



# Ling

## FISHERIES PLAN CHAPTER

September 2011



# Introduction

This chapter of the National Deepwater Plan sets the operational objectives and performance criteria for the ling fishery and key related fisheries. Specifically, it addresses the management of the following quota management target and bycatch species and stocks:

- Ling (target): LIN3, LIN4, LIN5, LIN6, and LIN7
- Ribaldo (bycatch): RIB3, RIB4, RIB5, RIB6, RIB7, and RIB8
- Patagonian toothfish (target): PTO1

Note that not all stocks of ling and ribaldo are managed as deepwater fisheries, LIN1 and LIN2, RIB1, RIB2, and RIB9 are managed as inshore fisheries by the Ministry for Primary Industries (MPI) Inshore Fisheries Management Team. This distinction is because the majority of the fishing in those quota management areas is undertaken by the inshore fleet. The specific management of these stocks will be addressed through the Ministry's Inshore Finfish Plan.

Throughout this chapter, all references to ling fisheries refer only to those stocks covered under this plan (e.g. LIN3-LIN7). This chapter also sets out the current management regime with respect to any environmental effects caused by fishing these species.

This chapter consists of the following sections:

1. Overview of the ling fisheries
2. Overview of non-target (bycatch and incidental) interactions
3. Operational objectives for the ling fisheries
4. Performance measurement against objectives

## 1. Overview of the ling fisheries

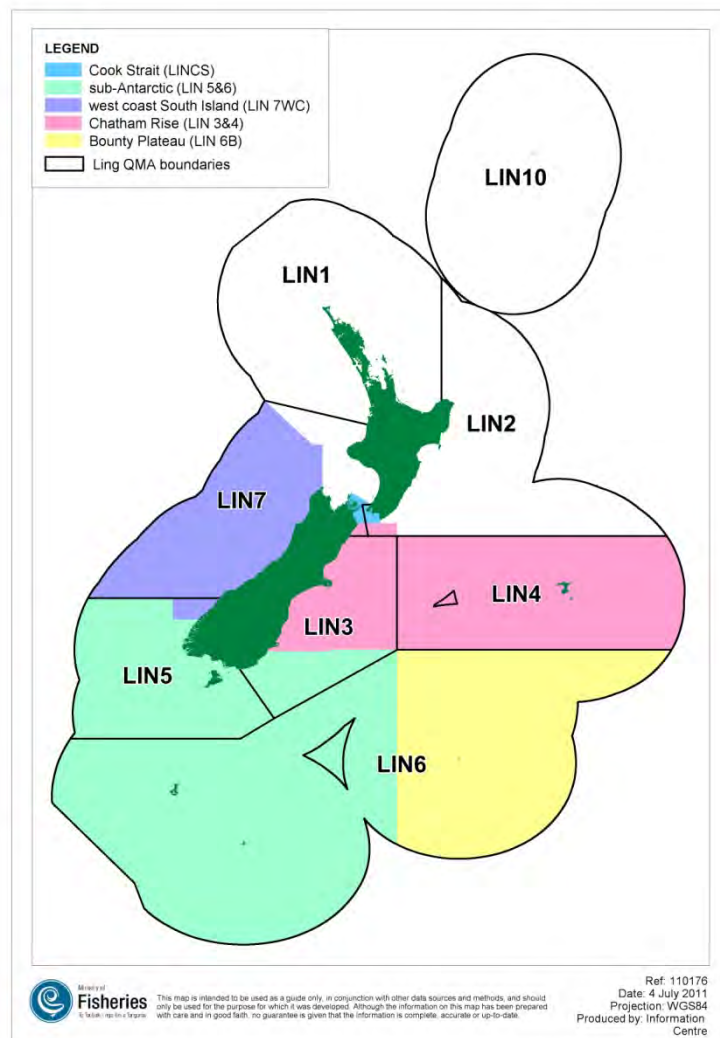


Figure 1: Map of the ling biological stocks (coloured areas) and Quota Management Areas

### Biology overview

Ling (*Genypterus blacodes*) are distributed throughout New Zealand waters, but are more abundant south of latitude 40° S. Ling occur at depths between 25m and 1000m, with greatest abundance at 300m to 550m. Ling are predominantly bottom dwelling fish and feed mainly on crustaceans. They are also caught well above the bottom when, for example, they feed on hoki.

The maximum age of ling is about 30 years. Growth rates have been found to vary between areas, with the fastest growth recorded in Cook Strait and the slowest on the Campbell Plateau. Little is known about the distribution of juvenile ling until they are about 40 cm total length, when they begin to appear in trawl catches.

A review of the biological stock structure of ling was conducted in 2005<sup>1</sup>. This indicated that there are at least five discrete stocks, west coast South Island (LIN 7WC), Chatham Rise (LIN 3&4), Cook

<sup>1</sup> Horn, P. A review of the stock structure of ling (*Genypterus blacodes*) in New Zealand waters. Fisheries Assessment Report 2005/59.

Strait (LIN CS), Bounty Plateau (LIN 6B), and the sub-Antarctic (LIN 5&6) stocks (Figure 1). The distribution of the Cook Strait stock may extend some distance up the east coast of the North Island, but there is no information to indicate how far north it extends, i.e. where the exact boundary between LIN CS and LIN 2 lies.

The timing of spawning appears to vary between the five areas: occurring in July to September off the west coast of the South Island and in Cook Strait; July to November on the Chatham Rise; September to December on Campbell Plateau and Puysegur Bank; and September to February on the Bounty Plateau.

For more detailed information on the biology of ling and the current status of the stocks see the current MPI Stock Assessment Plenary available on the Ministry’s website ([www.fish.govt.nz](http://www.fish.govt.nz)).

## Fisheries management overview

Ling was introduced into the Quota Management System (QMS) in 1986 and since that time the Quota Management Area (QMA) boundaries have not changed. As described above, the five biological stocks of ling do not align with the quota management areas. Stock assessments for ling fisheries are completed based on biological stock, rather than QMAs (Table 1).

**Table 1: The relationship between biological stock areas (stock assessment areas) and Quota Management Areas (QMAs).**

Biological stock	QMA(s)
Chatham Rise	LIN3 and LIN4
Sub-Antarctic	LIN5 and part of LIN6
West coast South Island	Part of LIN7
Cook Strait	Parts of both LIN2 and LIN7
Bounty Plateau (LIN 6B)	Part of LIN6

The main fisheries for ling generally align with the biological stocks. Catch limits for ling fisheries, however, are based on the QMAs. To avoid possible confusion in the use of the terms ‘stock’ and ‘fishery’, in this document, the terms ‘fishery’ and ‘biological stock’ will be used to refer to the biological stock as described above. All other references to ‘stock’ will refer to ling QMAs.

All ling stocks managed under the National Deepwater Plan are Tier 1<sup>2</sup> stocks as they are considered high volume and/or high value fisheries. As noted earlier, there is a proportion of catch in some of the fisheries covered by this chapter that is taken by inshore vessels. References to the ‘inshore’ fleet indicate the fishing activity that is carried out on any vessel that is less than 28 m overall length.

The temporal and spatial overlap of ling trawl fishing with the hoki fishery means that management measures implemented in the hoki fishery also impact on ling catch and fishing operations. During the hoki quota reductions from 2001 to 2004, ling catches declined proportionately as less fishing for hoki took place. Ling was not sufficiently profitable to replace hoki as a major target species or in some areas was not able to be caught without significant hoki bycatch. Fishing effort for ling also depends on export price, as indicated by a brief increase in targeted fishing for ling in 2007/08 when export prices rose.

<sup>2</sup> High volume and/or high value fishery

## Management approach

### Stock management

The current management approach for all five biological ling stocks is based on frequent stock assessments and leads to regular reviews of the TAC/TACCs. Stock status is determined using the best available scientific information. These TAC/TACC reviews are conducted and other management responses implemented to ensure the stocks are managed within the default biological targets and limits as set out in the Harvest Strategy Standard (Table 2).

**Table 2: Default reference points and associated management response used in ling fisheries**

Reference point	Management response
Management target of 40% B <sub>0</sub>	The stock is permitted to fluctuate around this management target. TAC/TACC changes will be employed to move stock toward or above target.
Soft limit of 20% B <sub>0</sub>	A formal, time-constrained rebuilding plan will be implemented if this limit is reached.
Hard limit of 10% B <sub>0</sub>	The limit below which a fishery will be considered for closure.
Rebuild strategy	To be determined.
Harvest control rule	Management actions focussed on adjusting fishing mortality determined following consideration of the results of stock assessments and in some cases, forward projections under a range of catch assumptions, guided by the biological reference points.

Stock assessment models have been accepted for all five biological stocks managed under the National Deepwater Plan over recent years. The current status of accepted assessments for stocks is shown in Table 3. Assessments are based on information from the catch history, trawl surveys, catch-at-age data and estimates of biological parameters. Stock specific details can be found in the fishery overviews later in this document.

**Table3: The relationship between biological stock areas (stock assessment areas) and Quota Management Areas (QMAs).**

Biological Stock	QMAs	Date of most current accepted stock assessment
Chatham Rise	LIN 3 and LIN 4	2011
Sub-Antarctic	LIN 5 and part of LIN 6	2011
West coast South Island	part of LIN 7	2008
Cook Strait	parts of both LIN 2 and LIN 7	2010
Bounty Plateau	part of LIN 6	2006

Due to the incongruence between the biological stocks and the QMA boundaries, should any future stock sustainability concerns arise in deepwater ling fisheries, they would likely be addressed

through a combination of TAC/TACC reductions and area-based catch limits agreed with industry<sup>3</sup>. There are no such mechanisms in place, or necessary, in any ling fishery at present.

**Management need:**

To develop and agree specific harvest strategies for each ling stock included in this plan

To develop a management tool or tools to manage ling fisheries on the basis of biological stocks

*Collaborative Management*

DWG is the commercial stakeholder organisation representing the majority of deepwater and middle-depth fisheries, based on a mandate from the quota owners of the associated QMA stocks. In total, 90% of ling quota for QMAs LIN 3-LIN 7 is owned by companies that are represented by Deepwater Group Ltd (DWG).

In 2010 the Ministry of Fisheries (now MPI) and DWG signed a Memorandum of Understanding (MOU) that established a structured partnership for the Ministry and the deepwater fishing industry to collaborate in managing New Zealand's deepwater fisheries. This MOU updates and replaces the initial MOU signed in 2008 and recognises the maturing relationship between both parties that has evolved since the first MOU was signed in 2006.

Areas where this collaborative partnership operates include:

- Ensuring industry support for and commitment to management approaches even when management interventions result in reduced catch allocations or fishing restrictions;
- Developing innovative solutions to fisheries management issues, such as catch spreading arrangements within QMAs and mitigating risks to protected species;
- Enabling industry to bring commercial acumen and expertise to the procurement of research and other services that will lead to better value for money.
- Providing more effective opportunities to implement the informed and assisted compliance model

Both parties consider that acting in isolation is less effective and that greater benefits will be best achieved through continuing the partnership arrangement. The intention of the MOU is to capture those benefits in an explicit and transparent manner.

As noted previously, there is a substantial inshore component to some of the ling fisheries. Of the areas covered by this plan, LIN 7 has the least representation through DWG, with only 71% of quota represented. In order to engage efficiently with the inshore fleet, the Fisheries Management Deepwater Team will continue to work with the Inshore Fisheries Management Team to ensure appropriate engagement with 'inshore' quota-owners and operators.

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<sup>3</sup> Similar to those in both orange roughy (i.e. ORH 3B and ORH MEC) and hoki fisheries

## Commercial fishery overview

Records from the fisheries begin in the 1970s, when foreign longliners began fishing for ling, but soon expanded to include large foreign and domestic trawlers, small domestic longliners and small domestic trawlers.

In recent years, the fisheries continue to be prosecuted by both deepwater and inshore vessels using a variety of methods. The main fishing method and proportion of catch taken by inshore vessels differs by fishery and will be described in more detail later in this chapter.

The deepwater trawl fleet fishes predominantly on the west coast of the South Island and in the sub-Antarctic fishery at Puysegur Bank and the slope of the Stewart-Snares shelf (see Figure 13). Between 2001/02 and 2010/11, trawlers greater than 28 m have taken 55-71% of the annual ling catch from the fisheries covered in this chapter. A significant amount of ling is taken as bycatch in trawl fisheries for hoki, hake, and silver warehou.

The deepwater longline fleet consists of several autoliners which take the majority of the bottom longline proportion of the catch. These vessels almost exclusively target ling, with most of the catch coming from the sub-Antarctic and Chatham Rise fisheries. The Bounty Platform fishery is fished almost entirely by this fleet, but catches are smaller than those in the sub-Antarctic and Chatham Rise fisheries. Between 2001/02 and 2010/11, deepwater bottom longliners have taken 15-31% of the annual ling catch from fisheries covered in this chapter.

Inshore vessels catch ling primarily from the west coast South Island fishery south of Hokitika Canyon, with over 50% of catches in that fishery coming from inshore vessels in 2009-10. Overall, in fisheries covered in this chapter, inshore vessels have caught 9-22% of the total annual catch. This proportion has been increasing in recent years. Within the inshore fleet, 60% of catches are taken by longlining and about 30% by trawling, with the remainder taken by other methods such as setnetting, drop lining, and as a bycatch in blue cod potting.

The four main target species for ling catches are ling, hoki, hake, and silver warehou. The catches of ling by fishing for these target species are given by fishing method in Table 4.

**Table 4: Estimated catch<sup>4</sup> (in tonnes) of ling in LIN 3-LIN 7 by target species and fishing method (BLL – bottom longline; BT – bottom trawl; MW – midwater trawl and SN – setnet)**

Target species	LIN				HOK		HAK		SWA
	BLL	BT	MW	SN	BT	MW	BT	MW	BT
Fishing Yr									
2001/02	5,764	1,666	1,356	144	7,116	1,142	366	4	155
2002/03	4,905	1,815	1,815	122	6,839	1,153	481	10	41
2003/04	4,894	2,183	2,710	113	6,562	1,251	563	6	16
2004/05	4,590	3,375	0	78	4,866	875	656	5	90
2005/06	3,489	4,041	18	78	2,757	740	236	4	136
2006/07	3,744	5,579	196	119	2,564	306	414	3	326
2007/08	4,834	5,394	81	85	2,800	152	551	1	342

<sup>4</sup> Estimated catch indicates information from catch effort reporting forms. These forms are filled out at sea and represent an estimation of the amount of catch for the top 5-8 species caught only. However, they are filled out for each tow completed and include information such as target species, fishing method, statistical area, and other information that is helpful in determining characteristics of a fishery.

