

ANTARCTIC TOOTHFISH

An analysis of management, catch and trade

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— OCEANIA —



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EXECUTIVE SUMMARY

1. Antarctic Toothfish (*Dissostichus mawsoni*) occurs only within the Convention Area of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Its distribution is predominantly south of 65°S. CCAMLR has sole responsibility for the management of this species.
2. CCAMLR data indicate that catch of Antarctic Toothfish totalled 1090 t in the period 1989/90 to 1999/00. Of this catch 1089 t has been taken in the three seasons from 1997/98 to 1999/00. New Zealand is reported as having taken 1082 t (99%) of that catch in the exploratory fishery in the Ross Sea area (Subarea 88.1).
3. CCAMLR authorised a maximum of three vessels to fish in Subarea 88.1 in each of the years 1996/97 to 1999/00 and six vessels in 2000/01. It is understood that an increased number of countries propose to undertake exploratory fishing in this Subarea in 2001/02. These proposals will be considered by CCAMLR at its meeting in October/November 2001.
4. Scientific knowledge of Antarctic Toothfish in Subarea 88.1 has increased significantly in recent years as a result of the exploratory fishing by New Zealand. However, considerable uncertainty remains in relation to the stock assessment for Subarea 88.1.
5. CCAMLR believes that the incidence of illegal, unreported and unregulated (IUU) fishing in Subareas 88.1, 48.1 and 48.2 is "probably low". CCAMLR has not provided either a qualitative or quantitative estimate of IUU fishing in other Subareas where Antarctic Toothfish is likely to be taken. The Catch Documentation Scheme (CDS) introduced in May 2000, in an attempt to control IUU catch of Patagonian Toothfish, also applies to Antarctic Toothfish.
6. Trade data for Antarctic Toothfish are extremely limited. There is a lack of specificity in trade codes and little knowledge of the extent and pattern of re-exporting of Antarctic Toothfish. Meaningful analysis of the data is very difficult. Data provided by the CDS should in theory help to clarify the anomalies apparent in the trade data available for this analysis, particularly by identifying the flows and extent of re-exporting of Antarctic Toothfish.
7. The only trade data specific to Antarctic Toothfish available for this analysis were import data from the USA for the period 1999 to June 2001 and export data from New Zealand for the May 2000 to June 2001 period. When compared to US import figures New Zealand data appear to significantly understate the volume of exports from that country. To address this deficiency, data on imports of *Dissostichus* spp. from New Zealand by Japan, the European Union (EU) and Canada have been included in the analysis. It is reasonable to assume that these imports are Antarctic Toothfish as New Zealand's reported catch of *Dissostichus* spp. is almost exclusively Antarctic Toothfish.
8. The analysis of available trade data, albeit limited, reveals that the catch level of Antarctic Toothfish may be more than twice as high as that reported to CCAMLR.
9. Further, the US import statistics identify 10 CCAMLR member countries as having supplied Antarctic Toothfish to the US market over 1999 and 2000. These countries supplied 84% of US imports. Of these suppliers, only New Zealand reported catch of Antarctic Toothfish to CCAMLR and it accounted for only 10% of US imports. The other nine CCAMLR member countries were Argentina, Chile, France, India, Portugal, South Africa, South Korea, Spain and Uruguay.
10. In the 6 months to June 2001 Uruguay's share of the US market increased to 47%, Chile supplied 19%, New Zealand 14%, South Korea 4% and Portugal 1%. Non-Members of CCAMLR supplying the US market over this period included Taiwan (4%) and, new suppliers, Vietnam (5%), Japan (4%), Singapore (2%) and Canada (0.5%).

11. The analysis suggests that IUU fishing for Antarctic Toothfish is likely to be occurring and implicates CCAMLR Members and non-Members.
12. It is worth noting that Mauritius, a major player in the transshipment of IUU-caught Patagonian Toothfish in the past, did not export any Antarctic Toothfish product to the USA in the 6 months to June 2001 despite having exported around 80 t (whole weight) in each of the preceding two years. This could be a positive sign that the undertaking by Mauritius to address its role in IUU fishing is having some effect.
13. The pattern emerging with respect to Antarctic Toothfish is similar to that found by TRAFFIC for Patagonian Toothfish. CCAMLR has failed to control IUU fishing for Patagonian Toothfish and many CCAMLR Members were involved in this. Considerable concern is now held for the status of some stocks. In light of this experience CCAMLR appears to be taking a cavalier approach to the management of Antarctic Toothfish.

RECOMMENDATIONS

CCAMLR must not allow Antarctic Toothfish to follow the trend of Patagonian Toothfish. The following aspects of management, catch and trade in Antarctic Toothfish require urgent attention if this species is to be managed sustainably.

1. CCAMLR must acknowledge and respond to the findings of this analysis that suggest that Antarctic Toothfish is likely to be the subject of IUU fishing and that CCAMLR Members are implicated in this activity.
2. CCAMLR should examine the CDS data for Antarctic Toothfish carefully in order to clarify the anomalies identified in the trade data examined in this study. In particular, the issue of which CCAMLR countries are legitimately involved in re-exporting needs to be examined in order that those countries are not implicated unfairly in IUU fishing.
3. The CDS must be used to monitor trade in both Patagonian Toothfish and Antarctic Toothfish. In 2000 CCAMLR's analysis of preliminary CDS documentation was based on data for both species grouped together. The data are collected on a species basis and should be analysed in the same way.
4. Those CCAMLR Members identified as supplying Antarctic Toothfish to the US market since January 1999 but which have not reported catch to CCAMLR should be asked to explain the source of the product. Examination of CDS data may provide this information for the period from May 2000.
5. To facilitate the use of trade statistics CCAMLR should reinforce its earlier recommendation that Members introduce trade codes specific to Patagonian Toothfish and Antarctic Toothfish.
6. Further, CCAMLR Members should be encouraged to identify a sufficient number of codes to allow meaningful identification of product type. The New Zealand codes are a good example of how this might be done. Where new codes are introduced countries need to ensure that sufficient information is provided to exporters to minimise the risk of misclassification.
7. In the light of the uncertainty over the true level of removals of Antarctic Toothfish and the areas of CCAMLR from which these removals have occurred, CCAMLR must reconsider whether its current approach to exploratory fishing for Antarctic Toothfish is consistent with precautionary management. If the current approach is found wanting CCAMLR must take steps to address it.
8. CCAMLR should not authorise any further exploratory fishing targeting Antarctic Toothfish until it has addressed the above recommendations.

INTRODUCTION

This overview of management, catch and trade of Antarctic Toothfish (*Dissostichus mawsoni*) has been undertaken as an adjunct to a larger study by TRAFFIC of management and trade in Patagonian toothfish (*Dissostichus eleginoides*) (Lack and Sant, 2001). That study revealed that catches of Patagonian Toothfish could be more than twice as high as those reported by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) which is responsible for management of both species in the Southern Ocean. Illegal, unreported and unregulated (IUU) fishing is a major factor contributing to unsustainable catch levels for Patagonian Toothfish. The Catch Documentation Scheme (CDS) introduced by CCAMLR in May 2000, in an attempt to control IUU catch of Patagonian Toothfish, also applies to Antarctic Toothfish.

The known catch of Antarctic Toothfish is very low in comparison to Patagonian Toothfish and the relative attention given to the two species by scientists, managers and the wider community has reflected this. There is now considerable concern for the status of Patagonian Toothfish stocks as a result of the impact of IUU fishing over the last decade. Given this, and the similarity between the two species and their markets, it is possible that authorised, as well as IUU fishing, operators may increase fishing effort on Antarctic Toothfish. It is timely therefore to examine what is known about the management, catch and trade of this species and to identify possible management issues.

THE ANTARCTIC TOOTHFISH

Distribution

Antarctic Toothfish are found around mainland Antarctica, generally south of 65°S (Figure 1)¹. It is widely acknowledged (CCAMLR, 1998; CCAMLR, 1998a; 2.22; Kock, 1992) that the normal range of Antarctic Toothfish is wholly within the CCAMLR Area. As with any species, it would not be unusual to find occasional occurrences of individual Antarctic Toothfish outside this normal range, including outside the CCAMLR Area.

Patagonian Toothfish is found further north around subantarctic islands and seamounts, between 50°S and 60°S including the southern limits of the New Zealand EEZ (where it is rare). It is also found on the continental shelf off the coasts of Chile and Argentina south of about 40°S. The two species overlap in the Ross Dependency² (Smith & Gaffney, 2000; Kock, 2000).

Overlaying the distribution of Antarctic Toothfish on the CCAMLR Convention Area (Figure 1) indicates that the main areas of distribution of Antarctic Toothfish south of 65°S are in Subareas 88.1, 88.2, 48.5 (Subarea 48.5 is closed to directed fishing for *Dissostichus* spp.), 48.6, 58.4.1 and 58.4.2. Antarctic Toothfish may also be caught north of 65°S in Subareas 48.1, 48.2 and 48.4.

Biology

The maximum size and weight observed of Antarctic Toothfish are 180 cm and about 75 kg respectively. Individuals of 140 to 165 cm in length have been estimated to be from 22 to 30 years old (Kock, 2000). Research by the New Zealand National Institute of Water and Atmospheric Research (NIWA) has shown that growth in Antarctic Toothfish is probably similar to that of hoki (*Macruronus novaezelandiae*), a relatively fast

¹ While the indicative distribution of Antarctic Toothfish shown in Figure 1, as adapted from Smith and Gaffney (2000), suggests that the species may be found outside the CCAMLR Area specifically north of the CCAMLR Area boundary in Subareas 48.1 and 58.4.1, there appears to be general consensus among other scientists that, with the possible exception of a few individual fish, this is unlikely to be the case. The Smith and Gaffney (2000) information does not purport to give a highly accurate specification of distribution and nor is it intended to provide advice on density. This, together with the process of superimposing this information onto a map showing the CCAMLR Area is believed to be responsible for this apparent inconsistency with the general view that Antarctic Toothfish are found wholly within the CCAMLR Area.

