pattern of actions to restrict fishing gear and practices to prevent, mitigate, or minimize adverse impacts on habitat and has achieved a demonstrated trend of reductions in adverse habitat impacts from fishing, or has determined that no impacts on habitat result from fishing.

### 80 Scoring Guidepost

Specific actions have been taken to restrict fishing gear and fishing practices to prevent, mitigate, or minimize actual or potential impacts on habitat caused by fishing.

### 60 Scoring Guidepost

Efforts are made to identify, document, and assess the risks to habitat from fishery impacts.

SCORE 79

There has been no formal direct assessment of the impacts of bottom trawling on the seabed around the HIMI islands. AFMA has noted, however, that the HIMI wilderness reserve already protects a large part of the HIMI shelf from fishing. According to SouthMAC, the following management arrangements are intended to mitigate the impacts of trawling on the benthos:

- Limiting the number of vessels in the fishery;
- Closure of all waters within 1 nm of the 12 nm territorial sea (already closed to fishing);
- Consideration of the development of an MPA (by Environment Australia) based in part on benthic survey work undertaken during research cruises in 1990, 1992 and 1993 (already implemented).

We did not, however, find evidence of continuing, comprehensive effort to identify, document, and assess the risks to habitat from fishery impacts. Although the surveys do collect information on habitat impacts, there needs to be a more comprehensive approach to studying the effects of the bottom trawls in the areas where they operate intensively, for example through direct monitoring of trawled and untrawled areas. Although there are large areas of the shelf that are not and cannot be trawled, it is important to determine the extent to which localised intensive impacts may cause irreversible change in areas of potentially unique benthic habitat. Although comprehensive information is collected on the technical details of the net and ground tackle, we have seen no evidence of studies to consider potential gear modifications that might mitigate the effects of bottom trawling. . This matter is considered in more detail in Principle 2.

### **Condition 3.2**

Meet Conditions 2.1 and 2.2. In addition, provide evidence to the certifier that there is some process in place to provide an ongoing, although periodic, process to identify, document, assess, reduce and ameliorate risks to habitat resulting from fishing practices. This process should meet requirements set out in the Management Plan.

### **Indicator 3.2.1.8**

[The strategy to prohibit the use of destructive fishery practices.](#)

### 100 Scoring Guidepost

The management system affirmatively and comprehensively prohibits fishery or operational practices that damage or destroy natural geological, biological, or chemical features or characteristics of the aquatic area in which the fishery occurs, except those impacts that are physically unavoidable consequences of authorized uses of fishing gear.

#### 80 Scoring Guidepost

The fishery does not use explosives or toxic chemicals to kill or stun aquatic species.

#### 60 Scoring Guidepost

The fishery management system has a mechanism to determine whether participants use destructive fishing practices.

SCORE        100

Destructive fishing practices are comprehensively prohibited in this fishery.

#### **Indicator 3.2.1.9**

Use of no-take zones, and MPAs, or other mechanisms, to achieve harvest limits and ecosystem objectives.

#### 100 Scoring Guideposts

The management system has demonstrated a consistent ability and willingness to establish no-take zones and/or MPAs or other mechanisms where appropriate in order to achieve harvest limit and ecosystem goals.

#### 80 Scoring Guideposts

The management system has established no-take zones, MPAs, or other control mechanisms, where appropriate.

#### 60 Scoring Guideposts

The management system is developing no-take zones, MPAs, or other control mechanisms, where appropriate.

SCORE        95

The Department of Environment and Heritage and AAD considered and implemented the development of an MPA for the conservation zones of HIMI based in part on benthic survey work undertaken during research cruises in 1990, 1992 and 1993. The marine

protected areas now cover 17% of the total EEZ and precludes fishing in almost 40% of the trawlable grounds less than 1000 meters in depth. While there is no direct measure of its effectiveness, it seems to be generally considered an appropriate control mechanism.

### **Indicator 3.2.1.10**

Minimisation of operational waste.

#### 100 Scoring Guideposts

The management system has eliminated operational waste other than accidental loss of fishing gear.

#### 80 Scoring Guideposts

- The management system monitors the implementation of rules to minimise operational waste
- Rules to minimise operational waste are enforced.

#### 60 Scoring Guideposts

The management system has established rules to minimise operational waste

SCORE        100

The management system has eliminated operational waste in the HIMI fishery other than accidental loss of fishing gear . Reports on all non-biodegradable gear lost are made within 24 hours, by industry and confirmed by observers, with summaries of all gear lost and any operational waste reported annually. There is also a safety policy for dumping fish meal if it should overheat and be in danger of spontaneous combustion. And there is a regulatory requirement for zero offal disposal at sea.

### **SubCriterion 3.2.2**

The management system includes a research plan to support the achievement of management objectives, including the identification and mitigation of ecosystem impacts, and provides for the dissemination of research results to all interested parties in a timely fashion.

Elements considered include:

- Role of science in setting research agenda
- Role of science in decision making by managers
- Diversity and quality of input
- Transparency of process
- Nature of the guidelines for responding to assessment outcomes

- Timing, scope of response to assessment outcomes (actual relevance of process)
- Relationship between those who design research and those responsible for implementation
- Relationship to present and future management needs
- Long-term commitment
- Adequacy of funding
- Predictability of funding
- Prioritisation/allocation of funding

### **Indicator 3.2.2.1**

#### [Identification of key areas requiring further research and research planning](#)

##### 100 Scoring Guideposts

- There is an ongoing, funded, comprehensive and balanced research programme, linking research to the management plan.
- A comprehensive regular review of research requirements takes place on an on-going basis, including input from independent scientists.
- There is a stable, well-led, diverse and objective research planning organization.
- There is significant and regular coordination and agreement between fishery managers and research scientists on research needs and priorities in the fishery.

##### 80 Scoring Guideposts

- Key areas requiring further research have been identified through the implementation of an internal review strategy.
- There is regular coordination and agreement between fishery managers and research scientists on short and long term research needs and priorities in the fishery.

##### 60 Scoring Guideposts

- A strategy exists to identify key areas requiring further research.
- An objective research planning organization exists.
- There is some coordination and agreement between fishery managers and research scientists on research needs and priorities in the fishery

SCORE            90

The process of research planning through SAFAG, SouthMAC, AAD and AFMA, and with additional input from CCAMLR is comprehensive. There is, however, scope for additional input from independent scientists to increase objectivity. Additionally, the icefish fishery has to compete to some extent for research attention with the toothfish fishery. Evidence from the minutes of SAFAG and SouthMAC meetings, and discussions with participants

suggests that the toothfish fishery receives much more attention. This is not surprising given its higher value and greater demand for access, but a balance needs to be reached to ensure that the icefish fishery does not get sidelined.

### **Indicator 3.2.2.2**

#### [Allocation of funding and other resources to key research](#)

##### 100 Scoring Guideposts

- Funding is sufficient for research needs to address all significant knowledge gaps.
- Funding is adjusted in a timely and appropriate manner to serve changing research priorities.
- Funding is predictable over a long-enough time scale to allow research planning appropriate to all identified long-term research needs.

##### 80 Scoring Guideposts

- Funding is sufficient for research needs to address major gaps in knowledge.
- There is a mechanism to adjust funding to meet requirements of newly identified research priorities.
- Funding is predictable over long-enough time scale to allow continuity of all major stock assessment and ecological interactions research programs.

##### 60 Scoring Guideposts

Funding is adequate for near-term research needs.

SCORE        80

Funding for research is, for the most part, sufficient, timely and predictable. However, the evaluation team was concerned about the lack of funding for research into the effects of bottom trawling on habitat.

### **Indicator 3.2.2.3**

#### [The status of research supporting the harvest strategy and the identification and mitigation of ecosystem impacts.](#)

##### 100 Scoring Guideposts

- Continuing, significant progress is made in scientific understanding of target and impacted species.
- Continuing, significant progress is made in application of scientific understanding to harvest strategy.

- Continuing, significant progress is made in scientific understanding of ecosystem impacts of fishery.
- Continuing, significant progress is made in application of scientific understanding to ecosystem management strategy.

### 80 Scoring Guideposts

- Evident progress has been made in scientific understanding related to target and impacted species.
- There is evident application of scientific understanding to the harvest strategy.
- Evident progress has been made in scientific understanding related to ecosystem impacts of fishery.
- There is evident application of scientific understanding to strategy for managing ecological impacts of fishing.

### 60 Scoring Guideposts

Near-term research is carried out with basic strategic planning or coordination.

SCORE            85

As with the previous indicator, the status of research supporting the harvest strategy and identification and mitigation of ecosystem impacts is generally good. Two areas were identified that need work over an above the already on-going programme:

- Research into the longer term effects of icefish harvest, leading to the identification of a minimum stock size threshold; and
- Research in to the effects of bottom trawling on habitat.

As pointed out by one of the peer reviewers, the fishery might also pay attention to the sustainable harvest rate under varying productivity regimes.

### **Indicator 3.2.2.4**

[Consideration of relevant research carried out by other organisations.](#)

### 100 Scoring Guidepost

- Relevant research carried out by other objective research organisations is taken into account.
- This research is often co-ordinated with existing research plans of the management system.

### 80 Scoring Guidepost

- Appropriate research carried out by other objective research organisations is taken into consideration.
- Some proactive co-ordination between organisations occurs.

### 60 Scoring Guidepost

The objective research planning organization is aware of research activities carried out by other objective research organisations.

SCORE            90

There is opportunity through the input of CCAMLR and CSIRO, as well as the work of AAD for research carried out by other objective research organisations to be taken into account as it regards icefish specifically or Antarctic fisheries in general.

### **SubCriterion 3.2.3**

The management system includes measures to ensure effective compliance, control, surveillance and enforcement to ensure its effective implementation.

Elements considered in scoring include:

- The management system contains procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that management system controls are not violated and appropriate corrective actions are taken
- Actual adherence to procedures is considered under section 3.3.3.

### **Indicator 3.2.3.1**

#### Compliance control

### 100 Scoring Guidepost

- The management system has established a comprehensive compliance and enforcement system.
- The management system has demonstrated a consistent ability to enforce applicable rules, including a independently verified system for validation of reported results.
- Penalties for violations of rules provide substantial deterrent value.

### 80 Scoring Guidepost

- The management system has established a compliance and enforcement system.
- There is a record of consistent enforcement and prosecution of violations in the fishery.
- Penalties for violations of rules have deterrent value.

## 60 Scoring Guidepost

- Compliance with management measures is enforced on an *ad-hoc* basis.
- Penalties for violations of rules exist

SCORE 95

HIMI is an extraordinarily remote location, making enforcement of fishery regulations extremely difficult. The Australian government has, however, shown itself to be committed, both morally and financially to ensuring compliance in the HIMI fishery to the greatest extent possible, including the use of armed patrol and high penalties. There are also mechanisms to report all fishing related activities through 100% observer coverage, VMS on boats, and dock side monitoring of catch. There is currently not thought to be a compliance problem in the icefish fishery, but there remains a serious threat of illegal fishing for toothfish.

### **3.3 Operation of the fishery**

#### **SubCriterion 3.3.1**

The fishing operation assists and co-operates with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

#### **Indicator 3.3.1.1**

Cooperation with management authorities in the collection of catch information.

## 100 Scoring Guidepost

- Fishing operations use electronic logbooks, VMS, or some other real-time monitoring to report all catch information by time and area.
- Comprehensive biological data are collected routinely and independently by trained fishery observers deployed at a coverage level in the fishery suitable for meeting research needs and achieving management objectives.

## 80 Scoring Guidepost

- Fishing operations use logbooks, or equivalent procedure to record catch information by time and area on a real time basis.
- Trained fishery observers are taken onboard fishing vessels for a portion of fishing days to allow some estimation of fishery-wide discard mortality.

## 60 Scoring Guidepost

- Catch data are recorded at least at the end of a fishing trip by dealers at the dock (or to whom ever the fishing operation sells its catch).
- There is some cooperation between the fishery participants and the management authority.

SCORE            100

The data collection systems operating in the HIMI icefish fishery meet the requirements of the 100% scoring guideposts under this indicator. Both electronic logbooks and a VMS system are operating in the fishery. An independent AFMA scientific observer and a data collection officer are deployed on every vessel.

**Indicator 3.3.1.2**

Cooperation between the fishing operation and management authority in the collection of data on bycatch, including discards and incidental takes.

100 Scoring Guidepost

- All fishing operators collect information on all discards.
- Comprehensive collection of data on discards and other takes is undertaken independently by trained fishery observers.

80 Scoring Guidepost

- Some fishing operators voluntarily collect information on discards and other incidental takes (i.e. protected species, birds, turtles, whales)
- Trained fishery observers are taken onboard fishing vessels for a portion of fishing days giving some estimation of fishery-wide discards.

60 Scoring Guidepost

Information is available to managers on the catch of non-target species.

SCORE            100

Records from the fishery indicate that cooperation on data collection is of the highest level. Data on all catches are recorded either by the fishers themselves or the trained fishery observers. No catch is discarded. The catch is either frozen or converted to fishmeal.

**SubCriterion 3.3.2**

The fishery operates in such a way that demonstrably:

- prevents, mitigates or minimises impacts on non-target species and inadvertent impacts upon target species; prevents, mitigates or minimises or mitigates adverse impacts on habitat;
- prevents destructive fishing practices; and
- minimises operational waste.

Elements considered in scoring include:

- Fishery practices and performance
- Use of gears

### **Indicator 3.3.2.1**

Avoidance of impacts on non-target species and inadvertent impacts upon target species, including by-catch and discard.

#### 100 Scoring Guidepost

Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species, and their effectiveness is clearly demonstrated.

#### 80 Scoring Guidepost

Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species and there is some evidence that they are having the desired effect.

#### 60 Scoring Guidepost

Measures have been implemented that are intended to reduce the major impacts on non-target species and inadvertent impacts on target species.

SCORE            85

Measures have been implemented to reduce the major impacts on non-target species and inadvertent impacts on target species. These include:

- A minimum size limit for the target species (*C. gunnari*) which increases during the season to protect the incoming cohort where applicable
- A move-on rule in the event that the catch contains above a threshold level of undersize fish providing a very high level of protection for undersized fish
- Specific catch limits for the main bycatch species
- Observers on board every vessel who, among other things monitor interactions with non-target species including seabirds and marine mammals

- Interactions with protected species must be reported to AFMA within 24 hours of the occurrence

However, at this stage while there is some evidence that they are having the desired effect, their effectiveness has not been clearly demonstrated.

### **Indicator 3.3.2.2**

The extent to which fishing methods prevent, mitigate, or minimise adverse impacts of fishing on habitat.

#### 100 Scoring Guidepost

There is direct evidence that fishing operations effectively implement appropriate methods to avoid significant adverse impacts on all habitats.

#### 80 Scoring Guidepost

There is evidence that fishing operations are effective in avoiding significant adverse effects on the environment, especially in critical or sensitive areas such as spawning or nursery sites.

#### 60 Scoring Guidepost

Fishing operations use measures to reduce major impacts on habitat, especially in critical or sensitive areas such as spawning or nursery sites.

SCORE            85

AAD has undertaken work to survey bottom habitats and assess the potential impacts of bottom trawling. The footprint of the fishing gear is reasonably well known, and the VMS provides high quality effort data that could potentially be used in an assessment of bottom trawl impacts. Critical areas such as spawning or nursery sites are totally closed to any commercial activity. Therefore, the fishery can be confined in such a way that significant adverse impacts are avoided. There is some evidence that this is the case, but more work on assessing impacts and mitigation methods needs to be undertaken before the 100% guidepost is reached for this indicator.

### **Indicator 3.3.2.3**

The use of destructive fishing practices in the fishery.

#### 100 Scoring Guidepost

To the extent that it can be shown, no destructive fishing practices occur in the fishery

### 80 Scoring Guidepost

- Enforcement is considered sufficient to prevent the use of destructive fishing practices.
- There is a code of conduct for responsible fishing that is fully supported by fishers.

### 60 Scoring Guidepost

No destructive fishing practices are allowed in the fishery.

SCORE 100

To the extent that it can be shown, no destructive fishing practices occur in the fishery

### **Indicator 3.3.2.4**

[Minimisation of operational waste from the fishery.](#)

### 100 Scoring Guidepost

Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is evidence they are effective and these measures are supported by the fishers.

### 80 Scoring Guidepost

Measures/facilities are in place to reduce all sources of operational waste that are known to have detrimental environmental consequences, and there is some evidence they are effective.

### 60 Scoring Guidepost

Measures/facilities are in place to reduce sources of operational waste that are known to have detrimental environmental consequences.

SCORE 100

To the extent possible, all operational waste has been eliminated in the HIMI fishery. Full retention of all catch is practiced. Any fish that are not frozen are reduced to fish meal. No waste is dumped at sea.

### **SubCriterion 3.3.3**

Fishing operations are conducted in compliance with the management system and legal and administrative requirements.

### **Indicator 3.3.3.1**

Degree of awareness amongst fishers of the management system, legal and administrative requirements.

#### 100 Scoring Guidepost

All fishers are aware of all management requirements and demonstrate an understanding of and support for the management system.

#### 80 Scoring Guidepost

Fishers are aware of management requirements upon them and are kept up to date with new developments.

#### 60 Scoring Guidepost

Fishers are aware of some management requirements.