2008/09	4,064	3,426	0	88	1,726	162	664	1	477
2009/10	4,505	2,138	0	98	2,459	250	424	2	399
2010/11	3,851	2,541	0	71	2,207	267	374	0	287

The timing of fishing for ling varies by area, with peak catches being taken in September on the Chatham Rise, October in the sub-Antarctic, May-July in Cook Strait and the west coast of the South Island, and March-May on the Bounty Platform. With the exception of the Bounty Platform fishery, ling fisheries overlap both spatially and temporally with hoki fishing activity and many vessels that are engaged in the hoki fishery take ling as bycatch.

## Environmental overview

The fishing methods used in ling fishing have different environmental effects. Information on the nature and extent of the interactions between the ling fisheries and the environment is predominantly from commercial fishing trips that carried a Ministry observer. Observer coverage in ling fisheries has varied widely by fleet. The highest coverage has historically been in the deepwater fisheries. Coverage levels for the period 2004/05 to 2009/10 are shown in Table 5. Currently, the longline vessels are split into 'small' and 'large' vessels with small being < 34 m and large as ≥ 34 m. This will be adjusted in future years to be split at 28 m as used in the National Deepwater Plan to differentiate between deepwater and inshore vessels.

**Table 3: Observer coverage of ling target fisheries from 2004/05 to 2009/10**

Fishing year	% Coverage (by tow/# of hooks)		
	Trawl	≥ 34 m BLL	< 34 m BLL
2004/05	7.7	16.0	0.5
2005/06	8.1	27.0	0.0
2006/07	9.5	15.7	6.5
2007/08	10.8	24.1	3.8
2008/09	10.3	27.5	8.5
2009/10	16.6	9.3	

Trawl fisheries interact with seabirds and marine mammals, particularly New Zealand fur seals, sometimes causing incidental mortalities. Trawlers utilising bottom trawl gear and those that use mid-water trawl gear on the bottom also interact with the seabed, the associated benthic environment, flora and fauna.

Longline fisheries for ling are known to interact with seabirds, and occasionally with marine mammals, sometimes causing incidental mortalities. While the effects of longlining on the benthic habitat are much less than those resulting from bottom trawling, benthic interactions do occur.

Information on the environmental interactions of inshore vessels is limited, as observer coverage in these fisheries has been low, and there was no legislative requirement under the Fisheries Act 1996 to report non-fish bycatch until 1 October 2008. In 2008/09 a programme was initiated that focused on monitoring inshore fisheries for the capture of protected species. As information becomes available, the environmental interactions of these fisheries will be analysed and considered.

Where interactions with protected species and/or the marine environment are determined to be having an adverse effect, management intervention is required to avoid, remedy or mitigate such



effects. A key focus of the National Deepwater Plan is to ensure that adverse effects are avoided or mitigated and that deepwater fisheries manage interactions with protected species and the marine environment appropriately. This is currently being achieved both through regulations and the range of non-regulatory measures that are implemented by industry and monitored and audited by the Ministry.

**Table 6: Regulatory and non-regulatory measures to reduce effects of fishing for ling on the environment**

	Measure	Description	Status
Bottom Longliners	Circular No. F541	All longliners must comply with a range of options restricting longline setting time in conjunction with line weighting as well as offal management.  In addition, longline vessels $\geq 7$ m in length must use a streamer line during the setting of bottom longlines.	Regulatory
	Circular No. F517	Trawlers >28 m in length overall are required to carry approved seabird scaring devices and must deploy a device as soon as practicable after shooting the net and for as long as practicable prior to hauling.	Regulatory
Trawlers >28m	Vessel Management Plan (VMP)	A vessel-specific plan which specifies seabird mitigation devices to be used, offal management procedures, incident response requirements and other techniques or processes in place to minimise risk to seabirds from fishing operations.	Non-regulatory, required by DWG and by the Ministry for FCV registration, audited by the Ministry
	Marine Mammal Operating Procedure (MMOP)	Generic ,fleet-wide procedure aimed at minimising risks of capture of marine mammals, ensuring safe and correct handling of marine mammals, incident response requirements, and collection of information to improve mitigation of marine mammal incidental captures.	Non-regulatory, required by DWG, audited by the Ministry
All trawlers	Benthic Protection Areas (BPAs)	Areas in which bottom trawling and dredging is prohibited, and mid-water trawling is tightly controlled. BPAs cover ~30% of the New Zealand EEZ.	Regulatory
	Seamount Closures	17 underwater topographic features are closed to all types of trawling. Twelve of these features are seamounts that rise more than 1,000 m from the seafloor.	Regulatory

Section 2 provides more information on the extent of environmental interactions in ling target fisheries.

## Economic overview

Three companies hold 59% of ling quota for stocks managed under the National Deepwater Plan. Eighty percent of the quota is currently held by seven companies. In June 2010 the market value of ling quota was estimated to be NZ \$246.2 million.

In 2011, ling was the eighth most valuable seafood export for New Zealand, with 4,148 tonnes of product exported, realising a value of NZ \$39.7 million (see Table 7). The principle export markets are Japan, Hong Kong, and Spain. Ling is mainly exported in frozen form, either as fillets or trunks (headed and gutted). There can be a slight price difference between longline-caught and trawl-

caught ling, however this is market dependant and is not consistent, depending on multiple factors, and is unlikely to affect the overall value of ling fisheries.

**Table 7: Total export volume and value of ling for calendar years 2007-2011.**

Calendar year	Export volume (tonnes)	Export value (millions NZ)
2007	4,920	\$45.9
2008	4,123	\$35.4
2009	4,911	\$34.9
2010	4,976	\$39.5
2011	4,570	\$39.7

Source: New Zealand Seafood Exports – Seafood Industry Council

The ling fisheries covered in this plan may be considered for certification by a credible third party as a sustainable fishery. Certification would provide access to those markets that only desire certified seafood and may lift the value of ling products and in turn, the value of quota.

**Management need:**

To enable quota holders to develop and implement a harvest regime that will maximise the economic benefits returned from the fishery

To support the ling fisheries in achieving and maintaining certification by an independent third party as sustainably managed fisheries

## Compliance overview

Ling fisheries are subject to a number of regulatory measures aimed at ensuring the fisheries are managed to achieve long-term sustainability. All vessels fishing in New Zealand waters that are greater than 28 m in length, or that fish for orange roughy or scampi, are required to carry an automatic location communicator. Signals from each vessel are then monitored in near real-time for positional data through a vessel monitoring system (VMS). Further work will be undertaken through the implementation of this chapter to identify and assess compliance risks in these fisheries. However, the following compliance risks have been identified as being of particular relevance to ling fisheries and these are described in more detail below:

1. Area misreporting
2. Discarding
3. Failure to comply with environmental mitigation regulations

### *Area misreporting*

Area misreporting, known colloquially as ‘trucking’, occurs when fish caught in one quota management area (QMA) is deliberately misreported as caught in another. This activity is illegal in New Zealand waters. The primary motive behind this type of offence is to minimise the cost of acquiring Annual Catch Entitlement (ACE) or to avoid paying deemed value charges.

Area misreporting is a known issue in ling fisheries, particularly in LIN 5 and LIN 6 where there have been a number of investigations and successful prosecutions. The TACC is lower for LIN 5 than LIN 6 and is fully caught most years. This leads to increased ACE prices for LIN 5 as ACE for this stock becomes less available. LIN 6 has a much larger TACC, and thus lower ACE prices, as the TAC is

undercaught every year. This has led to some fishers targeting and catching ling in LIN 5, but reporting it as caught from LIN 6 to increase their returns.

### *Discarding*

In a compliance context, discarding refers to the dumping of QMS species at sea without appropriate approval which is prohibited under s 72 of the Fisheries Act 1996 (the Act). Several incentives exist for fishers to illegally discard QMS species:

- Avoiding the costs of utilising or sourcing ACE to cover the catch or paying deemed value charges if ACE cannot be obtained
- Some fishers choose to deliberately discard smaller or less valuable (e.g. damaged) fish to maximise the economic return from their catch based on the ACE they hold. This is commonly known as highgrading.

The Ministry strives to minimise the opportunity for these and other types of offending to occur through careful risk analysis of the ling fisheries with cooperative input from the industry. Information sharing with industry allows the Ministry to focus compliance efforts on current risks.

### *Compliance with environmental mitigation regulations*

Regulation requires that all deepwater trawl vessels over 28 m in length deploy seabird scaring devices to ensure that fishing activity does not pose an unnecessary risk to seabirds. Separate regulations apply to bottom longline vessels which include the use of bird scaring devices, weighting of the longlines, and restrictions on offal discharge and gear setting (see Table 6).

#### **Management need:**

To ensure that compliance with all regulatory and non-regulatory management measures in ling fisheries is satisfactory and offending is minimised.

## **Social and cultural overview**

The Fisheries Act (1996) (the Act) requires that, prior to setting management measures for ling fisheries, the Minister with responsibility for fisheries shall consult with persons having an interest in the stock or the effects of fishing on the aquatic environment in the area in which the fisheries takes place, including Maori, environmental, commercial and recreational interests. In addition, the Act requires that in setting a TAC under section 13, the Minister shall have regard to such social, cultural and economic factors (s)he considers relevant.

Social and cultural factors include those related to the harvesting of ling by all parties; commercial, recreational and customary. There is, however, little recreational or customary fishing for ling in the QMAs managed under the National Deepwater Plan. The customary and recreational sectors in LIN 5 and LIN 7 each have a one tonne allowance, but there is no information available on the amount of this allocation that is harvested annually. There are no customary or recreational allowances in the other ling QMAs managed under the National Deepwater Plan.

Under section 12(1)(b) of the Act, the Minister with responsibility for fisheries has an obligation to provide for tangata whenua input and participation, having particular regard to kaitiakitanga, in the setting of sustainability measures. This is being given effect through the development of Iwi Fisheries

Plans and Forum Fisheries Plans which will be consulted each year to ensure that objectives and aspirations of Maori with respect to their fisheries, including ling, are taken into account in Annual Operational Plans and when making sustainability decisions. The objectives set out in Iwi Fisheries Plans and Forum Fisheries Plans will also be taken into account as part of the 5 yearly review of the National Deepwater Plan.

Social and cultural factors also include the non-extractive value of healthy ling, ribaldo, and Patagonian toothfish stocks and the values associated with an aquatic environment that is not adversely impacted by fishing activity. These intrinsic values must also be considered when determining the appropriate management measures for a fishery. The environmental objectives detailed in Section 2 will contribute to maintaining a healthy aquatic environment.

## **Overview by fishery**

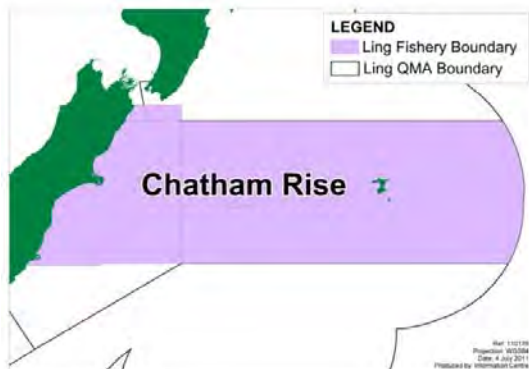
The following part provides a description of each ling fishery (by biological stock) and an outline of its current status.

### *Historical fishery information*

Ling was introduced to the QMS in 1986. TACCs were gradually increased through quota appeals to a total TACC for all ling stocks of 21,977 tonnes in 2004. This included a total for LIN3-7 of 20,585 tonnes. The total TACC for LIN3-LIN7 as of 1 October 2012 is 20,834.

## Chatham Rise fishery – LIN 3 and LIN 4

The Chatham Rise biological stock covers all of the LIN 4 QMA and part of LIN 3. Assessments are completed using catch information from Statistical Areas 018-024, 049-052, 301 and 401-412 as shown in Figure 2 below.



**Figure 2: Map of Chatham Rise biological stock as assessed**

The Chatham Rise fishery began in the early 1970s. From 1975 to 1980 there was a substantial longline fishery carried out by Japanese and Korean longliners, which was replaced in the 1980s by a trawl fishery. In the early 1990s a domestic longline fishery developed, mainly based on autoliners, and has taken slightly less than half of the total catch in recent years.

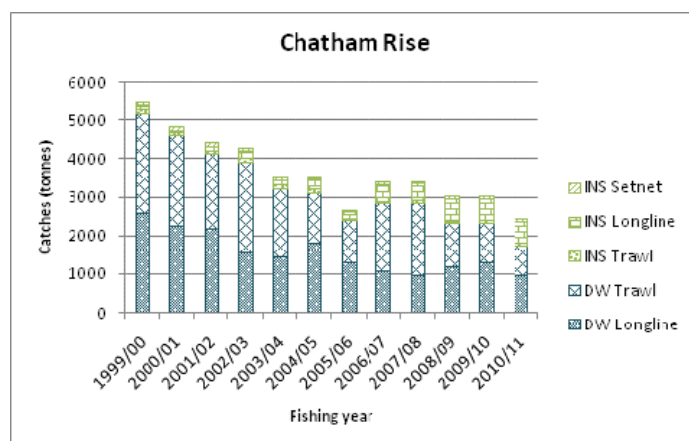
The Chatham Rise fishery is predominantly a deepwater fishery, with catches from the deepwater fleet making up 71% of ling catches in 2010/11. The

deepwater proportion of catch in the Chatham Rise has been slowly declining over the last 10 years, having made up 94% of the Chatham Rise ling catch in the 2000/01 fishing year. The inshore component of this fishery consists mostly of longliners, with a small amount of both trawling and setnetting.

LIN 3 and 4 were introduced to the QMS in 1986 with TACCs of 1,850 and 4,300 tonnes respectively. Historically, LIN 3 and 4 were managed together under an Adaptive Management Programme, which in 1994/95 increased TACCs by about one half and one third to 2,810 and 5,720 respectively. The Adaptive Management Programme involved increasing TACCs in exchange for industry provision of additional data to improve understanding of stock status and allow analyses to be performed for better monitoring of the stock. A stock assessment in 1999 indicated that the biomass was approximately 25-30%  $B_0$  and TACCs were reduced to the level of the CAY estimate for the biological stock (2,060 and 4,200 tonnes for LIN 3 and LIN 4 respectively). Neither TACC has been fully caught in recent years with the exception of LIN 3 in 2006/07. About 92% of the total LIN 3 catch comes from the Chatham Rise stock, the remaining 8% comes from the area outside of the Chatham Rise biological stock and is part of the sub-Antarctic stock.

