



Australian Government

Australian Fisheries Management Authority

ANNUAL STATUS REPORT

Heard Island and McDonald Islands Fishery



March 2007

This report has been prepared by AFMA for consideration by the Department of the Environment and Water Resources in relation to the exemption of the HIMI Fishery from export controls under the *Environment Protection and Biodiversity Conservation Act 1999*.

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 Protecting our fishing future

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Introduction

The Heard Island and McDonald Islands (HIMI) Fishery lies in waters adjacent to the Islands of the same name. The Islands are Australia's most remote sovereign territory and are located on the Kerguelen Plateau in the south Indian Ocean, about 4,000 kilometres south-west of Perth. The Fishery extends from 12 nautical miles offshore to the edge of the 200 nautical mile Australian Exclusive Economic Zone (EEZ) around the Islands.

These 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. They are included on the register of the National Estate and the World Heritage List.

Strict environmental management measures have been in place since access to the Fishery was first granted in 1995. These measures are incorporated in the *Heard Island and McDonald Islands Fishery Management Plan 2002* (the Plan) and supporting instruments, developed under the *Fisheries Management Act 1991*.

The HIMI Fishery falls within the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) Convention area (see figure 1), and is managed by AFMA (in close cooperation with the Australian Antarctic Division) in accordance with CCAMLR Conservation Measures. Given the environmental significance of the area, AFMA and CCAMLR are committed to minimising the impacts of fishing on the marine environment. AFMA has adopted a precautionary approach to management, exceeding standards required by CCAMLR. This approach considers the effects of harvesting on target, dependent and associated species, and ecological relationships, to ensure sustainability of target species stocks and the broader marine environment. The target species are Patagonian toothfish (*Dissostichus eleginoides*) and mackerel icefish (*Champsocephalus gunnari*).

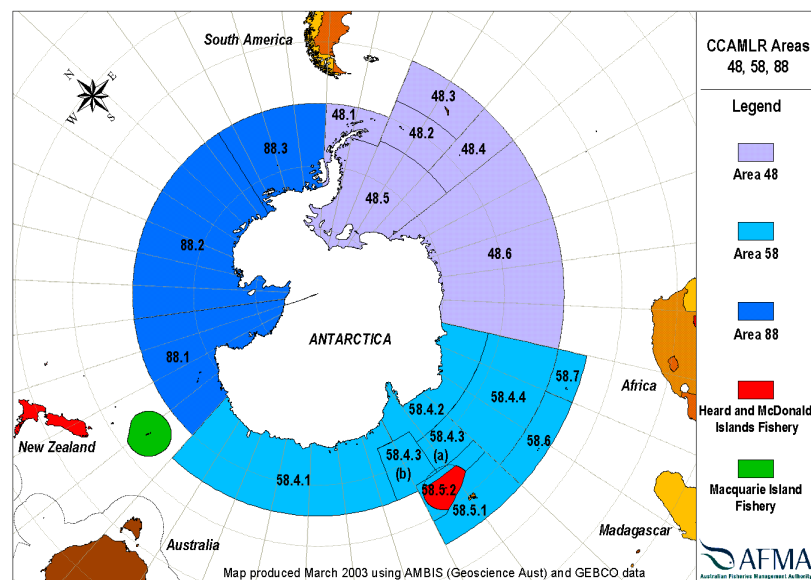


Figure 1: Location of the HIMI Fishery within the CCAMLR Convention area

The HIMI Fishery was the first Commonwealth fishery to be assessed and granted an export exemption under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This exemption took effect on 14 May 2002 and will expire on 13 May 2007. During this time a number of significant changes have occurred in the Fishery, including:

HIMI Marine Reserve declared

The HIMI Marine Reserve declared in October 2002 under the EPBC Act comprises the islands, the territorial sea around the islands (to 12 nautical miles) plus additional marine areas extending in parts to the 200 nautical mile EEZ boundary (see figure 5).

Within the Australian EEZ the HIMI Marine Reserve is the largest no-take marine protected area in the world, comprising over 16% of the EEZ. No fishing is permitted within the Marine Reserve.

In conjunction with the declaration of the Marine Reserve a number of Conservation Zones were also established. The conservation and fisheries values of the Conservation Zones are currently being assessed and a decision by the Minister for the Environment and Water Resources is expected shortly regarding the future status of these areas.

Introduction of longlining

While longlining is almost universally employed in CCAMLR's toothfish fisheries, AFMA had not previously permitted longlining within the HIMI Fishery because of the potential of seabird by-catch. Since 2002, and in line with action 5.2 of the longline fishing Threat Abatement Plan (TAP) a range of suitable mitigation measures were developed and trialled in the HIMI Fishery. These trials proved successful and longlining was formally introduced into the Fishery on 25 November 2005. No seabirds have been killed as a result of interactions with longline fishing gear since the trial began.

MSC certification for mackerel icefish

On 31 March 2006, following an extensive assessment process, the Marine Stewardship Council (MSC) issued a certificate for the Australian mackerel icefish Fishery. Due to the high management and environmental standards which must be achieved very few fisheries receive this endorsement globally. More information on this assessment can be found on the MSC website at:

http://www.msc.org/html/content_465.htm.



Combating Illegal, Unreported and Unregulated fishing

Australia remains committed to prevent, deter and eliminate to illegal, unreported and unregulated (IUU) fishing. Dedicated Southern Ocean patrols, international cooperation and strong port state controls are proving to be significant deterrents to IUU fishing in Australia's EEZ at HIMI. There have been no sightings of illegal foreign fishing vessels in the HIMI EEZ since the apprehension of the Maya V in January 2004.

Since 2004, Australia has adopted or agreed to the following initiatives to combat IUU fishing in the HIMI region:

- Australia was a key supporter for the adoption of a centralised vessel monitoring system by CCAMLR in November 2004.
- in May 2005, the Australian Government committed \$217.2 million dollars to a full-time armed patrol program in the Southern Ocean to stamp out Patagonian toothfish poachers at HIMI, in addition to the previous Government commitment of \$99 million in 2004.
- in July 2005, AFMA fisheries officers and CCAMLR staff provided training to Mauritian officials on the CCAMLR catch documentation scheme for toothfish. The training provided Mauritian officials with the practical experience needed to validate the catch documentation received at the point of unloading. This initiative has resulted in a significant reduction in the amount of IUU catch being processed through Mauritius. Widespread adoption of the catch documentation scheme is a key step in clamping down on trade in illegally caught toothfish.
- the *Fisheries Management Act 1991* was amended to increase the fines for offences committed by the owners and operators of foreign fishing vessels. The amendments also permit AFMA to include the cost of pursuit and apprehension by Australian authorities in any security bonds applied to detained vessels.

- in January 2007 Australia signed a new Treaty with France providing for cooperative enforcement, through joint patrols, of our respective Southern Ocean waters. This has the potential to double Australia's on-the-water capacity and is providing an added deterrent to would-be IUU fishers.

Joint Australia/France research into Patagonian toothfish

Australia and France have commenced discussions and a collaborative work program aimed at determining the extent to which the HIMI toothfish stock is shared or straddles into the adjacent areas on the Kerguelen Plateau. To date the collaborative work has involved:

- the tagging and release of toothfish within the HIMI Fishery. This tagging program has resulted in a small number of tagged fish being recaptured in Kerguelen and Crozet;
- the collection and analysis of toothfish samples from HIMI, Kerguelen, Crozet and Williams Ridge for genetic testing;
- the signing of a joint Australian/French Compliance and Research Treaty agreement. Some preliminary discussions have taken place between Australian and French scientists with further talks scheduled.

Discussions between Australian Antarctic Division (AAD) scientists and French scientists continued at CCAMLR meeting in November 2006. The French have completed a trawl survey and have started a tagging program to complement similar activity in the Australian EEZ around HIMI. Haul by haul data from the French fleet will be provided to AAD scientists. A joint meeting to discuss the data and results is scheduled in 2007.

Potting trials

Pot fishing operations started in the HIMI Fishery on a trial basis, under a Scientific permit, in December 2005. Two trips were undertaken and the trial showed that Patagonian toothfish could be targeted. The method was shown to catch toothfish of a large size, but in low numbers compared to other methods. There were also technical difficulties with the gear and gear design with around 290 traps being lost in total. It is anticipated that further trials will be conducted in the 2007/08 season.

Bycatch was very low with macrourids (around 100 kilograms in total) being the main vertebrate bycatch. Starfish (around 100 kilograms in total), often attached to the outside of the pots, were the main invertebrate bycatch. Two sleeper sharks were taken and there were no seabird or marine mammal interactions with the fishing gear.

Improved seabird mitigation measures – mid-water trawl operations

Around March 2005, 12 seabirds (7 black-browed albatross and 5 white chinned petrels) were killed in midwater trawl operations in the HIMI icefish fishery. This was unprecedented as midwater trawling had been widely used previously at that time of year, without incident. All the birds were taken in daylight hours. The Company implemented revised management arrangements for the fishing method to mitigate future catches of seabirds.

The following condition was placed on statutory fishing rights for midwater trawl operations targeting mackerel icefish as a result:

'The SFR holder shall ensure that no midwater trawling occurs during the period 1 February to 31 March each year. At all other times midwater trawling can only occur at night (ie: during the hours of darkness between the times of nautical twilight).'

Additional measures adopted by the Company include the removal of the 'stickers' from the net prior to the trawl being shot away, ensuring the trawl deck is swept clean of any fish, aiming to keep the meshes closed when the net is on the surface by maintaining a practical speed, monitor the number of birds around the boat and not shoot away where there is a significant risk of seabirds becoming entangled.

No seabird interactions have been reported in trawl operations since that time.

New stock assessment method for Patagonian toothfish

The CCAMLR Working Group on Fish Stock Assessment (WG-FSA) has adopted the new assessment based on the CASAL (C++ Algorithmic Stock Assessment Laboratory) model. The CASAL assessment enables the use of a wider range of data that is now available for the toothfish fishery in the HIMI Fishery. The model uses abundance-at-length estimated from the surveys, catch-at-length from the fisheries and standardised catch per unit effort (CPUE) time series to estimate current and initial population size and year-class strengths since 1981.

The model promises greater flexibility in that selectivity and mortality can be estimated for each fishing method and different age components in the fishery. Therefore it has the potential to be a more robust tool for future assessments of toothfish, although it is still sensitive to uncertainties in critical biological parameters such as rates of natural mortality. The results were used in projections to estimate the long term yield that satisfies the CCAMLR decision rules for toothfish.