SCORE        95

The degree of awareness of the management requirements amongst fishing entities in this fishery is of the highest level. Industry representatives sit on both SAFAG and SouthMAC and are therefore directly involved in the process. Given the small number of operators and vessels involved, the level of awareness amongst the operators on the ground is also likely to be very high. Due to scheduling difficulties during the assessment, we were not able to directly confirm this through interviews of fishing skippers.

### **Indicator 3.3.3.2**

Extent to which fishers comply with the management system, legal and administrative requirements.

#### 100 Scoring Guidepost

- Fishers are fully compliant with, and fully supportive of, a code of conduct which incorporates the legal and administrative requirements of the management system.
- The fishery operates with no evidence of patterns of evasion or non-compliance.

#### 80 Scoring Guidepost

- Fishers are fully compliant with relevant management requirements.

- There is no record of persistent violations in the fishery.
- A code of conduct exists for operating in the fishery

#### 60 Scoring Guidepost

- There is a basic record of the level of violations in the fishery.
- Penalties exist for violations of rules.

SCORE        100

Statutory Fishing Rights carry with them a comprehensive set of conditions for operating in the fishery with which, to our knowledge, the fishers are fully compliant. There is no evidence of patterns of evasion or non-compliance.

### **3.4 Monitoring and Performance Evaluation**

#### **SubCriterion 3.4.1**

The management system provides for monitoring of the effects of fishing

##### **Indicator 3.4.1.1**

The monitoring programme for the fishery and the use of the results of monitoring

#### 100 Scoring Guidepost

- The management system has demonstrated a consistent ability to monitor all relevant aspects of the fishery and employs an independently verified system for validation of reported results.
- The fishery operates with no significant “blind spots”.

#### 80 Scoring Guidepost

- The monitoring programme established in the fishery has been subject to outside review and comment.
- The results of the monitoring programme are compiled, analysed, and disseminated to fishery managers such that management and research efforts can be informed as to needed improvements in a timely manner.

#### 60 Scoring Guidepost

The management system has established a comprehensive monitoring programme.

SCORE        90

The fishery has a comprehensive monitoring system, including electronic logbooks, in-season reporting, 100% observer coverage and an automated Vessel Monitoring System. The results of this programme are disseminated to managers. An issue that was raised in interview with AFMA was the recording of catch by volumetric measurement. When the catch is unloaded, the catch weight is almost always less than the estimates made at sea. Flow scales could be installed on board to improve the accuracy of catch recording at sea.

### **Indicator 3.4.1.2**

#### [Monitoring of the catch of non-target species](#)

##### 100 Scoring Guidepost

- There is real-time, reliable monitoring of and accounting for catch and use or discard of non-target species throughout all components of the fishery.
- There has been continued improvement in the accuracy and precision of monitoring and accounting of catch and use or discard of non-target species.

##### 80 Scoring Guidepost

There is reliable and timely monitoring of and accounting for catch of non-target species and use or discard of that catch throughout major components of the fishery.

##### 60 Scoring Guidepost

Information is available to managers on the catch of non-target species.

SCORE        95

The monitoring programme includes catches of all species, including incidental catches. These catches are also monitored through the observer programme. On-board scales would improve the accuracy of catch weights.

### **SubCriterion 3.4.2**

[The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic, and institutional information.](#)

Elements considered in scoring:

- Solicitation and treatment of scientific information from scientific and technical sources
- Solicitation and treatment of information from stakeholders
- Accommodation of dissent and respect for differing perspectives
- Training at all appropriate levels with respect to management principles and criteria

- Burden of proof/persuasion applied to types of proposal or category of stakeholder
- Efforts to quantify relative risks borne by different species, ecological systems, and stakeholders as a result of uncertainty
- Presentation of alternatives to managers
- Characterization of risk, uncertainty, consequences
- Opportunity for deliberation

### **Indicator 3.4.2.1**

The extent to which the management system solicits and takes account of relevant scientific, social, cultural, economic, and institutional information.

#### 100 Scoring Guidepost

- The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information.
- The management system seeks affirmatively to acquire information that improves management, even if it may be controversial or reveal weaknesses in the management system, including matters related to compliance with applicable international and domestic law.
- The management system allots analytical and deliberative resources in a manner that shows no evidence of a pattern of discrimination against significant stakeholder interests.
- The management system quantifies and documents the degree of risk imposed on different species, ecological systems, and stakeholders by particular decisions or courses of action, particularly in light of scientific uncertainty.

#### 80 Scoring Guidepost

- There is an open and tolerant process to solicit relevant information.
- Information that may be controversial or reveal weaknesses in the management system is accepted and evaluated.
- The management system evaluates information in an unbiased, objective manner.
- The management system does not place an unfair burden of proof on proposals of a certain type or arising from a particular category of stakeholder.
- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests.
- The management system attempts to characterize and reveal the risks of harm to different species, ecological systems, and stakeholders arising from management decision-making.

#### 60 Scoring Guidepost

- The management system allows for the introduction or consideration of new information that is potentially relevant to the management of the fishery.
- A process to solicit relevant information exists.
- There is evidence that diverse points of view are received and responded to.

SCORE 90

Information on scientific, social, cultural, economic and institutional issues is solicited through meetings of SAFAG, SouthMAC and the CCAMLR Consultative Forum and both AAD and AFMA allot analytical and deliberative resources in a manner that does not show any distinctive evidence of a pattern of discrimination against significant stakeholder interests. The assessment and management of the HIMI icefish fishery is explicitly tied to the CCAMLR process. Through its scientific working groups, CCAMLR provides an explicit, formal and identifiable process for the solicitation and taking into account of relevant scientific information. This includes information that may be controversial or reveal weaknesses in the management system.

AFMA and AAD are encouraged to become more affirmative in their efforts to acquire information from individuals and research organisations not directly involved in the HIMI fishery, its research or management, on scientific, social, cultural, economic and institutional issues that might improve management.

### **Indicator 3.4.2.2**

[The quality of the information and advice presented to managers.](#)

#### 100 Scoring Guidepost

- The management system regularly presents decision makers with a reasonable number of carefully analysed alternatives for action that fall in, and extend to the margins of a range that includes all legally permissible options.
- The management system provides decision makers with time and opportunity for deliberation in a manner suitable for the nature of the decisions under consideration.
- The management system shows evidence of a pattern of behaviour by decision makers that reveals that they have found the information provided to them to be useful, adequate in scope and detail, and otherwise appropriate to the performance of their duties.

#### 80 Scoring Guidepost

- The management system regularly presents decision makers with a reasonable number of quantitatively analyzed alternatives for action that fall in a range that includes all legally permissible options proposed by stakeholders.
- The management system's decision makers show evidence of relying consistently upon the information provided to them.

- Decision makers are aware of the consequences of their decisions

### 60 Scoring Guidepost

- Decision-makers are presented with a basic range of alternatives for management action.
- Decision-makers receive qualitative information and advice on the relative risks of different management alternatives

SCORE            90

To the extent that the evaluation team was able to determine, SAFAG provides high quality scientific support to SouthMAC and the managers are afforded sufficient time to assess and act upon the information they are provided. However, the issue of time allotted to icefish compared to toothfish in the HIMI fishery is likely to be an issue here (see also indicator 3.2.2.1), as is the nature and extent of environmental impacts information provided by SAFAG to SouthMAC (see Principle 2).

### **SubCriterion 3.4.3**

The performance of the management system is regularly and candidly evaluated against agreed performance measures and adapted as needed to meet management targets.

Elements considered in scoring:

- Frequency of evaluation
- Candor (accuracy and precision)
- Agreed measures of performance
- Transparency of evaluation
- Participation in evaluation

### **Indicator 3.4.3.1**

Internal assessment and review of the management system.

### 100 Scoring Guidepost

- There is an open internal, continuing, objective system for evaluation of management performance that actively, seeks input from interested participants and stakeholders.
- The criteria for and results of the on-going evaluation of management performance are made public and reflect input from all interested participants and stakeholders.
- There is a consistent pattern of seeking and using the results of the on-going evaluation of management performance.

### 80 Scoring Guidepost

- There is a system for evaluation of management performance that allows input from interested participants and stakeholders with respect to criteria and results.
- The criteria for and results of the on-going evaluation of management performance are made public.

### 60 Scoring Guidepost

There is a system for internal evaluation of management performance.

SCORE            80

The management system is subjected to regular review against published performance measures that are set out in the Fishery Management Plan. These criteria are reasonable as far as they go, but they are notably deficient with respect to environmental issues. There is reference to the minimization of the catch of non-target species, but nothing with respect to other environmental impacts, such as maintenance of the structure and function of the benthic environment, and minimization of impacts on predators. More challenging performance measures on these issues should be incorporated into the FMP, based in part on a process of stakeholder consultation.

According to the 2002/03 Annual Report of AFMA, as part of this process, the 19th meeting of SouthMAC in November 2003 was intended to review the success of the first year of operation of the HIMI Fishery Management Plan. However, it is not evident from the minutes of that meeting that any substantive review took place. This should be rectified as soon as possible by either issuing publicly a more detailed report of the review (if undertaken), or by actually undertaking the review and reporting on it (if not undertaken).

### **Indicator 3.4.3.2**

[External assessment and review of the management system.](#)

### 100 Scoring Guidepost

- The management system provides for independent, expert review of all significant aspects of management performance on a regular and continuing basis.
- There is a consistent pattern of seeking and using the results of the independent evaluation of management performance.

### 80 Scoring Guidepost

- The management system provides for independent, expert review of management performance.

- The criteria for evaluation of management performance are set outside the management system.
- The results of any independent review are made public.

### 60 Scoring Guidepost

- There is a system for external evaluation of the main aspects of management performance

SCORE            80

Through its Scientific Committee, CCAMLR provides annually an external review of the assessment and the process of setting catch limits and other controls on the HIMI icefish fishery. The Commission also evaluates the implementation of Conservation Measures by evaluating levels of compliance with conservation measures, including a comparison of reported catches to catch limits. Although this process can be regarded as an independent, expert review of management performance, it is severely lacking in detail with respect to the efficiency and effectiveness of the management system, and the achievement of the specific detail of the AFMA legislative responsibilities for the fishery. Its strength is that it takes place annually and subjects the assessment to the direct scrutiny and input of scientists from many of the 24 member countries of CCAMLR. It suffers, however, from a lack of scope and the fact that CCAMLR itself represents a rather insular environment that suffers from a lack of regular independent review of its own management process.

The CCAMLR Commission and Scientific Committee would never claim to provide the level of independent scrutiny of individual fisheries managed by coastal states within the Convention Area that an independent review of management performance would require. Even if it did, there is a question as to the extent to which CCAMLR could provide a truly external review of the HIMI fishery. Although CCAMLR and AFMA are clearly separate and very different entities, in terms of fisheries management they are both guided by the same principles of conservation that were first set out in the articles of the CCAMLR Convention nearly 25 years ago (described earlier in the discussion on CCAMLR). The assessment of the fishery undertaken by AAD is now identical to that undertaken by CCAMLR's Scientific Committee. This suggests that a truly external and independent review of the AFMA management process needs to be external to the CCAMLR process also.

CCAMLR does, however, provide the necessary "criteria for evaluation of management performance set outside the management system". The AFMA management system has been developed specifically to meet the independent requirements of CCAMLR, because HIMI falls within the CCAMLR Convention Area. That the principles of conservation in the Convention are now encapsulated within AFMA's management system for HIMI is testament to their commitment to the CCAMLR process.

Nevertheless, given the close association between the AAD assessment process and that of CCAMLR, a truly independent (independent of AFMA, AAD and CCAMLR) evaluation of management performance would be of great value and should be undertaken as a high priority. Alongside the existing annual review by CCAMLR, an additional independent review should take place every five years and focus on how the CCAMLR-based management process enables AFMA to achieve its objectives and specific legislative responsibilities for the icefish fishery. This is a legislative requirement that is recognized in the Management Plan. While this is an important requirement, we recognise that securing broad commitment to conduct an independent review of the icefish management system, including the CCAMLR aspects, may take some time. The Condition therefore requires that the applicant provide a reasonable time frame for the assessment to expect a review to be designed, agreed, and implemented.

The Australian National Audit Office (ANAO) has undertaken reviews of AFMA, which have resulted in some modifications to the management process, but these reviews were not specifically targeted at the HIMI icefish fishery and therefore did not address the icefish system in any specific detail.

### **Indicator 3.4.3.3**

[Guidelines for responding to the assessment of management performance.](#)

#### 100 Scoring Guidepost

- Comprehensive, objective standards or triggers for responding to internal and external assessments of management performance have been established.
- The management system has demonstrated a consistent pattern of responding to the results of internal and external assessments of management performance.
- The management system has demonstrated a consistent pattern of incorporating significant recommendations for improvement developed through internal or external assessments of management performance.

#### 80 Scoring Guidepost

- Established objective guidelines for responding to internal and external assessments of management performance exist.
- There is evidence of improved performance based on the results of internal and external assessments of management performance.

#### 60 Scoring Guidepost

- Objective guidelines for responding to internal assessments of management performance exist.

SCORE            80

The 2002 Fishery Management Plan includes specific performance criteria against which measures to meet its objectives are assessed. AFMA and SouthMAC must, at least once every 5 years, assess the effectiveness of the Fishery Management Plan including the measures taken to achieve the objectives by reference to these performance criteria. Each year, SouthMAC must assess and AFMA must include in its Annual Report a statement of the extent to which these performance criteria were met in the year. The Annual Report provides a response to this internal review process. Each year following the CCAMLR meeting, SouthMAC meets to discuss the outcomes of the meeting.

## **10 TRACKING, TRACING FISH AND FISH PRODUCTS**

Under Section 2, subsection 2.5, a brief description is given of the processing and transshipment activities that generally take place in this fishery. MSC Chain of Custody requirements were only checked as far as the landing of fish on board legally licensed fishing vessels and found to be compliant with MSC requirements. Further chain of custody assessments were not conducted for any of the fish moving from boat deck into the processing segment of the fishery either onboard or at shoreside processors. It is highly recommended that any Chain of Custody certificates issued for product originating from this fishery also examine and verify the captain's logbook data, the required reporting data on catch from the fishery, and observer reports as part of ensuring that the fish products carrying the MSC logo are properly verified.

## **11 PEER REVIEW, PUBLIC COMMENT, AND OBJECTIONS**

The draft report was peer reviewed by Dr. D. Lee Alverson and Dr. John Pope. It was also released for public comment simultaneously and was out for comment for more than the minimum number of days (30) required by the MSC. The peer reviews received are appended to this document in Appendix 2, and the public comments in Appendix 3.

Following revisions based on comments from stakeholders, the report was posted for 21 days to determine if any objections would be lodged against the report findings. During that period, the client (Austral Fisheries) lodged the intent to object to the score and condition assigned to performance indicator 2.1.5.3. During the 30-day period following, where the objection has to be formally submitted, the client instead requested that SCS re-examine information previously submitted in answer to the performance indicator to avoid the lengthy and potentially costly objections process. After discussing the efficacy of this with the MSC, SCS agreed to the re-examination of evidence in an effort to be thorough and objective; however, SCS also required a submission of further evidence and a review by the stakeholders that commented on the previous draft of the report.

In its reconsideration of the evidence provided and stakeholder review, SCS revised the score of Indicator 2.1.5.3 which subsequently led to removing the condition and replacing it with

a strong recommendation. A summary of the evidence and the revised scores are provided in Section 9 under the performance indicator.

No other inquiries or submissions were made regarding objections to the findings of this report.

## **12 CERTIFICATION RECOMMENDATION AND PERFORMANCE SCORES**

It is the assessment team's consensus judgment that the management of the Australian Heard and MacDonal Islands Mackerel Icefish Fishery complies overall with the MSC Principles and Criteria. Therefore, SCS as the certification body of record recommends that the fishery be issued a joint fishery/chain of custody certificate pending (1) the submission of an Action Plan to show how the applicant intends (content and timelines) to meet the proposed conditions, (2) approval by the certification body (SCS) of the action plan, and (3) proof of a contractual agreement between the applicant and an accredited certification body that assures the applicant will continue to comply with all specified conditions, all required surveillance audits, and all other responsibilities under the MSC program.

The fishery achieved a normalized score of 80 or above on each of the three MSC Principles independently (Principle 1 – 80.37, Principle 2 – 87.8, and Principle 3 – 91.31). Although the evaluation team found the fishery in overall compliance (a normalized score of 80 on each MSC Principle), it also found the fishery's performance on a number of specific indicators to be below the established compliance mark (an unweighted score of 80 for a single indicator). In these specific cases, the MSC requires that the Certification Body set 'Conditions for Continued Certification' that when met bring the level of compliance for the select indicator up to the 80-level score. Table 3 below shows the overall results of the evaluation in terms of Principle 1, 2, and 3.

Table 3. Scoring assigned to fishery using AHP.