Stock assessments for the Chatham Rise biological stock incorporate data from the annual Chatham Rise trawl survey, proportion-at-age data from longline and trawl fisheries, and longline fishery CPUE series. Stock assessments are scheduled to be carried out every third year beginning in 2011/12.

- The most recent assessment (2011) indicated that the biological stock is about 55% $B_0$  which is Very Likely (> 90%) to be at or above the default management target of 40% $B_0$ .



**Figure 3: Catch history of ling from the Chatham Rise (LIN 3& LIN 4) by fishery and method. INS = inshore; DW = deepwater**

### Sub-Antarctic fishery – LIN 5, part of LIN 6, and part of LIN 3

The sub-Antarctic biological stock includes all of LIN 5, a small portion of LIN 3, and most of LIN 6 (excluding the Bounty Platform) (Figure 4). Data for stock assessments are drawn from Statistical Areas 025-031, 302, 303, 501-504, 601-606, 610-612, 616-620, and 623-625.



**Figure 4: Map of the sub-Antarctic (LIN5&6) biological stock as assessed**

Ling in the sub-Antarctic is mainly caught by large trawl vessels targeting hoki or ling along the Stewart-Snares shelf and the Puysegur area. There are also fisheries adjacent to the Auckland and Campbell Islands.

Deepwater longline fishing takes about 15-20% of the annual catches in the sub-Antarctic. Longline effort has been focussed mainly on the Campbell Plateau and Pukaki Rise. Inshore longline catches have been increasing in recent years, however, they are small compared to trawling or deepwater longlining (Table 5).

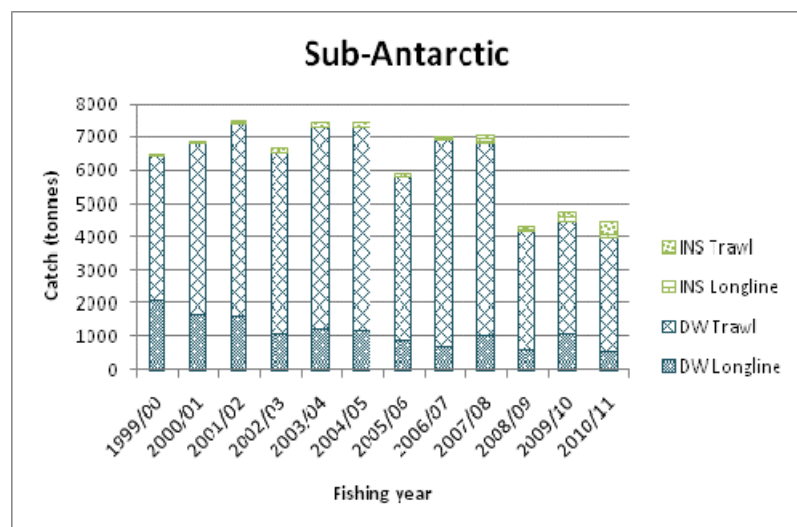
LIN 5 and LIN 6 were introduced into the QMS in 1986 with TACCs of 2,500 tonnes and 7,000 tonnes, respectively. These were increased to 3,001 tonnes for LIN 5 and 7,100 tonnes for

LIN 6 through quota appeals. In 2004 the stock assessment for LIN 5 and LIN 6 (excluding the Bounty Plateau) showed that the stock was lightly fished and the TACCs were subsequently raised to 3,595 tonnes and 8,505 tonnes. The LIN 5 TACC has been overcaught in six of the last 10 years and the LIN 6 TACC has been undercaught in all of the past 10 years. Catches over the TACC in LIN 5 may potentially increase the risk of localised depletion of the sub-Antarctic stock in this area.

Stock assessments for the sub-Antarctic stock are based on annual trawl surveys, longline CPUE, and proportions-at-age from commercial fisheries and research surveys. Stock assessments are scheduled to be carried out every third year beginning in 2011/12.

There have been incidences and prosecutions for area misreporting (trucking) between LIN 5 and LIN 6. As described previously, this is when catch from one QMA is reported as caught in another QMA.

- The most recent stock assessment (2011) indicated that the biological stock was between 70% and 101%B<sub>0</sub> which is Exceptionally Likely (> 99%) to be at or above the default management target of 40%B<sub>0</sub>.



**Figure 5: Catch history of ling from the sub-Antarctic (LIN 5 and LIN 6) by fishery and method. INS = inshore; DW = deepwater**

## Bounty Plateau fishery (LIN 6B) – (part of LIN 6)

The Bounty Plateau ling stock covers the eastern part of the LIN 6 QMA (Figure 6). Stock assessments are undertaken using data from Statistical Areas 607-609, 613-615, 621, and 622.

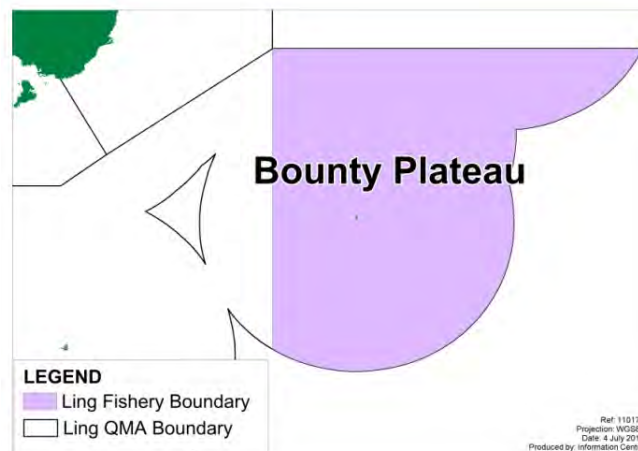


Figure 6: Map of Bounty Plateau (LIN6B) biological stock as assessed

The Bounty Plateau ling fishery is prosecuted almost entirely by autoliners, with over 98% of catches since 1992 taken by lining. Annual catches in the fishery have been highly variable ranging between <2 and 1,319 tonnes over the last 13 years (Figure 7). On average, the Bounty Plateau fishery takes roughly 7% of the total LIN 6 TACC and 10% of the total LIN 6 catch (with catch less than the TACC). There are no specific catch limits in place for the Bounty Plateau fishery.

The Bounty Plateau stock is assessed separately to the rest of the LIN 6 QMA. Stock assessments for the Bounty Plateau are based on catch history and CPUE and catch-at-age from the commercial longline fishery. Assessments are scheduled to be undertaken every five years beginning in 2013/14.

- The most recent assessment (2006) estimated the biomass of the stock to be at 61%B<sub>0</sub> which is Very Likely (> 90%) to be at or above the default management target of 40%B<sub>0</sub>.

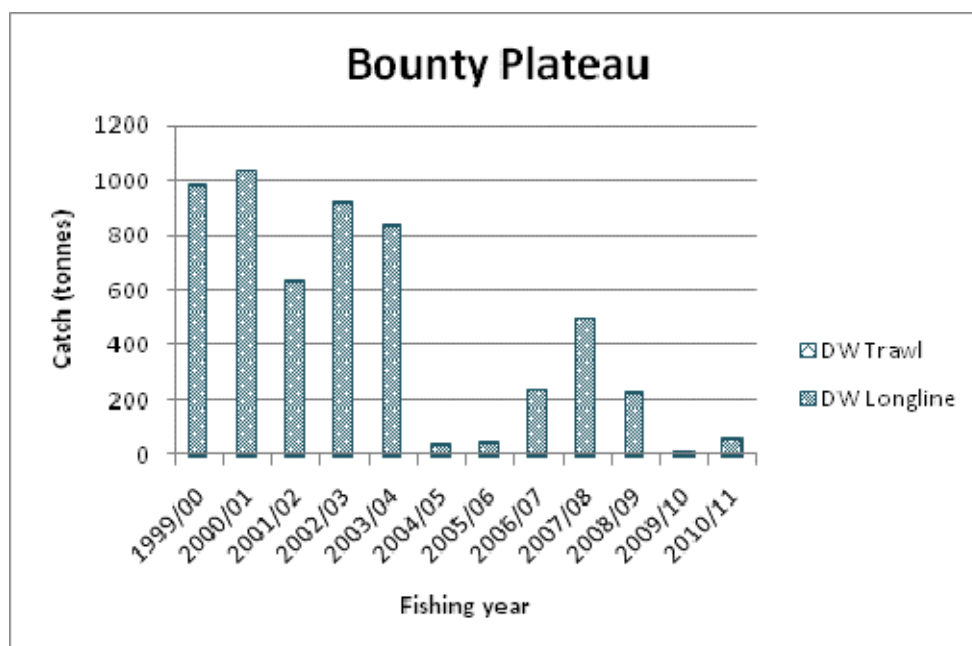


Figure 7: Catch history of ling on the Bounty Plateau by fishing method. DW = deepwater

## West coast South Island – LIN 7WC

The west coast South Island ling stock includes the majority of the LIN 7 QMA and assessments are undertaken using data from Statistical Areas 032-036 and 701-706 (Figure 8).

The west coast South Island is a diverse fishery, with significant catches taken by the deepwater trawl fleet, inshore trawl fleet, and inshore longline fleet. There are also smaller amounts of catch taken by deepwater longlining, and inshore setnetting.

In the deepwater trawl fishery, the majority of catches were historically taken when vessels were targeting hoki, however, as the hoki TACC was decreased in the early 2000s, the bycatch of ling decreased proportionally. There was an increase in ling target fishing over this time period, but not of the same magnitude.

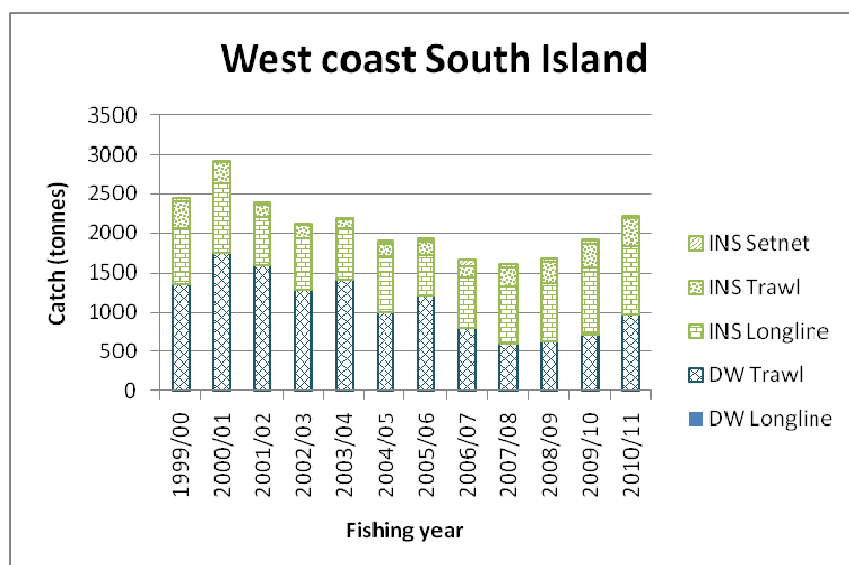
The majority of longline fishing on the west coast of the South Island is by inshore vessels and takes place within the 12 nm limit (i.e. within the territorial sea). Trawl vessels larger than 46 metres in length and foreign flagged vessels are prohibited from fishing inside the Territorial Sea and within certain 25 nm exclusion zones on this coast.

LIN 7 was introduced to the QMS in 1986 with a TACC of 1,960 tonnes. This was increased through quota appeals to 2,225 tonnes. The TACC has been consistently overcaught every year from 1994/95 (except in 2008/09). The TACC for LIN 7 was raised to 2,474 tonnes from 1 October 2009.

Current stock assessments for the west coast South Island ling stock are based on catch history and catch-at-age from the commercial fisheries, and are scheduled to be carried out every third year beginning in 2012/13. Under the 10 Year Research Programme, a trawl survey on the west coast of



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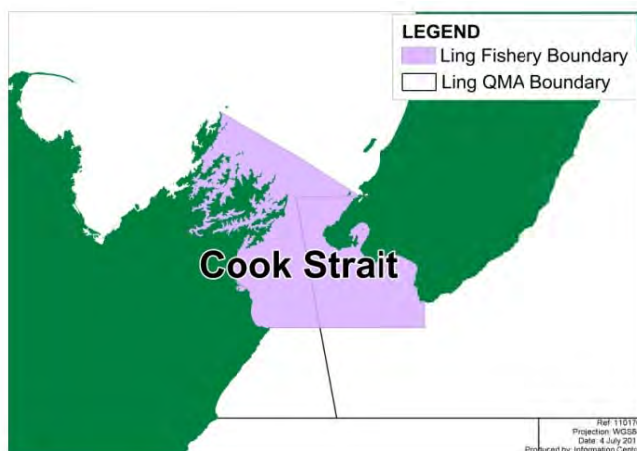
of the South Island is to be established in 2012/13. This is expected to contribute information that will support the assessment of the LIN7WC biological stock.

➤ The most recent stock assessment (2008) estimated the biomass of the stock to be at 69%B<sub>0</sub> which is Very Likely (> 90%) to be at or above the default management target of 40%B<sub>0</sub>.



## Cook Strait stock (LIN CS) –part of LIN 7 and part of LIN 2

The Cook Strait fishery includes a small portion each of LIN 7 and LIN 2 QMAs. The stock is assessed using data from statistical areas 16 and 17.



stock as

The Cook Strait ling catch has historically been mostly a bycatch of the hoki trawl fishery that takes place in the same area. Both inshore and deepwater trawl vessels have targeted hoki in the area. Bycatch of ling from hoki target fishing in the Cook Strait accounts for about 94% of the total ling catch from trawling in the Cook Strait. As the hoki TACC was cut in the early 2000s, catches of ling in Cook Strait also declined.