² The Ross Dependency is that area of the Antarctic continent over which New Zealand claims jurisdiction. It stretches from 160E to 150W. It is over 3000 kilometres south of New Zealand and takes in Ross Island, the Ross Sea, the Ross Ice Shelf, the Transantarctic Mountains and part of the continent extending to the South Pole.

growing species, and that fish older than 25 are not common (NIWA, 2000). CCAMLR's Working Group - Fish Stock Assessment (WG-FSA) has noted that Antarctic Toothfish appear to grow faster and reach a smaller maximum length than Patagonian Toothfish (CCAMLR WG-FSA, 1999).

Toothfish are bottom living, in depths of 300m to 2500m, but occasionally move off the bottom to feed. They feed on a variety of other fish, octopus, squid and crustaceans. Antarctic Toothfish are likely to become sexually mature at a similar length to Patagonian Toothfish (70-95 cm), corresponding to 8-10 years of age, and probably spawn over the continental slope in August-September. Toothfish eggs and larvae are pelagic (free swimming/floating near the sea surface) and the larvae feed on zooplankton. The species' fecundity ranges from 470 000 to more than 1.4 million eggs depending on the length of the fish (Kock, 2000; Williams and Trebilco, undated).

This biological information suggests that, in comparison to Patagonian Toothfish, Antarctic Toothfish is more fecund, faster growing and has a shorter life span. These characteristics may make it relatively less vulnerable to overfishing than Patagonian Toothfish. However, current CCAMLR estimates that suggest Antarctic Toothfish is more productive than Patagonian Toothfish appear to be counter intuitive for a species inhabiting higher latitudes (CCAMLR WG-FSA, 2000) and require further investigation.

The restriction of Antarctic Toothfish to waters south of 60°S may also afford the species some protection from overfishing since sea ice cover effectively prevents fishing for eight months of the year in Subareas 48.1 and 88.2 where the species is likely to be caught (ISOFISH, 1999).

Scientific knowledge and advice

The scientific understanding of Antarctic Toothfish has improved significantly in recent years as a result of research conducted in the exploratory fishery in CCAMLR Subarea 88.1 (which falls within the Ross Dependency). However, considerable uncertainty remains. This stems from uncertainty in biology and fishery parameters for both *Dissostichus* spp. and the validity of the assumption of the relationship between catch per unit effort (CPUE) and density (CPUE is considered to be an approximate relative estimate of biomass density) (CCAMLR SC, 2000).

Up until 1999, CCAMLR's WG-FSA had determined its recommendations of precautionary catch levels in exploratory fisheries for *Dissostichus* spp. by extrapolating from estimated yields for Patagonian Toothfish in Subarea 48.3 (longline) and Division 58.5.2 (trawl). A discount factor was then applied (Table 1) to reflect the level of uncertainty and relative lack of information. The estimates were also adjusted to reflect the relative areas of fishable seabed in the proposed exploratory fishery.

Table 1. Discount factors¹ applied in exploratory fisheries for *Dissostichus* spp.

	Patagonian Toothfish	Antarctic Toothfish
1997/98	0.45	0.3
1998/99	0.45	0.3
1999/00	0.5	0.25
2000/01	0.5	0.5

1. The lower the discount factor the higher the uncertainty.

Sources: CCAMLR SC, 1997; CCAMLR SC, 1998; CCAMLR, 1999; CCAMLR, 2000

Despite refinements to this method in 1999 the WG-FSA concluded in that year that "the calculated long-term annual yields were far in excess of any possible precautionary catch levels appropriate for those Subareas or divisions" (CCAMLR WG-FSA, 1999). It was felt that the most likely explanation lay in the extrapolation of recruitment to areas where no direct estimates of recruitment were available. As a result the WG-FSA and the Scientific Committee advised CCAMLR they were unable to provide advice on precautionary catch levels for new and exploratory fisheries in 1999/2000. The Scientific Committee provided CCAMLR with a number of options for dealing with exploratory fishing proposals for that year. One option was to set catch limits at zero until fisheries-independent research had provided sufficient data for an assessment (CCAMLR Scientific Committee (SC), 1999).

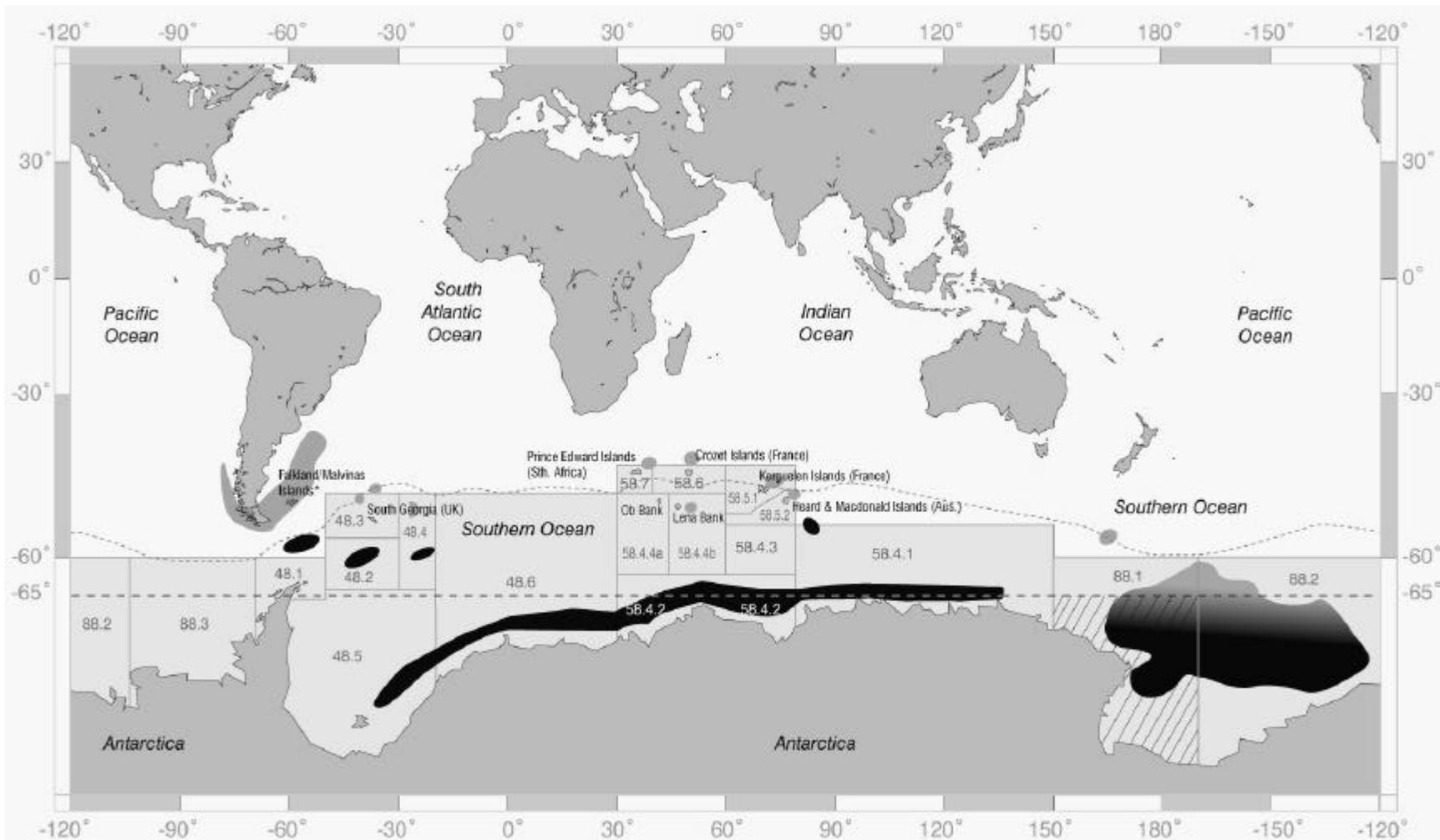
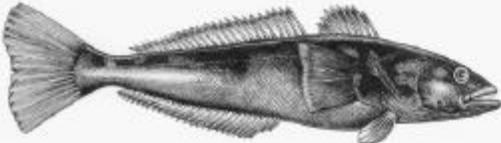


Figure 1: Distribution Map of the Patagonian and Antarctic Toothfish (*Dissostichus eleginoides* & *D. mawsoni*). NB: Indicative only.

MAP KEY



● Patagonian Toothfish
 ● Antarctic Toothfish
 ▨ 99% of CCAMLR Reported catches of Antarctic Toothfish have occurred in this area

- - - Antarctic convergence
 48.6 CCAMLR Convention Area (numbers denote CCAMLR fishing areas/subareas)

Source: adapted from maps by Lack and Sant (2001) and Smith and Gaffney (2000) with CCAMLR information.
 *Falkland/Malvinas Islands: Recognized by the UN as a 'Non-Self-Governing Territory administered by the UK, also claimed by Argentina'.

