Ministry for Primary Industries
Manatū Ahu Matua

Oreo
FISHERIES PLAN CHAPTER

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Introduction

This chapter of the National Deepwater Plan sets the operational objectives and performance criteria for the oreo fishery. Specifically it addresses the management of the following quota management and bycatch species:

- Smooth oreo (target)
- Black oreo (target)
- Spiky oreo (bycatch)
- Warty oreo (bycatch)

Note that the four species of oreos (black, smooth, spiky and warty) fished in New Zealand are generally managed as a single species complex.[1] Only black and smooth oreos are commercially fished in New Zealand fisheries waters in significant quantities.

This chapter consists of the following sections:

1. Overview of oreo fisheries
2. Overview of non-target (bycatch and incidental) interactions
3. Operational objectives for oreo fisheries
4. Measuring performance

This chapter also addresses the management of any environmental effects caused by fishing these species.

The oreo chapter of the National Deepwater Plan is intended to manage oreo fisheries, however, management objectives are included in the latter part of this Chapter for the Tier 2 bycatch species alfonsino (*Beryx spelndens*, *Beryx decadactylus*, BYX), and ruby fish (*Plagiogeneion rubignosus*, RBY). Inclusion of management objectives for ruby fish and alfonsino is for administrative purposes only as they are regarded as separate fisheries.

[1] OEO3A is an example of where they are not.

1. Overview of the Oreo Fisheries

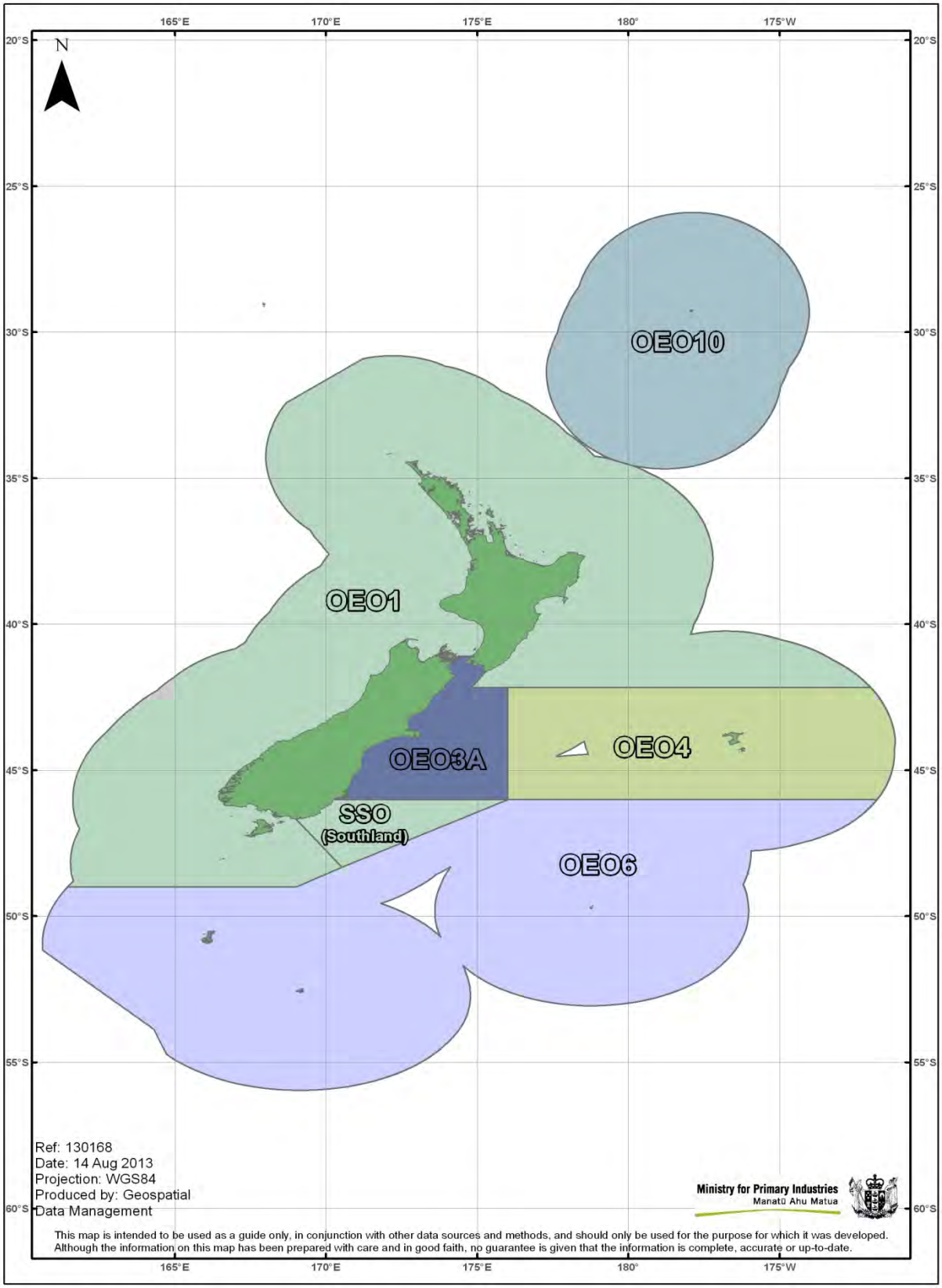

Figure 1: Map of the oreo Quota Management Areas (QMAs).

Biology overview

Oreo refers to four separate oreo species:

- Black oreo (*Allocyttus niger* - BOE)
- Smooth oreo (*Pseudocyttus maculatus* - SSO)
- Spiky oreo (*Neocttus rhomboidalis* - SOR*)*
- Warty oreo *(Allocyttus verrucosus* - WOE)

All four oreo species share some biological characteristics, such as being relatively long-lived and slow growing. They are also all found predominantly in southern latitudes of New Zealand's Exclusive Economic Zone (EEZ) from the South Chatham Rise to the sub-Antarctic, at depths from 600 to 1,500 m, with younger fish typically found towards the shallower end of this depth range.

Oreo are found over isolated topographical features and are also widespread over more extensive flat areas of seabed. While they appear to undergo vertical migrations, it is unknown whether there are extensive horizontal migrations by any species. Given that spawning is widespread, and given the absence of major localised spawning grounds, oreo (once settled) possibly travel relatively small distances during their adult lives. A plausible stock hypothesis is that New Zealand oreo stocks consist of a large number of adult populations that mix with adjacent populations to a greater or lesser extent, depending on the isolation of the habitat where they reside.

This hypothesis also fits with developmental observations of the duration of oreo pelagic egg and larval phases which suggest that eggs and larvae mix extensively, and that populations over large areas will likely contribute to a common larval pool, which subsequently provides recruits to the range of the species and the various fishing grounds.

The biology of each species is described in further detail below.

Black oreo

Black oreo have been found within a 600 to 1,300 m depth range. The geographical distribution south of about 45°S is not well known. It is a southern species and is abundant on the South Chatham Rise, along the east coast of the South Island, the north and east slope of Pukaki Rise, the Bounty Platform, the Snares slope, Puysegur Bank and the northern end of the Macquarie Ridge. They most likely occur right around the slope of the Campbell Plateau. Spawning occurs from late October to at least December and is widespread on the south Chatham Rise. Maximum estimated age of black oreo is 153 years (at length 45.5 cm TL).[2] Estimated age at maturity for females is 27 years. Average length at maturity is 34 cm TL for black oreo.

Smooth oreo

Smooth oreo occur from 650 to about 1,500 m depth. The geographical distribution and spawning patterns are similar to black oreo. Maximum estimated age is 86 years (at 51 cm TL). Estimated age at maturity for females is 31 years. Average length at maturity is 40 cm TL for smooth oreo.

[2] Measurements provided in this chapter are for total lengths (TL).

Spiky and warty oreos

Little information is available on the biology of spiky and warty oreo.

For more detailed information on the biology of oreos and the current status of the stock see the current Stock Assessment Plenary available at http://fs.fish.govt.nz

Fisheries management overview

There are two main species of oreo fished within the New Zealand EEZ: smooth oreo and black oreo. Spiky oreo are caught rarely and only as bycatch of smooth oreo, black oreo and other deepwater fisheries. All three species are managed under the Quota Management System (QMS) with quota allocated as a combined oreo assemblage (i.e. they are managed as if they were one stock). Stock assessments for oreo fisheries are completed based on biological stock, rather than Quota Management Areas (QMAs). Table 1 indicates the relationship between biological stock area and QMAs.

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

Species	Biological stock	QMAs	Date of most recent accepted stock assessment	Proposed date of next stock assessment
Smooth oreo	Southland	OEO1 + 3A	2007[3]	2012/13
	OEO3A	OEO3A	2009	Not specified
	OEO4	OEO4	2007	2014/15
	Pukaki Rise	OEO6	2006[4]	Not specified
	Bounty Plateau	OEO6	2008	Not specified
Black oreo	OEO3A	OEO3A	2008	2014/15
	OEO4	OEO4	2009	Not specified
	Pukaki Rise	OEO6	2009[5]	Not specified

Target fisheries exist for black and smooth oreo in OEO1, OEO3A, OEO4 and OEO6. Spiky oreo is taken as a bycatch in these fisheries and all three species are taken as bycatch in the target orange roughy fishery. The Chatham Rise (OEO3A and OEO4) is the main fishing area, but other fisheries occur off Southland on the east coast of the South Island (OEO1 and OEO3A), and on the Pukaki Rise, Macquarie Ridge, and Bounty Plateau (OEO6).

[3] Previously reported assessments for Southland (OEO1/OEO3A) and Bounty Plateau smooth oreo (only Maximum Posterior Density results) are repeated.

[4] New assessments for Pukaki Rise black oreo and smooth oreo were attempted in 2013 but these were rejected by the Working Group. The assessments rejected the use of the existing CPUE time series as not indexing the abundance. Consequently, previous assessments also based on the same approach to CPUE should not be relied upon for management, as they will not be estimating the population size. Reanalysis will require a new project to look at trips and target species.

[5] See note above.

Stock Management

The current management approach for all five smooth oreo and three black oreo biological stocks is based on regular stock assessments and leads to regular reviews of the Total Allowable Catch/Total Allowable Commercial Catch (TAC/TACC). These 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).

Stock assessment models have been accepted for all biological stocks managed under the National Deepwater Plan over recent years. The current status of accepted assessments for stocks is shown in Table 1 above. 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.

Table 2: Default biological reference points and associated management response used in oreo fisheries.

Reference point	Management response
Management target of 40% B_0	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_0	A formal, time-constrained rebuilding plan will be implemented if this limit is reached.
Hard limit of 10% B_0	The limit below which a fishery will be considered for closure. [6]
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.

Due to some incongruence between the biological stocks and the QMA boundaries, should any future sustainability concerns arise in oreo fisheries, they would likely be addressed through a combination of TAC/TACC reductions and area-based catch limits agreed and implemented in collaboration with industry. Other management options could include managing each species of oreo separately, rather than as a species complex. Oreo quota owners currently manage the two species under separate catch limits in OEO3A.

[6] Fisheries closed as a result of falling below the hard limit will not be re-opened until it can be demonstrated that there is at least a 70% probability that the stock has rebuilt to or above the level of the soft limit.

Management need:

To develop and agree specific harvest strategies for each oreo stock included in this Chapter.

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

Sub-QMA Management

All oreo stocks are managed under the National Deepwater Plan as Tier 1 stocks as they are high volume or high value fisheries. The temporal and spatial overlap between oreo and orange roughy (trips frequently target and catch a mixture of these species) means that management measures introduced in oreo fisheries can affect orange roughy catch and fishing behaviour and vice versa.

Collaborative management

Oreo quota is owned by companies that are represented by Deepwater Group Ltd (DWG). The 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 stocks.

In 2010, the Ministry for Primary Industries (the Ministry) and DWG signed a Memorandum of Understanding (MOU) that established a structured partnership between the Ministry and the deepwater fishing industry to collaborate in managing New Zealand's deepwater fisheries. This MOU updated and replaced the 2008 MOU 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 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 quota management areas 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 ongoing 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.

Commercial fishery overview

The New Zealand oreo fishery was first developed by vessels from the then Soviet Union, which may have fished these species as early as the late 1960s and were responsible for most of the oreo catch until 1978. By 1980-81 for political reasons, Soviet vessels were restricted to Sub-Antarctic waters.

After declaration of the 200-mile EEZ in 1978, foreign vessels were permitted to operate in New Zealand fisheries waters under licences issued by the New Zealand Government. In the early-1980s,

a number of New Zealand companies chartered Soviet vessels to catch oreo and other species. These arrangements quickly displaced licensed fishing operations for these species.

In October 1986 the management of oreo was incorporated under the QMS and quota allocated. New QMAs were also declared in 1986. Initially, New Zealand quota owners chartered foreign fishing vessels to catch their oreo quota, but since the early 1980s domestic catch has grown through New Zealand investment and development of a deepwater fleet. Foreign charter vessels (FCVs) no longer take significant amounts of oreo.

Licensed and FCV catch was predominantly of black oreo, a result of the areas and types of grounds able to be fished with the technology available to those vessels at that time. The growing domestic fleet initially targeted orange roughy, which was much more valuable than either of the two oreo species, with a by-catch of mainly smooth oreo. Otherwise, oreo were only fished as a target species once orange roughy quotas had been caught, with smooth oreo preferred to black oreo, because it is easier to process and provides higher yields.

New Zealand vessels initially fished mainly on the Chatham Rise, where oreo and orange roughy abundance was relatively high and weather conditions are easier than further south. In the early 1980s much of the smooth oreo catch was taken from spawning aggregations. However, in the mid-1980s, the New Zealand industry progressively discovered and developed oreo fisheries on a number of topographic features around the margins of the Chatham Rise, especially towards the east, in management area OEO4. Bycatch in these fisheries varied, with smooth oreo the main species with smaller amounts of black oreo.

Orange roughy are less common on the western end of the Chatham Rise (OEO3A), while oreo are more abundant, especially black oreo. Target fisheries for both oreo species have been developed on both flat seabed and on features on the southwest Chatham Rise, with smooth oreo again being the preferred species.

By the mid-1980s, most of the New Zealand oreo catch was taken from OEO3A and OEO4.

After completion of the fishing down phase of oreo on the Chatham Rise (associated with the ORH3B fishery)[7] there was a series of TACC reductions and after 1989, deepwater quota owners invested in exploration and development of more southern waters, both through quota owner-funded trawl and side-scan sonar surveys, and company funded voyages. Catches from OEO1 increased after 1990/91, while significant catches in OEO6 were recorded after 1994, largely driven by investment decisions in orange roughy.

