Hector's and Maui's Dolphin Threat Management Plan

Draft for Public Consultation

29 AUGUST 2007

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1. PURPOSE

The purpose of this draft Hector's dolphin Threat Management Plan (TMP) and Initial Position Paper (IPP) is to outline proposals to effectively manage human-induced threats to Hector's dolphins (including Maui's dolphins), and seek stakeholder submissions on the measures proposed, as part of the consultation process.

2. SUBMISSIONS

The Department of Conservation (DOC) and the Ministry of Fisheries (MFish) request that you provide written comments on the proposals contained in this draft Plan by **24 October 2007**.

These comments should be sent to:

TMP Submissions
PO Box 11-146
WELLINGTON 6011

OR:

Hectorstmp@biodiversity.govt.nz

3. EXECUTIVE SUMMARY

3.1. Overview

Public and government concern over the effect of human induced mortality on Hector's and Maui's dolphins has led to the development of a TMP to help protect these species.

Led by the Ministry of Fisheries (MFish) and the Department of Conservation (DOC), the TMP is designed to:

⇒Describe the nature and extent of threats to Hectors and Maui's dolphins and

⇒Implement strategies to reduce those threats which are human induced

The TMP builds on material released in a discussion document in May 2007 and incorporates response to that document including feedback gained during regional forums. This is your opportunity to provide further input to the plan and have your say on the best proposed course of action. The consultation period closes on 24 October 2007.

The TMP comprises three key sections:

⇒Part I provides context on the problem, outlines general threats facing the dolphins, and introduces threat management proposals.

⇒Part II focuses on fishing related threats to the dolphins and options for managing those threats by fishing method. The section looks at fishing threats across the species and regional populations. This approach allows you to focus on the populations and regions and fishing methods of most interest to you.

⇒We also draw your attention to the Regulatory Impact Statement (RIS) at the back of Part II, which provides a useful overview of the fisheries impact issues and measures.

⇒Part III outlines preliminary proposals for Marine Mammal Sanctuaries. The Sanctuaries are proposed in areas of high dolphin abundance and important habitat for dolphins.

Scientific and anecdotal information indicates fishing is the biggest cause of human induced mortality of Hector's and Maui's dolphins. Therefore, this document focuses on a range of options to reduce the risk of fishing related mortality to the dolphins.

It is acknowledged, that:

⇒The nature and extent of threats is still highly uncertain, largely due to gaps in available information.

⇒The Minister of Fisheries final decision on fishing related measures, in consultation with the Minister of Conservation, will be based on the level of effect from fishing related mortality that the Minister considers acceptable.

Because the nature and extent of fishing related mortality varies between each of the four populations of Maui's and Hector's dolphins, different options have been developed for each population.

Key regions affected

⇒West Coast, North Island
⇒West Coast, South Island
⇒East Coast, South Island

⇒South Coast, South Island

Note four new marine mammal sanctuaries are proposed by the DOC – the areas proposed provide significant habitat to dolphin populations and represent each of the four genetically distinct populations of dolphins except for West Coast South Island.

The way forward

Status quo (ie taking no further action) will not reduce the risk of fishing related mortality. The Minister of Fisheries would choose this option if he considered the existing level of fishing related mortality was acceptable. Outside of the Status quo, three broad options are outlined in the plan:

⇒Option 1 presents measures that will likely result in the least reduction of the risk of dolphin mortality and least cost to fishers

⇒Option 2 presents measures that will have a moderate impact on the risk of dolphin mortality but involve moderate cost to fishers

⇒Option 3 presents measures that will likely result in the most reduction of the risk of dolphin mortality significantly but will come at the most cost to fishers.

3.2. Context of the problem – in brief

Location of the dolphins

Hector's and Maui's dolphins are only found in New Zealand's waters.

⇒Hector's dolphins are principally found in the South Island

⇒Maui's dolphins are found off the north-west coast of the North Island.

⇒They are inshore coastal species with a limited home range

⇒They are mostly seen in murky waters close to shore and generally live in small groups – usually three to five individuals but larger groups (up to 30-40 individuals) are sometimes seen

Biology

Both dolphin species live only about 20 years, have a low reproduction rate (calving every 2-3 years) and have late onset of sexual maturity (7-9 years). These factors result in a low maximum population growth rate, which put Hector's and Maui's dolphin at threat from even low levels of human-induced mortality

Endangered status

⇒Hector's dolphin is considered to be one of the world's rarest dolphin species

⇒Following a decline in numbers, the Minister of Conservation declared Hector's dolphins a "threatened species" in 1999

⇒The dolphins were further classified as "nationally endangered" in 2003

⇒The South Island Hector's dolphin is ranked as nationally endangered by DOC and endangered by the World Conservation Union (IUCN), and is estimated to consist of around 7, 270 individual dolphins

⇒The North Island Maui's dolphin, is estimated to have a population of around 111 individuals and is ranked as nationally critical by DOC and critically endangered by the IUCN

Population status

⇒While there is uncertainty over trends in population size the South Island and West Coast North Island there is some evidence of overall population decline at a species level as well as within individual populations.

⇒Government has a general policy position that threatened species numbers should be increased to reach non-threatened status. However, in the absence of a Population Management Plan issued under the Marine Mammal Protection Act there is no obligation to require such a rebuild to occur.

Wide-spread public concern

There has been wide-spread public concern regarding the impact of human induced mortality on Hector's and Maui's dolphins. This has been shown by petitions to Parliament and proposed management strategies from Non-Governmental Organisations, and significant amounts of correspondence to Ministers from the public and some local Government agencies.

Threats

There are a number of actual and potential threats facing the dolphins including fishing-related threats and non-fishing related threats. Some of these threats are a direct cause of dolphin mortality, whereas others may impact on the population through sub-lethal impacts (for example, reducing reproductive success).

♦ *Non-fishing related threats*

These are seen as a major component for the management of Hector's and Maui's dolphin. These threats include:

⇒Disease

⇒Impacts associated with interactions between the dolphins and vessel operations,

⇒Permitted and non-permitted tourist vessels

⇒ Pollution from discharges into the coastal marine area

⇒Plastic debris generated from dumping of both urban and marine based waste

A range of nationally consistent actions are proposed to mitigate non-fishing threats. Measures include investigating areas that may need vessel speed restrictions, a four year moratorium on the issuing of marine mammal viewing permits and the inclusion of Hector's and Maui's dolphin habitats in the review of the New Zealand Coastal Policy Statement.

♦ *Fishing related threats*

Hector's and Maui's dolphins have a close inshore distribution, which results in an overlap with commercial and amateur set net fisheries, as well as inshore trawl fisheries.

Review of reported mortalities of Hectors and Maui's dolphins indicate that entanglement in set nets poses the greatest risk of human induced mortality to the dolphins.

Overall, the nature and extent of fishing related impacts is highly uncertain due to poor information on level of mortalities, which results from low observer coverage of fishing and poor incentives to voluntarily report incidents. However, it is believed that the effects of fishing are the greatest cause of human induced mortality on the dolphins.

The effect of fishing related mortality is likely to be greatest on populations that are small because the level of mortality they can sustain will be less.

Existing controls and number of incidents

A mix of controls are in place to mitigate the impacts of fishing on specific populations of Hector's and Maui's dolphins.

It is difficult to measure the effectiveness of current management controls because of the low level of monitoring and suspected low levels of voluntary reporting.

No confirmed incidents of fishing related mortality of Maui's dolphins have been recorded since 2003. However, because the population is estimated at 111, scientific information suggests that it cannot sustain even one human induced mortality and rebuild.

There have been 36 confirmed incidents of fishing related mortality of Hector's dolphins from the East Coast South Island population since the marine mammal sanctuary was introduced in 1988.

No mitigation measures are in place for the West Coast population.

3.3. Where to from here?

A range of management options have been developed to manage the effects of fishing-related mortality on Hector's and Maui's dolphins, for inclusion in the draft TMP. All options are outlined in Table 1 at the end of the executive summary.

Options have been developed for each of the four populations of Maui's and Hector's dolphins because the nature and extent of fishing related mortality varies between populations. However, the Minister of Fisheries will make a decision at a species level in considering impacts of measures across populations.

Options have been developed to address each threat (fishing method) which has been identified as creating a risk of fishing related mortality. There are three broad mitigation options for each threat, ranging from least to most restriction.

The options are categorised by their ability to reduce the risk of fishing related mortality caused by each threat and by the cost to fishers.

Marine Mammal Sanctuaries

There are four proposals for new marine mammal sanctuaries:

⇒West Coast of the North Island

⇒Clifford and Cloudy Bay in Marlborough

⇒Porpoise Bay/Fortrose, Catlins Coast

⇒Te Waewae Bay, South Coast.

It is also proposed to extend the existing Banks Peninsula marine mammal sanctuary in Canterbury

If the Minister of Fisheries in consultation with the Minister of Conservation decide further measures to mange the effects of fishing are needed, their preference is for a consistent approach to measures applying throughout the range of the dolphins. Reasons for this include transparency, compliance, cost and efficiency.

Applying a consistent approach means that Fisheries Act 1996 measures would apply in Marine Mammal Sanctuaries and in areas outside the Marine Mammal Sanctuaries. This will also provide an integrated approach to threat management.

The Department of Conservation prefers measures within the Marine Mammal Sanctuaries that will give the greatest protection. They consider these measures will best meet the objectives and intent of the sanctuaries.

3.4. Implementation and review of fishing related options

The Minister of Fisheries, in consultation with the Minister of Conservation can choose different options for each threat and for each population.

Minister of Fisheries could also choose to bring in measures over time.

The Minister's decision will be based on the level of risk of fishing related mortality the Minister considers appropriate for the species as a whole and for each individual population.

Depending on the options agreed to by Ministers, increased levels of monitoring (via observer coverage and electronic monitoring) and research are proposed to enable ongoing analysis of effectiveness of measures.

Government wants any new measures to manage the effects of fishing in place before the end of 2007. In order to meet this timetable the intention is to implement any measures considered necessary first by Gazette Notice under section 11 of the Fisheries Act 1996. Measures would be replaced by regulations as soon as possible in 2008.

3.5. Implementation and review of non-fishing related proposals

The Minister of Conservation will consider all submissions on non-fishing related threats and choose what proposed national measures will be included in the final TMP.

The marine mammal sanctuary proposals will follow the defined statutory process which is outlined in Part III.

MFish and the DOC are developing a communications plan to ensure decisions from Minister's are communicated to affected fishers and interested stakeholder groups.

Table 1: Summary of possible fisheries measures

	MAUI DOLPHIN				**HECTOR'S DOLPHIN**			
Option	**Recreational**	**Commercial**			**Recreational**	**Commercial**		
	Set net	**Set net**	**Trawl**	**Drift net**		**Set net**	**Trawl**	**Potting (ECSI only)**
Status quo –	No change	No change	No change	No change	No change	No change	No change	No change
1 - highest residual risk/ lower cost to users	Partial area prohibitions in additional selected NI harbours	Partial area prohibitions in additional selected NI harbours	Additional monitoring on vessels operating in within 4 nm between Maunganui Bluff to Pariokariwa Point	Partial area prohibitions in parts of Waikato River	Mandatory net attendance, no overnight, and maximum net size and number	Adherence to existing codes of practice and additional monitoring on vessels operating within areas that overlap with Hector's dolphin distribution	Development and adherence to a code of practice and additional monitoring on vessels operating within areas that overlap with Hector's dolphin distribution	Kaikoura fishers to voluntarily weigh down lines when setting in pots in areas where tidal movements are strong
2 – moderate residual risk/higher costs to users	Mandatory net attendance and no overnight setting in NI harbours	Mandatory net attendance and no overnight setting in NI harbours	Seasonal area prohibition between Manukau Harbour to Port Waikato and Maunganui Bluff to Pariokariwa Point	Full area prohibition in Port Waikato	Seasonal prohibition within areas that overlap with Hector's dolphin distribution with limited fishing allowed in designated areas	Seasonal prohibition within areas that overlap with Hector's dolphin distribution with limited fishing allowed in designated areas	Prohibition within areas that overlap with Hectors' dolphin distribution out to 2nm except for vessels targeting flatfish with low headline height nets	
3– lowest residual risk/highest cost to users	Full prohibition in West Coast NI (Kaipara to Cape Egmont) Harbours and extension of closure out to 12nm and to Cape Egmont	Full prohibition in West Coast NI (Kaipara to Cape Egmont) Harbours and extension of closure out to 12nm and to Cape Egmont	Full trawl prohibition Maunganui Bluff to Cape Egmont out to 4nm		Full prohibition within areas that overlap with Hector's dolphin distribution out to 6nm (West Coast South Island) or 12nm (East Coast and South Coast South Island)	Full prohibition within areas that overlap with Hector's dolphin distribution out to 6nm (West Coast South Island) or 12nm (East Coast and South Coast South Island)	Full prohibition within areas that overlap with Hector's dolphin distribution out to 2nm	

4. DOCUMENT STRUCTURE

This document is structured as follows:

PART I

- *Context*

This section provides context on the problem, outlines general threats facing the dolphins, and introduces threat management proposals.

PART II

- *Ministry of Fisheries Initial Position Paper*

The Minister of Fisheries has obligations under the Fisheries Act 1996 (FA96) to avoid, remedy or mitigate the adverse effects of fishing on the aquatic environment. This includes avoiding, remedying or mitigating the effect of fishing-related mortality on any protected species such as Hector's dolphins[1]. Specific proposals to implement measures to avoid, remedy or mitigate fishing impacts under the FA96 are set out and analyzed separately in the draft TMP from measures proposed under other legislation (for example, the Marine Mammals Protection Act 1978).

Matters are considered at a species level but also in relation to each population of dolphin. Each regional section (North Island West Coast, South Island West Coast, South Island South East Coast and South South Island) contains a mix of options based on fishing type and sector. The mix of options form a matrix the Minister may choose from between and within populations.

PART III

- *Marine Mammal Sanctuary Proposals*

This section outlines initial proposals for Marine Mammal Sanctuaries.

- *Research*

This section outlines proposed future research on Hector's dolphin.

- *Monitoring*

This section outlines proposed future monitoring of fishing related threats to Hector's dolphins.

5. IMPLEMENTATION

The TMP will set out the management framework for managing human induced threats to Maui's and Hector's dolphins. The plan will outline: biology; identify threats; characterization of the nature and extent of threats, management of threats, monitoring, research and review sections.

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[1] *Throughout this document reference to* Hector's dolphin species (*Cephalorhynchus hectori*) encompasses both the Maui's dolphin sub-species (*Cephalorhynchus hectori maui*) and the South Island Hector's dolphin subspecies (*C. h. hectori*).

The document in its draft form contains options to manage fishing and non-fishing related threats and initial proposals for Marine Mammal Sanctuaries. The final TMP will contain those measures agreed by Ministers, and where necessary Cabinet, following consultation. The final TMP will likely be available in early 2008 following decisions by Ministers. However, measures agreed by the Minister of Fisheries in consultation with the Minister of Conservation under the Fisheries Act 1996 are proposed for implementation in 2007 if possible. A full implementation timetable for those measures is set out in Part II of this document.

6. PART I - CONTEXT

6.1. Introduction

Hector's dolphins are endemic to New Zealand and are considered to be one of the world's rarest dolphin species. The Government's Vision Statement[2] for the management of Hector's dolphins includes:

"Hector's dolphins should be managed for their long-term viability and recovery throughout their natural range."

As part of a long-term strategy to achieve this vision, DOC and MFish have been jointly working to develop a TMP[3] for Hector's dolphins. The TMP is intended to identify all human-induced threats to Hector's dolphin populations and outline strategies to mitigate those threats.

The goals of the draft TMP are[4]:

⇒To ensure that the long-term viability of Hector's dolphins is not threatened by human activities; and

⇒ To further reduce impacts of human activities as far as possible, taking into account advances in technology and knowledge, and financial, social and cultural implications.

A collaborative process has been undertaken to develop this draft TMP for consultation, involving stakeholders from interest groups.

6.2. New Zealand's Hector's dolphins

Hector's dolphins are endemic to New Zealand, meaning they are only found in New Zealand's waters. The species is divided into two subspecies (based on genetic differences), one of which occurs principally in South Island waters (Hector's dolphin), and the other in the waters of the north-west coast of the North Island (Maui's dolphin; Map1).

The current best abundance estimate for Hector's dolphin is 7270 individuals (95% confidence interval of 5303-9966). For Maui's dolphin, the population estimate is 111 animals (95% confidence interval of 48-252).

Three populations of Hector's dolphin have been identified in the South Island that are genetically distinct and are geographically separated. These are found on the east coast of the South Island, the west coast of the South Island and the south coast of the South Island.

The Maui's dolphin population has a restricted distribution between north Taranaki and Northland. Hector's dolphins have been sighted irregularly at other North Island locations such as Wellington, Wairarapa Coast, Hawke's Bay, and Bay of Plenty. It is unknown what relationship exists between these dolphins and the North and South Island populations.

Hector's dolphin is an inshore coastal species with a limited home range. They are most often seen in murky waters close to shore and generally live in small groups – usually three to five individuals but

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[2] The Vision Statement is derived from the DOC's Conservation General Policy.
[3] The TMP is not a statutory document.
[4] The goals of the TMP have been developed by DOC and MFish.

larger groups (up to 30-40 individuals) are sometimes seen. Hector's dolphins feed on a variety of inshore species, including red cod, yellow eyed mullet, small kahawai, stargazers and sea floor invertebrates.

Map 1: Distribution of Hector's and Maui's Dolphins (indicative only) [5]

[5] Information on Hector's dolphin distribution for the current map has been obtained from: Hector's Dolphin annual distribution metadata - lineage document November 2006; from Ministry of Fisheries, Web Mapping application (author, Suze Baird, NIWA): www.nabis.govt.nz
https://www.nabis.govt.nz/resources/documents/MD/Annual%20distribution%20of%20Hector's%20dolphin.pdf
Maui's Dolphin annual distribution metadata - lineage document November 2006; from Ministry of Fisheries, Web Mapping application (author, Suze Baird, NIWA): www.nabis.govt.nz
https://www.nabis.govt.nz/resources/documents/MD/Annual%20distribution%20of%20Maui%20dolphin.pdf

6.2.1. Status of the species

Species management in New Zealand is driven by public and Government expectations, legislation and policy. For example, one objective of the Government's Biodiversity Strategy (objective 3.7) is to: "Protect and enhance populations of marine and coastal species threatened with extinction, and prevent additional species and ecological communities from becoming threatened". The identification of species at risk of extinction provides the ability to focus resources on the highest priority actions to prevent the extinction of these species.

Hector's dolphins were declared a "threatened species" by the Minister of Conservation in 1999. In addition to their threatened species status, there are two classification systems that have been applied to the Hector's and Maui's dolphin populations.

The New Zealand Threat Classification System has been developed by the DOC and sets out a system for classifying species according to the threat of extinction using criteria that has specifically been developed for New Zealand conditions[6]. There are seven rankings within the Threat Classification System. The highest ranking is Nationally Critical, followed by Nationally Endangered through to the lowest ranking, Range Restricted. The Threat Classification System identifies the level of risk of extinction for species, enabling Government Departments to target their research and management and fulfill their obligations of biodiversity protection. Other organizations such as research institutes, local authorities and iwi are also important users of the New Zealand Threat Classification System.

DOC has assessed Hector's and Maui's dolphin for their risk of extinction using the New Zealand Threat Classification System. The classification has been undertaken at the subspecies level.

With a New Zealand population of less than 250 breeding adults, Maui's dolphin is classified as "nationally critical", (the highest risk-ranking possible). Hector's dolphin is classified as "nationally endangered" (the second highest risk-ranking).

The second classification system that applies to Hector's and Maui's dolphins is the World Conservation Union (IUCN) Red List Categories and Criteria. This is an easily and widely understood system for classifying species at high risk of global extinction. There are seven categories described for ranking species according to the IUCN Red List and Categories Criteria. In order of severity these are: extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened, and least concern.

Under the criteria, South Island Hector's dolphin is listed as "endangered", such that the best available evidence indicates that this subspecies is considered to be facing a very high risk of extinction in the wild. Maui's dolphin has been classified as "critically endangered", such that the best available evidence indicates that this subspecies is considered to be facing an extremely high risk of extinction in the wild.

Both of these classification systems indicate that for both subspecies current information indicates that active management is required to mitigate human impacts.

6.2.2. Social and cultural value of Hector's dolphins

Hector's dolphins are revered as a taonga by Maori. Tutumairekurai is the most common of the Maori names for Hector's dolphin, meaning ocean dweller. Some Maori believe that the spirits of the dead become tutumairekurai. Papakanua, tupoupou, hopuhopu and upokohue were names also used.

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[6] Molloy, J; Bell, B; Clout, M; de Lange, P; Gibbs, G; Given, D; Norton, D; Smith, N; Stephens, T. 2002: Classifying species according to threat of extinction-a system of New Zealand. *Threatened Species Occasional Publication 22.* Biodiversity Recovery Unit, Department of Conservation, Wellington. P26

Social values relating to Hector's dolphins have been reflected in Government Policy (recovery to natural range), petitions to parliament and letters to Ministers about the conservation of Hector's and Maui's dolphins, and through general social commentary in the media. In general, there is an expressed desire for greater dolphin abundance and fewer (or no) human-induced deaths.

Hector's dolphins are found only in New Zealand waters and are New Zealand's only endemic dolphin species. Because of this and their status as one of the world's rarest dolphins, they are viewed as a very special component of New Zealand's and the world's marine biodiversity. With the increase in public awareness of the marine environment and our knowledge of marine species and ecosystems, Hector's dolphins are increasingly being recognized along with New Zealand's more familiar threatened terrestrial species. Hector's dolphins have therefore become a symbol of marine species conservation in New Zealand.

Marine mammal tourism in New Zealand has increased over recent years and boat excursions involving viewing or swimming with dolphins, including Hector's dolphins, are now popular with tourists. Around 20 permits have been issued for viewing or swimming with Hector's dolphins, but swim-with-dolphin ventures have been limited to Banks Peninsula. Many tourism ventures promote viewing and swimming with Hector's dolphins as a uniquely New Zealand experience and such ventures and the local communities receive considerable economic gain from the species.

Over recent years, coastal communities fortunate enough to have a population of Hector's dolphins in their waters have embraced the species. The town of Hector (on the South Island's west coast) has adopted Hector's dolphins as the town's icon, with a sculpture of a Hector's dolphin along with an interpretation area located on the foreshore. The community group "Hector for Hector's" has been established to increase awareness about the species. Many other coastal communities use the presence of Hector's dolphins to promote their town or city from a tourism perspective.

New Zealand is internationally recognized for its management of the marine environment. In particular, it is known for its stance on marine mammal issues such as whaling and has a strong presence in the international community regarding marine mammal protection and conservation issues. New Zealand's management of marine mammals in national waters is therefore of significant international interest.

6.3. Problem definition

Hector's dolphins are short lived (about 20 years), have a low reproduction rate (a female has a single calf every 2-3 years) and become sexually mature at a relatively late age (about 7-9 years). These biological factors result in a low overall maximum population growth rate, meaning that Hector's dolphin can be threatened by low levels of human-induced mortality.

In addition to having a low population growth rate, Hector's dolphins do not appear to take large scale movements, which increases their susceptibility to population fragmentation. The furthest distance between two sightings of an individual is 106km, and a satellite tagging study has indicated that their average activity radius is between 10 and 14km. As such, Hector's dolphins are generally restricted to local areas with little movement between areas. This characteristic means that local groups are connected by gene flow only with immediately adjacent groups, which increases the susceptibility of local dolphin groups to becoming reproductively isolated. Genetic continuity between groups is important to maintaining the genetic diversity of the population and may result in genetic (and population) fragmentation if groups are removed through human-induced mortality.

There are a number of actual and potential threats facing Hector's dolphins, including fishing related mortality (e.g. through net entanglement), boat strike, pollution, disease, mining and tourism impacts. Some of these threats are a direct cause of dolphin mortality, whereas others may impact on the population through sub-lethal impacts (e.g. reducing reproductive success). Further details on threats and their consequences are provided in the next section.

6.4. Threats to Hector's dolphins

This section provides a general overview of all known threats to Hector's dolphins.

There are a range of human-induced and natural threats facing Hector's dolphins. Given the threatened status of the species, it is important to take into account impacts of natural threats on Hector's dolphins when considering the nature and extent of measures necessary to manage human-induced threats.

As part of the process to develop this draft TMP, a Hector's dolphin Expert Panel was tasked with identifying all of the known actual or potential threats to Hector's dolphins. The range of potential threats identified is set out below, along with a general description of their impacts.

DOC maintains a database relating to Hector's dolphins, which includes information about reported incidents involving mortality (such as beachcast animals, bycatch and boat strike) and also incidents such as live strandings. Many of the incident reports were sourced from Government agencies other than DOC or from research institutes. Since 1994, the majority of incidents have been allocated an "incident number", a standard set of data and photographs have been collected for each incident, and a necropsy has been undertaken to help establish the animal's cause of death. The database relies on reports of Hector's dolphin incidents. However, it is unknown what proportion of mortalities goes unreported and therefore the database only provides an indication of the threats posed to this species.

Information on known Hector's dolphin mortalities reported throughout the draft TMP has been taken from the incident database (unless otherwise specified). Further information on the database is provided in the following section.

6.4.1. Human induced threats to Hector's dolphins

6.4.1.1. Fishing threats

Because Hector's dolphins have a close inshore distribution, their range overlaps with commercial and amateur set net fisheries, and inshore trawl fisheries. Fishing-related mortality through net entanglement is recognised as a significant threat to Hector's dolphins. Further information about fishing threats to Hector's dolphins is provided below.

Set netting

Set netting involves the placing of a net, either in midwater, or on or near the sea floor. Set nets are made from fine nylon, so fish can't see them. They may be up to 10m high and several hundred metres long. These nets catch marine life that swims into them and gets tangled. Fish bigger than the net's mesh size get tangled in the net by their gills or fins; smaller fish swim through the net. Set netting usually occurs in shallow waters within a few miles of the coast.

The vulnerability of Hector's dolphin to net entanglement, particularly in inshore set nets, has been established through a combination of interviews with fishers, independent observer programmes and necropsies of bycaught and beach-cast animals.

The summer period is when dolphins tend to be closer inshore, and is therefore the time of year when Hector's dolphins are at most risk of set net entanglement. In the South Island, this summer inshore movement coincides with greatest amateur and commercial set netting effort, particularly for flatfish, red cod, mullet, butterfish, moki and small sharks.

The DOC incident database indicates that 32% of the total reported incidents, and 63% of incidents where the cause of death was able to be assessed, are attributable to set net entanglement[7]; indicating that set netting is the greatest known cause of human-induced Hector's dolphin mortalities.

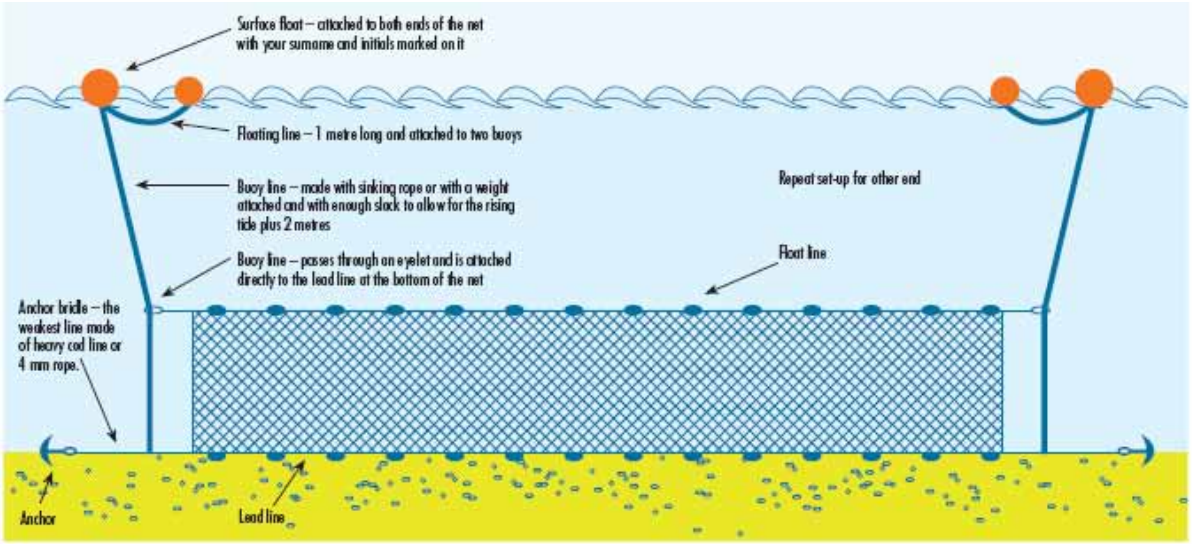

Figure 1: Features of a set net

Trawling

Trawling involves towing a specialised net. Steel paravanes (trawl doors) are adjusted to "fly" through the water in opposing directions and hold the mouth of the net open. The net is set to herd fish into its mouth, and eventually into the cod end (Figure 2 below). In New Zealand, most trawling is carried out near the bottom, and in water depths ranging from around 10 metres to more than 1000 m deep.

Hector's dolphins have been known to occasionally become caught by inshore trawl vessels where nets are towed along the sea floor or in midwater.

Total reported instances of Hector's dolphins caught in trawl nets are low compared to set nets. However, the focus of observer programmes and interview programmes to assess dolphin bycatch has tended to target set net fisheries. Nevertheless the incident rate (per day fishing) appears to be lower for trawl than set net fisheries.

Since 1921, there have been 19 reported dolphin mortalities definitely attributable to trawling (around 9% of incidents with a known cause of death). All of these incidents were in South Island trawl fisheries and occurred within 2nm from shore.

[7] Since 1921 when the first incident was recorded. Natural mortalities are included in the database.

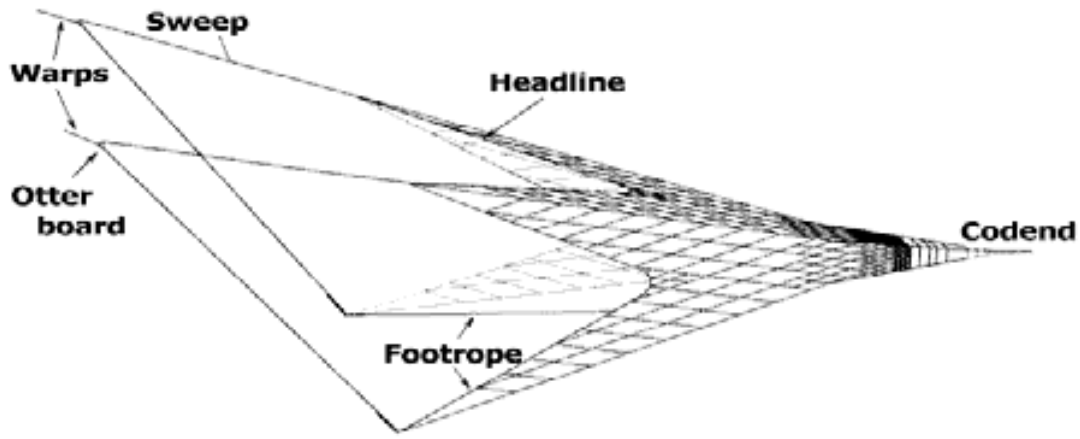

Figure 2: Features of a Trawl Net[8]

Drift netting

Drift netting is a form of set netting where nets are not anchored to land or the sea bed so they drift freely with the current. Drift nets are included in the definition of set netting but are distinguished from the set net method described above. Because drift nets drift freely with the current they do not roll up like set nets commonly do. This is what presents the risks to Hector's dolphins, because any net that drifts into the dolphins range may entangle them.