Principles, Criteria, Subcriteria, and Indicators	AHP Assigned Weight	AHP Assigned Score
MSC		
Principle 1		80.37
MSC		
Criterion 1	.333	
SC 1.1.1	.145	
Indicator 1.1.1.1	.333	100
Indicator 1.1.1.2	.333	95
Indicator 1.1.1.3	.333	79
SC 1.1.2	.145	
Indicator 1.1.2.1	.125	100
Indicator 1.1.2.2	.125	95
Indicator 1.1.2.3	.125	100
Indicator 1.1.2.4	.125	95
Indicator 1.1.2.5	.125	85
Indicator 1.1.2.6	.125	85
Indicator 1.1.2.7	.125	90
Indicator 1.1.2.8	.125	79
SC 1.1.3	.168	
Indicator 1.1.3.1	.667	75
Indicator 1.1.3.2	.333	75
SC 1.1.4	.168	
Indicator 1.1.4.1	.500	95
Indicator 1.1.4.2	.500	79
SC 1.1.5	.185	
Indicator 1.1.5.1	.667	75
Indicator 1.1.5.2	.333	79
SC 1.1.6	.189	

		<b>Indicato r 1.1.6.1</b>	<b>1.0</b>	<b>79</b>
<b>MSC Criterion 2</b>			<b>.333</b>	
		<b>Indicato r 1.2.1</b>	<b>1.0</b>	<b>79</b>
<b>MSC Criterion 3</b>			<b>.333</b>	
		<b>Indicato r 1.3.1</b>	<b>.400</b>	<b>80</b>
		<b>Indicato r 1.3.2</b>	<b>.600</b>	<b>79</b>
<b>MSC Principle 2</b>				<b>87.80</b>
<b>MSC Criterion 1</b>			<b>.333</b>	
	<b>SC 2.1.1</b>		<b>.148</b>	
		<b>Indicato r 2.1.1.1</b>	<b>.500</b>	<b>85</b>
		<b>Indicato r 2.1.1.2</b>	<b>.500</b>	<b>85</b>
	<b>SC 2.1.2</b>		<b>.148</b>	
		<b>Indicato r 2.1.2.1</b>	<b>.500</b>	<b>95</b>
		<b>Indicato r 2.1.2.2</b>	<b>.500</b>	<b>95</b>
	<b>SC 2.1.3</b>		<b>.180</b>	
		<b>Indicato r 2.1.3.1</b>	<b>.357</b>	<b>75</b>
		<b>Indicato r 2.1.3.2</b>	<b>.286</b>	<b>90</b>
		<b>Indicato r 2.1.3.3</b>	<b>.357</b>	<b>75</b>
	<b>SC 2.1.4</b>		<b>.227</b>	
		<b>Indicato r 2.1.4.1</b>	<b>1.0</b>	<b>90</b>
	<b>SC 2.1.5</b>		<b>.297</b>	
		<b>Indicato r 2.1.5.1</b>	<b>.333</b>	<b>75</b>
		<b>Indicato r 2.1.5.2</b>	<b>.333</b>	<b>85</b>
		<b>Indicato r 2.1.5.3</b>	<b>.333</b>	<b>80</b>
<b>MSC Criterion 2</b>			<b>.333</b>	
	<b>SC 2.2.1</b>		<b>.148</b>	
		<b>Indicato r 2.2.1.1</b>	<b>.500</b>	<b>90</b>

		Indicator 2.2.1.2	.500	75
	SC 2.2.2		.148	
		Indicator 2.2.2.1	1.0	95
	SC 2.2.3		.180	
		Indicator 2.2.3.1	1.0	75
	SC 2.2.4		.227	
		Indicator 2.2.4.1	.500	80
		Indicator 2.2.4.2	.500	90
	SC 2.2.5		.297	
		Indicator 2.2.5.1		
		Indicator 2.2.5.2	.500	90
MSC Criterion 3			.333	
	SC2.3.1		1.0	
		Indicator 2.3.1.1	1.0	95
MSC Principle 3				91.31
SCS Criterion 1			.250	
	SC 3.1.1		.250	
		Indicator 3.1.1.1	.500	80
		Indicator 3.1.1.2	.500	95
	SC 3.1.2		.250	
		Indicator 3.1.2.1	.357	95
		Indicator 3.1.2.2	.357	90
		Indicator 3.1.2.3	.286	100
	SC 3.1.3		.250	
		Indicator 3.1.3.1	.500	90
		Indicator 3.1.3.2	.500	95

	SC 3.1.4	.250	
	Indicator 3.1.4.1	.357	90
	Indicator 3.1.4.2	.286	100
	Indicator 3.1.4.3	.357	90
SCS Criterion 2		.250	
	SC 3.2.1	.429	
	Indicator 3.2.1.1	.102	90
	Indicator 3.2.1.2	.102	90
	Indicator 3.2.1.3	.102	95
	Indicator 3.2.1.4	.102	70
	Indicator 3.2.1.5	.102	90
	Indicator 3.2.1.6	.102	90
	Indicator 3.2.1.7	.102	79
	Indicator 3.2.1.8	.102	100
	Indicator 3.2.1.9	.102	95
	Indicator 3.2.1.10	.102	100
	SC 3.2.2	.286	
	Indicator 3.2.2.1	.250	90
	Indicator 3.2.2.2	.250	80
	Indicator 3.2.2.3	.250	85
	Indicator 3.2.2.4	.250	90
	SC 3.2.3	.286	
	Indicator 3.2.3.1	1.0	95
SCS Criterion 3		.250	
	SC 3.3.1	.308	
	Indicator 3.3.1.1	.500	100

		<b>Indicator 3.3.1.2</b>	<b>.500</b>	<b>100</b>
	<b>SC 3.3.2</b>		<b>.385</b>	
		<b>Indicator 3.3.2.1</b>	<b>.261</b>	<b>85</b>
		<b>Indicator 3.3.2.2</b>	<b>.261</b>	<b>85</b>
		<b>Indicator 3.3.2.3</b>	<b>.261</b>	<b>100</b>
	<b>SC 3.3.3</b>	<b>Indicator 3.3.2.4</b>	<b>.217</b>	<b>100</b>
			<b>.308</b>	
		<b>Indicator 3.3.3.1</b>	<b>.500</b>	<b>95</b>
		<b>Indicator 3.3.3.2</b>	<b>.500</b>	<b>100</b>
<b>SCS</b>	<b>Criterion 4</b>		<b>.250</b>	
	<b>SC 3.4.1</b>		<b>.308</b>	
		<b>Indicator 3.4.1.1</b>	<b>.500</b>	<b>90</b>
		<b>Indicator 3.4.1.2</b>	<b>.500</b>	<b>95</b>
	<b>SC 3.4.2</b>		<b>.308</b>	
		<b>Indicator 3.4.2.1</b>	<b>.500</b>	<b>90</b>
		<b>Indicator 3.4.2.2</b>	<b>.500</b>	<b>90</b>
	<b>SC 3.4.3</b>		<b>.385</b>	
		<b>Indicator 3.4.3.1</b>	<b>.286</b>	<b>80</b>
		<b>Indicator 3.4.3.2</b>	<b>.429</b>	<b>80</b>
		<b>Indicator 3.4.3.3</b>	<b>.286</b>	<b>80</b>

### **13 MEETING CONDITIONS FOR CONTINUED CERTIFICATION**

To be awarded an MSC certificate for the fishery, the applicants must agree in written contract to develop an action plan for meeting the required 'Conditions'; a plan that must provide specific information on what actions will be taken, who will take the actions, and when the actions will be completed. An Action Plan is approved by SCS as the certification body of record (see Appendix 4). The applicant must also agree in a written contract to be financially and technically responsible for surveillance visits by an MSC accredited certification body, which would occur at a minimum of once a year, or more often at the

discretion of the certification body (based on the applicant's action plan or by previous findings by the certification body from annual surveillance audits or other sources of information). The contract is in place. Surveillance audits will be comprised in general of (1) checking on compliance with the agreed action plan for meeting pre-specified 'Conditions', and (2) sets of selected questions that allow the certifier to determine whether the fishery is being maintained at a level of performance similar to or better than the performance recognized during the initial assessment.

We are mindful that even though the applicant (Austral Fisheries) takes the necessary steps to meet conditions, it's capacity to affect the management system may be limited. In the case where the managers or other sectors of the fishery are not able to cooperate, it will be the applicant's responsibility to find other ways to effectively meet the conditions. The certification body will be mindful of the difficulties that may accrue as a result of different interests in the fishery when measuring performance against the required conditions.

### **13.1 General Conditions for Continued Certification**

The general 'Conditions' set for the HIMI Mackerel Icefish fishery are:

- Austral Fisheries must recognize that MSC standards require regular monitoring inspections at least once a year, focusing on compliance with the 'Conditions' set forth in this report (as outlined below) and continued conformity with the standards of certification.
- Austral Fisheries must agree by contract to be responsible financially and technically for compliance with required surveillance audits by an accredited MSC certification body, and a contract must be signed and verified by SCS prior to certification being awarded.
- Austral Fisheries must recognize that MSC standards require a full re-evaluation for certification (as opposed to yearly monitoring for update purposes) every five years.
- Prior to receiving final certification, Austral Fisheries shall develop an 'Action Plan for Meeting the Condition for Continued Certification' and have it approved by SCS.

### **13.2 Specific Conditions for Continued Certification**

In addition to the general requirements outlined above, Austral Fisheries must also agree in a written contract with an accredited MSC certification body to meet the specific conditions as described in Section 9 and summarized below (within the agreed timelines that will be agreed in the 'Action Plan for Meeting the Condition for Continued Certification' to be approved by SCS).

## **MSC Principle 1**

### **Indicator 1.1.1.3**

The stock units are well defined for the purposes of conservation, fisheries management and stock assessment.

SCORE            79

## **Condition 1.1**

The client should provide evidence to the certification body contracted for surveillance reports that the current stock designations used for the icefish assessments are the best choice for conservation and more precautionary than alternative stock designations. One approach might be a re-assessment under the alternative assumption that there is a single stock for the Indian Ocean region. This could be used to demonstrate that the management strategies that are currently used under the assumption of separate stocks are robust and ultimately more precautionary than alternative assumptions regarding stock structure. Other approaches may also be used, such as evidence from studies designed to further elucidate stock structure/distribution.

### **Indicator 1.1.2.8**

[There is knowledge of environmental influences on stock dynamics.](#)

SCORE 79

## **Condition 1.2**

The client should provide evidence that the fishery assessments meet the first bullet point under the 80 scoring guidepost – “Impacts of inter-annual variability on stock abundance have been studied and are taken into account in the assessment”. For example, analyses could be provided that show how the fishery assessments factor in uncertainty in growth, mortality, size at first maturity and fecundity, and the influence of the environment on these variables.

### **Indicator 1.1.3.1**

[Limit Reference Points \(LRPs\) or operational equivalents have been set.](#)

SCORE 75

## **Condition 1.3**

The client should provide evidence that a comprehensive review has been or is being undertaken regarding appropriate Limit Reference Points for the Icefish fishery. Evidence should be provided that the LRPs used meet the AFMA requirements (are appropriate for maintaining both ecologically viable stocks of the target species and an ecologically sustainable fishery), are appropriate for the biology of the icefish stock and takes into account available knowledge of fishery impacts on non-target species and the ecosystem, and ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified maximum level. The results of this review should be published.

### **Indicator 1.1.3.2**

[Target Reference Points \(TRPs\) or operational equivalents have been set.](#)

SCORE 75

## **Condition 1.4**

3. A review should be provided about what target reference points, which are based on the biology of the icefish stock and take into account available knowledge of fishery impacts on non-target species and the ecosystem, should be specified for the icefish fishery. The analysis should examine how target reference points considered are more precautionary than the corresponding limit reference points and how they ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified maximum level.
4. The review provided should discuss how the target reference points used or proposed for use by AFMA for the icefish fishery compare with those specified or applied by CCAMLR.

**Indicator 1.1.4.2**

Stock assessment methods are statistically rigorous, major uncertainties have been considered and assumptions have been evaluated.

SCORE 79

**Condition 1.5**

The approach that is used in determining the recommended TAC should be investigated relative to uncertainty in the estimate of natural mortality, the imprecision in the estimates of the parameters of the mixture of components of the length composition data and the uncertainty in the parameters of the growth curve, and alternative stock structures. There should be an explicit report demonstrating the precautionary nature of the approach and how additional information on these parameters is being incorporated.

**Indicator 1.1.5.1**

Current stock sizes are above associated limit reference points.

SCORE 75

**Condition 1.6**

Meet Condition 1.3. In meeting Condition 1.3, ensure that there is an assessment that shows the probability that the current spawning biomass lies above the chosen limit reference point for the icefish stocks at HIMI. This report should be reviewed by AFMA, AAD, and CCAMLR.

**Indicator 1.1.5.2**

Current exploitation rates are below associated limit reference points.

SCORE 79

**Condition 1.7**

Meet Condition 1.3. In addition, show with what probability subsequent survey estimates of the biomass of the residual spawning stock exceeded the levels predicted over recent years.

**Indicator 1.1.6.1**

Clear, well-tested, precautionary harvest control rules have been established and tested and shown to be effective in meeting management objectives.

SCORE: 79

### **Condition 1.8**

Carry out appropriate simulation testing to consider the harvest strategy in relation to the characteristics of the icefish stock to evaluate the robustness of the reference points and the fishery management model.

### **Indicator 1.2.1**

There is a well-defined and effective strategy, and a specific recovery plan in place, to promote recovery of the target stock within a reasonable time frame.

SCORE 79

### **Condition 1.9**

The client only needs to develop and abide by a condition for this indicator if it plans to begin fishing in areas previously described as depleted (i.e. Pike, Discovery, and Shell Banks ). Before commercial harvesting is permitted to recommence on these populations/stocks, the fishery management system would have to:

4. Provide an explicit specification of the conditions that require that the recovery strategy is invoked.
5. Specify precisely how the harvest is to be controlled as the stock recovers, the time period expected for recovery, and the conditions that signal that the stock has recovered.
6. Provide a simulation study that demonstrates that there is a high probability that the stock will recover if the recovery strategy is invoked.

### **Indicator 1.3.2**

Data and stock assessment indicate no changes in structure that would alter reproductive capacity.

SCORE 79

### **Condition 1.10**

Estimate the expected changes in size and age at maturity, age composition, and fecundity and establish a routine comparison of observed data with these expected values to ensure that unexpected changes might be detected.

## **MSC PRINCIPLE 2**

### **Indicator 2.1.3.1**

The ecological risks and potential ecological impacts of the fishery.

SCORE 75

### **Condition 2.1**

The fishery must complete a comprehensive scientifically robust assessment of the ecological risks of the fishery (such as the one started by CSIRO), including potential impacts on benthic systems, key land-based marine predators, and sharks, skates and rays, that is already underway. The report should be sure to include the range of stakeholder views/inputs and meet peer review standards for scientific assessments.

## **Condition 2.2**

Should any risks identified under the risk assessment be rated as moderate or high, the fishery would have to provide data and/or information showing what measures are being taken to mitigate the risks and analyses of why the measures are sufficient.

### **Indicator 2.1.3.3**

The potential for ecosystems, habitats and species that may be affected by the fishery to recover from any fishery impacts, or to have impacts mitigated.

SCORE 75

## **Condition 2.3**

Conditions 2.1 and 2.2 apply.

### **Indicator 2.1.5.1**

The impact of the removal of the target species or other direct fishery activities on ecosystems, habitats, associated or dependent species, or on biological productivity of the region

SCORE 75

## **Condition 2.4**

Conditions 2.1 and 2.2 apply.

### **Indicator 2.2.1.2**

The functional roles and importance of the target species in the trophic network of any threatened, protected, or 'icon' species in the region.

SCORE 75

## **Condition 2.5**

The client should provide evidence that AAD research on the trophic role of icefish in predator diets either has been or is being conducted. The AAD research should be properly peer reviewed and published. Once available, this information should be used in Condition 2.1.

### **Indicator 2.2.3.1**

The ecological risks and the range of potential ecological impacts of the fishery on any threatened, protected, or 'icon' species.

SCORE 75

## **Condition 2.6**

Condition 2.1 applies.

**Indicator 3.2.1.4**

The provision within the management system for rebuilding and recovery of depleted stocks

SCORE 70

**Condition 3.1**

The management system must be improved to contain criteria for assessing when a stock within the fishery is overfished, the strategies to be adopted when the stock is classified as overfished, and the conditions under which an overfished (stock or) fishery is considered to have recovered. This is considered in more detail under Principle 1. To the extent possible, this condition should be informed by or be coincident with conditions in Principle 1.

**Indicator 3.2.1.7**

The program to prevent, mitigate, or minimize adverse impacts on habitat caused by fishing.

SCORE 79

**Condition 3.2**

Meet Conditions 2.1 and 2.2. In addition, provide evidence to the certifier that there is some process in place to provide an ongoing, although periodic, process to identify, document, assess, reduce and ameliorate risks to habitat resulting from fishing practices. This process should meet requirements set out in the Management Plan.

## **14 MSC LOGO LICENSING RESPONSIBILITIES**

As the “applicant” for certification of the HIMI Mackerel Icefish fishery, Austral Fisheries is the only entity that has the right to apply for a license to use the MSC logo. It is also the case that Austral has the right to approve the use of the logo for other quota holders in the fishery at its discretion.

## **15 CONCLUSION**

The SCS Assessment team concluded after all aspects of the MSC procedures were followed, that the HIMI Mackerel Icefish fishery meets the standards of the MSC. The lead assessor for the assessment team presented all evidence to the SCS Certification Panel, which agreed with the assessment team's decision and authorized certification of the fishery. During the posting and call for formal objections, no formal objections were filed. As a result, the fishery can now be certified under the MSC program once the remaining steps (an Action Plan and a contract for continued surveillance audits) have been completed..