Study on the benthic impacts of demersal fishing gear in the Southern Ocean

The Fisheries Research and Development Corporation (FRDC) has approved a four year project (commenced 1 July 2006) to investigate 'Demersal fishing interactions with marine benthos in the Australian EEZ of the Southern Ocean: an assessment of the vulnerability of benthic habitats to damage by demersal gears'. The development of underwater camera technology which can be attached to the fishing gear (trawl, longline and pot) is a key aim of the project along with assessment of benthic interactions of the differing gear types.

Ministerial Direction

In December 2005 the Minister for Fisheries, Forestry and Conservation issued a Direction to AFMA to take immediate action in all Commonwealth fisheries to cease overfishing and recover overfished stocks, avoid stocks becoming overfished in future and manage the broader environmental impacts of fishing. AFMA responded to the Ministerial Direction¹ with the document Future Operating Environment for Commonwealth Fisheries². The Ministerial Direction has a limited impact on the management of Antarctic fisheries, as there are currently measures in place which address most of the key issues, as outlined in table 1.

Table 1 – Actions in response to the Ministerial Direction

Action	Status	Comment
Implementation of harvest strategy policy	√	Harvest strategies adopted by CCAMLR are in place for the HIMI Fishery.
Managing fisheries using output controls	√	No action required – total allowable catches (TACs) and individual transferable quotas (ITQs) for target species are the management tools being used.
Use of boat SFRs	√	No action required – boat statutory fishing rights (SFRs) are not used
Minimise the incentives for discarding	√	Generally there is a no discarding. Some species, such as sleeper sharks can be returned to the sea. Tagging (toothfish) and releasing live and vigorous fish (skates and rays) is permitted and will be considered further by the AFMA Board over the next 12 months
Managing the broader environmental impacts	√	No action required – effective mitigation measures are being used, and modified as necessary
Enhance monitoring activity	√	No action required – ICMMS is mandatory and 2 observers are present on each voyage

¹ http://www.mffc.gov.au/releases/2005/afma_directions.pdf

² http://www.afma.gov.au/information/newsroom/securing_the_future.htm

Use of independent surveys	√	No action required – a random stratified trawl survey and tagging are used as the basis for stock assessments in the HIMI Fishery.
Spatial closures	√	No action required – representative marine protected areas have been declared in the EEZ around HIMI.

1 Description of the fishery

At a glance	
Principal species	Patagonian toothfish (<i>Dissostichus eleginoides</i>) Mackerel icefish (<i>Champsocephalus gunnari</i>)
Fishing techniques	Demersal otter board trawling, midwater trawling & demersal longlining
Number of vessels	up to 3
2006-2007 total allowable catches	2427 tonnes Patagonian toothfish 42 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
Estimated catch & value 2005-2006	2497 tonnes toothfish and 663 tonnes of mackerel icefish To maintain operator confidentiality AFMA is unable to release this information
Main markets	United States of America, Japan
Stock Status	Not overfished
Management method	As the islands lie to the south of the Antarctic convergence, they also fall under the jurisdiction of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). 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.
Consultative Forum	Sub-Antarctic Fisheries Management Advisory Committee (SouthMAC) and Sub-Antarctic Resource Assessment Group (SARAG)

1.1 Target and bycatch species

The Fishery's two target species are Patagonian toothfish and mackerel icefish. All other species are considered bycatch and may not be targeted.

Patagonian toothfish (Dissostichus eleginoides)

The Patagonian toothfish is also known as mero, Chilean sea bass and black hake and is found in sub-Antarctic waters on shelves around islands and submarine banks. They are primarily bottom-living, in depths of 300 to 2000 metres, although move off the bottom on occasion to feed.



Patagonian toothfish reach sexual maturity between 70 and 95 cms in length at around 10 years old. They grow up to 2.2 metres in length and 100 kgs in weight. As yet, the maximum age of this species is unknown, although initial estimates indicate that toothfish live up to 50 years. Trawl operators target, on average, four to nine year old Patagonian toothfish. The older fish are thought to inhabit deeper waters and canyons which are less accessible to trawl gear. At harvest by trawlers, the average toothfish is 80 cms long and around 3.5 kgs in weight.

Mackerel icefish (Champscephalus gunnari)

The fishing grounds for mackerel icefish are different to the fishing grounds for Patagonian toothfish. Mackerel icefish is a relatively fast growing and short lived species with highly variable recruitment and can rapidly disappear from fishing grounds as a natural phenomena (Williams R, van Wijk E, Constable A and Lamb T - 2001). They are a benthopelagic species and have been reported to depths of 200 to 350 metres in the HIMI region. The maximum size recorded from the HIMI region is 40 cm to 42 cm (total length).

Mackerel icefish spawn close to inshore. Data indicate that 50% of mackerel icefish have reached sexual maturity by 24 cm in length, and all icefish have reached sexual maturity between 25 centimetres and 26 centimetres long, or three years old. In recognition of this, the Plan has a minimum size catch limit of 24 cms. The Fishery targets, on average, the two to four year old fish. The maximum age recorded for mackerel icefish is six years.

Bycatch species

All species, other than the two target species, are referred to as bycatch. Observer data from the Fishery indicates 141 different catch categories entries during the 2002 – 2005 fishing period. Of these entries, 27 had catches of more than 100 kgs. The totals of the other bycatch entries ranged from 86 kg to 0.01 kg. The two major bycatch species are grey rockcod (*Lepidonotothen squamifrons*), unicorn icefish (*Channichthys rhinoceratus*) and skates and rays (*Bathyraja spp.*). Research has been carried out on these two species, resulting in the setting of species specific catch limits.

Annual precautionary catch limits are set for all other fish bycatch species. In order to minimise bycatch, SFR conditions specify that operators must move on from a fishing area if, in any one haul, the bycatch of

- unicorn icefish, grey rock cod or sleeper shark is equal to or greater than two tonnes or
- any other species is equal to or greater than one tonne.

The Plan requires that all bycatch be retained (with some exceptions) in order to limit possible interactions with marine mammals and seabirds. All retained bycatch is processed into fish meal and sold on return to port, with the exception of grey rockcod and unicorn icefish, which are generally retained whole. Skates, sharks, jellyfish, sponges, crabs and coral are returned to the ocean as these species either have a high chance of survival, do not attract seabirds and marine mammals when discarded or cannot be effectively processed through the meal plant.

1.2 Management arrangements

Output controls are the primary means of controlling the level of catch, and are set as annual TACs for target and some bycatch species. The TACs for the target species are divided among SFR holders in proportion to their holdings for each species.

Input controls are used to minimise bycatch and the impact of the HIMI Fishery on the broader marine environment. The key input controls include:

- limiting the number of vessels accessing the Fishery at any one time to three;
- placing two observers on board all trips to the Fishery to monitor compliance with management arrangements and collect environmental, ecological and fisheries data;
- prohibiting discharge of offal and other bycatch to avoid incidental interactions with seabirds and mammals;
- imposing 'move-on' provisions such that vessels are required to move away from certain areas should a defined level of bycatch be taken in one fishing shot; and
- gear restrictions for trawl (bobbin diameter and mesh size) and longline (integrated weight line and the use of blue snoods).

The management mechanisms within the Management Plan and supporting legislative instruments are summarised in the following table.

Table 2. The structure of the HIMI Fishery Management Plan

Management Plan	Supporting instruments
<ul style="list-style-type: none"> • Sub-Antarctic Fisheries Bycatch Action Plan requirements • Fisheries assessment plan requirements • Granting of SFRs • Quantity of fish that may be taken including carry over provisions • Minimum quota holding requirements • Granting rights for additional target species • Boat nomination • Environmental requirements <ul style="list-style-type: none"> - reporting of gear loss - no poultry or brassicas are to be discarded from the boat - nil offal overboard - restrictions on the use of plastic packaging bands - limited light at night • Reporting of death or serious injury of seabird and marine mammals • Obligations on holders of SFRs <ul style="list-style-type: none"> - to minimise bycatch - carriage of observers - requirement to comply with regulations and fisheries assessment plan. • Transferring of fishing rights • Determination of TAC • Schedule - target species • Schedule - additional species subject to declaration by AFMA • Contingency arrangements <ul style="list-style-type: none"> - breakdown of meal plant - disposal of fish meal - injury or death of seabird or marine mammal • Eligible boats criteria 	<p>Regulations</p> <ul style="list-style-type: none"> • CCAMLR inspection requirements • Standard for going from two to one observer • Prior departure/arrival reporting requirements • Logbook notices • Approval process <p>Directions</p> <ul style="list-style-type: none"> • Gear restrictions <ul style="list-style-type: none"> - mesh sizes - bobbins etc. restrictions - fishing methods (initially to be restricted to trawling) • Area Closures <ul style="list-style-type: none"> - Heard Island Plateau - Shell Bank - territorial waters - buffer Zone <p>Conditions of SFR's</p> <ul style="list-style-type: none"> • Bycatch restrictions • Bycatch move on provisions • CCAMLR catch reports • Icefish size restrictions • ICVMS reporting requirements • Observer safety standards

1.3 Fishing methods (gear types)

The only fishing methods permitted in the Fishery are trawling and longlining. Patagonian toothfish are targeted using demersal trawl and demersal longlining methods, and mackerel icefish are targeted through both midwater and demersal trawling methods. Any other fishing method that may be trialled must be carried out under a Scientific Permit issued in accordance with the Management Plan.

Demersal trawling

Figure 2 illustrates the configuration of demersal trawl fishing gear. Demersal trawlers tow a net along the ocean floor, in depths up to about 1,500 metres. The net is towed behind the vessel by long wires (the warps) and is deployed and retrieved from the stern of the vessel by winches. The net opening (the mouth) is spread horizontally by the outward force acting on the otter boards as they are towed through the water. The bottom of the net opening, the footrope, is weighted bringing the net opening close to the bottom and has ground gear, principally bobbins, attached to enable the gear to be towed across the substrate with minimal hookups. The top of the mouth, the headline, is lifted vertically by floats. Vessels are generally equipped with electronic units to allow the proximity of the nets to the seabed to be monitored.