Map: hiwire.com.au Illustration: Bruce Mahalski

CCAMLR, however, chose another option involving the setting of a maximum catch for each statistical area that would enable the conduct of a fisheries-based research plan in the small scale research units (SSRUs) in that area including the application of a discount factor (as previously applied) to reflect uncertainty. The Commission reduced the discount factor for Antarctic Toothfish to 0.25 (suggesting increased uncertainty) and increased that for Patagonian Toothfish to 0.5, on the basis of advice from the Scientific Committee on actual CPUE in some exploratory fisheries (CCAMLR, 1999).

The only exploratory longline fishery for which the WG-FSA was able to make an assessment and to recommend precautionary catch levels for 2000/01 was that for *D. mawsoni* in Subarea 88.1. In setting precautionary catch limits for *Dissostichus* spp. in Subarea 88.1 the WG-FSA conducts separate calculations for those parts of the Subarea that are believed to be occupied predominantly by either Patagonian Toothfish or Antarctic Toothfish (CCAMLR WG-FSA, 1998). Long-term annual yield is calculated for Patagonian Toothfish in the area north of 65°S within Subarea 88.1 and for Antarctic Toothfish in the area south of 65°S within Subarea 88.1. The Conservation Measures implementing the resultant precautionary catch levels are however specified for *Dissostichus* spp. (ie both Antarctic Toothfish and Patagonian Toothfish) in the areas north and south of 65°S (see Conservation Measure 210/XIX in Appendix A).

The best available estimate of long-term annual yield of *D. mawsoni* in Subarea 88.1 (south of 65°S) for 2000/01 was 3778 t (CCAMLR SC, 2000).

On the basis of the additional information incorporated in the assessment for 2000/01 the Commission raised the discount factor for Antarctic Toothfish to 0.5 (CCAMLR, 2000). The precautionary catch limit for *Dissostichus* spp. south of 65°S was therefore set at 1889 t with a maximum of 472 t to be taken from each of the 4 SSRUs in the Subarea in order to ensure an adequate spread of research effort. In addition, in the 2000/01 season, fishing in any fine-scale rectangle (0.5° latitude by 1° longitude) was to cease when the reported catch reached 100 t.

Since no further information was available for the area north of 65°S no assessment was carried out in 2000 and the precautionary catch for that area in 2000/01 was retained at 175 t, the level of the 1999/00 season.

MANAGEMENT

CCAMLR's management regime for *Dissostichus* spp. currently involves the use of two categories of fisheries – established and exploratory.

There are three established fisheries for *Dissostichus* spp. in the CCAMLR Area, in Subareas 48.3, 48.4 and 58.5.2 (Figure 1). Commercial fishing, subject to total catch limits, mainly for Patagonian Toothfish, has been conducted in these fisheries for many years. Each of these areas is predominantly outside the general distribution of Antarctic Toothfish and no catch of this species was reported taken in these fisheries between 1989/90 and 1999/00. The taking of *D. mawsoni*, other than for scientific purposes, is prohibited in Subarea 48.4.

Exploratory fisheries for *Dissostichus* spp. must follow clearly defined experimental fishing plans and be authorised under Conservation Measures which specify, among other things, the catch limits, the number of vessels and countries authorised to fish, the fishing season and requirements relating to areas to be fished and the conduct of fishing operations. Thus, in exploratory fisheries vessels are required to undertake some research on stock distribution and abundance as part of their development of the fishery. This approach strives to maximise the data collection potential of fishing vessels while ensuring that unacceptable damage is not inflicted on stocks for which key management data are missing. At various times specific countries have been authorised to conduct exploratory fishing for *Dissostichus* spp. in Subareas/divisions 48.1, 48.2, 48.6, 58.4.1, 58.4.3, 58.4.4, 88.1, 88.2 and 88.3 (CCAMLR WG-FSA 2000). Little of the authorised exploratory fishing has been conducted.

In 1992/93 a research fisheries cruise in CCAMLR Subarea 48.2 to the west of the Atlantic Peninsula targeting Antarctic Toothfish yielded very disappointing results. A repeat survey of Subareas 48.1, 48.2 and 88.3, further west in 1997/98 was also disappointing. Yields of *Dissostichus* spp. were very low in the three Subareas, with values of only 5.7 g/hook (Subarea 88.3), 19.1 g/hook (Subarea 48.1) and 3.0 g/hook (Subarea 48.2), and an average over all areas of 11.1 g/hook. As a result no commercial fishing for *Dissostichus* spp. has taken place in these regions (Arana and Vega, 1999).

Only in Subarea 88.1 has exploratory fishing been conducted consistently over a period of years (1996/97 – 2000/01). Copies of Conservation Measures relating to general measures for exploratory fisheries for *Dissostichus* spp and for the exploratory longline fisheries in Subarea 88.1 in the 2000/01 season are provided at Appendix A.

Between 1996/97 and 1999/00 a maximum of three vessels, all from New Zealand, were authorised to fish in Subarea 88.1. Despite opposition from New Zealand, and the concern expressed by Australia at the large number of exploratory fishery proposals (throughout the CCAMLR Area) for *Dissostichus* spp. in 2000/01, CCAMLR approved a maximum of six vessels to operate in the exploratory fishery in 2000/01. Three vessels from New Zealand, two from South Africa and one from Uruguay were authorised to operate in the Subarea (CCAMLR, 2000).

New Zealand has a strong affiliation and long history with the Ross Dependency in Subarea 88.1. The extent to which New Zealand's opposition to increased effort in this Subarea is based on an altruistic desire to maintain the integrity of the research effort, as opposed to its desire to maintain sole access to the Subarea for New Zealand fishing operations, is unclear. Nevertheless the following arguments posed by New Zealand against an increase in effort in the area appear to have some validity:

- An escalation in effort is not warranted for the purposes of researching this exploratory fishery.
- There is a danger that the current research program may be undermined in the following manner:
 - (i) there is potential for the short total season length to be further shortened if the catch limit was reached. This would then restrict the collection of research data to a shorter period than required;
 - (ii) difficulties may be encountered in trying to replicate research sets previously fished within SSRUs for research purposes; and
 - (iii) interpretation of longline CPUE data is confounded by changes in vessels from year to year.
- Multiple exploratory fishing operations in Subarea 88.1 should only be authorised if a fisheries management system is developed to address practical issues which will arise relating to compliance with general measures governing exploratory fisheries for *Dissostichus* spp. (see Conservation Measure 200/XIX Appendix A). In particular, the requirement for the maintenance of a maximum of only one vessel per fine-scale rectangle presents a major difficulty to operational management (CCAMLR, 2000).

Australia's concerns centred on the need for compliance with CCAMLR's Conservation Measure 65/XII. This Conservation Measure requires that exploratory fishing should not be allowed to expand further than the acquisition of information necessary to ensure the fishery is conducted in accordance with the objectives of the Convention. Australia contended that large numbers of vessels fishing for small catch limits in small statistical units would be inconsistent with this Conservation Measure and proposed a restriction of each Member to one vessel per exploratory fishery (CCAMLR, 2000). Australia's concerns echoed those expressed by the USA two years earlier when it had urged CCAMLR to make every effort to ensure that Antarctic Toothfish fisheries develop under strict precautionary principles (CCAMLR, 1998).

Country reports for the 2000/01 season have begun to be filed with CCAMLR. Those available as at 1 October 2001 indicate that New Zealand took 581 t, South Africa 26 t and Uruguay 23 t of *Dissostichus* spp. in the exploratory fishery in Subarea 88.1 in the 2000/01 season (Anon, 2001; Anon, 2001a; Anon 2001b).

Preliminary advice suggests that nine proposals for exploratory fishing for *Dissostichus* spp. have been submitted to CCAMLR for 2001/02. These proposals are interesting for several reasons including: several are from CCAMLR Members not previously engaged in such fishing; they demonstrate a continued high level of interest in further toothfish fisheries; and they show a considerably increased interest in more southerly areas, such as Subareas 88.1, 88.2, 88.3, 48.6 and 58.4.2, where Antarctic toothfish are more likely to occur. (I. Hay, Australian Antarctic Division, *in litt.* to G. Sant, 4 October 2001). Details of these proposals are not yet publicly available. They will be considered at CCAMLR XX in October/November 2001.

Catch

The total catch taken in exploratory fisheries for *Dissostichus* spp between 1996/97 and 1999/00 was approximately 1205 t (CCAMLR WG-FSA, 2000). Of this 1089 t was taken in Subarea 88.1. Exploratory fishing effort in Subarea 88.1 has been concentrated south of 65°S where Antarctic Toothfish is most likely to be found. This is reflected by the fact that catch in this Subarea has been nearly entirely of Antarctic Toothfish with 1082 t reported taken from Subarea 88.1 over the 1996/97-1999/00 period (CCAMLR WG-FSA, 2000). Details of exploratory fishing in Subarea 88.1 are summarised in Table 2.

Table 2. Exploratory fishing for *Dissostichus* spp. in Subarea 88.1, 1996/97 - 2000/01

	Catch limits (t)	Catch of <i>Dissostichus</i> Spp. (t)	Catch of Antarctic Toothfish (t)	Countries fishing	Reported catch of Antarctic Toothfish (CCAMLR Area)
1996/97	1980	0	0	New Zealand	0
1997/98				New Zealand	42
N. of 65°S	338	0	0		
S. of 65°S	1172	42	41		
1998/99				New Zealand	296
N. of 65°S	271	0	0		
S. of 65°S	2010	297	296		
1999/2000				New Zealand	751
N. of 65°S	175	0	0		
S. of 65°S	1915	750	745		
2000/01				New Zealand S. Africa Uruguay	n.a
N. of 65°S	175	n.a.	n.a		
S. of 65°S	1889	630 ¹	552 ²		

1. Some of this catch may have been taken north of 65°S since New Zealand reports that some fishing took place in that area but does not indicate the quantity of the catch taken in that area.