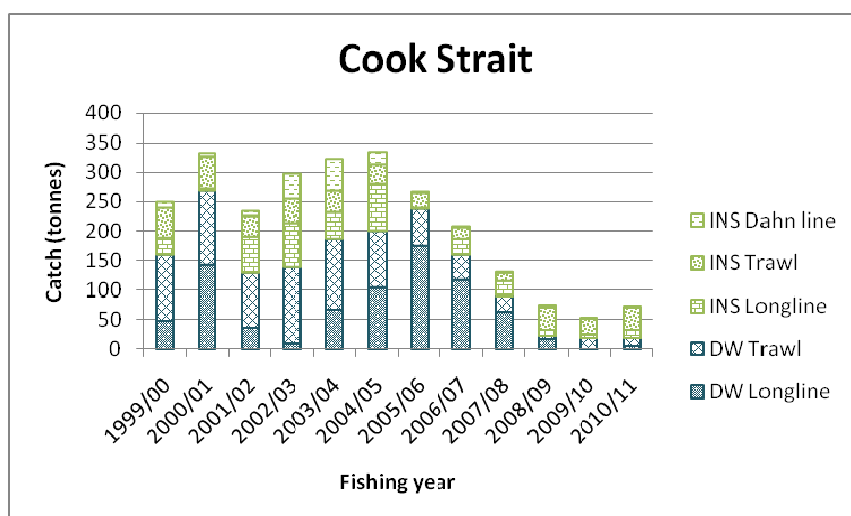
There is also a ling longline fishery in Cook Strait that consists of both inshore and deepwater vessels.

The majority of the Cook Strait fishery falls within the Territorial Sea (12 nm from the coast). Commercial Fishing Regulations dictate that no trawl vessel longer than 46 m may fish within the Territorial Sea. The Fisheries (Central Area Commercial Fishing) Regulations 1986 also close several other areas to trawling by vessels longer than 46 m. These overlap with the Cook Strait fisheries and result in the entire fishery area being closed to all trawlers longer than 46 m and also to all FCVs.

It is possible that the Cook Strait biological stock may extend north up the Wairarapa Coast on the east coast of the North Island, but the extent of this is unclear and no stock assessments have yet been carried out on such a wider definition of the Cook Strait stock.

Stock assessments for the Cook Strait biological stock are currently based on catch history, CPUE from commercial trawl fisheries and catch-at-age from commercial trawl and longline fisheries. They are scheduled to be carried out every third year beginning in 2012/13.

- The most recent stock assessment (2010) estimated the biomass of the biological stock to be at  $54\%B_0$  which is Likely (> 60%) to be at or above the default management target of  $40\%B_0$ .



## 2. Overview of non-target interactions

This section describes in more detail the relevant non-target bycatch (see Table 8), incidental interactions and incidental captures<sup>5</sup> that occur in the ling fishery. The bycatch and incidental captures are categorised as follows:

1. **Associated species:** These are QMS species which are managed in conjunction with ling either because they are caught as a bycatch of ling fisheries, or because there is an overlap in the fishing method and vessels involved in the fishery. Patagonian toothfish and ribaldo are covered in this section.
2. **Incidental bycatch (Tier 3) species:** These are non-QMS species which are usually discarded or reduced to fish meal and are considered to be of little commercial value.
3. **Incidental interactions with endangered, threatened and protected (ETP) species:** This category relates to the incidental interaction, capture, and mortality of protected species such as seabirds, marine mammals, protected corals and protected or vulnerable shark species.
4. **Benthic interactions:** This category includes benthic habitat and invertebrate species that are captured by, or that are known to interact with, ling bottom trawl and bottom longline fishing gear. Most of this information originates from Ministry observer reports.

Fish and invertebrate species taken as bycatch or incidental catch in target ling fisheries for the last three complete fishing years are shown in Table 8 below which is derived from data collected by Ministry observers.

Table 8 is colour coded as follows:

- Those species highlighted in blue are **key associated** species managed through this ling chapter;
- Those species highlighted in orange are **key bycatch** species managed through another chapter in the National Deepwater Plan;
- Those species highlighted in green are **key bycatch** species managed through the highly migratory species fisheries plan;
- Those species highlighted in yellow are **key bycatch** species managed through an inshore fisheries plan;
- Remaining species (i.e. uncoloured) are **incidental bycatch** species which will be monitored annually as part of the implementation of the National Deepwater Plan.

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<sup>5</sup> Captures refers to all animals live or dead that are brought on deck or animals that are observed killed by the fishing activity. It excludes any animals that were decomposing (i.e. not killed in fishing interaction), and those that land on deck or collide with the vessel superstructure.

**Table 4: Catch weight by species or species group for the top 50 species (listed in order of decreasing catch volume over the period 2003-2011) caught in ling target fishing and details from observer records for the period 1 October 2008 to 30 September 2011**

Common name	2008/09		2009/10		2010/11	
	Sum of observed catch (t)	% of catch	Sum of observed catch (t)	% of catch	Sum of observed catch (t)	% of catch
<b>Ling</b>	1481.9	53.82	1397.9	52.34	812.1	56.74
Hoki	391.0	14.20	661.6	24.77	223.1	15.59
White warehou	25.1	0.91	100.6	3.77	76.7	5.36
Spiny dogfish	294.3	10.69	55.4	2.07	56.5	3.94
Hake	48.1	1.75	67.1	2.51	19.7	1.38
Silver warehou	22.8	0.83	68.3	2.56	9.4	0.66
Southern blue whiting	112.8	4.10	0.003	0.0001	7.4	0.52
Javelinfish	19.2	0.70	36.9	1.38	18.7	1.30
Ribaldo	27.9	1.01	51.2	1.92	54.2	3.79
Rattails	17.3	0.63	35.4	1.33	24.5	1.71
Pale ghost shark	49.1	1.78	2.7	0.10	5.9	0.41
Black cod	68.1	2.47	0	0	0.1	0.009
Dark ghost shark	15.0	0.54	29.5	1.11	7.2	0.50
Arrow squid	4.2	0.15	9.3	0.35	7.9	0.55
Silverside	6.6	0.24	4.6	0.17	0.7	0.05
Red cod	9.0	0.33	9.6	0.36	8.2	0.57
Other sharks and dogfish	27.6	1.00	5.9	0.22	6.8	0.48
Rough skate	22.0	0.80	1.3	0.05	2.7	0.19
Sea perch	18.9	0.69	8.1	0.31	7.5	0.52
Giant stargazer	2.7	0.10	11.5	0.43	2.9	0.20
Leafscale gulper shark	9.0	0.33	2.7	0.10	9.1	0.64
School shark	16.0	0.58	10.5	0.39	1.6	0.11
Smooth skate	13.1	0.48	6.2	0.23	4.7	0.33
Shovelnose dogfish	0.5	0.02	3.0	0.11	14.1	0.98
Hairy conger	6.8	0.25	4.0	0.15	14.2	0.99
Barracouta	0	0	14.1	0.53	1.3	0.09
Lookdown dory	3.1	0.11	5.9	0.22	1.5	0.11
Blue warehou	0	0	15.2	0.57	4.1	0.28
Seal shark	1.5	0.05	8.3	0.31	2.8	0.20
Silver dory	0.6	0.02	7.9	0.30	0.2	0.02
Bluenose	1.6	0.06	0.5	0.02	2.2	0.15
Warty squid	0.6	0.02	2.1	0.08	0.9	0.06
Basking shark	0	0	0	0	0	0
Plunket's shark	0.1	0.004	0.8	0.03	8.4	0.59
Sponges	1.5	0.05	0.3	0.01	0.02	0.002
Common roughy	0.04	0.001	7.2	0.27	0.08	0.006
Conger eel	5.2	0.19	0.2	0.007	0.7	0.05
Banded bellowsfish	0.05	0.002	5.3	0.20	0.02	0.001

Purple chimaera	5.3	0.19	0	0	0.007	0.0005
Alfonsino & long-finned beryx	2.9	0.11	1.8	0.07	0	0
Deepwater dogfish (unspecified)	0.5	0.02	1.8	0.07	0.01	0.0007
Warty squid	2.7	0.10	0.6	0.02	0.7	0.05
Gemfish	0.004	0.0001	0.5	0.02	0.3	0.02
Hagfish	2.0	0.07	0.7	0.02	1.0	0.07
Alfonsino	0.003	0.0001	2.0	0.08	0.1	0.009
Baxter's lantern dogfish	0.8	0.03	0.5	0.02	0.4	0.03
Witch	0.1	0.005	0.6	0.02	0.05	0.003
Silver conger	3.0	0.11	0.04	0.002	0.05	0.003
Hapuku	1	0.04	1.6	0.06	0.4	0.03
Ray's bream	0.1	0.005	0.4	0.02	0.2	0.01

## Category 1: Associated species

The following QMS stocks are included in the ling fisheries chapter:

- Ribaldo: RIB 3, RIB 4, RIB 5, RIB 6, RIB 7, and RIB 8
- Patagonian toothfish: PTO 1

Ribaldo is included as it is a bycatch species in ling fisheries (amongst others), and is occasionally targeted by longliners.

Patagonian toothfish is not caught in conjunction with ling, however, this species is predominantly taken by bottom longliners and some of the same vessels are active in the both the ling and toothfish fisheries. For this reason, toothfish is managed under the ling fisheries plan.

Summaries of the current status of these species are provided below. For more information on the biology and stock status of ribaldo and Patagonian toothfish please see the Ministry for Primary Industries Fisheries Plenary Report available at [www.fish.govt.nz](http://www.fish.govt.nz).

### RIBALDO (RIB)

#### Biological overview

Ribaldo (*Mora moro*) is most commonly found at depths of 450-1,200 m all around New Zealand, although they occur most often (though never abundantly) in deeper areas of the north and south Chatham Rise, Puysegur Trench, and Campbell and Challenger Plateaus.

Spawning is reported to take place in winter, mainly June-August, with some temporal variation between areas. There is no evidence for any spawning migration or aggregation, and ripe and running ripe fish have been found on the Chatham Rise, west coast South Island, Campbell Plateau, Puysegur Trench, and south-east coast of the North Island and Southland/sub-Antarctic. Length at maturity for New Zealand ribaldo has been estimated at 45 cm total length.

Ribaldo growth is rapid for about the first 10 years, before slowing and becoming negligible after about 25 years. The maximum age is estimated to be 37 and 39 years for female and male fish, respectively. Early life history is unknown, however, juvenile fish of less than 10 cm have been captured in the upper 200 m of the water column over bottom depths of about 1,000 m on the Chatham Rise. Distribution of larger juveniles is similar to that of ripe and running ripe females, which is consistent with the widespread spawning events described above.

#### Commercial fishery overview

Ribaldo is caught by trawling, bottom longlining, and to a lesser extent, setnetting.

The main catches of ribaldo in trawl gear occur in fisheries targeting hake around the sub-Antarctic Islands, northern Chatham Rise, and the west coast of the South Island. Ribaldo taken as bycatch in hake fisheries makes up around 80% of the trawl catch of ribaldo and about 50% of the total catch. Smaller amounts are also taken as a bycatch in hoki and orange roughy trawl fisheries. Ribaldo is not targeted by trawlers.

Ribaldo catch by bottom longliners is almost entirely in the ling fisheries, most notably on the north Chatham Rise, east coast of the South Island, and around the sub-Antarctic Islands. Ribaldo catch from ling bottom longline fisheries makes up nearly 30% of the overall ribaldo catches. There is some

targeting of ribaldo with bottom longlines, although it only makes up a small proportion of the total ribaldo catch (~8%).

The largest overall catch of ribaldo comes from RIB 7, where the TACC of 330 tonnes has been overcaught for the last eight years, with the exception of 2009/10.

### **Fisheries management overview**

Ribaldo was introduced into the QMS on 1 October 1998. TACCs were increased from 1 October 2006 in RIB 6 and RIB 7 where landings<sup>6</sup> had been above the previous TACC for a number of years. The TACCs were increased to the average landings of the previous seven years plus an additional 10%.

It is unknown whether current catches are sustainable in the long term, or whether catches at the level of the current TACCs will allow the stocks to move towards a size that will support the maximum sustainable yield.

Ribaldo will be managed using CPUE and observer data from the commercial trawl fisheries. Trawl surveys on the Chatham Rise and in the sub-Antarctic will assist monitoring of ribald, providing relative biomass estimates and CPUE. Ribaldo stocks will undergo regular characterisations at three yearly intervals. Over the five years of this plan, a management strategy will be developed to effectively monitor and manage ribaldo stocks based on available information, and will define what additional information is required to adequately monitor ribaldo.

#### **Management need:**

To develop and implement a management strategy to ensure effective management of ribaldo

### **Economic Overview**

- 62% of deepwater ribaldo quota is held by five companies
- Ribaldo does not feature in New Zealand's export statistics

## **PATAGONIAN TOOTHFISH (PTO)**

### **Biological Overview**

Patagonian toothfish (*Dissostichus eleginoides*) is widely distributed in all waters south of approximately 40-45°S. Toothfish are known to occur in certain areas towards the southern boundary of the New Zealand EEZ, with the occasional specimen being recorded as far north as the Chatham Rise. Toothfish are mostly caught in depths of 800-1200 m, although large fish have been found as deep as 3,000 m.

The maximum age for Patagonian toothfish has been estimated to be 40- 50 years, reaching a maximum length of 2 m, and a weight of over 150 kg. Maturity is reached at 90-100 cm for males and 110-130 cm for females.

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<sup>6</sup> Landings are information reported by Licensed Fish Receivers and are based on actual amounts of fish removed from the water. Landings are a more accurate reflection of catches, but do not include additional information such as target species, fishing method, or statistical area that is useful for characterising a fishery.

There is little information available on the distribution and stock structure of Patagonian toothfish within the New Zealand EEZ.

### **Commercial fishery overview**

There is only a small commercial fishery within the New Zealand EEZ for Patagonian toothfish at present. Catches over the last 15 years have been very low, ranging from 0 to a high of 22 tonnes in 2010/11. Commercial targeting of Patagonian toothfish has only occurred in recent years with catches in the early years being either bycatch from other fisheries or from several research surveys carried out by industry vessels.

There are a number of significant Patagonian toothfish fisheries in the Southern hemisphere managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) or by the respective flag states where the fisheries lie within Exclusive Economic Zones. A related species, Antarctic toothfish (*D. mawsoni*) occurs generally further south of the Antarctic convergence area and is also fished by New Zealand vessels and managed by CCAMLR.

It is expected that vessels that fish within the CCAMLR managed zone in the summer months will engage in the PTO 1 fishery at other times to determine the viability of a commercial fishery within the New Zealand EEZ.