There is a current drift net prohibition that exists in New Zealand waters (Driftnet Prohibition Act 1991). The distinguishing criteria for drift netting that is prohibited is that nets are, when either singly or tied or connected together in combination with other nets, more than 1 kilometre in length. Drift net fishers fishing at the Waikato River (where drift nets are occasionally used) use much smaller nets not covered by the Driftnet Prohibition Act 1991.

Drift netting threats relate specifically to the Maui's dolphin population. Commercial and non-commercial fishers have used drift nets to catch mullet at the Port Waikato. There has been one report of a possible Maui's dolphin entanglement in a lost drift net. However, use of these nets has declined recently.[9] All drift net fishing occurs at Port Waikato (including the Waikato River) but it is a short distance out to sea, so lost nets can float out with the current.

Craypotting/Rock Lobster Potting

Potting involves setting a baited trap on the seafloor. These traps (pots) are either made from nylon mesh; or are made from steel and wire (Figure 3). There have been three known incidents of Hector's dolphins becoming entangled in a rock lobster pot line[10]. All of these incidents have occurred in the Kaikoura region. This is likely to be because the area around Kaikoura is highly tidal and has a high level of potting intensity; consequently the rope used to attach the rock lobster pot to the buoy is longer than usual to prevent loss of pots. The rope hangs loose in the water at low tide creating a potential situation where

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[8] Source: Australian Fisheries Management Authority. South East Trawl Fishery Bycatch Action Plan (2001). http://www.afma.gov.au/information/publications/fishery/baps/docs/setbkgd.htm.
[9] Anecdotal information suggests that this is because of low quality of catches.
[10] One incident in: 1989; 1997; and in 2004. All three resulted in death of the dolphin involved.

Hector's dolphins can become entangled.

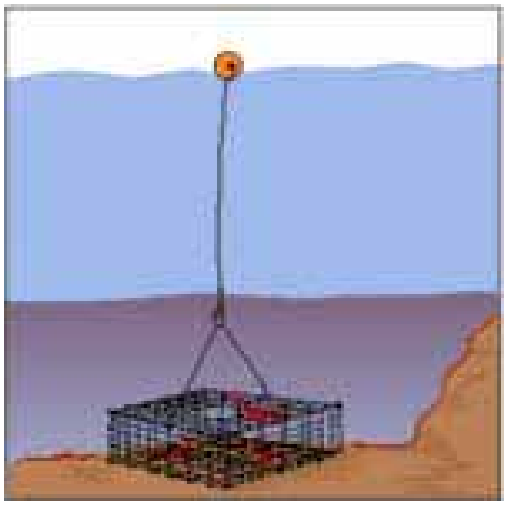

Figure 3: Rock Lobster Pot

6.4.1.2. Commercial tourism

Marine mammal tourism has increased in recent years throughout New Zealand. Hector's dolphin tourism consists of vessel based viewing and swimming. Swim with dolphin operations are limited to Banks Peninsula, Canterbury.

Several shore and boat-based studies of bottlenose, common and Hector's dolphins have indicated that vessel approaches and intensity of vessel traffic are associated with behavioural change. In some areas Hector's dolphins are very vessel positive, but they can exhibit avoidance behaviour if the interaction is too long or if resting.

Although it appears that single encounters with a boat or a group of swimmers are unlikely to cause major disturbance for Hector's dolphins, cumulative effects of encounters of excessive duration could have detrimental consequences. Long-term effects of encounters may, for example, reduce breeding success, feeding activity, and resting opportunities, and these could result in displacement of individuals from an area.

Permitted tourism

Commercial tourism operations in New Zealand require a Marine Mammal Viewing Permit under the Marine Mammals Protection Regulations 1992. Permitting of New Zealand commercial marine mammal viewing operations began in 1988. There are now around 20 permits specifically directed at viewing and/or swimming with Hector's dolphins. A further nine permit holders, while primarily targeting other marine mammal or wildlife species, are operating in areas where Hector's dolphins occur and thus have the potential to interact with the species. As permits are issued to operators working at different levels of effort, permit numbers in themselves do not reflect the level of potential impact for a given area. There are currently no commercial tourism operations targeting Maui's dolphins.

Commercial operators have the potential to impact detrimentally on Hector's dolphins. However, the permitting regime seeks to manage such impacts.

Non-permitted tourism

In addition to permitted tourism, there are other commercial tourism operators not permitted under the

Regulations who react opportunistically when dolphins are sighted. Independent viewing of Hector's dolphins is simply regulated by the prescribed conditions governing the behaviour of all persons around marine mammals as outlined in sections 18, 19 and 20 of the Marine Mammals Protection Regulations 1992. The potential detrimental impacts from such tourism are concerning as compliance monitoring is limited.

6.4.1.3. Vessel traffic

Vessel traffic (for example, recreational boating or commercial vessel traffic) can potentially result in boat strike or disturbance of Hector's dolphins.

Boat strike is a known cause of Hector's dolphin mortality. There has been one confirmed Hector's dolphin mortality resulting from boat strike in the Canterbury region in 1999. There have been nine additional incidents in the South Island where the cause of death has been identified as trauma, but from an unknown cause. Live dolphins have also been photographed with scars from boat propellers and one Maui's dolphin beachcast at Bethell's Beach had old scars from a propeller strike.

It is possible that audible disturbance may lead to exclusion from important areas such as calving or nursery areas. Interference with Hector's dolphins' sonar and communication systems could also affect their ability to locate prey and to socially interact and breed. However, underwater noise levels in areas where Hector's dolphins are common (e.g. Akaroa and Lyttelton Harbours) have not been studied, and the impacts are unknown.

6.4.1.4. Pollution

The near-shore habitat of Hector's dolphins exposes them to a variety of pollutants and contaminants such as organochlorines, heavy metals, oil spills and plastic debris.

Organochlorines

Organochlorines are known to have detrimental effects on the reproductive success of some marine mammal species, in some cases resulting in sterility, and they may suppress the immune system in some species.

Organochlorines may be bioaccumulated and biomagnified along the food chain. Therefore, species such as Hector's dolphins that are near the top of the food chain and live in a coastal habitat are susceptible to high levels of organochlorines. Hector's dolphin tissue has been found to contain high levels of organochlorines such as DDT, PCBs and dioxins.

Hector's dolphins show the highest toxic equivalent levels (the toxicity of a combination of different organochlorine compounds) of all southern ocean cetaceans. On the global scale, however, Hector's dolphin organochlorine levels are generally within the lower range recorded for marine mammals in the highly industrialised Northern Hemisphere, except for DDTs. DDT levels detected in Hector's dolphins are very high and second only to the highly contaminated Canadian beluga whales (Delphinapterus leucas).

Metals

Non-essential metals (e.g. mercury, lead and cadmium), which have little or no recorded biological function, can accumulate and are often toxic even at low concentrations.

Data on the effects of metal toxicity in cetacean species is sparse, and the risk from metal toxicity is unquantified for Hector's dolphins. For certain species, there is some evidence that high levels of non-essential metals may have resulted in or contributed to chronic illness and mortality of cetaceans.

Hector's dolphins, like other cetaceans, have been found to bioaccumulate certain metals to various levels. A 1990s study showed relatively high cadmium levels (0.01-7.53 ppm) for Hector's dolphins. Lead levels were comparatively low (up to 0.16 ppm)[11].

Oil spills

The extraction and transportation of crude oil poses a potential threat for Hector's dolphins. The New Zealand oil and gas exploration industry is based off Taranaki, but also operates drill ships off Canterbury, along the west coast of the South Island, and the east coast of the North Island. The threat of oil spills is thus present throughout much of the Hector's dolphin habitat.

While no major oil spills have occurred in New Zealand, near misses have been reported from the mainland when the fishing vessel *Don Wong 529* sank off Stewart Island, the *Jody F. Millennium* grounded in Poverty Bay and the *Tai Ping* grounded in Bluff Harbour.

Polycyclic aromatic hydrocarbons such as found in oil and gas compounds have been linked to cancers in some species of marine mammals. The risk from these compounds is unquantified for Hector's dolphins.

Plastic debris

Plastic debris constitutes a potential threat to marine mammals. Marine mammals can become physically entangled in loops or openings of drifting debris. Entangled animals may suffer impaired ability to catch food or avoid predators or incur wounds and infections from the abrasive or cutting action of attached debris. Plastic ingestion is a major risk to some cetacean species and could pose a threat to the dolphins. There is anecdotal evidence that Hector's dolphins at Banks Peninsula have been recorded with pieces of fishing line or set net stuck around the head or upper body, cutting into the blubber and flesh. One Hector's dolphin stranded in Canterbury was later found to have plastic debris in its stomach.

6.4.1.5. Marine farming

Marine farms have the potential to affect Hector's dolphins in a number of ways, including:

- ⇒ Habitat competition, displacement, and fragmentation
- ⇒ Entanglement
- ⇒ Noise disturbance from construction activities and additional boat traffic
- ⇒ Debris ingestion
- ⇒ Ecological effects on the food supply of dolphins

Habitat competition and fragmentation

The effect of aquaculture on whales and dolphins is a relatively new field of study, and limited information is available at this stage. A key concern is the potential impact of marine farms in areas of existing high use by Hector's dolphins and areas used for breeding, calving, nursing or other critical activities (e.g. feeding grounds). There is conflicting evidence about avoidance behaviour of dolphins around marine farms, with responses apparently varying by species; very little information exists on Hector's dolphins.

There is potential for habitat fragmentation to occur in areas where there are continuous series of marine farms that modify a large stretch of coastline. This is particularly so for Hector's dolphins, because of

[11] Slooten and Dawson (1994)

their small home range and limited migration between regional groups.

Entanglement in aquaculture operations

Entanglement of marine mammals in aquaculture operations appears to be especially problematic for large whales, but mussel farms are generally considered to be low risk for dolphin entanglement. Mussel lines are anchored under tension and mussel line droppers are arranged in a series of loops that hang down in the water column under their own weight or alternatively the weight of the crop. The configuration of spat catching lines is somewhat different. Lines are thinner and have less tension. However, spat rope is fibrous and slippery, and therefore has less surface resistance than conventional rope.

There has been one probable Hector's dolphin entanglement in salmon farming activities when a predator net was being changed[12]. This incident has resulted in changes to the procedure used when changing predator nets. In situations where the nets need to be changed, this will now be done in such a way that reduces risk to dolphins[13].

Noise

An increase in underwater noise and human activity can be expected during construction, maintenance and harvesting of marine farms. The effects of this disturbance on marine mammals near shellfish farms are unstudied, and there is conflicting anecdotal evidence about noise avoidance behaviour of cetaceans as a result of industrial activities.

Vessel traffic

Vessel traffic associated with marine farms typically consists of slower vessels (8 – 13kn) that cannot change direction very quickly, and therefore there is a low risk of boat strike. The amount of vessel traffic associated with marine farms is a low proportion of total traffic, including in areas where the aquaculture industry is well developed.

Debris

Potentially harmful operational by-products of mussel farms include lost lines, farm support buoys, and plastics. Debris can build up on the seabed directly below mussel farms. While such problems should be minimal in properly maintained farms, the potential for material loss is very real after stormy weather and in poorly maintained farms. Generally, the only materials lost more often are small pieces of lashing (<100mm) and intact floats without attached lashing.

Potential hazards associated with Hector's dolphins include entanglement and/or plastic ingestion. However, there is little information to indicate whether marine mammals in New Zealand are impacted by debris from aquaculture.

Prey availability and foraging

Marine farm structures may also interfere with dolphins' sonar signals and communication, reducing the ability of dolphins to hunt successfully. Dolphins that hunt collaboratively for schooling fish (e.g. dusky, common and Hector's dolphins) may be adversely affected.

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[12] Cause of death unable to be determined with certainty

[13] In situations where the net needs to opened, the "blunt ends" will be opened to enable marine mammals to more easily find an exit.

Alternatively, some fish species are known to aggregate around shallow water structures and thereby provide areas of higher fish abundance than in the open water. This can make good foraging areas for coastal dolphin species, and Hector's dolphins are sometimes known to feed around bivalve marine farms.

6.4.1.6. Construction and mining

Construction activities in the coastal environment include port developments, and seabed mining and exploration including seismic testing. Potential impacts include:

- ⇒ Disturbance of seafloor with benthic communities.
- ⇒ Avoidance of the area by Hector's dolphins because of noise production and the presence of vessels.
- ⇒ Discharge plumes and suspended sediments interfering with photosynthetic, filtering, feeding and respiratory functions of marine organisms.
- ⇒ Avoidance of the area by fish species, leading to a loss of food sources for Hector's dolphins.
- ⇒ Changes in bathymetry and bottom type may also cause alterations in population and migration patterns.

The presently available information is inadequate to allow any conclusions to be drawn about threats posed by offshore mining, beyond suggesting that a potential for adverse impacts exists. DOC has recently formalised a series of non-mandatory guidelines for minimising acoustic disturbance to marine mammals from seismic survey operations (DOC 2006). These guidelines have been endorsed by the Petroleum Exploration and Production Association of New Zealand and include requirements for delayed and soft starts to seismic operations in the presence of marine mammals.

6.4.1.7. Coastal development

Because of the relatively inshore distribution of Hector's dolphins, coastal works and development have the potential to negatively impact on aspects of their ecology. Works and development associated with ports, marinas, inshore aquaculture, tidal energy, wave energy and coastal mining all have the potential to confer impacts onto the dolphins. These activities may displace dolphins from important habitat, as well as potentially impacting on predator prey relationships, foraging success and reproductive success. Activities such as these require specific consent from local authorities. The impacts on the environment and local fauna can be addressed during the application phase of the consent in accordance with the regional coastal plan for the area, and other provisions of the Resource Management Act 1991. However, regional coastal plans seldom have provisions relating to significant dolphin habitat.

6.4.1.8. Scientific interactions

Research on Hector's dolphins can potentially generate a threat to the dolphins themselves. This could include tagging (including satellite or other transmitters), taking biopsy samples, or through harassment.

DOC recently commissioned a programme that involved attaching satellite transmitters onto the dorsal fins of three Hector's dolphins at Banks Peninsula. The study found no evidence that the dolphins experienced deleterious health impacts from the tagging, nor did they exhibit disruptions to normal behaviours.

6.4.1.9. Shooting

There have been historical reports of dolphins being shot, but there are no known recent incidents.

6.4.1.10. Climate change

A study investigating the potential impacts of climate change on migratory species (including marine mammals) identified a number of possible future effects[14]. The study concluded that the greatest threat to marine mammals probably comes from changes in their food resources as a result of climate change. Other potential impacts include:

- ⇒ Direct effects of changes in temperature include shifts in species ranges – some ranges may expand and some may contract, but species with restricted ranges may be particularly vulnerable.
- ⇒ Indirect effects of changes in temperature include prey availability affecting the distribution, abundance and migration, community structure, susceptibility to disease and contaminants, reproductive success, and ultimately, survival of marine mammal species.
- ⇒ Changes in the range and abundance of competitors and predators will also affect marine mammals to varying degrees depending on the species and location.
- ⇒ The construction of protective measures for coastal habitats against rising sea levels could degrade habitat, effect prey availability, cause direct mortality and create obstructions to migration.
- ⇒ Changes in ocean currents, upwellings and fronts could affect the distribution of marine mammals either directly if the limits to their range are defined by the changes between two water masses, or indirectly as a result of changes in the distribution and occurrence of prey associated with currents, upwellings and fronts.
- ⇒ The potential effects and impacts of changes in salinity, pH and CO_2 on marine mammals are not fully understood and require further research.
- ⇒ Changes in rainfall patterns and increased run-off, as well as changes in temperature, salinity, pH and CO_2, could potentially increase toxic algal blooms.

6.4.2. Non-human induced threats

6.4.2.1. Parasites and disease

An assessment of health during a recent trial tagging study at Banks Peninsula found that most results were within expected ranges or not significantly different when compared with similar species. The major result was the diagnosis of *Brucella abortus* (or a similar organism) in one tagged animal. *Brucella* is a pathogen of terrestrial mammals that can cause late pregnancy abortion, and has been seen in a range of cetacean species elsewhere. In 2006 *Brucella* was identified in a dead Maui's dolphin and this could potentially have serious ramifications for this critically small population.

Whale lice are found on freshly dead dolphins and at close range they can be seen on living dolphins as small dark brown spots, but do not appear to cause any harm. Several species of nematodes and lungworms have also been found in Hector's dolphins. There is no evidence that these parasitic infections could have caused death.

Pneumonia has been noted in several Hector's dolphins, and may have played a role in the deaths of the

[14] Robinson *et al* (2005)

animals. This may be indicative of other intense, but sub-lethal, stress on the dolphins that lead to the pneumonia.

6.4.2.2. Predation

The dolphin's main natural predators are thought to be sharks and killer whale. There are three shark species around New Zealand that are suspected to consume Hector's dolphin – great white, blue, and broad-nosed seven-gilled sharks. Mako sharks and bronze whaler sharks are unlikely to constitute a serious risk for Hector's dolphins.

There are two reported instances of white sharks eating Maui's dolphins off the North Island's west coast. In both instances it is unknown if the dolphins were killed by the shark or scavenged after the dolphins died. Hector's dolphin remains have been found in the gut contents of seven-gilled sharks and blue sharks. A seven-gilled shark caught in the Manukau Harbour was found to have Maui's dolphin remains within its stomach[15]. Due to the small size of the shark it is presumed to have scavenged the remains.

Apart from sharks, other likely natural predators of Hector's dolphin are orca/killer whales (*Orcinus orca*), which are present in the coastal waters of New Zealand.

6.4.2.3. Weather

Pathological reports of dead Hector's dolphins suggest extreme weather events have been a possible reason for the separation of stranded calves from mothers.

6.4.2.4. Stochastic (random) effects on small populations

Hector's dolphin populations are thought to be vulnerable to stochastic events. Small populations with very low growth rates are much more sensitive to random variations in survival and reproduction, and random environmental changes. There are three stochastic factors that can affect populations: demographic stochasticity, which refers to variability in vital rates such as survival; environmental stochasticity, which refers to small to moderate environmental events; and catastrophes, which are large environmental events.

Small populations may also suffer from reductions in genetic variability, also referred to as inbreeding depression. Loss of genetic diversity increases sensitivity to environmental change, and can also lead to increased extinction risk. Reduced ability to deal with environmental change could also play an important role in populations' ability to deal with climate change.

6.5. Screening of threats for management

In order to prioritise the most serious and manageable threats for treatment, the Hector's dolphin Expert Panel undertook a first cut prioritisation of the threats they had identified. This was done with respect to two broad dimensions:

⇒ Impact – the significance of the threat to Hector's dolphins

⇒ Treatability – the extent to which the threat can be treated

[15] Genetics analysis carried out by the University of Auckland

Threats that were identified by the Expert Panel as being of lower significance and/or not treatable (or treatable with difficulty) were: craypotting (rock lobster potting); shooting; climate change; disease; predation; parasites; stochastic effects on small populations; weather and inbreeding. With the exception of craypotting, these threats will not be explored further with regard to threat management options in this draft TMP. MFish and DOC consider that consideration of management measures for craypotting/rock lobster potting is warranted because entanglement in pot buoy lines is a known cause of Hector's dolphin mortality.

6.6. Department of Conservation incident database - overview

DOC manages a database consisting of all reported deaths of Hector's and Maui's dolphins. The data is sourced from dead dolphins reported by commercial and non-commercial fishers, DOC staff, MFish and the public. The majority of dead dolphins are found as beach cast dolphins or entangled in nets. An undetermined number of deaths go unreported and therefore this data should be treated with caution.

For beach cast dolphins that are found to have a fishing-related cause of death, it is typically difficult to ascertain whether the deaths associated with set netting are commercial or non-commercial. In addition, it is often not clear what type of net has caused net marks observed on a carcass (e.g. set net or trawl net). It is generally only through the self-reporting by fishers that we can be certain of this sectoral relationship. The incident database has recently been revised to eliminate subjectivity, and only identifies a cause of death if this can be confirmed with certainty (e.g. through pathology results or fisher self-reporting).

The database holds records of reported dolphin deaths from as early as 1921 but consistently from the 1970s till present. In the past, standardised pathology reports were sometimes completed but only since 1998 have they been completed whenever possible right around New Zealand. In total, 390 Hector's dolphins deaths have been recorded since 1945 and 40 Maui's dolphin deaths since 1921. As mentioned above, these figures are likely to under represent all human induced mortality events due to under reporting of incidences. The level of reporting is of concern to DOC as it is vitally important for the management of the species that human induced deaths are documented.

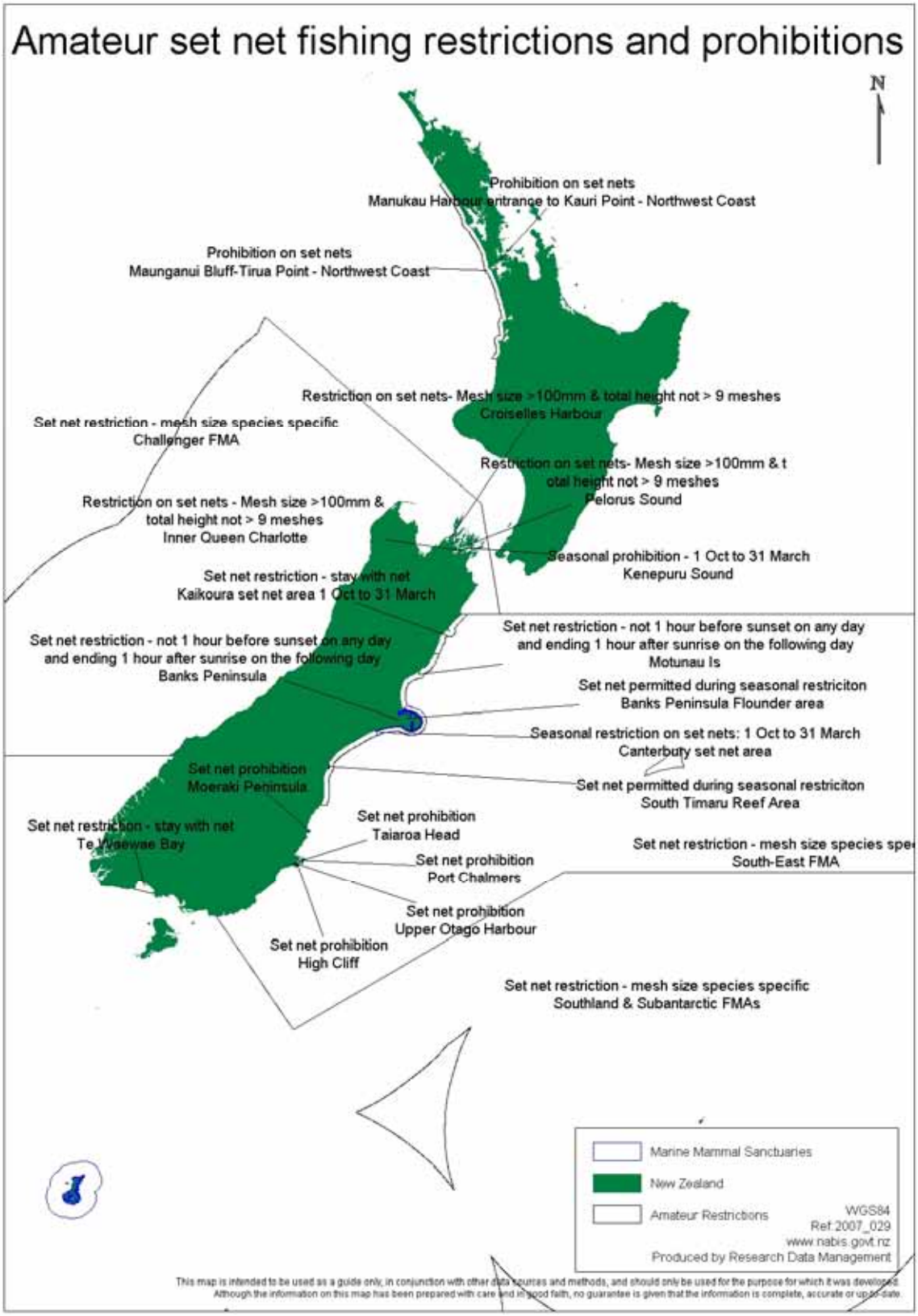
DOC encourages commercial, non-commercial fishers and the public to report Hector's dolphin incidental catch and beachcast dolphins to the nearest DOC office for the purposes of necropsy.

It is an offence under the Marine Mammals Protection Act 1978 for any person not to report the incidental capture of a marine mammal. Failure to report could result in a fine of up to $10,000.

6.7. Current threat management

6.7.1. Fishing threats

There are a number of mandatory measures in place around New Zealand's coastline that mitigate the impacts of fishing on Hector's dolphins. These restrictions are illustrated in the Maps below. Further detail on current fishing-related management measures is provided in Part II of this document.



Map 2: Current mandatory amateur set net restrictions and prohibitions

Map 3: Current mandatory commercial set net, trawl and Danish seine restrictions and prohibitions

6.8. Proposed threat management

As previously noted, the Minister of Fisheries has obligations under the FA96 to avoid, remedy or mitigate any adverse effects of fishing on the aquatic environment. This includes taking such measures he considers necessary to avoid, remedy or mitigate the effect of fishing-related mortality on Hector's dolphins. DOC has the responsibility to manage marine mammals in accordance with the Marine Mammals Protection Act 1978 (MMPA), Marine Mammals Protection Regulations 1992 and in line with Conservation General Policy. Under the Marine Mammals Protection Act 1978 the Minister of Conservation may, by way of a gazette notice, define an area to be a marine mammal sanctuary.

Threat mitigation options and proposals are focused on regional and national solutions. Regional solutions consist of options to avoid, remedy or mitigate the effects of fishing-related mortality on regional populations of Hector's and Maui's dolphins (and, accordingly, the species as a whole) combined with Marine Mammal Sanctuary (MMS) Proposals to further protect important sub-populations and dolphin habitat. Non-fishing threats will be managed by a series of overarching national actions that can be implemented at a regional level.

Proposed measures to control fishing activity within the Hector's Dolphins range will be considered by the Minister of Fisheries following consultation with the Minister of Conservation. The proposed measures are outlined in Part II of this document. Departments have a preference for putting in place measures which cover the range of the dolphins. Accordingly, the proposed measures will cover geographical areas which overlap with preliminary proposals for marine mammal sanctuaries. DOC has developed preliminary proposals for marine mammal sanctuaries.

Of the options set out in Part II of this document which could overlap with any proposed MMS areas, DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

DOC and MFish consider the combination of FA96 tools and the Marine Mammals Protection Act will allow an integrated approach to the management of threats to dolphin populations, and believe an integrated approach is the best way to meet the goals of the draft TMP.

The following section provides a brief overview of the proposed options to avoid, remedy or mitigate fishing threats to each of the regional populations, as well as proposed MMS. Further detail around fishing threats facing each of the populations and analysis of the fishing options proposed is presented in the MFish Initial Position Paper (Part II). Full descriptions and maps of the proposed sanctuaries are presented in Part III.

6.8.1. Regional threat management proposals

6.8.1.1. West Coast North Island (Maui's dolphin)

Area

The area to which these proposals apply extends from Maunganui Bluff in the north to Cape Egmont in the south. See Map 4.

Population description

Maui's dolphins on the west coast of the North Island are found from Maunganui Bluff in the north, to Tongaporutu, approximately 40km northeast of New Plymouth. There have been some unconfirmed sightings west of New Plymouth. The population of Maui's dolphin is estimated at 111 individuals (95%

Confidence Interval = 48-252).

Maui's dolphins are most frequently sighted between Manukau Harbour and Port Waikato within 4nm of the coast. Summer sightings are usually within 1nm of the shore, but in winter the dolphins occur up to 3.3nm offshore and recent aerial surveys have suggested that they may range even further offshore. Current research is focusing on whether the dolphins utilise west coast harbours. There are two verified sightings further inside the Manukau Harbour entrance than an existing set net prohibition, and three verified sightings inside the Kaipara Harbour entrance.

West Coast North Island Marine Mammal Sanctuary Proposal

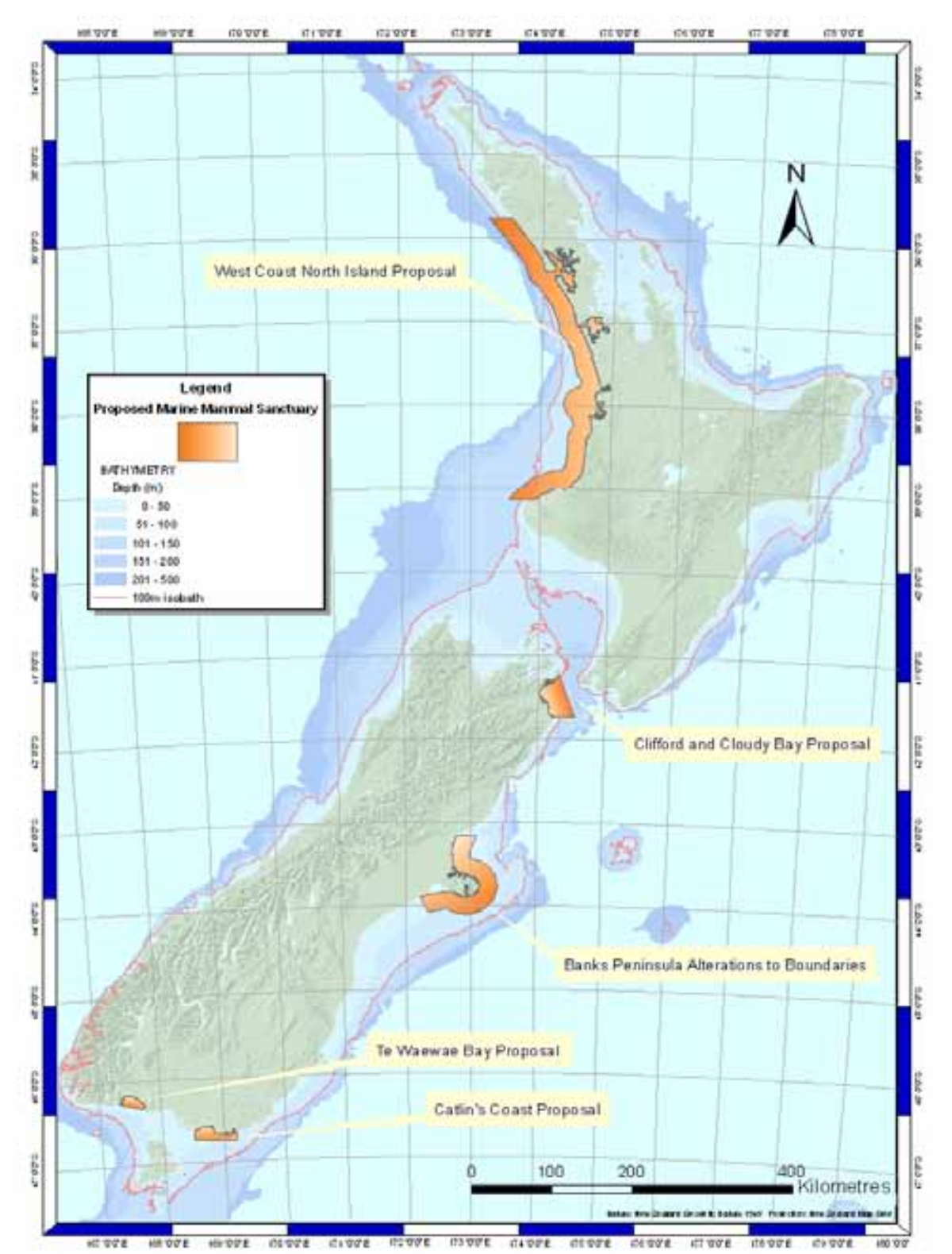
The proposed boundaries for the marine mammal sanctuary extend longshore from Maunganui Bluff in Northland to Oakura Beach, Taranaki in the south.