2. New Zealand reports that 95% of its catch of 581 t of *Dissostichus* spp. was *D. mawsoni*. The proportion of catch by South Africa and Uruguay represented by *D. mawsoni* is unavailable.

Sources: CCAMLR, 2000a; Anon, 2000; Anon, 2001; Anon, 2001a; Anon, 2001b

The company holding New Zealand's exploratory fishing permit for Subarea 88.1, SS Fishing³, was found guilty and fined in November 2000 of not complying with the research provisions of New Zealand's *Antarctic Marine Living Resources Act 1981*. The legal action related to the failure of the company to complete the requisite research lines in the last SSRUs. Catch taken in these SSRUs was seized initially but released following the dropping of more serious charges of fishing without a permit (Haworth, 2001; Anon, 2001).

IUU FISHING

CCAMLR does not make separate estimates of IUU catch of Antarctic Toothfish. Its estimates are made for *Dissostichus* spp. However in Subareas 88.1, 48.1 and 48.2 CCAMLR's WG-FSA considers estimated unreported catch of *Dissostichus* spp. to be "probably low". (CCAMLR WG-FSA, 2000). No indication of the level of IUU fishing in Subareas 88.2, 48.4, 48.5, 48.6, 58.4.1 or 58.4.2 is provided by

³ SS Fishing Ltd is a joint venture between Sanford Ltd and NZ Longline Ltd (50% Sealord Group Ltd and 50% Amaltal Ltd).

CCAMLR. The data forthcoming from the CDS should provide additional information on total removals, including possible IUU catch, of Antarctic Toothfish.

The New Zealand Government has conducted surveillance and patrol efforts in the Ross Sea area (Subarea 88.1) in recent years. This, along with the sheer distance to an accommodating port may have deterred poachers contemplating visiting this area (ISOFISH, 1999). As mentioned above the window of opportunity for fishing for Antarctic Toothfish, south of 65°S, is reduced considerably by the presence of sea ice for two-thirds of the year in much of the area of the Antarctic Toothfish distribution. This may deter IUU fishing for this species.

MARKETS AND TRADE

Markets

The major markets for Patagonian Toothfish are the USA, Japan, countries of the European Union and Canada. There is little information about the consumer market specific to Antarctic Toothfish. However, as discussed below, it appears that Antarctic Toothfish and Patagonian Toothfish are probably used interchangeably and that the major markets for Antarctic Toothfish are likely to be similar to those for Patagonian Toothfish.

To the untrained eye it is difficult to differentiate between whole, live Patagonian Toothfish and Antarctic Toothfish. Researchers have identified a range of distinguishing characteristics that trained observers can use to differentiate between specimens of the two species. It is not possible, however, to differentiate visually between fillets of the two species. It has been necessary to develop a biochemical test (Smith, Gaffney and Purves, 2001) to distinguish between fillet samples of Patagonian and Antarctic Toothfish. This test relies on muscle proteins revealed by isoelectric focusing and mitochondrial DNA markers. The proteins also distinguish toothfish from other species marketed under similar trade names.

The similarity in fillet appearance suggests that there is little to preclude the two species being used interchangeably. The following description of product available for export by a New Zealand exporter of toothfish suggests that exporters do not differentiate between the two species from a market perspective:

“Antarctic Toothfish *Dissostichus mawsoni* & *Dissostichus eleginoides*. Very white flesh, fine textured with a high oil content. Packed as trunks, fillets and collars. Main catch January to February.” (Sanford, undated)

Given the similarities between the species, and the relatively low amounts of Antarctic Toothfish reaching the market, it is likely that Antarctic Toothfish is marketed and sold to consumers under the same common names as Patagonian Toothfish, eg Chilean Sea Bass, Hake, Chilean Grouper, Southern Hemisphere Cod. Antarctic Toothfish may also be known as Antarctic Cod or Giant Antarctic Cod on the US market (Anon, undated).

Trade

TRAFFIC's trade analysis of Patagonian Toothfish (Lack and Sant, 2001) was impeded by the lack of specific trade codes for the species in a number of significant trading countries, the unknown extent of re-exporting and the application of conversion factors for various product forms. The impact of these factors is magnified in the analysis of trade in Antarctic Toothfish.

CCAMLR has recommended that member countries introduce separate trade codes for Patagonian Toothfish and Antarctic Toothfish. The information available suggests that only New Zealand and the United States have done so. Significant toothfish importers such as Japan, the European Union (EU) and Canada have introduced codes only for “*Dissostichus* spp.”. It is not believed that any of the major toothfish exporting countries has introduced separate codes. This severely restricts analysis of trade data. However, some trade data are available for the major known catching country of Antarctic Toothfish, New Zealand, as well as for a major toothfish market, the USA.

There is even less information available about the nature and extent of re-exporting of Antarctic Toothfish than for Patagonian Toothfish. Similarly, the appropriate conversion factors for Antarctic Toothfish are less well established than those for Patagonian Toothfish.

CCAMLR uses conversion factors of 1.7 and 2.2 respectively to convert headed and gutted (HGT) and fillets of Patagonian Toothfish to whole weight. The CCAMLR WG-FSA (2000) provides a comparison of conversion factors for Patagonian Toothfish and Antarctic Toothfish from various sources. These estimates vary from source to source and are inconclusive. However, the range of estimates for each species suggests that it is appropriate, for the purposes of this study, to apply the conversion factors for HGT and fillets of Patagonian Toothfish to Antarctic Toothfish. The Working Group report also provides some estimates of conversion factors for headed, gutted and tailed (HAT) Toothfish. The estimates range from 1.574 to 1.768. Given that 1.7 has been applied to HGT product the higher estimate of 1.768 has been used as the appropriate conversion factor for HAT Antarctic Toothfish product in this analysis.

NZ exports

New Zealand introduced separate codes for Patagonian and Antarctic Toothfish in May 2000. Eight export codes are specified for each species (Appendix B) identifying 4 categories of frozen product and 4 categories of fresh or chilled product.

The data for May 2000 to June 2001 (referred to as 2000/01 hereafter) are shown in Table 3. It indicates that New Zealand exported 19.4 t (product weight) of frozen HGT Antarctic Toothfish and 17.4 t of Other frozen (not whole, HGT or fillets) Antarctic Toothfish. HGT product comprised some 57% of total exports of Antarctic Toothfish and over 70% of this was exported to the USA. Taiwan is the only other recorded export market over this period. Japan was the major market for the Other frozen product taking 84% of exports for this product. Again Taiwan was the only other recorded market.

Table 3. New Zealand exports of Antarctic Toothfish, May 2000 - June 2001 (product weight)

	Headed & gutted		Other ¹	
	Kgs	\$NZ	Kgs	\$NZ
October 2000				
Taiwan	5097	94877		
December 2000				
Japan			12388	109384
April 2001				
Taiwan			2298	23257
June 2001				
Taiwan	708	7320		
USA	13572	250214		
Total June	14280	257534		
Total	19377	352411	14686	132641
NZ\$/kg		18.19		9.04

1. Other than HGT, whole and fillets.
Source: Statistics New Zealand, 2001.

Applying the conversion factor of 1.7 to the 19.4 t of HGT product exported in 2000/01 results in a whole weight equivalent of 33 t of Antarctic Toothfish.

Conversion of the 14.7 t of "other" Antarctic Toothfish product is more problematic. This category is composed of product other than headed and gutted, whole or fillets. However it is unclear what form this product is in. This product was exported to Japan and Taiwan, neither of which have import codes specific to Antarctic Toothfish which might clarify the nature of the product. Some Antarctic Toothfish product is exported as trunks (presumably HAT) and collars (Sanford, undated), a section from around base of the head of the fish and essentially a byproduct of other processing. Both these products would be included in

the “other” category. Another possibility is that the product is heads (Australia has developed a significant but low value market for Patagonian Toothfish heads). However the relatively high price of NZ\$9/kg suggests that this is not the case. Assuming, therefore, that the product is either all collars or all HAT the whole weight equivalent of the “other category” could range from zero to 26 t. The whole weight equivalent of collars is already accounted for in the conversion of HGT or HAT product to whole weight hence if this category comprised only collars the whole weight equivalent is zero. Alternatively if all this product was HAT then applying the conversion factor of 1.768 results in a whole weight equivalent of 26 t.

According to this trade data the whole weight equivalent of New Zealand exports in 2000/01 could, therefore, range from 33 t to 59 t. This is a significantly lower figure than expected given New Zealand’s catch of 745 t in the 1999/00 season. The possible reasons for this are considered under the section headed Discussion.

US imports

The USA introduced import codes for Patagonian Toothfish on 1 January 1998 and for Antarctic Toothfish on 1 January 1999 (see Appendix B). Data on imports of Antarctic Toothfish recorded since that time are contained in Table 4. The data show that imports of this product into the USA are increasing. In calendar year 1999 the USA imported 370 t (product weight) of Antarctic Toothfish and in 2000, 625 t. In the six months to June 2001 477 t of Antarctic Toothfish products were imported.

Over the two calendar years 1999 and 2000 over 90% of this product was in “other frozen” form ie not fillets. The proportion of filleted product increased in 2001 with 17% of imports to June in that form.

Suppliers of Antarctic Toothfish products to the US market over the period 1999 to June 2001 are shown in Figures 2 and 3. The source of Antarctic Toothfish imports into the USA has varied considerably over the last 3 years. However Uruguay has remained the major supplier of “other frozen” product throughout that period. Uruguay, Chile, New Zealand and Portugal have supplied the US import market in each of the last 3 years.