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## APPENDIX 1 – STAKEHOLDER COMMENTS



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Submission on the MSC assessment of the mackerel icefish  
(*Champscephalus gunnari*) Heard Island and the McDonald Islands  
fishery

For: Scientific Certification Systems, Inc.

Authors: Nathan Walker and Chris Howe

Date: 14 April 2004

Status: DRAFT

## **Executive Summary**

There has been considerable progress in the Heard Island and McDonald Islands (HIMI) fishery to date, which provides a good basis for the application for Marine Stewardship Council (MSC) certification.

The fishery appears to be well managed with both input and output controls used to good effect, as part of an ecosystem based approach under CCAMLR. The Fisheries Management Plan (Anon. 2002) provides detail on the management strategies used in this fishery.

Environmental issues have been addressed to a large extent with the Assessment Report (Anon. 2001) and the Bycatch Action Plan (Anon. 2003). However it appears that some ecosystem components require risk assessments and suitable subsequent management responses. In general it has been stated that there is very low bycatch as well as few interactions with seabirds and seals. The evidence, trials or reasoning behind the mitigation measures already in place do, however, need to be detailed. Several mitigation methods have been implemented to allow for the trial reintroduction of longlining into the fishery; however we expect to see further details on the progress and results of the trial reintroduction and the trials of the mitigation methods used. Targets for the reduction of environmental impacts need to be set, using a continuous improvement approach. A large marine reserve system has been established to protect a range of marine habitats and areas used by land based predators for foraging.

We expect to see the governance of the fishery clearly explained in the certifier's report, and the management arrangements for the implementation of the measures required for continuous improvement from the certification and any corrective actions raised. During the course of assessment and/or certification of this fishery, transparency of the process is important to maintain stakeholder involvement and support.

This submission is structured as follows:

- Introduction
- An introduction to Ecosystem-Based Management (EBM),
- WWF expectations and fishery actions in relation to the target fishery,
- WWF expectations and fishery actions in relation to the fishery's effects on the ecosystem,
- WWF expectations and fishery actions in relation to fishery management systems.

## ***1. Introduction***

WWF is the world's largest and most experienced independent conservation organization, with around 5 million supporters and a global network of 27 National Organizations, 5 Associates, and 21 Programme Offices.

WWF supports the approach of certifying healthy and well-managed fisheries that meet the Marine Stewardship Council's Principles and Criteria. WWF and Unilever established the Marine Stewardship Council in 1996 to create market incentives for sustainable fishing.

WWF is pleased to encourage the mackerel icefish (*Champscephalus gunnari*) fishery in the Heard Island and McDonald Islands in its' pursuit of MSC Certification. If successfully certified, it will assist the fishery to improve the fishery's management, work towards a better understanding of the marine ecosystem in which it operates, and thus towards a healthy and well-managed fishery for future generations.

WWF encourages the mackerel icefish fishery to continue to develop and implement an Ecosystem-Based Management (EBM) system. WWF believes that EBM provides the framework to obtain ongoing food production from healthy marine ecosystems, while allowing these ecosystems to function and develop. EBM takes account of the consequences of the interactions of fishing with the ecosystem and is likely to succeed where other management systems have failed (Ward *et al.* 2002).

WWF is engaging with this assessment prior to the final certifier's report, in order to clearly communicate WWF's views. WWF seeks to aid fisheries throughout the MSC assessment process but also wants to ensure that environmental impacts of the fishery are thoroughly considered. If the fishery is certified any actions required should be carried out in a timely manner, and integration with other governance arrangements, such as CCAMLR, should be addressed.

This submission consists of five sections; summary, an overview of Ecosystem-Based Management, and specific concerns relating to the target fishery, the ecosystem and fishery management systems.

## **2. An introduction to Ecosystem-Based Management (EBM)**

The aim of EBM is to achieve sustainability in the exploitation of natural resources, such as fisheries. EBM is an integrated approach that looks at the effects of the environment on the resource and also the effects of resource exploitation on the environment. WWF has produced a paper, Ward *et al.* 2002, that details the concept and an operational framework for EBM, including practical examples of how EBM can be implemented, and delivery mechanisms and related activities in order to overcome the major obstacles.

The principles of EBM are:

1. Maintaining the natural structure and function of ecosystems, including the biodiversity and productivity of natural systems and identified important species, is the focus for management,
2. Human use and values of ecosystems are central to establishing objectives for use and management of natural resources,
3. Ecosystems are dynamic; their attributes and boundaries are constantly changing and consequently, interactions with human uses also are dynamic,
4. Natural resources are best managed within a management system that is based on a shared vision and a set of objectives developed amongst stakeholders,
5. Successful management is adaptive and based on scientific knowledge, continual learning and embedded monitoring processes.

A successful Ecosystem-Based Management system will:

1. Operate within a supportive policy framework,
2. Recognise economic, social and cultural interests as factors that may affect resource management,
3. Recognise ecological values and incorporate them into management,
4. Provide adequate information on utilised species to ensure that overfishing is a low risk,
5. Ensure that the resource management system is comprehensive and inclusive, based on reliable data and knowledge and uses an adaptive system,
6. Environmental externalities are properly considered within the resource management system.

In a typical fishery, the ecological aspects of EBM would be implemented using the following steps:

1. Identify the stakeholders: the interested parties,
2. Prepare a map of the ecoregions: species, habitats, and oceanographic features,
3. Identify the partners and their interests: stakeholders directly interested or affected by the fishery,
4. Establish the ecosystem values: habitats, species and uses,
5. Determine the main potential hazards of the fishery to the ecosystem values,
6. Conduct an ecological risk assessment: determine the actual risks of the fishery,
7. Establish the objectives and targets: agreed goals for the ecosystem and the fish stock,
8. Establish strategies for achieving targets,
9. Design the information system: includes monitoring of stock and ecological indicators,
10. Establish information needs and research priorities,
11. Design performance assessment and review process,
12. Design and implement an EBM training and education package for fishers and managers.

WWF would like to see the Heard Island and McDonald Islands mackerel icefish fishery further embed an Ecosystem-Based Management system. The stock assessment process in use at present is considered to be ecosystem based, however WWF would like the certifiers to

comment on the usefulness of the twelve steps listed above to strengthen the management of the fishery and contribute to implementing the MSC's Principles and Criteria in practice.

### **3. Target fishery**

#### Fishery actions

The HIMI fishery is controlled via a range of both input and output controls, including:

##### Input controls:

- A maximum of three boats in the fishery can operate at one time, controlled via minimum quota holdings,
- A 'move on' rule is in place, where if in any one haul of mackerel icefish (over 100 kg) and more than 10% of the mackerel icefish by number are smaller than 240 mm total length, the fishing vessel must not fish using that method within 5 nm of the location, for at least five days,
- Under the Management Plan the mesh size of the trawl nets must be 120 mm when targeting Patagonian toothfish and 90 mm when targeting mackerel icefish (to allow for escape of juveniles),
- 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,
- Minimum size limit of 240 mm total length for mackerel icefish,
- Once 50% of the catch limit for any one non-target species is taken, AFMA will review the operating practices of the quota holders,
- Carryover provision for Patagonian toothfish - each operator may inadvertently exceed their catch by 20 t. 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 kg will be deducted from the operator's quota allocation the next year for every one kg (up to the maximum of 20 t) taken as overcatch (Anon. 2001).

The stock assessment for the HIMI fishery also includes biological reference points that are considered when setting total allowable catch (TAC). For example the escapement of mackerel icefish of the spawning biomass must be over 75% over a two year projection, in order to avoid the likelihood of declining recruitment (Anon. 2001).

CCAMLR states that there are two stocks of mackerel icefish, one over Shell Bank, (closed to fishing) and the other over the central Heard Plateau (Anon. 2001).

#### WWF fishery specific expectations

- The scientific evidence of the mackerel icefish stock definitions should be included in the certifier's report, and a judgement made regarding the adequacy of scientific evidence,
- If the scientific evidence is not adequate, the confirmation of genetic analysis should be undertaken to determine the population structure of mackerel icefish. A detailed understanding of the population structure via genetic studies would allow for more robust stock assessments and subsequent management decisions if such research has not previously occurred,
- The distribution of the fishing effort and catch before and after the establishment of the HIMI marine reserve is detailed in the certifier's report.

## **4. Ecosystem**

### **4.1 Environmental Risk Assessment (ERA):**

#### WWF general expectations

- *The fishery would identify and respond to key impacts on the ecosystem in a strategic manner.*
- *The fishery would undertake a peer reviewed ERA, (if an ERA hasn't already been completed), that involves recognised experts in the ecosystem components related to the fishery,*
- *The certifier require an ERA and a completion date is set,*
- *The certifiers provide details to stakeholders on who participated in the expert group conducting the ERA and whether commentary by the certifiers on whether they consider that the composition of the expert group was acceptable.*

#### Fishery actions

Risk assessments have been completed for grey rockcod, unicorn icefish and deep water skates (Constable *et al.* 1998). Due to, and because of these assessments, more reliable precautionary catch limits were determined for grey rockcod, unicorn icefish and skates (Anon. 2001).

CSIRO has been contracted by AFMA to do an ecological risk assessment for Commonwealth Fisheries, which was due to be completed by late 2003. One of the objectives of this ecological risk assessment was to determine the relative sustainability risks of the target species, bycatch species and the broader ecological impacts where possible. AFMA states that if the ERA identifies risks to bycatch species or habitats, appropriate management responses will be implemented (Anon. 2002).

#### WWF fishery specific expectations

- The ERA should include a comparison of the relative risks posed by the different fishing methods. WWF expects the certifier's report to detail the progress of the ERAs for the mackerel icefish fishery and list the outstanding actions
- A longlining trial with several mitigation methods commenced in May 2003. WWF suggests that a comparative assessment of the environmental impact of bottom trawling and longlining be completed, so that appropriate resources can be allocated for the minimisation for the impacts on the environment,
- The completion of the ERA should be a requirement of certification; a completion date should be stipulated. The ERA also needs to be peer reviewed by a credible external examiner not directly involved with the fishery or the certification assessment (i.e. an expert not working directly for CSIRO).
- The ERA recommendations should stipulate corrective actions required and set timelines for their implementation,
- The composition of the group conducting the ERA needs to be stated clearly and the certifiers need to comment on whether the composition of the group was satisfactory,
- The involvement of the fishing companies in deciding and implementing management responses to the ERA needs to be clearly identified and agreed to by all stakeholders involved in the certification process.

#### **4.2 Strategic statement on the fishery's intention to reduce environmental and ecological impact**

##### WWF general expectations

- *The fishery publish a strategic statement about its intention with respect to its environmental and ecological impact,*
- *The certifiers require a strategic statement and set a completion date for the statement,*
- *The certifier details the stakeholder engagement process for the certification assessment, including listing the stakeholders involved, the comments or submissions received from stakeholders and how these informed the certification assessment.*

##### Fishery actions

AFMA has produced several documents that address the HIMI fishery in a strategic manner. This includes:

- The "Assessment Report - Heard Island and McDonald Islands Fishery" (Anon. 2001) assesses the fishery for sustainability under the "Guidelines for Assessing the Ecological Sustainability of Commercial Fisheries". The guidelines were developed by AFMA and the Department of Environment and Heritage (formerly known as Environment Australia), and were based on the MSC certification criteria.
- The Antarctic Fisheries Bycatch Action Plan 2003-2004 prepared by Anon. (2003) provides the strategic statement in regard to three issues; non-target fish bycatch, incidental take of seabirds and marine mammals, and the ecological impacts of fishing operations on habitats in the fisheries. Within each of these areas there are strategic actions which are made up of three action types; data collection, data analysis, and management response. Aims (targets) are also listed for some of the strategic actions.

#### WWF fishery specific expectations

WWF acknowledges the progress that has been made with the preparation of these strategic documents. In addition, the certifier's report should also detail:

- How the current 'agreed' bycatch limits were established, the consultation process employed to define these limits and the individuals involved in this process and who was consulted in relation to the setting of these limits,
- A requirement to identify and establish objective targets and timelines for reducing interactions with bycatch species, coupled with a plan for continuous improvement over time.

### **4.3 Post-ERA action:**

#### WWF general expectations

*The certifiers will ensure that the mackerel icefish fishery completes the following:*

- *The setting of time bound, measurable, peer-reviewed targets for the reduction of environmental impacts,*
- *Identification of appropriate strategies for reducing environmental impacts (which could include technical mitigation, temporal or spatial avoidance, or codes of practice),*
- *Identification of appropriate activities to implement strategies and achieve targets,*
- *Implementation of appropriate monitoring, reporting and evaluation processes.*

#### Fishery actions

Measures already currently in place in the HIMI fishery to avoid the capture and mortality of bycatch species include:

- Limits on minimum bobbin diameter and rubber disc sizes to reduce bycatch of sessile organisms and reduce benthic impacts,
- Discharge of offal is prohibited to reduce the attraction of seabird and mammals to the fishing vessel,
- Sharks and skates that are alive and vigorous are tagged and returned to the sea by observers, under the Management Plan,
- A 'move on' rule is in place, where, if in a haul the catch of unicorn icefish or grey rockcod is 2 t or more, then the fishing vessel must not fish using that method within 5 nm of the location of that haul, for at least five days,
- If any of the precautionary catch limits for any of the bycatch species are reached during the season, the mackerel icefish fishery is closed,
- The use of cables to connect net monitoring equipment is prohibited in order to prevent bird strike on these cables,
- Lighting on boat is to be kept at a safe minimum, to prevent attracting seabirds,
- Plastic packing bands are to be used only when necessary and are to be cut so they don't form a loop when removed, and incinerated as soon as is possible (Anon. 2001).

#### WWF fishery specific expectations

WWF is encouraged by the measures currently in place to reduce the environmental impact of the fishery. The certifier's report should also:

- Describe how targets for the reduction of environmental impact have been established and/or provide clarification of the steps that should be taken to reduce environmental impact,
- Describe how monitoring and evaluation of environmental impact reduction measures will occur,
- State how the current mitigation methods were selected, whether by acceptance of proven track records, or by scientific trials or by other means,
- Describe the process by which the minimum performance requirements for the fishery are set, and the extent to which this conforms with stakeholder expectations as to the requirements for a well-managed fishery,
- Identify and describe all mitigation measures used in the fishery, For example, what exactly are the limits on bobbin and rubber disc size?
- Provide comment on the survival rate of skates and sharks following after capture, tagging and release,
- For the mitigation methods that are not proven elsewhere, provide details of the trials that tested the effects of these measures.

#### **4.4 Trials of mitigation methods:**

##### WWF general expectations

*If no clear strategy or activity to mitigate bycatch exists, and trials are necessary in order to identify the best mitigation method, the certifiers will ensure that:*

- *There is a scientifically robust, peer reviewed, time bound research plan, in place before trials commence,*
- *That there is a clear, time bound decision making process for deciding on appropriate strategies and actions as a result of the trial. This should include details on who will make the decisions and which stakeholders will be involved,*
- *Details are supplied of any previous trials, including details of who decided what should be trialled.*

##### Fishery actions

Two Australian longline vessels have been trialling seabird mitigation methods in Antarctic waters. All Australian longline vessels are required to meet CCAMLR Conservation measures, which in sub-Antarctic waters only allows operating in winter months and setting longline gear at night. AFMA also requires longline vessels to use other seabird mitigation methods (blue snoods, paired streamer lines and minimum sink rates) (Anon. 2003).

##### WWF fishery specific expectations

To assess the effectiveness of trials of mitigation methods, the certifiers should ensure that the following have occurred. The certifier's report should:

- Provide details of the trials of seabird mitigation methods previously conducted should be included in the certifier's report, including methods and stakeholder involvement in the trials,
- Provide details of any planned trials and stipulate that these plans be made available to stakeholders prior to implementation,

- Stipulate that a scientifically robust, peer reviewed research plan be in place, prior to commencement of any future trials,
- Ensure that the decision process following trials, for the establishment of strategies and management actions, is transparent and involves the stakeholders.

#### **4.5 Other environmental issues:**

##### *4.5.1 Marine reserve*

###### Fishery actions

The Heard Island and McDonald Islands Marine Reserve was declared on 16 October 2002 (DEH 2004). The regions selected were based on; their conservation values, representative portions of the different marine habitat types, the unique features of the benthic and pelagic environments, and the marine areas used by land-based marine predators for local foraging activities (Anon. 2003, DEH 2004).

###### WWF fishery specific expectations

The HIMI marine reserve is a significant development in the HIMI fishery, however WWF recommends that the certifiers report:

- Describes the details of the distribution of catch, effort and interactions with seabirds and mammals, by fishing method, before and after the establishment of the marine reserve,
- Lists all reported details of any illegal incursions into the marine reserve area since its establishment; including if there have not been any.

##### *4.5.2 Longline trial reintroduction*

###### Fishery actions

Trial longlining was reintroduced into the HIMI fishery in May 2003 as a trial, provided that the vessels use several mitigation methods (blue snoods, paired streamer lines and minimum sink rate). During May and June 2003, no seabirds were killed by longlining in the HIMI area, however three seabirds were entangled and later freed alive. Three elephant seals were killed after being entangled in the backbone of the longline (Anon. 2003).