Black and smooth oreo have overlapping distributions throughout the EEZ. While catches of smooth oreo are often closely associated with those of orange roughy, the black oreo/smooth oreo/orange roughy catch mix is highly variable between regions, depths and seasons. These contiguous populations occur around the 1,000 m depth contour with unknown and probably varying degrees of mixing. Conventional fishing patterns, in which vessels continually move between grounds to

[7] ORH3B is comprised of fisheries developed on the Chatham Rise (the largest historical fishery, the East and South Rise and the smaller Northwest Rise fishery) and in the Sub-Antarctic area.

maintain catch rates, reduces the risk of undue depletion of any single population. Table 3 provides a detailed breakdown of the total estimated catch of all oreo species.

Currently, the main oreo fisheries are on the South Chatham Rise, along the east coast of the South Island, with significant catches also on the north and east slope of the Pukaki Rise, the Bounty Platform, the Snares slope, Puysegur Bank and the northern end of the Macquarie Ridge (Figure 18). Most fishing activity takes place in the spring and summer months, from September to March. Further detail on each fishery is provided later in this chapter.

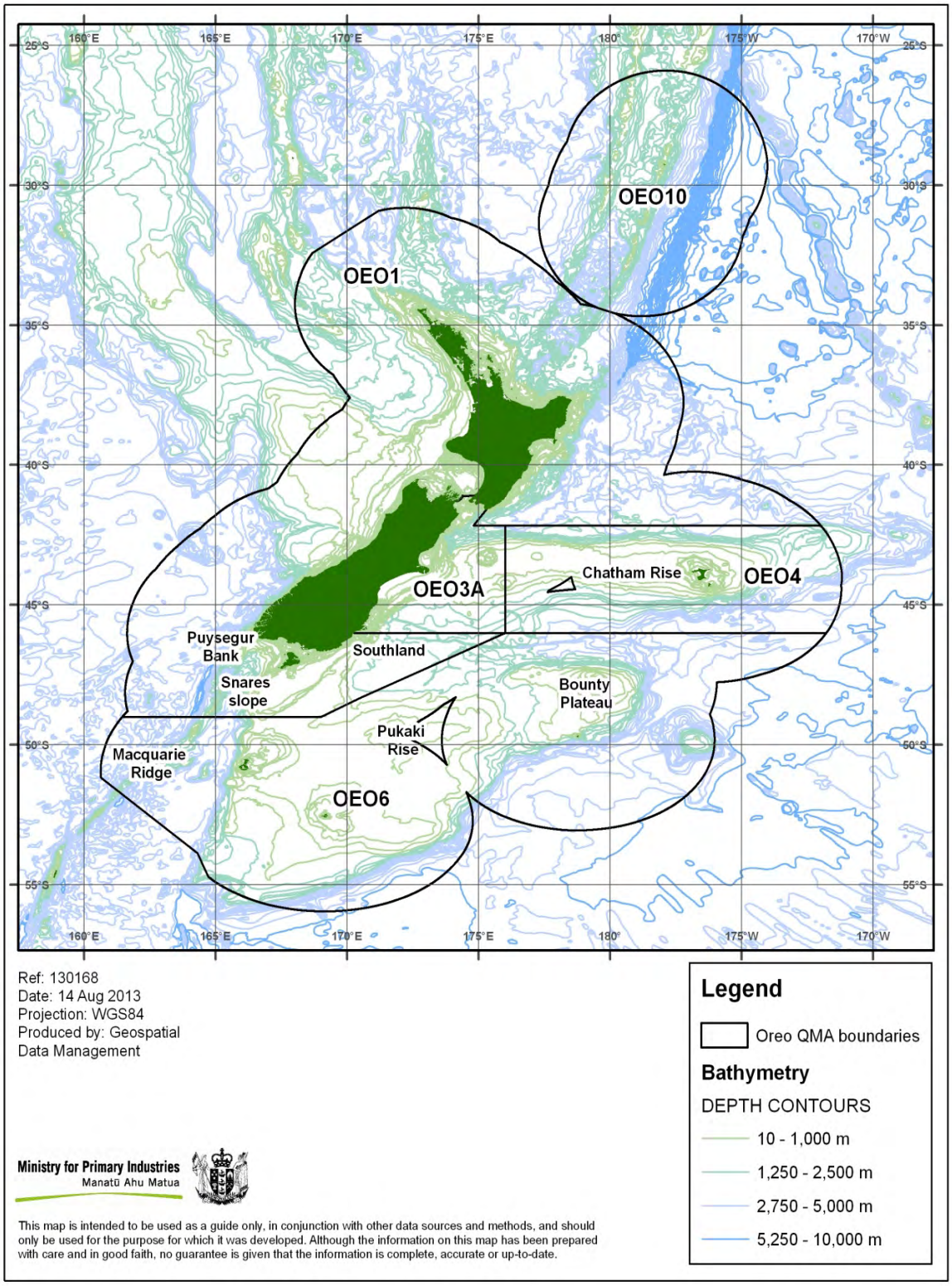

Figure 2: Map of the New Zealand EEZ and main features pertinent to oreo fishing.

Table 3: Table of estimated greenweight oreo catch (tonnes) by target species (2000 – 2011).

	Target species	Black oreo	Smooth oreo	Oreo[8]	Spiky oreo	Warty oreo	Total
2000/01	Black oreo	1,675	483	0	0.00	4.00	2,162
	Smooth oreo	574	6,267	0	0.14	0.38	6,842
	Oreo	2,182	6,103	64	0.00	12.00	8,361
	Orange roughy	504	2,930	13	43.00	2.00	3,491
	Total	4,936	15,785	77	55	18	20,872
2001/02	Black oreo	979	211	0	0.00	0.00	1,191
	Smooth oreo	602	3,390	0	0.30	0.25	3,992
	Oreo	2,303	6,989	10	0.00	0.89	9,303
	Orange roughy	550	2,485	7	26.00	1.00	3,068
	Total	4,435	13,077	18	33	2	17,566
2002/03	Black oreo	673	157	0	0.00	0.00	829
	Smooth oreo	227	2,683	0	0.00	0.00	2,910
	Oreo	2,813	6,243	50	0.04	0.07	9,106
	Orange roughy	633	2,535	43	33.00	0.94	3,245
	Total	4,346	11,619	97	41	1	16,105
2003/04	Black oreo	622	193	0	0.00	0.00	816
	Smooth oreo	418	2,701	0	0.02	0.00	3,119
	Oreo	2,640	5,102	361	16.00	0.00	8,120
	Orange roughy	587	2,901	18	20.00	0.10	3,526
	Total	4,268	10,899	379	40	0.10	15,585
2004/05	Black oreo	787	361	0	0.00	0.00	1,147
	Smooth oreo	772	4,551	0	0.05	0.00	5,323
	Oreo	2,386	4,415	40	0.02	0.00	6,841
	Orange roughy	714	2,328	42	31.00	0.09	3,115
	Total	4,659	11,654	82	38	0.09	16,434
2005/06	Black oreo	704	435	0	0.05	0.00	1,140
	Smooth oreo	405	3,118	0	0.06	0.00	3,523
	Oreo	3,613	4,273	290	0.19	0.00	8,176
	Orange roughy	622	2,433	45	24.00	0.42	3,125
	Total	5,345	10,259	337	38	0.42	15,979
2006/07	Black oreo	1,722	433	0	0.00	0.00	2,155
	Smooth oreo	541	3,580	0	0.13	0.00	4,121
	Oreo	3,031	3,693	2	0.03	0.00	6,726
	Orange roughy	342	2,136	14	14.00	0.15	2,506
	Total	5,635	9,843	16	26	0.15	15,521
2007/08	Black oreo	3,324	994	0.00	0.00	0.02	4,319
	Smooth oreo	441	4,839	0.00	0.31	0.00	5,280
	Oreo	1,238	2,189	0.00	0.00	0.00	3,427
	Orange roughy	285	2,094	0.03	11.00	0.31	2,391
	Total	5,289	10,117	0.03	21	0.33	15,427
2008/09	Black oreo	3,491	898	0	0.00	0.00	4,389
	Smooth oreo	961	7,222	0	0.09	0.00	8,183
	Oreo	2	1	0	0.00	0.00	4
	Orange roughy	525	1,946	0	17.00	0.21	2,489
	Total	4,980	10,067	0	21	0.21	15,068
2009/10	Black oreo	4,132	1,113		0.07	0.00	5,245
	Smooth oreo	996	8,490		0.23	0.02	9,486
	Orange roughy	343	969		21.00	0.13	1,333
	Total	5,470	10,574		26	0.15	16,071

[8] The generic 'OEO' oreo code was not used after 2009.

	Target species	Black oreo	Smooth oreo	Oreo[8]	Spiky oreo	Warty oreo	Total
2010/11	Black oreo	**2,553**	**586**		**0.00**	**0.00**	**3,138**
	Smooth oreo	**920**	**8,574**		**0.57**	**0.00**	**9,495**
	Orange roughy	**107**	**586**		**25.00**	**0.13**	**718**
	Total	**3,580**	**9,746**		**37**	**0.13**	**13,363**

Excludes cardinalfish target fisheries (typically less than 0.1% of total oreo catch).

Environmental overview

Oreo fishing activity is known to interact with the wider marine environment including:

1. Benthic organisms associated with deepwater features (such as hills and canyons) as well as a variety of substrate types, especially where trawl gear comes into contact with the sea bed and these features
2. Incidentally captured finfish species, including sharks
3. Incidentally captured marine mammals, notably New Zealand fur seals
4. Seabirds

Information on the nature and extent of these interactions is predominately sourced from commercial fishing trips that have carried a Ministry observer. Observer coverage has historically been relatively high in deepwater trawl fisheries such as oreo (Table 4).

Table 4: Observer coverage of oreo target fisheries from 2005/06 to 2011/12.

Fishing Year	Observed tows	% observed
2005/06	1,079	16%
2006/07	2,323	48%
2007/08	1,049	42%
2008/09	893	41%
2009/10	964	38%
2010/11	612	32%
2011/12	428	26%

Where interactions with protected[9] 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 managed and impacts minimised and that the deepwater fisheries continue to improve performance in terms of interactions with protected species and the marine environment.[10] 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 5).

[9] Protected under the Wildlife Act 1953 or the Marine Mammals Protection Act 1978.

[10] In terms of protected species the biological goal is that adverse effects on populations are managed. There is also the goal of reducing impacts on individuals of particular species.

Section Two provides more information on the extent of environmental interactions in oreo target fisheries.

Table 5: Regulatory and non-regulatory measures to reduce effects of fishing for oreo on the environment.

	Measure	Description	Status
Trawlers >28m	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
	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, 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, and by the Ministry, 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 spatial closures that protect underwater topographic features from all types of trawling. Twelve of these features are seamounts that rise more than 1,000 m from the seafloor.	Regulatory

Economic overview

Management need:

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

Three companies hold approximately 80% of quota for oreo stocks. In September 2009 the asset value (prices for ACE (Annual Catch Entitlement) and quota) of oreo was $74.4 million.[11]

In 2012, oreo was the 15th most valuable seafood export for New Zealand, with 6,199 tonnes of product exported (mainly sold as frozen fillets), realising a value of approximately $19 million (Table 6). The principal export markets for the last calendar year (2012) by value are Australia, China, Russia and Iran.

[11] Source: Statistics NZ; Quarterly Report period ending December 2011 (figures in the report are generated via Treasury-driven processes and are only currently available up to 2009).

Table 6: Total export volume and value of oreo for 2007-12.[12]

Year	Export volume (tonnes)	Export value ($NZ million)
2012	6,199	$18.9
2011	5,364	$18.9
2010	7,765	$19.7
2009	5,316	$19.7
2008	5,338	$18.0
2007	5,748	$19.5

Compliance overview

Oreo 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 metres in length, or that fish for orange roughy or scampi, are required to carry an automatic location communicator (ALC) with a standard poll interval of two hours. Signals from each vessel are then monitored in near real-time for positional data through a vessel monitoring system (VMS). VMS is useful in monitoring vessels for compliance with spatial regulations, i.e. VMS can help with area misreporting and fishing in prohibited areas. 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 oreo fisheries and these are described in more detail below:

- Area misreporting
- Discarding
- Failure to comply with environmental mitigation regulations
- Fishing in prohibited areas

The Ministry strives to minimise the opportunity for these and other types of offending to occur through careful risk analysis of the oreo fisheries with cooperative input from industry. Information sharing between the Ministry and industry allows compliance efforts to reflect current risks and will also help to develop and monitor performance against the compliance standards and benchmarks necessary to achieve many of the goals within this Chapter.

Area misreporting

Area misreporting, known colloquially as 'trucking', occurs when fish caught in one 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 ACE or to avoid paying deemed value charges.

The TACC for OEO3A and OEO4 is fully caught most years (Figures 4-6, 8). This leads to increased ACE prices for these oreo stocks as ACE becomes less available. OEO1 has a TACC that is rarely fully caught, resulting in lower ACE prices. This could lead to some fishers targeting and catching oreo in OEO3A and OEO4, but reporting it as caught from OEO1 to increase their returns.

[12] Source: Seafood New Zealand.

Discarding

In a compliance context, discarding refers to the dumping of QMS species at sea without appropriate approval, an activity prohibited under section 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.

Compliance with environmental mitigation regulations

Regulation requires that all deepwater trawl vessels over 28 metres in length deploy seabird scaring devices to ensure that fishing activity does not pose an unnecessary risk to seabirds. Ministry observers report on the use and effectiveness of the measures. There are a number of non-regulatory environmental measures also in place (refer pages 28-32).

Fishing in prohibited areas

Areas are closed to bottom trawl fishing by the Fisheries (Benthic Protection Area) Regulations 2007 and the "seamount" closures that are implemented through commercial fishing regulations.

Management need:

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

Social and cultural overview

The Act requires that, prior to setting management measures for oreo fisheries, the Minister 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 take place, including Māori, environmental, commercial and recreational interests. In addition, the Act requires that in setting a TAC under section 13, the Minister, in specified circumstances, shall have regard to such social, cultural and economic factors he or she considers relevant.

Social and cultural factors include those related to the harvesting of oreo by all parties; commercial, recreational and customary. However, because oreo are a deepwater species, there are no recreational or customary fishing allowances for oreo in the QMAs managed under the National Deepwater Plan.

Under section 12(1)(b) of the Act, the Minister 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 on each year to ensure that objectives and aspirations of Māori with respect to their fisheries, including oreo, 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 five yearly review of the National Deepwater Plan.

Social and cultural factors also include the non-extractive value of healthy oreo and key bycatch 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 Two will contribute to maintaining a healthy aquatic environment.