In 1999 South Africa supplied 14% of US imports however this fell to 7% in 2000 and figures available up to June 2001 record no imports from South Africa. Similarly Mauritius supplied 13% and 8% in 1999 and 2000 respectively but none in 2001. South Korea emerged as a source in 2000 and Chile, after supplying only a small quantity in 1999, has emerged as the second biggest supplier in 2001.

The whole weight equivalent of these imports is also included in Table 4. It has been assumed that the “other frozen” category is all HGT product. It is known that, apart from fillets, this is the predominant form in which Patagonian Toothfish is imported into the USA. Given that Antarctic Toothfish appears to be directed to the same segment of the market it seems reasonable to assume that this product is also HGT. In addition the New Zealand export statistics indicate that exports of Antarctic Toothfish to the USA in 2000/01 were HGT product. However, the wide variation in value per kilogram of this product (see Table 4) may be indicative of a range of product types and/or quality.

Over the two calendar years 1999 and 2000 the USA imported the whole weight equivalent of 1724 t of Antarctic Toothfish comprised of 1579 t of “other frozen” Antarctic Toothfish and 146 t of frozen fillets. CCAMLR Members (Argentina, Chile, France, India, New Zealand, Portugal, South Africa, South Korea, Spain and Uruguay) supplied 84% of US imports over 1999-2000. Uruguay supplied 30%, Argentina, New Zealand and South Africa each supplied 10%, France (including Reunion) 7%, Chile 5%, South Korea 5%, Spain 3% and Portugal and India each supplied 2%.

Table 4 US imports of Antarctic Toothfish

		Fillet frozen		Total	Fillet frozen		Total	Fillet frozen		Other frozen		
		Product Weight (kgs)			Whole Weight (kgs)			US\$	\$US/kg	US\$	\$US/kg	
To June 2001	Canada	2256			4963			5412	2.40			
	Chile (M)	20820	68797		45804	116955		252373	12.12	611620	8.89	
	Japan (M)	18144			39917			30918	1.70			
	New Zealand (M)		66344			112785				499369	7.53	
	Portugal (M)		6382			10849				19939	3.12	
	Singapore		10697			18185				79086	7.39	
	South Korea (M)		19433			33036				167127	8.60	
	Taiwan	19958			43908			56870	2.85			
	Uruguay (M)		222093			377558				1662972	7.49	
	Vietnam	19731	2569		43408	4367		62920	3.19	9634	3.75	
	Total	80909	396315	477224	178000	673736	851735	408493	5.05	3049747	7.70	
2000	Argentina (M)		86773			147514				728793	\$8.40	
	Azerbaijan		37269			63357				360943	\$9.68	
	Chile (M)	33538			73784			400335	\$11.94			
	Mauritius		47069			80017				414921	\$8.82	
	New Zealand (M)		60879			103494				573861	\$9.43	
	Portugal (M)		15240			25908				26499	\$1.74	
	Reunion (M)		23214			39464				203120	\$8.75	
	South Africa (M)		45907			78042				406081	\$8.85	
	South Korea (M)		47042			79971				392141	\$8.34	
	Suriname		7410			12597				16375	\$2.21	
	Uruguay (M)		220605			375029				2076733	\$9.41	
		Total	33538	591408	624946	73784	1005394	1079177	400335	\$11.94	5199467	\$8.79
	1999	Argentina (M)		12508			21264				131207	\$10.49
		Chile (M)	14600	1828		32120	3108		180690	\$12.38	15325	\$8.38
		France (M)		44940			76398				466125	\$10.37
India (M)			21000			35700				24150	\$1.15	
Indonesia		17747			39043			93501	\$5.27			
Mauritius			47933			81486				378675	\$7.90	
New Zealand (M)		312	41872		686	71182		3978	\$12.75	382968	\$9.15	
Portugal (M)			8344			14185				12717	\$1.52	
South Africa (M)			50586			85996				438169	\$8.66	
Spain (M)			29672			50442				263748	\$8.89	
Taiwan			1446			2458				2820	\$1.95	
Uruguay (M)			77012			130920				651360	\$8.46	
		Total	32659	337141	369800	71850	573140	644990	278169	\$8.52	2767264	\$8.21

(M) CCAMLR Member
Source: US NMFS, 2001

In the 6 months to June 2001 Uruguay's share of the US market increased to 47%, Chile supplied 19%, New Zealand 14%, South Korea 4% and Portugal 1%. Non-Members of CCAMLR supplying the US market over this period included Taiwan (4%) and, new suppliers, Vietnam (5%), Japan (4%), Singapore (2%) and Canada (0.5%). It is significant that Mauritius, a major player in the transshipment of IUU caught toothfish in the past, has not exported any Antarctic Toothfish product to the USA in the 6 months to June 2001 despite having exported around 80 t in each of the preceding two years. This could be a positive sign that the undertaking by Mauritius to address its role in IUU fishing is having some effect.

Discussion

There are a number of anomalies apparent in the limited trade data available:

- the New Zealand export and US import data provide significantly different estimates of the extent of trade in Antarctic Toothfish between these two countries;
- the New Zealand export data account for only a small proportion of that country's reported catch of Antarctic Toothfish;
- the bulk of the imports into the USA is from CCAMLR Members and other countries that have not reported catch to CCAMLR; and
- the trade data suggest that there is significantly more Antarctic Toothfish traded than reported as catch to CCAMLR.

Each of these is discussed below.

New Zealand exports and US imports

A comparison of New Zealand export data and US import data for Antarctic Toothfish is possible only for the period May 2000 to June 2001. Monthly trade data during this period indicate that the USA imported 127 t (product weight) of Antarctic Toothfish product from New Zealand. In comparison New Zealand export statistics show only 14 t of product going to the USA. It is likely that imports of 61 t in May 2000 were exported from New Zealand prior to the introduction of the codes in that same month. Excluding this tonnage from the US import data results in a comparison of 66 t of imports and 14 t of exports.

Given that this is the first year of codes for Antarctic Toothfish in New Zealand it is possible that there has been some misclassification of product and that Antarctic Toothfish continued to be classified under the more general category used prior to the introduction of the new codes. This is not uncommon in the initial stages of introduction of new trade codes. A comparison of the New Zealand trade statistics with CDS documents may clarify this.

Given that the USA has been using its Antarctic Toothfish codes for nearly three years it is likely that the US import data are likely to be more accurate. If this is the case it suggests that the New Zealand export data for 2000/01 significantly understate the volume of total exports of Antarctic Toothfish.

Figure 2. Major suppliers of Other frozen Antarctic Toothfish product to the US market, 1999 - June 2001

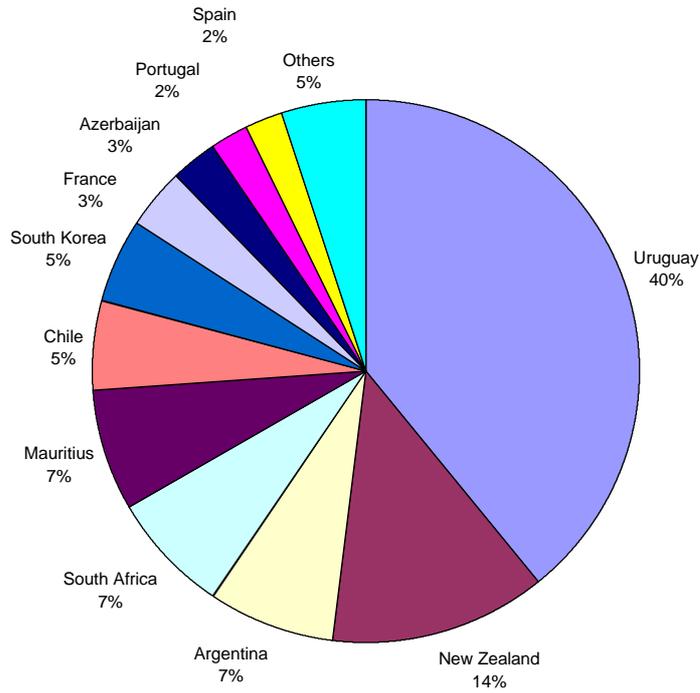
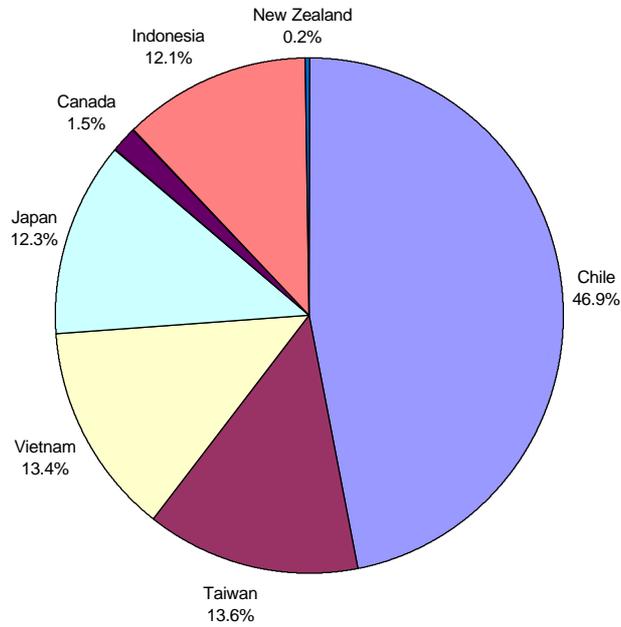


Figure 3. Suppliers of Frozen fillets of Antarctic Toothfish to the US market, 1999 - June 2001



Source: US NMFS, 2001

New Zealand trade and catch data

Exports from New Zealand in the period May 2000 to June 2001 could reflect New Zealand catch of Antarctic Toothfish in both the 1999/00 and 2000/01 seasons since New Zealand fishing in the Ross Sea generally occurs in the warmer months, around January to March. Over those two seasons New Zealand reported catch of 1297 t of Antarctic Toothfish to CCAMLR. The trade statistics, which suggest that between 33 and 59 t (whole weight) of Antarctic Toothfish were exported, do not adequately account for this catch.