###### WWF expectations

- Details of the trial reintroduction of longlining should be included in the certifier's report, especially with regard to interactions with seabirds and marine mammals.

## **5. Fishery management systems**

### **5.1 Transparency:**

#### WWF general expectations

*The certifiers need to ensure that:*

- *There is transparency in decision-making process by clearly stating key decision-making points in documentation, ensuring that stakeholders are able to judge the*

*actions and decisions of the certification body and the fishery independently of the certifier's report,*

- *The fishery's statements, plans, and results of trials are clearly communicated to stakeholders in a timely fashion,*
- *The fishery's documents, where they are referred to as part of the certification (e.g. codes of practice, trials of mitigation devices) are available to stakeholders,*
- *A high level of transparency and accountability is evident during the certification process. In particular WWF believes a rigorous certification process requires the certifier to respond in a timely fashion to stakeholder queries and to make available primary source material upon which the certifier has based its recommendations*

## **5.2 Governance of the fishery:**

### WWF general expectations

*The certifier's report should clearly state:*

- *How the fishery is managed,*
- *The relationship between the entity being certified and the fishery operation,*
- *The involvement of stakeholders in making decisions about the fishery and whether this is adequate,*
- *The relationship between the management of the fishery and the legislative framework and whether it is adequate*
- *The relationship between the management framework of the fishery including the Management Advisory Committee and any management structure that will be required to implement any corrective action requests.*

## **References**

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## Acronyms

AFMA	Australian Fisheries Management Authority
BAP	Bycatch Action Plan
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
DEH	Department of Environment and Heritage
ERA	Environmental Risk Assessment
FRDC	Fisheries Research and Development Corporation
HIMI	Heard Island and McDonald Islands
MSC	Marine Stewardship Council
SCS	Scientific Certification Systems, Inc.
SFR	Statutory Fishing Right
TAC	Total Allowable Catch
WWF	WWF – the conservation organisation (formerly World Wide Fund for Nature)

## APPENDIX 2 PEER REVIEW COMMENTS



NATURAL RESOURCES CONSULTANTS, INC.

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April 19, 2005

Dr. Chet Chaffee  
Scientific Certification Systems  
2004 Sunny View Lane  
Mountain View, CA 94047

Dear Chet:

I have now read the icefish document several times and made notes, which are elaborated on below. I must admit that from place to place I had some language difficulty, as a result of my fleeting understanding of English and Australian. That is, there is some local jargon that does not easily translate, but these instances are rare and did not distract from my reading of the document, which I enjoyed and learned something of interest. There are several places in the assessment report that read like someone from the Chamber of Commerce or a tour guide was doing the writing and I wondered where to get on line to buy a ticket to Heard and Macdonald's Islands. I have divided my comments into General, Specific, and Suggestions. The latter are dealt with, on a page, paragraph and sentence basis.

There are several observations that are of a general nature and do not relate to any specific section of the document, but relate to the assessment methodology and the underlying assumption of the swept area population estimates.

#### GENERAL COMMENTS

- A. This comment most likely can be attributed to the MSC required reporting structure, and not to any team shortcomings. In doing this review, I found it, at times, difficult to evaluate various conclusions, because I did not know enough about some of the life history characteristics of the icefish. It would be beneficial to the reader if in the introductory section that we require a table of life history parameter, e.g. natural mortality, maximum age, growth rate (K value), age at maturity, critical age or size, etc. Most of the info is in your report but it is some time until the reader becomes aware of this information. I am not suggesting you change your report only something that the MSC might consider in the future.
  
- B. As you may be aware, the first paper that I know of dealing with swept area estimates was published almost four decades ago (Alverson and Pereyra, 1969). Since that time this survey method and biomass estimates have been used broadly around the world. Reported results, however, frequently gloss over the assumptions and factors that may bias the conclusions. They also are often vague in defining what biomass they are actually attempting to estimate.

I am not suggesting that the icefish survey can be faulted in this respect because the survey methodology in your report is treated in a very general way. I suspect the team's review of the icefish survey and estimating procedure found their methodology satisfactory. So, my comments are of a nature that you guys will have to decide whether or not they are of any value.

First, I cannot tell from the document what the scientists doing the survey are estimating, although it would appear they believe they are attempting and estimate of the exploitable biomass of the stock from which the TAC is established. That, however, is not really clear because some of your comments, later in the text, seem to suggest that the age 2 group and earlier age classes are estimated by

back calculating using age specific mortality. Is the TA based on the age 3 and older fish?

Second, swept area surveys estimated the quantity or numbers of the age groups in a stock that inhabits a particular area, stratum, etc. As such, an estimate must be defined in terms of its spatial geometry. In as much as they are using a bottom trawl survey their estimate is really of the population vulnerable to the net, meaning in the icefish survey, the population on the seabed in the area surveyed, up to the average height of the trawl above the seabed--in a more sophisticated analysis the geometry of the net opening, which modern technology can provide, is used to define the area and portion of the water column surveyed. In my reading of the behavior of this species, it would appear there are significant differences in the spatial (both geographical and bathymetric) distribution of the different age classes. For example, the 2-plus age class is noted to have, at different times of the day, a considerable distribution in the pelagic environment above the seabed. I would expect that even some of the older fish might, at times, aggregate above the average net height. If this is true, the trawl survey may be estimating only a portion of the icefish overall stock. That is the animals that inhabit the water column above the average net height are not available to the survey. This of course is all speculation, but your team has implied a vulnerability of the stock to the trawl is (1.0). I am not sure what the vulnerability (1.0) noted is based on. Does this coefficient deal with just the stock in the path of the net swept or does vulnerability take into account the possibility of animals that may be swimming at depths above the nets path or go under the food rope? Vulnerability must be established based on two factors, the ability of the species or age group to escape from the path of the net and the portion of the stock that may be in habiting water at the time of the survey, above or below the net, which escape under the foodrope. In semi-pelagic species such as North Pacific pollock and hake, the surveys provide estimates, which are adjusted upward based on a simultaneous acoustical enumeration of the stock above the net. The on bottom portion of the overall stock will change from year-to-year. I suspect this was noted by the team because there is a suggestion regarding improving the surveys using this technique, but it is not very clear what the current assumptions include. If there is no adjustment and fish in the area not available to the trawl, then one might think the precautionary approach being used is even more robust.

Finally, it is not clear whether the assumption of their coefficient of one (1.0) have been evaluated or examined. Edwards at the NMFS lab made estimates of the vulnerability of each commercial species taken in the trawl surveys using a variety of observational techniques. As I recall, some of the flounders had values greater than 1.0 while many of the roundfish had values lower than 1.0.

- C. Like the team, I am a little concerned with the uncertainty of the estimate of natural mortality. It may well be that the natural mortality curve is U shaped, with high mortality in the very early years, declining in mid years and increasing in the later age groups. Even of more concern is the observed small number of year classes in the population. For a species that does not mature until age 3, this seems very strange. One would expect to observe some age classes in the fishery up to at least 9 or 10. Their absence could result from possible out migration of older age groups, miss reading of ages based on the modal method or a sharp increase in the death rate after the beast starts to spawn? At any rate, it is good that you have pointed to this uncertainty because it may be dangerous to apply the .4 rate in extrapolating back to estimate recruitment. Further if we are over estimating the natural mortality rate the stock may not be so conservatively fished. Anyway, it seems important that every effort be made to refine age specific mortality rates.
- D. I am glad to see the teams concern regarding reference points. As it is apparent from the report that the current management strategy does not set a lower floor (limit) where fishing would be cut back or curtailed, even if it is implicit in some of the management action on stocks in other regions. The 75% over a two-year spawning escapement sounds good, but that will depend on swings in recruitment and even more, on the status of the stock in the pre-fished period. If the pre-fished stock level was at the lower end of the natural variability (it is not clear how the pre-fished stock level compares with the current situation) when estimated, then one might be concerned.
- E. The setting of the TAC at the lower boundary of the 95% of the stock abundance confidence interval should provide the needed buffer for uncertainty. Depending on the variance and breadth of the confidence interval, it could lead to minimal and

conservative harvest of the stock, which may be justified on the basis of uncertainty.

- F. The high number of 100% score seems uncharacteristic even for well-managed fisheries and some of these scores do not seem supportable. On the other hand, I would have passed the fishery anyway, particularly with the noted conditions, some of which seem to constitute excessive demands. See more on this matter in the specific comments.
- G. I don't recall seeing any estimate or discussion of F. If the harvest rate is .25% over two years then the instantaneous mortality rate would be about .36 over two years with a annual (i) rate of about .18 and an annual fishing mortality of about .16. If this is in the ballpark than fishing removals (considering natural mortality) would result in the fishery adding an annual mortality of about .095, which seems to suggest a conservative fishery. If there are elements of the population not available to the net, it would be an even more cautious approach.

## **SPECIFICS**

1. Page 6, last paragraph, starting on third line. I would insert after "Two aspects of bottom trawling which are important" to understand ecosystem impacts:  
first ...
2. Page 7, data presented under "The target species." Poor paragraph organization, I would suggest that the last sentence be placed at end of first sentence and use only one paragraph. The substance of the last sentence is life history and should be coupled to the topical sentence. The following material all deals with distribution and behavior. Note the 700-meter depth range seems inconsistent with the discussion of this matter later in the paper.
3. Page 13 (i). This principle seems to be inconsistent with the noted high inter year variability in icefish recruitment. That is the phrase "stable recruitment of harvest species" is misleading. Would it be more correct to say, "threaten stocks with

recruitment overfishing." From what you have said about effects of oceanographic factors on recruitment, recruitment is not stable to begin with.

4. Page 18, under 3.4 (b). I know these are AFMA's objectives but the term ecologically sustainable remains jargon unless defined in functional terms and the metrics to used evaluate the objective specified. One can find these terms in almost every management entities goals or objectives, but what parameters are measured and how they will they be measured to insure the goal, is seldom spelled out.
5. Page 24, (1). "To avoid the likelihood of declining recruitment," this harks back to comment 3 above. You cannot assure the spawning stock is sufficient to avoid the likelihood of declining recruitment. According to your report, recruitment is continually going up or down and natural factors could decrease the stock to a level impacting recruitment. You can attempt to assure "the fishery does not lead to or contribute to a decline in recruitment."
6. Page 25, paragraph continuing from previous page, last sentence or "would be" sentence something is missing.
7. Page 39, last paragraph. I think this is an important observation, but don't know why remoteness and seasonal aspects of the fishery prevent sampling when you have 100% observer coverage. Anyway, on the next page you say the sampling sizes are more than adequate.
8. Page 41, Sub Criterion 1.1.1 deals with stock units and 1.1.1.1. Classification or identification abilities at the species level. This seems peculiar and has little to do with stock determination. Of course, I expect one could say if you can't identify the species, you can't determine the stock. But, if you can't identify the species there is no icefish fishery.

9. Page 43, first paragraph beginning of page. Note depth distribution data is not consistent with that noted earlier in the report.
10. Page 46. You may wish to add estimated vulnerability of the age group to the oncoming trawl to this set.
11. Page 50, first paragraph under Score. This paragraph does not make a lot of sense. A mesh size has been set to prevent capture of 2-year old fish. If all the fish caught by the nets are unaffected by the mesh size, what is the basis of the minimum mesh size and how does one know the composition of the fish population of the region, independent of the what is observed in the net surveys which also may not accurately depicted the population on the grounds? The comments made earlier regarding "move on" etc. suggests that net selectivity is occurring. Are they referring to the 3-year age group and up? Am I missing something?
12. Page 53, under Annual variability of year class strength. The middle of this paragraph states "all fish swept during the haul are caught" and notes no adjustment for selectivity being made. There are three different factors that the authors are dealing with. All fish caught is a vulnerability issue that should deal with (1) the ability of the species to escape the path of the oncoming trawl, and (2) availability of the fish below and above the net. Selectivity (3) is a function of the net mesh and will alter an age classes ability to escape capture, thus reducing its overall vulnerability to less than (1.0). Small fish generally have higher levels of vulnerability (because they cannot escape the oncoming net) as they do not have the swimming endurance of larger fish, but they may not be vulnerable to capture because of net selectivity.
13. Page 58, under Score, second paragraph. "The state of each icefish stock" I thought we were dealing with only one stock? Does the team mean the state of each icefish cohort or are they referring to assessments in areas outside the Heard/McDonald region?

14. Page 79, first paragraph beginning of page. Here and elsewhere, the team uses the term harvest strategy and I know what is implied, however, in many regions, harvest strategy relates to the selection of fishing gear, areas and operational modes. At any rate, these are management strategies to achieve stated objectives and it may be confusing to some readers.
  
15. Page 80, paragraph under "Benthic impacts," sentence 2. Unless the fishers are using mid-water trawls, bobbins do not "ride just over the substrate." They, in fact, ride on the substrate and maintain the net just off the bottom and some fish escape under the footrope. Also, I am not convinced that benthic impact of the gear needs the attention implied. From my reading of the density of trawling in the area in association with the closed areas, the potential impact of trawling on the benthic community may be very improbable. Thus, you may be requiring research not supported by the effort data. The fishery data available can provide you with a preliminary look at the likelihood of any significant benthic damage. According to the statistics given in your report, one or two vessels involved have harvested a maximum of about 1,100 mt, on average it's much less. I have no idea of the average catch rate but let's assume 10 tons per tow. This would mean that the total tows per year in the fishing zone was about 110 or even if its five tons per two 220. From these data and knowledge of the portion of the seabed swept, we can get some idea of trawling intensity. Note in the case of benthic impacts, the area influenced is not the net opening but the area between the doors. I have looked at the sweep of the larger trawlers fishing in the Bering Sea that have an average door spread of 600 feet. During a three-hour tow, they will impact almost one (1) nautical square mile of the seabed. So if we assume the total tows to be 110 (and the spread of the doors about the same as those vessels fishing in the Bering Sea) about 110 square nautical miles of seabed will be impacted. At the lower catch rate (5 tons an hour) it will be double that 220 square nautical miles. I have looked at you shaded area where the fishery is stated to occur. I can't read the latitude and longitude numbers very well, but the fishing area would appear to encompass around 100,000 square nautical miles. This, I presume does not include the closed areas. This would mean the impacted area, resulting from this tow range, constitutes about 1 to 2/1000 of the substrate in the fishing region. If my swept area and area calculation is not in order, have the managers put together a grid

trawl density profile, get an estimate of the swept area per tow and make you own calculations. Benthic studies can be very costly and difficult to assess. It would seem you might be pushing for an investigation where the risk of any impacts is very, very small. Some evidence of the need might also be evaluated by looking at the energetics of the fish populations of the region. It would appear that the icefish has little dependence on the productivity of the benthos, but relies on the productivity of the pelagic environment. So what about the other elements of the fish community in the region? If you think the effort level in the fishery may have detrimental impacts on the seabed I would guess the annual research surveys may also be a significant contributor to the problem, on the fishing grounds and as well as in the closed area. If there are unique habitats in the trawled region, (deepwater corals or long lived non mobile invertebrates) the observers should have already observed this from the bycatch and these grounds closed to fishing.

16. Page 85, last paragraph. I suggest "high variability in the important oceanographic parameters."
17. Page 104, last paragraph. "However, there is still limited data on bycatch and habitat effects." As stated this may be somewhat misleading and read to mean there is limited data on bycatch (which we know is not true) as well as impacts on the benthic communities. An alternative statement might be "There is little data on the impacts of bycatch on these non-target species and trawling on the benthic community."
18. Page 169, last paragraph. I'm having trouble with a last paragraphs. If the monitoring program includes catches of all species why add "and incidental catches?"
19. Page 183 to page 189 (Conditions). From what I can glean about the fishery, it constitutes a small operation involving one or two boats at any one time, producing a small amount or product. Supporting research has provided relatively good information on the fishery and the environment and the fishery is closely checked by observers, landing checks, etc. The operators are willing cooperators in the management effort and the established management regime. The vessel or vessels fish over a region that is relatively large in contrast to the annual swept

area impacted. Its overall value is quite small. Its potential impact on the ecosystem seems miniscule in terms of the area fished, acknowledging there may be localized impact in the areas fished, but unless there is something unique and special on these grounds the fishery would seem to be orderly and in operating consistent with good conservation objectives. Taking this into account, it would appear that the team has covered every risk no matter how small and required some research, that is unrealistic in terms of cost and value of the information it would ultimately yield to assist management. If all these conditions were imposed on already certified MSC fisheries, most could not pass muster. I am not supportive of conditions, 1.9-the last element, 2.2 (which impact conditions 2.3, 2.4, 2.5, and 3.4.)

1.9 The last element of condition 1.9 involves a study that requires a bundle of assumptions that seldom can be supported and leads to a simulation that seldom provides reliable information for management. They are more profitable to consultants than for fishery management. Considering the size of the fishery and its low potential risks, it's asking a lot. Before promoting the simulation studies, high priority should be given to refining life history parameters.