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Fishing related threat management options

Fishing-related threats identified as facing Maui's dolphins are set netting, trawling and drift netting. Measures proposed to avoid, remedy or mitigate the effects of these fishing methods on Maui's dolphins are outlined below[16].

[16] Further detail on the nature and extent of these threats, and analysis of the proposed measures, is provided in Part II of this document.



Map 4: Map of New Zealand showing proposed Marine Mammal Sanctuaries

Amateur and Commercial Set Nets

Status Quo	Current management
Option 1	Prohibit all set netting at the mouth of Kaipara Harbour and the lower reaches of Waikato River. Extend the existing prohibition further into the Manukau Harbour entrance
Option 2	In all parts of Kaipara, Manukau, Raglan, Aotea, and Kawhia Harbours, and Port Waikato: Mandatory attendance with a set net Overnight set netting is prohibited
Option 3	Prohibit set netting in all parts of the Kaipara, Manukau, Raglan, Aotea, and Kawhia Harbours, and Port Waikato Extension of current ban to 12nm offshore from Maunganui Bluff and south to Cape Egmont

Commercial Inshore Trawling

Status Quo	Current management
Option 1	Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 4nm between Maunganui Bluff and Pariokariwa Point
Option 2	Trawl prohibition within 4nm of the shore from Manukau Harbour to Port Waikato Winter trawl prohibition (1 June to 31 August) within 4nm of the shore from Maunganui Bluff to Pariokariwa Point
Option 3	Trawl prohibition within 4nm of the coast from Maunganui Bluff to Cape Egmont

Commercial and Amateur Drift Nets

Status Quo	Current management
Option 1	Prohibit drift netting in the lower reaches of the Waikato River
Option 2	Prohibit drift netting at Port Waikato (includes lower reaches of Waikato River)

Proposed non-fishing measures

Proposed measures to manage non-fishing threats to Maui's dolphins are:

⇒ Implement non-fishing related mitigation national actions as a matter of priority (see next section).

⇒ Marine Mammals Protection Regulations 1992 will be strictly enforced.

6.8.1.2. East Coast of the South Island

Area

Proposed measures on the east coast of the South Island extend from Cape Jackson in the north to Slope Point in the South. See Map 4.

All river mouths, estuaries, lagoons and harbours are excluded from the area to which proposals apply *except* the Avon-Heathcote Estuary, Lyttelton Harbour, Akaroa Harbour and Timaru Harbour.

Population description

The East Coast South Island Hector's dolphin population has around 1790[17] individuals (CV 0.14)[18], with the population being centred around Banks Peninsula. Relatively high densities are also in Cloudy and Clifford Bays and between Cape Campbell and Oamaru.

The population occurs in shallow water close to shore, particularly in summer. Hector's dolphins are regularly seen in the harbours and bays of Banks Peninsula. Genetic analysis suggests some movement of individuals between the East Coast South Island and the West Coast South Island populations.

East Coast South Island Marine Mammal Sanctuary Proposals

♦ *Clifford Bay and Cloudy Bay*

The proposed boundaries for Clifford and Cloudy Bay proposed marine mammal sanctuary extend from Cape Campbell to a point 12 miles offshore in a direct line to Tory Channel (Map 4).

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

♦ *Alterations to Bank Peninsula Marine Mammal Sanctuary*

The proposed alteration will extend from the existing southern boundary to the Rakaia River towards a seaward boundary at the 12-mile limit and north along the shore to the Waipara River (Map 4).

The existing fishing related restrictions will be abolished and replaced by regulations under the Fisheries Act providing that the chosen option provides for a level of threat mitigation that is no less than what presently exists.

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[17] This population figure includes the extent of coastline that incorporates Porpoise Bay.
[18] The CV is a measure of variation around the population estimate (defined as the ratio of standard deviation to the mean).

- *Catlins Coast*

The proposed boundaries for the Catlins Coast proposed marine mammal sanctuary extend from Brother's Point offshore 5 miles to a point 6.9 miles offshore to Bushy Point Beacon (Map 4).

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Fishing related threat mitigation options

Fishing-related threats identified as facing Hector's dolphins on the east coast of the South Island are set netting, trawling and rock lobster potting. Measures proposed to avoid, remedy or mitigate the effects of these fishing methods on the east coast South Island Hector's dolphin population are outlined below[19].

[19] Further detail on the nature and extent of these threats, and analysis of the proposed measures, is provided in Part II of this document.

Amateur and Commercial Set Netting

Status Quo	Current management
Option 1 (amateur)	Mandatory attendance with a set net Maximum of one set net per person and per boat Overnight set netting prohibited Maximum net length of 30m (60m exemption for fishers targeting flatfish)
Option 1 (commercial)	Adherence to voluntary set net Code of Practice (CoP) Require additional monitoring on vessels operating closer than 12nm (extended to 18nm from the Waiau River to the Waitaki River) to assess compliance with CoP and to determine nature and extent of set net/dolphin interactions *(Above measures extended to 18nm offshore from the Waiau River to the Waitaki River)*
Option 2a	Set net prohibition inside 2nm with options for a Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November) *(Open seasons in designated areas and only for flatfish and butterfish. Option 1 amateur measures apply to amateur and commercial set netting in designated areas)*
Option 2b	Set net prohibition inside 4nm with options for a Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November) *(Open seasons in designated areas and only for flatfish and butterfish. Option 1 amateur measures apply to amateur and commercial set netting in designated areas)*
Option 3	Prohibit set netting inside 12nm (extended to 18nm from the Waiau River to the Waitaki River)

Commercial Inshore Trawling

Status Quo	Current management
Option 1	Development of, and adherence to a voluntary CoP inside 12nm Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 12nm to assess compliance with CoP and to determine nature and extent of trawl/dolphin interactions *(Above measures extended to 18nm offshore from the Waiau River to the Waitaki River)*
Option 2	Option 1 plus trawl prohibition inside 2nm (except for vessels targeting flatfish with low headline height nets)
Option 3	Option 1 plus trawl prohibition inside 2nm

Rock Lobster Potting (amateur and commercial)

Option 1	CRA 5 fishers at Kaikoura to voluntarily weigh down their pot buoy lines when setting in pots in areas where tidal movements are strong

Proposed Non-Fishing Measures

Proposed measures to manage non-fishing threats to Hector's dolphins on the east coast of the South Island are:

6.8.1.3. South Coast Of The South Island

⇒ Marine Mammals Protection Regulations 1992 will be strictly enforced.

⇒ Implement non-fishing related mitigation national actions as a matter of priority

Area

Proposed measures on the south coast of the South Island extend from Slope Point (south of Waikawa Harbour in the Catlins) in the east through to Sandhill Point (western point of Te Waewae Bay) in the west. See Map 4.

All lagoons, coastal lakes, river mouths, estuaries and harbours on the south coast of the South Island are excluded from the areas to which the proposals apply.

Population description

The Hector's dolphin population on the south coast of the South Island is the smallest of the three South

Island Hector's dolphin populations. Most of the population is found in Te Waewae Bay but Hector's dolphins have also been sighted in Toetoe Bay, Oreti Beach and occasionally in Fiordland. The most recent published population estimate for Te Waewae Bay is 89 individuals (95% confidence interval = 36-218). More recent research suggests that there may be more than 89 dolphins that use the bay, but this study has not yet been published.

The south coast South Island population, like other Hector's dolphins, is concentrated close to shore during the summer months, with a wider dispersal in winter. Genetic analysis suggests some movement of individuals between the populations on the south and west coasts of the South Island.

South Coast South Island Marine Mammal Sanctuary Proposal

The proposed boundary of the proposed Te Waewae Bay Sanctuary is a line from Pahia point to Sand Hill Point (Map 4).

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Fishing related threat mitigation options

Fishing-related threats identified as facing Hector's dolphins on the south coast of the South Island are set netting and trawling. Measures proposed to avoid, remedy or mitigate the effects of these fishing methods on the east coast South Island Hector's dolphin population are outlined below.[20]

Amateur and Commercial Set Netting

Status Quo	Current management
Option 1 (amateur)	Mandatory attendance with a set net; Maximum of one set net per person and per boat; Overnight set netting prohibited Maximum net length of 30m (60m exemption for fishers targeting flatfish)
Option 1 (commercial)	Adherence to voluntary set net Code of Practice (CoP) Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 12nm to assess compliance with CoP and to determine nature and extent of set net/dolphin interactions

[20] Further detail on the nature and extent of these threats, and analysis of the proposed measures, is provided in Part II of this document.

Option 2a	Set net prohibition inside 2nm with options for a: Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November) (Open seasons in designated areas and only for butterfish. Option 1 amateur measures apply to amateur and commercial set netting in designated areas)
Option 2b	Set net prohibition inside 4nm (including Te Waewae Bay) with options for a: Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November) (Open seasons in designated areas and only for butterfish. Option 1 amateur measures apply to amateur and commercial set netting in designated areas)
Option 3	Prohibit set netting inside 12nm

Commercial Inshore Trawling

Status Quo	Current management
Option 1	Development of, and adherence to a voluntary CoP inside 12nm Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 12nm to assess compliance with CoP and to determine nature and extent of trawl/dolphin interactions
Option 2	Option 1 plus trawl prohibition inside 2nm (except for vessels targeting flatfish with low headline height nets)
Option 3	Option 1 plus trawl prohibition inside 2nm

Proposed Non-Fishing Measures

Proposed measures to manage non-fishing threats to Hector's dolphins on the south coast of the South Island are:

⇒Implement non-fishing related mitigation national actions as a matter of priority (see next section).

6.8.1.4. Marine Mammals Protection Regulations 1992 will be strictly enforced.
West Coast of the South Island

Area

The area on the west coast of the South Island to which the proposals apply extends from Cape Farewell in the north to Awarua Point in the south (just north of Fiordland)[21]. See Map 4.

Population description

The west coast of the South Island is the stronghold for Hector's dolphin, with a population estimate of about 5400 individuals[22] (5 388, 95% Confidence Interval = 3613 - 8034), representing about 70% of the national species abundance. There are particularly high concentrations around the coast between Kongahu Point (near Karamea) and Makawhio Point (South Westland). The population occurs within 6 nm of the coast during both summer and winter, in water less than 100m deep. Genetic analysis has suggested that there is some movement of individuals between the populations on the West and both the South Coast and East Coast South Island populations.

Marine Mammal Sanctuary Proposals

No proposals for the west coast of the South Island are being proposed at this stage due to the ongoing West Coast Marine Protection Process.

Fishing related threat mitigation options

Fishing-related threats identified as facing Hector's dolphins on the west coast of the South Island are set netting and trawling. Measures proposed to avoid, remedy or mitigate the effects of these fishing methods on the east coast South Island Hector's dolphin population are outlined below.[23]

Amateur and Commercial Set netting

Status Quo	Current management
Option 1 (amateur)	Mandatory attendance with a set net; Maximum of one set net per person and per boat; Overnight set netting prohibited Maximum net length of 30m (60m exemption for fishers targeting flatfish)

[21] Options do not apply to river mouths, estuaries, and lagoons
[22] Based on stratified line transect aerial surveys over four periods since 1998 (Slooten *et. al.* 2004)
[23] Further detail on the nature and extent of these threats, and analysis of the proposed measures, is provided in Part II of this document.

Option 1 (commercial)	Adherence to voluntary Code of Practice (CoP) Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 6nm to assess compliance with CoP and to determine nature and extent of trawl/dolphin interactions
Option 2a	Option 1 plus set net prohibition inside 2nm with options for a: Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November)
Option 2b	Option 1 plus set net prohibition inside 4nm with options for a: Six month open season (1 April to 30 September) Nine month open season (1 March to 30 November)
Option 3	Prohibit set netting inside 6nm

Commercial Inshore Trawling

Status Quo	Current management
Option 1	Adherence to the voluntary CoP Require additional monitoring (observers or electronic monitoring) on vessels operating closer than 6 nm to assess compliance with CoP and to determine nature and extent of trawl/dolphin interactions
Option 2	Option 1 plus all trawling prohibited inside 2nm, except for vessels targeting flatfish with low headline height nets.
Option 3	Option 1 plus all trawling prohibited inside 2nm

Proposed Non-Fishing Measures

Proposed measures to manage non-fishing threats to Hector's dolphins on the west coast of the South Island are:

⇒Implement non-fishing related mitigation national actions as a matter of priority (see next section).

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.

6.8.2. National action options

Human induced non-fishing national actions

Non-fishing related threats pose a serious risk to the long-term viability of Hector's and Maui's dolphins. Whilst the current effects of these threats are not considered population threatening at this time, the cumulative effects may cause high levels of disturbance, further fragmentation, or population decline due to impacts on factors such as breeding success.

All non-fishing related threats will be mitigated through overarching national actions that can then be implemented on a regional level. This will allow a consistent national approach to all management initiatives.

Research and the growth of knowledge over time on the impacts of non-fishing related threats will require an adaptive management approach to adequately mitigate the adverse effects of these threats.

MFish and DOC will work with local government and the public to implement national actions contained within the plan.

Proposed mitigation actions

♦ *Commercial Tourism - Permitted and Incidental Viewing of Hector's and Maui's Dolphins*

Permitted commercial tourism targeting Hector's dolphins has been a growing industry throughout New Zealand over the past 20 years. Vessel based Hector's dolphin viewing occurs throughout the South Island and permitted swimming is centred within Akaroa Harbour. No swimming with Hector's dolphins is permitted for any other area.

Proposed Actions:

⇒ National four-year moratorium on the granting of marine mammal viewing permits targeting Hector's and Maui's dolphins, effective from December 2007.

⇒ Recommendations will be made to the Director-General of DOC to impose an indefinite moratorium on the granting of marine mammal viewing permits targeting Maui's dolphins.

⇒ Recommendations will be made to the Director-General to declare that no new permits for swimming with Hector's dolphins will be issued to commercial operators.

⇒ Recommendations will be made to the Director-General to not allow any alteration to any existing permits which allow swimming with Hector's dolphins.

⇒ Recommendations will be made to the Director-General to not permit any increase in the level of swimming or viewing activity by commercial operators with existing permits.

⇒ Develop a national code of practice to ensure consistent behaviour to minimise impacts of threats.

⇒ Liaise with commercial operators to provide correct and consistent conservation messages, education/interpretation material.

⇒ Provide certainty for marine tourism ventures that incidentally encounter Hector's and Maui's dolphins on the expected behaviour toward the dolphins and when a permit should be sought.

⇒ Assess impacts of tourism on the dolphins.

- *Vessel Traffic (Vessel Traffic Going From A-B)*

In areas where Hector's dolphins are present, threats from vessels travelling from point to point can include boat strike, disturbance from noise and displacement from ecologically important areas. There are a number of areas around New Zealand where significant levels of vessel traffic during the summer period may have an impact.

Proposed Actions:

⇒In areas considered as important habitat where interactions may pose a significant threat, speed restrictions or no-go areas will be investigated.

⇒Develop and distribute educational/interpretation material to ensure safe boating practices around Hector's dolphins.

⇒Regular compliance effort in areas where vessel traffic is a concern to ensure vessel operators are following conditions relating to the behaviour around marine mammals in Part III, Marine Mammals Protection Regulations 1992.

Note: No action to mitigate vessel traffic threats will be implemented if considered dangerous or impracticable. Vessels will always have the right of passage in an emergency or situation where safety may be compromised by any speed or area restrictions.

- *Recreational Boaters Searching Out Hector's Dolphins*

Recreational boaters may search out or alter their course in order to view dolphins. Hector's dolphins are also vessel positive and can be attracted to the boat to bow ride a vessel. The possible threats during these types of interaction are similar to any vessel based interaction and include possible boat strike, physical and audible disturbance and displacement.

Proposed Actions:

⇒In areas that are particularly important to Hector's and Maui's dolphins, speed restrictions will be investigated.

⇒Public awareness/interpretation information will be used to educate on marine mammal regulations when interacting with the dolphins. DOC will focus on vessel owner's behaviour during interactions to eliminate possible disturbance or boat strike.

⇒Undertake regular compliance in heavy vessel traffic areas.

- *Coastal Space Allocation and Discharges- Overarching Actions*

The allocation and occupation of coastal space has the potential to impact on Hector's and Maui's dolphins through possible displacement from important habitat, effects on predator prey relationships, foraging success and reproductive success.

Coastal development can include works and development associated with ports and marinas, inshore aquaculture, tidal and wave energy, and coastal mining.

Councils must give effect to The New Zealand Coastal Policy Statement (NZCPS) when developing or reviewing Regional Coastal Plans.

The NZCPS is a mandatory national policy statement prepared under the Resource Management Act 1991 (RMA). It is the role of the Minister of Conservation to prepare and approve the NZCPS. Its purpose, as set out in s56 of the RMA is "to state policies in order to achieve the purpose of this Act in

relation to the coastal environment of New Zealand". Policy Statements and plans must take into effect the NZCPS. When considering an application for resource consent, local authorities must have regard to the NZCPS.

The following actions provide overarching policy guidance to local authorities when considering the use of the coastal marine area.

Proposed Actions:

⇒Investigate including provisions in the NZCPS which direct councils to identify and protect Maui's and Hector's dolphin habitat, and identify, and where practicable, eliminate threats to those habitats.

⇒Developing a best practice guide, in conjunction with local authorities, to identify and protect Maui's and Hector's dolphin habitat, and eliminate threats to that habitat.

- *Coastal Space Allocation and Discharges -Threat Specific Proposed Actions*

Pollution from Land use

Hector's dolphins' near-shore habitat preference has exposed the species to a variety of pollutants, contaminants and plastic debris. The long-term bioaccumulation, contact with or ingestion of pollutants can be detrimental to breeding success, cause sterility and suppress the immune system leading to chronic illness. Entanglement in or ingestion of plastic debris can lead to impaired ability to target preferred prey, avoid predators and cause infection or choking.

Proposed Action:

⇒Investigate including of provisions in the NZCPS relating to the effects of land-based pollutants on Hector's and Maui's dolphins to manage the possible impacts of coastal discharges in Hector's and Maui dolphin habitat.

- *Aquaculture*

Although there is little information on the behaviour of Hector's dolphins around marine farms, they do have the potential to impact through habitat competition, displacement and fragmentation, entanglement, noise disturbance, debris ingestion and changes to benthic habitat resulting in altering availability of preferred prey.

Proposed Actions:

⇒Liaise with the aquaculture industry to develop best practice guidelines for Hector's dolphins for managing aquaculture interaction and marine mammals.

⇒Identify areas where marine farming may adversely impact Hector's dolphin populations and include.

⇒Continue to monitor the effects of marine farming on Hector's dolphins.

- *Mining and Oil Exploration/Development*

Construction and other activities in the coastal environment include port developments, and seabed mining and exploration including seismic testing. Impacts include disturbance of seafloor and benthic communities, avoidance, effects of sediment plumes, possible shifts or loss of prey species.

Proposed Actions:

⇒Investigate inclusion of provisions in the NZCPS relating to Hector's and Maui's dolphins to manage the possible impacts of mining and oil exploration/development in Hector's and Maui's dolphin habitat.

⇒Continue to promote and monitor the use of Guidelines for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations.

♦ *Marine Energy*

Interest in marine energy has been increasing over the past few years due to the need to generate energy with a low carbon footprint. Presently the industry is still in a trial stage but there is significant interest in both tidal and wave energy within Hector's and Maui's dolphin habitat.

Proposed Action:

⇒Investigate inclusion of provisions in the NZCPS about Hector's and Maui's dolphins to manage the possible impacts of marine based energy development and implementation in Hector's and Maui dolphin habitat.

⇒Work with local government and the marine energy industry to develop proposals that minimise impacts on this species.

♦ *Scientific Research Interactions*

The interaction of researchers with Hector's and Maui's dolphins may result in possible impacts associated with the use of vessels and people in close contact with the dolphins. Any invasive techniques used to collect samples may also have an adverse impact. Currently permit applications only need to be made for invasive research proposals.

Proposed Actions:

⇒Encourage research undertaken on Hector's or Maui's dolphins to reflect DOC's priorities.

⇒Research supported by DOC must have some benefit for the long-term management of the species.

⇒Any project that DOC provides support (financial, operational, permitted) for will be required to provide regular updates during the research programme and provide a thesis or report and raw data on completion.

♦ *Department of Conservation Hector's and Maui's dolphin Incident Database*

Necropsy- (Dolphin Autopsy)

DOC manages a database consisting of all reported deaths of Hector's and Maui's dolphins. The data is sourced from dead dolphins reported by commercial and non-commercial fishers, DOC staff, MFish and the public. The majority of dead dolphins are found as beach cast dolphins or entangled in nets. Where possible each reported dolphin recovered is sent for an independent standardised necropsy.

Proposed Actions:

⇒Review standard procedure for necropsy and update to ensure best methods are used to indicate type of mortality.

⇒Include (dependant on condition of the carcass) toxicology sampling to assess levels of contamination and the biological effects of pollutants.

- *Hector's and Maui's Dolphin Data Storage*

Sightings

Sightings information collected by the public can be very important to determine where small populations of marine mammals range. Public sightings are especially important for Maui's dolphins due to their critical population size and limited distribution.

Proposed Actions:

⇒Create and manage a database of Hector's and Maui's dolphin sightings. The data stored will be based on identification criteria to confirm sighting reliability.

⇒Encourage wider reporting of public sighting of Hector's and Maui's dolphins by developing website based reporting forms.

Incident Database

Proposed Actions:

⇒Maintain quality and consistency in responding to mortality/stranding incidents.

⇒Assess best practice for mortality incidents, implement improvements as needed.

- *Hector's Dolphins in Captivity*

Marine mammals may be held in captivity subject to a lawful permit under the MMPA.

Conservation general policy 4.4(k) provides that whales and dolphins should not be brought into or bred in captivity in New Zealand or exported to be held in captivity, except where this is essential for the conservation management of the species.

DOC considers that the keeping of indigenous or endangered marine mammal species for the purpose of public display or captive breeding is not an appropriate management practice for the long-term survival of these species.

Proposed Action:

⇒Permit applications for the capture and subsequent keeping in captivity of Hector's or Maui's dolphins shall be dealt with in accordance with the provisions of the MMPA.

- *Climate Change*

Little is known on the effects of climate change on marine mammals and no research has been undertaken to determine any impact on Hector's dolphins.

Proposed Action:

⇒Monitor impacts of climate change on ecosystem health and how any possible changes may impact on Hector's and Maui's dolphins. Adaptive management approaches will need to be considered when managing climate change.

♦ *Shooting*

There have been some historical reports of shooting Hector's dolphins but no recent reports.

Proposed Action:

⇛It is an offence to shoot at, kill or injure a Hector's or Maui's dolphin without a permit. Unlawful shootings at Hector's or Maui's dolphins shall be dealt with under the provisions of the MMPA.

Non-human induced threats

The plan does not take into account the management of non-human induced threats as the impacts of predation, disease and weather are not considered to be manageable. However, the results of non-human induced threats can be recorded for the interest of science.

Proposed Actions:

⇒As part of the standard necropsy of dolphins, DOC will monitor and record the levels of disease and possible impacts on the dolphins.

⇒As part of the standard necropsy of dolphins, DOC will monitor and record the levels of possible predation.

Public awareness

DOC and MFish will develop public awareness material for the following topics:

⇒TMP.

⇒Changes to any existing regulations.

⇒Marine mammal tourism targeting Hector's and Maui's dolphins.

⇒Marine Mammals Protection Regulations.

⇒Consistent information for permitted tourism ventures.

⇒Hector's and Maui's dolphin general information.

⇒Community involvement in Hector's and Maui's dolphin conservation.

⇒Sightings reporting of Maui's dolphins.

⇒Compliance signage.

⇒Awareness material will be updated periodically if there are any changes to information.

6.9. Information gathering

6.9.1. Research (full description Part III)

Research is required to help future decisions relating to the management of Hector's and Maui's dolphins and also to measure the effectiveness of any management measures implemented, including under this TMP.

Although a significant amount of research has already been conducted on Hector's and Maui's dolphins, there are a number of key areas where DOC and MFish consider that more research is required.

Key areas for research

The key areas for further research on Hector's and Maui's dolphins (in order of priority) are to verify and refine existing knowledge of population distribution patterns; population abundance; genetic flow within and between populations; and information on the life history parameters of the species (e.g. age at first reproduction). Also important are: cause of death assessments, population trends (historic and contemporary), and assessments of threats and their impacts (lethal & sublethal).

An accurate determination of dolphin distribution is considered the highest priority for further research. The objective of this research would be to "determine the distribution of the four populations to ensure Hector's dolphins are managed across their entire range and determine any distribution changes as a result of any management measures implemented". For example, confirming the depth and offshore limits of their range on a seasonal basis would be of significant use for the dolphin's management. A variety of methods are available to study such distribution patterns, but surveys should ideally be undertaken following recognised protocols.

Ongoing monitoring of dolphin abundance, using appropriate methods, is recognised by DOC and MFish as another priority, particularly for measuring the performance of management methods implemented. The objective of such research would be "to gather baseline data on the abundance of each population". Much of this research would overlap with studies of their distribution patterns and could be undertaken concurrently.

Studies of the relatedness within and among populations of Hector's dolphins is the third research priority. The objective of such research would be "to determine the level of gene flow within and between populations to assess current levels (and potential effects) of population fragmentation.

The final research priority identified is on the basic biology of Hector's and Maui's dolphins. There is currently a paucity of data on this topic, but it is vital for assessing the present and potential future status of the dolphin populations. The objective of this research would be "to gather information on the life history characteristics of Hector's dolphins to enable more robust assessment of demographic trends and threats to the populations".

6.9.2. Monitoring of fishing interactions

Information on the nature and extent of the interactions between fisheries and dolphins is important to guide decisions on how best to manage those interactions. Such information will help MFish and DOC to assess the effectiveness of fishing-related management measures and review any management decisions.

Fishers are currently required by law to report dolphin bycatch, but this does not always occur and therefore it is difficult to determine the number of dolphin mortalities caused by fishing. Independent monitoring of fisheries therefore provides an opportunity to gather reliable, unbiased information about fisheries interactions with dolphins.

MFish and DOC consider that the monitoring of fisheries interactions with dolphins should be focused in areas where dolphins and potentially threatening fishing methods overlap and where few measures are in place to avoid, remedy or mitigate the adverse effects of fishing. The level of monitoring required will be the subject of a later paper to Ministers following decisions on the best overall framework to mitigate threats of fishing related mortality.

Two monitoring methods that should be considered as part of this draft TMP are: observers on fishing vessels; and electronic monitoring (video cameras) on fishing vessels.

Both DOC and MFish use fisheries observers via the Conservation Services Programme (CSP) to monitor the interactions between fishing vessels and protected species such as Hector's and Maui's dolphins. Observers provide independent monitoring of protected species interactions with fishing

vessels and are also able to collect a range of information on the interactions. There are some difficulties however, for example, some vessels are too small to accommodate an observer as well as crew.

Electronic monitoring provides another alternative that is used in many fisheries around the world and has been trialed in New Zealand. Video cameras are able to record images of fishing activity and the footage can be later reviewed to assess interactions with protected species. This can provide certainty about the mortalities of species such as Hector's and Maui's dolphins.

The effects of amateur fishing on protected species would also be useful to monitor, but there are currently no tools available to achieve this. There are potential options however (e.g. boat ramp surveys) and MFish welcomes comments from stakeholders on ways to effectively monitor amateur fishing interactions with Hector's dolphins.

7. PART II – MINISTRY OF FISHERIES INITIAL POSITION PAPER (IPP)

Background information relating to the general biology of Hector's dolphins and the threats facing them (including fishing) is provided in Part I of this consultation document. This MFish IPP should be read in conjunction with Part I.

Part II is structured as follows:

⇒Introduction:

- Implementation
- Fisheries Act 1996 (FA96) statutory considerations
- Background information on option development and analysis

⇒General species considerations

⇒The main body of the paper sets out, by population:

- Population characteristics
- Nature and extent of fishing threats
- Existing threat management
- Need and scope for additional threat management
- Proposed management options
- Analysis of options (costs and benefits)

⇒Regulatory Impact Statement (RIS)

7.1. Implementation

The Minister of Fisheries in consultation with the Minister of Conservation will determine whether it is necessary for additional measures to be implemented to avoid, remedy, or mitigate the effects of fishing related mortality on Maui's and Hector's dolphins. The Minister of Fisheries and Minister of Conservation have previously expressed a desire to see any additional measures in place before the end of the Calendar year. In order to achieve this timeframe new measures would first be implemented via Gazette Notice in late November or early December 2007 followed by regulations as soon as possible in 2008.

7.2. Introduction

7.2.1. Legislative obligations

In considering the issues and options outlined in this IPP, the Minister of Fisheries must follow relevant statutory criteria:

Sustainability measures – Part III

The draft TMP contains proposals to implement sustainability measures. 'Sustainability measure' is defined as any measure set or varied under Part III of the FA96 for the purpose of ensuring sustainability.[24] The proposed sustainability measures in the draft TMP would be set under sections 11(1) and 15(2) of the FA96, which are contained in Part III. Sustainability measures set under sections 15(2) and 11(1) can be introduced by way of regulation or Gazette notice (as outlined in more detail below).

Section 15 is linked to the Wildlife Act 1953 and the Marine Mammals Protection Act 1978 (MMPA), which provide for the establishment of population management plans (PMPs) for protected species. Hector's Dolphins are a protected species for the purpose of the MMPA. Therefore, they are also 'protected species' under the definition in the FA96 and section 15[25].

There is no PMP in place for Hector's dolphins. In the absence of a PMP, s15(2) of the FA96 applies[26].

Section 15(2) allows the Minister of Fisheries, in the absence of a PMP and after consultation with the Minister of Conservation, to take such measures that he or she considers are necessary to avoid, remedy, or mitigate the effect of fishing-related mortality on any protected species. Such measures may include, but are not limited to, setting a limit on fishing-related mortality (FRML).

Section 15(3) provides that the Minister may require, or authorise the chief executive to require any person or class or persons (listed in section 189) to give the Minister or the chief executive such information relating to fishing-related mortality as the Minister or chief executive, as the case may be, considers necessary. That information may be required in the approved manner and form.

Section 15(4) allows the Minister to recommend the making of such regulations under s 298 of the FA96 as are considered necessary or expedient for the purpose of implementing any measures referred to in s 15(2)[27].

Section 11(1) allows the Minister to set or vary sustainability measures for stocks or areas. Sustainability measures may relate to the fishing methods by which any fish, aquatic life, or seaweed of any stock may be taken or that may used in any area.[28]

Section 11 provides for the Minister to implement sustainability measures set under section 11(1), by notice in the Gazette or by recommending the making of regulations under s 298 of the FA96 (s 11(4)). Section 11 sustainability measures may only be imposed after having taken into account the various statutory considerations set out in s 11. These considerations are set out and discussed in Appendix 1 of the draft TMP.

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24 Fisheries Act 1996, s2.

25 Section 2 of the Fisheries Act 1996 states:

Protected species means—

(a) Any marine wildlife as defined in section 2 of the Wildlife Act 1953 that is absolutely protected under section 3 of that Act:

(b) Any marine mammal as defined in section 2(1) of the Marine Mammals Protection Act 1978:

26 Section 15(2) of the Act states that "In the absence of a population management plan, the Minister [of Fisheries] may, after consultation with the Minister of Conservation, take such measures as he or she considers are necessary to avoid, remedy, or mitigate the effect of fishing related mortality on any protected species, and such measures may include setting a limit on fishing-related mortality."