Overview by fishery

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

OEO3A black and smooth oreo

Fishing for black and smooth oreo in OEO3A began, possibly as early as the 1960s, with Soviet trawlers, but is now fished by large, domestic trawlers. OEO3A was introduced into the QMS in 1986/87. Figure 3 indicates the OEO3A stock area, which covers most of the South Island east coast.

Within the OEO3A QMA, fishers can effectively target black or smooth oreo. The two species have distinct but overlapping depth ranges and geographical distributions and are assessed and managed separately. A non-regulatory agreement between the fishing industry and the Minister to limit catch of smooth oreo from OEO3A to 1,400 tonnes was implemented in 1998/99, with further non-regulatory restrictions on black oreo introduced in 2000/01.

There are no area-based restrictions applying to this stock, but a seamount in OEO3A is closed to all trawling (Figure 3). The catch and catch limits from 1999/00 to 2010/11 are shown in Figures 4 to 6 below. Generally fishers have kept near or only slightly exceeded the non-regulatory catch limits since they were introduced.

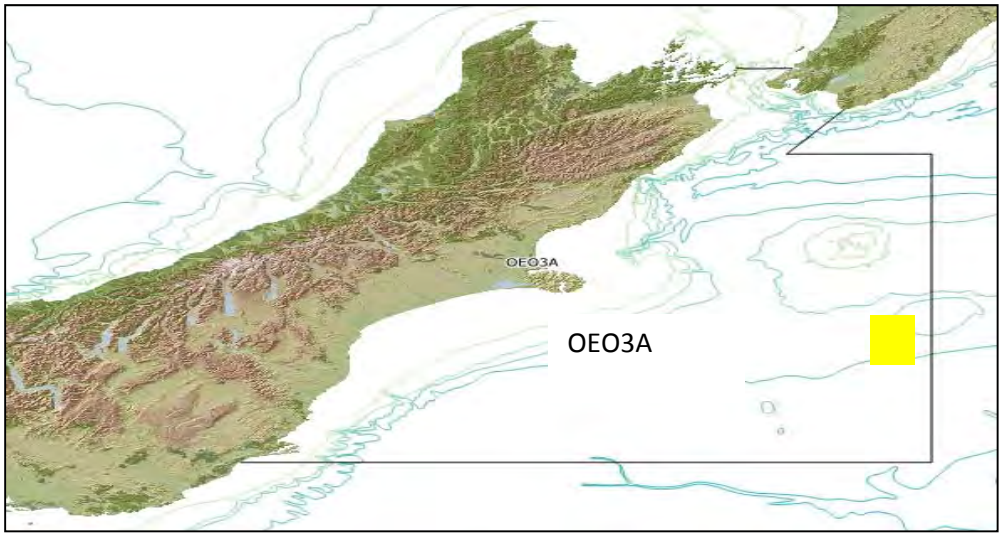

Figure 3: Map showing the OEO3A quota management area with "seamount" closure (highlighted in yellow not to scale, for indicative purposes only).

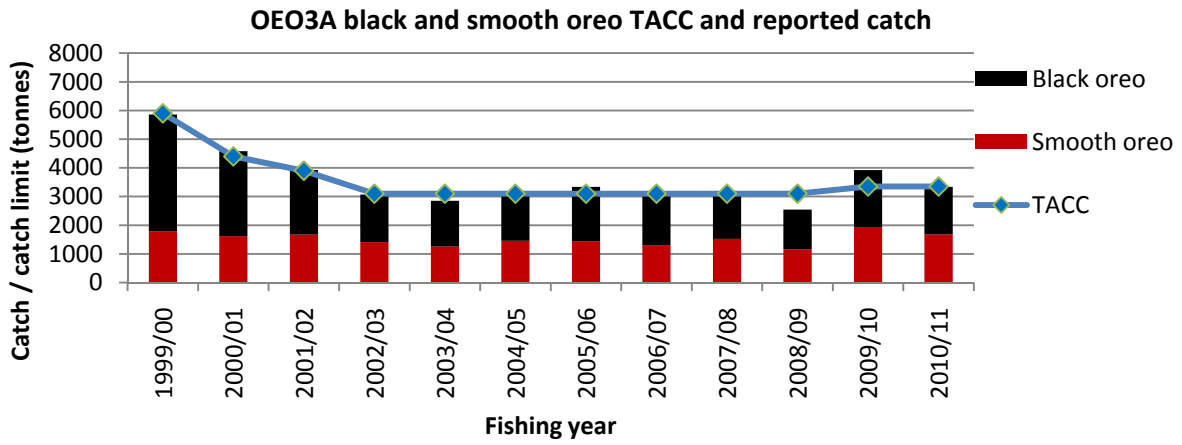

Figure 4: Catch and TACC history for the OEO3A smooth oreo fish stock.

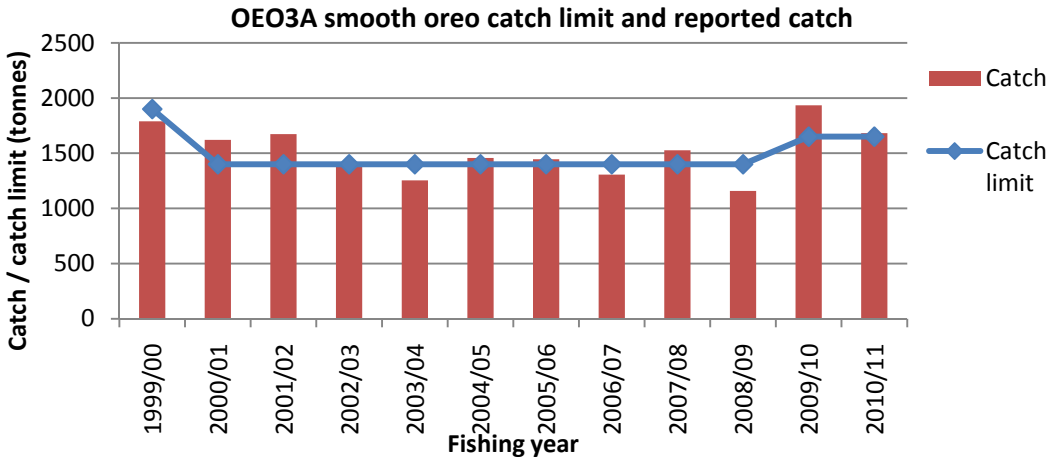

Figure 5: Catch and catch limit history for the OEO3A smooth oreo fish stock.

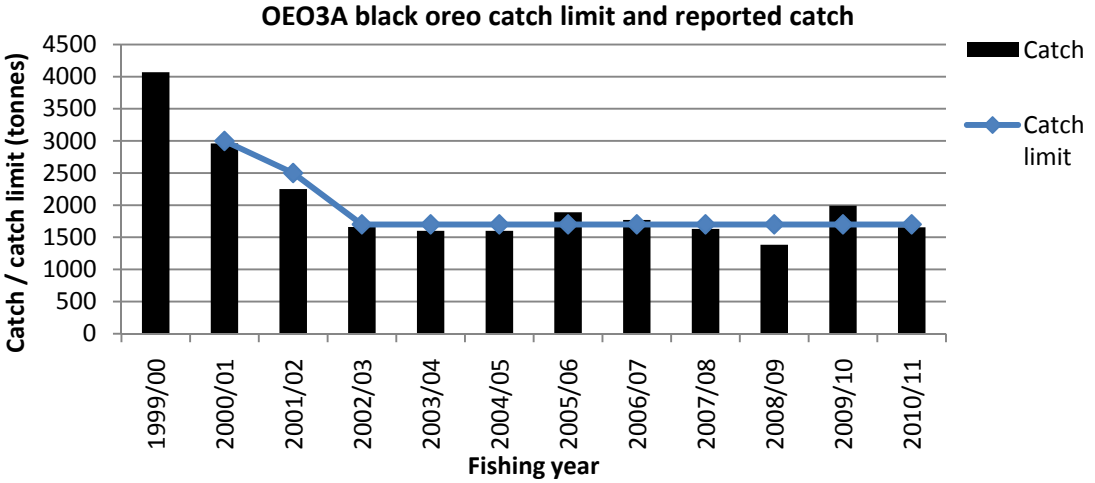

Figure 6: Catch and TACC history for the OEO3A black oreo fish stock.

The last stock assessment for the OEO3A smooth oreo fish stock was completed in 2009, utilising acoustic survey data, catch-per-unit-effort (CPUE) and observer length data. Biomass in 2009 was

estimated to be at 36% B_0 (unfished biomass), and about as likely as not to be at or above the default management target of 40% B_0. Biomass is estimated to have been increasing since the late 1990s.

The last accepted stock assessment for the OEO3A black oreo stock was completed in 2008, utilising data from the 2006 acoustic survey, catch history, CPUE and data from observers on length frequency. Biomass was estimated to be at about 29% B_0 with the stock estimated to be unlikely to be at or above the management target of 40% B_0. However, this stock assessment has since been withdrawn.[13] The 2008 model is now deemed inadequate, and a new approach will need to be developed.

OEO4 black and smooth oreo

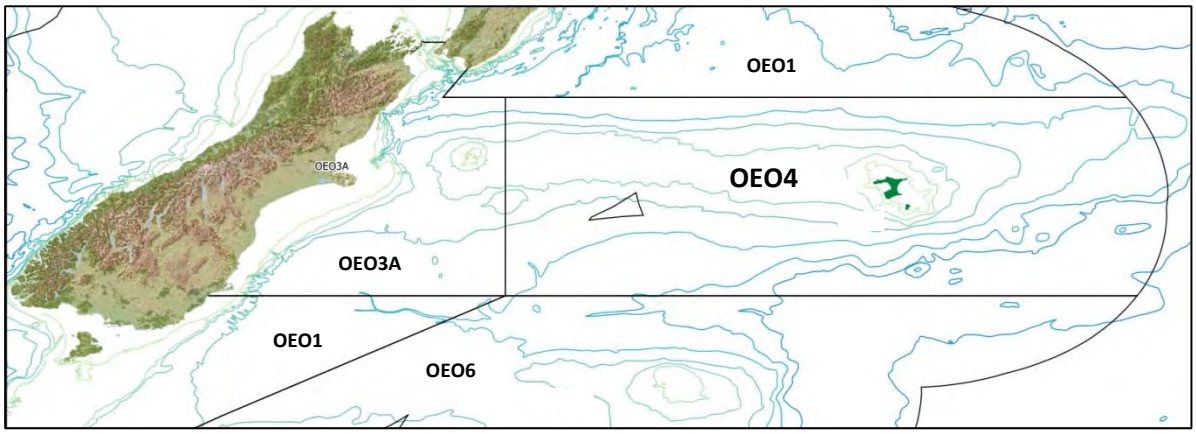

Figure 7: Map showing the OEO4 quota management area.

OEO4 is the largest oreo fishery in New Zealand fishery waters (with a TACC of 7,000 tonnes), and includes the Chatham Rise oreo fishery. Black and smooth oreo in OEO4 are fished and managed as a species group, although separate stock assessments are undertaken for each species. A catch limit of 6,750 tonnes was set for OEO4 in 1982/83. Total oreo catch from OEO4 exceeded the TAC from 1991/92 to 1994/95. Catch has remained high in OEO4 while the corresponding orange roughy fishery has declined. OEO4 contains four seamounts closed to all trawling, and two Benthic Protection Areas (BPAs); Mid-Chatham Rise and East Chatham Rise; which are closed to bottom trawling (see Figure 19).

The OEO4 TACC was reduced from 7,000 to 5,200 tonnes in 2001/02 as a precautionary measure following concerns over the long-term viability of a 7,000 tonne TACC, but was restored to 7,000 tonnes in 2003/04 following a more favourable stock assessment. The most recent assessments were in 2009 and 2012 for black and smooth oreo respectively. A new stock assessment for smooth oreo is planned for 2014.

[13] Report from the Fisheries Assessment Plenary: stock assessments and yield estimates, July 2013.

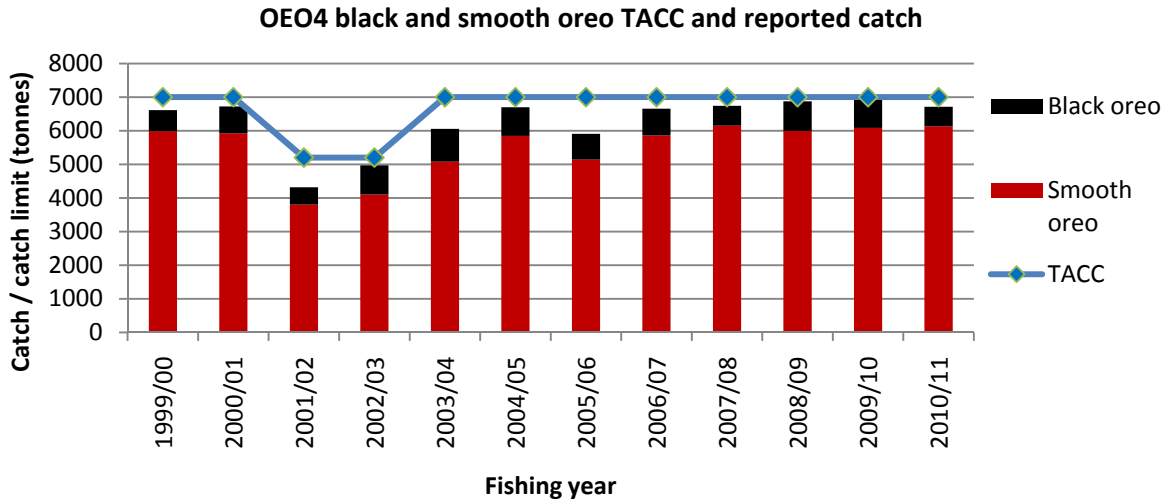

Figure 8: Catch history and TACC for the OEO4 black and smooth oreo fish stocks.

Smooth oreos in QMA4 are assumed to be distinct from OEO1 and OEO6 stocks but may mix with the OEO3A stock. For black oreos, the population has been found to be genetically similar to other oreo stocks and it is likely that some mixing occurs.

The latest assessment for the OEO4 smooth oreo stock was completed in 2012, based on acoustic surveys in 1998, 2001, 2005 and 2009, catch history and observer length data. The biomass in 2010 was estimated to be at 33 or 41% B_0 based on two models and is as likely as not to be at or above the management target of 40% B_0. No formal stock projections were run but continuing decline in biomass was considered likely.

A stock assessment for the OEO4 black oreo stock was completed in 2009, using CPUE and observer length frequency data. Results from the stock assessment were inconclusive, as the assessment models were unable to represent observer length frequency, and were therefore considered unreliable. However the assessment did note that CPUE has been stable in the past five years, after initial declines during the 1980s and 1990s.