Demersal trawling relies on herding fish inward toward the path of the oncoming net mouth, rather than the speed of the tow. As the fish swim away from the warps and the net wings, they are enclosed and fall back towards the tapered body of the net. As the gear is hauled up toward the vessel the fish are contained in the end section of the net, the codend, which is fastened with a rope to release the catch on the vessel deck.

In the Fishery, demersal trawl nets are limited to a minimum mesh size of 120 mm when targeting Patagonian toothfish and 90 mm when targeting mackerel icefish to enable juvenile fish to escape the net.

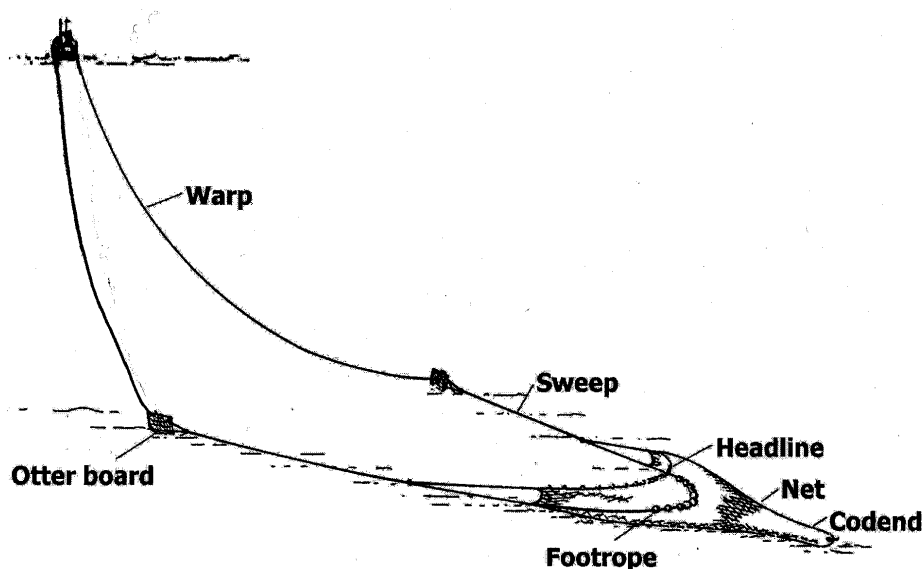


Figure 2: Demersal trawl (adapted from FAO, 1987)

Midwater trawling

Figure 3 illustrates the configuration of midwater trawl fishing gear. When midwater trawling, a net similar to (but typically larger than) a demersal trawl is towed in the mid water column. The net is spread horizontally and vertically like that of the demersal trawler, however, it does not have the same ground gear as it is not designed to touch the seafloor. Midwater trawl nets are also equipped with electronic units to allow monitoring of the net in the water column. Midwater trawling in the Fishery occurs at depths of around 350 metres.

Like demersal trawling, midwater trawling relies on the herding of fish inward toward the mouth of the net where they are scooped up and are ultimately trapped in the codend. In the Fishery, midwater trawling is primarily used to target mackerel icefish, and net mesh sizes are limited to a minimum of 90 mm.

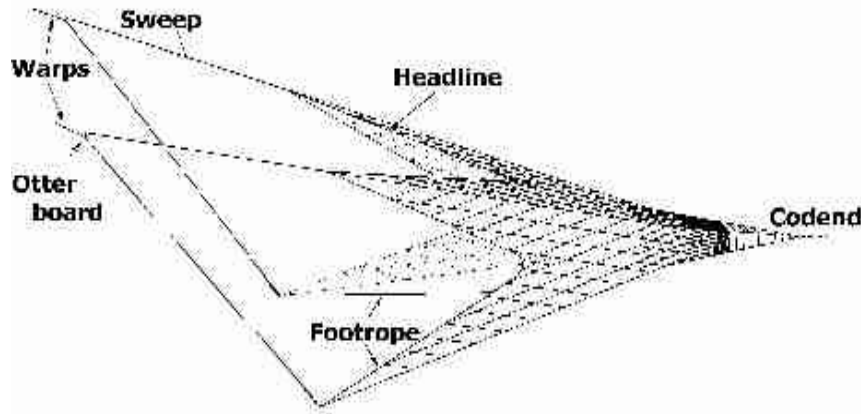


Figure 3: Mid water trawling (Hampidjan netmakers)

Demersal longlining

The autoline (or Mustad) system is most commonly used by 'Norwegian-style' vessels and typically has a simple configuration (see Figure 4). Essentially, the system consists of a single, long 'backbone' or 'mother-line' (usually 9-12 mm diameter), containing several thousand, short (~ 400 mm), evenly-spaced 'branch-lines' (or 'snoods') each with a baited hook on the terminal end. Each snood is attached via a collar to the main-line in a manner that allows the snood to rotate 360° around the main-line, as well as 360° about a swivel. Snoods are spaced 1-2 m apart (typically every 1300 mm).

The longline is normally stored in several 'magazines' on board the vessel, each containing 1000-1200 m of ready-hooked longline. A typical magazine might contain 950-1200 hooks. Magazines can be joined in sequence to create the desired length of longline.

Line setting is a relatively straightforward procedure. Typically, one end of the longline is drawn from the hauling room at the stern of the vessel. The other end is attached to a marker flag, radio beacon and buoys that are thrown overboard to designate the outer limit of the longline. Heavy grapnel anchors (40-100 kgs) that have been attached to the line at a point several hundred metres below the buoys cause the longline to rapidly submerge and eventually grab onto the ocean floor. This 'down-line' (the initial length of the longline from the buoys to the anchors) does not contain hooks.

The anchors stabilise one end of the longline. The vessel then steams away from the fixed end of the longline at 2-10 knots, causing the central, hook portion of the longline to be paid out from the stern of the vessel. Each hook passes through an automatic baiting machine (where hooks are baited with about 90% success) before they enter the water.

Autoline vessels deploy negatively buoyant longlines. Weights or floats may be clipped to the longline at various intervals along the line during setting to alter the sink rate of the line. The longline is then gradually set on the ocean floor (often following topographic features as identified from an on board global positioning system). A second set of grapnels stabilises the proximal end of the longline. Currently Australian vessels are using integrated weight line (9.5 – 11.5 mm diameter) with an internal lead core of 50 grams/m used to sink the line rather than the attachment of external weights.

The bottom-set hooks are then left to attract toothfish for up to 24 hours. The vessel then travels slowly (1-2 knots) towards the distal end of the longline, steadily hauling the longline back onto the stern of the vessel (Smith 1998; Blackwell et al. 2000).

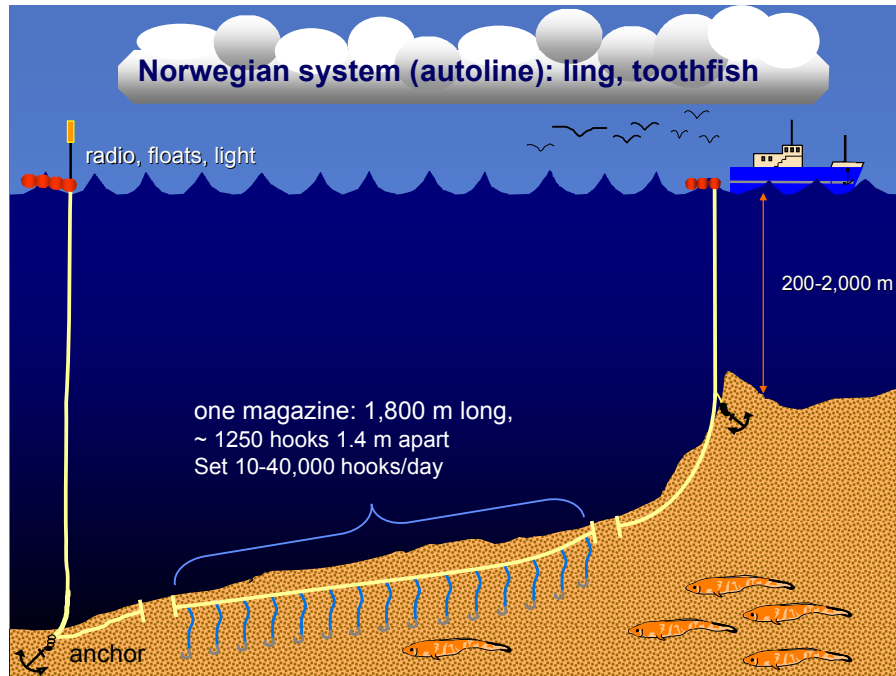


Figure 4: Indicative longline configuration (Graham Robertson, AAD)

1.4 Fishing areas

The Heard Island and McDonald Islands are Australia's most remote sovereign territory and are located on the Kerguelen Plateau in the south Indian Ocean, about 4,000 kilometres south-west of Perth. The Fishery extends from 12 nautical miles offshore to the edge of the 200 nautical mile Australian EEZ around the Islands.

The HIMI Fishery lies within the Australian EEZ inside CCAMLR Statistical Division 58.5.2 (see figure 1). The closest land is the French territory Kerguelen Islands, situated approximately 380 kilometres to the north-west of the Fishery.

No fishing is allowed within the Marine Reserves and only limited fishing activities have been allowed within the Conservation Zones. The conservation and fishery values of the Conservation Zones are currently being assessed and a decision by the Minister for the Environment and Water Resources is expected shortly.

Given the small number of vessels operating in the Fishery and in line with AFMA's confidentiality policies the main fishing areas cannot be publicly disclosed.

A small portion of the Australian EEZ, known as 'the lemon wedge' (south of 56°S), lies outside of Statistical Division 58.5.2 and is not included in the area of the Fishery.