27 Where a limit on fishing-related mortality has been set, the Minister is also able to prohibit all or any fishing or fishing methods in an area by Gazette notice under s 15(5)(b) to ensure this limit is not exceeded. MFish is not proposing to introduce any new fishing relating mortality limits for Hector's dolphins.

28 Fisheries Act 1996, s11(3)(d). Section 11(3) provides a non-exhaustive list of what sustainability measures may relate to.

Purpose of the Fisheries Act 1996

The purpose (section 8) of the FA96 is to provide for the utilisation of fisheries resources while ensuring sustainability.

'Ensuring sustainability' is defined as "maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations" and "avoiding, remedying or mitigating any adverse effect of fishing on the aquatic environment".[29]

'Fisheries resources' is defined as any one or more stock or species of fish, aquatic life, or seaweed[30].

'Effect' means the direct or indirect effect of fishing.[31] It includes: Any positive or adverse effect; and any temporary or permanent effect; and any past, present, or future effect; and any cumulative effect which arises over time or in combination with other effects regardless of the scale, intensity, duration, or frequency of the effect. It also includes: any potential effect of high probability; and any potential effect of low probability which has a high potential impact[32]:

'Utilisation' means "conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural wellbeing".[33]

The Courts have given further consideration to the purpose of the the FA96. In particular the courts have considered the relationship between utilisation and sustainability. In *Squid Fishery Management Co v Minister of Fisheries*,[34] the Court of Appeal noted that the Minister was required to balance utilisation objectives and conservation values. In 'the Kahawai case'[35], the High Court noted:

> "…there is no hierarchy between the two objectives of providing for utilisation while ensuring sustainability and that utilisation should be allowed to the extent that it is sustainable. I agree, though, … that on a plain reading of s 8 the bottom line is sustainability. That must be the Minister's ultimate objective. Without it, there will eventually be no utilisation."

MFish considers, that in providing for the utilisation of a fisheries resource enabling people to provide for their social, economic and cultural wellbeing is a relevant consideration when setting a sustainability measure. It is up to the Minister to determine how much weight to give to wellbeing in making his overall decision.

As more restrictive sustainability measures are likely to have a greater impact on utilisation, the selection of the most appropriate suite of measures requires the Minister to weight the benefits of more effective mitigation against the costs that are likely to be associated with those measures. To improve information on the sustainability benefits and utilisation costs of measures to manage the effects of fishing on Hector's dolphins, and to better understand the qualitative interests in the options contained in this IPP, MFish has commissioned a socio-economic impact assessment and a research project to assess the relative effectiveness of different management strategies. Information will be available from these projects for incorporation into final advice on the TMP. Each regional section of this document contains an initial analysis of the costs and benefits of the management measures proposed.

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[29] Fisheries Act 1996, s2.
[30] Fisheries Act 1996, s2.
[31] Fisheries Act 1996, s2.
[32] Fisheries Act 1996, s2.
33 Fisheries Act 1996, s2. 'Conservation' means the maintenance or restoration of fisheries resources for their future use; and 'conserving' has a corresponding meaning:"
[34] *Squid Fishery Management Co v Minister of Fisheries*, (13 July 2004, CA39/04).
[35] *NZRFC & Ors v Minister of Fisheries & Ors*, High Court Auckland, 21 March 2007.

Environmental principles

Section 9 of the FA96 contains environmental principles that the Minister must take into account when making a decision under the FA96, relating to the utilisation of fisheries resources or ensuring sustainability. These principles are:

- ⇒Associated or dependent species should be maintained above a level that ensures their long-term viability;
- ⇒Biological diversity of the aquatic environment should be maintained;
- ⇒Habitat of particular significance for fisheries management should be protected.

Hector's dolphins are an associated or dependent species as defined in the FA96. 'Associated or dependent species' is defined as any non-harvested species taken or otherwise affected by the taking of any harvested species.[36] 'Harvested species' is defined as any fish aquatic life, or seaweed that may for the time being be taken with lawful authority.[37] MFish considers that Hector's dolphins are affected by the taking of harvested species.

'Biological diversity' is defined in the FA96 as meaning the variability among living organisms, including diversity within species, between species and of ecosystems.[38] In relation to any decision to avoid, remedy or mitigate the effects of fishing on Hector's dolphins, MFish considers the Minister should take account of maintaining:

- ⇒The Hector's dolphin species above a level that ensures long-term viability; and
- ⇒The genetic diversity within the species, including the viability of the four genetically distinct populations, in the aquatic environment.

Information principles

Under s 10 of the FA96, decision makers are required to take into account four information principles. The Minister should take into account the best available information; consider any uncertainty in the information available; be cautious when information is uncertain, unreliable, or inadequate; and not use the absence of, or any uncertainty in, any information as a reason for postponing or failing to take any measure to achieve the purpose of the Act.[39]

'Best available information' is defined as "the best information that, in the particular circumstances, is available without unreasonable, cost, effort, or time."[40]

MFish notes the Fisheries Act 1996 Amendment Bill was introduced to Parliament on 22 February 2007. The Bill proposes to amend s10(c) and (d) of the Act to provide greater care in favour of sustainability where information is uncertain.

The Bill currently proposes to replace s 10(c) and (d) of the FA96 to read:

"(c) if information is absent or is uncertain, unreliable, or inadequate, decision makers—
should be cautious; and

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[36] Fisheries Act 1996, s2.
[37] Fisheries Act 1996, s2.
[38] Fisheries Act 1996, s2.
[39] Fisheries Act 1996, ss10(a),(b),(c),(d).
[40] Fisheries Act 1996, s2.

(ii) should not use any of those factors as a reason for postponing or failing to take measures to ensure sustainability.''

The intention of the Bill is to provide clearer direction in section 10(c) and (d) to persons making fisheries management decisions where there are gaps or flaws in the available information. It seeks to clarify where the balance lies in deciding between the utilisation or the sustainability of fisheries resources where a decision has to be made in those cases. The proposed amendment will retain the existing direction in section 10 for decisions makers to use best available information, to consider uncertainty and to exercise care when information is uncertain, unreliable or inadequate. The Bill is presently being considered by the Primary Production Select Committee, who have received and heard submissions on the Bill. The intention is that the Bill can be passed into law and in effect before October 2007 – however, that timetable is tight and is dependent on parliamentary process. As such, it is possible that when the Minister is considering his decisions, in relation to the proposals set out in the initial position papers, the new amendments to section 10 will need to be applied (where relevant).

Until such time that the Fisheries Act 1996 Amendment Bill is approved by Parliament and passed into law, MFish and the Minister will apply section 10(c) and (d) as it is currently set out in the FA96.

Case law on s15(2)

The Court of Appeal has commented that in considering whether to take any measure under s15(2), the Minister is required to form a view as to the extent which (or perhaps the point at which) utilisation of the fish resource threatens the sustainability of the protected species.[41]

The Court of Appeal also commented on the difference between the Minister's obligations in relation to harvestable species and protected species. The Court commented that in the context of a harvestable species, balancing utilization objectives and conservation values requires utilization to the extent it is possible. [42] However, the Court noted that setting an FRML for protected species under s15(2) requires a different type of exercise.[43]

The Court considered that the point of setting a FRML for sealions under s15(2) is not to arrive at a number of sea lions which can be harvested sustainably, and that thinking associated with sustainability of a harvestable species is not appropriate. [44] Although the options contained in this IPP do not include introducing an FRML, the Court's comments have relevance to other s15(2) measures the Minister may consider necessary.

The Court indicated that s15(2) involved balancing risk on the one hand against utilisation advantages on the other.[45] The Minister was required to address the extent to which utilisation of fisheries resources conflicted with conservation of the protected species.

The Court also commented that "fishing related mortality" refers only to the death of the protected species in the course of fishing activity. Further, relevant to s15(2) is the impact of fishing on the population of the protected species as a whole, the section does not provide for measures aimed at simply

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[41] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ) para 79.
[42] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ) para 75.
[43] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ) para 77.
[44] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ) para 77.
[45] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ) para 77.

eliminating or reducing individual deaths. [46]

International obligations and the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992

New Zealand is party to a number of international conventions. These conventions generally require measures to be taken to protect and conserve and mitigate fishing related mortalities endangered species. These proposals are consistent with these obligations.

The proposals in the draft TMP are not inconsistent with the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. The measures proposed are sustainability measures under the Fisheries Act. Application of sustainability measures applies generically to all commercial fishers.

The exercise of customary fishing is provided for by specific regulations.

7.2.2. Consultation

Section 12 of the FA96 requires the Minister to before doing anything under relevant sections, to consult with such persons or organizations as the Minister considers are representative of those classes of persons having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned, including Maori, environmental, commercial and recreational interests. It also requires the Minister to provide for the input and participation of tangata whenua having a non-commercial interest in the stock concerned, or an interest in the effects of fishing on the aquatic environment in the area concerned and have particular regard to kaitiakitanga. This IPP forms part of that consultation process.

7.2.3. Achieving the goals of the draft TMP

The Goals of the draft TMP are:

⇒To ensure that the long-term viability of Hector's dolphins is not threatened by human activities; and

⇒To further reduce impacts of human activities as far as possible, taking into account advances in technology and knowledge, and financial, social and cultural implications.

⇒MFish considers the goals of the draft TMP are consistent with the FA96. Goal 1 is consistent with the Section 9(a) of the FA96 (associated and dependent species should be maintained above a level that ensures their long-term viability), and Goal 2 is consistent with the balance between sustainability and utilisation (including providing for social, economic and cultural wellbeing) consistent with the purpose of the FA96.

⇒As such, MFish considers that by meeting his statutory obligations under the FA96, the Minister of Fisheries will also meet the goals of the draft TMP with respect to human activities that are within his mandate to manage (i.e. fishing).

7.2.4. Discussion of generic factors relating to Hector's dolphins

MFish considers the environmental principles contained in s9 of the FA96 to be particularly relevant when considering whether measures are necessary to avoid, remedy or mitigate the effects of fishing-related mortality on Hector's dolphins. In particular, the principles that associated or dependent species

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[46] *Squid Fishery Management Company v Minister of Fisheries* (Unreported, Court of Appeal, 13 July 2004) Hammond, William Young, O'Regan JJ), para 7.

should be maintained above a level that ensures their long term viability (MFish considers Hector's dolphins to be an associated or dependent species) and that biological diversity of the aquatic environment should be maintained, provide useful guidance to the decision-maker.

Measures that are more likely to reduce the effects of fishing-related mortality are also likely to have a greater impact on utilisation. The nature and extent of additional management necessary to avoid, remedy, or mitigate the effects of fishing on Hector's dolphins, if any, will depend on the balance between sustainability and utilisation the Minister considers appropriate. MFish invites submitters to provide further information on the impacts of the proposed options on fishing and the ability of people to provide for their social, economic and cultural wellbeing.

MFish considers that some of the factors relevant to the Minister's decisions are:

⇒Population biology (for example, genetic diversity, size and productivity)

⇒Relationship of the species to long term-viability

⇒Nature and extent of the effects of fishing-related mortality on Hector's dolphins

⇒Effectiveness of current management measures

⇒The likely effectiveness of measures proposed to manage the effects of fishing

⇒Costs and impacts on fishers of measures proposed to manage the effects of fishing

⇒Uncertainty in the information available on the above factors.

The degree of uncertainty and the adequacy of the available information are matters for the Minister to assess and weigh in making decisions on any measures he considers necessary to avoid, remedy or mitigate the effects of fishing-related mortality on Hector's dolphins after taking into account the information principles in s10. In relation to the various factors identified above, MFish invites submitters to provide further information on these points.

7.2.4.1. Uncertainty in information relevant to the Minister of Fisheries' decision-making

As noted above, the degree of uncertainty and the adequacy of the available information are relevant considerations for the Minister when making decisions on whether any additional measures are necessary to avoid, remedy or mitigate the effects of fishing-related mortality on Hector's dolphins. MFish notes that the uncertainty in information relating to the following areas is particularly relevant to the Minister's deliberations:

Long-term viability

Biological[47] and stochastic[48] factors mean that there is a great deal of uncertainty around the minimum abundance that will ensure the long-term viability of Hector's dolphins, and consequently there is no definitive guidance for the Minister on the level above which the species should be maintained.

Abundance of Hector's dolphins

There is uncertainty around the current population estimates for Hector's dolphins. The most recent surveys to estimate abundance of South Island Hector's dolphins were undertaken 6-7 years ago. As such,

[47] For example, Allee effect and depensation
[48] For example, environmental and demographic stochasticity

the current abundance of South Island Hector's dolphins is unknown.

The most recent published population estimate for Te Waewae Bay (south coast of the South Island) is from a study conducted in 1998-99, which entailed a single boat-based line transect survey of the area. A more recent intensive study of Hector's dolphins that use Te Waewae Bay suggests that the number of dolphins that use the bay might be considerably more than the abundance estimate from the 1998-99 study. While the results from the more recent study are yet to be finalised, this highlights uncertainty around the abundance of Hector's dolphins that use Te Waewae Bay.

The abundance of Maui's dolphins has been more recently estimated (from a study undertaken in January 2004).

Nature and extent of fishing threats

As mentioned in the previous section, information on the extent of fishing impacts on Hector's dolphins is inadequate and uncertain. This is primarily due to limited information on the level of fishing-dolphin interactions and trends in species abundance; both of which make it difficult for MFish to determine the extent to which fishing has had, is having, or will have, an adverse effect.

Effectiveness of management measures (current and proposed)

Low levels of bycatch monitoring means that the level of interaction under *status quo* management cannot be ascertained with certainty. Limited monitoring results in uncertainty around catch rates of Hector's dolphins in fishing gear (including any geographical and seasonal variations in catch rates) and consequently the effectiveness of proposed area and seasonal restrictions also cannot be determined with certainty.

Costs and impacts on fishers of measures proposed

There is also uncertainty around the impacts that the proposed measures will have on people's social, cultural and economic wellbeing. This is primarily because there is limited specific information about the fishing activities (for example, effort and target species) that are affected by the proposals[49]. To reduce this uncertainty, MFish has contracted an independent research provider to investigate the potential impacts of the proposed measures on fishers. Further detail about this research is provided below.

7.2.4.2. New research

Socio-economic impact

Each regional section of this document contains an initial analysis of the costs and benefits of the management measures proposed. To improve information available to guide the Minister's decision making, an independent research company, Aranovus Research, has been commissioned by MFish to undertake an independent survey of recreational, customary and commercial set net and trawl fishers to assess the impacts of the range of proposed mitigation measures outlined in this document.

The purpose of the independent survey being undertaken by Aranovus Research is to understand what the potential impacts of the range of proposed mitigation measures are likely to be on the economic, social and cultural well being of recreational, customary and commercial set net and trawl fishers.

The survey focuses on the four distinct Hector's and Maui's dolphin areas:

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[49] Due to the nature of the reporting framework for commercial fishers and no formal reporting of amateur fishing effort

⇒West Coast of the North Island;

⇒West Coast of the South Island;

⇒East Coast of the South Island; and the

⇒South Coast of the South Island.

To find out more about this survey or participate in it, visit www.nzfishersurvey.com

The survey by Aranovus Research does not replace feedback in the public consultation process and stakeholders may contribute to both processes if they choose to. However, the survey and the consultation process are independent of each other.

Effectiveness of measures

In addition to the socio-economic impact analysis, modelling work is being undertaken by the National Institute of Water and Atmospheric Research (NIWA) to assess the relative performance of the proposed options for commercial set netting. For each population, projections will be made into the future to assess how the populations perform under the different management options. Results from this work will be available in time to be incorporated into final advice to the Minister. The absence of rigorous data (effort and dolphin catchability) associated with other threats, such as amateur set netting and trawling, precludes assessment of management options for these methods in the modelling.

7.2.4.3. Effects of fishing on the species and populations

Hector's dolphins are present in four main regions around New Zealand's coastline – the west coast of the North Island where the Maui's dolphin subspecies resides, and the east, south and west coasts of the South Island where the Hector's dolphin subspecies resides. Genetic analysis has identified that these four regional populations are genetically distinct and are separated by little or no gene flow.

The Minister's legislative obligations require him to consider steps necessary at a species level (s.15 and s.9). However, it is reasonable in considering the necessity to implement measures to have regard to each of the distinct populations for the following reasons:

⇒Section 9 obliges the Minister to maintain biodiversity which includes between and within species genetic diversity. Impacts on genetically distinct populations are therefore relevant to this environmental principle.

⇒Each population contributes to status (numbers) of the species as a whole

⇒The nature of extent of fishing related threats varies between populations

⇒Impacts on utilisation of measures proposed to manage at a species or population level will vary between populations because the nature of fisheries that impact on the species differ by region

Some Hector's dolphin populations may currently be well above a viable level (for example, there are 5400 Hector's dolphins in the population on the west coast of the South Island). If this is the case, those populations may be able to sustain a continued decline from current numbers due to fishing-related mortalities, while still maintaining their viability.

However, declines in population abundance can lead to loss of genetic diversity within a population (and accordingly within the species).

Species management issues

Biological information on Hector's dolphins at a species level is outlined earlier in this document. In relation to overall abundance, Hector's dolphin is considered to be one of the world's rarest dolphin species. In light of evidence of population decline, the Minister of Conservation declared Hector's dolphins as a "threatened species" in 1999 and further classified the species as "nationally endangered" in 2003. The South Island Hector's dolphin is ranked as nationally endangered by DOC and endangered by the World Conservation Union (IUCN), and is estimated to number around 7270 individuals. The North Island Maui's dolphin, with an estimated population size of about 111 individuals, is ranked as nationally critical by DOC and critically endangered by the IUCN.

There is uncertainty over trends in population size for some populations. There is genetic evidence of abundance decline at both a population and local group level. South Island and west coast North Island populations indicate local group differences or loss of genetic diversity due to local group decline.

MFish notes that in the absence of a PMP, there is no legislative directive in the FA96 or elsewhere which outlines a target level of abundance for Hector's dolphins, other than "above a level that ensures their long-term viability". However, there are other statutes and conservation policy statements that reflect Government's overall desired outcome for threatened species (this desired outcome moreover involves achieving recovery to non-threatened status). For example, the MMPA allows the Minister of Conservation, under a PMP, to determine a level of fishing-related mortality which should allow threatened species to achieve non-threatened status as soon as reasonably practicable, and in any event within a period not exceeding 20 years. The vision statement for the management of Hector's dolphins ("Hector's dolphins should be managed for their long-term viability and recovery throughout their natural range") is derived from DOC's Conservation Services General Policy and also reflects the desired recovery component associated with managing threatened species.

MFish considers that Government's management objectives for threatened species expressed through other statutes and policy can provide relevant context to the Minister of Fisheries' decisions on whether measures are necessary to manage the effects of fishing-related mortality on Hector's dolphins.

In determining whether it is necessary to take measures to reduce fishing related mortality of Hector's dolphins at a species level it is important to understand the extent to which fishing is impacting on the status of the Hector's dolphin species. There is uncertainty on the extent of fisheries interactions due to lack of independent monitoring of interactions and few incentives to voluntarily report mortalities due to possible Government intervention.

In light of limited data, scientists have used population modelling and extrapolation techniques to estimate trends in Hector's dolphin populations through time. These studies have primarily focused on the past, present and future impacts of commercial set netting on Hector's dolphin populations. The absence of scientifically rigorous data on the nature and extent of other threats precludes their use in the modelling. Difficulties with estimating past entanglement rates and uncertainty in abundance estimates means there is a lot of uncertainty associated with the results of this modelling work. In general, findings have suggested that the abundance of Hector's dolphins has declined due to fishing activity and is likely to continue to decline under current management regimes.[50] However, there is a lack of comparative abundance estimates through time and consequently MFish cannot determine with certainty whether species abundance has changed significantly.

Nevertheless, fishing (particularly set netting) is considered to be the greatest known threat to Hector's

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[50] For example, Slooten, E. (2007). Conservation management in the face of uncertainty: Effectiveness of four options for managing Hector's dolphin bycatch. *Endangered Species Research*: 3, pp 169-179.

dolphins.[51]

In summary MFish consider amongst other things the following points useful in considering whether status quo management is appropriate of whether the Minister considers it necessary to take further steps to avoid remedy or mitigate the effects of fishing related mortality on Hector's dolphins:

⇒The biological characteristics, population status and trends of Maui's and Hector's dolphin;

⇒Increased public awareness and general societal trends toward being more risk averse in relation to human impacts on vulnerable species;

⇒Government concern over the status and trends in Hector's and Maui's dolphins including an overall desire based on expressed policy outcomes to rebuild threatened species; and,

⇒Information (scientific and anecdotal) indicating that fishing is the biggest known cause of human induced mortality of Hector's and Maui's dolphins.

7.2.5. Management proposals

As part of development of management proposals, officials held discussions with different stakeholder groups to seek input on ways to mitigate threats to Hector's dolphins. Outcomes of the regional process have assisted the development of the threat management options contained in this document, as well as analysis of the costs and benefits of those options. A summary of the outcomes of the regional discussions is provided in Appendix 2.

The nature and extent of fishing related threats varies between each of the four populations, as do the impacts on users from measures proposed. MFish has developed specific analysis at a population level around the nature and extent of fishing related impacts, and options for managing those impacts. Treatment of fishing threats to each of the four populations should be broadly consistent with any overall strategy for the species – in particular to ensure biological diversity is maintained, but also because each of the populations can contribute to any overarching approach for the Hector's dolphin species.

As such, while options have been developed for each of the four populations, the Minister will also be making a decision at a species level in considering impacts of measures across populations.

Options have been developed to address each threat (fishing method) that has been identified as creating a risk of fishing related mortality. There are three broad mitigation options for each threat. Only two options are provided for drift netting given the specific nature of problem (very localised use). The options are categorised by their ability to reduce risk of fishing related mortality caused by each threat and cost to fishers (as illustrated below). The nature and extent of each threat varies between method and between populations. The range of options forms a matrix.

[51] Based on reported mortalities with a confirmed cause.

Status quo	Option 1	Option 2	Option 3
LOWER → Level of risk mitigation / Impact on current use → HIGHER			

The Minister is free to choose a mix of options within populations and across the species as a whole but should, given the uncertainty in information on biological risk, carefully consider the impact on use when determining the appropriate options. MFish notes that depending on the nature and extent of the threat from different fishing methods to a given population, the Minister could choose a higher level of risk mitigation (e.g. Options 2 or 3) for methods that pose the highest threat, but choose a lower level of risk mitigation for methods that pose a lesser threat to the population. That is, the level of mitigation that the Minister considers necessary may vary between populations and fishing threats, depending on the particular circumstances of the region, the balance struck between utilisation and sustainability, and the need to ensure viability (including biological diversity) of the species as a whole.

MFish has a general preference that measures should be applied consistently throughout the range of each dolphin population to ensure the measures are most effective but also aid in compliance both in terms of enforcement and cost.

7.2.5.1. Set net definition

The legal definition of set netting is very broad and encompasses most fishing methods and gear that enmesh fish. MFish has identified set netting (see Part I explanation of this method) as a risk to Hector's dolphins. MFish notes that in referring to set nets, the focus has been on methods that may cause entanglement and death of Hector's dolphins. MFish recognises that there may be some methods, such as ring shooting, that is included in the legal definition of set netting that may not need to be prohibited to avoid, remedy, or mitigate the effects fishing on Hector's dolphins because of the way the gear is deployed. MFish invites stakeholder comments on methods that may be encompassed in the legal definition of set netting, but may not be a threat to Hector's dolphin. MFish will provide advice to the Minister, incorporating information from stakeholders on possible non-harmful methods, which may be excluded from regulations on set net restrictions.

7.2.5.2. Transition timeframe for implementation of measures

Also relevant to the Minister's decisions is the speed with which measures are introduced. The Minister could choose an option and introduce the measures over a time period to allow for adjustment by users – particularly if measures implemented are onerous in terms of cost. In considering an appropriate transition time period the Minister would need to consider:

- ⇒The urgency of the problem, including the effects of fishing-related mortality on Hector's dolphins.
- ⇒The effectiveness of current measures (risk to dolphins during the period while measures were introduced)
- ⇒The effects on fisheries resource users through mitigated impacts on use

The Minister could also choose to phase in measures by implementing a less onerous option for a certain time period and replacing that with a higher level of mitigation at a later specified date.

7.2.5.3. Monitoring

Given uncertainty in information about the status of the population and the effects of fishing, threat mitigation should be accompanied by better estimation of fishing related impacts. MFish considers that the Minister should determine whether additional monitoring may be necessary, if he chooses an option that allows for use of fishing methods known to pose a threat to Hector's dolphins.

Detail around a proposed monitoring programme is outlined in Part III.

7.2.5.4. Impacts on fishers

In the analysis of options provided in the regional sections, MFish discusses the potential effect of each option on fishers. In providing submissions, stakeholders should provide information on any utilisation, economic, social, and cultural factors that may be relevant to the proposed options. In particular, fishers should provide information on how these proposals may have an impact on their fishing activities.

The nature of the information that will be used to analyse impacts on utilisation associated with the proposed measures is outlined below.

Commercial fishers

MFish has characterized the main set net and trawl fisheries in each region and analysed selected commercial set net and trawl fisheries in some regions. This analysis has been used to identify the number of fishers that will possibly be affected by the proposed options and the nature of effects on catch and value.

As mentioned above, MFish has contracted an independent assessment of the likely cost of the proposed options. That contract will build on the analysis of MFish data. That research will also collect the qualitative information to assess the socio-economic impact of the proposed options. In addition, MFish welcomes commercial fishers' comments on the impacts of the proposed options on their fishing operations.

Recreational fishers

MFish has little information on the number of recreational set net events around New Zealand's coastline, and welcomes stakeholder information on this. Due to inherent data limitations, any quantitative estimates of the level of recreational activity with set nets will be very inexact. MFish expects that the research project will provide some qualitative understanding of the significance of amateur set netting. MFish expects the research to provide some, although perhaps not definitive, indication of how differences among the proposed options will affect recreational set netting and the socio-economic impact of the proposed options. For example, MFish expects the contract to generate qualitative data about the seasonal and spatial distribution of recreational set net activity and the alternative recreational fishing options available.

MFish recognises that set netting is a popular recreational activity. Removing the opportunity to set net would eliminate the opportunity that exists at present and would detract from a popular activity. MFish welcomes stakeholders' specific comments on the nature and extent of how the proposals might have an impact on their individual circumstances.

Customary fishers

The DOC incident database lists no Hector's dolphin mortalities attributable to customary set net fishing. MFish understands the use of set nets for customary fishing is low and, accordingly, believes the associated risk to Hector's dolphins is low.

The measures proposed in this document apply to amateur and commercial fishers. However, MFish notes that customary fishing regulations enable Tangata Tiaki, or a tangata whenua representative appointed for the area, to issue authorisations in contradiction to any amateur set net area closures. It is possible that the proposed prohibitions on amateur set netting might lead to an increase in authorisation applications for customary set netting. The aforementioned research programme is intended to provide some information on current customary fishing practice. Due to inherent data limitations, any quantitative estimates of the level of customary activity with set nets will be very inexact. MFish does expect that the research will provide some qualitative understanding of the significance of customary set netting. MFish expects the research to provide some, although perhaps not definitive, indication of how differences among the proposed options will affect customary set netting.

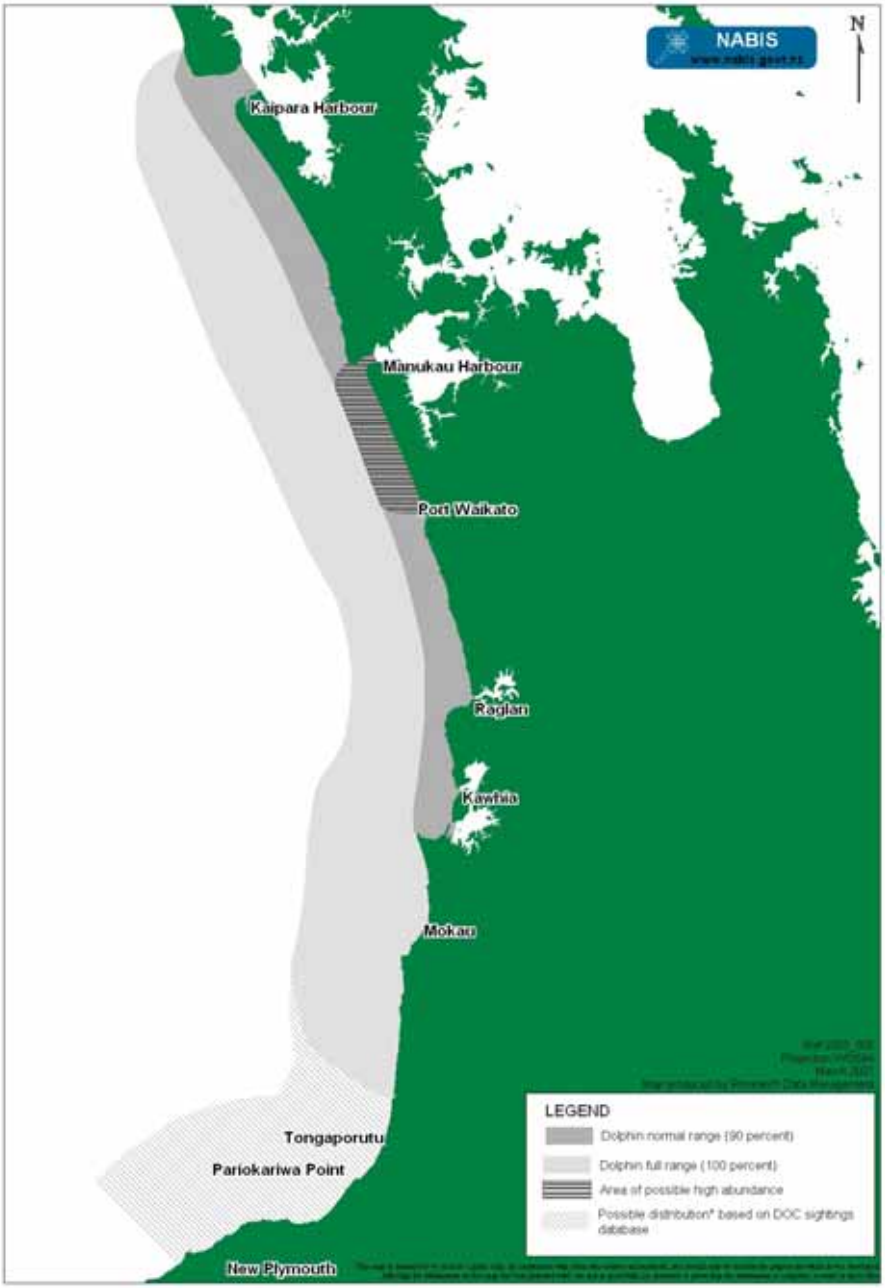
MFish welcomes iwi specific comments on the nature and extent of how the proposals might have a social, cultural, or economic impact on their individual circumstances.

7.3. West Coast North Island (Maui's Dolphin)

7.3.1. Population characteristics

Distribution

Most recent sightings of Maui's dolphins have occurred between Maunganui Bluff on the North Island's west coast (WCNI), south to Tongaporutu, 40 km north-east of New Plymouth (Map 5). Confirmed sightings outside this range are rare, although Maui's dolphins were once found along most of the WCNI and up the east coast as far as Bay of Plenty. The lack of Maui's dolphin sightings in the south Taranaki-Wanganui region since the 1970s indicates a reduction in range from what was once a centre of the dolphin population.