There are a number of possible explanations for this. It is possible that not all of the catch of recent years has been placed on the market. There are no data to indicate whether this is the case. However given that the market for toothfish remained strong in the major markets of the USA and Japan there would appear to be little reason to maintain frozen stocks. As indicated earlier, an unknown quantity of the catch from the New Zealand exploratory fishery in 1999/00 was seized pending resolution of legal action against SS Fishing Ltd. It is not clear when this catch was released but it is possible that this catch may not have reached the market until 2001. This could explain some of the apparent discrepancy.

Another explanation could lie in the domestic market for New Zealand catch of Antarctic Toothfish. While New Zealand's seafood industry is relatively large, its domestic market accounts for only 10% of its annual revenues, and most seafood enterprises rely heavily, or almost entirely, on international sales (Brown, Giller and Kennings (1999)). Advice from the New Zealand Seafood Industry Council suggests that the domestic market for Antarctic Toothfish is insignificant (Alistair McFarlane, SEAFIC pers. comm. to Mary Lack 21 September 2001).

The most likely explanation for the discrepancy between exports and catch is that the 2000/01 export data for New Zealand significantly understate the true volume of exports of Antarctic Toothfish. As discussed above imports by the USA from New Zealand are significantly higher than indicated by New Zealand export data. It is also possible that, given the lack of specific trade codes for Antarctic Toothfish and Patagonian Toothfish in importing countries other than the USA exports of Antarctic Toothfish from New Zealand are recorded in those countries' statistics as either *Dissostichus* spp. or misclassified as Patagonian Toothfish. New Zealand has caught less than 8 t of Patagonian Toothfish in the last three seasons and export statistics record no exports of Patagonian Toothfish since May 2000. It is reasonable to assume therefore that imports from New Zealand of toothfish, however classified, would be Antarctic Toothfish. The available import data for the relevant period, 2000 and 2001 was therefore examined. Data was available for Japan (January 2000 to June 2001), the EU (2000 only) and Canada (2000 only). The data revealed that these markets imported the whole weight equivalent of 209 t of toothfish from New Zealand (Anon, 2001c; EUROSTAT, 2001; Statistics Canada, 2001). Together with the US imports (January 2000 to June 2001) from New Zealand of 216 t (whole weight) of Antarctic Toothfish the import data available accounts for 425 t of New Zealand's catch of 1297 t. Even allowing for the fact that import data for 2001 were not available for the EU and Canadian markets the unexplained gap between catch and trade is likely to be significant

Exporters of Antarctic Toothfish that have not reported catch

Catches of Antarctic Toothfish reported to CCAMLR since 1998/99 have been made almost exclusively by New Zealand. In 1998/99 New Zealand took all of the reported catch of 296 t (CCAMLR, 2000a) and in 1999/00, 745 t) of the reported catch of 751 t (CCAMLR WG-FSA, 2000).

Countries exporting Antarctic Toothfish are either (a) both catching and exporting Antarctic Toothfish, or (b) re-exporting imported product caught by another country. CCAMLR statistics indicate that all but 6 tonnes (0.5%) of Antarctic Toothfish reported taken in the two year period 1998/99-1999/00 were taken by New Zealand. However, the CCAMLR data for 1999/00 relates to the 12 months to 30 June 2000. It is possible, therefore, that some of the US imports in the second half of 2000 resulted from legitimate catch by CCAMLR Members in that period. Such catch would appear in the CCAMLR records for 2000/01. However, given the

main areas of distribution of Antarctic Toothfish are in areas where fishing is only possible in the warmer months (January – March) this is considered unlikely.

For this reason it seems reasonable to consider that New Zealand was the only legitimate supplier of significant quantities of Antarctic Toothfish over the 1999 and 2000 period. Any other country both catching and exporting Antarctic Toothfish in significant quantities is implicated in IUU fishing.

Any legitimate re-exports should also have been sourced originally from New Zealand. The limited, and seemingly questionable, New Zealand data for 2000/01 indicate that New Zealand exported only to the USA, Japan and Taiwan in that year. Taiwan imported 5 t in October 2000 and Japan 12 t in December 2000, presumably product from the 1999/00 season. The USA did not import Antarctic Toothfish from Taiwan or Japan in 2000. However both countries have supplied fillets (20 t and 18 t respectively) to the US market in 2001 in quantities in excess of their reported imports from New Zealand. As already discussed the New Zealand statistics are likely to be under-reporting exports and this could explain the discrepancies in the amounts imported and exported. In addition, in both cases Antarctic Toothfish was imported from New Zealand as HGT product and the exports to the USA were in the form of fillets, suggesting the possibility that these exports to the USA were re-exports of processed product. It is possible, therefore, that the exports from Japan and Taiwan to the USA in 2001 are legitimate re-exports.

There is no obvious explanation for the exports of Antarctic Toothfish to the USA in 2000 and 2001 by the other countries identified as suppliers in the US import statistics. It is possible that the New Zealand export data exclude some markets altogether as well as understating the quantities exported to the three identified markets. This may mean that, in addition to Japan and Taiwan, some of the countries identified as suppliers of Antarctic Toothfish to the US market are legitimate re-exporters. The analysis in the previous section, for example, suggests that the EU (United Kingdom and Spain) and Canada imported toothfish from New Zealand in 2000 and could legitimately have re-exported to the USA. This fails to account for the exports of other CCAMLR Members and non-Members to the USA.

Re-exports do not appear to be a feasible explanation for the significant gap between trade and reported catch in Antarctic Toothfish.

COMPARING CATCH AND TRADE

It is clear from the analysis above that the trade data are by no means definitive. The data available are, however, sufficiently robust to allow a comparison to be made between CCAMLR reported catch and trade of Antarctic Toothfish for the two-year period 1999-2000. A summary of the data available is shown in Table 5. The analysis reveals a significant difference between reported catch and recorded trade. The possible explanations for this difference, including the likelihood of IUU fishing for Antarctic Toothfish, are discussed below.

The calculation relies on:

- a) the CCAMLR catch figures of Antarctic Toothfish for the 1998/99 and 1999/00 seasons;
- b) the whole weight equivalent of US imports of Antarctic Toothfish in 1999 and 2000;
- c) the whole weight equivalent of imports of *Dissostichus* spp. from New Zealand in 1999 and 2000 for Japan and Canada, and in 2000 for the United Kingdom and Spain
- d) the whole weight equivalent of exports of Antarctic Toothfish from New Zealand from May to December 2000 to markets other than those included in (b) and (c), in this case only Taiwan; and
- e) an assumption that the New Zealand domestic market accounted for 5% of New Zealand catch of Antarctic Toothfish over 1999 and 2000.

Table 5. Catch and trade of Antarctic Toothfish, 1999 and 2000 (whole weight t)

CCAMLR Reported catch	1047
Trade/Domestic Consumption	
Total US imports of Antarctic Toothfish (inc. those from New Zealand)	1724
Imports of <i>Dissostichus</i> spp. from New Zealand ¹	
- Japan	163
- United Kingdom	71
- Spain	4
- Canada	70
New Zealand exports to countries other than those above	
- Taiwan	9
New Zealand domestic consumption	52
Total trade/consumption	2093
Gap	1046

1. Likely to be Antarctic Toothfish

The above analysis suggests that the catch level of Antarctic Toothfish may be twice as high as that reported to CCAMLR. To the extent that the trade data include re-exported product this estimate may overstate total trade. A conservative estimate of the IUU Gap can be made by assuming that the US import market and the New Zealand domestic markets were the only markets for Antarctic Toothfish in 1999 and 2000. Under this very conservative scenario the difference between reported catch (1047 t) and trade (1776 t) is 729 t. This conservative estimate of trade is still 70% higher than CCAMLR's reported catch.

On the other hand the estimate in Table 5 may be considered to understate total trade/consumption since 48% of New Zealand's catch of 1041 t remains unaccounted for. The USA imported 175 t of Antarctic Toothfish from New Zealand, other countries imported 317 t and domestic consumption is assumed to account for 52 t, leaving 497 t unaccounted for. If this tonnage is added to the total trade/consumption figure of 2093 t the IUU gap increases to 1543 t, suggesting catch could be two and a half times higher than CCAMLR's reported catch figure. As discussed earlier the delayed entry of some New Zealand catch from the 1999/00 season onto the market may account for some of the 497 t that is otherwise unaccounted for in this analysis.

Reasons for the Gap

The explanation for the identified gap between catch and trade could lie in one or more of the following:

1. Antarctic Toothfish is being taken outside the CCAMLR Area.
2. CCAMLR Members not reporting their catch of Antarctic Toothfish in the CCAMLR area to CCAMLR.
3. Non-Members catching Antarctic Toothfish illegally in the CCAMLR Area.
4. Trade figures overstating trade in Antarctic Toothfish.

Each of these is discussed below.