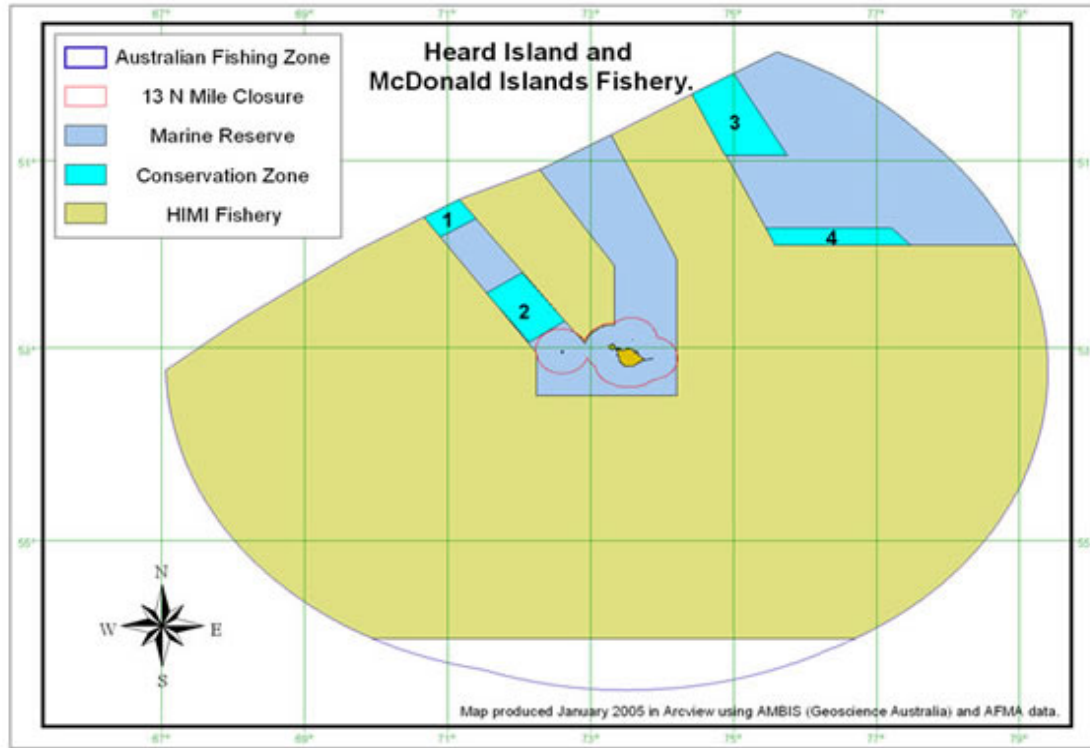


Figure 5: The HIMI Fishery including the Marine Reserve and Conservation Zones

1.5 Allocation between sectors

There is no allocation between sectors in this Fishery. SFR holders can choose to take their share of the TAC for toothfish by either trawl or longline methods. Mackerel icefish can only be caught by trawl fishing methods.

1.6 Governing legislation/fishing authority

The HIMI Fishery is managed by AFMA under the *Fisheries Management Act 1991*, with the *Antarctic Marine Living Resources Conservation Act 1981* implementing Australia's international obligations under CCAMLR. AFMA and AAD respectively are charged with administration of these Acts. The *Fisheries Management Act 1991* takes precedence over the *Antarctic Marine Living Resources Conservation Act 1981*, in situations where both Acts apply.

1.7 Status of export approval/accreditation under the *Environment Protection and Biodiversity Act 1999*

The HIMI Fishery was the first Commonwealth Fishery to be accredited for export approval/accreditation under the EPBC Act. This accreditation was granted for a period of 5 years and is due to expire on 13 May 2007. This accreditation was subject to number of recommendations the outcomes of which are discussed in Attachment A. A copy of the letter of accreditation and recommendations can be found at:

www.environment.gov.au/coasts/fisheries/commonwealth/heard-mcdonald/letter151002.html.

2 Management

2.1 Changes to management arrangements

Since accreditation of the HIMI Fishery in 2002 the following amendments have been made to the Plan and associated legislation.

- accreditation of longlining as an approved method (Direction No. HIMIFD 9 – prohibition on the use of fishing methods other than trawling or longlining);
- Management Plan amendment of 16 November 2004 to:
 - change the southern boundary of the Fishery from 55°S to 56°S to reflect a decision by CCAMLR to alter the boundary of Statistical Division 58.5.2
- Management Plan amendments of 10 May 2006 to:
 - amend the date for allocating monitoring responsibilities, under the Fisheries Assessment Plan, from 1 December to 1 March;
 - provide AFMA with the capacity to determine catch limits for non-target species;
 - alter the overcatch provisions to make them consistent with the overcatch provisions proposed for the Macquarie Island Toothfish Fishery; and
 - specify the number of SFRs for Patagonian toothfish and mackerel icefish.

Each year the conditions on SFRs may be amended (as necessary), to reflect any changes in Conservation Measures determined by CCAMLR. For example, longline season extensions have been approved in recent years following the adoption of effective seabird mitigation strategies.

2.2 Performance of the fishery against objectives, performance indicators and performance measures

A statement of the performance of the HIMI Fishery against its objectives, performance indicators and performance measures is made annually in AFMA's annual report. A copy of the current statement can be found at:

http://www.afma.gov.au/information/publications/corporate/annual/ar05_06/ar05_06_03.pdf

2.3 Compliance risks present in the fishery and actions taken to reduce these risks

The Plan and associated legislation outline measures which ensure there is a high level of compliance with management arrangements for the Fishery. The measures in place to monitor and ensure compliance include:

- the requirement to carry an Integrated Computerised Vessel Monitoring System (ICVMS), which enables monitoring of the movement of vessels within the Fishery. Information provided through the ICVMS includes the vessel's location, course and speed;
- the presence of two observers on board all voyages, which allows for monitoring and recording of all catch by an independent person. Observers are also able to monitor an operator's compliance with management arrangements, in particular input controls and environmental management measures;
- a formal process through which observers may raise any compliance related issues with the Master of the Vessel to ensure operators are aware of and comply with management measures;
- at port monitoring of all catch unloads by an AFMA authorised officer. This further verifies catch records maintained by the observer, reported by the vessel's Master and ensures compliance with catch limits;
- requirement to complete the toothfish Catch Documentation Scheme (CDS) paperwork for unloading and export of all toothfish product; and
- completion of shot-by-shot daily logbooks and provision of that data to AFMA and AAD.

The main risk to compliance risk in the Fishery comes from IUU operators. In recent years there has been a significant decline in the estimate of IUU catches being taken from the HIMI Fishery,

as shown in table 3 below. This decline can be largely attributed to the commitment of \$217.2 million dollars by the Australian Government in May 2005 to a full-time armed patrol program in the Southern Ocean to stamp out Patagonian toothfish poachers at HIMI, which followed the success of an original Government commitment of \$99 million in 2004.

Table 3: Estimated annual catch by IUU vessels in the HIMI Fishery

Fishing Season (1 December to 30 November)	Estimated IUU catch (tonnes)
1995/1996	3,000
1996/1997	7,117
1997/1998	4,150
1998/1999	427
1999/2000	1,154
2000/2001	2,004
2001/2002	2,500
2002/2003	1,512
2003/2004	634
2004/2005	265
2005/2006	112

2.4 Consultation processes

The Plan and associated management arrangements in place in the HIMI Fishery were developed in consultation with SouthMAC, operators and other stakeholders. The Plan details objectives for the Fishery; measures to achieve these objectives; and criteria to assess the Plan's performance. CCAMLR Conservation Measures are a minimum requirement under the Plan and AFMA has included a number of additional measures. The consultative structure in place for determining all Conservation Measures for the Fishery is detailed in the figure 6 below. SARAG's Research Planning Sub-Group, SARAG, SouthMAC and the AFMA Board are involved in determining all additional management measures.

Each of these consultative groups draw membership from government organisations, conservation groups, industry and other stakeholders. SouthMAC is the key advisory committee for the Fishery and includes representation from AFMA, AAD, the Department of Environment and Waters Resources (DEW), a conservation group and industry. SARAG is the key scientific assessment group for the Fishery and includes representation from AFMA, AAD, CSIRO, industry and expertise based scientists.

Both SARAG and SouthMAC meet several times a year, including immediately after CCAMLR to consider any Conservation Measures agreed by CCAMLR. SARAG provides SouthMAC with stock assessment advice as a core part of its functions. SouthMAC recommends to the AFMA Board catch limits for the Fishery, based on advice from SARAG. The AFMA Board must endorse these catch limits before they can enter into effect.

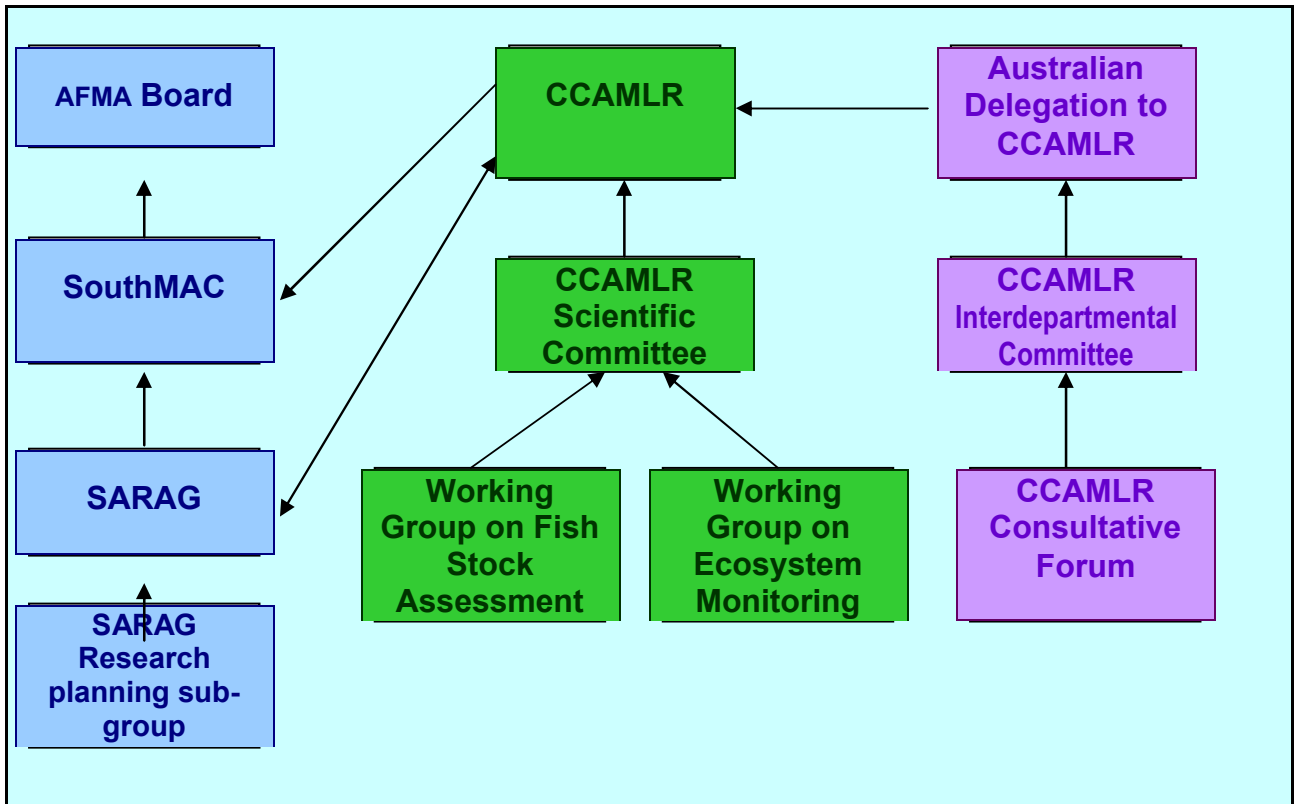


Figure 6. Key consultative relationships in place for determining Conservation Measures for the Fishery

Australia may set these catch limits at a level lower than that set by CCAMLR but cannot exceed the CCAMLR set TAC. Australia is legally bound to comply with all Conservation Measures and has consistently set environmental standards over and above those required by CCAMLR. Many of the additional management measures adopted by Australia have since been adopted by CCAMLR for all toothfish or icefish fisheries within the Convention area.