Map 5: Maui's dolphin distribution[52]

Aerial (e.g. 2004[53]) and boat (Russell 2002; see Slooten, *et al* 2005) surveys suggest Maui's dolphins are now most common between the Manukau Harbour and Port Waikato within 4nm of the coast – 75% of summer survey sightings place Maui's dolphins within 1nm of coast compared to 33% in winter; maximum distances of offshore survey sightings were 3.1nm in summer and 3.3nm in winter.

[52] Indicative only

[53] Slooten, E, *et.al.* Distribution of Maui's dolphin *Cephalorhynchus hectori maui*, New Zealand Fisheries Assessment Report, 2005/28.21 p.

New distribution information

Since 2003, an area on the WCNI has been closed to amateur and commercial set netting (further detail is provided in the Existing Threat Management section below). The extent of the closed area corresponds to the then known range of the Maui's population – from Pariokariwa Point (north of New Plymouth) to Maunganui Bluff (north of Dargaville) out to 4nm, as well as the mouth of the Manukau Harbour.

Maui's dolphins are not typically encountered in harbours (unlike Hector's dolphins). However, there have been recent verified sightings (since 2003) of Maui's dolphins inside the entrances to the Kaipara and Manukau Harbours and outside the entrance to the Raglan Harbour (Table 2). In addition, researchers using acoustic data loggers (PODs) recently recorded what they believe to be Maui's dolphin acoustics in the Manukau Harbour[54].

Table 2 Summary of West Coast Harbour and Taranaki Bight Distribution Research

	Maunganui - Pariokariwa	**Kaipara**	**Manukau**	**Raglan**	**Aotea/Kawhia**	**Taranaki Bight**
Verified sightings	173	4 (3 in entrance and 1 beyond)	2 (beyond entrance area)	1 (just outside)	0	0
Aerial surveys (Slooten *et al* 2005)	59	0	0	Not Surveyed	Not Surveyed	0
Strandings (since 1921)	40	0	0	0	0	0
POD detections	N/A	0	21	0	Not Surveyed	N/A

Recent verified sightings are limited to two Manukau Harbour sightings (further inside the harbour than the existing set net prohibition extends), four Kaipara Harbour sightings (three at the harbour entrance and one further inside the entrance), and one sighting outside the Raglan Harbour entrance.

PODs have detected sounds in the frequency range produced by Maui's dolphins in the Manukau Harbour past the current set net prohibition. Twenty one acoustic events have been logged in the Manukau Harbour (18 at Cornwallis on the northern side of the harbour and three at Kauri Point on the southern side). The researchers cannot determine whether these events relate to one or more sound sources. The POD research that detected the acoustics in Manukau Harbour is not complete, and results are preliminary. MFish notes that while Maui's dolphin acoustics recorded by PODs placed outside the Manukau Harbour have been verified by the simultaneous sighting of a Maui's dolphin in the vicinity of the POD, none of the acoustic events inside the Manukau Harbour are corroborated by sightings (ie, sightings have not been made at the same time as the acoustic events were recorded). PODs in the Kaipara and Raglan harbours have not detected sounds within the frequency range produced by Maui's dolphins.

Preliminary results from recent DOC aerial surveys in 2006 indicate that Maui's dolphins may move

[54] PODs detect sounds that can be attributed to Maui's dolphins. No Maui's dolphin acoustics have been detected in the Kaipara and Raglan Harbours. However, the Kaipara has a wide expanse of water so if dolphins do enter the harbour the chances of detection are probably low. The Raglan POD has only been in place a short time. Researchers will place PODs in the Kawhia Harbour in the future.

further offshore than the existing 4nm set net prohibition. However, the findings of this work are not yet verified, and MFish is therefore uncertain of the validity of the sightings.

There have been recent public sightings of dolphins reported in the Taranaki Bight, but investigations indicated all but one was unlikely to be a Maui's dolphin. This single possible Maui's dolphin sighting is unable to be confirmed because the information provided about the sighting was inconclusive. DOC has included this region in its aerial surveys but has made no sightings of Maui's dolphins.

Biology

Maui's dolphins mature late (7-9 years), have a slow reproductive rate (one calf every 2-3 years) and live to around 20 years old. The Maui's dolphin population is critically small (111 individuals, 95% confidence interval = 48-252) and genetic evidence suggests there may have been a recent decline in abundance (within the last few generations)[55]. Researchers have indicated there may be fewer than 30 breeding females in the population meaning productivity of the population as a whole is extremely low.

7.3.2. Fishing threats to Maui's dolphins

Life history (maturity, fecundity, and longevity) and population size mean Maui's dolphins are threatened by any human-induced mortality. Potential Biological Removal (PBR) analysis estimates that human-induced mortalities need to be zero to reduce extinction risk for this population[56].

Potential fishing threats to the Maui's dolphin population are set netting, trawling, and drift netting.

DOC incident database lists 17 reported Maui's dolphin mortalities since 1988. Of these mortalities, the cause of death was able to be assessed in 9 cases. The remaining mortalities were either not assessed for cause of death (3) or the cause of death was not determinable due to the condition of the carcass (5 individuals). Fishing activity is the identified cause of death in two cases, natural mortality in a further two cases, and cause of death deemed to be unknown in one case (Table 3). The cause of death cannot be determined in the remaining mortalities although four have been identified as "possible net entanglements", "probable net entanglements", or "possible human interaction"[57].

Table 3 Total number of reported Maui's dolphin mortalities on the west coast North Island (including cause of death) since 1988 where the cause of death was confirmed.

Cause of death	Number
Net entanglement	2
Natural	2

Fishers are required by law to report any dolphin entanglement. However, MFish cannot be certain that fishers always see and report all fishing-related mortalities. Consequently, the fishing-related mortalities in Table 3 may be underestimates and, as such, MFish cannot determine with certainty the extent of actual Maui's dolphin mortalities caused by fishing.

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[55] Pichler, F. B. 2002. Genetic assessment of population boundaries and gene exchange in Hector's dolphin. Department of Conservation Science Internal Series 44. 37 p

[56] See Appendix 3 for a description of the PBR analysis for Hector's (including Maui's) dolphins. PBR is only one of a number of factors in determining appropriate management action. There is currently debate around the inputs to the PBR analysis. MFish and DOC intend to have the Hector's dolphin PBR analysis independently reviewed to resolve this issue.

[57] The "possible" and "probable" net entanglements relate to carcasses that show evidence of entanglement (for example, some sign of net marks) but the cause of death cannot be determined with certainty.

7.3.2.1. Set nets

Vulnerability of dolphins (Maui's and other dolphins) to entanglement in fishing gear, particularly in inshore set nets, has been established through a combination of interviews and autopsies of set net caught and beach-cast animals. Maui's dolphin has a close inshore distribution that until recently overlapped with commercial and amateur set net fisheries – in 2003 MFish created set net exclusion zones across the confirmed Maui's dolphins range (further detail is provided in the Existing Threat Management section below).

Maui's dolphins are known to have been entangled in set nets historically. MFish cannot determine the extent of set net related mortalities but evidence (as noted above) suggests that at least two Maui's dolphins have died since 1988 as a result of net entanglements. There have been four reported mortalities since the 2003 set net prohibition was implemented and none have been attributed to fishing.

Commercial and amateur set netting is common in areas immediately outside the set net closed area, including in areas where new information suggests that Maui's dolphins may occasionally be present (ie, harbours and south of the closed area – see above section on new distribution information). Commercial and non-commercial set netting occurs in all west coast harbours. As such, any Maui's dolphin coming into these waters may be at risk of entanglement. The main set net target species are flounder, mullet, and rig. Set netting is the most effective way to catch these species. Virtually all parts of all the harbours are fished, from intertidal upper reaches to the deeper channels towards the entrances.

Set net practices at Port Waikato also represent a potential risk to Maui's dolphins because there is a possibility that nets get lost and washed out into areas where dolphins occur. MFish Compliance has ongoing problems with amateur net fishers who do not use correct netting practices and this increases chances that set nets become lost and float out to sea.

The Taranaki Bight is also fished by amateur (inshore) and commercial (further offshore) set netters. The Taranaki Bight was once a core area of distribution with comparatively large numbers of Maui's dolphins thought to have been in the region. However, this is no longer the case and the southernmost verified sighting in recent times was in the region of Mokau in northern Taranaki. Set netting in the Taranaki Bight southward of the closed area would represent a threat if Maui's dolphins are in this region.

Approximately 119 commercial set netters (operating about 136 vessels) fish on the WCNI. Most set netters fish in WCNI harbours, especially the Kaipara Harbour and the Manukau Harbour. Table 4 below characterizes the main commercial set net fisheries on the WCNI using estimated catch and effort data reported from statistical reporting areas 40 to 46. Not all the catch and effort (and value) listed in Table 4 can be attributed to the WCNI area that overlaps with Maui's dolphins because the statistical reporting areas cover a much wider area. However, the characterization illustrates the nature and extent of set netting on the WCNI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Maui's dolphins (see later in this section). Selected WCNI fishery characterizations are in Appendix 4.

Table 4 WCNI set net characterisation captured from estimated catch and effort reporting in statistical reporting areas 40 to 46. Value is estimated from the port price for the corresponding fishing year[58].

Fishery		**2003-04**	**2004-05**	**2005-06**
School shark	Catch (tonne)	198	225	250
	Fishers	30	29	24
	Vessels	33	29	27
	Value ($)	$459,518	$406,125	$335,000
Grey Mullet	Catch (tonne)	207	265	212
	Fishers	80	74	61
	Vessels	92	88	73
	Value ($)	$434,648	$643,950	$533,180
Rig	Catch (tonne)	234	243	199
	Fishers	87	87	82
	Vessels	102	102	89
	Value ($)	$821,340	$773,955	$565,160
Flatfish[59]	Catch (tonne)	340	309	246
	Fishers	108	102	97
	Vessels	127	117	112
	Value ($)	$1,273,419	$1,302,435	$800,730
Warehou	Catch (tonne)	89	126	65
	Fishers	12	8	6
	Vessels	12	8	6
	Value ($)	$78,956	$166,950	$69,550
Kahawai	Catch (tonne)	46	47	34
	Fishers	85	85	72
	Vessels	103	99	84
	Value ($)	$19,877	$38,070	$14,620
Spiny dogfish	Catch (tonne)	13	32	33
	Fishers	7	7	8
	Vessels	7	7	8
	Value ($)	$6,474	$14,080	$15,510
Trevally	Catch (tonne)	31	41	30
	Fishers	76	74	64
	Vessels	89	84	73
	Value ($)	$20,770	$36,490	$25,800
Snapper	Catch (tonne)	22	37	21
	Fishers	28	33	27
	Vessels	30	37	29
	Value ($)	$95,241	$160,580	$82,320
Red gurnard	Catch (tonne)	16	21	18
	Fishers	53	51	35
	Vessels	57	58	42

[58] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

[59] Including all flatfish species codes.

Fishery		2003-04	2004-05	2005-06
	Value ($)	$30,078	$36,015	$28,260
Parore	Catch (tonne)	9	9	11
	Fishers	53	50	47
	Vessels	63	58	53
	Value ($)	N/A	$4,860	$5,940

7.3.2.2. Commercial trawling

Trawl gear is a known risk to Maui's dolphins – there are confirmed incidences of Hector's dolphins being caught in trawl nets off the east coast of the South Island. MFish notes that trawl fishers on the WCNI occasionally catch other dolphin species but there are no reported incidences of Maui's dolphins being caught in trawl gear. However, there is no incentive for fishers to report Maui's dolphin mortalities (although there are financial penalties for non-reporting) and fisheries observer coverage in the WCNI trawl fishery is normally low. Trawling is prohibited on the WCNI within 1nm of the shore and within 2nm of harbour entrances but outside this area trawlers operate where dolphins have been sighted. For this reason, MFish considers that trawling should be regarded as a potential threat to Maui's dolphins.

There are approximately 23 trawl fishers operating about 34 vessels (under 46m) on the WCNI[60]. The WCNI trawl fishery targets a range of species, notably jack mackerel, trevally, snapper, and gurnard in both near shore and deeper waters. Trawl positioning information inside 4nm suggests comparatively lower trawl activity between the Manukau Harbour and Port Waikato (ie, an area with higher abundance of Maui's dolphins) and higher trawl activity further north close to the Kaipara Harbour.

Table 5 below characterises the main commercial trawl fisheries on the WCNI using estimated catch and effort data reported from statistical reporting areas 040 to 046 over the past three fishing years. Not all the catch and effort (and value) listed in Table 5 can be attributed to the WNCI area that overlaps with Maui's dolphins because the statistical reporting areas cover a much wider area. However, the characterisation illustrates the nature and extent of trawling on the WCNI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Maui's dolphins (see later in this section).

Table 5 WCNI trawl characterisation captured from estimated catch and effort reporting in statistical reporting areas 40 to 46. Value is estimated from the port price for the corresponding fishing year[61]. Analysis excludes vessels >46m except for * that may include vessels greater than 46m.

Fishery		2003-04	2004-05	2005-06
Trevally	Catch (tonne)	1287	1128	1471
	Fishers	24	21	20
	Vessels	36	30	27
	Value ($)	$862,367	$1,004,196	$1,264,761
Snapper	Catch (tonne)	1116	1109	976

[60] Vessels greater than 46 metres cannot trawl inside 12nm where threat management measures are proposed.

[61] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

Fishery		2003-04	2004-05	2005-06
	Fishers	23	23	22
	Vessels	38	34	31
	Value ($)	$4,841,034	$4,812,322	$3,825,748
Red gurnard	Catch (tonne)	518	645	576
	Fishers	27	22	22
	Vessels	41	34	32
	Value ($)	$972,875	$1,106,664	$904,733
Barracouta	Catch (tonne)	224	896	406
	Fishers	21	19	18
	Vessels	35	27	27
	Value ($)	$93,856	$250,880	$117,740
Tarakihi	Catch (tonne)	264	277	264
	Fishers	20	14	16
	Vessels	32	24	24
	Value ($)	$636,973	$623,876	$583,190
Leatherjacket	Catch (tonne)	151	103	105
	Fishers	20	16	18
	Vessels	30	21	25
	Value ($)	$69,626	$42,745	$54,075
John dory	Catch (tonne)	81	130	67
	Fishers	27	21	21
	Vessels	38	33	30
	Value ($)	$426,776	$634,409	$300,992
School shark	Catch (tonne)	100	95	75
	Fishers	23	17	21
	Vessels	34	26	29
	Value ($)	$232,926	$170,878	$100,079
Spiny dogfish*	Catch (tonne)	38	42	22
	Fishers	12	9	10
	Vessels	18	16	13
	Value ($)	$18,924	$18,480	$10,340
Rig*	Catch (tonne)	20	11	10
	Fishers	24	17	28
	Vessels	37	28	30
	Value ($)	$70,200	$35,035	$28,400
Silver warehou	Catch (tonne)	1	3	4
	Fishers	5	1	3
	Vessels	5	5	6
	Value ($)	$1,045	$2,346	$3,049

7.3.2.3. Drift Net Fishing

Drift netting involves use of nets that drift with currents. Some fishers use drift nets as alternatives to set net fishing in the Waikato River (mainly for mullet). Although Maui's dolphins do not enter the Waikato River, the nearshore region at the river mouth is at the southern end of an area where Maui's dolphins appear more abundant than other areas. The potential threat associated with drift net fishing arises because fishers occasionally lose their nets. Unlike set nets, lost drift nets do not roll up but instead may float down the river and out into Maui's dolphin habitat where dolphins could get entangled.

MFish is unable to confirm any Maui's dolphin mortalities resulting from the drift net fishery. However, a dead Maui's dolphin was found close to the Waikato River mouth with a net nearby (identified as possibly being from a drift net). MFish invites information from stakeholders on the likelihood of lost drift nets.

There are currently four drift netters operating in statistical reporting area 042 (operating at Port Waikato) but up to six fishers have drift netted at the Port over the past three fishing years. Catch and effort appears to have declined over the past three years. MFish cannot ascertain how much catch and effort (i) falls in the lower and upper reaches of Port Waikato and (ii) may be affected by options to manage the effects of fishing on dolphins because fishers are only required to estimate catch when reporting by statistical reporting area. Nevertheless, MFish considers Table 6 below – that reports on estimated catch, participation, and value of key WCSI drift net fisheries – and the analysis later in this section illustrates the nature of potential costs associated with each threat management option.

Table 6 WCNI driftnet fishery characterisation captured from estimated catch and effort reporting in statistical reporting area 042. Value is estimated from the port price for the corresponding fishing year[62].

Fishery		**2003-04**	**2004-05**	**2005-06**
Grey mullet	Catch (tonne)	46	54	36
	Fishers	4	5	4
	Vessels	2	5	4
	Value ($)	$96,588	$97,470	$48,240
Yellow eyed mullet	Catch (tonne)	6	2	0.5
	Fishers	2	2	1
	Vessels	2	2	1
	Value ($)	$12,960	$4,500	$1,230

7.3.3. Existing threat management

7.3.3.1. Set nets

Amateur and commercial set net prohibition

Since 2003 both amateur and commercial set netting has been prohibited between Maunganui Bluff and Pariokariwa Point (out to 4nm) and inside the entrance to the Manukau Harbour (Map 6). As such, set

[62] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

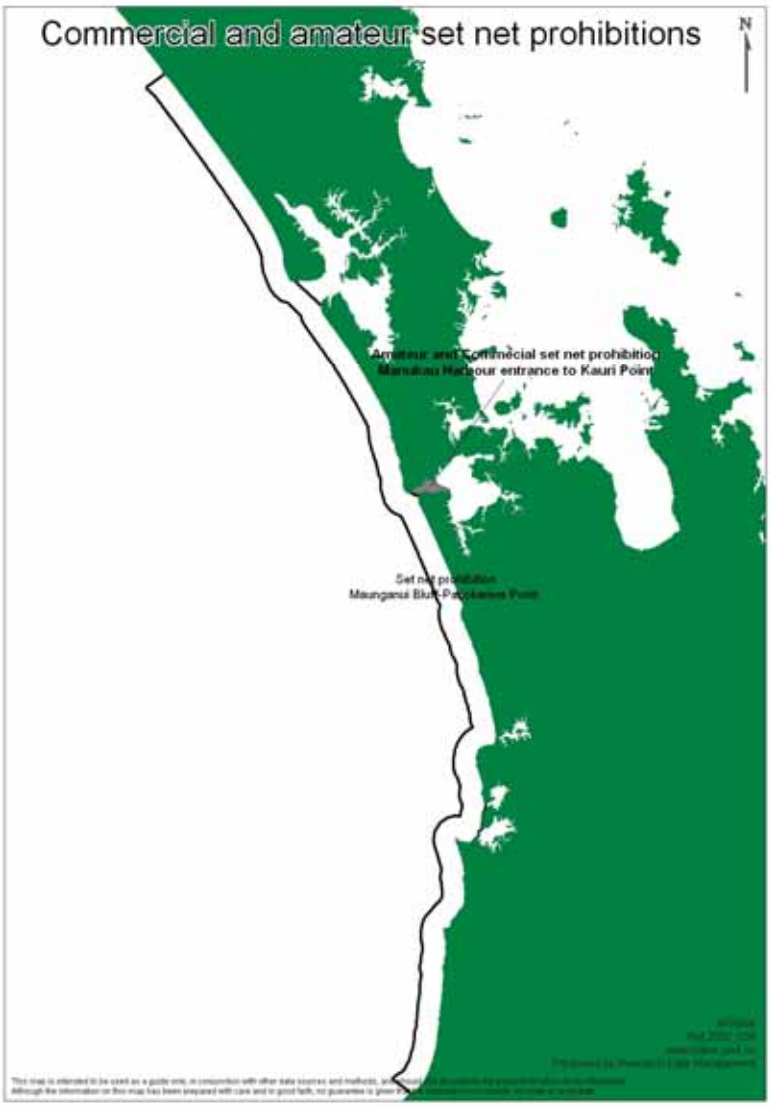
netting on the WCNI is now confined to harbours, offshore (outside 4nm), and to the north and south of the closed area. The Minister approved the prohibition to help avoid Maui's dolphin entanglements with set nets. The closed area was intended to cover Maui's dolphin range as determined by a combination of:

⇒Strandings (e.g. dead dolphins washed ashore and dolphins recovered entangled in nets)

⇒Verified public sightings[63]

⇒Aerial surveys and

⇒Boat-based surveys.



Map 6: Commercial and amateur set net prohibition on the west coast of the North Island

[63] The prohibition extended 30km to 40km north and south of the verified sightings at the time.

In addition to the set net closed area, regulations and voluntary mechanisms that apply to set net use around New Zealand may help reduce the chance of interactions (if Maui's dolphins range beyond the set net prohibition). These nationally applicable measures are outlined below.

Amateur set nets

The following amateur set net rules apply throughout New Zealand:

⇒Amateur nets must not exceed 60m in length[64].

⇒The use of stakes to secure amateur nets is prohibited[65]

⇒Amateur set nets must not be set in a way that causes fish to be stranded by the falling tide[66]

⇒Amateur nets must not be set within 60m of another net[67].

Similarly to elsewhere in New Zealand, MFish publicises an amateur set net Code of Practice (CoP) that promotes good netting practice, including:

⇒Using a net designed for the fish species being targeted

⇒Deploying a net with anchors that are suitable for sea conditions to prevent losing nets

⇒Setting a net that can be easily retrieved

⇒Staying with and regularly checking the net

⇒Avoiding setting nets when dolphins are present

⇒Deploying a net for the shortest soak time possible

⇒Avoiding setting nets overnight

Commercial set nets

The following commercial set net rules apply throughout New Zealand:

⇒Commercial fishers cannot use more than 3000m of net per day[68]

⇒Commercial fishers must service their net while it is set at least every 18 hours[69]

⇒Commercial fishers must service their net while it is set at least every 24 hours[70]

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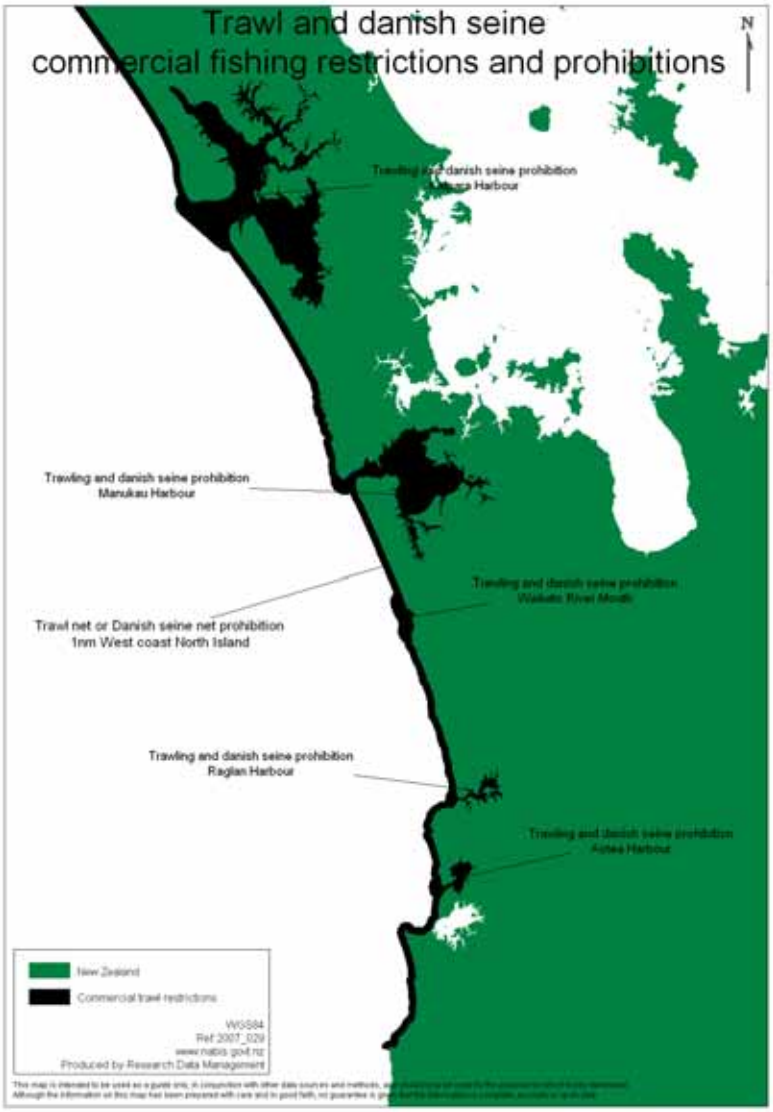
[64] r 12(1)(a) of the Fisheries (Amateur Fishing) Regulations 1986
[65] r 11 of the Fisheries (Amateur Fishing) Regulations 1986
[66] r 10 of the Fisheries (Amateur Fishing) Regulations 1986
[67] r 12(1)(c) of the Fisheries (Amateur Fishing) Regulations 1986
[68] r 65(3) of the Fisheries (Commercial Fishing) Regulations 1986
[69] r 66 of the Fisheries (Commercial Fishing) Regulations 1986
[70] r 7B of the Fisheries (Central Area Commercial Fishing) Regulations 1986

7.3.3.2. *Commercial trawling*

There are no specific legislative, regulatory, or voluntary management measures to avoid, remedy, or mitigate any effects of trawling on Maui's dolphins. However, the Fisheries (Auckland and Kermadec Areas Commercial Fishing) Regulations 1986 prohibit trawling within 1nm of the west Auckland coast, and prohibit trawling and Danish seining in defined areas including: Kawhia Harbour, Aotea Harbour, Raglan Harbour, Manukau Harbour, Kaipara Harbour, Hokianga Harbour, Waikato River Mouth and adjacent seas within 2nm, and the harbours of Herekino and Whangape (Map 7). In addition there is a 2nm voluntary trawl exclusion area in Taranaki between the Awakino River mouth and Port Taranaki.

The trawl prohibitions along the WCNI mean that trawl effort immediately offshore is not high.



Map 7: Current mandatory trawl and Danish seine restrictions on the west coast of the North Island

7.3.3.3. *Drift net fishing*

There are no specific legislative, regulatory, or voluntary management measures to avoid, remedy, or mitigate any effects of drift net fishing in the Waikato River on Maui's dolphins. However, in summer

2005-06, MFish worked to raise fishers' awareness of good drift netting practices through a public awareness campaign (including distribution of posters) in the Port Waikato area.

7.3.4. Additional threat management

Whether the Minister considers it necessary to implement further measures to manage the effects of fishing related mortality on Hector's dolphins depends ultimately on the balance between sustainability and utilisation the Minister considers appropriate. The following points are particularly relevant:

⇒The population is critically endangered and is the smallest out of any of the Hector's (Maui's) dolphin populations (about 111 animals; range 48 to 252)

⇒PBR analysis indicates the Maui's dolphin population can sustain no human-induced mortalities per year[71]

⇒Genetic analysis suggests the population may have undergone a recent decline in abundance (within the last few generations).

Even low levels (<1) of fishing related mortality will have an effect on the Maui's dolphin population. In this circumstance it is appropriate to consider the risk of fishing related mortality that may be appropriate. MFish considers that some residual risk of fishing-related mortality remains following measures implemented in 2003. The key decision is whether the Minister considers the current level of residual risk acceptable. If the current level of residual risk is considered acceptable then no further measures would need to be implemented to reduce risk. However, if the Minister considers current residual risk unacceptable then he should consider the options below that outline possible additional measures to reduce or remove risk.

MFish notes FA96 does not oblige the Minister to reduce the risk of fishing-related mortalities to zero. However, the characteristics of this population (subject to significant decline in number of dolphins over time and very low current number of dolphins) suggest the Minister should be cautious determining the degree of acceptable risk of fishing-related mortality. Residual risk from fishing arises from three keys areas:

⇒Use of set nets in areas outside the set net closed area

⇒Trawling

⇒Drift netting.

[71] The nature of PBR analysis, or any modelling exercise relying on estimated biological and variable inputs, does not necessarily lend itself to decision making with certainty. This is especially relevant in determining acceptable risk to a protected species like Maui's dolphin where the courts have determined that a precautionary approach to balancing utilisation and sustainability is open to the Minister.

7.3.4.1. Set nets

The previous Minister of Fisheries implemented measures to reduce the effect of fishing-related mortality from set nets in 2003. Since 2003 there have been no known mortalities confirmed as a result of fishing[72].

New distribution information suggests there may be residual risk from set netting outside the current closed area. However, there is considerable uncertainty over the nature and extent of this risk. There are three key points of uncertainty in relation to this information that should be taken into account when deciding whether to implement further measures and what measures should be implemented:

⇒The extent of use of the Manukau and Kaipara Harbours by Maui's dolphins

⇒How far into the Manukau and Kaipara Harbours the dolphins travel

⇒Whether the dolphins use other west coast harbours or move south or further offshore from the existing closed area.

Information prior to 2003 suggested dolphins were present in the Manukau Harbour entrance. When measures were applied to address the risk of set netting this area was included in the closed area. Since 2003, there have been four verified sightings of Maui's dolphins in the entrance to the Kaipara Harbour and two in Manukau Harbour further in than the existing closure. In addition, data from a POD further inside the Manukau Harbour from the existing closure also suggests dolphins may occasionally be present.

The POD information is uncertain – the scientific study of which the POD data are a part is still underway and has yet to be scientifically peer reviewed. In addition, POD acoustics further inside the harbour than the existing closure have not been corroborated by sightings, and a POD even further inside the Manukau Harbour has not recorded sounds associated with dolphins being present. This would suggest that less weight should be given to this information than a completed reviewed scientific document.

There is no information to indicate the extent to which dolphins travel into the Manukau and Kaipara harbours from the entrance – boat-based surveys inside Manukau Harbour have not identified Maui's dolphins and there are no stranding reports inside the harbour. As already noted, public sighting reports inside the harbour are limited to the harbour entrance area despite extensive boating activity inside the harbour. However the area is large, and lack of data does not necessarily mean that dolphins do not travel further into the harbour.

Environmental groups and councils in the Auckland and Waikato regions have proposed widespread closures covering all west coast harbours and south to Cape Egmont to manage the risk of interaction between dolphins and set nets. There is no information to suggest that dolphins enter any west coast harbours other than the Manukau and Kaipara Harbours, and information on the extent of the use of these harbours is uncertain. It is possible that if dolphins enter the Manukau and Kaipara harbours they may also enter other west coast harbours. Hector's dolphin's in the South Island are known to frequent shallow harbour environments. However, harbour entrances on the WCNI are often rough with bars, shoals and strong currents potentially acting as barriers to entry.

Information supporting a southern and seaward extension of the set net current closed area is also uncertain. There are no verified Maui's dolphin sightings south of the closed area since it was

[72] Of the four reported mortalities since 2003, one was a natural mortality and cause of death in the others is unknown.

implemented in 2003 although there is at least one inconclusive sighting and DOC has information suggesting there may have been other sightings south of the existing closure. In addition, new survey information that indicates Maui's dolphins move seaward of the existing 4nm set prohibition (up to 9nm) is not yet verified or complete, and should be accorded the same status as the POD research.

As noted, the biological status of Maui's dolphin and effects of fishing-related mortality is such that an option erring on the side of sustainability is open to the Minister. The Minister should carefully consider whether he believes it reasonable to impose a total set net closure in all harbours and south to Cape Egmont given uncertainty in information. If the Minister decides to pursue such an option this would imply that he considers a very low level of residual risk of fishing-related mortality is acceptable.

7.3.4.2. Trawling

The previous Minister considered threats posed by trawling in 2003 and decided that mitigation measures were not necessary but agreed that additional fishery monitoring to determine the nature and extent of trawl-related threats should be implemented. However, there has been a low level of observer coverage of the inshore trawl fleet. There was no coverage in 2004-05 and 2005-06. There have been 68 observed tows on inshore trawl vessels fishing off the WCNI in the current fishing year (although some occurred outside Maui's dolphins range) and no Maui's dolphins were observed or captured on these tows. MFish also notes that there is little incentive (given possible consequences) to report incidents voluntarily.