OEO1 + OEO6

Oreos in the OEO1 and OEO6 are managed as a single stock but assessed as four separate stocks, separated by species and geography. The OEO1 QMA is large and includes fishery management areas 1, 2, 5, 7, 8 and 9 (Figure 1). However, most fishing takes place off the lower east coast of the South Island, termed the Southland area (Figure 12). Figure 9 indicates the OEO6 fishery, which contains two biological stocks of smooth oreo (Pukaki Rise and Bounty Plateau), and one stock of black oreo (Pukaki Rise). Both the OEO1 and OEO6 fisheries were introduced into the QMS in 1986/87 fishing year.

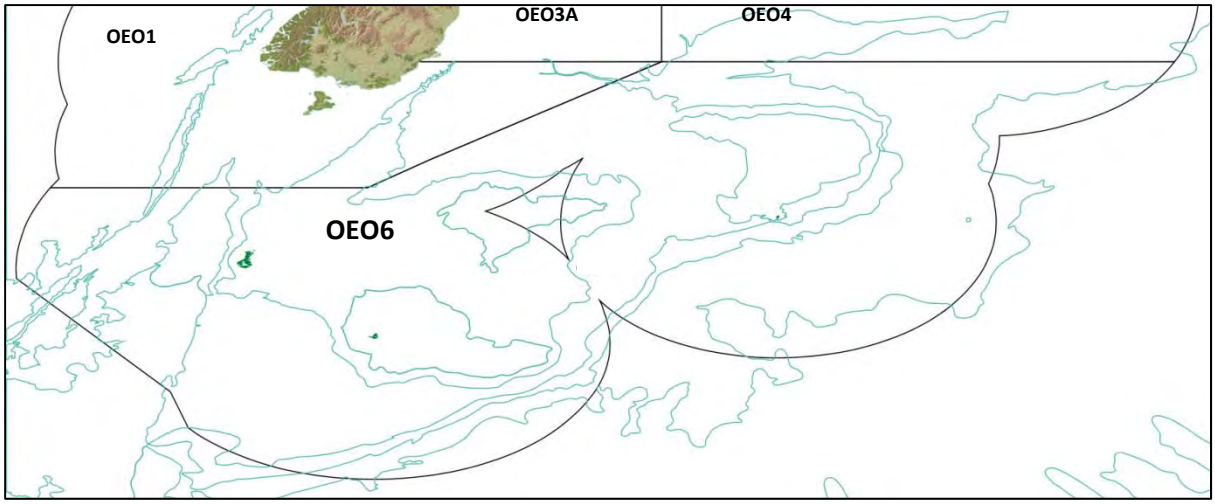

Figure 9: Map showing the OEO6 quota management area.

OEO1 was fished under the adaptive management programme up to the end of 1997/98, and TAC reverted back to pre-adaptive management levels in 1998/99. Catches have declined since then, and from 2007/08 the TACC was reduced to 2,500 tonnes (Figure 10).

Catch from the Sub-Antarctic area (OEO6) increased substantially in 1994/95 and the TACC was increased from 3,000 to 6,000 tonnes in 1996/97. There was also a non-regulatory agreement not to fish for orange roughy in the Puysegur area which started in 1998 and has resulted in no oreo fishing there due to mixing of the species (Figure 11).

Figures 10 and 11 show TACC and catch for the oreo stocks in OEO1 and OEO6. The OEO1 QMA has been significantly undercaught except during the 2000/01 fishing year. OEO6 is generally fully caught most years, with the exception of the 2010/11 fishing year, due to a significant drop in TACC for orange roughy in this area (as deepwater fishing trips frequently target and catch a mixture of these species).

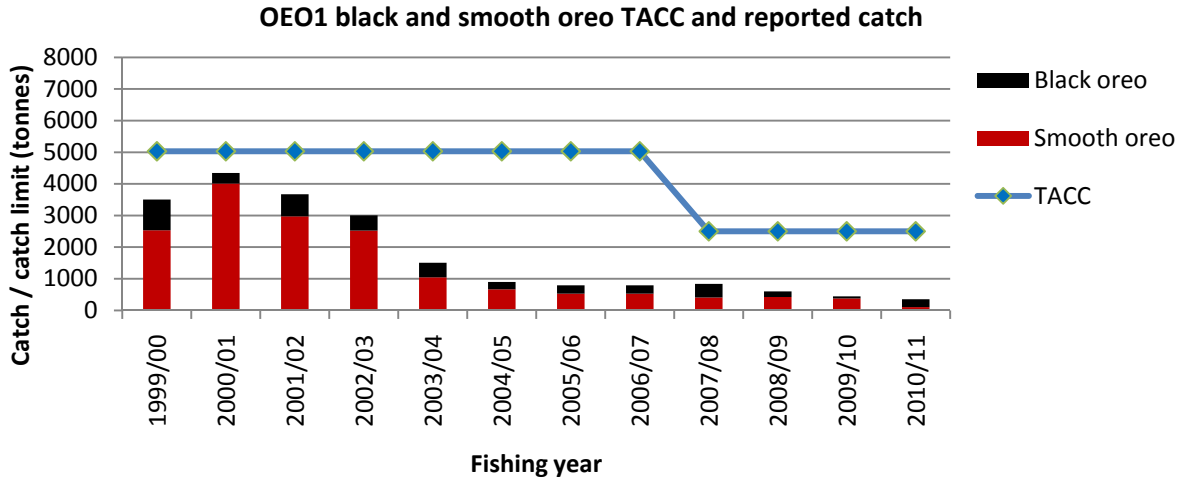

Figure 10: Catch and TACC history for the OEO1 smooth and black oreo fish stocks.[14]

[14] Note this includes catch from the Southland smooth oreo fishery (SSO).

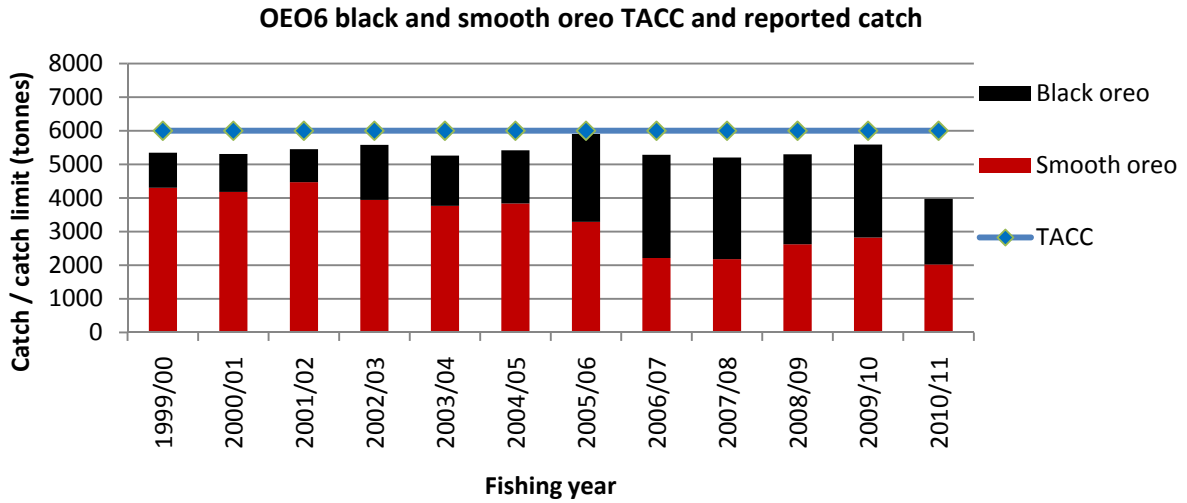

Figure 11: Catch and TACC history for the OEO6 smooth and black oreo fish stocks.

OEO1 + OEO3A (Southland smooth oreo)

This fishery is mostly in OEO1 on the east coast of the South Island but catches occur at the northern end of the fishery and straddle the boundary line between OEO1 and OEO3A at Latitude 46°S. The OEO1 QMA and the Southland SSO area are shown in Figure 12 below.

The assessment for the Southland smooth oreo biological stock incorporate data from CPUE analysis and length frequency data collected by both Ministry and industry observers.

A 2003 stock assessment, which was applicable to the Southland area only, indicated that mature virgin biomass of smooth oreo was probably small and that the stock was unlikely to be able to support a large fishery. The 2005 Plenary concluded that catches at the level of the 2000/01 catch (1,010 tonnes) were probably not sustainable.

Following the 2003 stock assessment, industry agreed to set a catch limit for smooth oreo in the Southland area of 400 tonnes within a wider TACC for the OEO1 stock of 2,500 tonnes. Figure 10 shows that this voluntary measure has generally been successful in constraining catches of smooth oreo to below 400 tonnes in the Southland area. The significant drop in catches of smooth oreo in 2010/11 is the result of significant reductions in catch limits for orange roughy in QMA ORH3B because, as noted above, catches of both black and smooth oreos are closely associated with orange roughy.

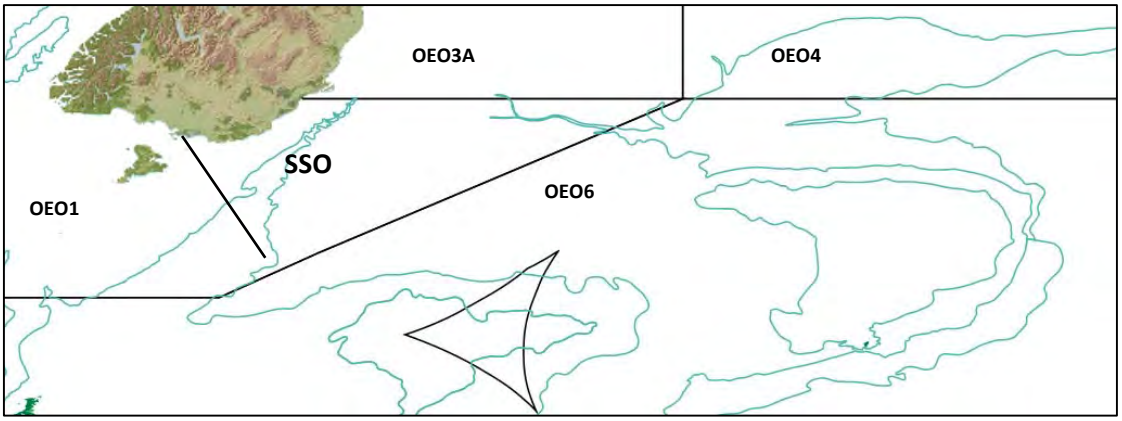

Figure 12: Map showing the Southland (SSO) area (within the OEO1 QMA) to which the 400 tonne smooth oreo catch limit applies.

The most recent stock assessment was completed in 2007 and estimated that the biological stock was at 27% B_0, and was unlikely to be at or above the default management target of 40% B_0. At the time of assessment, the biomass was estimated to have been declining steadily since the late 1980s.

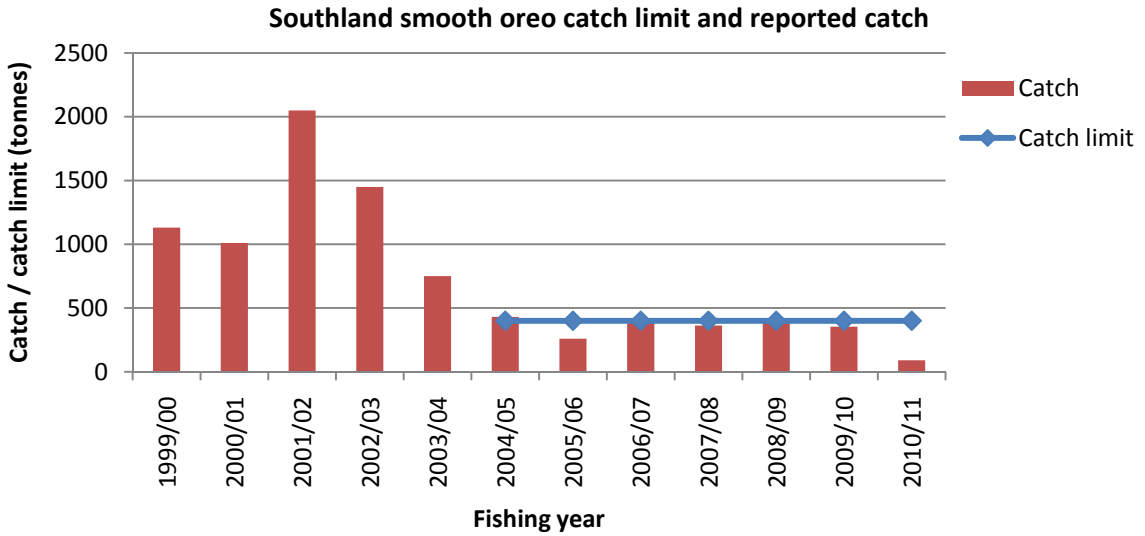

Figure 13: Catch and catch limit history for the Southland smooth oreo fish stock. Note the 400 tonne catch limit was introduced from 2004.

OEO6 Pukaki Rise black and smooth oreo

The Pukaki Rise smooth oreo stock comprises the main smooth oreo stock in OEO6 with mean annual catches of about 1,700 tonnes from 1995/96 to 2004/05, taken mainly by New Zealand trawl vessels. There was also a small Soviet fishery from 1980-1986 with mean annual catches of less than 100 tonnes.

The Pukaki Rise black oreo stock is the main black oreo fish stock in OEO6 and the largest black oreo fish stock in the New Zealand EEZ, with mean annual catches of around 1,800 tonnes, but with over 3,000 tonnes taken in the years 1997/98 and 1998/99. There was an early Soviet fishery from 1980-1985 with mean annual catches of around 1,700 tonnes.

Figure 14 shows the indicative stock boundaries for the Pukaki Rise biological oreo stocks (both black and smooth), within the OEO6 fishery. Some mixing is thought to occur with other smooth oreo fish stocks. Black oreos on the Pukaki Rise are thought not to be mixing with other black oreo fish stocks.

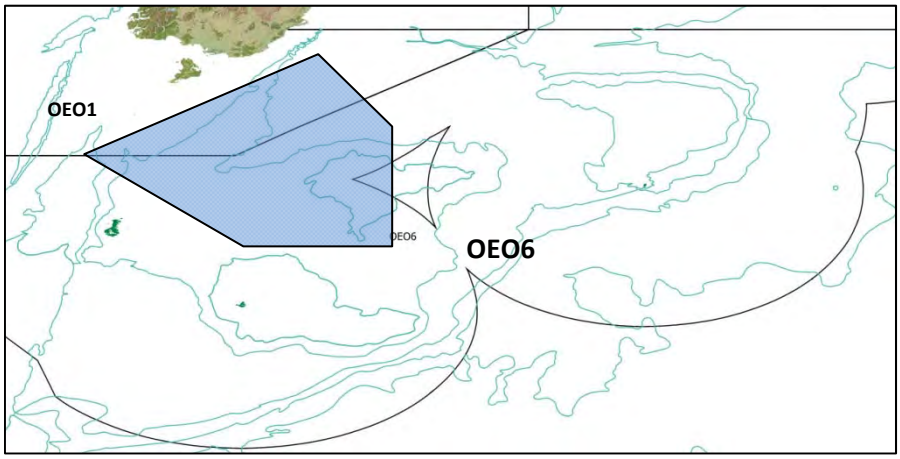

Figure 14: Indicative stock boundary (the blue shaded area) for the Pukaki Rise biological oreo stocks (both black and smooth), within the OEO6 fishery.