The *Fisheries Management Act 1991* provides for AFMA to amend the Plan, but requires the same consultation process as undertaken when determining the original Plan. The need for administrative flexibility is incorporated into the Plan through the use of supporting instruments such as regulations, directions and conditions on SFRs, where AFMA may vary certain requirements.

2.5 Compliance with threat abatement plans, recovery plans and international agreements

The HIMI Fishery is 100% compliant with the seabird TAP, recovery plans and CCAMLR requirements. The strict environmental measures in place in the Fishery are among the highest in the world and fisher's adherence to these measures is verified through the carriage of two observers on every trip.

Data already collected by observers indicates that there has been a high level of compliance with all management measures. Further data, collected through a research and monitoring program, is incorporated into assessments of target and bycatch species, as well as the broader marine environment.

3 Research and Monitoring

3.1 Research results

Research needs of the Fishery are identified in the Sub-Antarctic Fisheries Five Year Strategic Research Plan and reviewed annually by SARAG. This Plan provides for further research into

stock assessment, collection of fishery and biological data as well as providing an ecological and economic assessment of the Fishery.

Since commercial fishing began in the area, operators have contributed significantly to research and monitoring through the provision of vessel time, cooperation with the observer program, direct financial contributions and expertise of crew. Under the direction of AAD, operators have undertaken an extensive monitoring program, which has formed the basis of AAD's annual stock assessment of the two target species. Observers also undertake genetic and biological sampling of target and bycatch species. As part of its core functions, AAD also uses the data collected to assess bycatch species and the broader marine environment. This information is then presented to SARAG, SouthMAC, the Australian delegation to CCAMLR and then CCAMLR who then review these assessments. A substantial number of research papers for the Fishery have also been completed and provided to CCAMLR.

Where possible, information is also obtained from other fisheries within the Convention area, to provide a comparative basis for assessment of stocks and the broader environment within the area of the Fishery. Comparisons are also drawn, where appropriate, from studies of Australia's other sub-Antarctic Fishery at Macquarie Island.

Acknowledging that research and monitoring is important but costly, SARAG, SouthMAC and the AFMA Board agreed that it should continue as a collaborative approach between industry and research providers. The Plan reflects this decision by requiring that a Fisheries Assessment Plan (FAP) be implemented. The requirements of the FAP amount to approximately 20 days of research and monitoring, the major component being a random stratified trawl survey (RSTS). The FAP will be developed by AFMA in conjunction with SARAG, SouthMAC and SFR holders, and will incorporate monitoring that is identified annually by SARAG, having regard of the Five Year Strategic Research Plan.

The FAP will define monitoring to ensure:

- an adequate program of monitoring to ensure that reliable fisheries stock estimates can be made for each target species
- adequate monitoring of the direct impact of the Fishery on non-target species and the ecosystem in the area of the Fishery
- the yearly allocation of monitoring responsibilities to statutory fishing right holders in proportion to the numbers of statutory fishing rights they are likely to hold at the beginning of each fishing year.

AFMA calls annually for research applications to address research priorities and gaps in knowledge, as identified in the Five Year Strategic Research Plan. SARAG, SouthMAC and AFMA's Research Committee assess these applications for funding from the AFMA Research Fund and FRDC. Research projects, additional to those funded by industry or AAD, related to the Fishery, that have received funding since the Fishery's inception include:

- 'Population structure of the Patagonian toothfish (*Dissostichus eleginoides*) in Australian waters' (FRDC Project 2000/108);
- 'Determination of age, growth and stock structure of Patagonian toothfish based on otoliths' (Antarctic Scientific Advisory Committee funding in 1994 and FRDC Project 1997/123);
- 'Stock assessment and management strategy evaluation for sub-Antarctic fisheries' (ongoing work by CSIRO funded by industry (80%) and Government (20%) from the levybase); and
- 'Demersal fishing interactions with marine benthos in the Australian EEZ of the Southern Ocean; an assessment of the vulnerability of benthic habitats to impacts by demersal gears' (FRDC Project 2006/042).

3.2 Monitoring programs used to gather information on the fishery

The HIMI Fishery has had a comprehensive information collection system in place since the Fishery commenced in 1997, which is mix of fishery dependent and independent research.

Fishery dependent monitoring – regular data collection

The core component of the fishery dependent system is a shot by shot catch and effort logbook. The vessel's master is required to record an estimated weight of each species caught in each fishing operation.

The requirement to carry authorised and accredited observers on all voyages to the Fishery further provides a high degree of reliability of the fishery dependent data set. AFMA's observer program collected information on the landed catch from over 90% of the trawl shots undertaken in the Fishery since 1998. Observers verify the vessel supplied information eg shot by shot catch estimates and conversion ratios from factory operations. The two AFMA authorised observers present on each trip to the Fishery since it commenced maintain independent records that are used to verify the vessel supplied information. Fisheries scientists from AAD have worked closely with the observers, masters and crew since the Fishery commenced to ensure that this data set is an accurate reflection of fishing activity.

Fishery dependant data integrates observer catch and effort records and biological data on the target and bycatch species. This data is processed and error checked by AAD scientists after every cruise, who then cross-reference observer data with vessel's logbook data, vessel's daily factory records and unloading documentation.

The breadth of data collected on target and bycatch species in logbooks and by observers exceeds CCAMLR standards. Observers also collect extensive biological samples from target and bycatch species so scientists can better understand the biology of these species in the HIMI region. The collection of otoliths for example is essential in the development of length-at-age keys needed to convert length frequency data into age density information needed in the stock assessment model.

Fishery independent monitoring – one off data collection

Fishery independent data is collected and strongly supports the fishery dependant data. Research surveys are the most important source of information for the stock assessment process. The application of the fishery independent assessment approaches depends on estimates of the actual abundance of certain age classes in both fish stocks.

Data to support these estimates has been collected from:

- research surveys undertaken by the AAD vessel 'Aurora Australis' in the early 1990s; and
- commercial vessels which are required under the FAP to undertake an annual RSTS, under direction of AAD, for Patagonian toothfish and mackerel icefish. Commercial vessels have been undertaking this research since 1997.

In 1997 AAD, in conjunction with commercial operators, instituted a tagging program for Patagonian toothfish caught in the area of the Fishery. Observers with industry support carry out tagging and to date 13989 toothfish have been tagged and released (trawl - 12446 tags, longline - 1391 tags and pots – 152 tags). All tagged releases and recaptures are recorded. A proportion of tagged releases are injected with an otolith marking agent to assist in determining age and growth of Patagonian toothfish. The tagging program has also provided information on migration. 2873 tagged Patagonian toothfish have been recaptured (2828 from within the HIMI EEZ and 45 in waters outside the HIMI EEZ).

Tables 5 and 6 (below) summarise key components of the information collection system in place for the Fishery with an emphasis on information needs for the stock assessment process and management of Patagonian toothfish and mackerel icefish.

3.3 Collaborative research

The results of research are incorporated in the annual stock assessments. The stock assessments are submitted to CCAMLR and peer reviewed by WG-FSA and the Scientific Committee.

The collaborative research between Australia and France on shared toothfish stocks on the Kerguelen Plateau is in its initial stages. The next step in the process is a joint meeting of scientists, scheduled for May 2007, which will include an analysis of the available data, the outcomes of an RSTS conducted in the French zone and progress with the tagging programs.

4 Catch data

4.1 Total catch of target species (including retained & discarded catch)

As a consequence of its remote location the HIMI Fishery is a purely commercial Fishery with no recreation or indigenous sectors. The estimated harvest by illegal fishers is detailed in Section 2.3 above.

The total seasonal catch of target species, as reported by CCAMLR, is provided in table 4. The impacts of IUU catches are reflected in the lowering of TACs for Patagonian toothfish. The fluctuations in icefish catches are natural and are based on annual survey data predicting availability of fish for the following season.

Table 4: Seasonal catch of target species in the HIMI Fishery (CCAMLR statistical bulletin)

Fishing season (1 December to 30 November)	Patagonian toothfish (tonnes)	Mackerel icefish (tonnes)
April-November 1998	3765	115
1998/1999	3547	2
1999/2000	3566	137
2000/2001	2980	1136
2001/2002	2756	865
2002/2003	2844	2345
2003/2004	2864	78
2004/2005	2744	1851
2005/2006	2497	663

Apart from tagged toothfish all the catch of target species is retained. For mackerel icefish a 'move-on' provision applies where if any haul contains more than 100 kilograms, and more than 10% by number of the catch is smaller than 240 mm in total length, the trawl operator must move at least 5 nautical miles away.

4.2 Total catch of target species taken in other fisheries

Australian and French scientists are conducting joint research to determine the extent the toothfish stock is shared on the Kerguelen Plateau. The recent Patagonian toothfish catch from the French zone around Kerguelen Island (CCAMLR Statistical Area 58.5.1), as reported by CCAMLR, is:

- 5291 tonnes for 2002/03;
- 5171 tonnes for 2003/04; and
- 5065 tonnes for 2004/05.