### **Fisheries management overview**

Patagonian toothfish was introduced to the QMS on 1 October 2010 with a single QMA and a TACC of 49.5 tonnes. The majority of catch pre-QMS introduction and in the 2010/11 fishing year was from the northern extension of the Macquarie Ridge Complex (FMA 6). Toothfish is almost exclusively a target fishery, although individuals have been caught in ling longline fisheries and bottom trawl fisheries for oreo, hoki and orange roughy.

#### **Management need:**

To develop a management regime to allow for development of a sustainable commercial fishery for Patagonian toothfish in New Zealand waters

To develop a harvest strategy for toothfish having regard to that developed by CCAMLR and that applied in the Macquarie Island toothfish fishery

### **Economic overview**

There is limited export and economic data available on New Zealand-caught Patagonian toothfish due to the fishery's recent introduction to the QMS, limited historical fishing, and the overlap with the catch taken outside the EEZ.

Both species of toothfish fetch a premium price in export markets. In the 2011 calendar year, export statistics show 65.7 tonnes of Patagonian toothfish exported for a value of \$1.6 million.

When Patagonian toothfish was introduced to the QMS, the annual deemed value rate was set at \$12.50 per kg. Due to an increase in export price, the annual deemed value rate was increased to \$15.00 per kg from Oct 1, 2011. Regular reviews will be necessary to ensure that the deemed value rates remain appropriate to discourage deliberate overfishing of the TACC.

## **Compliance overview**

The Southern Hemisphere Patagonian toothfish fisheries have historically been renowned for Illegal, Unregulated and Unreported (IUU) fishing. This is due to the high market value of toothfish and the remoteness of the Southern Ocean. CCAMLR and other jurisdictions (South Georgia (UK) and Australia) where remote toothfish fishing occurs have developed compliance regimes to minimise the risk from IUU fishing. With the New Zealand fishery on Patagonian toothfish occurring near the remote southern border of the EEZ there is a risk of non-New Zealand vessels entering the New Zealand EEZ, and illegally fishing. This risk will be mitigated by use of surface and aerial surveillance to adequately monitor relevant areas. As the New Zealand Patagonian toothfish fishery is continuous with the Australian Macquarie Island fishery, there may be scope for joint surveillance in the area.



## Category 2: Incidental bycatch species

These are typically species with little or no commercial value, which are not the focus of fishing effort and are frequently discarded or processed into fishmeal, although all catch must be recorded on landing returns. Catch levels will continue to be monitored annually using data collected by observers. If there are concerns that harvest levels are thought to be impacting on the sustainability of the species or if there are utilisation concerns then some form of management intervention may be necessary. This could include section 11 measures or the species being assessed for possible introduction to the QMS.

The QMS Introduction Standard requires the Ministry to carry out an annual process to determine which further species or stocks may be considered by the Minister with responsibility for fisheries for introduction into the QMS. The first step of the process is to identify candidate species or stocks based on whether they meet one of six criteria. Key criteria include variation in catch of a stock or where there is information to suggest a sustainability or utilisation concern exists.

### **Management need:**

To monitor and analyse catches of incidental bycatch species (Tier 3) and to address any sustainability issues identified.

### Category 3: Incidental captures of ETP species

As described previously, ling fisheries interact with a range of seabird and marine mammal species. The Fisheries Act requires that when an environmental impact is adverse this effect should be avoided, remedied or mitigated.

Tables 9 and 10 below describe the extent of the interactions with seabirds and marine mammals by fishing method from observed vessels over the last five complete fishing years for which reliable information is available. Table 12 shows the main seabird species captured<sup>7</sup> in ling fisheries by method for the last five years.

**Table 9: Observed seabird and fur seal captures from ling target trawl fisheries**

Year	No. Observed captures		% tows observed
	Seabirds	Fur seals	
2004/05	3	10	7.7
2005/06	3	2	8.1
2006/07	2	12	9.4
2007/08	8	4	10.9
2008/09	4	0	10.4
2009/10	11	6	16.6

**Table 10: Observed seabird captures from ling longline fisheries by vessel size**

Year	<34 m		≥34 m	
	No. Observed captures	% hooks observed	No. Observed captures	% hooks observed
2004/05	0	0.5	18	16.0
2005/06	N/A	0	29	27.0
2006/07	38	6.5	13	15.7
2007/08	3	3.8	19	24.1
2008/09	4	8.5	5	27.5

### Seabirds

Seabirds are caught in both trawl and longline fisheries for ling.

Current research uses a model-based approach to estimate the total number of seabirds captured in ling target fisheries by method based on observer information and amount of effort. Estimates for the most recent five years for which data are available are shown in Table 11.

**Table 11: Seabird interactions in ling fisheries 2004/05 – 2009/10 from Abraham and Thompson, 2011**

Year	Observed captures	% observer coverage	Strike rate based on observer data (per 100 tows or 1000 hooks)	Model-based estimate of total captures
<b>Ling target trawl</b>				
2004-05	3	7.7	3.95	30 (16-49)

<sup>7</sup> A capture is defined as an animal brought on deck, living or dead, by the fishing gear. It does not include estimates of warp strikes by seabirds (unless the body subsequently comes up with the gear) or seabirds hitting the vessel superstructure or landing on the vessel.

Year	Observed captures	% observer coverage	Strike rate based on observer data (per 100 tows or 1000 hooks)	Model-based estimate of total captures
2005-06	3	8.1	2.65	41 (22-70)
2006-07	2	9.5	1.27	29 (15-49)
2007-08	7	10.8	2.90	45 (27-73)
2008-09	4	10.3	2.76	38 (22-61)
2009-10	11	16.7	5.53	33 (20-50)
<b>Large vessel (≥34m) ling target longline</b>				
2004-05	18	16.0	0.007	523 (134-1732)
2005-06	29	27.0	0.008	182 (92-376)
2006-07	13	15.7	0.007	285 (53-1103)
2007-08	19	24.1	0.006	314 (99-1102)
2008-09	5	27.5	0.002	413* (75-1407)
<b>Small vessel (&lt;34m) ling target longline (estimates are ratio based)</b>				
2004-05	0	0.5	0.000	168 (88-270)
2005-06	N/A	0.0	N/A	46 (24-74)
2006-07	38	6.5	0.110	152 (98-221)
2007-08	3	3.8	0.012	128 (69-205)
2008-09	4	8.5	0.008	146 (79-232)

\*The majority of observer coverage in 2008/09 on bottom longline vessels was on vessels using integrated weight lines providing very limited information on vessels not using integrated weight lines. In this model, vessels without integrated weight lines are estimated to have higher interactions with seabirds, as there can occasionally be very large capture events with non-integrated weight lines. The lack of information causes a large amount of uncertainty in the model and inflates the estimated captures and associated confidence interval. This issue may be avoided in future by spreading coverage more evenly amongst longline vessels.

In trawl fisheries, seabird captures occur in two main ways. They either collide with or are struck by the moving trawl warps (notably larger seabirds such as Salvin's albatross) or are caught in the net when it is on the surface during deployment and retrieval (notably smaller seabirds such as shearwaters and petrels). Regulations were passed in 2005 that require trawl vessels to deploy bird scaring devices, such as tori lines, to scare birds away from the warp danger zone around the stern of the vessel. These mitigation measures have been successful in reducing the number of warp interactions with large seabirds and there has been a noticeable decline in the number of fatal interactions of large sea birds since these measures were first introduced to trawl fisheries.

In addition to the mandatory mitigation measures, industry and the Ministry work collaboratively to ensure all trawlers over 28m in length have, and follow, a Vessel Management Plan (VMP). VMPs specify the measures that must be followed onboard each vessel so as to reduce the risk of incidental seabird captures. These measures can include storing offal while shooting and hauling fishing gear, and making sure all fish are removed from the net before it beginning a new tow. Ministry observers monitor vessel performance against its VMP and if a vessel is not complying with the guidelines in its VMP, the Director General of the Ministry for Primary Industries has the option of putting vessel-specific regulations in place to better control offal management practices.

In bottom longline fisheries, birds are mainly captured during shooting of the gear, as seabirds try to take the bait off the hook and accidentally get hooked. The risk of capture is also present during hauling when any remaining baits are near the surface. In 2008, seabird sustainability measures for bottom longlines were put in place to minimise and mitigate seabird interactions in longline fisheries. These include the mandatory use of bird scaring devices such as streamer (tori) lines on all vessels over 7m in length, the weighting of lines to ensure that bait sinks as fast as possible to

minimise the time that seabirds are able to access it, restriction of offal or fish discharge while hauling or setting of gear, and restrictions on the timing of fishing activity (e.g. day/night). Seabird interactions with large autoline vessels have declined substantially since 2000, likely due to the introduction of bird scaring devices in 2008 (19 large birds in 2000/01; 3 large birds in 2009/10).

The inshore ling fishery also interacts with seabirds, although the level of interaction is poorly quantified, as observer coverage in the inshore fisheries has historically been low.

Seabird capture numbers are based on data collected by Ministry observers, as historically there was no legislative requirement for fishers to report interactions with and captures of non-fish species to the Ministry<sup>8</sup>. As of 1 October 2008, it has been a requirement for fishers to report all interactions on the non-fish bycatch reporting form, which is adding to information about seabird interactions in New Zealand fisheries.

The Ministry is also finalising a new NPOA for seabirds that puts in place a risk-based approach to managing fishing interactions with seabirds, targeting mitigation on those species most at risk. Preliminary results of the application of this approach have indicated that large trawlers and large bottom longliners do not pose a significant risk to any seabird species under current mitigation management regimes. Risks are categorised by vessel/method types, and are not broken down into risks posed specifically by ling fishing. The risk assessment does indicate that small inshore vessels may pose a risk to some seabird species, such as Chatham albatross and black-browed albatross. This is due, in part, to the lack of observer coverage in these fisheries, as the risk assessment took a precautionary approach to estimating potential captures in fisheries with limited information.

The Level 2 Risk Assessment assessed the risk to seabird populations based on the cumulative effects of all fishing activity in New Zealand waters. Therefore, incidental seabird captures in the ling fisheries is assessed in the wider context of New Zealand-wide fishing activity (Table 12).

**Table 12: Summary of top 10 seabird species (listed in order of risk to the population) historically (2000-2011) observed captured in ling fisheries by fishing method for the period 1 October 2005 to 30 September 2011 (BLL = Bottom longline).**

Species	2005/06		2006/07		2007/08		2008/09		2009/10		2010/11	
	Trawl	BLL	Trawl	BLL	Trawl	BLL	Trawl	BLL	Trawl	BLL	Trawl	BLL
Chatham Island albatross ( <i>Thalassarche bulleri</i> )	0	1	0	12	0	0	0	2	0	0	0	0
Salvin's albatross ( <i>Thalassarche salvini</i> )	0	2	0	22	1	0	0	1	0	0	1	2
Cape petrels ( <i>Caption</i> spp.)	0	3	0	2	0	1	0	3	1	2	0	0
White-chinned petrel ( <i>Pterodroma lessonii</i> )	0	14	0	11	3	9	1	0	1	1	1	25
Grey petrel ( <i>Procellaria cinerea</i> )	0	0	0	0	0	4	0	4	0	0	0	0
Sooty shearwater ( <i>Puffinus tenuirostris</i> )	0	6	2	1	1	5	4	0	2	7	2	0
Common diving petrel ( <i>Pelecanoides urinatrix</i> )	0	6	0	0	0	0	0	0	0	0	0	0
Petrel (unidentified) ( <i>Procellariidae</i> spp.)	0	0	0	0	0	0	0	0	0	0	0	0

<sup>8</sup> Reporting requirements for non-fish bycatch before 2008 included recording the event and details in the vessel's log and reporting it to a fishery officer upon return to port. However, records from this reporting stream are minimal.

Prions (unidentified) ( <i>Pachyptila</i> spp.)	0	2	0	1	0	0	1	0	0	0	0	0
Seabird-small (unidentified)	0	0	0	0	1	0	0	0	0	0	0	0
Other seabirds	5	6	0	2	3	3	0	4	1	0	4	1
<b>Total</b>	5	40	2	51	9	22	6	14	5	10	8	28

A focus over the next five years will be to increase the information available on seabird interactions in the inshore fisheries and to mitigate and minimise interactions with seabirds.

**Management need:**

To continue at-sea monitoring and management programme to mitigate and minimise seabird interactions across all fisheries

To analyze seabird interactions in the wider context of New Zealand fisheries and the risk assessment

To gather more information on seabird interactions with small inshore vessels fishing for ling

**Marine mammals**

New Zealand fur seals are occasionally captured in ling fisheries. The majority of NZ fur seal captures take place in trawl fisheries, with only rare incidences of NZ fur seal captures reported in historical longline data. Table 13 provides information on observed captures and estimated total NZ fur seal captures from 2002/03 to 2009/10 in ling trawl fisheries. Estimated captures are based on the number of observed captures<sup>9</sup>.

**Table 13: Observed and estimated fur seal captures from ling target trawl fisheries from 2002/03 to 2009/10**

Year	Number of tows	Observed captures	% tows observed	Observed capture rate	Estimated total captures (modelled)
2009/10	1196	6	16.6	3.02	25
2008/09	1408	0	10.3	0.00	27
2007/08	2229	4	10.8	1.66	45
2006/07	1661	12	9.5	7.64	42
2005/06	1394	2	8.1	1.77	53
2004/05	991	10	7.7	13.16	58
2003/04	572	0	3.8	0.00	16
2002/03	632	0	2.5	0.00	6

Although the NZ fur seal is a protected species under the Marine Mammal Protection Act 1978, the species status has been classified by the Department of Conservation as ‘Not Threatened’. In addition, the NZ fur seal population has been expanding around the coast of New Zealand in the last twenty to thirty years.

The ling fisheries are not known to interact with any other marine mammals, although there have been reported captures of pilot whales in the past, one in 2001/02 and two in 2002/03. All three of

<sup>9</sup> For information on method of estimation, see Dragonfly, 2011.

these occurred in the longline fishery. There have been no further reports of interactions with any cetaceans.

Industry has developed a Marine Mammal Operating Procedure (MMOP), which is generic across all trawlers greater than 28m in length. The MMOP describes a range of procedures that a vessel and crew should follow to reduce the risk of marine mammal captures. These measures include managing offal discharge and to steam away from large aggregations (>5 animals) of marine mammals before shooting and hauling fishing gear. The Ministry monitors and audits vessel performance against the MMOP via the Ministry Observer Programme. The Ministry intends to report the results of these audits annually from 2011/12 via the Deepwater Annual Review Report (ARR).