2.2 This condition places the responsibility to evaluate the effectiveness of all reserves in mitigating fishery impacts. To begin with, the concept of this management tool did not surface in the fishery, but is a tool proposed and supported by a number of scientists, conservationist and managers. Is it the fisheries responsibility to evaluate management tools used in fisheries or the management agency? Are you telling the reader that the MPS were imposed without any real evidence that they would contribute to mitigating fishery impacts? Managers use a number of tools to attain their conservation objectives and it is their responsibility to evaluate their utility to meet management objectives. Besides, if you have not defined any impacts-just possible impacts and if there are no definable impacts what is there to mitigate. Reserves provide sanctuary for young fish, portions of the spawning stock, protect unique bottom habitats, etc. But, you have not shown recruitment overfishing; growth overfishing and bottom impacts require mitigation. You have only made

assumptions regarding potential impacts on non-target species and the benthos that require investigation. In certification, it is the MSC team that should evaluate the effectiveness of tools used for managing the fishery. Of course, this condition may be tool to force the user to request such an evaluation from the management agency. Even so, the value of MPA is under study in many regions and the results, with some exceptions, are most often uncertain. Before this becomes a condition, you must make clear impacts that should be mitigated.

- 2.5. Some of my previous comments bear on this matter. Before a condition of this character is imposed on a user, there should be reasonable evidence that the probability of a risk really exists. From your own accounting, this is not evident. If this fishery remains at its current level of effort, it is highly unlikely that it constitutes any real threat to the benthic community of the shelf and slope where this fishery operates. My calculations may be in error. However, before you impose this condition it would be prudent to ask the managers to undertake a evaluation of the current fishing intensity, distribution in time, annual swept area in defined grids of the fishing zone and determine how much of the shelf and slope area is impacted on an annual basis (see NRC report "Effect of Trawling and Dredging on Seafloor Habitat"). Benthic studies are expensive, are difficult to carry out in the depth range this fishery operates and frequently lead to highly controversial results.
  
- 3.5. What in the world has the team been doing with its time? It seems to me that is exactly what the MSC team has been concerned with. You have already decided to green light the fishery, subject to your conditions. Further, the MSC requires a continuous monitoring of these events and the applicant knows this requirement. Even if the industry did the job, would you accept their information to be unbiased? Perhaps this condition is just to insure they pay for future MSC reviews.

## SUGGESTIONS

Chet, all in all, I think the team has done a good job and some or perhaps much of what is noted above may reflect misunderstanding of what, is being said or semantic problems. I do think some of the conditions constitute too much of a burden on a small fishery and the information gained may be trivial and of no consequences to the fisheries management. These need to be carefully reviewed before proceeding. At a minimum, some preliminary evaluation of effort level, distribution and intensity as related to the area fished should be examined before making all the fuss about benthic impacts. There are also some questions as to what has been considered in developing the annual estimates of stock size and how the coefficients that influence the estimates have been developed, what has been assumed, and what portion of the overall stock is being estimated. You may wish to clear this up by adding a paragraph or two dealing with these matters. Although it would be nice to have the spawner recruitment relationship established, species with such high annual variable recruitment seldom yield curves that are very reliable and helpful for management. Regardless, the data should be available over time to examine and the time and cost should not be inordinate. It's worth pushing them to look into this matter.

Lee Alverson

NATURAL RESOURCES CONSULTANTS, INC.

**Referee’s Report on MSC Assessment Report- The Australian Antarctic Mackerel Icefish Fishery at Heard and MacDonalD Islands. By John Pope NRC (Europe) Ltd.**

This is a well-constructed report and I have only minor, detailed changes to suggest. The report gives a strong impression that this fishery is one that is responsibly managed and conducted. I agree with the overall conclusion that this fishery should be certified by MSC subject to the conditions suggested. Amongst the conditions the most important to attend to are those concerned with tightening up the specification of limit and target reference points.

With respect to the Assessment Team’s performance evaluations. I append comments where appropriate (see annex 1). In general I agreed that the sub-criteria and indicators they had chosen properly covered the various MSC Principles. In some cases I felt the wording of the guideposts were designed to measure performance against a more aggressively harvested fish than icefish seems to be. Some guideposts seem designed for a fishery which would require very detailed population dynamic information to manage properly. This does not appear to be always needed for the icefish. In some cases (particularly under MSC Principle 1) I therefore felt guideposts were sometimes perhaps too exacting for this particular fishery. These sometimes lead to scores which were either too low if measured against more moderate guideposts or which were high relative to the given guideposts but reasonable relative to more appropriate guideposts. In practice the modifications I suggest to the scores only once lead me to disagree with those where the team had given a score of less than 80% and imposed a condition I would not regard as strictly needed. Similarly in two cases would I have suggested a condition where the team did not. In a few cases I have suggested minor modifications to the conditions set by the Assessment Team. For convenience these are listed in the table below.

Indicator number	Suggestion as to condition
1.1.1.3	Suggest modification.
1.1.2.5	Suggest 79% score and additional condition.
1.1.3.1	Suggest condition is limited to Icefish in this part of report.
1.1.3.2	As 1.1.3.1.
1.1.5.1	Suggest minor modification.
1.3.1	Condition might perhaps be dropped.
2.1.3.1	Suggest a clarification to condition.
2.2.1.2	Suggest minor modification.
3.1.3.1	I tend to regard the comments on the score as an unofficial condition.
3.4.3.1	Assessor’s comments might become a condition.

I have not reworked the overall scores subject to my suggestions but noting that the overall score for MSC Principle 1 is only just above 80% it is possible that in aggregate my modifications might lead to a failure on this Principle. However, this would be a result due to the sometimes rather exacting guideposts suggested by the assessment team and my feeling is

that this fishery should pass on this principle. This fishery deserves to be certified subject to the conditions!

A few editorial corrections need to be made. A chart showing the different grounds mentioned in the report, the extent of the closed area and the depth strata it covers would be helpful.

## ANNEX 1

### MSC PRINCIPLE 1

### MSC CRITERION 1

### SUB-CRITERION 1.1.1

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 1.1.1.1.**

Agreed

**Indicator 1.1.1.2.**

Agreed

**Indicator 1.1.1.3.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK. At 79% the score is a very near miss and I would have thought 75% perhaps a more realistic expression of our ability to score accurately. Clearly, given the recent nature of studies on this stock, uncertainties are bound to exist about stock structure and it is thus important to show that the adopted assumption is conservative.

**Are any conditions that are imposed reasonable?**

While the condition is desirable I doubt, given current information, if it is achievable. An alternative would be a condition to make and appropriately report ongoing studies of stock movement/ distribution using such standard approaches for such studies as are applicable to the ice-fish.

## SUB-CRITERION 1.1.2

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 1.1.2.1.**

Agreed

**Indicator 1.1.2.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

I would be inclined to give a score nearer to 80% given current uncertainties about age readings from hard parts. However, given the nature of the assessment I would certainly still consider the score should remain a pass.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 1.1.2.3.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK but a greater emphasis on the consistency of available time series would be valuable.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK for current collection but maybe a bit high given that current reporting standards only commenced in 1997.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 1.1.2.4.**

Agreed

**Indicator 1.1.2.5.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Given the uncertainty about ageing older fish and the natural mortality rate that they suffer, I would be inclined to give a near miss score and impose a condition which would lead to better knowledge of the mortality and/or life history strategy of mature fish. Clearly if they spawn a

few times and die management would be different than if they continued to repeat spawn for a number of years. Note, that for a number of fish stocks, the older ages can be missed by surveys due to distributional effects. C.f. some Mediterranean hake stocks.

**Are any conditions that are imposed reasonable?**

Suggest new condition to better describe and report appropriately on mortality processes and/or life history strategy of mature fish.

**Indicator 1.1.2.6.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

80% guidepost mentions knowledge sufficient to undertake precautionary assessment. Surely its always possible to be precautionary , knowledge simply narrows the range needing to be considered.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

I thought this sounded like a bare 80%.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 1.1.2.7.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Suggest 80% or 85%. The surveys sound good but only the first of the guideposts for 100% is met. I should feel more comfortable if survey trends were shown to be self consistent and consistent with the fishery.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 1.1.2.8.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Sounds more like 75 or 70%. I do not get the impression that a lot is known.

**Are any conditions that are imposed reasonable?**

Yes but I suspect that longer time series may be needed.

### **SUB-CRITERION 1.1.3**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 1.1.3.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

Suggest 100% and 80% guideposts should not consider ecosystem impacts or by catches here but leave these to be dealt with under MSC criterion 2.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

This is a key issue and I am left very uncertain that the current practice is adequate or not. Just what the 75% escapement rule entails is not clear to me. This indicator needs to be clarified further!!

**Are any conditions that are imposed reasonable?**

Would prefer that LRP referred only to ice-fish here. If they have to be made more exacting to protect non-target species deal with this under MSC Criterion 2. Its very important there should be limit reference points for both harvest rate and for SSB.

**Indicator 1.1.3.2.**

My comments here are much as for the previous indicator. If anything the score given is too high.

**Are any conditions that are imposed reasonable?**

YES

### **SUB-CRITERION 1.1.4**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 1.1.4.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

I think they are too exacting for a fishery of this nature.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Sounds too high relative to given guideposts but with guideposts more related to the needs of the management of this fishery I would agree that it passes at 80%. It is possible that delay difference models might be appropriate to the knowledge available for this stock.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 1.1.4.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

Quite exacting

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK I think the score might be a bit high relative to given guideposts but reasonable relative to more appropriate guidepost for this fishery.

**Are any conditions that are imposed reasonable?**

Condition 1.5 seems reasonable and feasible.

**SUB-CRITERION 1.1.5**

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 1.1.5.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK but impossible to interpret for this fishery where clear LRPs do not seem to be available.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Difficult to say but not unreasonable in the circumstances.

**Are any conditions that are imposed reasonable?**

Yes. Moreover the resulting report should be peer reviewed at CCAMLR or similar forum.

**Indicator 1.1.5.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK

**Are any conditions that are imposed reasonable?**

Condition 1.7 seems reasonable.

#### **SUB-CRITERION 1.1.6**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 1.1.6.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

The guideposts may be a bit exacting for a fishery which seems to be conducted according to a fairly conservative rule. .

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Possibly high but OK if some allowance made for guidelines

**Are any conditions that are imposed reasonable?**

Yes. This fishery might be suited to a management procedure approach which would satisfy this condition.

#### **MSC CRITERION 2**

#### **SUB-CRITERION 1.2.1**

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 1.2.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK.

**Are any conditions that are imposed reasonable?**

Yes seems very sensible.

#### **MSC CRITERION 3**

**SUB-CRITERION 1.3.1**

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 1.3.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK, perhaps a little exacting

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

I would be content for this to get an 80% at this stage of the development of the fishery

**Are any conditions that are imposed reasonable?**

This condition would be a good idea to attend to but is perhaps not strictly necessary.

**Indicator 1.3.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK.

**Are any conditions that are imposed reasonable?**

Yes this should be done routinely.

## **MSC PRINCIPLE 2**

### **MSC CRITERION 1**

#### **SUB-CRITERION 2.1.1**

**Does the sub-criterion wording fit well with MSC intentions?**

##### **Indicator 2.1.1.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

About OK but might be a concern with knowledge of other fish species (Perhaps elasmobranch species) It also seems that this is an area where environmentally driven shifts in productivity may occur and knowledge may be needed under various possible regimes.

**Are any conditions that are imposed reasonable?**

N/A

##### **Indicator 2.1.1.2**

**Does the indicators wording fit well with the Sub-Criterion**

The indicator wording does though the intent seems slanted to land based species while the concern presumably should be on all.

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Suggest 80% It sounds more like a just passes in the assessment.

**Are any conditions that are imposed reasonable?**

N/A

#### **SUB-CRITERION 2.1.2**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

##### **Indicator 2.1.2.1**

Agreed

**Indicator 2.1.2.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

May be a bit low suggest 90%

**Are any conditions that are imposed reasonable?**

N/A

**SUB-CRITERION 2.1.3**

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 2.1.3.1**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

Its difficult to believe that any fishery would meet the 100% guidepost and even the 80% guidepost would defeat most fisheries.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Yes with those given. I regard these as tough but against that they lead to sensible conditions which are also invoked in later sub-criteria.

**Are any conditions that are imposed reasonable?**

The two conditions given here are sensible. With respect to condition 2.2 the extent that the existing reserve adequately covers all depth strata should be examined in the report.

**Indicator 2.1.3.2**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Yes though I would like to be assured that the by-catch limits are related to by-catch mortality rate rather than to by-catch as % of catch.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 2.1.3.3.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK though quite tough

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Yes

**Are any conditions that are imposed reasonable?**

This reimposes conditions 2.1 and 2.2 introduced under indicator 2.1.3.1. These seem even more clearly needed here.

#### **SUB-CRITERION 2.1.4**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 2.1.4.1**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Yes though I somewhat unsighted about the objectives and limits and as to whether the 75% escapement rule as formulated really helps predators of icefish.

**Are any conditions that are imposed reasonable?**

N/A

#### **SUB-CRITERION 2.1.5**

**Does the sub-criterion wording fit well with MSC intentions?**

Yes though there seems some redundancy with previous sub-criteria.

**Indicator 2.1.5.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Yes though some of the justification might be questioned. Those given under guidepost 1 and 2 might be questioned. These seem more related to the target species than other ecosystem components. The assessors argument is I suppose that if the icefish are not greatly impacted then tropic interactions will not be. Despite my quibbles here, the fact remains that while impacts are though to be minimal they have yet to be assessed and this indicates a less than 80% marking

**Are any conditions that are imposed reasonable?**

Re-imposes conditions 2.1 and 2.2. No extra work required.

**Indicator 2.1.5.2.**

Agreed

**Indicator 2.1.5.3**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

The mark might be somewhat low but I would agree it should be less than 80%.

**Are any conditions that are imposed reasonable?**

Yes The main thrust of the report should be aimed at assessing direct impacts on the benthos and the adequacy of existing gear restrictions/reserves to mitigate this

## **MSC CRITERION 2**

### **SUB CRITERION 2.2.1**

**Does the sub-criterion wording fit well with MSC intentions?**

Icon species are not identified as a specific concern in MSC wording (unless they are endangered, threatened, protected or associated and ecologically related species)

**Indicator 2.2.1.1**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK (though 100% is probably not attainable in the real world)

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Score 90 is OK as long as no marine species are threatened. Sharks and skates are rightly of concern to stakeholders but are any threatened in this area? If yes score should be less than 80 on the second guide post.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 2.2.1.2**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK (though 100% is probably not attainable in the real world)  
Guideposts here need to reflect the knowledge required for managing a specific fishery. A less intense fishery can probably get along OK with far less knowledge of these factors than one which is harvested aggressively. The fourth guidepost (ongoing research) is perhaps in tension with the other three (existing knowledge)

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

In an absolute sense this score sounds a little high. However, the overall intensity of the fishery may make them reasonable ( see my comments under Guideposts).

**Are any conditions that are imposed reasonable?**

The essential condition should be requiring the appropriate publishing of the AAD report since this Indicator is concerned with knowledge.

**SUB-CRITERION 2.2.2**

**Does the sub-criterion wording fit well with MSC intentions?**

Icon species are not identified as a specific concern in MSC wording (unless they are endangered, threatened, protected or associated and ecologically related species)

**Indicator 2.2.2.1**

Agreed

**Indicator 2.2.3.1**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

The 80% level seems a tough one. Probably the main need is to conform with CCAMLR standards of risk assessment.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Score is correct with given Guidepost (which is tough)

**Are any conditions that are imposed reasonable?**

The Condition is the same as for a previous indicator

**SUB-CRITERION 2.2.4**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 2.2.4.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK but do not seem to quite capture the well monitored nature of this fishery which gives a potential for adaptive responses to such problems.

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK (as a narrow failure viewed against existing guideposts) though the actual system sound fairly robust

**Are any conditions that are imposed reasonable?**

The condition is a logical extension to condition 1. I.e. if a problem is identified then tackle it!

**Indicator 2.2.4.2.**

Agreed

**SUB-CRITERION 2.2.5**

**Indicator 2.2.5.1**

Agreed

**Indicator 2.2.5.2**

Agreed

**MSC CRITERION 3**

**Sub-Criterion 2.3.1**

**Does the sub-criterion wording fit well with MSC intentions?**

The Sub-criterion wording seems to cover a wider range than does the MSC Criterion which refers only to exploited (I presume by-catch) populations while the sub-criterion extends to ecologically related.

**Indicator 2.3.1.1**

Agreed

### **MSC PRINCIPLE 3**

Note missing reference to section at foot of page 130, and head of page 133

#### **MSC CRITERION 1**

##### **SUB-CRITERION 3.1.1**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

###### **Indicator 3.1.1.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK. Near Miss for good reasons

**Are any conditions that are imposed reasonable?**

Condition should be readily met and is desirable.

###### **Indicator 3.1.1.2.**

Agreed

##### **SUB-CRITERION 3.1.2**

**Does the sub-criterion wording fit well with MSC intentions?**

###### **Indicator 3.1.2.1.**

Agreed

###### **Indicator 3.1.2.2.**

Agreed

###### **Indicator 3.1.2.3.**

Agreed

##### **SUB-CRITERION 3.1.3**

**Does the sub-criterion wording fit well with MSC intentions?**

**Indicator 3.1.3.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

From the comments, which are quite negative, it sounds at best more like a bare pass of 80%. The managers might do well to regard the second paragraph of comment on the score as an unofficial “condition”.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 3.1.3.2.**

Agreed

**SUB-CRITERION 3.1.4**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.1.4.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

In the sense that the assessors rightly point out the lack of rules for long term effects the score is too high and should be less than 80%. However, as the assessors have already made explicit conditions on this point under MSC Principle 1 I think this score can stand as being an expression of the adequacy of the broad objectives.