Catch history data are derived from declared catches and tow-by-tow data to estimate the species split (Figure 15). These data indicate generally increasing catches of black oreo and declining catches of smooth oreo, but combined catches for both oreo species steady at around 3,000-3,500 tonnes per year, with the exception of the 2010/11 fishing year when the decrease in TACC for orange roughy in the QMA ORH3B reduced deepwater trawl fishing effort in this area.

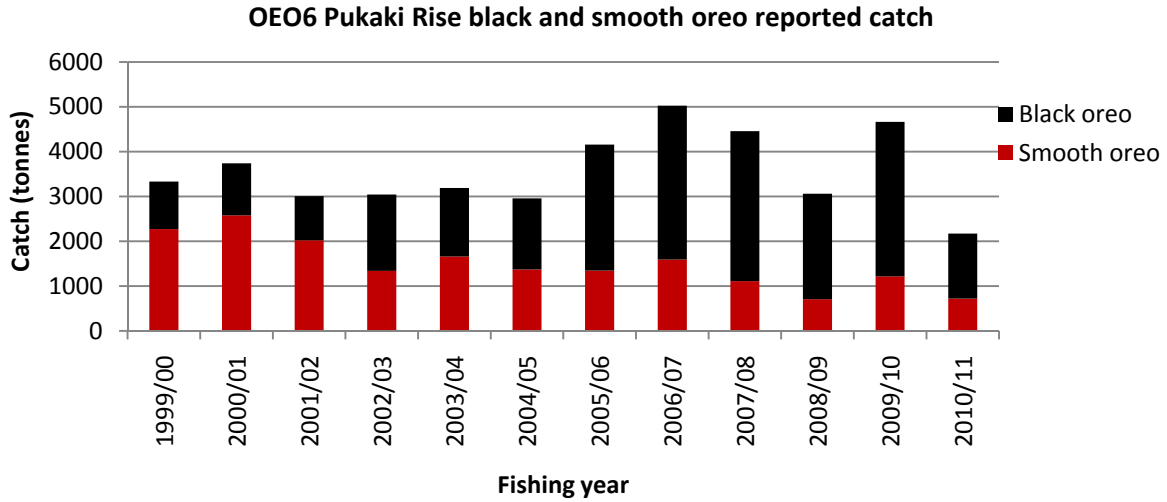

Figure 15: Catch history for the OEO6 Pukaki Rise black and smooth oreo fish stocks.

The first and latest assessment for the Pukaki Rise smooth oreo biological stock was undertaken in 2006, using CPUE data and length frequency data collected by observers, with biological parameters estimated from Chatham Rise and Puysegur Bank smooth oreo research data. The biomass in 2006 was estimated to be at 42% B_0, and was estimated to be about as likely as not to be at or above the management target of 40% B_0. The biomass is estimated to have been declining since 2006.

The latest assessment for the Pukaki Rise black oreo stock was undertaken in 2009, using observer length frequency data and CPUE. Biological parameters are also derived from Chatham Rise and Puysegur Bank research data. B_{2009} was estimated to be at 44% B_o which is about as likely as not to be at or above the management target of 40% B_0. Stock trajectory was estimated to decline in the next five years if catches are maintained at current levels.

New assessments for Pukaki Rise black oreo and Pukaki Rise smooth oreo were attempted in 2013 but these were rejected by the Fisheries Assessment Working Group. The Pukaki Rise smooth oreo CPUE was thought to be unreliable until further investigations have been conducted. Since the black oreo fishery is in the same area, the Working Group determined that the black oreo CPUE analysis also could not be accepted as an index of abundance of black oreo in the Pukaki Rise (OEO6) assessment area. The Working Group also noted that the 2006 smooth oreo assessment used the same approach and was therefore also unreliable.

OEO6 Bounty Plateau smooth oreo

A small Soviet fishery preceded development of the New Zealand deepwater trawl fishery in the mid 1990s. Catches have varied between around 500-2,000 tonnes from 1993/94 to 2010/11 (Figure 17). The indicative stock boundary of the Bounty Plateau smooth oreo biological stock, as used for the stock assessment, is shown in Figure 16.

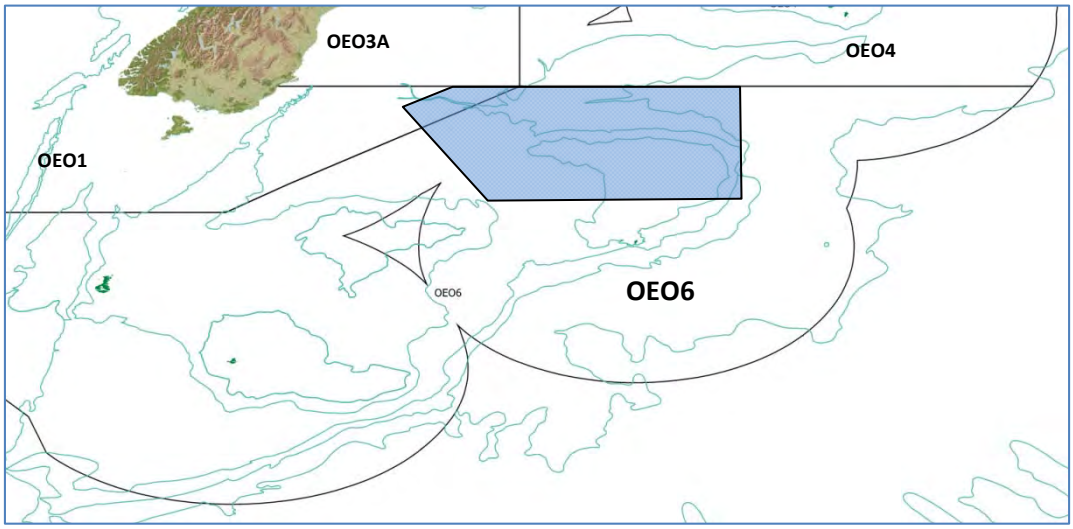

Figure 16: Indicative stock boundary (indicated by the blue shaded area) for the Bounty Plateau biological smooth oreo stock, within the OEO6 fishery.

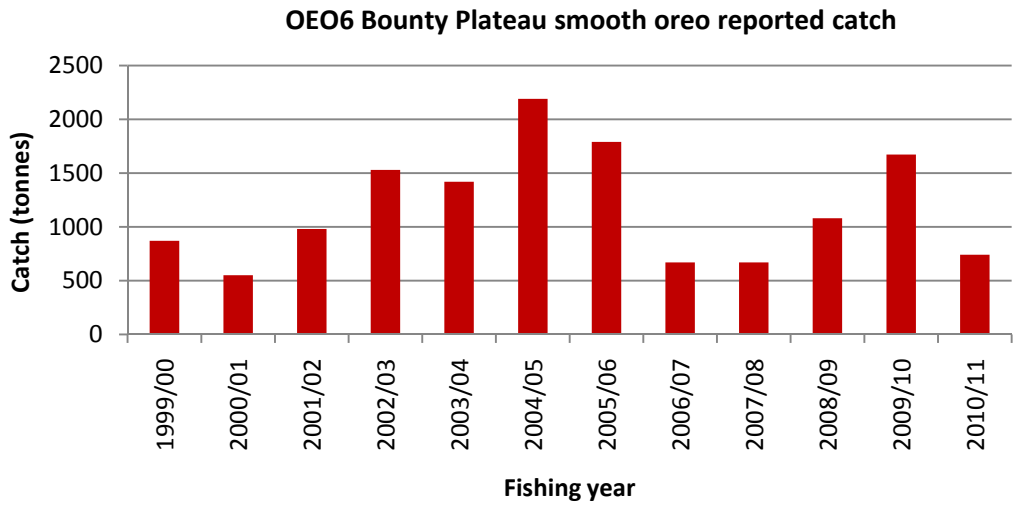

Figure 17: Catch history for the OEO6 Bounty Plateau smooth oreo fish stock.

The stock assessment for Bounty Plateau smooth oreo was undertaken in 2008, using CPUE, length frequency data collected by observers, and biological parameter values estimated for Chatham Rise and Puysegur Bank smooth oreo. B_{2008} was estimated at 33% B_0, and unlikely to be at or above the management target of 40% B_0. Biomass was estimated to have been decreasing since 1995, but due to uncertainties around the assessment no stock projections were made.

Major OEO6 quota owners and operators implemented, by signed agreement in August 2012, the withdrawal from major fishing grounds on the Pukaki Rise and Bounty Platform to oreo and (because of oreo bycatch issues) orange roughy target fishing (see area enclosure co-ordinates in Table 7). The agreed regime is to address concerns regarding the size of smooth and black oreos being taken from these grounds and to therefore improve future productivity and profitability (small fish being of low value) with regard to these grounds. The cessation of target fishing on these particular grounds is for a period of **three** years commencing from 1 October 2012.

Table 7: OEO6 closure co-ordinates.

Pukaki Grounds enclosed by:	Bounty Grounds enclosed by:
48° 19.0’ S 170° 0.0’ E	48° 30.0’ S 176° 0.0’ E
46° 0.0’ S 176° 0.0’ E	46° 0.0’ S 176° 0.0’ E
50° 0.0’ S 176° 0.0’ E	46° 0.0’ S 175° 0.0’ W
50° 0.0’ S 170° 0.0’ E	48° 30.0’ S 175° 0.0’ W

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[15] that occur in the oreo fishery. The bycatch and incidental captures are categorised as follows:

1. **Associated species:** These are QMS species which are managed in conjunction with oreo either because they are caught as a bycatch of oreo fisheries, or because there is an overlap in the fishing method and vessels involved in the fishery.
2. **Incidental bycatch species:** These are typically non-QMS species caught in small quantities, 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 accidental capture, interaction, and mortality of protected species such as seabirds, marine mammals, protected corals and protected shark species.
4. **Benthic interactions:** This category includes benthic invertebrate species that are captured by trawl gear, the damage to or mortality of bottom-dwelling animals not captured in nets, and overall damage to benthic habitats. Most of this information originates from Ministry observer reports.

Fish and invertebrate species taken as bycatch or incidental catch in target oreo fisheries for three recent 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 oreo chapter
- Those species highlighted in yellow are **key bycatch** species managed through another chapter in the National Deepwater Plan;
- Those species highlighted in green 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.

[15] 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 a current fishing interaction), and those that land on deck or collide with the vessel superstructure.

Table 8: Catch (kg) by species or species group for the top 50 species (listed in order of decreasing catch volume over the period 2006-2011) caught in oreo (black and smooth) target fishing from observer records for the period 1 October 2008 to 30 September 2011.

	2008/09		2009/10		2010/11	
Common name	**Observed catch (kg)**	**%**	**Observed catch (kg)**	**%**	**Observed catch (kg)**	**%**
Smooth oreo	3,722,629	48%	3,682,800	59%	3,712,687	74%
Black oreo	1,981,902	26%	2,009,840	32%	1,166,499	23%
Orange roughy	175,278	2%	207,351	3%	60,441	1%
Baxter's lantern dogfish	60,692	1%	80,223	1%	18,337	0.4%
Rattails	22,650	0.3%	13,097	0%	14,782	0.3%
Ridge scaled rattail	13,520	0.2%	13,068	0.2%	8,861	0.2%
Hoki	6,594	0.09%	29,747	0.5%	4,089	0.08%
Johnson's cod	1,631	0.02%	1,501	0.02%	3,571	0.07%
Slickhead	17,582	0.3%	13,213	0.2%	3,483	0.07%
Other sharks and dogs (unspecified)	260	0.003%	5,726	0.09%	3,327	0.07%
Deepwater dogfish (unspecified)	8,288	0.2%	4,919	0.08%	2,554	0.05%
Basketwork eel	4,836	0.06%	3,170	0.05%	1,947	0.04%
Javelinfish	2,910	0.04%	4,420	0.07%	1,763	0.04%
Bushy hard coral	38	0.000%	1,030	0.02%	1,761	0.04%
Banded bellowsfish	20	0.000%	0		1,646	0.03%
Oreo	200	0.003%	122,304	2%	1,425	0.03%
White warehou	18	0.000%	14	0.000%	1,293	0.03%
Morids	5,434	0.07%	2,402	0.04%	1,083	0.02%
Warty squid	5,215	0.07%	3,303	0.05%	1,062	0.02%
Pale ghost shark	1,796	0.02%	1,093	0.02%	782	0.02%
Warty squid	439	0.006%	274	0.004%	504	0.01%
Black slickhead	25	0.000%	165	0.003%	289	0.006%
Chimaera spp.	65	0.001%	105	0.002%	276	0.005%
Leafscale gulper shark	81	0.001%	209	0.003%	270	0.005%
Tam O'Shanter urchins	580	0.008%	649	0.01%	203	0.004%
Ribaldo	297	0.004%	307	0.005%	174	0.003%
Long-nosed chimaera	1,067	0.01%	848	0.01%	158	0.003%
Bubblegum coral	561	0.007%	584	0.009%	123	0.002%
Purple chimaera (generic)	537	0.007%	227	0.004%	107	0.002%
Ling	91	0.001%	91	0.001%	88	0.002%
Shovelnose dogfish	983	0.01%	1,595	0.03%	82	0.002%
Sea cucumber (other than Stichopus mollis)	1,725	0.02%	115	0.002%	67	0.001%
Hake	462	0.006%	457	0.007%	60	0.001%
Longnose velvet dogfish	683	0.009%	933	0.01%	54	0.001%
Violet cod	5,080	0.07%	1,316	0.02%	52	0.001%
Purple chimaera	350	0.005%	556	0.009%	28	0.001%

Spiky oreo	87	0.001%	1,853	0.03%	21	<0.000%
Rabbitfish	22	0.000%	32	0.001%	14	0.000%
Cat shark	99	0.001%	271	0.004%	12	0.000%
Southern blue whiting	6	0.000%	136	0.002%	11	0.000%
Lucifer dogfish	1,653	0.02%	14	<0.000%	6	0.000%
Deepwater branching coral	15,148	0.2%	79	0.001%	5	<0.000%
Coral (unidentified)	5	<0.000%	1	<0.000%	3	<0.000%
Cardinal fish	1	0.000%	49	0.001%	1	0.000%
Lantern sharks	0		0		0	
Seal shark	1,428	0.02%	1,065	0.02%	0	
Dogfish sharks	30	<0.000%	0		0	
Grenadier cod	5	<0.000%	1,227	0.02%	0	
Madrepora coral	25	<0.000%	41	0.001%	0	
Spiny dogfish	31	0.000%	0		0	
Rock cod	5	0.000%	0		0	
Abyssal rattail	0		0		0	
Smooth skate	21	0.000%	812	0.01%	0	
Rough shovelnose dogfish	0		190	0.003%	0	
Golden corals	0	0.000%	207	0.003%	0	

Category 1: Associated species

Only spiky oreo is included in this category. However very little information is available on the biology of other oreo species, including spiky oreo. There is no commercial fishery or targeting of this species.