**Management need:**

Given the low level of interactions with marine mammals that occur in these fisheries, the Ministry considers the current management measures to be sufficient but will continue regular monitoring to ensure this remains the case.

## Sharks (Elasmobranchs)

Sharks can be classified into two categories, protected species and others. Protected shark species are those that are either protected under New Zealand law or are shark species for which New Zealand has international obligations to ensure that fishing activity does not have an adverse effect on their population. Table 14 shows which shark species are currently included in this category.

**Table 14: Protected shark species and historical observed captures in ling fisheries**

Species	Protection		Captures In ling fisheries
	International Obligations	Domestic Law	
Great white shark	✓	✓	0
Basking shark	✓	✓	2 (both occurred in 2004)
Whale shark	✓	✓	0
Deepwater nurse shark		✓	0

While not specifically mentioned in the National Deepwater Plan, New Zealand has obligations under the FAO International Plan of Action for Sharks to ensure conservation and management of all sharks. In 2008, the Minister of Fisheries approved a National Plan of Action (NPOA) for the Conservation and Management of Sharks which establishes a range of actions to ensure that fisheries management in New Zealand satisfies the objectives of the IPOA-Sharks. The NPOA focuses on a series of management actions to enable us to meet our international obligations with respect to the management of shark interactions. These actions focus on four broad areas:

- Eliminating live shark finning (currently illegal under Animal Welfare Act 1999)
- Ensuring appropriate management of threatened and endangered shark species
- Reviewing shark management
- Improvement of information on shark captures

The ling fishery has very limited interactions with protected shark species, but does interact with other shark species more regularly. However, the information on the nature and extent of these interactions, and species involved is incomplete. A key objective of the National Deepwater Plan is to improve monitoring and information collected regarding interactions with shark species across all deepwater fisheries. If the results of this monitoring indicate that further research into particular shark species is needed then this research will be delivered through the 10 Year Research Programme as required.

**Management need:**

Continued monitoring of elasmobranch interactions in ling fisheries, and analysis in the wider New Zealand fisheries context and with respect to any relevant risk assessments completed

To gather more detailed information on interactions with all elasmobranchs to identify the nature and extent of interactions and determine if additional management measures are needed

### **Protected coral species**

An amendment to the Wildlife Act 1953 of July 2010 means that most hard coral species in New Zealand are now protected. During the last seven fishing years, observers have reported less than 20 kgs of hard corals being taken in ling target fisheries (see Table 11).

**Management need:**

Given the low level of interactions that occur in these fisheries, the Ministry considers the current management measures to be sufficient but will continue regular monitoring to ensure this remains the case.

## Category 4: Benthic interactions

Ling is mainly caught with bottom longlines and bottom trawl gear. Contact of components of bottom trawl gear (doors, ground rope, etc.) with the seafloor results in the mortality and capture of benthic invertebrates and impacts on both physical and biological components of the benthic habitat. Bottom longlines also contact the seafloor, but do not have as large an interaction with the benthic habitat.

The Ministry acknowledges that bycatch data does not provide information on the nature and extent of benthic interactions from ling fishing activity. Table 15 below details the benthic bycatch that has been recorded from observed vessels targeting ling over the last seven fishing years.

**Table 15: Benthic bycatch from ling target trawl fisheries from observer records for 2003-2010 fishing years**

Phyla	Common name	Total amount recorded (kg)
Cnidaria	Corals (protected species)	10
	Corals (generic code & non-protected species)	4
	Anemones	828
	Sea pens	2.
	Hydroids	0
Porifera	Sponges	8,786

The footprint of all ling target trawl fishing has been calculated as having covered 12,627 km<sup>2</sup> between 1989/90 and 2008/09. Figure 12 below shows the total footprint of ling target trawl fisheries.

In recent years the management measures to address the effects of deepwater trawl activity have focused on 'avoiding' these effects rather than remedying or mitigating them (as per the requirements under the Fisheries Act to avoid, remedy, or mitigate). This has been achieved by closing areas to bottom trawling; first with seamounts and then with Benthic Protection Areas (BPAs). The implementation of BPAs in 2007 effectively closed over 30% of the New Zealand EEZ to bottom trawling. The Ministry also implemented a monitoring regime to ensure these closures were adhered to. The BPA closures were based on the best available marine classification and over 10% of each environment class was closed.<sup>10</sup> BPA closures cover 7.5% of the full reported range of ling, no information is available on the amount of this that has ever been trawled.

The current BPAs will be reviewed after 2013 and if research suggests that the existing BPAs are not protecting representative areas of marine habitats then further closures will be considered.<sup>11</sup> Figure 13 below details the BPAs and also includes details of the ling habitat depth range.

### Management need:

To continue monitoring the extent of the trawl footprint in ling trawl fisheries each year

To monitor interactions of longline gear with the benthic habitat and ensure appropriate management measures are developed if interactions are considered to have an adverse impact

<sup>10</sup> The exception was environment class 55, where only 3% was closed, because a third of this area is included in the Territorial Sea and most bottom trawling in that area is for coastal rather than deepwater species.

<sup>11</sup> Some eNGOs do not consider that the Benthic Protected Areas adequately address the benthic interactions that arise from ling and other deepwater trawl interactions.



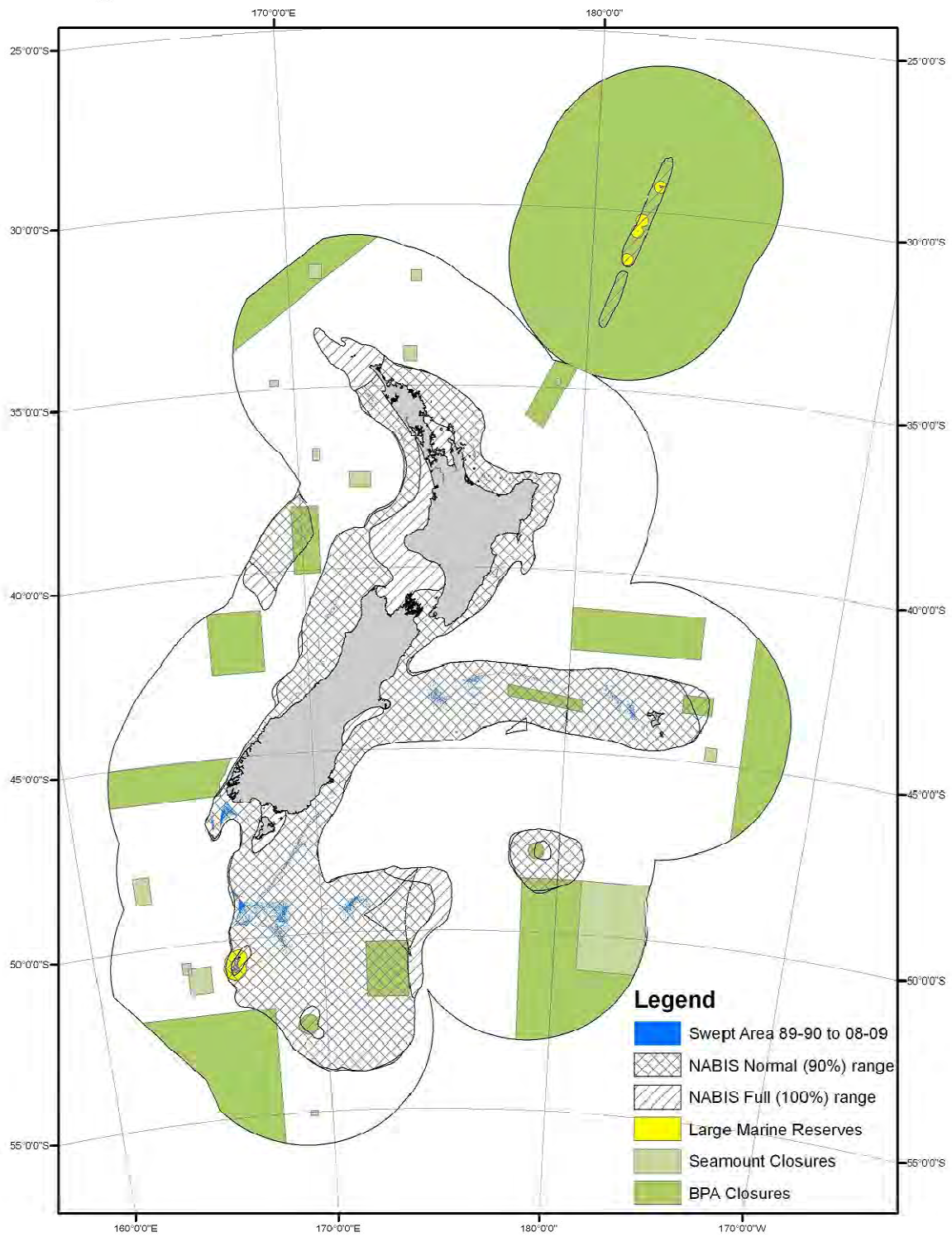
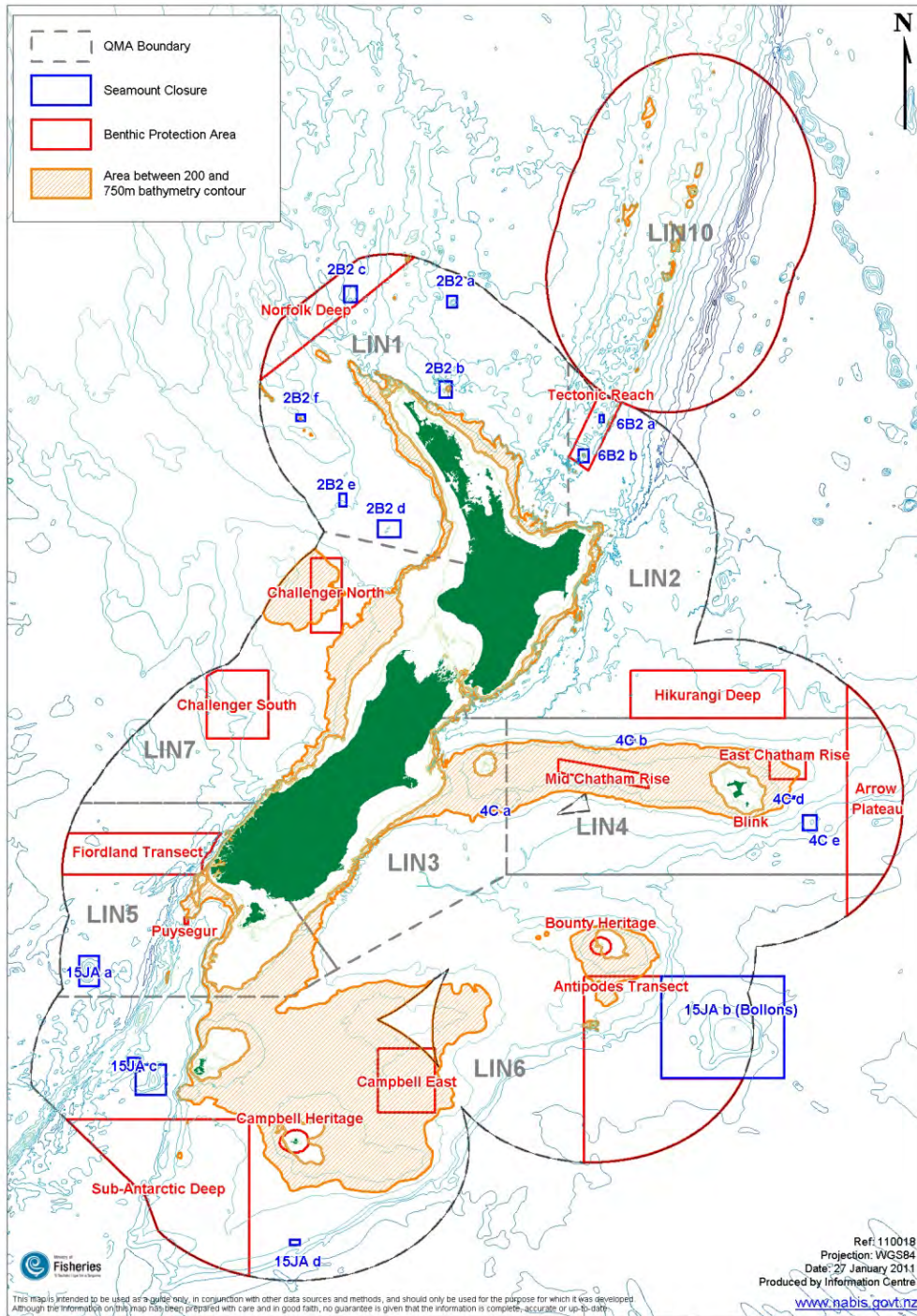


Figure 12: Ling bottom trawl footprint 1989-90 to 2008-09 (note trawl tracks are not to scale)



**Figure 13: The areas of ling habitat currently closed to bottom trawling activity through BPAs and seamount closures**

### 3. Operational objectives for ling fisheries

This part of the plan describes the operational objectives that will drive the management of ling fisheries over the five year timeframe of the National Deepwater Plan. Each operational objective is described in terms of the high level management approach that will be taken to address these key issues.

Operational objectives are specific, measurable and time bound. The actions (and services) required to meet these operational objectives will be specified each year in the Annual Operational Plan.

This section also shows the expected timeframe for delivery of the work that will contribute to achievement of the stated Performance Indicators. Timeframes are presented by financial year (1 July – 30 June), and to enable readers to interpret these timeframes correctly, the following guidelines are included below:

- Where the timeframe is “**by** 20xx/yy”, it is expected that work will be **completed** by the **end** of the stated financial year
- Where the timeframe is “**from** 20xx/yy”, it is expected that work will **commence** during the stated financial year, and will likely be ongoing across one or more financial years
- Where the timeframe is “**during** 20xx/yy”, it is expected that work will be **completed** during the stated financial year.
- “Annual delivery” requires work to be reported annually throughout the duration of this Plan.