Table 5: Fishery dependent information collection systems in place in the HIMI Fishery

Description	Information collected	Required by	Collection frequency	Provided to
ANT05 logbook	<ol style="list-style-type: none"> Fishing gear description Shot by shot information on: <ul style="list-style-type: none"> - fishing effort; and - catch estimates of target and bycatch species 	AFMA (in regulations under the Management Plan)	<ol style="list-style-type: none"> Every cruise Every trawl shot 	AAD and CCAMLR For stock assessment purposes and bycatch monitoring
ANT02-CE	10 day reports catch and effort by fine scale area	CCAMLR (as conditions on SFRs)	Every 10 day period	CCAMLR for real time monitoring of catches against TACs
Integrated Computerised Vessel Monitoring System (ICVMS)	<ol style="list-style-type: none"> Vessel position, Prior reporting requirements 	AFMA (in regulations under the Management Plan)	<ol style="list-style-type: none"> Continuous Notification of entry and exit from: <ul style="list-style-type: none"> - the Fishery; and - port 	<i>Not released – data is used for AFMA compliance purposes</i>
<p>At sea independent monitoring provided by AFMA authorised and accredited observers</p> <p>Periodic cruises by international scientific observers</p>	<p>Shot by shot monitoring of:</p> <p>Catch and effort information</p> <p>Biological data on target species including:</p> <ul style="list-style-type: none"> - sexed length/weight frequencies, - otoliths and other biological samples <p>Bycatch</p> <p>Interactions with marine mammals and seabirds</p> <p>Data to confirm conversion ratios of processed fish</p>	<p>AFMA under the Management Plan and regulations</p> <p>- exceeds standards in place under the CCAMLR Scheme of International Scientific Observation</p>	<p>Every cruise</p> <p>The objective of the program is 70% observer coverage of trawl shots in the Fishery</p>	<p>Data to CCAMLR standard provided to CCAMLR one month after each trip</p> <p>Detailed data and samples provide to AAD for stock assessment purposes</p> <p>Bycatch monitoring</p> <p>Impacts on seabirds and marine mammal populations</p> <p>Information on ecological impacts provided to AAD and others</p> <p>Conversion ratios used by AFMA for quota management purposes</p>
Landed catch monitoring	<ol style="list-style-type: none"> Verified landed weight and product destination of all toothfish products Weight and grade of landed catch of all other species 	<ol style="list-style-type: none"> AFMA and CCAMLR AFMA and CCAMLR 	<ol style="list-style-type: none"> Every cruise Every cruise 	<ol style="list-style-type: none"> <i>Dissostichus</i> catch documents provided to CCAMLR to monitor toothfish take by CCAMLR members Monitoring of catch against ITQ's and monitoring of retained bycatch by AFMA

* AFMA implements all relevant all CCAMLR requirements, and in many instance exceed them.

Table 6: Fishery independent information collection systems in the HIMI Fishery

Description	Information collected	Program conducted by	Collection frequency	Provided to
AAD exploratory fishing surveys (pre-commercial fishing surveys)	Catch and effort information for all species for all stations	AAD	1989/90 1991/92 1993/94	AAD for stock assessment Provided to WG-FSA
Pre-recruit mackerel icefish surveys	Information collected from each survey trawl shot: <ul style="list-style-type: none"> sexed length frequency (abundance of each icefish age class species) otoliths length frequency on other finfish species bycatch quantified 	AAD design and coordinate the survey Industry commitment secured under the Fisheries Assessment Plan The survey is conducted under a scientific permit	June/July 1997 May-June 1998 May 2000 May/June 2001	AAD for stock assessment and biological research Reviewed by SARAG Provided to WG-FSA
Random stratified trawl surveys for Patagonian toothfish Conducted in shallower parts of the Fishery where juvenile Patagonian toothfish occur	Information collected from each survey trawl shot: <ul style="list-style-type: none"> sexed length frequency (abundance of each toothfish age class species) otoliths to support reliability of length at age key for toothfish genetic samples length frequency other finfish species bycatch quantified 	AAD design and coordinate the survey Industry commitment secured under the Fisheries Assessment Plan The survey is conducted under a scientific permit	May/June 1998 March/April 1999 May 2000 May/June 2001	AAD for stock assessment and biological research Reviewed by SARAG Provided to WG-FSA
Acoustic surveys	Acoustic records of toothfish and mackerel icefish aggregations recorded digitally Records of juvenile mackerel icefish aggregations	AAD and industry provide equipment which is installed with industry cooperation Conducted under a scientific permit	Commenced in 1996/97 continuing Annual icefish pre-recruit survey since 1999/2000	AAD for analysis Potentially provides an additional measure of stock abundance and fish behaviour Mapping data to AAD and AGSO
Tagging of Patagonian toothfish	Records of all releases and recaptures <ul style="list-style-type: none"> recaptured fish re-released if vigorous proportion of releases injected with a otolith marking agent 	Program designed by AAD Tagging done by observers with industry support	Commenced in 1996/97 continuing annually	AAD to assist refining input parameters for stock assessment Reviewed by SARAG Provided to WG-FSA

4.3 Total catch of bycatch species

The term by-product is not used in the Fishery, with reference just made to target species (Patagonian toothfish and mackerel icefish) and by-catch species.

A catch limit is set by AFMA for each by-catch species each season in line with limits determined by CCAMLR. For the 2006/07 season the catch limits for bycatch species are:

- skates and rays - 120 tonnes
- macrourids - 465 tonnes
- unicorn icefish - 150 tonnes
- grey rockcod - 80 tonnes
- each other species - 50 tonnes

The total catch (tonnes) by season of bycatch species is shown in table 7. The reported catch for skates and rays does not include animals that have been tagged or returned to the sea in a live and vigorous state, which is an approved CCAMLR procedure. To date 3932 skates/rays have been tagged with 25 recaptures from within the HIMI EEZ.

The catch limit for each species is not prescribed specifically by CCAMLR is 50 tonnes. Table 7 shows the total catch of all other bycatch species. No individual species catch exceed 50 tonnes.

Table 7: Seasonal catch of by-catch species in the HIMI Fishery (CCAMLR statistical bulletin) – note catches before 2002 were trawl only and from AFMA log records. From 2002 the data is both trawl and longline and includes more comprehensive data provided to CCAMLR

Fishing season (1 December to 30 November)	Skates & rays (tonnes)	Macrourids (tonnes)	Unicorn icefish (tonnes)	Grey rockcod (tonnes)	All other species (tonnes)
April-November 1998	5	<1	4	<1	23
1998/1999	3	2	1	11	5
1999/2000	9	<1	4	6	32
2000/2001	6	<1	2	4	52
2001/2002	5	<1	4	1	23
2002/2003	24	5	21	<1	27
2003/2004	67	45	14	3	17
2004/2005	76	69	34	2	22
2005/2006	17	27	32	5	6

4.4 Spatial issues/trends

For confidentiality reasons the spatial trends of the Fishery cannot be disclosed in detail. However, since in the introduction of longlining in 2003 the fleet has resulted in targeting toothfish at greater depths, thus spreading fishing effort more widely across the Fishery.

4.5 Effort data

Table 8 shows the effort expended in the Fishery expressed in kilograms per hour for trawling and kilograms per 1000 hooks for longlining.

Table 8: Effort for trawl and longline operations when targeting Patagonian toothfish

Year	Trawl (kgs per hour)	Longline (kgs/1000 hooks)
1997	1049	-
1998	3941	-
1999	4096	-
2000	2212	-
2001	2317	-
2002	2162	-
2003	3022	243
2004	2253	350
2005	2277	423
2006	1477	390

5 Status of target stock

5.1 Resource concerns

Both target species; Patagonian toothfish and mackerel icefish were assessed by the Bureau of Rural Sciences in the Fishery Status Reports 2005 as not overfished. The status of byproduct species were assessed as uncertain.

The assessments for target species were considered robust but less so for byproduct (referred to as bycatch in the Fishery) species.

A copy of the full report can be found at:

<http://www.affashop.gov.au/product.asp?prodid=13611>

Scientists from AAD undertake assessments each year, as part of their core work. When assessments are complete, they are subject to independent peer review and review by SAFAG.

The Australian delegation then submits assessments to the CCAMLR WG-FSA, where they are open to international scrutiny and discussion. Most of the discussion within WG-FSA is now focused on the appropriateness of the various input parameters, which feed into the assessments.

WG-FSA then recommends to the Commission, via the CCAMLR Scientific Committee, TACs for Statistical Division 58.5.2. Once approved by CCAMLR, TACs and other measures are then set out in Conservation Measures for the coming season.

CCAMLR agreed TACs are further considered by SouthMAC. The AFMA Board then formally endorses the TAC (at or below the TAC set by CCAMLR) before the fishing season commences on 1 December. A summary of the process is provided in Table 9 below.

The assessments of fish stocks in the Fishery are undertaken in accordance with a precautionary approach endorsed by CCAMLR in the mid 1990s. The objective of this approach is to maintain a stock at a proportion of its pre-exploitation abundance such that:

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

When these two objectives are articulated for a particular species they give rise to biological reference points that form the basis for decision rules (see Table 9). The decision rules provide the foundation for incorporating uncertainties regarding population parameters and stock status into assessments of fishing strategies designed to meet the objectives.