Category 2: Incidental bycatch species (non-QMS Tier 3)

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 measures under section 11 of the Act 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 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

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

Seabirds

Table 9 describes the extent of the interactions with seabirds from observed vessels in oreo target trawls over the last 10 complete fishing years.

Table 9: Seabird captures (both dead and alive) in oreo trawl fisheries 2002/03-2011/12. For each fishing year, the table gives the total number of tows; the number of observed tows; observer coverage (the percentage of tows that were observed); the number of observed captures (both dead and alive); and the capture rate (captures per hundred tows).

Fishing effort				Observed captures[16]	
Year	All tows	Observed tows	% observer coverage	Number	Rate
2002/03	2,834	301	10.6	0	0.00
2003/04	2,543	372	14.6	0	0.00
2004/05	2,571	494	19.2	1	0.20
2005/06	2,308	365	15.8	5	1.37
2006/07	2,255	1,078	47.8	0	0.00
2007/08	2,499	1,050	42	3	0.29
2008/09	2,167	893	41.2	2	0.22
2009/10	2,541	963	37.9	6	0.62
2010/11	1,899	612	32.2	4	0.65
2011/12	1,660	428	25.8	1	0.23

In deepwater trawl fisheries, seabird captures occur in two main ways. They either collide with or are struck by the trawl warps (notably larger seabirds such as albatross) or are caught in the net when it is on the surface during deployment or 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.[17] 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.

[16] 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.

[17] Fisheries (Commercial Fishing) Amendment Regulations 2006/027.

In addition to the mandatory mitigation measures, industry and the Ministry work collaboratively to ensure all trawlers over 28 metres 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 ('stickers') are removed from the net before it beginning a new tow. Ministry observers monitor each vessel's 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 requiring a particular seabird mitigation measure to be carried, used, or adopted.[18]

Measures of seabird captures are based on data collected by Ministry observers. 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.[19]

The Ministry has finalised a new National Plan of Action (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 do not pose a significant risk to any seabird species under current management regimes. Risks are categorised by vessel/method types, and are not broken down into risks posed specifically by oreo fishing.

The Level Two Seabird 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 oreo fishery are assessed in the wider context of New Zealand-wide fishing activity (Table 10).

Table 10: Summary of all seabird species (listed in order of decreasing capture numbers) observed captured in oreo fisheries for the period 2006/07-2011/12.

Species	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Totals
Salvin's albatross (*Thalassarche salvini*)	0	1	1	3	0	1	6
Sooty shearwater (*Puffinus tenuirostris*)	0	1	1	0	3	0	5
Chatham Island albatross (*Thalassarche bulleri*)	0	0	0	3	0	0	3
Grey petrel (*Procellaria cinerea*)	0	1	0	0	0	0	1
Storm petrels (family Hydrobatidae)	0	0	0	0	1	0	1
Total	0	3	2	6	4	1	16

[18] Fisheries (Commercial Fishing) Regulations 2001, Regulation 58.

[19] 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 or other specified authority, upon return to port. However, records from this reporting stream are minimal.

Management need:

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

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

Marine mammals

New Zealand fur seals are occasionally captured in oreo fisheries. Table 11 provides information on observed captures and estimated total New Zealand fur seal captures for completed fishing years from 2002/03 to 2011/12 in the oreo fisheries. Estimated captures are based on the number of observed captures.[20]

Table 11: Fur seal captures in oreo trawl fisheries 2002/03-2011/12. For each fishing year, the table gives the total number of tows; the number of observed tows; observer coverage (the percentage of tows that were observed); the number of observed captures (both dead and alive); the capture rate (captures per hundred tows); the estimation method used; the mean number of estimated total captures (with 95% confidence interval (CI)).

Fishing effort				Observed captures	Estimated captures	
Year	All tows	Observed tows	% observer coverage	Observed captures	Capture rate (captures per 100 tows)	Model-based mean estimate of total captures (95% CI)
2002/03	2,834	301	10.6	0	0.00	3 (0-14)
2003/04	2,542	372	14.6	1	0.27	4 (0-16)
2004/05	2,571	494	19.2	1	0.20	11 (0-61)
2005/06	2,308	365	15.8	1	0.27	7 (1-28)
2006/07	2,255	1,078	47.8	1	0.09	2 (1-5)
2007/08	2,499	1,050	42	4	0.38	6 (4-15)
2008/09	2,167	893	41.2	0	0.00	2 (0-11)
2009/10	2,541	963	37.9	0	0.00	2 (0-10)
2010/11	1,899	612	32.2	0	0.00	2 (0-12)
2011/12	1,660	428	25.8	0	0.00	2 (0-10)

Although the New Zealand fur seal is a protected species under the Marine Mammals Protection Act 1978, the species status has been classified by the Department of Conservation as 'Not Threatened'. In addition, the New Zealand fur seal population has been expanding around the coast of New Zealand in the last 20 to 30 years.

The oreo fisheries are not known to interact with any other marine mammals.

Industry has developed a Marine Mammal Operating Procedure (MMOP), which is generic across all trawlers greater than 28 metres in length. The MMOP describes a range of procedures that a vessel

[20] For information on method of estimation, see Dragonfly, 2011.

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 fishing gear. The Ministry monitors and audits vessel performance against the MMOP via the Ministry Observer Programme. The Ministry reports the results of these audits annually 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)

For the purposes of this plan, 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. The following shark species are currently included in this category:

Table 12: Protected shark species and historical observed captures in oreo fisheries 2008-2012.

	Protection		Captures In oreo fisheries
Species	International Obligations	Domestic Law	
Great white shark	✓	✓	0
Basking shark	✓	✓	0
Whale shark	✓	✓	0
Deepwater nurse shark		✓	0
Oceanic whitetip shark	✓	✓	0

While not specifically mentioned in the National Deepwater Plan, New Zealand has obligations under the FAO International Plan of Action for Sharks[21] to ensure conservation of sharks and management of all fisheries that catch sharks, either as the target or as bycatch. In 2008, the then Minister responsible for fisheries approved a 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.[22] The NPOA focuses on a series of management actions to enable

[21] Food and Agriculture Organisation of the United Nations. The objective of the IPOA-SHARKS is to ensure the conservation and management of sharks and their long-term sustainable use. The legal foundation of the IPOA-SHARKS is, however, voluntary. Each State is responsible for developing, implementing and monitoring its NPOA.

[22] The Ministry has reviewed the 2008 NPOA for the Conservation and Management of Sharks, and is drafting an updated NPOA to cover the coming four (or more) years from 2013.

New Zealand to meet its international obligations with respect to the management of shark interactions. These actions focus on four broad areas:

- Eliminating live shark finning (currently illegal in New Zealand under Animal Welfare Act 1999)
- Ensuring appropriate conservation of threatened and endangered shark species
- Reviewing fisheries management where sharks are the target or a bycatch; and
- Improvement of information on shark captures

The oreo 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 management action or further research into particular shark species are needed then appropriate actions will be taken, with research delivered through the 10 Year Research Programme. In addition to this, an ecological risk assessment approach under development will be applied to understand the risks to the different shark species from all fishing and specific fishing activity.

Management need:

Continued monitoring of elasmobranch interactions in oreo 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 elasmobranches 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 many hard coral species in New Zealand are now protected. During the last seven fishing years (2005/06 – 2011/12), observers have reported 44.6 tonnes of hard corals that are now protected species being taken in oreo target fisheries (see Table 13).

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

How interactions happen

Oreos are taken by bottom trawling which has an impact on the seabed. Contact of components of the trawl system (doors, ground rope etc.) with the seafloor results in the capture of benthic invertebrates and impacts on both physical and biological components of the benthic habitat. Data from vessels' catch and effort reporting are used to monitor this impact. Table 14 below details the benthic bycatch that has been recorded from observed vessels targeting oreo.

Table 13: Benthic bycatch reported by observers from oreo target tows during the 2005/06 – 2011/12 fishing years (kg).

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Grand Total
Bamboo coral		16	37	50	25	18	24	169
Bamboo corals	81	117	94	2	4			298
Bathypathes spp.				1	6			7
Black corals	3	14	12	1	6	1	1	38
Bottlebrush coral			10	1	1	1	1	14
Bubblegum coral	338	781	396	599	584	123	94	2,915
Bushy bamboo coral			1	13	4			19
Bushy hard coral	11	2,233	6,969	38	1,030	758	73	11,112
Caryophyllia spp.			310	0				310
Crested cup coral		13	241	1	57		28	340
Deepwater branching coral		18	8,401	15,170	688	7	24	24,308
Dendrobathypathes spp.				1				1
Flabellum cup corals		3		0				3
Golden corals	8	25	631	0	207			871
Gorgonian coral	1		26	89	66	27	9	219
Hydrocorals		20	6					26
Leiopathes black coral						3		3
Madrepora coral		1	3,018	28	41			3,088
Parantipathes spp.				1	0			1
Plumarella spp.			1					1
Precious corals	1	1	6		4		0	13
Primnoa spp.			2	51	27			79
Primnoidae (Family)				1				1
Red hydrocorals		6	5					11
Scleractinia			2		568	100		670
Sea fans				1				1
Solitary bowl coral				0	0			0
Spiny white hydrocorals						50		50
Stony branching corals				0		0		0
Stony cup corals			0					0
White hydrocoral		1		0	2			3
Grand Total (kgs)	**443**	**3,249**	**20,170**	**16,046**	**3,321**	**1,088**	**254**	**44,571**

Management measures to limit interactions

In recent years the management measures to address the effects of deepwater trawl activity have focused on avoiding these effects. This has been achieved through closing areas to bottom trawling; first with seamounts and then with Benthic Protection Areas (BPAs). The implementation of BPAs in 2007 closed approximately 30% of the New Zealand EEZ to bottom trawling. The Ministry also implemented a monitoring regime to ensure these closures are adhered to. The regime includes requirements for electronic net monitoring systems, monitoring by onboard fisheries observers, and the use of ALCs. The BPAs currently in place represent 17% of oreo habitat (based on oreo depth range) as detailed in Figure 19.

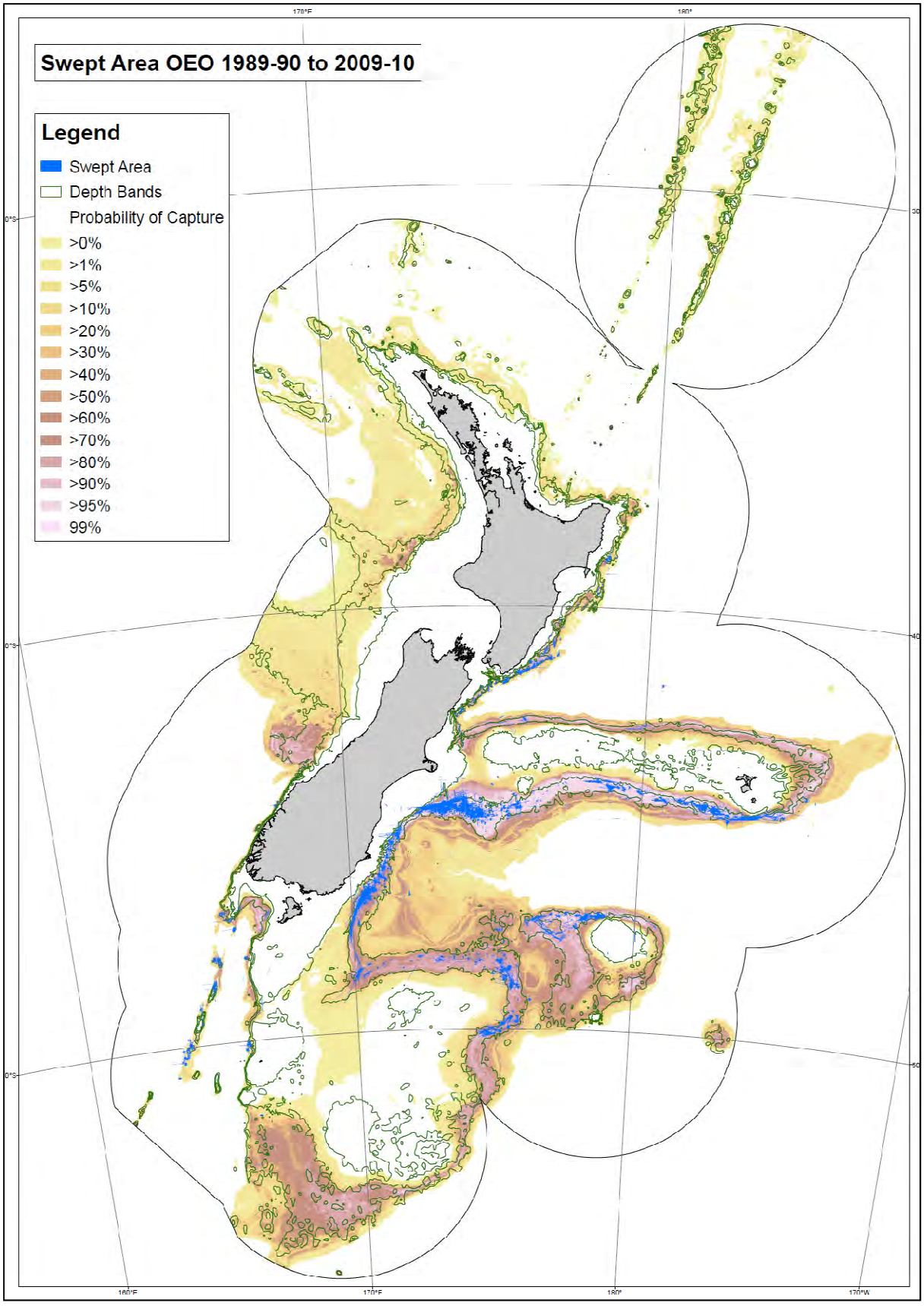

Figure 18: Oreo fishery bottom trawl grounds from 1989/90 to 2009/10.