In considering the most appropriate course of action, the Minister should note that there have been no reported Maui's dolphin interactions with trawlers but that trawling does overlap with Maui's dolphins range. In addition, trawling is known to catch Hector's dolphins in South Island waters (albeit that South Island trawlers have a higher probability of catching a Hector's dolphin due to a higher dolphin abundance) and other dolphin species off the WCNI.

The Minister should also note that aerial and boat-based surveys indicate most Maui's dolphins stay close inshore over summer inside voluntary and mandatory non-trawl zones. Maui's dolphins appear more dispersed in winter with a greater potential to overlap with the inshore trawl fishery. And as previously mentioned, trawl positioning information inside 4nm suggests lower trawl activity between Manukau Harbour and Port Waikato (ie. an area with comparatively higher number of Maui's dolphin's) than further north close to the Kaipara. Spatial differences in trawl effort may help mitigate risk of interactions with Maui's dolphins.

7.3.4.3. Drift nets

Loss of drift nets from the Waikato River is a potential threat to Maui's dolphins. MFish cannot quantify the incidence of lost nets or the level of risk posed to dolphins from this fishing method except to note that drift net effort has declined in recent years and there are no confirmed drift net related mortalities (although there one possible drift net entanglement).

7.3.5. Options

This section outlines options to avoid, remedy, or mitigate the effects of fishing on Maui's dolphins, if the Minister deems it necessary. Implicit in the Minister's decision is a careful consideration of the balance between sustainability and utilisation. Some options give more weight to sustainability relative to the use of fisheries resources. In considering the options the Minister should have regard to the information noted above, which outlines the nature of the risk from fishing-related mortality to the Maui's dolphin population, and should also have regard to the impact on fishers from the proposed measures and consider uncertainty in the information.

7.3.5.1. Status quo option

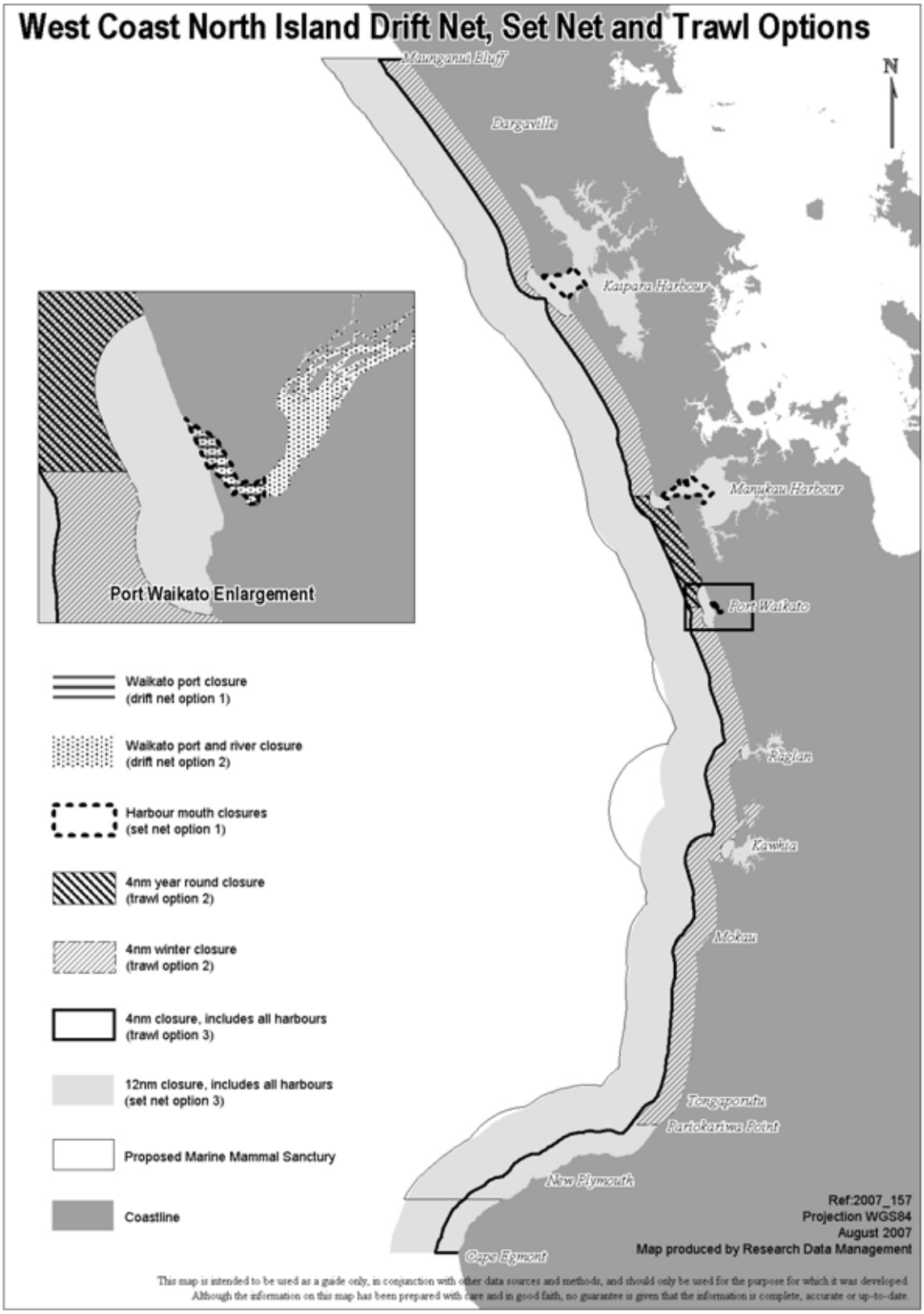
The nature and extent of fishing threats to the Maui's dolphin population, and an analysis of effectiveness of current measures and consideration of the need for further measures have been outlined in the sections above. In light of this information, the Minister may consider that the risks of fishing-related mortality are acceptable and consequently further measures to avoid, remedy or mitigate the effects of fishing-related mortality on Maui's dolphins are not necessary at present. MFish notes the *status quo* remains a valid option given uncertainty over the nature and extent of the impact of fishing-related mortality on Maui's dolphins and the impact on fisheries users. No further analysis of the *status quo* is carried out in this option section.

7.3.5.2. Amateur and commercial set nets

MFish proposes the following options to manage the threats of amateur and commercial set netting on Maui's dolphins. The measures are intended to address the potential risk of set netting in harbours and other areas outside the existing closure (see Map 8).

Status Quo	Existing Management
Option 1	Prohibit set netting at the mouth of the Kaipara Harbour and the lower reaches of the Waikato River, and also further into the Manukau Harbour entrance[73]
Option 2	Prohibit overnight set netting and require fishers stay with their fishing nets in all parts of Kaipara, Manukau, Raglan, Aotea, and Kawhia Harbours, and at Port Waikato
Option 3	Prohibit set netting in all parts of Kaipara, Manukau, Raglan, Aotea, and Kawhia Harbours, Port Waikato, and within 12nm of the shore from Maunganui Bluff to Cape Egmont.

[73] The lower reaches of the Waikato River is a smaller area than Port Waikato. Port Waikato includes the lower reaches of the Waikato River.



Map 8 WCNI set net options

Option 1

Option 1proposes to prohibit amateur and commercial set net fishing:

⇒In the entrance to the Kaipara Harbour – west of a line that runs from Pouto Point to South Head (excluding the lagoon) to encompass verified sightings post-2003

⇒Further into the Manukau Harbour entrance than the present closure (Lawry Point generally south east to channel marker no. 4 then generally south west to a peninsula 1km south of Grahams Beach)

⇒The lower reaches of the Waikato River – from the store (shop) to the river mouth.

The harbour entrance closures lower the risk of dolphin entanglements if dolphins do enter those harbour entrances. The Waikato River prohibition minimises potential net loss into dolphin habitat. Option 1 does not apply to the Raglan, Aotea, and Kawhia Harbour entrances, as there have been no confirmed sightings of Maui's dolphins in those areas. It is open to the Minister to strengthen the protection provided by Option 1 by including additional measures discussed in Option 2 below.

♦ *Effectiveness*

Closing the mouth of the Kaipara Harbour and Manukau Harbour to set netting would help avoid fishing-related mortalities if dolphins visit these areas. It is uncertain if, how often, and for how long Maui's dolphins come into these areas. New distributional information (sightings and POD research) suggests presence of Maui's dolphins in the entrances to the Manukau and Kaipara harbours is intermittent and not common. Based on this information, the Minister needs to determine if it is necessary to prohibit set netting in areas where Maui's dolphins may occasionally visit[74]. In making this determination, the Minister will need to consider the uncertainty in distributional information and the impacts that closures will have on utilisation.

Maui's dolphins do not appear to enter Port Waikato, but a set net prohibition on the lower reaches of the river would minimise the chance of set net loss from the river and potential dolphin entanglements. Closure of this area could lower such risks appreciably as any nets lost further upstream would most likely have rolled up before they reach the sea.

Some residual risk to Maui's dolphin could remain if Option 1 was implemented. The nature and extent of residual risk, if any, would depend on whether dolphins may travel further into the Manukau and Kaipara Harbours than the proposed closures, and if so, how often. Risk would also stem from any use by the dolphins of other west coast harbours not covered by the proposed closures, and potential risk south and offshore from the existing prohibition. As noted, there is no information available (sightings or POD data) to confirm that dolphins travel into the inner reaches of the Manukau or Kaipara Harbours or enter any other west coast harbours.

♦ *Impacts on fishers*

Commercial and amateur fishers will face impacts on current use if the Minister chooses Option 1. However, the impacts are likely to be lower than those associated with Option 2 because Option 1 provides greater flexibility for fishers to continue to set nets despite the removal of part of the fishable area.

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[74] Prohibiting set netting in the Kaipara Harbour entrance and further into the Manukau Harbour entrance is consistent with the rationale behind the 2003 prohibition, ie, to cover Maui's dolphin range determined by a combination of factors, including verified public sightings.

The Kaipara and Manukau harbours support important amateur and commercial set net fisheries including flatfish, grey mullet, kahawai, spiny dogfish, rig, trevally, and yellow eyed mullet. MFish has assessed the nature of costs associated with fishing method prohibitions in the assessment of Option 3 further below (Option 3 proposes set net prohibitions through the harbours' entirety). The Option 3 assessment is relevant to the assessment of costs associated with Option 1 because MFish cannot determine how fishing effort is distributed throughout Manukau and Kaipara Harbours with sufficient preciseness to enable assessment of costs associated with prohibitions in only part of the harbours. However, MFish notes that cost (in terms of lost fishing opportunity and/or catch) is probably lower in Option 1 than Option 3 because set nets would still be permitted in most parts of the harbours.

Anecdotal information indicates that rig is a popular amateur and commercial fishery inside the Manukau Harbour entrance. If this is the case, it is likely that rig fishers would be most affected by Option 1 (mullet and flounder are targeted further in the harbour although an extended prohibition will also effect these fishers). MFish notes the existing closed area removed a sizable portion of the Manukau Harbour that was fishable, and an expansion of that would cause a further loss of fishable area (commercial fishers have said that just inside the closed area line is a productive rig fishing area). It would also place more fishing pressure on the remainder of the harbour, which may increase gear conflict within and between sectors.

Anecdotal information from fishers in the Kaipara harbour suggests that because the Kaipara entrance area is subject to strong currents and often rough conditions it is not well suited to set net fishing. Some fishers suggest there is very limited amateur netting at the harbour entrance and only limited commercial fishing.

MFish is aware that there are 2-4 commercial set netters who are largely resident in the Port Waikato area and frequently fish at Port Waikato. It is likely that these fishers will often set net in other areas away from Port Waikato such as the Manukau Harbour or Firth of Thames. Up to a dozen commercial set netters from other areas such as South Auckland and around the Firth of Thames may also travel to Port Waikato for fishing. For the "resident" and "itinerant" fishers, most of the fishing is targeting mullet with nets inside the river delta. Closure of the river mouth area may not have a significant effect on these fishers because most fishing occurs further upstream (in the delta).

MFish invites submissions from fishers that describe the nature and effect of Option 1 measures on their fishing operations.

Option 2

Option 2 requires fishers to remain with their set nets at all times when fishing and prohibits overnight set net fishing. Option 2 focuses on reducing the number of nets used at any one time and enabling fishers to remove their nets immediately if dolphins appear.

Option 2 applies to commercial and amateur fishers fishing inside west coast harbours and harbour entrances between Maunganui Bluff and Pariokariwa Point, and at Port Waikato. However, the Minister is not bound to apply Option 2 to all proposed areas. The Minister could choose to include some areas (eg, the Kaipara and Manukau harbours) and exclude others in Option 2 after determining acceptable risk to Maui's dolphins from set netting in different areas.

- *Effectiveness*

Option 2 may lower the risk of dolphin entanglement in set nets by:

⇒Decreasing the number of nets deployed – mandatory net attendance net is likely to discourage

fishers from using a set net in preference to other fishing methods (MFish Compliance report that mandatory net attendance at Kaikoura last summer produced a notable decline in amateur set net usage)[75]

⇒Reducing set net soak time (fishers will not be able to leave their set net)

⇒Enabling fishers to immediately remove their set net from the water if a dolphin appears in the vicinity

⇒Enabling fishers to respond to dolphin entanglements faster in order to attempt to release entangled dolphins alive.

Prohibitions on overnight setting will further reduce the risk of net entanglement by reducing set frequency and ensuring that fishers only fish in daylight when they can see their nets and any Maui's dolphins that might be present.

MFish notes that an additional benefit of this option is that the above proposed restrictions will likely result in better quality fish and less wastage (due to reduced soak times, for example), and there will also be a reduced likelihood of nets being lost in inclement weather.

The overall effectiveness of Option 2 is difficult to quantify because set nets, despite proposed mitigation measures, could still pose a risk to Maui's dolphins (eg, dolphins could still become entangled in set nets and die before fishers can release them). However, MFish considers the mitigation does reduce risk of entanglement below *status quo* risk by creating disincentives to use set nets and providing the opportunity for a proactive response to entanglements and potential entanglements.

♦ *Impacts on fishers*

There are a number of potential costs to fishers associated with Option 2. MFish considers these potential costs will impact fishers more than costs associated with Option 1 because Option 2 removes flexibility in the exercise of amateur and commercial fishing activity to the extent that fishers may have to:

⇒Re-equip (if possible) to maintain current levels of catch

⇒Accept lower catches or fish longer for similar returns

⇒Cease fishing or shift to areas with fewer restrictions.

MFish does not consider commercial fishers could use different fishing gear and maintain current levels of catch with equivalent effort. MFish cannot quantify the effect of Option 2 on total catch from, and value of, WCNI set net fisheries apart to note that it is likely to be substantial because a large part of the WCNI set net fishery is fished in WCNI harbours. MFish considers the viability of some set net operations may decrease.

MFish considers the assessment of costs associated with Option 3 is also relevant to Option 2. Under Option 2, commercial fishers can continue to use nets (unlike Option 3), but commercial operations that use multiple set nets at any one time will be most affected if they cannot shift their fishing effort to other areas where the proposed restrictions do not apply.

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[75] MFish would invite recreational fishers to hand in any unused or unwanted amateur set nets. The handing in of unused or unwanted nets would remove potential latent effort in the amateur set net fishery. MFish could consider ways to reward fishers who hand in nets such as t-shirts, posters, or school donations.

Option 2 will enable amateur fishers to continue to use set nets to target important recreational species in harbours including flatfish, rig, and mullet. However, the limitations on fishing activity proposed in Option 2 may impact the amateur fishing experience and daily catch. Some amateur fishers set nets then move on to set additional nets or line fish in another area. Requirements to stay with nets will effectively prevent this activity. MFish considers that lower overall recreational catch is the most likely outcome. MFish also considers there may be health and safety implications for fishers that stay with nets in rough weather.

MFish invites submissions from fishers that describe the nature and effect of Option 2 measures on their fishing operations.

Option 3

Option 3 prohibits amateur and commercial set netting in all WCNI harbours between Maunganui Bluff and Cape Egmont out to 12nm and also at Port Waikato. There is no obligation on the Minister to apply Option 3 in its entirety. The Minister could choose to include some areas and exclude others in Option 3 after determining acceptable risk to Maui's dolphins from fishing.

♦ *Effectiveness*

MFish considers that Option 3 provides the Minister with the greatest certainty that risks to Maui's dolphins from set nets will be avoided. Risk of entanglement would approach zero with the possible exception of any dolphins that may venture further offshore than 12nm, or further south of the boundary of the extended set net closed area. However, MFish cannot quantify the extent to which Option 3 provides more protection than Options 1 and 2 given the limited and uncertain nature of new information on the distribution of Maui's dolphins.

♦ *Impacts on fishers*

The overall impact of Option 3 on amateur and commercial fishers is difficult to quantify. However, MFish has characterised the main commercial set net fisheries on the WCNI to help the Minister consider the impacts on commercial use (see Table 4 above).

There are approximately 119 commercial set net fishers on the WCNI operating about 136 vessels. Option 3 will have a significant impact on these fishers (highest impact of the three options considered). Commercial fishers will be excluded from set netting on the west coast from Maunganui Bluff to Cape Egmont out to 12nm and in west coast harbours and Port Waikato. The most important and most valuable WCNI set net fisheries are unlikely to be viable outside the Option 3 prohibition. MFish considers that most commercial set net fishers on the WCNI would be negatively affected by Option 3.

The following points are relevant in considering cost to commercial fishers associated with Option 3:

⇒Set nets support large harbour fisheries on the WCNI and also south of the current set net closed area towards Taranaki and outside the current 4nm prohibition. The main target fisheries are grey mullet, rig, trevally, flatfish, school shark, spiny dogfish, and kahawai (see Table 4).

⇒The two largest harbours on the WCNI yield large volumes of fish and provide employment to fishers:

- Around 611 tonnes of fish was harvested with set nets in the Manukau Harbour over the past three fishing years (worth nearly 2 million dollars – see Appendix 4). Over the same period MFish data indicates 52 fishers deployed set nets in the Manukau Harbour using 69 vessels. Estimated catches include:
  - 210 tonnes of grey mullet

- 97 tonnes of rig
- 28 tonnes of trevally
- 229 tonnes of flatfish (all flatfish species codes)
- 30 tonnes of kahawai

o Over 1000 tonnes of fish was harvested with set nets in the Kaipara Harbour over the past three years (worth nearly 3.5 million dollars – see Appendix 4). Over the same period MFish data indicates 74 fishers deployed set nets in the Kaipara Harbour using 83 vessels. Estimated catches include:

- 276 tonnes of grey mullet
- 153 tonnes of rig
- 29 tonnes of trevally
- 514 tonnes of flatfish (all flatfish species codes)
- 50 tonnes of kahawai

⇒Costs associated with Option 3 may include closure of some WCNI harbour fisheries and devaluation of Individual Transferable Quota (ITQ) for stocks taken in those harbours because there are no alternative fishing methods available to harvest the main target species inside WCNI harbours in quantities that would provide for viable commercial fishing operations equivalent to current operations[76]

⇒It is unlikely target set net fisheries in the harbours could shift effort without significant cost (many of the fishers are local to the harbour areas) or without reducing catches through increased effort in areas where set netting was still permitted (eg, Firth of Thames) for the main west coast harbour species.

⇒Option 3 would force Taranaki set netters beyond 12nm. MFish cannot determine the viability of the fishery beyond 12nm but notes such a shift in set net activity would be costly because of operational costs associated with fishing further out at sea.

Lack of quantitative information about amateur set netting on the WCNI means only the nature of potential costs to amateur fishers are discussed. However, the following points are relevant in considering costs to amateur fishers associated with Option 3:

⇒Set nets support large amateur fisheries on the WCNI harbours and also south of the current set net prohibition towards Taranaki. The main target fisheries are flatfish, mullet, and rig

⇒Set netting is the preferred method for most amateur fishers who target rig, flatfish, and mullet in west coast harbours (ie, the most efficient and effective fishing method)

⇒Amateur fishers cannot employ other methods to catch their favoured species in ways that produce catches equivalent to set net catches (with similar effort).

⇒Amateur set netters generally fish the harbours, rivers, and coastal areas in close proximity to their residence such that Option 3 would remove most set net fishing opportunities unless fishers picked up additional traveling costs.

⇒Iwi commonly fish using set nets under the amateur fishing regulations to catch flounder and mullet that are favoured species for kai moana, as well as at hui, tangi, and other important marae-based

[76] Trawling is already prohibited in the two largest west coast North Island harbours (Manukau and Kaipara).

functions.

MFish invites submissions from fishers that describe the nature and effect of Option 3 measures on their fishing operations.

Customary Fishing

MFish does not have quantitative information on the extent of customary set netting on the West Coast of the North Island. However, it is likely that customary fishing takes place using set net within the West Coast Harbours in this area. Customary fishing under the authority of the Kaimoana Customary Fishing Regulations or Regulation 27 of the Amateur Fishing Regulations will be unaffected by any measures implemented to manage the effects of fishing on Maui's dolphins. However, MFish will work with Tangata Tiaki/Kaitiaki to raise awareness of the issues associated with set netting and Maui's dolphins, and support non-issuance of authorisations for set netting in areas where Maui's dolphins are present.

Table 7: Summary of Set Net Management Options[77]

	Kaipara	Manukau	Raglan	Aotea/Kawhia	Taranaki	Port Waikato
Information	No information that confirms all of harbour as dolphin habitat. 4 confirmed entrance area sightings.	POD detections beyond entrance closed area – no information that confirms all of harbour as dolphin habitat but 2 sightings beyond closed area.	No information that indicates that dolphins have entered harbours. 1 confirmed entrance area sighting.	No information that indicates that dolphins have entered harbours.	No confirmed sightings of dolphins in this area in recent years.	Dolphins offshore from Port Waikato at one end of core area.
Status quo	Status quo	Status quo	Status quo	Status quo	Status quo	Status quo
Social, cultural and economic implications.	No change	No change	No change	No change	No change	No change
Level of protection	No change	No change	No change	No change	No change	No change
Option 1 – Harbour and Port Waikato entrance set net closures	Entrance area closed to set netting.	Possibly extend current entrance closure[78].	No closure	No closure	Not included.	Close lower reaches of Waikato River to set netting.
Social, cultural and	There is little set netting in	Closure would further	N/A	N/A	N/A	Closure would

[77] MFish is gathering more information on the costs associated with each set net option to inform the final advice to the Minister.
[78] Acknowledging there have been no confirmed sightings well within the harbours.

	Kaipara	Manukau	Raglan	Aotea/Kawhia	Taranaki	Port Waikato
economic implications.	this area, but loss of fishing area could have adverse economic effects on the fishers who do set nets here.	reduce the area of the Manukau where set netting is allowed. Reduced catches would have social, cultural and economic impacts.				reduce area where set net fishing allowed. Uncertain whether this would mean reduced catches and associated impacts.
Level of protection	Sightings indicate dolphins are in entrance area, so closure would remove potential net threat from here.	POD detections do not yet show how far dolphins may venture into the harbour, so level of protection dependent on extent of any closed area.	N/A	N/A	N/A	Set nets lost at Waikato entrance most likely to reach dolphins offshore, so closure of this area would prevent this threat.
Option 2 – Net attendance and no night setting	Harbour set netters required to stay with their nets and not set at night.	Harbour set netters required to stay with their nets and not set at night	Harbour set netters required to stay with their nets and not set at night	Harbour set netters required to stay with their nets and not set at night	Taranaki set netters required to stay with their nets and not set at night.	Port Waikato set netters required to stay with their nets and not set at night.
Level of protection	Netting continues but possibly reduced in overall intensity – nets watched, could be retrieved if dolphins seen.	Netting continues but possibly reduced in overall intensity – nets watched, could be retrieved if dolphins seen.	Netting continues but possibly reduced in overall intensity – nets watched, could be retrieved if dolphins seen.	Netting continues but possibly reduced in overall intensity – nets watched, could be retrieved if dolphins seen.	Netting continues but possibly reduced in overall intensity – nets watched, could be retrieved if dolphins seen.	If complied with, attendance should ensure risks associated with nets lost at Port Waikato eliminated.
Social, cultural and economic implications	Some fishers stay with their nets now, others say it is impracticable and some	Some fishers stay with their nets now, others say it is impracticable and some	Some fishers stay with their nets now, others say it is impracticable and some	Some fishers stay with their nets now, others say it is impracticable	If attendance not feasible, social and economic	Attendance and no night setting should not present any

	Kaipara	Manukau	Raglan	Aotea/Kawhia	Taranaki	Port Waikato
	commercial fishers say it is uneconomic. No night setting could also reduce catches.	commercial fishers say it is uneconomic. No night setting could also reduce catches.	commercial fishers say it is uneconomic. No night setting could also reduce catches.	and some commercial fishers say it is uneconomic. No night setting could also reduce catches.	effects would be the same as a total ban.	particular difficulties for fishers at Port Waikato.
Option 3 – Set net ban	Harbour closed to all set netting	Harbour closed to all set netting	Harbour closed to all set netting	Harbours closed to all set netting	Coastal closure extended to Cape Egmont and out to 12nm	Port Waikato area closed to all set netting
Level of protection	Total – set netting eliminated as a risk (other than illegal activities).	Total – set netting eliminated as a risk (other than illegal activities).	Total – set netting eliminated as a risk (other than illegal activities).	Total – set netting eliminated as a risk (other than illegal activities).	Total – set netting eliminated as a risk (other than illegal activities).	Total – lost nets eliminated as a risk (other than illegal activities).
Social, cultural and economic implications	Significant social, cultural and economic impacts.	Significant social, cultural and economic impacts.	Significant social, cultural and economic impacts.	Significant social, cultural and economic impacts.	Significant impacts on non-commercial set netters fishing close to shore, reduced fishing ground for commercial fishers.	Significant social, cultural and economic impacts.

7.3.5.3. Commercial trawling (mid water, bottom, and pair)

MFish proposes the following options to manage the potential threat of commercial trawling on Maui's dolphins. In considering the most appropriate course of action, the Minister should note that there have been no reported Maui's dolphin interactions with trawlers but that trawling does overlap with Maui's dolphins range. In addition, trawling is known to catch Hector's dolphins in South Island waters and other dolphin species off the WCNI.

The previous Minister considered threats posed by trawling in 2003 and decided that mitigation measures were not necessary but agreed that additional fishery monitoring to determine the nature and extent of trawl-related threats should be implemented. However, MFish notes that monitoring in the WCNI trawl fleet remains very low.

Status Quo	Existing management
Option 1	Additional fisheries monitoring (observer coverage or electronic monitoring) to determine nature and extent of trawl/dolphin interactions inside 4nm from shore between Maunganui Bluff and Pariokariwa Point
Option 2	Trawl prohibition between Maunganui Bluff and Pariokariwa Point inside 4nm from shore between 1 June and 31 August; and Trawl prohibition between Manukau Harbour and Port Waikato inside 4nm from shore year-round
Option 3	Trawl prohibition inside 4nm from shore from Maunganui Bluff to Cape Egmont

Option 1

Option 1 proposes that vessels trawling inside 4nm of the shoreline between Maunganui Bluff and Pariokariwa Point (monitoring zone) are subject to monitoring commensurate with the risk that trawling in the area poses to Maui's dolphins. Option 1 is consistent with the previous Minister's evaluation of risk to Maui's dolphins from trawling and includes no other trawling restrictions.

♦ *Effectiveness*

Option 1 will not mitigate risk of entanglement with trawl nets but will instead provide quantitative information on the nature and extent of any risk. Option 1 is appropriate if the Minister considers trawlers pose low risk to Maui's dolphins, and the current level of risk from trawl activities is acceptable.

♦ *Impacts on fishers*

There are approximately 23 fishers on the WCNI operating about 34 vessels (<46m) (2005-06 fishing year) that may require additional monitoring as part of Option 1. Direct costs to these fishers from Option 1 could include:

⇒Accommodating fisheries observers (up to $1000 per day) or

⇒Installing and operating video monitoring equipment (approximately $10,000 installation and additional ongoing operating costs).

The overall impact of Option 1 on commercial fishers is difficult to quantify because it is difficult to determine the extent to which individual vessels are reliant on having access to inshore areas (eg, within 4nm where monitoring may be required) as part of their fishing operations. MFish has characterised the main trawl fisheries (vessels <46m) on the WCNI to help the Minister consider the impacts on use (See Table 5). Key indications from these characterisations are:

⇒The WCNI inshore trawl fleet supports large and nationally valuable trawl fisheries including snapper, trevally, tarakihi, gurnard, school shark and kahawai:

- The WCNI trawl fleet (<46m) caught approximately 12,000 tonnes of fish over the past three years in the Statistical Reporting Areas that encompass the proposed monitoring zone. MFish cannot determine how much of this catch came from inside the proposed monitoring zone but considers gurnard, snapper, rig and trevally may be part of the catch inside 4nm.

- Over the past three years, approximately 60 trawl vessels (<46m) caught fish in Statistical Reporting Areas that include the proposed monitoring zone (MFish cannot determine which

vessels fished inside and outside 4nm and therefore cannot determine how many vessels would require monitoring under Option 1).

⇒Some vessels may opt out of monitoring costs by refraining from trawling inside the proposed monitoring zone. MFish cannot determine what proportion of vessels may refrain from fishing inside the monitoring zone and what impact this might have on the value of the WCNI trawl fishery

⇒Fisheries observer coverage may not be an option for smaller vessels due to on board space requirements. Video monitoring equipment will be the alternative cost.

⇒Option 1 may rationalise the WCNI trawl fleet as smaller scale fishers and vessels unable to recover increased monitoring costs move out of the fleet

MFish notes that fisheries observer costs and video monitoring equipment installation costs are significant and also that video monitoring equipment is not widely available (MFish anticipates a transition to electronic monitoring would be necessary). However, Option 1 is probably least costly to the WCNI trawl fishery overall because trawlers will still be permitted to fish in the monitoring zone.

MFish invites submissions from fishers that describe the nature and effect of Option 1 measures on their fishing operations.

Option 2

Option 2 proposes a trawl prohibition between:

⇒Maunganui Bluff and Pariokariwa Point within 4nm of the shore between 1 June and 31 August (the period that coincides with greater dispersion in the Maui's dolphin population) and

⇒Manukau Harbour and Port Waikato within 4nm of the shore year-round (covering the area where Maui's dolphins are most abundant)

Option 2 is a more conservative measure than Option 1 and is appropriate if the Minister considers it necessary to immediately mitigate risk from trawling by implementing measures that will keep trawlers away from Maui's dolphins in the area where they are most abundant year-round (total prohibition) and when they exhibit greater dispersion (winter prohibition).

♦ *Effectiveness*

Option 2 would remove the risk of trawlers interacting with Maui's dolphins inside the area where they are most abundant (aerial and boat surveys indicate that Maui's dolphins are more abundant between Manukau Harbour and Port Waikato) while the seasonal prohibition (1 June – 31 August) reflects greater offshore movement over the winter (determined by aerial surveys).

Risk of entanglement with trawl gear would remain outside the area of the closure. MFish cannot quantify the nature of any remaining risk to dolphins following application of these measures because of uncertain distribution information and uncertainties about whether there is any interaction with trawl gear.