Catch of Antarctic Toothfish outside the CCAMLR Area

It is generally accepted that Antarctic Toothfish are confined to the CCAMLR Area. Based on available scientific information it is extremely unlikely that commercial quantities of Antarctic Toothfish have been taken outside the Area however encounters with individual fish may occur. It would therefore be difficult to sustain an argument that catch of Antarctic Toothfish outside the Area could account for a significant proportion of even the lower estimate of the gap between reported catch and trade identified in this analysis.

CCAMLR Members failing to report catch of Antarctic Toothfish

Failure to report catch of Antarctic Toothfish by CCAMLR Members could result from either misreporting of catch of Antarctic Toothfish, possibly as Patagonian Toothfish, or not reporting catch.

Despite a number of proposals to undertake exploratory fishing in Subareas where Antarctic Toothfish is likely to be found New Zealand has been the only CCAMLR member that has reported catch of Antarctic Toothfish to CCAMLR between 1996/97 and 1999/00. New Zealand's catch has all been taken in the exploratory fishery in Subarea 88.1.

It is unlikely that significant quantities of Antarctic Toothfish would be taken in the established fisheries for *Dissostichus* spp. in Subareas 48.3, 48.4 and 58.5.2 during directed fishing for Patagonian Toothfish given these areas are outside the general distribution of Antarctic Toothfish. While it is possible that small quantities could be taken no Antarctic Toothfish were recorded as taken in these fisheries between 1989/90 and 1999/00.

In other areas where Antarctic Toothfish is most likely to be taken (Subareas/Divisions 88.2, 48.5, 48.6, 58.4.1 and 58.4.2) there has been little fishing effort for *Dissostichus* spp. over the period relevant to this analysis. For example, CCAMLR's effort statistics reveal only five fishing hours, conducted as part of authorised exploratory fishing targeting Patagonian Toothfish, in Subarea 58.4.1 in 1998/99. No catch of Patagonian Toothfish or Antarctic Toothfish was reported.

Given this it seems unlikely that CCAMLR Members are catching Antarctic Toothfish as part of approved exploratory fishing and misreporting it as Patagonian Toothfish either as a result of a failure to correctly identify the species or intentional misreporting. The incentive, other than to minimise reporting effort, to intentionally misreport Antarctic Toothfish as Patagonian Toothfish is in any case unclear.

The alternative scenario is that CCAMLR Members are fishing in the areas where Antarctic Toothfish is likely to be taken without authorisation and hence without reporting catch or effort. CCAMLR estimates indicate that CCAMLR Members were involved in IUU fishing for Patagonian Toothfish up to and including 1998/99 (Lack and Sant, 2001). It is possible therefore that more fishing in these Subareas was undertaken by CCAMLR Members than is reflected in the CCAMLR statistics and that CCAMLR Members took more Antarctic Toothfish than has been reported.

Certainly the US import statistics point to the involvement in trade of Antarctic Toothfish by a number of CCAMLR Members who have not reported catch of this species. This situation needs to be explained. Given that this product entering the USA has, since May 2000, presumably been accompanied by CDS documentation it may be that the CCAMLR catch data for 2000/01 will show a significant increase in reported catch of Antarctic Toothfish by CCAMLR Members.

Non-member catch of Antarctic Toothfish

As discussed above quantitative estimates of IUU catch of Antarctic Toothfish are not available from CCAMLR. CCAMLR's view is that the level of IUU fishing in Subareas 88.1, 48.1 and 48.2 is "probably low". This seems likely, at least in Subarea 88.1, where New Zealand has been actively fishing and has also undertaken surveillance activity with no reports of IUU fishing. CCAMLR has not provided either a qualitative or quantitative estimate of IUU fishing in the other Subareas where Antarctic Toothfish is likely to be taken.

It is quite possible that prior to the introduction of the CDS in May 2000 IUU catch of Antarctic Toothfish was being sold into markets such as the USA. However since that time it is difficult to understand how such product could continue to enter the USA. It is unlikely that the USA would be accepting product that claimed to be taken outside the CCAMLR Area, given that it is well known that Antarctic Toothfish, unlike Patagonian Toothfish, is confined to the CCAMLR Area. Therefore even if IUU fishing for Antarctic Toothfish is occurring the method by which this product is finding its way on to the market is unclear.

Possible overstatement of trade

It is accepted that the trade analysis is limited and subject to considerable uncertainty. One area of uncertainty relates to the precise product type included in some trade codes. Of particular concern in this analysis has been the lack of specification of product type in the Other frozen category of US imports. As discussed earlier, this product has been assumed to be HGT and the corresponding conversion factor of 1.7 applied to estimate the whole weight equivalent. To the extent that other product types such as trunks or collars are included in this category this analysis may overstate the whole weight equivalent of these imports and result in an overestimation of trade. In the absence of more specific trade codes it is hoped that the CDS documentation will allow more accurate estimates in the future.

However, it is not believed that the deficiencies in the trade statistics themselves provide an explanation of the gap. If, for example, none of the US imports of Other frozen product are converted to whole weight US imports would stand at 1074 t. Even under this scenario trade exceeds reported catch by 350t.

Summary

It seems unlikely that catches outside the CCAMLR Area or deficiencies in the trade statistics can account for the identified gap between reported catch and trade.

The more likely explanation appears to lie with IUU fishing resulting from unreported catch by CCAMLR Members in the CCAMLR Area or catch by non-Members in the Area. The means by which product from either of these sources is circumventing the CDS to reach markets such as the USA is unclear.

CONCLUSIONS

The analysis of trade in Antarctic Toothfish is severely compromised by the availability of reliable trade data specific to this species and anomalies in the data that are available.

Despite its limitations the above analysis suggests strongly that CCAMLR catch data do not give an accurate picture of total removals of Antarctic Toothfish from the CCAMLR Area. There appears to be an IUU gap of between 729 and 1543 t suggesting that total removals could be between 70% and 147% higher than that recorded by CCAMLR. Accepting even the lower of these estimates implies that CCAMLR is seriously underestimating catch of this species.

Of the data available the US import data are considered to be the most reliable. This data identifies CCAMLR Members as the main source of Antarctic Toothfish imports. Nearly 85% of the imports of Antarctic Toothfish into the USA are from CCAMLR Member countries. Since only New Zealand has reported catch to CCAMLR other CCAMLR Members are implicated in IUU fishing for Antarctic Toothfish. In addition, the analysis implicates a number of non-Member countries as potentially being involved in the catch and or trade of IUU-caught Antarctic Toothfish.

In light of these findings the credibility of CCAMLR's current management arrangements for Antarctic Toothfish is called into question.

In authorising 6 vessels to operate in Subarea 88.1 in 2000/01 CCAMLR appears to have ignored the concerns expressed by Australia, New Zealand and the USA. Based on stated intentions for 2001/02 interest in exploratory fishing in areas where Antarctic Toothfish is likely to be taken is increasing. Despite an earlier indication from New Zealand that they would consider a moratorium on the fishing of toothfish in the Ross Sea area (New Zealand Ministry of Fisheries, 2000) it seems likely that it will seek to undertake further exploratory fishing for *Dissostichus* spp. in 2001/02.

CCAMLR has responded in a seemingly cavalier fashion to its Scientific Committee's concerns about the integrity of the so-called precautionary catch levels in exploratory fisheries. It has ignored concerns expressed by a number of its Members about the level of exploratory fishing for *Dissostichus* spp. Such

actions must bring into question CCAMLR's commitment to precautionary management. CCAMLR has overseen the depletion of a number of Patagonian Toothfish stocks to dangerously low levels. It does not appear to have learned from this experience. Antarctic Toothfish provide the Commission with an opportunity to implement sound precautionary management from the very early stages of commercial fishing. The species is wholly within the CCAMLR Area and that makes the management task relatively easier than for Patagonian Toothfish. It also means that CCAMLR must take full responsibility for the long-term future of Antarctic Toothfish and bear the full blame if this future is jeopardised by overfishing.

RECOMMENDATIONS

The following aspects of management, catch and trade in Antarctic Toothfish require urgent attention if this species is to be managed sustainably.

1. CCAMLR must acknowledge and respond to the findings of this analysis that suggest that Antarctic Toothfish is likely to be the subject of IUU fishing and that CCAMLR Members are implicated in this activity.
2. CCAMLR should examine the CDS data for Antarctic Toothfish carefully in order to clarify the anomalies identified in the trade data examined in this study. In particular the issue of which CCAMLR countries are legitimately involved in re-exporting needs to be examined in order that those countries are not implicated unfairly in IUU fishing.
3. The CDS must be used to monitor trade in both Patagonian Toothfish and Antarctic Toothfish. In 2000 CCAMLR's analysis of preliminary CDS documentation was based on data for both species grouped together. The data is collected on a species basis and should be analysed in the same way.
4. Those CCAMLR Members identified as supplying Antarctic Toothfish to the US market since January 1999 but which have not reported catch to CCAMLR should be asked to explain the source of the product. Examination of CDS data may provide this information for the period from May 2000.
5. To facilitate the use of trade statistics CCAMLR should reinforce its earlier recommendation that Members introduce trade codes specific to Patagonian Toothfish and Antarctic Toothfish.
6. Further, countries should be encouraged to identify a sufficient number of codes to allow meaningful identification of product type. The New Zealand codes are a good example of how this might be done. Where new codes are introduced countries need to ensure that sufficient information is provided to exporters to minimise misclassification.
7. In the light of the uncertainty over the true level of removals of Antarctic Toothfish and the areas of CCAMLR from which these removals have occurred, CCAMLR must reconsider whether its current approach to exploratory fishing for Antarctic Toothfish is consistent with precautionary management. If the current approach is found wanting CCAMLR must take steps to address it.
8. CCAMLR should not authorise any further exploratory fishing targeting Antarctic Toothfish until it has addressed the above recommendations.