Table 9. Steps used in calculating yield for target species

Objective	Method(s) used for each target species	
	Patagonian toothfish	Mackerel icefish
Estimate year class strengths of recruits to the Fishery	Annual estimates of year-class strength at age four obtained by decomposing length-density data from the random stratified trawl surveys into age classes using statistical routines (Constable et al 2006) Each year, the different age classes are projected forward 35 years using an estimate of natural mortality, fishing mortality, growth	Estimates of year-class strength at ages two, three and four on Heard Island Plateau obtained by decomposing length-density data from random stratified trawl surveys into age classes using statistical routines (de la Mare <i>et al</i> 1998)
Growth and natural mortality estimates	Estimates of modified von Bertalanffy growth parameters are derived from age at length and tag recapture length density information (Candy et al 2006) Natural mortality rates are estimated based on empirical relationships between natural mortality and growth rates extrapolated across other fish stocks, and a value agreed at WG-FSA <ul style="list-style-type: none"> relies on age verification from otolith studies to develop age-length keys 	Derived primarily from length density information. Some otoliths are still collected however there is no consensus within CCAMLR on a technique for reading otoliths
Other biological and Fishery parameters determined	Obtained from: <ul style="list-style-type: none"> length at maturity information from sampling – although mainly based on other CCAMLR data given the lack of mature fish caught in the Fishery standardised catch rate time series fishery selectivity estimated within the model for different sub-fisheries catch weighted length frequency information from surveys information on removals factored in, including IUU catch 	Obtained from <ul style="list-style-type: none"> length at maturity information catch weighted length frequency information from pre-recruit surveys additional information on spatial separation of stocks may be used to update fishing selectivity functions information on removals factored in
Biological reference points	<ul style="list-style-type: none"> That the probability that spawning biomass will fall below 20% of the pre exploitation level over the 35 year projection period must not exceed 0.1; and the median escapement for the Fishery of the spawning biomass shall not be less than 50% over a 35 year projection <p>noting that lower figure derived from these calculations is taken as the TAC.</p>	<ul style="list-style-type: none"> That 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 <p>noting that lower figure derived from these calculations is taken as the TAC</p>
Method used by AAD to calculate yield	CCAMLR decision rules implemented in CASAL (Bull et al 2005)	Short-term assessment based on the principles of the GYM (de la Mare <i>et al.</i> 1998)
SARAG	Domestic review of assessment	Domestic review of assessment
Assessment completed for WG-FSA	Submitted by the Australian delegation	Submitted by the Australian delegation
WG-FSA recommends to the CCAMLR Scientific Committee	TAC by area/sub-area/gear type	TAC by area/sub-area/gear type
CCAMLR annual meeting	TACs, closures and other measures set out in Conservation Measures	TACs, closures and other measures set out in Conservation Measures
SARAG and SouthMAC	SARAG reviews CCAMLR TACs SouthMAC endorses TACs to AFMA Board	SARAG reviews CCAMLR TACs SouthMAC endorses TACs to AFMA Board
AFMA Board	Approves TACs, allocated as ITQ SFRs	Approves TACs, allocated as ITQ SFRs

5.2 Stock assessments

Stock assessments were undertaken by AAD in 2006 for Patagonian toothfish and mackerel icefish, and these were peer reviewed by CCAMLR's WG-FSA and Scientific Committee. The TACs resulting from the stock assessments were approved by CCAMLR at its twenty-fifth meeting from 23 October to 3 November 2006.

Patagonian toothfish

The CCAMLR Scientific Committee reassessed the catch limit for Patagonian toothfish in Division 58.5.2 and recommended a total allowable catch (TAC) of 2,427 tonnes for the 2006/07 season, which was adopted by CCAMLR. This is a decrease of 157 tonnes from the 2,584 tonnes TAC for the 2005/06 season.

WG-FSA adopted a new assessment based on the CASAL model. The CASAL assessment used abundance-at-length estimated from the surveys, catch-at-length from the fisheries and standardised CPUE time series to estimate current and initial population size and year-class strengths since 1981. The results were then used in projections to estimate the long term yield that satisfies the CCAMLR decision rules for toothfish.

Mackerel icefish

The Scientific Committee reassessed the catch limit for mackerel icefish in Division 58.5.2, and agreed to recommend a TAC of 42 tonnes for the 2006/07 fishing season, for the area known as the Heard Island Plateau. This reflects an agreement made at CCAMLR in 2005 that the TAC of 1210 tonnes (a combined TAC for 2005/06 and 2006/07) could be taken in the one season. Industry agreed to the concept of a combined TAC of 1210 tonnes in 2005/06 on the understanding that a zero or limited TAC (to allow for research) would be set in 2006/07.

There is a high level of recruitment variability of this stock. The absence of any indication of a strong 1+ or 2+ year class in the 2006 RSTS, indicates that yields are likely to be low in future until a cohort as large as the 1+ cohort detected in the 2003 survey becomes evident.

Bycatch species

No new assessments were carried out on bycatch species by CCAMLR in 2006 with the bycatch limits from the 2005/06 season resulting in same limits being the retained for 2006/07.

WG-FSA recommended that additional information on skate bycatch (and in particular cut-offs) be collected by vessels on the logsheets, and cross-referenced with observer data. Skates and rays which are cut off the lines are not counted against the bycatch limit. All catches would continue to be reported.

6 Interactions with protected species

6.1 Frequency and nature of interactions

The following tables provide an annual summary of the number of seabird and marine mammal interactions with fishing gear (table 10) and fishing vessels (table 11) by fishing method in the HIMI Fishery during the period of exemption of the previous strategic assessment (April 2002 to date).

Interactions with fishing gear covers wildlife being caught or entangled in fishing gear. Interactions with fishing vessels includes collisions with the gantry and superstructure, and do not include the interactions reported in table 10.

Table 10: Interactions with fishing gear

Fishery	Year	Seabirds		Marine mammals	
		Total interactions	Deaths	Total interactions	Deaths
Trawl	2002	2	0	3	3
	2003	6	6	6	6
	2004	-	-	1	1
	2005	12	12	1	1
	2006	-	-	5	5
Longline (since May 2003)	2003	3	-	3	3
	2004	-	-	2	2
	2005	-	-	3	3
	2006	-	-	-	-
Total		23	18	24	24

Table 11: Interactions with fishing vessels

Fishery	Year	Seabirds		Marine mammals	
		Total interactions	Deaths	Total interactions	Deaths
Trawl	2002	1	-	-	-
	2003	1	1	-	-
	2004	3	3	-	-
	2005	2	2	-	-
	2006	1	1	-	-
Longline (since May 2003)	2003	3	2	-	-
	2004	-	-	-	-
	2005	1	-	-	-
	2006	2	-	-	-
Total		14	9	0	0

As reported in the introduction, the major incidents with seabirds occurred in midwater trawl operations around March 2005 where 12 seabirds were killed. A successful mitigation strategy was adopted by the Company (and subsequently placed as a condition on SFRs by AFMA) where midwater trawling is not permitted during February and March and can only occur at night at other times. No seabird interactions have been reported in trawl operations since that time.

6.2 Management action taken to reduce interactions

Fishers are required to submit detailed reports of each wildlife interaction within 24 hours of the occurrence. Each report must also include a detailed response to the wildlife interaction which must be implemented immediately by the fisher to minimise the likelihood of similar interactions. The reports are submitted by AFMA to the Protected Species Unit at DEW.

Incidence and response reports are reviewed regularly at SARAG meetings. Stakeholders are encouraged to contribute innovation and the application of enhanced technology to minimise any future wildlife interactions.

A range of actions have been taken to minimise the levels of interaction. These include:

- no offal discharge requirement which limits provisioning opportunities for wildlife;
- limit (up to 3) on the number of boats allowed to operate in the Fishery;
- in longline operations - using integrated weight line, paired streamer lines, blue snoods, brickle curtains and seasonal closures all designed to avoid seabirds attending the baits;
- in midwater trawl operations - no midwater trawling occurs during the period 1 February to 31 March each year. At all other times midwater trawling can only occur at night;
- minimising of lighting on fishing boats to reduce the risk of seabirds colliding with boats; and
- prohibition on the use of plastic packaging bands.

7 Impacts of the fishery on the ecosystem

7.1 Results of Ecological Risk Assessments

AFMA has commissioned CSIRO to conduct an “Ecological risk assessment for Commonwealth fisheries”. The assessment will include the HIMI Fishery. One of the objectives of the project is to determine the relative sustainability risks in Commonwealth managed fisheries, considering target, bycatch and broader ecological impacts where possible. The project is being undertaken in close cooperation with SARAG and a draft report was provided to SARAG and AFMA in November 2006 with a final report expected to be completed in mid to late 2007. Should the project identify risks to bycatch or the environment not already being mitigated, appropriate management responses will be implemented.

7.2 Nature of impacts on the ecosystem

The CCAMLR management approach incorporates ecosystem components. Information on predators, prey and the environment are collected simultaneously and submitted to the CCAMLR Working Group on Ecosystem Monitoring and Management for the preparation of advice to the Scientific Committee. This information is then incorporated into the management arrangements for each Statistical Division.

It is important to note that the biological reference points for each of the target species include a minimum escapement of spawning biomass. This escapement allows not only for reproduction, but also for trophic interactions within the food web.

Impacts on benthic communities

Impacts on benthic communities are an issue for bottom trawl fisheries. While recognising that these impacts occur in the HIMI Fishery, AFMA considers that, based on current knowledge, the Fishery does not significantly impact on the benthos for the following reasons:

- a relatively small proportion of the HIMI EEZ is fished and within the fished areas benthic bycatch rates are low by comparison to total catch rates
- preliminary assessment work indicates there are sufficient unfished areas (including marine protected areas) in each physiological classification of invertebrate assemblages in the Fishery (ongoing risk assessment will provide more information in this regard)
- trawl gear used in the Fishery is designed to minimise benthic impacts.

The majority of the EEZ around HIMI is not trawled because it is unsuitable trawl ground, due largely to the excessive depth. Of the areas that are shallow enough to trawl, operators tend to concentrate on areas that are known to hold assemblages of either of the two target species.

No fishing is permitted within the HIMI Marine Reserve and management arrangements stipulate an additional one nautical mile buffer zone around the Reserve region of each Island. The HIMI Marine Reserve (see figure 5) is the world’s largest protected marine reserve and provides representative ecosystem protection across the physiological classifications, setting aside over 39% of all waters shallower than 1000 metres in the EEZ.

The nature of the physical contact that the fishing gear makes with the substrate is obviously an important aspect to assessing the level of benthic impact in fished areas. A minimum bobbin diameter for the trawl gear footrope is in place for all operators in the Fishery. This measure minimises benthic impacts by ensuring that the footrope is a minimum distance above the point of contact that the underside of each bobbin makes with seabed and therefore ensures minimal contact between the trawl net and the benthos.

FRDC has approved a four year project (commenced 1 July 2006) to investigate 'Demersal fishing interactions with marine benthos in the Australian EEZ of the Southern Ocean: an assessment of the vulnerability of benthic habitats to damage by demersal gears'. The development of underwater camera technology which can be attached to the fishing gear (trawl, longline and pot) is a key aim of the project along with assessment of benthic interactions of the differing gear types.

Longlining is an approved fishing method (since November 2005) and is likely to have less impact on the benthos than bottom trawling. Pot fishing has also been trialled and the trial is expected to continue in the 2007/08 season.

Heard Island contains plants that are endemic to the region, including the Kerguelen cabbage (*Pringlea antiscorbutica*). In order to protect these plants from the risk of introduced insect pests, operators are required to ensure that no brassicas (broccoli, cabbage, brussel sprouts or kale) are discharged.