♦ *Impacts on fishers*

Like Option 1, the overall impact of Option 2 on commercial fishers is difficult to quantify because it is difficult to determine the extent to which individual vessels are reliant on having access to inshore areas (e.g., within 4nm) as part of their fishing operations. MFish has characterised the main trawl fisheries on the WCNI to help the Minister consider the impacts on use (See Table 5 above). Indications from these characterisations are discussed in Options 1 and 3 and are also relevant to Option 2. The following indications area also relevant:

⇒Estimated catch over the past three years from the Statistical Reporting Area that covers the area where Maui's dolphin are most abundant is 2825.6 tonnes (*cf* with 9033.6 tonnes from the Statistical Reporting Areas that cover the remainder of the area covered by Option 2)

⇒Estimated catch in the Statistical Reporting Areas that cover the proposed winter closure was 224.4 tonnes over winter in 2004; 974.3 tonnes over winter in 2005 384.4 tonnes over winter in 2006

⇒Many fisheries along the WCNI can be prosecuted close in shore (eg, trevally, snapper, red gurnard, tarakihi, etc). It is likely the proposed 4nm closure would require affected fishers to either fish further offshore or shift effort into more northern and southern areas along the WCNI where the proposed closures would not apply. Shifting effort into southern areas could be problematic as trawling within inshore areas in Taranaki and Wanganui is already restricted (in Urenui Bay under a fisheries regulation, and between Awakino River to Rangitikei River under the north and south Taranaki voluntary trawl agreements). The proposed measures are likely to have a significant impact due to the limited availability of alternative inshore fishing areas along the WCNI and through increased fishing costs caused by lower catch levels and the requirement to fish further afield.

⇒MFish notes that the trawl fleet may rationalise towards vessels that can harvest efficiently under the proposed restrictions and that some fishers and smaller vessels may leave the fishery.

⇒If fishers cannot modify fishing activities under the proposed restrictions and are unable to fish in the remainder of the Quota Management Areas, the value of ITQ for stocks targeted off the WCNI may decrease.

MFish invites submissions from fishers that describe the nature and effect of Option 2 measures on their fishing operations.

Option 3

Option 3 proposes a trawl prohibition within 4nm of the coast from Maunganui Bluff to Cape Egmont. This area includes the current confirmed distribution of Maui's dolphins but also extends south to encompass the area where a single unconfirmed sighting has been made. Option 3 would reduce risk of fishing-related mortality from trawling to zero within the known range of the dolphins. Option 3 is appropriate if the Minister considers it necessary to reduce risk down to very low levels given the significance of the impact of any fishing-related mortality on the Maui's dolphin population.

The Minister is not restricted to the area defined in Option 3 should he determine that a trawl prohibition is necessary. The Minister can choose a smaller area if he considers that would suffice to avoid trawl interactions with Maui's dolphins.

♦ *Effectiveness*

A trawl prohibition inside 4nm between Maunganui Bluff and Cape Egmont will eliminate any trawl threat to Maui's dolphins in that area. Risk may remain for any dolphins that travel further offshore than 4nm.

Preliminary results from recent DOC aerial surveys in 2006 indicate that Maui's dolphins move outside the existing 4nm set prohibition, with sightings recorded further offshore than 4nm. However, the findings of this work are not yet verified, and MFish is therefore uncertain of the validity of the sightings.

There have been public sightings reported in the Taranaki Bight, but investigations indicated all but one was unlikely to be Maui's dolphin. This single sighting was unable to be confirmed because the information provided was inconclusive. DOC has included this region in its aerial surveys but has made

no sightings of Maui's dolphins.

♦ *Impacts on fishers*

The impacts of an all year-round trawl prohibition between Maunganui Bluff and Cape Egmont out to 4nm on the WCNI inshore trawl fishery would be substantial. Like Options 1 and 2, costs of this option are difficult to quantify. MFish considers the following points are important to help the Minister to determine the nature of costs to fishers associated with Option 3:

⇒The WCNI inshore trawl fleet (vessels <46m) supports large and nationally valuable trawl fisheries including trevally, snapper, gurnard, tarakihi, school shark, and John Dory. These fisheries are very valuable as illustrated below (value for the 2005-06 fishing year estimated using estimated catch and port price information):

- 1767 tonnes of trevally ($1 519 262)
- 769 tonnes of snapper ($3 016 326)
- 740 tonnes of red gurnard ($1 161 995)
- 330 tonnes of tarakihi ($728 973)

⇒The WCNI trawl fleet <46m caught approximately 11026.8 tonnes of targeted catch over the past three years in the Statistical Reporting Areas that include the area between Maunganui Bluff and Cape Egmont

⇒Over the past three years, approximately 61 trawl vessels <46m caught fish in the Statistical Reporting Areas between Maunganui Bluff and Cape Egmont (MFish cannot determine how many vessels fished inside and outside 4nm)

⇒Option 3 will require all trawl vessels to shift effort outside 4nm between Maunganui Bluff and Cape Egmont. MFish doubts the trawl fleet can maintain catches equivalent to current levels with equivalent effort (including cost) outside 4nm. As such, many inshore fishing operations would be substantially affected and this would have a significant impact on the local economy.

⇒Similarly with Option 2, affected fishers would be required to either fish further offshore or shift effort into more northern and southern areas along the WCNI where the prohibition would not apply (alternative fishing areas south of Taranaki is already restricted between Cape Egmont and the Rangitikei River under the south Taranaki voluntary trawl agreement). The likely impacts identified under Option 2 would be substantially greater under Option 3 as some fishers seek alternative fishing areas in which to continue to catch inshore species. The requirement to redistribute fishing effort will have significant cost as a direct result of lower catch levels and substantially higher fishing (travel) costs.

⇒MFish cannot determine if vessels will be able to shift effort inside a Quota Management Area to maintain existing catches of stocks targeted inside the proposed prohibition

⇒MFish doubts that viable alternative bulk fishing methods (e.g. longlining) will enable trawl fishers to maintain catch equivalent to current levels inside 4nm between Maunganui Bluff and Cape Egmont.

⇒Option 3 will most likely devalue ITQ for stocks targeted inside the proposed prohibition and a number of vessels and fishers will move out of the fishery.

MFish invites submissions from fishers that describe the nature and effect of Option 3 measures on their

fishing operations.

Table 8: Summary of Trawl Management Options and Impacts on Fishers

Information	Trawling occurs within 1-4nm of shore within dolphin habitat; Intensity of trawling lower between Manukau Harbour and Waikato River than further north towards the Kaipara; No information that establishes that dolphins have been caught/injured by trawlers.
Status Quo	Existing management
Option 1	Obtain information from observers and possibly electronic monitoring to determine level of risk/require a level of monitoring on vessels operating closer than 4nm
Level of Protection	Retains status quo with vessels operating in dolphin habitat but recognising that there is no proof that such operations have caused dolphin deaths/harm but there is residual risk that requires monitoring
Impacts on Fishers	Most vessels could continue to fish as they do now providing they cover monitoring costs if deemed necessary by the Minister
Option 2	Year- round closure within 4nm of shore between Manukau Harbour and Waikato River/Winter closure within 4nm of remainder of area Maunganui Bluff – Pariokariwa
Level of Protection	Dolphins between Manukau Harbour and Waikato River totally protected from trawling; Dolphins in remainder of habitat protected in winter when they appear to move further offshore at times.
Impacts on Fishers	Trawlers would lose access to the area between Manukau Harbour and Waikato River and catches currently taken there, but level of trawling in this area appears relatively low; Trawlers would retain access to dolphins' habitat in summer when most trawling occurs, and lose access in winter; Lesser economic impact than Option 1 as while some fishing area lost, can still fish "best" areas at best times.

Option 3	Prohibition to apply within 4nm of shore from Maunganui Bluff – Cape Egmont
Level of Protection	A prohibition on trawling in all parts of the dolphins' habitat would eliminate this method of fishing as a potential threat.
Impacts on Fishers	There would be economic impacts on the viability of trawl operations (the extent of these will become more apparent once socio economic research is complete); Removal of inshore areas is likely to cause catch reductions and reduced earnings; Loss of inshore grounds could increase fuel consumption as vessels travel further to find fish.

7.3.5.4. Drift netting

MFish proposes the following options to manage the threats of drift netting on Maui's dolphins. In considering the most appropriate course of action, the Minister should note that there have been no confirmed Maui's dolphin interactions with drift nets but there is a risk that dolphins could become entangled if drift nets are lost and float down the Waikato River and into Maui's dolphin habitat.

MFish cannot quantify the incidence of lost nets or the level of risk posed to dolphins from this fishing method except to note that drift net effort has declined in recent years and there is one possible, but no confirmed drift net related mortalities.

Status Quo	Existing management
Option 1	Prohibit drift netting in the lower reaches of the Waikato River
Option 2	Prohibit drift netting in Port Waikato

Option 1

Option 1 proposes a drift net prohibition in the lower reaches of the Waikato River (from the store to the river mouth) and is appropriate if the Minister considers a residual level of drift netting further upstream is acceptable given potential risk from drift nets to Maui's dolphins.

- *Effectiveness*

Prohibiting drift net fishing at the lower reaches of the river reduces chances of nets being lost and reaching the sea before they can be retrieved. MFish cannot determine the extent by which risk to Maui's dolphins will be reduced because the extent of lost drift nets is unknown.

- *Impacts on fishers*

Drift netting for mullet decreased in Port Waikato over the past three years. Nevertheless, drift net fishing is a specialist method that supports a small number of fishers who would be affected if part of the fishable area was removed from the fishery. Option 1 leaves the upper reaches of Port Waikato available to fishers.

MFish invites submissions from fishers that describe the nature and effect of Option 1 measures on their

fishing operations.

Option 2

Option 2 proposes a drift net prohibition at Port Waikato including the lower reaches of the Waikato River from the store to the river mouth (ie, a more extensive area than Option 1). Option 2 is appropriate if the Minister considers any threat to Maui's dolphins from drift net fishing is unacceptable.

- *Effectiveness*

Option 2 would most likely prevent any drift net fishing in the Waikato River and remove any potential risk that a drift net would float into Maui's dolphin habitat.

- *Impacts on fishers*

Catch effort information shows that drift net use at Port Waikato has declined to the extent that few fishers would be affected by a prohibition (see Table 6). Fishers could use set nets to maintain catches equivalent to current levels, although the Minister's decision on set net use may prevent any net fishing in Port Waikato and the lower reaches of the Waikato River. Drift net fishing is a specialist method that supports a small number of fishers who would be affected if the entire fishable area at Port Waikato was removed from the fishery.

Table 9: Summary of Drift Net Management Options and Impacts

Information	Drift netting happens at Port Waikato - one end of the are within which Maui's dolphins' appear to be most abundant; Dead dolphin found in net that may have been a Port Waikato drift net; Drift nets do get lost at Port Waikato; Use of drift nets has declined in recent years
Status Quo	Existing management
Option 1	Close the lower reaches of the Waikato River to drift netting
Level of Protection	Some low level of risk remains that nets could be lost upstream from the closure and reach the sea.
Impacts on Fishers	The closed area will remove small part of the fishable area at Port Waikato but leave the most heavily fished area open to drift netters.
Option 2	Prohibit drift net fishing at Port Waikato
Level of Protection	- A prohibition on use of drift nets at Port Waikato would eliminate this method of fishing as a potential threat.
Impacts on Fishers	- It is mainly commercial fishers who fish with drift nets. Numbers are relatively small; - Those who do can probably use other methods, so their choice of drift nets indicates it is providing good returns for them.

7.4. East Coast Of The South Island

The East Coast of the South Island (ECSI) population of Hector's dolphin extends between Cape Farewell (near Golden Bay) in the north and Slope Point (south of Waikawa Harbour in the Catlins) in the south. This area covers the northern part of Fisheries Management Area 7 (Farewell Spit to the Clarence River) and Fisheries Management Area 3 (Clarence River to Slope Point). The ECSI population encompasses the Nelson/Marlborough, Canterbury, and Otago Conservancy regions of DOC.

Areas where Hector's dolphins are not regularly found have been excluded from the area to which proposed measures apply. These excluded areas include Tasman Bay, Golden Bay, Marlborough Sounds (**except** Queen Charlotte and Port Underwood)[79] and river mouths, estuaries, lagoons, inlets and harbours, with the following named exceptions. Estuaries and harbours that **are** included in the proposal boundaries are the Avon-Heathcote Estuary, Lyttelton Harbour, Akaroa Harbour and Timaru Harbour.

7.4.1. Population characteristics

The ECSI Hector's dolphin population comprises approximately 1790[80] (95% confidence interval 1246 – 2843) individuals, of which about 900 are found around Banks Peninsula (see Map 9 for distribution of Hector's dolphins on the ECSI). Relatively high densities are also found in the following areas:

⇒Cloudy Bay and Clifford Bay

⇒Queen Victoria Rocks to Kaikoura Peninsula

⇒Waiau River to the Waitaki River

⇒Waianakarua River to Moeraki

⇒Curio and Porpoise Bays

Hector's dolphins on the ECSI are generally found in waters less than about 100m deep year round. In many areas, they are more strongly concentrated in shallow water close to shore during summer, and relatively more dispersed in winter. Studies around Banks Peninsula have shown that in summer Hector's dolphins are mostly found in water less than 20m deep and in winter the dolphins move out to deeper waters (20-100m). Researchers' and fishers' observations indicate that Hector's dolphins are more commonly found in murky water that is often associated with river mouths, and in bays sheltered from the south.

Genetic analysis has shown that the ECSI population's genetic diversity has declined and that there has been a significant decline in abundance in at least parts of its range[81]. However, there is a high level of uncertainty around the extent of population decline on the ECSI as there were no systematic surveys of Hector's dolphin abundance before 1984-85. Population estimates since this time are unable to be compared because different methodologies were used to undertake the population surveys.

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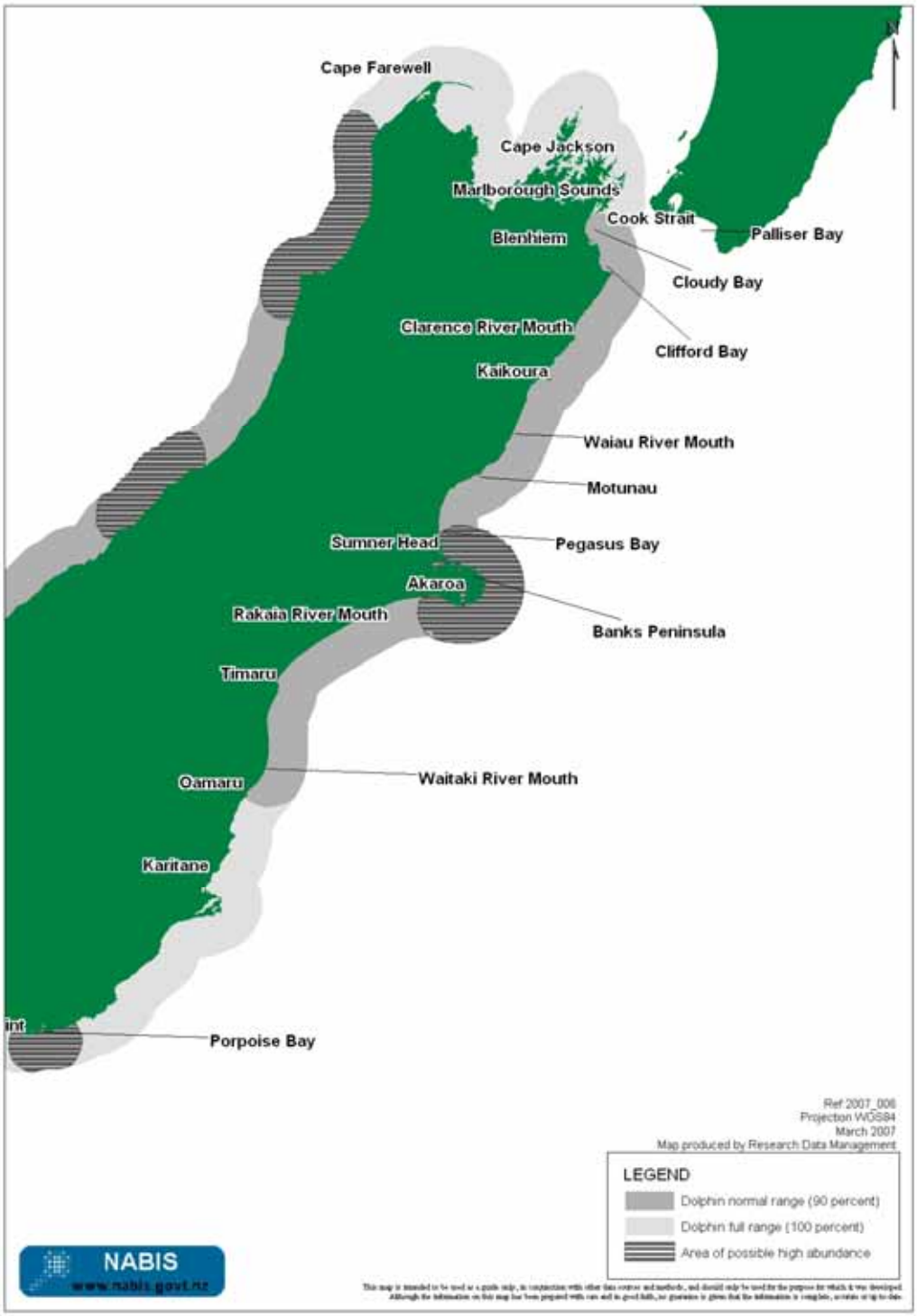
[79] Hector's dolphins are present in very low numbers in Golden Bay, and are not present in Tasman Bay and Pelorus Sound.

[80] This population figure includes the extent of coastline that incorporates Porpoise Bay.

[81] Pichler, F. B. 2002. Genetic assessment of population boundaries and gene exchange in Hector's dolphin. Department of Conservation Science Internal Series 44. 37 p



Map 9: Distribution of Hector's dolphins on the ECSI[82]

[82] Indicative only

7.4.2. Fishing threats to the population

The ECSI population is threatened by relatively low levels of human-induced mortality. Population Biological Removal (PBR) analysis[83] suggests the ECSI population can sustain 2 - 4 deaths each year (not including natural mortalities). This analysis has a recovery factor built into it, meaning that at the level of removals estimated by the analysis, the population should increase in size. PBR analysis using a default input value[84], suggests that the population could sustain around 13 human-induced mortalities annually.

Fishing threats identified as facing the ECSI population are:

- Set netting (amateur and commercial)
- Trawling (mid-water, bottom, and pair)
- Rock lobster potting.

DOC's incident database[85] indicates that since 1988, there have been 161 reported Hector's dolphin mortalities on the ECSI. Of these, there are 104 mortalities where the cause of death was able to be assessed (i.e. cause of death was not assessed, was not able to be assessed due to condition of the carcass or the information is currently not available for 57 individuals). The number of mortalities attributable to a specific cause of death (52 mortalities) is set out in Table 10 below[86].

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[83] When the Recovery Rate Goal is applied; see Appendix 3 for a description of the PBR analysis for Hector's dolphins. PBR is only one of a number of factors in determining appropriate management action. There is currently debate around the inputs to the PBR analysis for Hector's dolphins, leading to a range of estimated potential removals. MFish and DOC intend to have the Hector's dolphin PBR analysis independently reviewed to resolve this issue.

[84] Recovery Factor default value of 0.5, see Appendix 3

[85] The DOC incident database contains information about all reported Hector's dolphin incidents (mortalities, strandings, etc). An unknown number of incidents go unreported, and therefore the figures presented represent a minimum number of mortalities. Further detail around the DOC incident database, and its limitations, is provided in Part I of this document.

[86] In addition to the cases where the cause of death was able to be definitely attributable to a particular source, there were also 9 cases where the cause of death was concluded on the basis of the evidence to be probable entanglement, 25 cases where the cause of death was concluded to be possible entanglement, 7 cases where human interaction was a possibility and another 7 cases where a cause of death was not able to be determined by the pathologist. In the remaining cases, 15 were not assessed for a cause of death, details are not currently available for 15 individuals and in 27 cases, the carcass was too decomposed to allow a cause of death to be assessed. Possible or probable entanglements do not distinguish between the various types of nets e.g. trawl or set nets. Set net entanglement is generally assumed and, as such, some trawl related entanglements could be incorrectly attributed to possible or probable set net entanglement.

Table 10: Reported Hector's dolphin mortalities with a confirmed cause of death on the ECSI since 1988.

Cause of death	Number	Percentage of reported deaths with confirmed cause	Percentage of total reported mortalities
Known set net entanglement	30 (commercial set net: 16, recreational set net: 3, unknown set net: 11	58% (31% commercial; 6% recreational; 21% unknown)	19% (10% commercial; 2% recreational; 7% unknown)
Trauma – unknown source	5	10%	3%
Known trawler bycatch	6	12%	4%
Rock lobster pot entanglement	3	6%	2%
Boat strike	1	2%	1%
Natural	7	13%	4%

Table 9 indicates that fishing is the most significant known threat facing Hector's dolphins on the ECSI, being responsible for around 75% of mortalities with a confirmed cause (around 25% of all reported mortalities). Further details about the nature and extent of fishing threats to the ECSI population are provided below.

MFish notes the extent of Hector's dolphin mortalities from fishing is difficult to quantify, as there is no formal monitoring of amateur set netting and there has been limited observer coverage of the commercial set net and trawl fisheries[87]. Therefore, reliance is placed on fisher self-reporting or interview surveys of marine mammal incidental capture. Reporting of the incidental capture of marine mammals is mandatory under the MMPA but it is unknown what proportion of interactions goes unreported. Consequently, the figures reported on fishing-related dolphin mortalities on the ECSI represent the minimum number of deaths.

7.4.2.1. Set netting

Set netting is the main known threat to Hector's dolphins on the ECSI. Since the start of 1988, set netting has accounted for around 58% of dolphin mortalities with a confirmed cause. The nature and extent of the threat from commercial and amateur set netting to Hector's dolphins is different (due to differences in net types used and fishing locations, etc), and consequently these sectors are addressed separately.

Amateur set netting

Fishers set net mainly for butterfish (greenbone) over kelp/reef areas close inshore. Set netting for flatfish occurs in inner harbours and bays. Some amateur set netting takes place on open beach areas for small sharks (elephant fish, rig, school shark and spiny dogfish) in summer. There is set netting for moki on open mud and sandy substrates adjacent to submerged rocks and cliff faces.

The vulnerability of Hector's dolphins to entanglement in amateur set nets on the ECSI has been established through a combination of interviews with fishers, beach cast animals and fisher self-reporting.

Since 1988, there have been 3 confirmed entanglements attributed to amateur set netting off the ECSI (6% of all mortalities where cause of death can be confirmed). All of these occurred in the North

[87] Due to practicality problems associated with placing observers on board small vessels.

Canterbury region off open beach areas. Other deaths attributed to net entanglement have occurred but it cannot be determined whether amateur or commercial fisheries were the cause (11 definitely attributed to entanglement; 9 probable entanglements; and 25 possible entanglements). The "possible" and "probable" net entanglements relate to carcasses that show evidence of entanglement (for example, some sign of net marks) but the cause of death cannot be determined with certainty.

The summer inshore movement of Hector's dolphins coincides with a peak in amateur set net effort. The DOC database indicates that since the start of 1988, two out of the three confirmed amateur set net-related Hector's dolphin incidents occurred between 1 December and the end of February, with all three occurring between 1 October and 31 March. Of the confirmed net-related incidents where the sector (amateur/commercial) cause is unknown, all but one (91%) occurred between 1 December and the end of February.

MFish cannot determine whether the increase in set netting mortalities in summer is correlated with increased fishing activity (in accordance with the dolphins' inshore movement) or with a higher likelihood of people reporting beached carcasses during the warmer summer months. However, MFish believes it is reasonable to expect that set netting outside the summer months poses a lower risk to dolphins because of lower amateur set net usage during these months.

As noted above, there are a range of different finfish species targeted by amateur set netters off the ECSI, and there is evidence to suggest that risk to Hector's dolphins can vary with respect to target species. Available information on set net incidents[88] suggests that, of all set netting practices, overnight fishing solely for flatfish and daytime fishing solely for butterfish poses the least risk of dolphin mortalities. MFish is not aware of any dolphin mortalities caused by nets set only for butterfish that are confined to within kelp/reef areas of the ECSI. Hector's dolphins are occasionally seen in reef/kelp areas but fishers observations suggest these areas are not favoured by Hector's dolphins.

MFish considers that the configuration of nets used to target flatfish are less likely to catch dolphins than the type of set net used to target other species. Flatfish nets are set within 0.5m of the bottom in the tidal headwaters of harbours and larger bays. The nets are made of a small number of fine meshes (ie, usually 9-12) with a low breaking strain that hangs loosely to trap flatfish. There has been one confirmed entanglement in a flatfish net (December 1987 in the inner Akaroa Harbour area). MFish welcomes stakeholder views on the level of risk posed to Hector's dolphins from set nets targeting butterfish and flatfish.

Set netting for moki adjacent to reefs, small sharks (elephant fish, rig and school shark and spiny dogfish) in open coastal areas, and herring and red cod in inner harbour areas, is known to have caught Hector's dolphins[89], and is therefore considered by MFish to have a higher risk of dolphin entanglement than netting for flatfish. This is because fishing for these species involves using nets with larger mesh sizes and have more than double the number of meshes used to catch flatfish. These nets are usually made of courser mesh set tightly to form a wall that acts to catch the fish by their gills. In addition, these species are targeted in areas that are regularly frequented by Hector's dolphins.

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[88] From the DOC incident database and interview surveys of fishers (refer next section)

[89] Nets set by amateurs for small sharks caught 2 dolphins off eastern Banks Peninsula in January of 1986 and 1988. A net set to catch herrings in inner Akaroa Harbour caught a dolphin in January 1988. Some amateurs set nets for moki off sandy/muddy areas next to kelp/reef areas by extending their nets that have been set for butterfish, and this scenario has been known to catch dolphins. In the mid 1980s there were 2 mortalities associated with nets set for moki and butterfish and another in a moki net in 2002.

Customary set netting

The DOC incident database lists no mortalities attributable to customary set netting on the ECSI.

Customary fishing is now managed under a regulatory framework as a result of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. In order to undertake customary fishing, customary fishers must first obtain an authorisation from a Tangata Tiaki/Kaitiaki or tangata whenua representative appointed for that area.

MFish understands that the use of set nets for customary fishing in the area Hector's dolphins inhabit is not authorised by Tangata Tiaki/Kaitiaki. Customary set netting is confined to within coastal harbours, lagoons and lakes where there are no dolphins. As such, MFish considers there is currently no threat from customary set netting to Hector's dolphins on the ECSI. MFish welcomes stakeholder views on this.

Commercial set netting

Commercial set netting on the ECSI overlaps with Hector's dolphin distribution and has been attributed to more Hector's dolphin mortalities than amateur set netting in recent years. This may be in part due to observer monitoring and better awareness of reporting requirements rather than a reflection of the actual proportion of mortalities attributable to each sector. Most known set net entanglements have occurred in summer inside 4nm or inside the 20m water depth contour.

Approximately 62 commercial set netters (operating about 66 vessels) fish on the ECSI. Fishers target sharks with nets up to 800m long; elephant fish and rig normally in waters less than 50m deep, 1-20nm offshore; spiny dogfish and school shark normally in waters between 10m-100m deep, ~1nm offshore, to waters 100m deep, ~ 5-20nm offshore (except the Kaikoura Canyon). Fishers also catch butterfish, moki and trumpeter with short (up to 60m) nets in kelp/reef areas close inshore. Commercial set netting in the inshore area generally takes place in summer from October to March.

Table 11 below characterizes the main commercial set net fisheries on the ECSI using estimated catch and effort data reported from statistical reporting areas 17, 18, 20, 22, 24, and 26 over the past three fishing years. Not all the catch and effort (and value) listed in Table 11 can be attributed to the ECSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area. However, the characterization illustrates the nature and extent of set netting on the ECSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Hector's dolphins (see later in section).

Table 11 ECSI set net characterisation from estimated catch and effort reporting in statistical reporting areas 17, 18, 20, 22, 24, and 26. Value is estimated from the port price for the corresponding year[90].

Fishery		**2003-04**	**2004-05**	**2005-06**
Spiny dogfish	Catch (tonne)	410	235	283
	Fishers	22	20	26
	Vessels	26	24	27
	Value ($)	$204,180	$98,700	$138,670

[90] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

Fishery		2003-04	2004-05	2005-06
Tarakihi	Catch (tonne)	318	162	199
	Fishers	13	15	15
	Vessels	20	20	19
	Value ($)	$422,940	$233,847	$282,580
School shark	Catch (tonne)	166	216	127
	Fishers	32	34	33
	Vessels	40	39	36
	Value ($)	$298,855	$407,520	$218,863
Rig	Catch (tonne)	165	160	169
	Fishers	36	38	35
	Vessels	44	43	37
	Value ($)	$495,049	$434,667	$440,527
Elephant fish	Catch (tonne)	152	155	162
	Fishers	27	28	26
	Vessels	30	32	27
	Value ($)	$363,797	$235,083	$237,600
Seal Shark	Catch (tonne)	152	156	123
	Fishers	7	8	8
	Vessels	11	10	8
	Value ($)	$109,835	$240,240	$252,150
Moki	Catch (tonne)	55	52	52
	Fishers	30	38	32
	Vessels	37	44	35
	Value ($)	$61,913	$60,840	$60,320
Flatfish	Catch (tonne)	102	156	63
	Fishers	28	33	31
	Vessels	25	35	31
	Value ($)	$305,929	$490,360	$198,870
Warehou	Catch (tonne)	19	39	13
	Fishers	14	24	16
	Vessels	17	26	16
	Value ($)	$20,100	$38,090	$12,177
Stargazer	Catch (tonne)	20	18	21
	Fishers	12	13	12
	Vessels	18	16	12
	Value ($)	$21,015	$18,000	$24,990
Butterfish	Catch (tonne)	18	23	19
	Fishers	15	13	16
	Vessels	17	16	18
	Value ($)	$57,254	$77,203	$69,540

Fisher logbook information from 1995 to 2006 in statistical areas 020 and 022 indicates that there is more commercial set netting effort between 4nm and 15nm from shore than within 4nm from shore[91]. Between 1995 and 2006, over 80% and 60% of commercial set net effort (net length) occurred outside 4nm in statistical areas 020 and 022, respectively.

[91] Data provided by NIWA

Information on commercial set net effort using log book data from 1995 to 2006 in statistical areas 020 and 022 indicates that there is more commercial set netting activity between 4 – 15nm from shore than within 4nm from shore.[92] Between 1995 and 2006, over 80% and 60% of commercial set net effort (net length) occurred outside 4nm in statistical areas 020 and 022, respectively.

Commercial set netting has been responsible for 16 of the 52 (31%) Hector's dolphin mortalities with a confirmed cause on the ECSI since 1988. Most of these occurred in the Canterbury region (see Table 12 below).

Table 12: Mortalities attributable to commercial set netting on the east coast of the South Island since 1988.

DOC Conservancy	**Number of mortalities**
Canterbury	11
Otago	4 (3 incidents)
Nelson/Marlborough	1
Total	16

As previously mentioned, there have also been some deaths attributed to net entanglement where it cannot be determined whether amateur or commercial fisheries were the cause (11 definitely attributed to entanglement with the type of net unknown, plus 9 probable entanglements; and 25 possible entanglements).

The summer inshore movement of Hector's dolphins coincides with the peak commercial set net effort over the summer months. From the database, 14 out of the 16 (88%) confirmed commercial set net-related Hector's dolphin incidents occurred between 1 December and the end of February, with all 16 (100%) occurring between 1 October and 31 March. Of the confirmed set net-related incidents where the sectoral (amateur/commercial) cause is unknown, 91% occurred within these three and six month periods. These data indicate that inshore set netting in summer poses more risk to Hector's dolphins than set netting in winter.