**Are any conditions that are imposed reasonable?**

N/A

**Indicator 3.1.4.2.**

Agreed

**Indicator 3.1.4.3.**

Agreed

### **SUB-CRITERION 3.2.1**

**Does the sub-criterion wording fit well with MSC intentions?**

#### **Indicator 3.2.1.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

Both my perceptions of the “75% escapement rule”, that it limits exploitation rate but would not of itself prevent the stock being further reduced by 25% every two years and the comments of the assessors suggest that 90% is too high and should be 80% or lower. However, since the issue has be dealt with firmly under MSC Principle 1 there is no need for further conditions.

**Are any conditions that are imposed reasonable?**

N/A

#### **Indicator 3.2.1.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

No. The comments above under 3.2.1.1. remain relevant. There is no clear indication that the rule reflects the productivity of the stock.

**Are any conditions that are imposed reasonable?**

N/A

#### **Indicator 3.2.1.3.**

Agreed

#### **Indicator 3.2.1.4.**

Agreed

#### **Indicator 3.2.1.5.**

Agreed

#### **Indicator 3.2.1.6.**

Note wrongly numbered in report

Agreed

**Indicator 3.2.1.7.**

Agreed I agree with the score and condition but note it is more relevant to MSC 2 and is essentially a marker here.

**Indicator 3.2.1.8.**

Agreed

**Indicator 3.2.1.9.**

Agreed

**Indicator 3.2.1.10.**

Agreed

**SUB-CRITERION 3.2.2**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.2.2.1.**

Agreed

**Indicator 3.2.2.2.**

Agreed

**Indicator 3.2.2.3.**

Agreed. Might add identification of sustainable harvest rate under varying productivity regimes to the list of desirable research.

**Indicator 3.2.2.4.**

Agreed

**SUB-CRITERION 3.2.3**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.2.3.1.**

Agreed. If anything score could be higher.

**SUB-CRITERION 3.3.1**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.3.1.1.**

Agreed

**Indicator 3.3.1.2.**

Agreed

**SUB-CRITERION 3.3.2**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.3.2.1.**

Agreed

**Indicator 3.3.2.2.**

Agreed

**Indicator 3.3.2.3.**

Agreed

**Indicator 3.3.2.4.**

**Does the indicators wording fit well with the Sub-Criterion**

OK, I presume operational waste would include lost gear.

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK for Fish waste. Not clear about lost gear but some is likely. Is damaged netting retained and bought back to port (I imagine so). It would be worth while mentioning this issue which can impact marine mammals etc.

**Are any conditions that are imposed reasonable?**

N/A

**SUB-CRITERION 3.3.3**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.3.3.1.**

Agreed

**Indicator 3.3.3.2.**

Agreed

**SUB-CRITERION 3.4.1**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.4.1.1.**

Agreed

**Indicator 3.4.1.2.**

Agreed

**SUB-CRITERION 3.4.2**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.4.2.1.**

Agreed

**Indicator 3.4.2.2.**

Agreed

**SUB-CRITERION 3.4.3**

**Does the sub-criterion wording fit well with MSC intentions?**

OK

**Indicator 3.4.3.1.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

The score is a bare pass and the comments sound very like a condition. It might be better to give a score of 75% and impose the condition indicated.

**Are any conditions that are imposed reasonable?**

Suggest make comments on score into condition

**Indicator 3.4.3.2.**

**Does the indicators wording fit well with the Sub-Criterion**

OK

**Are the Guideposts reasonable?**

OK

**Is the score given consistent with the Guideposts (or with reasonable Guideposts)?**

OK

**Are any conditions that are imposed reasonable?**

I agree.

**Indicator 3.4.3.3.**

Agreed

## APPENDIX 3 PUBLIC COMMENTS



**WWF-New Zealand** The Treehouse  
Botanic Garden Glenmore Street  
PO Box 6237  
Wellington  
New Zealand

Submission on the draft final MSC Assessment Report for the Australian  
Antarctic Mackerel Icefish at Heard Island and McDonald Islands

For: Scientific Certification Systems, Inc.  
Date: 11 May 2005



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## **1. Introduction**

WWF has considered the draft final MSC Assessment Report on the Australian Antarctic Mackerel Icefish Fishery at Heard Island and McDonald Islands (HIMI). We congratulate the certifiers on the comprehensive nature of the assessment and believe it provides a sound basis for consideration of the client's application for MSC certification.

In broad terms WWF agrees with the result of the assessment process; that the HIMI Mackerel Icefish fishery meets the MSC Principles and Criteria and therefore should be certified. WWF does however have a number of general and specific comments to make on the draft Assessment Report that we would ask be considered in both the development of an Action Plan for the fishery as well as in the assessment process for other fisheries seeking MSC certification.

## **2. General Comments**

There are a number of general issues arising from our review of the draft Assessment Report.

### *1. Consistency of standards across fisheries*

As a conservation organisation WWF welcomes the high degree of rigour applied in the establishment of the Scoring Guidelines and assessment process for the HIMI Mackerel Icefish fishery. However WWF is mindful that overall compliance with the 80 Scoring Guidepost as set out in this assessment is an onerous task and one that few fisheries would be able to meet. We note the statement in the draft Assessment Report that 'The standards set may not be identical to those used for other MSC certified fisheries...' and that each fishery should be judged on its 'particular circumstances and requirements'. However we consider that there is a need for consistency in the standards applied across fisheries and we are concerned that a fishery may in fact be inadvertently penalised for setting already high levels of performance.

### *2. Scoring Guideposts thresholds*

WWF recognises that whenever a threshold is established, and applied as an absolute, there is potential to fall just short of that threshold. In this context we would draw attention to the fact that of the 22 proposed 'Conditions for Continued Certification' for the fishery, 11 relate to scores of 79 against the select indicators. A further 8 relate to scores of 75, meaning that 19 of the 22 potential conditions are for assessments just below the 80 Scoring Guidepost thresholds.

This raises a number of issues. First, there would appear to be a very fine line between identifying where management or research efforts may be further improved (or where MSC standards may not be met though management is not lacking) and setting a Condition for Continued Certification. The reasonableness of this on a 1 per cent differential is open to debate, particularly given that not all aspects of the assessment can be quantified and so there is necessarily a subjective element to the process. MSC certification reflects an existing high level of commitment to ecosystem based



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management and is a means towards continual improvement in a fishery. WWF strongly supports the MSC philosophy and its potential to improve marine fisheries conservation and management. We would therefore be concerned if, in the case of the HIMI Mackerel Icefish fishery the client decided not to pursue certification on the basis that certain conditions were too onerous or the associated costs were prohibitive, where those conditions were as a result of inconsistency between fisheries, or where they were raised because of a 1 point differential, although we recognize the need for fisheries to meet the pass mark and improve over the lifetime of the certificate.

### *3. Transparency in assessments against Scoring Guideposts*

In a number of cases difficulties were experienced in identifying how a score was determined, given the material and comments presented in the Assessment Report. In some instances the assessment rationale clearly identified weaknesses and areas for improvement that could be logically aligned with the indicators and so effect the resulting score. However in others the rationale for the resulting score was more cryptic. For example, in Indicator 2.2.4.1 the allocated score is 75 yet there is little indication in the assessment provided against the 80 Scoring Guidepost, as to why the fishery failed to meet that Guidepost.

WWF also noted some inconsistencies in the assessment approach. In some instances a score of 75 was subsequently explained using the 60 Scoring Guidepost (e.g., 2.2.3.1) while in other cases a score of 75 was explained against the 80 Scoring Guidepost (e.g., 2.2.4.1). This made it difficult to identify against which indicator/s the fishery had failed.

### *4. Delivery of Conditions*

Similar to the views expressed by the certifier, WWF is concerned that some of the conditions specified in the draft Assessment Report are likely to be well beyond the capacity of the client to commit to delivering. In particular, management of the fishery is linked to international decision-making forums and WWF is concerned at the discontinuity between the client's sphere of influence and that required to meet the conditions proposed in the draft Assessment Report.

In response to this issue WWF notes the statement in the Assessment Report that 'The certification body will be mindful of the difficulties that may accrue as a result of different interests in the fishery when measuring performance against the required conditions.' However it is unclear to us what this might mean in practice. In our view this issue requires further elaboration and clarity to ensure that expectations in measuring performance against conditions are clear and transparent from the outset.



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### **3. Specific Comments**

In addition to the general comments above there are a number of specific comments that WWF would like make in response to the draft Assessment Report. These are discussed against the relevant condition(s) below.

#### *Condition 1.1:*

WWF considers that the current basis used to establish the TAC for Mackerel Icefish *Champscephalus gunnari* is highly precautionary. However we agree that the level of certainty associated with this approach could be improved through its assessment under a single stock scenario.

#### *Conditions 1.3, 1.4 and 1.6:*

We are supportive of the need to specify a target reference point for the fishery as well as a limit reference point (Conditions 1.3 and 1.4) and that the status of the stock should be reviewed against the revised reference points (Condition 1.6).

#### *Condition 1.9:*

While WWF notes that closure of a fishery on the Shell Bank is a very precautionary approach to stock depletion, and offers one of the most effective strategies to provide for rebuilding, we believe that decision rules for the recommencement of fishing should be developed. These should take account of the single stock scenario in the absence of further evidence of stock delineation. *Conditions 2.2 and 2.5:*

There appears to be some internal inconsistency in the draft Assessment Report about how the HIMI Marine Reserve should be factored into the fishery assessment. In Section 1.2 the statement is made that ‘...the setting is quite important as the fishing is occurring... in areas adjacent to a World Heritage area and a large Marine Reserve. Therefore, knowing the type and extent of impact to the habitat and marine communities has a somewhat increased significance over bottom trawls that may be occurring in areas of less significance.’ In contrast, in the assessment under Indicator 3.1.2.6 the following statement appears ‘There is a need, however, to make better assessment of the effects of bottom trawling on non-target benthic organisms. This need while present, is somewhat lessened in importance by the fact that the fishery operates in an area where the world’s largest marine protected area is in place to protect the overall ecology of the area.’

WWF agrees that the fishery’s adjacency to a World Heritage site and marine reserve coupled with the fact that it utilises the bottom-trawl method places particular importance on the standards of mitigation. However we consider that there is a need to strike a reasonable balance between prohibition and mitigation. With regard to the former, we are concerned that the assessments under Principle 2 of the draft Assessment Report fail to give due regard to the fact that the HIMI Marine Reserve provides an already high level of protection against the direct impacts of bottom trawling. Further, we would note that no fishing occurs within the Marine Reserve but adjacent to the reserve



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are IUCN Category IV Conservation Assessment Zones in which scientific surveys are conducted under a research program designed by the Sub-Antarctic Fisheries Assessment Group.

Taken together, Conditions 2.2 and 2.5 appear problematic. On the one hand, under Condition 2.2 the fishery is to take responsibility for assessing the effectiveness of marine reserves in mitigating fishery impacts and specifically on benthic systems and marine predators. On the other hand the scoring assessment leading to the imposition of Condition 2.5 appears to give little weight to the fact that the impacts of trawling have already been mitigated to the highest level possible (i.e. prohibition) through the establishment of no-take areas within the HIMI Marine Reserve. This situation appears to arise from dividing the MSC Criteria into sub-criteria and then using a number of indicators to develop scores against the latter. This results in fragmentation of information from the fishery.

WWF is supportive of further work being undertaken to identify the impacts of demersal trawling and seek effective ways to mitigate these impacts (the spirit of Condition 2.5). However we are concerned about the reasonableness of requiring the client to assess the effectiveness of marine reserves as this should be the Government's responsibility under the HIMI Marine Reserve Management Plan.

*Condition 2.6:*

We agree that the outcomes of the AAD research should be utilised in a re-evaluation of the ecological risks of the fishery. Consistent with the 80 Scoring Guidepost, we would also suggest that a process is needed to ensure that mitigation measures implemented in response to these are assessed for their effectiveness.

*Condition 2.8:*

In the 80 Scoring Guideposts against Indicator 2.2.4.1, the assessments against the first two of the three points are both somewhat predictive in terms of an expectation that future action would be taken rather than prescriptive of the circumstances under which it would be taken. For example the assessment under the second dot point notes that the management plan has a range of mechanisms available to it '...should any adverse impacts on high priority species be detected'. To provide a higher level of certainty in management responses, WWF suggests that Condition 2.8 is amended to include a requirement for clear decision rules to be developed that would trigger the implementation of mitigation strategies.

A second issue in Indicator 2.2.4.1 is that Condition 2.8 refers back to the outcomes of Condition 2.1, which relates to an ecological risk assessment that is broader than threatened, protected or 'icon' species (noting that species considered to fall under the latter term are not defined). One outcome of this cross-reference is that all species assessed as a medium or high risk under the ecological risk assessment then arguably fall within the 'protected species' grouping. While we agree that objectives and limits should be determined for species judged as medium or high risk under an ecological risk assessment, WWF is concerned that such an outcome may have the effect of



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obfuscating the status and special requirements of threatened, protected or 'icon' species. Indeed, in a number of fisheries already assessed under CSIRO's ecological risk assessment (ERA) process the target species themselves are categorised as 'medium risk'. Our view is that such species require a different suite of management measures and objectives to those with a threatened, protected or 'iconic' status. WWF recommends that Condition 2.8 should be further amended to refer to threatened, protected or 'icon' species rather than cross-referenced to Condition 2.1.

The ERA work being undertaken by the CSIRO is referred to in a number of indicators (e.g., 2.1.3.1; 2.1.3.3; 2.2.3.1). WWF welcomes and is supportive of the ERA process however in the context of the Assessment we are concerned that there may be expectations of this process beyond what it has been designed to deliver. Our understanding is that the ERA being developed by CSIRO is primarily a mechanism to provide a risk assessment of both direct and indirect impacts of a fishery on the marine ecosystem. It will not in itself provide management responses or a basis for assessing the conservation status of any species or habitat. For example, one concern WWF has with the ERA is that the level of risk to a species is based on a current 'snapshot' of the species; that is, it does not take into account the cumulative impacts of fishing that have already occurred. We would therefore caution against a reliance on the ERA process without knowledge of the assumptions inherent in the process, and its limitations.

*Condition 3.4:*

We are puzzled over the broad scope of Condition 3.4 as much of the detail required under it seems to largely mirror the MSC assessment process itself. We suggest that Condition 3.4 be modified to be specific to performance evaluation processes and reporting frameworks.

#### **4. Concluding Comments**

WWF is pleased to support the certification of the HIMI Mackerel Icefish fishery against the MSC Principles and Criteria. In expressing our support for certification we make the following recommendations with regard to finalising the Conditions for Continued Certification:

- a) Condition 1.9: decision rules for the recommencement of fishing should be developed and these should take account of the single stock scenario in the absence of further evidence of stock delineation
- b) Conditions 2.2 and 2.5: internal inconsistencies in how the HIMI Marine Reserve should be factored into the assessment should be addressed and result in a more reasonable balance between prohibition and mitigation
- c) Condition 2.5: amend to remove the requirement that the client assess the effectiveness of marine reserves
- d) Condition 2.6: amend to include a requirement for the development of a process to assess the effectiveness of mitigation measures implemented in response to ecological risks



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- e) Condition 2.8: amend to include a requirement for clear decision rules to be developed that would trigger the implementation of mitigation strategies
- f) Condition 2.8: amend to refer to threatened, protected or ‘icon’ species rather than cross- referenced to Condition 2.1
- g) Condition 3.4: modify to be specific to performance evaluation processes and reporting frameworks
- h) Expectations in measuring performance against the final Conditions for Continuing Certification should be clear and transparent from the outset.

We would also ask that our general comments on the draft Assessment Report be considered in both the development of an Action Plan for the fishery as well as in any future assessment of other fisheries seeking MSC certification that may be undertaken by the certifier. In particular, WWF is very concerned about consistency of applications of the MSC standard across certifications and that fisheries should not be penalised for having high levels of performance.

WWF looks forward to the finalisation of the Assessment Report and the certification of the HIMI Mackerel Icefish Fishery. If you would like to discuss our comments further, please contact Nathan Walker on (+64) 4 471 4293 or via email at [nwalker@wwf.org.nz](mailto:nwalker@wwf.org.nz).

## APPENDIX 4 – ACTION PLAN FOR MEETING CONDITIONS



### AUSTRAL FISHERIES PTY. LTD.

A.C.N. 009 286 346 A.B.N. 70 009 286 346  
14 Neil Street, Osborne Park, Perth, Western Australia, 6017. PO Box 280, Mount Hawthorn 6915  
Telephone: (08) 9202 2444 Fax: (08) 9443 7750  
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Dr Chet Chaffee  
SCS  
2004 Sunnyview Lane  
Mountain View, CA 94040  
USA

By facsimile +1 650 969 4731

3 April 2006

Dear Chet

On behalf of the Heard Island and McDonald Islands industry, I have great pleasure in attaching the finalized Action Plan for the HIMI icefish fishery certification requirements of SCS.

This completes all requirements for the Marine Stewardship Council certification as I understand it, and will be a significant step towards greater understanding and involvement of all in the fishery management regime for our icefish fishery.