#### Utilisation-focused Operational Objectives

##### OO1.1 Support the relevant ling fisheries in achieving and maintaining credible third party certification and ensure any Conditions of Certification are met within the required timeframe

New Zealand ling fisheries are currently being assessed for potential certification by a credible third party certification scheme. This Operational Objective aims to ensure the adequate and timely provision of documentation required for all steps throughout the assessment process. This Operational Objective also recognises that any certification may require additional management actions that have not been specified in this Plan. Should any certification scheme refer to issues not incorporated in the other Operational Objectives, completion of these will be driven through this Operational Objective.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO 1.1 MO1.5 MO1.6 MO2.3	1. Credible third party certification schemes have been investigated and assessed for suitability with respect to ling fisheries 2. If any certification schemes are found to be appropriate for ling, certification has been initiated.	1. By 2013/14 2. From 2013/14

### OO1.2 Enable quota owners to develop and implement a harvest regime that will maximise the value obtained from ling fisheries

In 2010, ling was the tenth most valuable seafood export from New Zealand. The relatively high value of ling in markets notwithstanding, it is not a standalone target fishery, with nearly 50% of ling catches taken as bycatch in other fisheries, most notably the hoki trawl fisheries. This association with other species means that management of ling fisheries needs to take into account management measures and interventions in other fisheries that catch ling.

OO1.2 aims to assist quota owners in developing a list of principles or guidelines that can inform fisheries management decisions provided stock sustainability is assured. These guidelines will help give effect to the economic considerations of quota holders when TAC reviews occur. Principles will likely consider factors such as:

- The rate of change to the TAC
- Other factors including changes to other fisheries, such as hoki or hake fisheries, that may affect catch levels of ling

Contributing to Management Objectives	Performance Indicators	Timeframe
MO1.1	1. Guidelines that maximise the value obtained from ling fisheries are agreed by quota owners	1. By 2012/13
MO1.2		
MO1.6	2. Such guidelines are an integral component of ling management decisions, provided no sustainability concerns are present	2. From 2012/13
MO1.7		
MO2.1		

### OO1.3 Ensure satisfactory levels of compliance are achieved in ling and associated fisheries

Compliance indicators have been developed for deepwater fisheries in general to support the Voluntary, Assisted, Directed and Enforced (VADE) compliance model which focuses on “informed and assisted” compliance. Fishery specific compliance information is not readily available for any of the fisheries covered in this chapter. Initially, the Ministry will profile the levels of fisher compliance with the range of regulatory and non-regulatory management measures currently in place in the fisheries. A risk assessment will then be undertaken to identify compliance risks specific to ling and associated fisheries. The risk assessment will be used to identify any areas that may need focussed compliance monitoring. Levels of compliance will then be assessed annually against generic performance indicators and reported to stakeholders and tangata whenua through the Annual Review Report.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO1.1	1. The performance of ling fisheries is assessed against the specified compliance performance indicators	1. From 2012/13
MO1.3		
MO1.5	2. The results of each annual assessment demonstrate high levels of compliance in all ling and associated fisheries	2. From 2013/14
MO2.1		
MO2.5		

**OO1.4 Develop and implement a stock monitoring and management regime for Patagonian toothfish to enable development of appropriate management settings and harvest strategy**

Patagonian toothfish is new to the QMS and very limited fishing has taken place in New Zealand waters in the past. This has led to a scarcity of information on which to base the development of an appropriate TAC and a management approach. The initial years of the fishery will focus on gathering sufficient and appropriate information to determine a management approach, including a harvest strategy, as well as exploring the viability of a commercial fishery in New Zealand waters.

Contributing to Management Objectives	Performance Indicators	Timeframe
All	1. A management approach is developed which includes a harvest strategy and facilitates sustainable development of the fishery	1. From 2012/13

**OO1.5 Collaboratively assess potential management tools to manage ling based on biological stock boundaries**

Scientific research has shown that there are at least five distinct biological stocks of ling. Stock assessments for ling are performed based on these biological stocks resulting in biomass and stock status estimates that do not align with management areas. However, management should be at the level of the biological stocks to allow for interventions based on assessment units. There are two potential solutions to resolve this issue:

1. Amalgamation of QMAs to better align with biological stock distribution. This is a complicated solution that would require substantial quota owner support, unless it is driven by sustainability concerns.
2. Following the example of hoki, orange roughy, and oreo, QMA sub-area catch limits could potentially be agreed upon in collaboration with industry. This would allow for the catch levels and fishing pressure on the different biological stocks to be managed appropriately and to provide a management tool to restrict harvest levels in the event that sustainability concerns arose.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO1.2 MO1.1 MO1.3 MO1.5 MO1.6 MO2.1	1. Potential approaches to manage ling based on biological stocks have been assessed  2. A mechanism to allow for monitoring and management based on the biological stock structure has been considered and implementation plans developed	1. By 2012/13  2. From 2013/14

**OO1.6 Ensure all research planned under the 10 Year Research Programme which is used to inform the management of ling fisheries continues to be peer reviewed, meets the requirements of the research standard, and is delivered in time to inform management decisions before the start of each October fishing year**

The 10 Year Research Programme for Deepwater Fisheries sets out the research and monitoring approach for ling over the next 10 years. The research and monitoring approach differs by fishery based on the available information. All fisheries use CPUE and catch-at-age data from the relevant fishery as inputs to stock assessments, while LIN 3&4 and LIN 5&6 also have regular trawl surveys to provide biomass information. Within the timeframe of this National Deepwater Plan, Table 15 shows research projects that are scheduled for the ling fisheries:

**Table 12: Research projects scheduled for specific ling fisheries**

Year	Trawl survey			Stock assessment				
	LIN 3&4	LIN 5&6	LIN 7WC	LIN 3&4	LIN 5&6	LIN 6B	LIN 7WC	LIN CS
2011/12	✓	✓		✓	✓			
2012/13	✓	✓	✓				✓	✓
2013/14			✓			✓		
2014/15	✓	✓		✓	✓			

Note: Table does not include routine ageing work for these stocks

Contributing to Management Objectives	Performance Indicators	Timeframe
MO1.4 MO1.2 MO1.5 MO2.2 MO2.4 MO2.5 MO2.6 MO2.7	<ol style="list-style-type: none"> <li>All research projects scheduled through the 10 Year Research Programme are delivered in time to inform the annual management process for the start of the October fishing year</li> <li>All research delivered through the 10 Year Research Programme meets the Ministry Scientific Research Standard and is independently peer reviewed through the Ministry's Fisheries Assessment Working Group process</li> <li>Any other necessary information requirements are contracted and planned appropriately through the 'Additional Research' component of the 10 Year Research Programme</li> </ol>	<ol style="list-style-type: none"> <li>Annually</li> <li>Annually</li> </ol>

## Environmental operational objectives

### OO2.1 Develop an agreed harvest strategy for ling fisheries, including a stock rebuild strategy that is consistent with the Harvest Strategy Standard

Ling fisheries are currently managed using the default Harvest Strategy including generic reference points specified in the Harvest Strategy Standard. As part of the development of a species/stock specific harvest strategy, appropriate biological reference points for ling will be defined and agreed. Reference points will then be used to underpin the management of ling fisheries.

The ling harvest strategy will incorporate all components detailed in the Harvest Strategy Standard, but will tailor them specifically to the biological characteristics and productivity of ling. The following components will therefore be developed and agreed:

- Reference points, including a target (range) and soft and hard limits;
- A formal, time constrained rebuilding strategy; and
- A harvest control rule component that will guide management action

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.1	1. Agreed harvest strategies for ling stocks are in place	1. By 2013/14
MO1.2 MO1.3 MO1.5 MO1.6 MO2.2 MO2.6	2. Details of the harvest strategies, including a rebuild strategy, are publically available	2. By 2013/14
	3. Science information is reported against stock/species specific reference points	3. From 2013/14
	4. Agreed harvest strategies underpin management responses	

### OO2.2 Develop and implement a management strategy for ribaldo

Ribaldo is a bycatch fishery that is data poor. The 10 Year Research Programme is addressing the information gap through targeted data collection and regular characterisations of the fishery. To facilitate effective management of ribaldo in the absence of detailed information, an interim management procedure, based on the best available information, will be developed and agreed. The management procedure will guide management decisions and defined what information sources will be used to underpin management decisions.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.2 MO1.1 MO1.3 MO1.4 MO1.6 MO2.1 MO2.6	1. Agreed interim management procedure in place and used to guide management interventions in ribaldo fisheries	1. From 2013/14

**OO2.3 Implement appropriate spatial management measures to address any adverse effects of fishing for ling on the benthic habitat**

The management approach that the Ministry has taken to address benthic interactions with deepwater fisheries focuses on avoiding the effects of bottom trawling by closing areas of the benthic habitat to this fishing method.

The management of benthic interactions across ling fisheries managed under this plan will focus on monitoring the extent of the bottom trawl component of the ling fishery each year. Ongoing monitoring of ling trawl footprint is scheduled under the 10-Year Research Programme, through project DAE 2010/04 “Monitoring the trawl footprint for deepwater fisheries”. This project will update the trawl footprint annually, enabling the Ministry to assess any changes to the impacted area. The footprint will also be assessed against the best available marine habitat classification, currently the Benthic Optimised Marine Ecosystem Classification (BOMECE).

Ling and Patagonian toothfish are also fished using bottom longlines, which may impact the benthic habitat, but to a lesser degree than bottom trawls. Interactions of bottom longline gear with benthic organisms will be monitored and management action taken if interactions are deemed to be significantly adverse.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.7 MO1.2 MO1.6 MO2.6	<ol style="list-style-type: none"> <li>1. Maps of ling bottom trawl footprint produced annually</li> <li>2. The extent of the bottom trawl footprint is formally assessed against the BOMECE each year to consider whether benthic interactions are considered to have an adverse impact</li> <li>3. If the ling bottom trawl impacts are found to be having an adverse impact on the benthic habitat additional management measures are transparently developed and implemented</li> <li>4. Monitor interactions of bottom longline fisheries with benthic habitat and develop potential management tools to minimise or mitigate interactions if deemed necessary</li> </ol>	<ol style="list-style-type: none"> <li>1. From 2012/13</li> <li>2. Annually</li> <li>3. From 2012/13</li> <li>4. Annually</li> </ol>



#### OO2.4 Ensure that incidental seabird mortalities in ling fisheries are mitigated and minimised

As discussed previously, interactions occur between ling fisheries and some species of seabirds. Initial results from the implementation of the risk based seabird policy indicate no species are at risk from large trawl or large bottom longline vessels. To maintain this low risk level, current seabird mitigation measures will continue to be monitored and assessed to ensure continuing effectiveness.

The L2 Risk Assessment by Yvan et al. (2010) did indicate some potential risk to seabird populations from inshore trawl and bottom longline fishing activity. Where higher level risks occur, these will be addressed in collaboration with the Ministry's Inshore Fisheries Management Team and DWG.

The risk assessment which underpins the Ministry's seabird policy assesses the risk to seabird populations in the context of all New Zealand fisheries. In areas where risk is indicated by the risk assessment a four-step approach will be implemented to ensure that risks are addressed appropriately:

1. The context around the risk rating will be assessed to gauge if it is the result of a gap in information or if it is based on actual observed captures or interactions
2. Ongoing monitoring will identify any trends in seabird interactions in ling fisheries
3. Trends will be reviewed to indicate if any management intervention is required
4. Where necessary, corrective management measures will be developed and implemented

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.5 MO1.2 MO1.6 MO2.6	<ol style="list-style-type: none"> <li>1. Observed seabird captures are reported annually for ling fisheries, including analysis of captures by species, area, method and vessel size</li> <li>2. Additional management measures are developed and implemented if/when deemed necessary</li> </ol>	<ol style="list-style-type: none"> <li>1. Annually</li> <li>2. From 2011/12</li> </ol>

#### OO2.5 Monitor incidental bycatch of Tier 3 species in ling fisheries

As described earlier, ling fisheries catch some non-QMS species during fishing activity, most notably javelinfish and rattails. A level one risk assessment will be completed which will identify Tier 3 species which may be at risk from fishing activity. Acceptable levels of risk have not been defined, but it will be defined with regard to the legislative requirement to maintain species above a level that ensures long-term viability. Any species deemed to be at risk from fishing activity will then be assessed against the QMS introduction standard.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.4 MO1.6 MO2.2 MO2.6	<ol style="list-style-type: none"> <li>1. Any bycatch species deemed to be at risk from ling fishing is assessed against the QMS introduction standard and the outcome reported in the Annual Review Report</li> </ol>	<ol style="list-style-type: none"> <li>1. From 2011/12</li> </ol>

## 4. Measuring performance

Monitoring and measuring performance is critical to ensure operational objectives are achieving the management objectives, the Fisheries 2030 supporting outcomes, and in turn the overall strategic vision for the fisheries sector.

### Management Objectives: Review Criteria

Review criteria will enable the measurement of where we are in five years time, i.e. how the management of ling and Patagonian toothfish fisheries has improved over the five year duration of the National Deepwater Plan.

The nature of some of these management objectives means it may not be feasible to fully meet the targeted outcome within the five year duration of this plan.

Each of the high level management objectives for the deepwater fisheries is assessed below in terms of its current status and the target status after this plan has been in place for five years. The target status will demonstrate progress towards achieving the relevant Management Objective but remains high level to allow for unforeseen changes and events that may take place over the next five years.