Additionally, no poultry products (including eggs or egg shells) are discharged from the boat, to prevent an outbreak of Newcastle disease amongst the seabirds in the region.

7.3 Management action taken to reduce impacts

The management of the Fishery is based on CCAMLR's ecosystem management principles with additional controls imposed by AFMA. The following management actions are in place to minimise impacts to ecosystems:

- limitation to no more than three vessels operating in the Fishery at any one time
- minimum bobbin diameter and rubber disc sizes to reduce the impact of the fishing gear on benthic habitats and bycatch of sessile organisms
- a nil offal discharge policy, to avoid the effects that provisioning could have on wild animals and to avoid the attraction of animals to the boats
- contingency arrangements for disposal of fish meal should the fish meal plant breakdown
- restrictions on plastic packaging bands, avoiding any possible impact these bands may have on wild animals
- a requirement that all plastic is burned and that plastic residue must not be discarded at sea to avoid wild animals having any interactions with plastic from the Fishery
- a restriction on the discharge of poultry products or brassicas to avoid the introduction of avian diseases and non-native plants
- operators are required to make attempts to retrieve any lost gear
- operators also frequently recover illegal fishing gear from the region of the Fishery, which may include gear that has drifted into the Fishery
- ongoing assessment of benthic impacts.

8 Progress in implementation of recommendations and conditions resulting from the previous assessment of the fishery

8.1 Progress in implementing each recommendation and condition

The table at Attachment A outlines the progress made against the recommendations and conditions of the assessment as at 31 December 2006.

The joint research being undertaken by Australia and France to determine the extent to which the Patagonian toothfish stock is shared is ongoing and will take several years to resolve. Cooperation has been excellent with joint work currently being undertaken. The results of the work will determine the management actions required, including the possibility of setting a TAC for the Kerguelen Plateau with national allocations to Australia and France.

Comprehensive data is being collected for all bycatch species. The catch limits set by CCAMLR for all species have not been exceeded. As more data is collected stock assessments can be undertaken on particular species. There has been a focus on collecting data on skates and rays and this will be the basis of a new stock assessment in the future.

Longlining has been successfully introduced into the HIMI Fishery. A range of mitigation measures have been adopted to minimise the risk of seabird interactions. Since longline operation commenced in 2003 no seabirds have been killed as a result of interactions with fishing gear. A number of the mitigation measures used in the HIMI Fishery, including the use of integrated weight line and 'brickle curtains' (a barrier which is deployed to keep seabirds away from the line when hauling), have been adopted by other fleets which has resulted in significant reduction in seabird mortality from CCAMLR waters outside the HIMI Fishery. Longlining has opened up new fishing grounds through access to greater depths and different terrain. The technique targets larger size fish than trawling. The new integrated assessment (using CASAL) is able to use all this information in the Patagonian toothfish stock assessment.

Seal interactions are being monitored and are rare. A trial of seal excluder devices commenced in the trawl fishery in the 2006/07 season. The development of the underwater camera technology as part of the FRDC funded research project to look at benthic impacts of fishing gears will provide valuable information on seal interactions and behaviours.

9 References

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- Cover photo – Les Scott, Petuna Sealord Pty Ltd
Other photos – pages 4 and 7 - Austral Fisheries Pty Ltd

10 List of acronyms

AAD	-	Australian Antarctic Division
AFMA	-	Australian Fisheries Management Authority
AGSO	-	Geoscience Australia
CASAL	-	C++ Algorithmic Stock Assessment Laboratory
CCAMLR	-	Commission for the Conservation of Antarctic Marine Living Resources
CDS	-	Catch Documentation Scheme
CPUE	-	catch per unit effort
CSIRO	-	Commonwealth Scientific and Industrial Research Organisation
DEW	-	Department of the Environment and Water Resources
EPBC Act	-	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EEZ	-	Exclusive Economic Zone
FAP	-	Fisheries Assessment Plan
FRDC	-	Fisheries Research and Development Corporation
HIMI	-	Heard Island and McDonald Islands
ICVMS	-	Integrated Computerised Vessel Monitoring System
IUU	-	Illegal, unreported and unregulated
ITQ	-	individual transferable quota
MSC	-	Marine Stewardship Council
RSTS	-	random stratified trawl survey
SARAG	-	Sub-Antarctic Resource Assessment Group
SouthMAC	-	Sub-Antarctic Fisheries Management Advisory Committee
SFR	-	Statutory Fishing Right
TAC	-	total allowable catch
TAP	-	Threat Abatement Plan
WG-FSA	-	Working Group on Fish Stock Assessment

Heard Island and McDonald Islands Fishery Management Plan 2002

Recommendations to the Australian Fisheries Management Authority (AFMA) on the ecologically sustainable management of the Heard Island and McDonald Islands (HIMI) Fishery

Exempt – 30 April 2002 to 30 April 2007

Performance Criteria	Level of Achievement as at 31 December 2006	Deadline
<p>1. AFMA, in conjunction with other relevant agencies, is investigating the extent to which the HIMI Fishery and neighbouring Island groups, including Iles Kerguelen, share a single, or straddling, Patagonian toothfish stock. Completion of this work should be a high priority. In the event that a shared, or straddling, stock is confirmed, AFMA should ensure that the HIMI Fishery stock assessment of the species will take into account removals from neighbouring areas with which the HIMI stock is shared.</p>	<p>AFMA, in conjunction with Australian Antarctic Division (AAD) continue to work towards establishing whether the HIMI toothfish stock is shared or straddles into the adjacent areas. To date this work involved:</p> <ul style="list-style-type: none"> • the tagging and release of toothfish within the HIMI Fishery. This tagging program has resulted in a small number of tagged fish being recaptured in Kerguelen and Crozet; • the collection and analysis of toothfish samples from HIMI, Kerguelen, Crozet and Williams Ridge for genetic testing; • the signing of a joint Australian/French Compliance and Research Treaty agreement. Some preliminary discussions have taken place between Australian and French scientists with further talks scheduled. <p>Discussions between AAD scientists and French scientists continued at Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) meeting in November 2006. The French have completed a trawl survey and have started a tagging program to complement similar activity in the Australian EEZ around HIMI. Haul by haul data from the French fleet will be provided to AAD scientists.</p> <p>A joint meeting to discuss the data and results is scheduled for May 2007.</p>	<p>As required.</p>

Performance Criteria	Level of Achievement as at 31 December 2006	Deadline
<p>2. AFMA, in conjunction with other relevant agencies, is conducting risk assessments of sleeper shark, skates and rays. Completion of this work should be a high priority. Investigation of potential bycatch mitigation strategies in conjunction with this research should be undertaken. In the event that significant risks are identified, AFMA should implement appropriate mitigation measures.</p>	<p>Yes</p> <p>During 2002/03 a risk assessment of sleeper shark bycatch was completed by AAD and CSIRO and reviewed by the CCAMLR Scientific Committee. The study concluded there is not a serious risk to the sustainability of this species if numbers caught do not exceed current levels (which has been less than 10 annually).</p> <p>During 2002, AAD undertook a stock assessment for skates and rays. This assessment was reviewed and endorsed by CCAMLR Scientific Committee. The assessment resulted in the total allowable bycatch limit for these species being raised from 50 tonnes in 2001/02 to 120 tonnes in 2002/03, 2003/04, 2004/05 and 2005/06.</p> <p>The data gathered in recent years, including data from longline operations, may be used to update the assessment for the 2007/08 year. This is dependent on competing work priorities at AAD, where there is focus on an integrated assessment for the HIMI toothfish stocks.</p> <p>In addition SouthMAC has introduced review procedures if a bycatch trigger is approached. These trigger points are at substantially lower levels than the catch recommended by CCAMLR and set by AFMA annually.</p> <p>CCAMLR has encouraged the release of skates and rays that are alive and vigorous, and agreed these will not be counted against the catch limit set.</p> <p>AFMA, as required under the Antarctic Fisheries Bycatch Action Plan 2003, continues to regularly monitor review the bycatch levels and to implement appropriate mitigation measures.</p>	<p>Ongoing</p>

Performance Criteria	Level of Achievement as at 31 December 2006	Deadline
<p>3. Prior to the introduction of longlining in the HIMI Fishery:</p> <ul style="list-style-type: none"> • suitable seabird bycatch mitigation measures will be developed in accordance with the Threat Abatement Plan, for implementation by AFMA; • AFMA will conduct an evaluation, limited to assessing the deleterious effects of longlining on the environment; and • approval for the introduction of longlining from the Minister for the Environment and Heritage will be obtained. <p>This action is now finalised.</p>	<p>Yes</p> <p>In September 2005 following the trial a report on the 'Effects of Longlining' was prepared by AFMA following the trial. The report was discussed by the Sub-Antarctic Resource Assessment Group (SARAG) & the Sub-Antarctic Fisheries Management Advisory Committee (SouthMAC). SARAG and SouthMAC endorsed and supported the recommendation that longlining become a prescribed fishing method under the <i>Heard Island and McDonald Islands Fishery Management Plan 2002</i>.</p> <p>The AFMA Board endorsed the report and it was finalised and provided to the Minister for the Environment and Heritage on 4 October 2005. On 14 November 2005, the Minister advised AFMA that he supported the introduction of longlining as a prescribed fishing method in the HIMI Fishery. On 25 November 2005 a Direction allowing longlining was made by AFMA</p>	<p>Completed</p>
<p>AFMA is monitoring seal interactions, with a view to determining if seals are beginning to habituate to fishing vessels. In the event that seal interactions increase, AFMA should review existing mitigation measures and implement appropriate responses in a timely manner.</p>	<p>AFMA through their observer program continue to monitor seal interactions with fishing vessels. There is currently no conclusive evidence supporting that seals are beginning to habituate to vessels. In May 2003 the Sub-Antarctic Fur Seal and Southern Elephant Seal Recovery Team concluded that fishing was not having a significant effect on the recovery of these species.</p> <p>The number of seal interactions with fishing vessels has varied over recent years.</p> <p>2002/03 season – 9 deaths 2003/04 season – 3 deaths 2004/05 season – 3 deaths 2005/06 season – 5 deaths</p> <p>SARAG and SouthMAC continue to monitor these interactions in line with the requirement of the Antarctic Fisheries Bycatch Action Plan 2003.</p>	<p>Ongoing</p>