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CCAMLR CONSERVATION MEASURES

Conservation Measure 200/XIX^{1,2}

General Measures for Exploratory Fisheries for *Dissostichus* spp. in the Convention Area in the 2000/01 Season

The Commission, Noting the need for the distribution of fishing effort and catch in fine-scale rectangles³ in these exploratory fisheries, hereby adopts the following conservation measure:

1. This conservation measure applies to exploratory fisheries using the trawl or longline methods except for such fisheries where the Commission has given specific exemptions to the extent of those exemptions. In trawl fisheries, a haul comprises a single deployment of the trawl net. In longline fisheries, a haul comprises the setting of one or more lines in a single location.

2. Fishing should take place over as large a geographical and bathymetric range as possible to obtain the information necessary to determine fishery potential and to avoid over-concentration of catch and effort. To this end, fishing in any fine-scale rectangle shall cease when the reported catch reaches 100 tonnes and that rectangle shall be closed to fishing for the remainder of the season. Fishing in any fine-scale rectangle shall be restricted to one vessel at any one time.

3. In order to give effect to paragraph 2 above:

(i) the precise geographic position of a haul in trawl fisheries will be determined by the mid-point of the path between the start-point and end-point of the haul;

(ii) the precise geographic position of a haul in longline fisheries will be determined by the centre-point of the line or lines deployed;

(iii) catch and effort information for each species by fine-scale rectangle shall be reported to the Executive Secretary every five days using the Five-Day Catch and Effort Reporting System set out in Conservation Measure 51/XIX; and

(iv) the Secretariat shall notify Contracting Parties participating in these fisheries when the total catch for *Dissostichus eleginoides* and *Dissostichus mawsoni* combined in any fine-scale rectangle is likely to reach 100 tonnes, and fishing in that fine-scale rectangle shall be closed when that limit is reached.

4. If the by-catch of *Macrourus* spp. in any one haul

- is greater than 100 kg and exceeds 18% of the total catch of all fish by weight, or

- is equal to or greater than 2 tonnes, then

the fishing vessel shall move to another location at least 5 n miles distant⁴. The fishing vessel shall not return to any point within 5 n miles of the location where the by-catch of *Macrourus* spp. exceeded 18% for a period of at least five days⁵. The location where the by-catch exceeded 18% is defined as the path followed by the fishing vessel from the point at which the fishing gear was first deployed from the fishing vessel to the point at which the fishing gear was retrieved by the fishing vessel.

5. The by-catch of any species other than *Macrourus* spp. in the exploratory fisheries in the statistical subareas and divisions concerned shall be limited to the following:

- in small-scale research units (SSRUs) in Subarea 48.6, Division 58.4.2 and Subarea 88.1 south of 65°S, and on BANZARE Bank, the by-catch of any species shall be limited to 50 tonnes; and

- in other SSRUs, the by-catch of any species shall be limited to 20 tonnes.

For the purposes of by-catch catch limits, skates and rays will be counted as a single

species. If the by-catch of any one species exceeds 2 tonnes on any one haul, then the fishing vessel shall move to another location at least 5 n miles distant⁴. The fishing vessel shall not return to any point within 5 n miles of the location where the by-catch exceed 2 tonnes for a period of at least five days⁵. The location where the by-catch exceeded 2 tonnes is defined as the path followed by the fishing vessel from the point at which the fishing gear was first deployed from the fishing vessel to the point at which the fishing gear was retrieved by the fishing vessel.

6. The total number and weight of *Dissostichus eleginoides* and *Dissostichus mawsoni* discarded, including those with the 'jellymeat' condition, shall be reported.

7. Each vessel participating in the exploratory fisheries for *Dissostichus* spp. during the 2000/01 season shall have one scientific observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation, and where possible one additional scientific observer, on board throughout all fishing activities within the fishing season.

8. The data collection plan (Annex 200/A) and research plan (Annex 200/B) shall be implemented. Data collected pursuant to the Data Collection and Research Plans for the period up to 31 August 2001 shall be reported to CCAMLR by 30 September 2001 so that the data will be available to the meeting of the Working Group on Fish Stock Assessment (WG-FSA) in 2001. Such data taken after 31 August shall be reported to CCAMLR not later than three months after the closure of the fishery, but, where possible, submitted in time for the consideration of WG-FSA.

- 1 Except for waters adjacent to the Kerguelen and Crozet Islands
- 2 Except for waters adjacent to the Prince Edward Islands
- 3 A fine-scale rectangle is defined as an area of 0.5° latitude by 1° longitude with respect to the northwest corner of the statistical subarea or division. The identification of each rectangle is by the latitude of its northernmost boundary and the longitude of the boundary closest to 0°.
- 4 This provision concerning the minimum distance separating fishing locations is adopted pending the adoption of a more appropriate definition of a fishing location by the Commission.
- 5 The specified period is adopted in accordance with the reporting period specified in Conservation Measure 51/XIX, pending the adoption of a more appropriate period by the Commission.

Conservation Measure 210/Xix

Exploratory Longline Fishery for *Dissostichus* spp. in Statistical Subarea 88.1 in the 2000/01 Season

The Commission hereby adopts the following conservation measure in accordance with Conservation Measure 65/XII:

1. Fishing for *Dissostichus* spp. in Statistical Subarea 88.1 shall be limited to the exploratory longline fishery by New Zealand, South Africa and Uruguay. The fishery shall be conducted by three New Zealand, two South African and one Uruguayan-flagged vessels using longlining only.
2. The precautionary catch limit north of 65°S in Statistical Subarea 88.1 shall be limited to 175 tonnes of *Dissostichus* spp. In the event this limit is reached, the fishery north of 65°S shall be closed.
3. The precautionary catch limit south of 65°S in Statistical Subarea 88.1 shall be limited to 1 889 tonnes of *Dissostichus* spp. In the event this limit is reached, the fishery south of 65°S shall be closed. In order to ensure an adequate spread of fishing effort south of 65°S, no more than 472 tonnes of *Dissostichus* spp. shall be taken from each of the four small-scale research units (SSRUs), as defined in Annex 200/B of Conservation Measure 200/XIX, identified for Statistical Subarea 88.1 south of 65°S.
4. For the purposes of this exploratory longline fishery, the 2000/01 fishing season is defined as the period from 1 December 2000 to 31 August 2001.
5. The directed longline fishery for *Dissostichus* spp. in Statistical Subarea 88.1 shall be carried out in accordance with all aspects of Conservation Measures 29/XIX and 200/XIX with the exception of paragraph 6 below.
6. South of 65°S the directed fishery for the above species shall be carried out in accordance with the provisions of Conservation Measures 200/XIX and 29/XIX, except paragraph 3 (night setting) of Conservation Measure 29/XIX shall not apply. Prior to licensing, each vessel shall demonstrate its capacity to comply with experimental line-weighting trials as approved by the Scientific Committee and attached as Annex 210/A and such data shall be reported to CCAMLR immediately. South of 65°S, longlines may be set during daylight hours only if the vessels are demonstrating a consistent minimum line sink rate of 0.3 metres per second. Any vessel catching a total of three (3) seabirds shall immediately revert to night setting in accordance with Conservation Measure 29/XIX.
7. Each vessel participating in the fishery shall have at least two scientific observers, one of whom shall be an observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation, on board throughout all fishing activities within this fishery.
8. Each vessel participating in this exploratory longline fishery shall be required to operate a VMS at all times, in accordance with Conservation Measure 148/XVII.
9. Fishing for *Dissostichus* spp. in Statistical Subarea 88.1 shall be prohibited within
- 10 n miles of the coast of the Balleny Islands.
10. There shall be no offal discharge in this fishery.
11. All vessels shall be prohibited from discharging in this area: oil or fuel products or oily residues into the sea, except as permitted in Annex I of MARPOL 73/78; disposal of garbage; food wastes not capable of passing through a screen with openings no greater than 25 mm; or sewage within 12 n miles of land or ice shelves; or sewerage while the ship is travelling at a speed of less than 4 knots.

HARMONISED SYSTEM CODES FOR *DISSOSTICHUS* SPP.**New Zealand****Antarctic toothfish (*Dissostichus mawsoni*)**

0302690161 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), whole

0302691161 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), headed and gutted

0302691961 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), other than whole or headed and gutted

0304100094 Fish; fillets and other fish meat (whether or not minced), fresh or chilled

0303790191 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), whole

0303791191 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), headed and gutted

0303791992 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), other than whole or headed and gutted

0304200092 Fish; fillets, frozen

Patagonian toothfish (*Dissostichus eleginoides*)

0302690169 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), whole

0302691169 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), headed and gutted

0302691969 Fish; fresh or chilled (excluding fillets, livers, roes and other fish meat of heading no 0304), other than whole or headed and gutted

0304100095 Fish; fillets and other fish meat (whether or not minced), fresh or chilled

0303790193 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), whole

0303791193 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), headed and gutted

0303791993 Fish; frozen (excluding fillets, livers, roes and other fish meat of heading no 0304), other than whole or headed and gutted

0304200093 Fish; fillets, frozen

United States

0303.79.40.94 Antarctic toothfish, frozen, excluding fish fillets and other fish meat of heading 0304

0304.20.60.94 Antarctic toothfish, fish fillets and other fish meat (whether or not minced) fresh, chilled or frozen

0303.79.40.93 Patagonian toothfish, frozen, excluding fish fillets and other fish meat of heading 0304

0304.20.60.93 Patagonian toothfish, fish fillets and other fish meat (whether or not minced) fresh, chilled or frozen