### Management Objectives – Utilisation

<b>MO1.1</b>	<b>Enable economically viable deepwater and middle-depth fisheries in NZ over the long-term</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>Ling quota value of \$246.2 million (2010)</li> <li>Current ling export earnings are \$42 million (2010)</li> <li>Patagonian toothfish fishery is still in development</li> </ul>					<ul style="list-style-type: none"> <li>Options for alternate cost effective monitoring and management strategies are explored</li> <li>Management decisions are assessed in terms of their impacts on the economic yield from ling fisheries</li> <li>Information necessary to manage fisheries is transparently obtained on a cost effective basis</li> <li>An exploratory fishery for Patagonian toothfish has been provided for</li> <li>A management strategy is in place for ribaldo that maximises benefits within environmental limits</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO1.2</b>	<b>Ensure there is consistency and certainty of management measures and processes in deepwater and middle-depth fisheries</b>										
Status at start of plan						Target status at 5 year review					
<ul style="list-style-type: none"> <li>Ling fisheries are managed through the collaborative partnership between the Ministry for Primary Industries and the DeepWater Group Ltd (DWG)</li> <li>The overlap of the ling fisheries with the inshore fishing fleet is managed through a coordinated relationship with the Ministry Inshore Fisheries Management Team</li> <li>A fisheries plan is drafted that sets out objectives for ling fisheries</li> <li>Key management decisions are consulted on widely across all stakeholder groups with an interest in the fisheries</li> <li>Catch is monitored annually against the TACC set for each stock</li> <li>Ministry observers achieve 10% coverage on large ling trawlers, 20% on large bottom longliners, and low coverage on small vessels</li> </ul>						<ul style="list-style-type: none"> <li>Collaborative management relationship continues, with greater benefits realised through the MOU</li> <li>The transparent objectives within this plan are driving the management of ling fisheries</li> <li>Evidence of high levels of compliance with regulatory measures is available</li> <li>There is wide support for and high levels of adherence with the non-regulatory management measures in place in ling fisheries</li> <li>Observer coverage has been increased toward full coverage in the deepwater fleet and monitoring has increased in the inshore fleet</li> <li>Management measures are based on solid data and guided by the agreed harvest strategy</li> </ul>					
<b>Supporting Operational Objectives</b>											
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5	

<b>MO1.3</b>	<b>Ensure deepwater and middle-depth resources are managed so as to provide for the reasonably foreseeable needs of future generations</b>										
Status at start of plan						Target status at 5 year review					
<ul style="list-style-type: none"> <li>Current management focuses on retaining catch within the allocated catch limits and avoiding, remedying or mitigating the adverse effects of fishing on the aquatic environment</li> <li>The Harvest Strategy Standard provides a generic management target of 40%B<sub>0</sub>, although this has not been assessed in terms of its appropriateness for the long term management of ling or Patagonian toothfish</li> </ul>						<ul style="list-style-type: none"> <li>Awareness and understanding of how ling fisheries are managed has improved through delivery of the National Deepwater Plan</li> <li>Specific harvest strategies are in place that insure long term sustainability of ling stocks</li> <li>Evidence of high levels of compliance in ling fisheries is available</li> <li>A management approach has been determined for Patagonian toothfish allowing for sustainable development of the fishery</li> </ul>					
<b>Supporting Operational Objectives</b>											
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5	

<b>MO1.4</b>	<b>Ensure effective management of deepwater and middle depth fisheries is achieved through the availability of appropriate, accurate and robust information</b>										
Status at start of plan						Target status at 5 year review					
<ul style="list-style-type: none"> <li>• Two ling biological stocks to date have regular surveys which monitor biomass.</li> <li>• Stock assessments are available for all ling stocks</li> <li>• A schedule of further monitoring surveys, stock assessments and characterisations is planned through the 10 Year Research Programme for Deepwater Fisheries</li> <li>• Limited information is available to support management of Patagonian toothfish</li> </ul>						<ul style="list-style-type: none"> <li>• All surveys and stock assessments scheduled in the next five years are completed within required timeframes</li> <li>• All research delivered through the 10 Year Research Programme and used to inform management meets the Research and Science Information Standard for New Zealand fisheries</li> <li>• Outcomes of the observer optimisation project have been implemented to maximise benefits gained from observer coverage</li> <li>• Observer coverage in the inshore fisheries has increased and work is underway to address possible methods of minimising bias in coverage</li> <li>• Information is available on which to base a management strategy and harvest strategy for Patagonian toothfish</li> </ul>					
<b>Supporting Operational Objectives</b>											
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5	

<b>MO1.5</b>	<b>Ensure the management of New Zealand's deepwater and middle-depth fisheries are recognised as being consistent with or exceeding national and international best practice</b>										
Status at start of plan						Target status at 5 year review					
<ul style="list-style-type: none"> <li>• The Harvest Strategy Standard provides generic target and limit reference points that are consistent with international best practice, but no stock specific harvest strategies for ling are available</li> </ul>						<ul style="list-style-type: none"> <li>• Certification by a credible third party has been considered and pursued as appropriate</li> <li>• Available evidence shows that levels of compliance with regulatory and non-regulatory measures in ling and Patagonian toothfish fisheries are high</li> <li>• Specific harvest strategies have been developed that are consistent with the Harvest Strategy Standard, and therefore with international best practice</li> </ul>					
<b>Supporting Operational Objectives</b>											
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5	

<b>MO1.6</b>	<b>Ensure New Zealand’s deepwater and middle-depth fisheries are transparently managed</b>									
<b>Status at start of plan</b>					<b>Target status at 5 year review</b>					
<ul style="list-style-type: none"> <li>• The majority of information currently available regarding ling consists of scientific technical reports and advice papers that are accessible to a small number of people</li> <li>• There is no primary information location that can be accessed by all people with an interest in the management of ling fisheries</li> <li>• It is unclear how changes in stock status are addressed in management interventions</li> <li>• Patagonian toothfish have no clear management approach in place</li> </ul>					<ul style="list-style-type: none"> <li>• The Ministry for Primary Industries website is acknowledged as the most comprehensive source of information (both technical and “plain English”) on the management of deepwater fisheries</li> <li>• The Deepwater Annual Operational Plan (AOP) describes the Management Actions and Services relating to ling that will be delivered each year through the duration of this plan.</li> <li>• The Deepwater Annual Review Reports (ARR) detail the progress made in the previous year to deliver the Management Actions and Services specified in each AOP</li> <li>• Clear processes have been established to enable engagement between the Ministry and key stakeholders and Treaty partners</li> <li>• Agreement has been reached on how to better align management measures with biological stocks</li> <li>• A management approach for Patagonian toothfish has been developed and documented</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO1.7</b>	<b>Ensure the management of New Zealand’s deepwater and middle depth fisheries meets the Crown’s obligations to Maori</b>									
<b>Status at start of plan</b>					<b>Target status at 5 year review</b>					
<ul style="list-style-type: none"> <li>• 12 iwi are currently members of the DeepWater Group Ltd</li> <li>• All iwi that hold ling quota are engaged on key management decisions through Te Ohu Kai Moana</li> <li>• Other iwi quota owners are not actively represented in ling management</li> <li>• Non-commercial iwi interests are not represented in ling management</li> </ul>					<ul style="list-style-type: none"> <li>• A clear process has been established that provides tangata whenua the opportunity to engage on ling management decisions</li> <li>• All iwi with ling quota have the opportunity to engage through the DWG and/or Te Ohu Kai Moana</li> <li>• The wider commercial and non-commercial interests of tangata whenua that relate to ling are taken into account through the relevant Iwi/Forum Fisheries Plans and given effect through Annual Operational Plans</li> </ul>					
<b>Supporting Operational Objectives</b>										
Operational Objectives 1.11 and 1.12 from the hoki chapter, and 1.9 and 1.10 from the orange roughly chapter of the National Deepwater Plan relate to facilitating increased iwi involvement with fisheries management decisions. The Ministry will use this work to ensure that obligations to Maori are met with regards to all deepwater fisheries.										

## Management Objectives – Environmental

<b>MO2.1</b>	<b>Ensure ling, Patagonian toothfish, and key bycatch fish stocks are managed to an agreed harvest strategy</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>Ling is managed using the generic target and limit reference points from the Ministry's Harvest Strategy Standard</li> <li>No specific rebuild strategy or harvest control rules are in place for ling</li> <li>No harvest strategy is in place for Patagonian toothfish</li> </ul>					<ul style="list-style-type: none"> <li>Stock specific harvest strategies for relevant ling stocks have been developed and agreed with ling quota holders</li> <li>Stock specific harvest strategies underpin the management of relevant ling stocks and guide the sustainability advice for these stocks</li> <li>A harvest strategy has been developed for Patagonian toothfish and guides management advice</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.2</b>	<b>Maintain the genetic diversity of deepwater and middle-depth target and bycatch species</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>The harvest strategy standard provides generic reference points, but no analysis has been undertaken to determine whether these target and limit reference points are appropriate to maintain the genetic diversity of ling and associated bycatch stocks</li> </ul>					<ul style="list-style-type: none"> <li>Stock specific harvest strategies have been developed to ensure that genetic diversity of ling and associated species is not affected by fishing activity</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.3</b>	<b>Protect habitats of particular significance for fisheries management</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>There is no comprehensive definition of what constitutes habitat of particular significance for the management of ling</li> <li>Little information is available on any habitats that are of particular significance for ling</li> </ul>					<ul style="list-style-type: none"> <li>Policy definition is available describing how to apply 'habitat of particular significance for fisheries management'</li> <li>Ling habitat of significance to fisheries management have been identified</li> <li>Where necessary, management measures to adequately protect these habitats have been developed and implemented</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.4</b>	<b>Identify and avoid or minimise adverse effects of ling fisheries on incidental bycatch species</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>Incidental bycatch information is monitored through catch and effort reporting and observer data collection</li> <li>Observer coverage/monitoring of inshore vessels is low (&lt;5%)</li> </ul>					<ul style="list-style-type: none"> <li>A Level 1 risk assessment has been completed to identify incidental bycatch species at risk from ling fishing activity</li> <li>Incidental bycatch in ling fisheries is monitored and reported annually through contracted research project</li> <li>Where a species has been identified as being at risk from ling fishing activity, catch is assessed against QMS introduction standard</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.5</b>	<b>Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on the long-term viability of endangered, threatened and protected species</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>Interactions of ling trawl and large longline fisheries with ETP species are monitored and are not thought to have an adverse effect on any populations</li> <li>Interactions of small longline ling fisheries on ETP species, most notably seabirds, are inadequately monitored</li> </ul>					<ul style="list-style-type: none"> <li>Reliable information is available on the nature and extent of ETP species interactions across all ling fisheries</li> <li>Where interactions have been found, or thought likely to be adverse, appropriate management measures have been implemented to minimise, mitigate or avoid interactions with ETP species</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.6</b>	<b>Manage deepwater and middle-depth fisheries to avoid or minimise adverse effects on biological diversity</b>									
Status at start of plan					Target status at 5 year review					
<ul style="list-style-type: none"> <li>Research and information on the full extent of the impacts of ling fishing on biological diversity is limited</li> <li>The Chatham Rise and sub-Antarctic trawl surveys provide some information on the effects of fishing on biological diversity in these areas, some of which is from ling fishing activity</li> </ul>					<ul style="list-style-type: none"> <li>A biodiversity index is developed and monitored based on trawl survey data and other available information from ling fisheries</li> <li>Information is available to better understand the possible effects of fishing on trophic interactions at an ecosystem level</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5

<b>MO2.7</b>	<b>Identify and avoid or minimise adverse effects of deepwater and middle-depths fishing activity on the benthic habitat</b>									
<b>Status at start of plan</b>					<b>Target status at 5 year review</b>					
<ul style="list-style-type: none"> <li>• Benthic Protection Areas and Seamount Closures are in place, protecting 6% of the normal range of ling</li> <li>• The ling bottom trawl footprint covers 1.4% of the normal range of ling</li> <li>• There is limited information available on the effects of bottom longline fishing for ling on the benthic environment</li> </ul>					<ul style="list-style-type: none"> <li>• The bottom trawl component of ling fishing has been assessed annually against the BOMECE</li> <li>• A transparent programme to develop and implement additional management measures exists, should the impacts on benthic habitats become or are thought likely to become adverse</li> <li>• Regular information on the nature and extent of interactions of bottom longlines with the benthic habitat is available</li> </ul>					
<b>Supporting Operational Objectives</b>										
OO1.1	OO1.2	OO1.3	OO1.4	OO1.5	OO1.6	OO2.1	OO2.2	OO2.3	OO2.4	OO2.5



## Appendix I: Summary of Operational Objectives for ling fisheries:

- Denotes the primary management objective that each operational objective contributes to achieving
- Denotes additional management objectives that each operational objective contributes to achieving

Utilisation focused Operational Objectives	MO 1.1	MO 1.2	MO 1.3	MO 1.4	MO 1.5	MO 1.6	MO 1.7	MO 2.1	MO 2.2	MO 2.3	MO 2.4	MO 2.5	MO 2.6	MO 2.7
<b>OO1.1</b> Support the relevant ling fisheries in achieving maintaining credible third party certification and ensure any Conditions of Certification are met within the required timeframe	●●				●	●				●				
<b>OO1.2</b> Enable quota owners to develop and implement a harvest regime to maximise the value obtained from ling fisheries	●●	●				●	●	●						
<b>OO 1.3</b> Ensure satisfactory levels of compliance are achieved in ling and associated fisheries	●●		●		●			●				●		
<b>OO1.4</b> Develop and implement a stock monitoring and management regime for Patagonian toothfish to enable development of appropriate management settings and harvest strategy	●●	●	●	●	●	●	●	●	●				●	
<b>OO1.5</b> Collaboratively assess potential management tools to manage ling based on biological stock boundaries	●	●●	●		●	●		●						
<b>OO1.6</b> Ensure all research planned under the 10 Year Research Programme which is used to inform the management of ling fisheries continues to be peer reviewed, meets the requirements of the research standard, and is delivered in time to inform management decisions before the start of each October fishing year		●		●●	●				●		●	●	●	●

Environmental focused Operational Objectives	MO 1.1	MO 1.2	MO 1.3	MO 1.4	MO 1.5	MO 1.6	MO 1.7	MO 2.1	MO 2.2	MO 2.3	MO 2.4	MO 2.5	MO 2.6	MO 2.7
<b>OO2.1</b> Develop an agreed harvest strategy for ling fisheries including a stock rebuild strategy that is consistent with the Harvest Strategy Standard		●	●		●	●		●●	●				●	
<b>OO2.2</b> Develop and implement a management strategy for ribaldo	●		●	●		●		●	●●				●	

<b>Environmental focused Operational Objectives</b>	<b>MO 1.1</b>	<b>MO 1.2</b>	<b>MO 1.3</b>	<b>MO 1.4</b>	<b>MO 1.5</b>	<b>MO 1.6</b>	<b>MO 1.7</b>	<b>MO 2.1</b>	<b>MO 2.2</b>	<b>MO 2.3</b>	<b>MO 2.4</b>	<b>MO 2.5</b>	<b>MO 2.6</b>	<b>MO 2.7</b>
<b>OO2.3</b> Implement appropriate spatial management measures to address any adverse effects of fishing for ling on the benthic habitat		•				•							•	••
<b>OO2.4</b> Ensure that incidental seabird mortalities in ling fisheries are mitigated and minimised		•				•						••	•	
<b>OO2.5</b> Monitor incidental bycatch of Tier 3 species in ling fisheries						•			•		••		•	