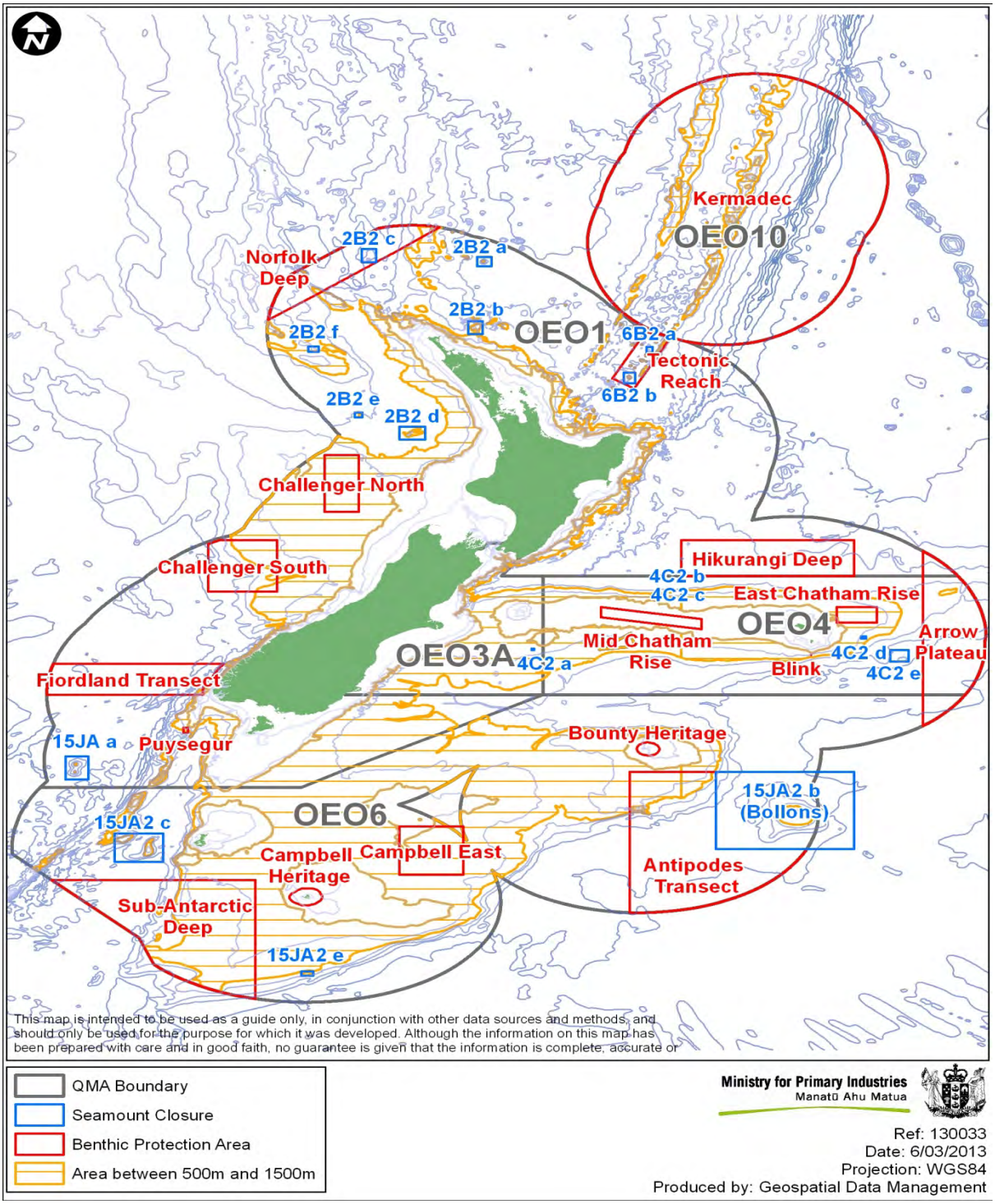

Figure 19: Oreo depth range and areas closed to bottom trawling within the New Zealand EEZ.

3. Operational Objectives for the oreo fisheries

This part of the Chapter describes the operational objectives that will drive the management of the oreo fisheries through the next five years. Each operational objective is described in terms of the high level management approach that will be taken to addressing these key issues (see Appendix 1 for overview).

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:

1. Where the timeframe is "**by** 20xx/xx", it is expected that work will be **completed** by the **end** of the stated financial year.
2. Where the timeframe is "**from** 20xx/xx", it is expected that work will **commence** during the stated financial year, and will likely be ongoing across one or more financial years.
3. Where the timeframe is "**during** 20xx/xx", it is expected that work will be **completed** during the stated financial year.
4. "Annual delivery" requires work to be reported annually through the duration of this Chapter.

Utilisation Operational Objectives

OO1.1 Enable quota owners to develop and implement a harvest regime that will maximise the value obtained from the oreo fisheries, in line with the harvest strategy

Oreo was the 15th most valuable seafood export for New Zealand in 2012 and the sixth most valuable deepwater species by export value. Operational Objective 1.1 recognises that, although ensuring biological sustainability is paramount to fisheries management decisions, economic decisions can also influence the value quota holders are able to realise each year.

This Chapter acknowledges that more sophisticated strategies for managing OEO3A and OEO4 (and also possibly OEO6) may develop in time. The DWG may also consider seeking independent certification of the New Zealand smooth oreo fishery at some future date.

Objective 1.1 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 address factors such as:

- Indicators of change in relative abundance of each species
- Consideration of the rate of change to the TAC

Contributing to Management Objectives:	Performance Indicators:	Timeframe
MO 1.1, MO 1.2 MO 1.3, MO 1.5, and MO 2.1	1. Guidelines that maximise the value obtained from the oreo fisheries are agreed by quota owners 2. Such guidelines are an integral component of oreo management decisions, provided no sustainability concerns have been raised	1. By 2014/15 2. From 2014/15

OO1.2 Ensure satisfactory levels of compliance are achieved in oreo and associated fisheries within sustainability limits

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 oreo and associated fisheries. The risk assessment will be used to identify any areas that may need focused compliance monitoring. Levels of compliance will then be assessed annually against generic performance indicators and reported to stakeholders including tangata whenua, and interested parties through the ARR.

Contributing to Management Objectives:	Performance Indicators:	Timeframe
MO1.1 MO1.3 MO1.5 MO2.1 MO2.5	1. The performance of oreo fisheries is assessed against the specified compliance performance indicators 2. The results of each annual assessment demonstrate high levels of compliance in all oreo and associated fisheries	1. From 2013/14 2. From 2014/15

OO1.3 Develop and implement stock monitoring and management regimes for ruby fish and alfonsino to enable development of appropriate management settings and harvest strategy

Little is known about the status of ruby fish or alfonsino (Tier 2) stocks and no estimates of current and reference biomass, or yield, are available for any ruby fish or alfonsino stock.[23] Regular

[23] Stock characterisations for ruby fish ((2012/13) and alfonsino (2011/12) have recently been undertaken. The Middle Depths Fishery Assessment Working Group meeting of September 2013 however, decided more work is required before these characterisations can be accepted before the final research report is published.

characterisations are scheduled in the 10 Year Research Programme for Deepwater Fisheries. The characterisations may provide the basis for delivering on this objective.

Contributing to Management Objectives	Performance Indicator	Timeframe
MO1.1, MO1.2. MO1.3, MO1.4. MO1.5, MO2.1	1. Monitoring and management approaches for ruby fish and alfonsino (Tier 2) are developed, including specific harvest strategy if appropriate.	1. From 2014/15

OO1.4 Collaboratively assess potential management tools to manage oreo based on the individual species

Scientific research has shown that there are at least five smooth oreo and three black oreo biological stocks. However, they do not currently align with management areas. Management should ideally 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. Reconfiguration of QMAs to 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. Expanding the use of sub-area catch limits (already used for some oreo stocks) 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 oreo based on individual species have been assessed 2. Potential mechanisms to allow for monitoring and management based on individual species have been considered	1. By 2013/14 2. From 2014/15

OO1.5 Ensure all research planned under the 10 Year Research Programme and used to inform the management of the oreo 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 fishing year

The 10 Year Research Programme for Deepwater Fisheries sets out the research and monitoring approach for oreo 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 OEO3A & OEO4 also have regular acoustic surveys to

provide biomass information. Within the timeframe of this Chapter, Table 15 shows research projects that are scheduled for the oreo, ruby fish and alfonsino fisheries.

During the development of the 10 Year Research Programme, it was recognised that fisheries research must also respond to new opportunities and address new risks. It was acknowledged that there should be a degree of flexibility, especially in out years for deepwater research. However, as yet no additional research related to oreo is planned.

Contributing to Management Objectives:	Performance Indicators:	Timeframe
MO 1.3, MO 1.4, MO 1.5 (MO 1.6)	1. 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 fishing year. 2. All research delivered through the 10 Year Research Programme meets the agreed Ministry research standard and is independently peer reviewed through the Ministry Working Group process. 3. Any additional research requirements are contracted and delivered in a timely manner through the Additional Research component of the 10 Year Research Programme and are also appropriately peer reviewed.	1. Annual delivery 2. Annual delivery 3. Annual delivery

OO1.6 Develop new ways to assess the biomass of stocks where fisheries independent data is unavailable

Fisheries-dependent data is generally cheaper to collect than fisheries-independent research information, but usually less reliable. The Ministry will evaluate and implement fishery management strategies designed to identify and operationalise strategies for managing oreo stocks using fisheries data. These management strategies need to be robust to several types of uncertainty and capable of balancing multiple economic, social and biological objectives.

Contributing to Management Objectives:	Performance Indicators:	Timeframe
MO 1.3, MO 1.4, MO 1.5 (MO 1.6)	1. Undertake Management Strategy Evaluation (Management Procedures) for low knowledge stocks (OEO1 - 6) that are reasonably high value 2. Develop a five-year tool to better inform information on stocks	1. From 2014/15 2. From 2014/15

Table 14: Research projects scheduled for specific oreo fisheries.

Year	Acoustic survey[24]		Stock assessment			Stock characterisation		
2012-13	SSO4		BOE3A	OEO6			RBY	
2013-14				SSO6	SSO4			
2014-15		BOE3A			SSO1	BYX		
2015-16	SSO4		BOE3A	OEO6				
2016-17							RBY	
2017-18		BOE3A			SSO4			
2018-19	SSO4		BOE3A	OEO6		BYX		
2019-20								

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

Environmental Operational Objectives

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

The oreo fisheries are currently managed using generic reference points specified in the Harvest Strategy Standard. As part of the development of species-specific harvest strategies, appropriate biological reference points for the oreo species will be determined and agreed. Reference points will then be used to underpin the management of oreo.

The oreo harvest strategy will incorporate all components detailed in the Harvest Strategy Standard, but will tailor the components specifically to the biological characteristics and productivity of the oreo species. The harvest strategy will also consider the economic and operational characteristics of the fishery. The following components will therefore be developed and agreed: 1) a management target, 2) soft and hard limit reference points, 3) a formal, time-constrained rebuilding plan, and 4) a harvest control rule component that will determine management action. The rebuilding strategy would be implemented should stock biomass fall below the soft limit so as to drive an increase in the stock biomass back to the management target.

Contributing to Management Objectives:	**Performance Indicators:**	**Timeframe**
MO 1.2, MO 1.3 MO 1.5 MO 2.1, MO 2.2	1. An agreed harvest strategy for the oreo species is in place 2. Details of the harvest strategy, including a rebuild strategy, are publicly available 3. The agreed harvest strategy has underpinned management responses	1. From 2014/15 2. From 2014/15 3. From 2014/15

[24] Trawl surveys are not conducted for oreo. It is anticipated that these acoustic surveys will use a mixture of dedicated research trips for wide-area surveys and industry vessels during commercial fishing trips for surveys of smaller areas.

OO2.2 Ensure that incidental marine mammal captures do not impact the long term viability of the populations and captures are minimised through good operational practices

As noted previously, New Zealand fur seals are the only marine mammal known to interact with the oreo fisheries and are only occasionally captured in oreo fisheries. In response, industry has developed a Marine Mammal Operating Procedure (MMOP) for all trawlers more than 28 metres in length, which describes a range of procedures designed to reduce the risk of marine mammal captures. The Ministry monitors and audits vessel performance against the MMOP via the Ministry Observer Programme. The Ministry reports the results of these audits annually via the Deepwater Annual Review Report.

Oreo fisheries are not known to interact with any other marine mammals.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO 1.3, MO 2.5, MO2.6	1. Observed marine mammal captures are reported annually for oreo fisheries, including analysis of captures by species, area and vessel size, with appropriate peer review 2. All practicable operational steps have been taken to minimise the number of interactions, and where appropriate the operational guidelines have been incorporated into the MMOP. 3. Good fishing practices are proven though adherence with the MMOP being achieved by all vessels, and performance is transparently reported annually to all stakeholders. 4. Any observed changes from the current level of interaction are addressed promptly, and the appropriate management action is taken. 5. Additional management measures are developed and implemented if/when deemed necessary	1. Annually 2. Ongoing 3. Annual delivery 4. As required 5. As required

OO2.3 Implement appropriate spatial management measures to address any adverse effects of fishing for oreo 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 differing benthic habitat to this fishing method.[25]

The management of benthic interactions across oreo fisheries managed under this Chapter will focus on annually monitoring the extent of bottom trawling. Ongoing monitoring of oreo trawl footprint is

[25] The bulk of closures have been in very deep water. It has recently been calculated that more than 90% of the New Zealand EEZ has never been bottom trawled.

scheduled under the 10-Year Research Programme. 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 (BOMEC).

Contributing to Management Objectives	Performance Indicators	Timeframe
MO 1.2, MO 1.3, MO 2.3, MO 2.4, MO 2.7 (MO 2.6)	1. Maps of oreo bottom trawl footprint produced annually 2. The extent of the bottom trawl footprint is formally assessed against the BOMEC each year to consider whether benthic interactions are considered to have an adverse impact 3. If the oreo bottom trawl impacts are found to be having an adverse impact on the benthic habitat additional management measures are transparently developed and implemented	1. Annually 2. Annually 3. As required

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

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

The risk assessment which underpins the NPOA assesses the risk to seabird populations in the context of all New Zealand fisheries. In areas where significant risk is the result on any deepwater fishing activity, 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 oreo 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 in a timely manner to address the impacts

Regardless of the results of the seabird risk assessment, work is undertaken to fine-tune bird mitigation devices and onboard offal management to further reduce risk.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.4 MO1.6 MO2.2 MO2.6	1. Observed seabird captures are reported annually for oreo fisheries, including analysis of captures by species, area, method and vessel size, with appropriate peer review 2. Additional management measures are developed and implemented if/when deemed necessary	1. Annually 2. As required

OO2.5 Monitor incidental bycatch of Tier 3 species in oreo and other deepwater fisheries

Oreo fisheries catch some non-QMS species during fishing activity, most notably dogfish and rattails. A level one risk assessment will be completed which will identify Tier 3 species (or species groups) which may be at risk from fishing activity. Acceptable levels of risk have not been defined, but these 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 and subject to appropriately increased monitoring.