I look forward to the annual reviews of our progress on the various Actions, and will continue to work closely with SCS to ensure we maintain our leading status as producers of icefish from one of the World's best managed fisheries resources.

Thanks again to you and your team for all of your efforts.

Kind regards



Martin Exel  
General Manager, Environment and Policy

copies:

Les Scott, Petuna Sealord Pty Ltd  
Rocco Musumeci, Everfresh Seafoods Pty Ltd

## ACTION PLAN

### Indicator: 1.1.1.3

CONDITION	Action	Completion Date	Progress
<p><b>CONDITION 1.1</b></p> <p>The client should provide evidence to the certification body contracted for surveillance reports that the current stock designations used for the Icefish assessments are the best choice for conservation and more precautionary than alternative stock designations. One approach might be a re-assessment under the alternative assumption that there is a single stock for the Indian Ocean region. This could be used to demonstrate that the management strategies that are currently used under the assumption of separate stocks are robust and ultimately more</p>	<p>Austral, on behalf of the HIMI industry, to provide copies of papers, and organise meeting/communication between the certification body for surveillance reports and AAD scientists, to demonstrate that current stock designations for icefish are both more precautionary than alternative designations, and are the best choice for conservation and management of the stocks.</p>	<p>December 2007</p>	<p>Papers publicly available on this topic include:</p> <ul style="list-style-type: none"> <li>- "An assessment of the mackerel icefish (<i>Champscephalus gunnari</i>) off Heard Island" 1998 by W.K. de La Mare, R Williams and A.J. Constable;</li> <li>- "Mitochondrial DNA variation of <i>Champscephalus gunnari</i> Lonnberg (Pisces:Channichthyidae) stocks on the Kerguelen Plateau, southern Indian Ocean" in Antarctic Science 6(3):347-352 (1994) R. Williams, A.J.Smolenski and R.W.G.White; and</li> </ul>

<p>precautionary than alternative assumptions regarding stock structure. Other approaches may also be used, such as evidence from studies designed to further elucidate stock structure/distribution.</p>			<p>“The fishery for <i>Champscephalus gunnari</i> and its biology at Heard Island (Division 58.5.2)” in the 2001 Workshop on Assessment of Mackerel Icefish, from the WGFSA report in 1991 by R. Williams, E. van Wijk, A. Constable and T. Lamb</p>
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**INDICATOR: 1.1.2.8**

Condition	Action	Completion Date	Progress
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CONDITION	Action	Completion Date	Progress
<p><b>CONDITION 1.2</b></p> <p>The client should provide evidence that the fishery assessments meet the first bullet point under the 80 scoring guidepost – “Impacts of inter-annual variability on stock abundance have been studied and are taken into account in the assessment”. For example, analyses could be provided that show how the fishery assessments factor in uncertainty in growth, mortality, size at first maturity and fecundity, and the influence of the environment on these variables.</p>	<p>A variety of activities by the managing authorities, and with participation by the client, are underway that specifically address this condition.</p> <p>Specifically, the client will provide to the certification body the finalisation and presentation of the ecosystem model currently under development as part of the HIMI Marine ecosystem study undertaken by AAD in 2004.</p> <p>This model will be used to explore the dynamics of mackerel icefish and its role in the foodwebs of the region. It will also be used to evaluate management strategies for icefish with the aim being to determine an alternative, ecologically sustainable, management strategy.</p> <p>Such a strategy will identify reference points, assessment methods (including indicators) and harvest rules based on outcomes.</p>	<p>Estimated times for completion:</p> <p>A number of relevant reports will be provided along the way to a final completion date of December 2010.</p> <p>The progress reports are:</p> <ol style="list-style-type: none"> <li>1. Progress reports in annual reports of the AFMA Sub-Antarctic Resources Assessment Group (SARAG)</li> <li>2. CCAMLR paper (estimated to be available November 2008)</li> <li>3. SARAG final report estimated to be available by September 2009</li> </ol> <p>The client will provide copies of each study within 30 days of its completion.</p> <p>If further clarification is requested by the certification body, the client will facilitate a meeting between the certification body, the client,</p>	

		<p>and the management authorities to discuss the outcomes and implications of these studies.</p> <p>Also, if the planned studies are not going to be completed on time, the client will advise the certification body as to any additional time required. The client notes that it does not have control over the estimated timeframes for completion of the identified work, and can only be responsible for submitting the work upon its completion.</p>	
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**INDICATOR: 1.1.3.1**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 1.3</b></p> <p>The client should provide evidence that a comprehensive review has been or is being undertaken regarding appropriate Limit Reference Points for the Icefish fishery. Evidence should be provided that the LRPs used meet the AFMA requirements (are appropriate for maintaining both ecologically viable stocks of the target species and an ecologically sustainable fishery), are appropriate for the biology of the icefish stock and takes into account available knowledge of fishery impacts on non-target species and the ecosystem, and ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified</p>	<p>The client will, as under Condition 1.2, deliver to the certification body the results of work being conducted by the managing authorities to develop a new model that incorporates ecosystem functions more fully into the assessment of icefish. In addition, the client will provide the results of the Management Strategy Evaluation work that will result from using the model to demonstrate the applicability of the chosen Limit Reference Points being used for ecologically sustainable management of the icefish fishery in the HIMI region.</p>	<p>Same as for Condition 1.2</p>	

maximum level. The results of this review should be published.			
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**INDICATOR: 1.1.3.2**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 1.4</b></p> <p>5. A review should be provided about what target reference points, which are based on the biology of the icefish stock and take into account available knowledge of fishery impacts on non-target species and the ecosystem, should be specified for the icefish fishery. The analysis should examine how target reference points considered are more precautionary than the corresponding limit reference points and how they ensure with high probability that the spawning biomass of the icefish stock does not fall below a specified minimum level and that fishing mortality does not exceed a specified maximum level.</p> <p>6. The review provided should discuss how the target</p>	<p>1. The review required will be provided through the MSE work being undertaken, as outlined in Conditions 1.2 and 1.3 above.</p> <p>In addition, the client will provide evidence to the certification body that the Target Reference Points are and will continue to be more precautionary than the Limit Reference Points.</p> <p>2. The AFMA reference points currently used for the icefish fishery, are those reference points specified and used by CCAMLR, as shown in all CCAMLR documentation including WGFSR reports, Scientific Committee</p>	<p>Same as for Condition 1.2.</p> <p>The timeline for completion of this work is also December 2010.</p>	

<p>reference points used or proposed for use by AFMA for the icefish fishery compare with those specified or applied by CCAMLR.</p>	<p>recommendations, and Commission Conservation Measures adopted.</p> <p>The client will also provide details on how any changes to these reference points will be incorporated by CCAMLR and AFMA in future.</p>		
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**INDICATOR: 1.1.4.2**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 1.5</b></p> <p>The approach that is used in determining the recommended TAC should be investigated relative to uncertainty in the estimate of natural mortality, the imprecision in the estimates of the parameters of the mixture of components of the length composition data and the uncertainty in the parameters of the growth curve, and alternative stock structures. There should be an explicit report demonstrating the precautionary nature of the approach and how additional information on these parameters is being incorporated.</p>	<p>The client will provide the certification body with the same information as in Condition 1.2 and 1.3. In addition, the client will ensure that the information includes a review of the methods for setting the TAC. The finalisation of the report on Management Strategy Evaluation will explicitly deal with the precautionary nature of the approach and how additional information on the parameters is being incorporated.</p>	<p>Same as for Condition 1.2.</p> <p>The Timeline for completion of this work is also December 2010.</p>	

**INDICATOR: 1.1.5.1**

Condition	Action	Completion Date	Progress
<p><b><u>Condition 1.6</u></b></p> <p>Meet Condition 1.3. In meeting Condition 1.3, ensure that there is an assessment that shows the probability that the current spawning biomass lies above the chosen limit reference point for the icefish stocks at HIMI. This report should be reviewed by AFMA, AAD, and CCAMLR.</p>	<p>The client will provide the same information as submitted under Conditions 1.2, 1.3, 1.4 and 1.5. Again, it is anticipated that the MSE report in 2008/09 will specifically address the relationship between survey indicators of Spawning Stock Biomass, and the actual (modelled) level of SSB, and how well the management strategies perform against the survey results and indicators.</p>	<p>Same as for Conditions 1.2 and 1.3.</p> <p>The Timeline for completion of this work is also December 2010.</p>	

**INDICATOR: 1.1.5.2**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 1.7</b></p> <p>Meet Condition 1.3. In addition, show with what probability subsequent survey estimates of the biomass of the residual spawning stock exceeded the levels predicted over recent years.</p>	<ol style="list-style-type: none"> <li>1. Meet condition 1.3, as outlined above.</li> <li>2. Include the feedback mechanisms described in review of the management measures being evaluated under the MSE outlined above.</li> <li>3. Determine if the assessment needs to encompass a time series of surveys as part of the MSE work.</li> </ol>	<p>Same as for Condition 1.3.</p> <p>The timeline for completion of this work is December 2010.</p> <p>Papers that are relevant include, but may not be limited to:</p> <ol style="list-style-type: none"> <li>1. SARAG paper September 2009</li> <li>2. WGFSA paper October 2007 on age specific mortality rates</li> <li>3. MSE survey requirements by SARAG September 2008.</li> </ol>	

**INDICATOR: 1.1.6.1**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<p><b><u>Condition 1.8</u></b></p> <p>Carry out appropriate simulation testing to consider the harvest strategy in relation to the characteristics of the icefish stock to evaluate the robustness of the reference points and the fishery management model.</p>	<p>The client will provide the same information as required under Conditions 1.2 and 1.3 as it will answer the question about the appropriate management strategy, under the MSE approach being taken for condition 1.2 above.</p>	<p>Same as for Condition 1.2.</p> <p>The timeline for completion of this work is December 2010.</p>	

**INDICATOR: 1.2.1**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 1.9</b></p> <p>The client only needs to develop and abide by a condition for this indicator if it plans to begin fishing in areas previously described as depleted (i.e. Pike, Discovery, and Shell Banks ). Before commercial harvesting is permitted to recommence on these populations/stocks, the fishery management system would have to:</p> <ol style="list-style-type: none"> <li>7. Provide an explicit specification of the conditions that require that the recovery strategy is invoked.</li> <li>8. Specify precisely how the harvest is to be controlled as the stock recovers, the time period expected for recovery, and the conditions that signal that the stock has recovered.</li> <li>9. Provide a simulation study that demonstrates that there is a high probability that the</li> </ol>	<p>The client will submit to the certification body information that shows how assessments will be done before areas now closed to fishing are opened for future fishing. The specific information to be submitted includes:</p> <ol style="list-style-type: none"> <li>1. Completion of food web model to determine likelihood of food depletion in recovery phase given natural variation in stock abundances</li> <li>2. Where stock depletion is evident, maintain commercial harvest levels at zero, and maintain annual surveys of population(s) for assessment purposes</li> <li>3. MSE work to be completed to derive</li> </ol>	<ul style="list-style-type: none"> <li>- Annual reports to SARAG (September each year)</li> <li>- CCAMLR paper November 2008</li> <li>- SARAG final report by September 2009</li> </ul>	

stock will recover if the recovery strategy is invoked.	appropriate indicators for recovery and options for harvesting regimes, where applicable.		
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**INDICATOR: 1.3.2**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<p><b>CONDITION 1.10</b></p> <p>Estimate the expected changes in size and age at maturity, age composition, and fecundity and establish a routine comparison of observed data with these expected values to ensure that unexpected changes might be detected.</p>	<p>Identify suitable indicators and estimate changes in parameters identified, as part of the MSE program identified in Condition 1.2</p>	<p>Same timeline as for Condition 1.2.</p>	

**INDICATOR: 2.1.3.1**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 2.1</b></p> <p>The fishery must complete a comprehensive scientifically robust assessment of the ecological risks of the fishery (such as the one started by CSIRO), including potential impacts on benthic systems, key land-based marine predators, and sharks, skates and rays, that is already underway. The report should be sure to include the range of stakeholder views/inputs and meet peer review standards for scientific assessments.</p>	<ol style="list-style-type: none"> <li>1. Upon completion of Ecological Risk Assessment (ERA) project by CSIRO for AFMA, identifying potential impacts of the fishery on the ecosystem and ecologically related species, the client will submit this to the certification body within 30 days of its completion, along with any peer reviews or commentaries on this report.</li> <li>2. Seek funding for benthic habitat impact study from FRDC and other research providers</li> <li>3. Conclude report on benthic habitat impacts of the icefish fishery</li> </ol>	<p>Completion dates are:</p> <ol style="list-style-type: none"> <li>1. ERA report due for completion and presentation September 2007 SARAG meeting</li> <li>2. Initial funding approval July 2006</li> <li>3. Milestone reports on benthic study annually at SARAG; final report Sept 2010.</li> </ol> <p>Again, if the planned studies are not going to be completed on time, the client will advise the certification body as to any additional time required. The client notes it does not have control over the estimated timelines for completion of the identified work, and can only be responsible for providing the work upon its completion.</p>	
<p><b>CONDITION 2.2</b></p>	<ol style="list-style-type: none"> <li>1. Participate fully with AFMA and other government agencies to</li> </ol>	<p>Timelines for submission of information are:</p>	

<p>Should any risks identified under the risk assessment be rated as moderate or high, the fishery would have to provide data and/or information showing what measures are being taken to mitigate the risks and analyses of why the measures are sufficient.</p>	<p>achieve appropriate management responses to identified risks, and mitigation measures required (or to be developed). 2. Submit to the certification body evidence showing what measures are being taken by the managing authorities.</p>	<ul style="list-style-type: none"> <li>- Strategic review of HIMI fishery due for completion in 2010</li> <li>- Annual reports of SARAG and SouthMAC</li> <li>- ERA report final Sept 2007</li> </ul>	
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**INDICATOR: 2.1.3.3**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<p><b>CONDITION 2.3</b></p> <p>Conditions 2.1 and 2.2 apply.</p>	<p>As above</p>	<p>As above</p>	

**INDICATOR: 2.1.5.1**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<p><b><u>Condition 2.4</u></b></p> <p>Conditions 2.1 and 2.2 apply.</p>	As above	As above	

**INDICATOR: 2.2.1.2**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<p><b>CONDITION 2.5</b></p> <p>The client should provide evidence that AAD research on the trophic role of icefish in predator diets either has been or is being conducted. The AAD research should be properly peer reviewed and published. Once available, this information should be used in Condition 2.1.</p>	<p>Trophic interaction research started in 2004 to be completed, with full review by peer-reviewed journals, SARAG and CCAMLR. Use information for Condition 2.1 above.</p>	<p>Timelines for submission of information are:</p> <ul style="list-style-type: none"> <li>- Annual reports to SARAG on progress</li> <li>- CCAMLR paper October 2008</li> <li>- SARAG final report Sept 2009</li> </ul>	

**INDICATOR: 2.2.3.1**

<b>Condition</b>	<b>Action</b>	<b>Completion Date</b>	<b>Progress</b>
<b>CONDITION 2.6</b>  Condition 2.1 applies.	As above for 2.1	As above for 2.1	

**INDICATOR: 3.2.1.4**

Condition	Action	Completion Date	Progress
<p><b>CONDITION 3.1</b></p> <p>The management system must be improved to contain criteria for assessing when a stock within the fishery is overfished, the strategies to be adopted when the stock is classified as overfished, and the conditions under which an overfished (stock or) fishery is considered to have recovered. This is considered in more detail under Principle 1. To the extent possible, this condition should be informed by or be coincident with conditions in Principle 1.</p>	<p>Implement actions as identified under Principle 1, Condition 1.2 with the MSE and other projects.</p>	<p>As per Condition 1.2 – Sept 2009 SARAG report</p>	

**INDICATOR: 3.2.1.7**

Condition	Action	Completion Date	Progress
<p><b>Condition 3.2</b></p> <p>Meet Conditions 2.1 and 2.2. In addition, provide evidence to the certifier that there is some process in place to provide an ongoing, although periodic, process to identify, document, assess, reduce and ameliorate risks to habitat resulting from fishing practices. This process should meet requirements set out in the Management Plan.</p>	<ul style="list-style-type: none"> <li>- Finalise benthic habitat impacts study</li> <li>- Maintain consistent, appropriate, observer coverage on all operations</li> <li>- Report annually to SARAG on bycatch species, quantities and profiles for evaluation and risk reduction strategies to be developed</li> <li>- Maintain shot-by-shot recording of fishing operations including benthic bycatch</li> <li>- Evaluate alternative fishing methods to reduce risks of habitat damage</li> </ul> <p>The client notes that the process of the Ecological Risk Assessment is an ongoing one. The AFMA requirements for ERA reporting have increased dramatically with a series of recent Ministerial Directions to AFMA, that outline major changes in the way Australian fisheries are to be managed. Aside from this,</p>	<p>Timelines for completion are:</p> <ul style="list-style-type: none"> <li>- FRDC report final due Sept 2010.</li> <li>- Annual reports to SARAG</li> <li>- Monitoring and observers on a constant basis</li> <li>- EPBC Act review due December 2009</li> </ul>	

	there are also direct requirements under the Environment Protection and Biodiversity Convention Act, which require formal review every 5 years, for any Commonwealth fishery, as well as any fishery in Australia that wishes to export product.		
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