Contributing to Management Objectives	Performance Indicators	Timeframe
MO2.4 MO1.6 MO2.2 MO2.6	1. Any bycatch species deemed to be at risk from oreo fishing is assessed against the QMS introduction standard and the outcome reported in the Annual Review Report 2. Additional monitoring is implemented for any bycatch species identified as being at risk from oreo fishing	1. From 2013/14 2. From 2013/14

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 the oreo fisheries has improved over the five year duration of this Chapter 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 chapter of the National Deepwater Plan.

Each of the high level management objectives for the deepwater fisheries is assessed below in terms of its current status in the oreo fisheries and the target status after this chapter has been in place for five years.

Management Objectives – Utilisation

MO1.1	**Enable an economically viable oreo fishery in New Zealand over the long term**
Status at start of chapter	Target status at five year review
• Oreo quota value of $74.4 million (2009) • Oreo annual export earnings were $19 million (2011) • Current alfonsino quota value is $30.9 million (2009); and for ruby fish is $0.6 million (2009)	• The real value of oreo quota has increased • Management decisions are assessed in terms of their impacts on the economic yield from the oreo fisheries • Information necessary to manage fisheries is transparently obtained on a cost effective basis

Supporting Operational Objectives:								
1.1	**1.2**	1.3	**1.4**	1.5	2.1	2.2	2.3	2.4

MO1.2	**Ensure there is consistency and certainty of management measures and processes in the oreo fisheries**
Status at the start of chapter	Target status at 5 year review
• All oreo fisheries are managed by the Ministry in collaboration with DWG to agreed biologically-based reference points • There is currently no fisheries plan in place that sets out the management objectives to guide the management of these fisheries • Key management decisions are consulted on widely across all stakeholder groups with an interest in oreo • Few management decisions are assessed in	• Wide support and compliance with both regulatory and non-regulatory management measures in place in these fisheries – and this is apparent in the performance of the oreo fisheries against compliance benchmarks • Collaborative management relationship continues with greater benefits realised and is extended to other stakeholder groups • Regular internal and external consultation

terms of the value that they contribute to both New Zealand and quota owners • Catch is monitored annually against TACCs, industry agreed catch limits and catch spreading arrangements • Management measures and processes to address environmental issues have been advanced in recent years but further work may be required in some areas (trophic linkages and ecosystem functioning) • There is currently no single information source that can be accessed by people with an interest in the management of the oreo fisheries	and review processes continued • Management measures and decisions are documented and are publicly available on the MPI website • Management decisions are assessed in terms of their value contribution prior to being implemented

Supporting Operational Objectives:								
1.1	**1.2**	1.3	**1.4**	1.5	2.1	2.2	2.3	2.4

MO1.3	**Ensure the oreo fisheries resources are managed so as to provide for the reasonably foreseeable needs of future generations**
Status at the start of chapter	Target status at 5 year review
• The foreseeable needs of future generations, including intrinsic and bequest values, have not specifically been identified in relation to oreo • Current management focuses on retaining catch within the allocated catch limit, and avoiding, remedying or mitigating the adverse effects of fishing on the aquatic environment • The Harvest Strategy Standard provides a generic management target of 40%B_0, although this target has not been assessed in terms of its appropriateness for the long term viability of oreo	• Through the delivery of the National Deepwater Plan there is a greater public awareness and understanding of how oreo fisheries are managed • There is wider public acknowledgement that oreo fisheries are well managed • Oreo fisheries are managed so that they are capable of achieving third party certification, if required • Each stock is fluctuating about its target reference point or, if below the target, are increasing towards the target

Supporting Operational Objectives								
1.1	1.2	1.3	**1.4**	**1.5**	**2.1**	**2.2**	**2.3**	2.4

MO1.4	**Ensure effective management of the oreo fishery is achieved through the availability of appropriate, accurate and robust information**
Status at the start of chapter	Target status at 5 year review
• Management of all oreo fisheries is supported by a significant research programme but the outputs from this programme are sometimes contentious and, in the absence of agreed harvest strategies, may not be clearly linked to management requirements	• The 10 Year Research Programme is implemented and the data necessary to support the objectives in the National Deepwater Plan is routinely collected in a cost-effective manner • All research used to inform management decisions continues to meet Ministry

• There is insufficient data and information available to assess the status of bycatch stocks or to fully assess the nature and extent of environmental effects • Available information is often highly technical and difficult to understand • All scientific information used to inform management decisions is peer reviewed • Much less information to support the management of ruby fish and alfonsino	standards and peer review requirements • Information available to better support management of ruby fish and alfonsino

Supporting Operational Objectives								
1.1	1.2	**1.3**	**1.4**	**1.5**	2.1	2.2	2.3	2.4

MO1.5	**Ensure that the management of New Zealand oreo is recognised as being consistent with or exceeding domestic and international best practice**
Status at the start of chapter	Target status at 5 year review
• The Tier 1 oreo stocks are monitored regularly and undergo regular TAC reviews • 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 oreo are available	• Through the delivery of the National Deepwater Plan there is a greater public awareness and understanding of how the oreo fisheries are managed • Levels of compliance in the oreo fisheries are monitored annually against compliance benchmarks and performance of the fisheries exceeds these benchmarks • There is wider public acknowledgement that oreo fisheries are well managed and are consistent with or exceeding best practice • Oreo fisheries are managed so that they are capable of achieving third party certification, if required

Supporting Operational Objectives								
1.1	1.2	1.3	**1.4**	**1.5**	**2.1**	2.2	2.3	2.4

MO1.6	**Ensure New Zealand's oreo fisheries are transparently managed**
Status at the start of chapter	Target status at 5 year review
• The majority of information currently available on oreo consists of scientific technical reports and advice papers that are accessible to a small number of people • There is no primary information source that can be accessed by all people with an interest in the management of the oreo fisheries	• The Ministry's fisheries website is acknowledged as a comprehensive source of information (both technical and "plain English") on the management of the oreo fisheries • The Deepwater Annual Operational Plan describes the Management Actions and Services relating to oreo that will be delivered each year through the duration of this chapter • Deepwater Annual Review Reports detail the

	progress made in the previous year to deliver the Management Actions and Services specified in each AOP • Clear processes have been established to enable engagement between the Ministry and key stakeholders and Treaty partners

Supporting Operational Objectives								
1.1	1.2	1.3	**1.4**	**1.5**	2.1	2.2	2.3	**2.4**

In addition, completion of Operational Objective 1.7 from the hoki chapter will support delivery of MO1.6

MO1.7	**Ensure the management of New Zealand's oreo fishery meets the Crown's obligations to Māori under the fisheries settlement Acts**
Status at the start of chapter	Target status at 5 year review
• Twelve iwi are currently members of the Deepwater Group Ltd • Iwi quota owners are actively represented in the management of oreo fisheries	• Iwi with an interest in oreo fisheries are actively engaged in the management of these fisheries • Iwi membership of the DWG has increased • Clear and agreed processes in place to allow TOKM[26] to represent commercial iwi views, where necessary • Iwi with an interest in oreo fisheries are enjoying the benefits of responsible asset management • Mechanism for wider iwi engagement is acknowledged to be through iwi fisheries plans and iwi forums
Supporting Operational Objectives	
Operational Objectives 1.11 and 1.12 from the hoki chapter, and 1.9 and 1.10 from the orange roughy 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 Māori are met with regards to all the deepwater fisheries, including oreo	

Management Objectives - Environment

MO2.1	**Ensure oreo is managed within an agreed harvest strategy**
Status at the start of chapter	Target status at 5 year review
• Specific harvest strategies, consistent with the Harvest Strategy Standard, are not yet in place for any of the oreo fisheries	• Oreo and related Tier 2 stocks are managed either at or above agreed target levels or are managed to ensure that stocks are moving towards an agreed target • Harvest strategies, consistent with the

[26] Te Ohu Kaimoana – the Māori Fisheries Trust.

	Harvest Strategy Standard, are established and implemented for all major oreo stocks • The necessary data and information is available to regularly assess performance against agreed biological reference points in all major oreo and related Tier 2 stocks

Supporting Operational Objectives								
1.1	1.2	**1.3**	**1.4**	1.5	**2.1**	2.2	2.3	2.4

MO2.2	**Maintain the genetic diversity of oreo and bycatch species**
Status at the start of chapter	Target status at 5 year review
• There is some information available on the genetic diversity within oreo stocks • Information on population structure (sex and size class distribution) for oreo is available from research surveys and observer data although coverage varies widely among stocks	• Information is available (collected as part of the 10 Year Research Programme) on appropriate biological parameters (e.g. sex and size class structure) for all oreo and processes are in place to monitor trends in this information[27]

Supporting Operational Objectives								
1.1	1.2	1.3	1.4	1.5	**2.1**	2.2	2.3	2.4

MO2.3	**Protect habitats of particular significance for fisheries management**
Status at the start of chapter	Target status at 5 year review
• Habitats of particular significance to the management of oreo fisheries have not been defined, although it is recognised that oreo are frequently associated with underwater topographic features such as hills and canyons • Regulatory closures under the Seamount and BPA Regulations have closed large areas of the New Zealand EEZ to bottom trawling[28]	• A policy definition is available which describes what is meant by 'habitats of particular significance to fisheries management' • Any habitats of particular significance to the management of oreo fisheries have been identified • Where necessary, management measures to further protect these habitats have been identified and are implemented

Supporting Operational Objectives								
1.1	1.2	1.3	1.4	1.5	2.1	2.2	**2.3**	2.4

MO2.4	**Identify and avoid or minimise adverse effects of oreo fishing activity on incidental bycatch species**
Status at the start of chapter	Target status at 5 year review
• Oreo fisheries are relatively clean fisheries in	• Incidental bycatch from oreo fisheries is

[27] Note that achieving the target status for MO 2.1 at 5 year review will make a significant contribution to ensuring the genetic diversity of this species is maintained.

[28] Seventeen percent of the area of the EEZ within the depth range of 500 to 1,500 m is within the Benthic Protection Area closures and the "Seamount" closures as shown in Figure 19.

terms of bycatch but are known to take a number of finfish and deepwater shark species • Less than 2% of the catch of non-QMS species reported by observers in oreo fisheries (Table 8) is reported against generic codes, particularly for rattail and shark species • Reported catch of non-QMS species that are reported against individual species codes are monitored under the process detailed in the paper 'Identification of candidate stocks for QMS introduction – standards and organisational procedures'	monitored annually • The oreo fisheries continue to have a minimal impact of incidental bycatch species • Action is taken when bycatch levels for a particular species mean that the species sustainability may be compromised or utilisation opportunities may be forgone – action may include QMS entry or other section 11 management measures • Impacts on bycatch species defined as at high risk are appropriately reduced

Supporting Operational Objectives

1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	**2.4**

MO2.5	**Manage the oreo fisheries so as to avoid or minimise adverse effects on the long-term viability of endangered, threatened and protected species**
Status at the start of chapter	Target status at 5 year review
• Oreo fisheries are known to have a low level of interaction with fur seals, seabirds and protected shark and coral species • Seabird interactions are managed through both regulation and non-mandatory measures • Interactions with protected shark species are low • Marine mammal interactions are infrequent but the small risk of interactions is mitigated through non-mandatory measures (MMOP) • There are no management measures in place specific to protected coral species but significant areas of New Zealand EEZ are closed to bottom trawling under the Seamount and BPA Regulations	• Robust information is available on actual incidental interactions with ETP species from all vessels targeting oreo • The ERA has assessed the nature and extent of the impact of the oreo fisheries on ETP species and, where this impact is adverse, management measures are in place to avoid or minimise the impact • Requirements of NPOA for seabirds and for sharks met

Supporting Operational Objectives

1.1	1.2	1.3	1.4	1.5	2.1	**2.2**	2.3	2.4

MO2.6	**Manage the oreo fisheries to avoid or minimise adverse effects on biological diversity**
Status at the start of chapter	Target status at 5 year review
• Research and information on the full extent of interactions on the biological diversity of the aquatic environment, including trophic relationships, due to oreo trawl activity is limited	• The ERA has identified any adverse effects on biological diversity • Management measures are either in place, or under development, to avoid or minimise adverse effects on biological diversity of the aquatic environment

Supporting Operational Objectives								
1.1	1.2	**1.3**	1.4	1.5	2.1	**2.2**	**2.3**	**2.4**

MO2.7	**Manage effects from the impact of oreo fishing activity on the benthic habitat using a spatial management approach**
Status at the start of chapter	Target status at 5 year review
• Benthic Protection Areas and Seamount closures are in place which have closed over 30% of the New Zealand EEZ to bottom trawling activity	• Review of BPAs post-2013 completed • Variations to existing spatial protection implemented as appropriate on the basis of this assessment

Supporting Operational Objectives								
1.1	1.2	1.3	1.4	1.5	2.1	2.2	**2.3**	2.4

Appendix 1: Summary of Operational Objectives for oreo fisheries:

Details of the operational objectives (OO) for the oreo fishery and link with management objectives (MO)

●● 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**
OO1.1 Enable quota owners to develop and implement a harvest regime that will maximise the value obtained from the oreo fisheries, in line with the harvest strategy	●●	●	●		●			●						
OO1.2 Ensure satisfactory levels of compliance are achieved in the oreo and associated fisheries		●●	●		●									
OO1.3 Develop and implement stock monitoring and management regimes for Tier 2 bycatch species to enable development of appropriate management settings and harvest strategy	●	●	●	●	●			●●						
OO1.4 Collaboratively assess potential management tools to manage oreo based on individual species	●	●	●	●●	●	●	●	●						
OO1.5 Ensure all research planned under the 10 Year Research Programme and used to inform the management of the oreo fisheries continues to be peer reviewed, meets the requirements			●	●●	●	●								

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
of the research standard and is delivered in time to inform management decisions before the start of each 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
OO2.1 Develop an agreed harvest strategy for oreo including a stock rebuild strategy that is consistent with the Harvest Strategy Standard		●	●		●			●●	●					
OO2.2 Ensure that incidental marine mammal captures, particularly fur seals, do not impact the long term viability of the population and captures are minimised through good operational practices			●									●●	●	
OO2.3 Implement appropriate spatial management measures to address any adverse effects of oreo trawl fishing on benthic habitats		●	●							●	●		●	●●
OO2.4 Monitor incidental bycatch in oreo fisheries						●			●		●●		●	