As indicated above, there is a high level of uncertainty around the actual number of Hector's dolphin deaths attributable to commercial set netting because the level of fisher self-reporting is unknown. Some observer coverage has been undertaken, aiming to improve information on the level of interaction between the commercial set net fishery and Hector's dolphins as follows.

An observer programme designed to assess the incidental catch of Hector's dolphins in commercial set net shark fisheries operating in Pegasus Bay-Canterbury Bight set net fishery (statistical areas 020 and 022) was carried out during the 1997-98 fishing year. During the survey a total of seven Hector's dolphins were observed caught in set nets, of which one was released alive. All events involving Hector's dolphins occurred near shore in shallow depths of less than 30 m. Using these observer data, a total bycatch of 18 Hector's dolphin interactions was estimated for 1997-98 set net fisheries in statistical areas 020 and 022. Voluntary measures have been put in place by commercial fishers to mitigate dolphin bycatch off the ECSI since this observer programme was undertaken (see next section on existing threat management).

[92] Data provided by NIWA

There has been some observer coverage on the ECSI since 1997-98. In 1999-00 and 2000-01, 54 and 20 days coverage were achieved, respectively (statistical areas 020 and 022). In 2005-06, 17 sets were observed in statistical area 024[93]. In 2006-07, 7 set net events were observed in statistical area 024[94] and 122 sets were observed in area 018[95]. During the observer programme, one Hector's dolphin was observed caught in a commercial set net targeting school shark south of Kaikoura in December 2006.

In Tasman/Golden Bay (statistical area 038), which are not included in the areas to which proposals apply, there have been 183 observed set net events over the last two fishing years (2005-07), and no Hector's dolphins were observed caught.

7.4.2.2. Commercial trawling (mid-water, bottom and pair)

Trawling off the ECSI constitutes a threat to Hector's dolphins, albeit less so than set netting. Total reported instances of Hector's dolphins caught in trawl nets are low compared to set nets. Around 12% of reported mortalities with a confirmed cause on the ECSI have been attributed to trawling.

There are about 94 trawl fishers operating about 108 vessels (<46m) on the ECSI to target a wide range of inshore species including barracouta, red cod, silver warehou, flatfish and various other target and bycatch species. MFish currently has little information to determine the overlap between trawl effort and Hector's dolphins' range, as fishers are generally not required to provide fishing location information at a finer spatial scale than statistical area. As a generalization, in the inshore fishery flatfish, red gurnard, rough skate, and elephant fish are caught in waters less than 50m deep. Lemon sole, red cod, red gurnard, tarakihi, warehou, spiny dogfish, and barracouta are caught between 50m and 100m. In the middle depth fishery between 100m and 200m the main trawl species are red cod, barracouta, warehou, ghost shark, jack mackerel, and spiny dogfish.

Table 13 below characterizes the main commercial trawl fisheries (vessels <46m) on the ECSI using estimated catch and effort data reported from statistical reporting areas 017, 018, 020, 022, 024, and 026. Not all the catch and effort (and value) listed in Table 13 can be attributed to the ECSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area. However, the characterization illustrates the nature of trawling on the ECSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the effects of fishing on Hector's dolphins (see later in section).

Table 13 ECSI trawl characterisation captured from estimated catch and effort reporting in statistical reporting areas 017, 018, 020, 022, 024, and 026. Value is estimated from the port price for the corresponding fishing year[96]. Analysis excludes vessels >46m.

Fishery		**2003-04**	**2004-05**	**2005-06**
Barracouta	Catch (tonne)	5007	3413	4489
	Fishers	56	60	64
	Vessels	75	72	64
	Value ($)	$2,155,594	$1,450,306	$1,660,947
Red cod	Catch (tonne)	6774	3043	2598

[93] Targeting school shark and spiny dogfish
[94] Targeting blue nose and butterfish
[95] Targeting tarakihi, ling, school shark and butterfish
[96] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

Fishery		2003-04	2004-05	2005-06
	Fishers	108	105	92
	Vessels	129	122	104
	Value ($)	$4,119,269	$1,805,513	$1,506,840
Silver warehou	Catch (tonne)	451	388	318
	Fishers	32	36	32
	Vessels	65	70	60
	Value ($)	$383,515	$305,227	$250,160
Spiny dogfish	Catch (tonne)	2446	1665	1824
	Fishers	57	62	61
	Vessels	74	78	72
	Value ($)	$1,217,886	$699,508	$893,770
Tarakihi	Catch (tonne)	1022	1020	1020
	Fishers	60	63	62
	Vessels	74	76	72
	Value ($)	$1,850,955	$1,819,294	$1,771,361
Warehou	Catch (tonne)	649	1244	608
	Fishers	42	36	31
	Vessels	55	50	39
	Value ($)	$686,546	$1,214,521	$569,921
Flatfish[97]	Catch (tonne)	1062	964	808
	Fishers	95	100	86
	Vessels	111	111	97
	Value ($)	$3,185,057	$3,030,872	$2,550,683
Rough skate	Catch (tonne)	685	860	618
	Fishers	89	85	76
	Vessels	105	99	87
	Value ($)	$337,815	$338,415	$228,797
Jack mackerel	Catch (tonne)	120	43	19
	Fishers	28	28	22
	Vessels	40	38	28
	Value ($)	$30,247	$6,384	$3,103
Elephantfish	Catch (tonne)	649	629	636
	Fishers	43	41	42
	Vessels	56	51	52
	Value ($)	$1,552,067	$954,399	$932,637
Ghost shark	Catch (tonne)	539	478	349
	Fishers	46	46	36
	Vessels	63	58	49
	Value ($)	$278,187.33	$228,057.93	$183,625.69
Red gurnard	Catch (tonne)	737	742	876
	Fishers	96	101	85
	Vessels	112	113	96
	Value ($)	$1,155,765	$1,176,084	$1,365,064

Hector's dolphin mortalities from trawling have generally occurred in shallow water less than 20m in depth and all known trawl-related mortalities have occurred within 2nm of the shore. There is little direct verifiable evidence of the nature (type of trawl used) of these incidents. However, trawl fishers stress that

[97] Includes all flatfish species codes.

the use of flatfish trawl gear with low headline, no wing doors, and a smaller sweep area, together with low tow speed (4-6kn) enables dolphins to swim away from the net. Some fishers therefore believe flatfish trawling poses minimal risk to Hector's dolphins. MFish welcomes further stakeholder information on the level of risk to Hector's dolphins posed by flatfish trawling relative to other trawling activities.

There was some observer coverage of the inshore trawl fishery in the Pegasus Bay- Canterbury Bight area in 1997-98 to determine whether Hector's dolphins were being captured in that fishery. One Hector's dolphin was observed caught in a trawl in water less than 20m depth of the Canterbury Bight when the fisher was targeting red cod. Observer coverage was too low to estimate the total number of dolphins caught in the trawl fishery. Before the observer programme, five dolphins were known to have been caught by trawlers off the ECSI. Three of these incidents occurred in Pegasus Bay.

Since the observer programme, there have been four known dolphin mortalities caused by trawling. Three of these were the result of one trawling incident in April 2006. This incident was reported by the fisher involved and occurred 0.5nm off the Wairau Bar in Cloudy Bay, Marlborough. The other incident occurred off the Canterbury Bight in 1999 and was also reported by the fisher involved.

In addition to the 1997-97 observer programme, since 1991 salmon verifiers have been placed on large trawlers (>23m long) from 7 December to 14 February in the salmon conservation area off the south-east coast of Banks Peninsula. No Hector's dolphin mortalities have been observed on these vessels.

The salmon conservation area extends offshore off Banks Peninsula for 7nm from Okains Bay to Akaroa Harbour. Water depth in this area steadily increases to around 70 – 80m. Water depth increases more rapidly nearer the south end of the area. Consequently, trawling for red cod occurs closer (~ 1nm) to the shore in this area. Since 1991 verifiers have observed around 790 fishing days, mostly in the salmon conservation area, ranging from 5 to 126 days each year. Trawling for red cod in the salmon conservation area is usually conducted with a 120 foot standard wing trawl with a net height of 1.5-2m. When trawling for barracouta and red cod the net height is raised to around 3m.

7.4.2.3. Rock lobster potting

There have been three known incidents of Hector's dolphins becoming entangled in buoy lines of pots set to catch rock lobsters[98]. All of these incidents have occurred at Kaikoura. This is likely to be because rock lobster fishers in the highly tidal Kaikoura area use longer lengths of buoy line to prevent loss of pots[99]. The longer lengths of buoy line are a threat to Hector's dolphins as they can become caught up in the rope that hangs loose at lower tides. There is a high level of uncertainty around the actual number of Hector's dolphin deaths attributable to rock lobster potting because the level of fisher self-reporting is unknown.

7.4.3. Existing threat management

There are a range of voluntary and regulatory measures in place on the ECSI to reduce the impacts of fishing on Hector's dolphins.

7.4.3.1. Current measures for amateur set netting

There are a number of measures currently in place to mitigate the impacts of amateur set netting on ECSI Hector's dolphins. Map 10 provides an illustration of the current mandatory amateur set net restrictions that apply.

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[98] One incident in: 1989; 1997; and in 2004. All three resulted in death of the dolphin involved.
[99] This loss can occur when strong currents and tidal movements pull the marker buoys underwater.

The Banks Peninsula Marine Mammal Sanctuary was established in 1988 and covers an area of 1170 km^2 from Sumner Head in the north to the Rakaia River in the south, out to 4nm offshore. Set netting is currently restricted in the sanctuary by a combination of fisheries and marine mammal sanctuary rules.

Amateur set netting can take place in the sanctuary for six months from 1 April to 30 September during daylight hours using one 30m net and staying with the net. In the flounder areas, recreational set netting is allowed at any time of the day for eight months from 1 March to 31 October with a 60m net and attendance is not required.

Set netting is not permitted at the southern end of Moeraki Peninsula and parts of Otago Peninsula and Harbour. No overnight set netting is allowed within 300m of Motunau Island and Banks Peninsula except in the flounder areas.

Since 2002, a seasonal closure has been in place in the Canterbury set net area (Waitaki River to the Waiau River and out to 4nm, including the Banks Peninsula Marine Mammal Sanctuary) that prohibits the use of amateur set nets from 1 October to 31 March. A shorter ban applies in flounder areas in Banks Peninsula and reefs in the Timaru area.

In addition to the measures introduced in 2002, the then Minister of Fisheries (Hon Pete Hodgson) agreed to a set net mortality limit of three dolphins per year in the Canterbury set net area from 1 October to 30 September.[100] If the limit is reached, the Minister is able to consider measures to address the problem. The limit was put in place as an interim measure pending the development of a Population Management Plan for Hector's dolphins by DOC.

Another interim measure was introduced in late 2006 to mitigate dolphin bycatch in amateur set nets until the TMP is completed. This measure requires amateur fishers to stay with their nets in the Kaikoura area (between the Waiau and Clarence Rivers and out to 4nm) from 1 October to 31 March.

The Minister of Fisheries has also recently approved a proposal from the East-Otago Taiapure-Local Fishery Committee that recreational fishers be required to stay with their set nets when fishing within their Taiapure area. This area extends from near Waikouaiti to near Purakanui. This measure is scheduled to be in place by regulation by 1 October 2007 (following approval by Cabinet).

In addition to measures introduced for the purpose of mitigating set netting impacts on Hector's dolphins, there are a number of restrictions that apply nationally to amateur set netting that may help to reduce the likelihood of Hector's dolphin bycatch on the ECSI. In particular: [101]

- ⇒The use of stakes to secure nets is prohibited.
- ⇒Set nets must not exceed 60m in length.
- ⇒Only one set net (maximum 60m) and one bait net (maximum 10m with a mesh size of 50mm or less) can be carried on a boat at any one time.
- ⇒Nets must not be set within 60m of another net.

MFish actively promotes a voluntary set net code of practice (CoP) for amateur fishers on the ECSI. Some of the provisions of this code can also help to reduce the likelihood of Hector's dolphin interactions. This code encourages wise set netting practices, including:

- ⇒Using a net designed for the fish species being targeted

[100] This is not a Fishing Related Mortality Limit for the purposes of s 15 of the FA96. This is an indicative figure for the Minister of Fisheries to take action if required.
[101] Refer west coast South Island section for relevant regulations.

⇒Deploying a net with anchors that are suitable for sea conditions to prevent losing nets

⇒Setting a net that can be easily retrieved

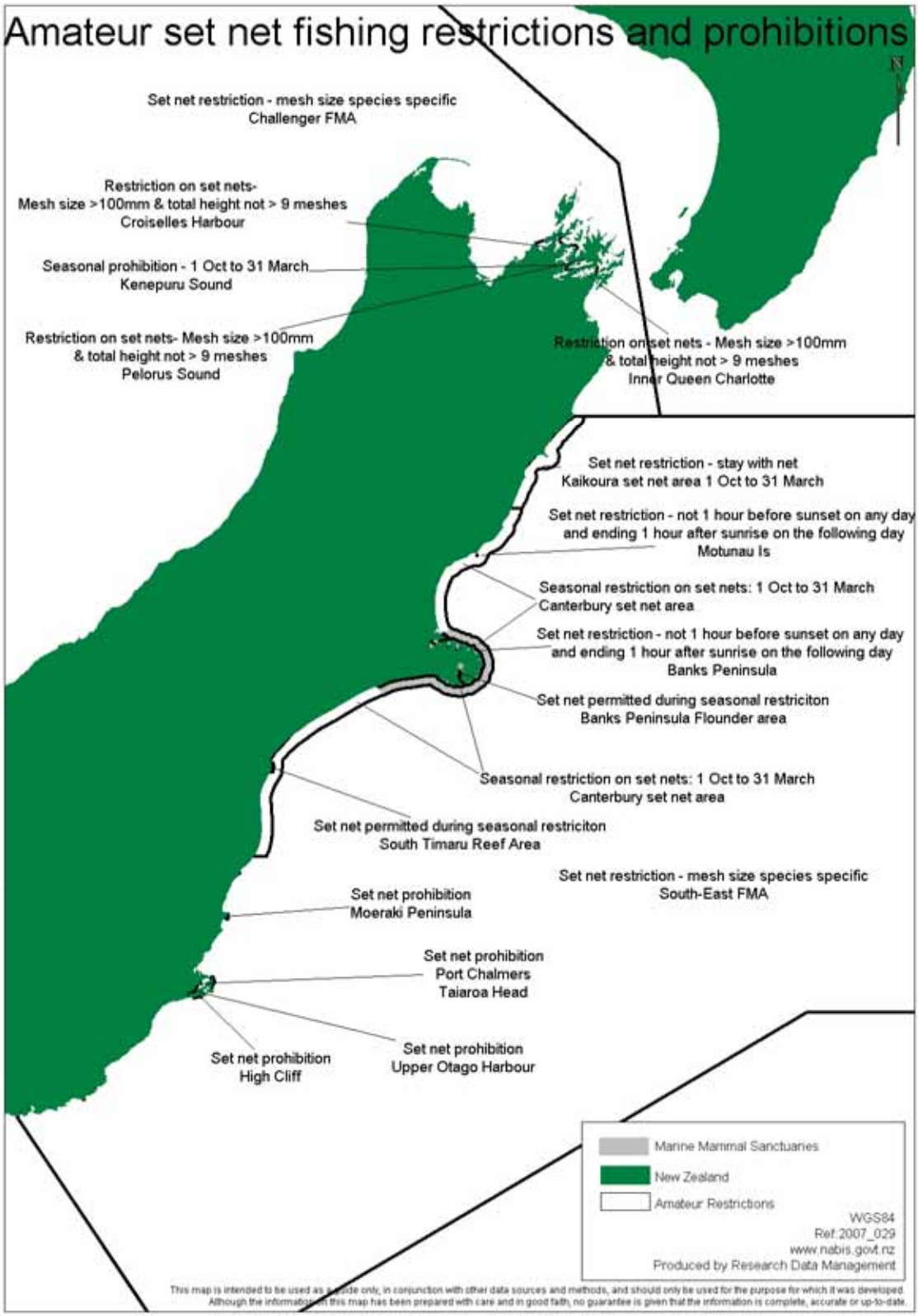
⇒Staying with and regularly checking the net

⇒Avoiding setting nets when Hector's dolphins are present

⇒Deploying a net for the shortest soak time possible

⇒Avoiding setting nets overnight

In addition to the MFish amateur set net CoP, the Kaikoura area is subject to a voluntary CoP (developed by local fishers) that includes an agreement to not use set nets in open beach areas. North Otago fishers also voluntarily support no overnight setting of nets and other netting practices that reduce the likelihood of dolphin mortalities.



Map 10: Current mandatory amateur set net restrictions on the ECSI

7.4.3.2. Current measures for commercial set netting

There are a number of measures currently in place to mitigate the impacts of commercial set netting on Hector's dolphins along the ECSI, although some were not implemented specifically for this purpose. Map 11 illustrates the current mandatory commercial set net restrictions that apply.

In 1989 surface set netting was banned between the Clarence River and Slope Point. A review of set netting in early 1990's resulted in commercial set nets being restricted to 1 km in length and fishers generally are not allowed to set more than 3km each day[102]. Set net soak times must be less than one day, except in the Canterbury area where a two-day soak period is allowed between October and December.

Within the Banks Peninsula Marine Mammal Sanctuary, commercial set netting can take place from 1 March to 31 October during daylight hours using one 30m net and staying with the net. In the flounder areas commercial set netting is allowed at anytime of the day with a 60m net and attendance is not required. Commercial set netting is otherwise prohibited.

Commercial set netting is not permitted at the southern end of Moeraki Peninsula and parts of Otago Peninsula and Harbour. No overnight set netting is allowed within 300m of Motunau Island and Banks Peninsula except in the flounder areas. In addition, there is a seasonal closure (January to April) to commercial set netting within a 1nm circle of the mouths of the Waiau, Hurunui, Waimakariri, Rakaia, Ashburton, Rangitata, Orari, Opihi, Waitaki and Clutha Rivers.

The aforementioned set net mortality limit of 3 dolphins per year in the Canterbury set net area from 1 October to 30 September similarly applies to commercial set netting.

The Hon Jim Anderton has also recently approved a proposal from the East-Otago Taiapure-Local Fishery Committee that commercial fishers be required to stay with their set nets when fishing within their Taiapure area. This measure is scheduled to be in place by regulation by 1 October 2007 (following approval by Cabinet).

There are also a number of voluntary measures in place to reduce the impacts of commercial set netting on Hector's dolphins. Commercial set netters fishing in FMA3 (which encompasses most of the ECSI) operate under the South East Finfish Management Ltd (SEFML) voluntary CoP. The northern part of the east coast falls within FMA7, which is under the jurisdiction of Challenger Finfisheries Management Company Limited (CFMCL). Commercial set netters in FMA7 operate under the CFMCL CoP. Under these CoPs, fishers are encouraged to adopt a number of fishing practices that reduce the likelihood of dolphin incidental bycatch, including:

- ⇒Avoiding setting nets where water is shallow, murky or discoloured
- ⇒Avoiding fishing in areas where Hector's dolphin are known to frequent
- ⇒Keep set duration as short as possible
- ⇒Set nets as tight as possible
- ⇒Maintain an active and alert lookout to spot Hector's dolphins active near the vessel during fishing operations
- ⇒Not setting nets when Hector's dolphins are active around the fishing vessel
- ⇒Deployment of pingers (acoustic devices that scare dolphins away from the nets)

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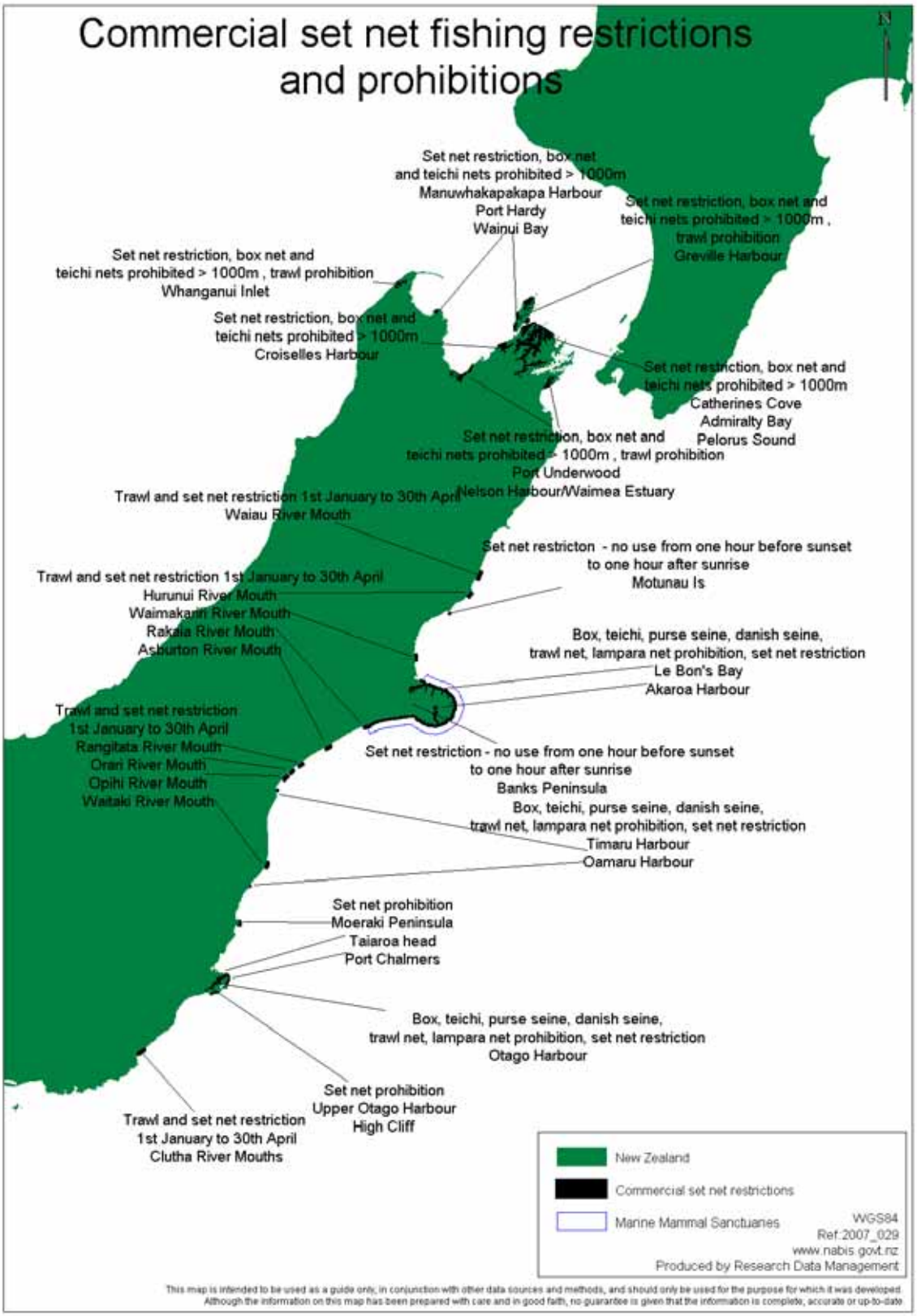
[102] Some set netters that set more than 3km of net per day are able to use the amount they historically used in the early 1990s

As part of the SEFML CoP, MFish understands that commercial fishers in the Canterbury area have changed the pattern of their fishing operations and now spend more time fishing outside the immediate coastal waters where Hector's dolphins are usually found or have reduced the amount of set net effort by going trawling instead[103]. Commercial set netters do not fish within 4nm of the Canterbury Bight coast from October to January. They also, all year, where possible, avoid fishing inside the 40m depth contour from the Clarence River to the Waitaki River. The SEFML CoP also requires commercial trawlers and set netters to stay outside 1nm between the southern boundary of the Banks Peninsula Marine Mammal Sanctuary and the Waitaki River throughout the fishing year.

In addition to measures introduced specifically for mitigating Hector's dolphin bycatch, there are also some mandatory measures that apply nationally to commercial set netting and may help reduce the chance of Hector's dolphin entanglement on the ECSI. These measures include:

- ⇒Commercial fishers cannot use more than 3000m of net per day[104]; and
- ⇒Commercial fishers must not leave set nets in the water for more than 24 hours without under-running the net and removing fish that have been caught[105].

[103] Based on fisher information supplied to AMP working groups
[104] Regulation 65 (3), Fisheries (Commercial Fishing) Regulations 1986
[105] Regulation 3E of the Fisheries (South-East Area Commercial Fishing) Regulations 1986



Map 11: Current mandatory commercial set net restrictions on the ECSI

7.4.3.3. Current measures for trawling

Trawling is banned in Pegasus Bay from the Waimakariri River to Okains Bay on Banks Peninsula to protect the elephant fish egg laying area. To minimize the bycatch of salmon there is also a seasonal closure (7 December to 14 February) in the Banks Peninsula Salmon Conservation Area (Okains Bay to Akaroa Harbour and out to 7nm) to trawlers greater than 23m in length or 250kv power, apart from certain named vessels[106]. In addition, for salmon protection, there is a seasonal closure (January to April) to trawling within a 1nm circle of the mouths of the Waiau, Hurunui, Waimakariri, Rakaia, Ashburton, Rangitata, Orari, Opihi, and Waitaki Rivers.

Trawling is banned in inner Golden Bay (inside an area between Pakawau Bridge to Tata Islands to Tata Beach) between 1 November and 30 April. Trawling is also banned in around Separation Point, to protect bryozoan beds and in Nelson Harbour/Waimea Estuary, Greville Harbour, Queen Charlotte Sound, and inner Pelorus Sound all year round. Trawling is only permitted within outer Pelorus Sounds subject to various method restrictions between 1 April and 31 August.

Map 12 illustrates the mandatory trawl and Danish seine restrictions that apply on the ECSI.

Additional voluntary restrictions include:

- ⇒Canterbury Bight: voluntary trawling ban within 1nm of the coast all year round
- ⇒Tasman Bay: voluntary trawling ban applies within the inner waters of Golden and Tasman Bays between 1 November and 30 April

[106] It is these vessels that have salmon verifiers placed on them between 7 December to 14 February, see previous section.

Map 12: Current mandatory trawl restrictions on the ECSI

7.4.3.4. Current measures for rock lobster potting

There are no statutory management measures to mitigate capture of Hector's dolphins in the buoy lines of rock lobster pots. Some rock lobster fishers have recently voluntarily weighed their buoy lines at intervals to keep the line taunt and below the surface. MFish welcomes stakeholder views on the likely effectiveness of this measure.

7.4.4. Additional threat management

This section considers whether additional threat management is necessary to manage the effects of fishing on ECSI Hector's dolphins by discussing:

⇒The effectiveness of current threat management; and

⇒Relevant considerations for the Minister when determining whether measures are necessary to avoid, remedy or mitigate the effects of fishing on the ECSI population.

7.4.4.1. Effectiveness of current threat management

Amateur set nets

Interview surveys of amateur fishers were carried out by researchers from 1984-88 (before implementation of the Banks Peninsula Marine Mammal Sanctuary) to estimate the magnitude and dynamics of Hector's dolphin incidental catch around Banks Peninsula and nearby coastal areas. Results from these surveys estimated that the incidental catch of Hector's dolphins in amateur set nets over five years from 1984-88 was 11 with a further 12 of unknown cause in Akaroa Harbour[107].

Since 1988, there have been three confirmed mortalities attributed to amateur set netting off the ECSI. There have been no Hector's dolphin mortalities confirmed to be the result of amateur set netting on the ECSI since the Canterbury area amateur set net prohibition came into effect in December 2001. MFish cannot determine whether these apparent reductions in bycatch levels are the result of measures introduced or failure of amateur fishers to report entanglements (ie, some interactions may have gone unreported).

There have been three known Hector's dolphin mortalities on the ECSI from net entanglement (three separate incidents - one in Canterbury and two in Kaikoura) since 2001 where it is unknown whether amateur or commercial nets were the cause.

MFish considers that a risk remains to Hector's dolphins from amateur set netting on the ECSI under the current voluntary and mandatory restrictions, in particular because:

⇒Set netting is the most significant known threat to Hector's dolphins

⇒Amateur set netting on the ECSI occurs within Hector's dolphins range

⇒The ECSI is a popular area for recreational set netters, particularly over the summer months (where set netting is permitted)

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[107] Later interviews by the Ministry of Agriculture and Fisheries in the early 1990s of fishers who caught 11 of these dolphins indicated that 4 were caught in moki set nets, 2 in moki/butterfish set nets (i.e. set for moki and butterfish) and one in a net that was set illegally for salmon. In addition, 2 were caught in set nets fishing for rig off the eastern bays of Banks Peninsula and 2 caught and released alive from a herring net and another unknown net set in the inner Akaroa Harbour area. Where known, these incidents occurred between Christmas Day and the end of January.

Commercial set nets

Low levels of observer coverage of the commercial fishery make it difficult to evaluate the success of commercial fishers' initiatives to mitigate Hector's dolphin mortalities.

Interview surveys carried out in the 1980s and early 1990s estimated between 86 and 200 dolphins were caught in commercial set nets from 1984 to 1988 (ie, before implementation of the marine mammal sanctuary) in the Banks Peninsula and nearby coastal areas. Since this time, there have been 16 confirmed commercial set net-related mortalities. MFish cannot determine whether this apparent reduction in dolphin bycatch is the result of sanctuary measures, voluntary industry initiatives, or failure of commercial fishers to report entanglements.

In the sanctuary, commercial set netting is banned within 4nm, except between 1 March and 31 October when commercial fishers can set nets under the same restrictions as amateur fishers. A recent study found that in summer, the proportion of sightings inside the 4nm offshore boundary of the sanctuary was 79% but this dropped to just over 35% in winter. The results of the study suggest that at certain times of the year, a high proportion of the dolphins around Banks Peninsula may move offshore into areas where they are at risk from commercial set nets. This new information highlights a potential risk to dolphins from commercial set netting offshore from the sanctuary. There have been no reported entanglements from this offshore area.

There have been a number of commercial set net mortalities in the Otago region in recent years. One incident occurred in December 2002 off Potato Point (Otago). Another three entanglements (two separate incidents) in commercial set nets occurred off Otago in the 2005-06 summer period. As mentioned above, the Minister of Fisheries has recently approved measures requiring commercial set netters to stay with their nets in the East Otago Taiāpure. This Taiāpure covers the coastline in the region where the three dolphins were caught but the offshore boundary does not encompass the specific location where one of the incidents occurred. MFish considers that this measure, once implemented, will reduce risk to Hector's dolphins within the Taiāpure area but not the threat of set netting in the wider Otago area.

There have been no dolphin mortalities reported by commercial set netters in the Canterbury area in the last nine years. However, there have been three unknown Hector's dolphin mortalities from net entanglement (ie. unknown whether amateur or commercial set nets caused the mortalities).

Scientists have used data collected in the 1997-98 observer programme in models that estimate trends in the ECSI population through time. These studies have focused on the impacts of commercial set netting because the absence of scientifically rigorous data on the nature and extent of other threats precludes their use in the modelling. Difficulties with estimating past entanglement rates and uncertainty in abundance estimates means there is uncertainty associated with the results of this modelling work. In general, findings have suggested that the ECSI Hector's dolphin population has declined and is likely to continue to decline under current management regimes for commercial set netting.[108]

MFish considers that a risk to Hector's dolphins exists from commercial set netting on the ECSI under the current management regime, in particular because:

- ⇒Set netting is the most significant known threat to Hector's dolphins
- ⇒Commercial set netting on the ECSI occurs within Hector's dolphins range
- ⇒Where sectoral cause has been identified, commercial set netting has been responsible for the most Hector's dolphin mortalities in recent years (four in the past five years)

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[108] For example, Slooten, E. (2007). Conservation management in the face of uncertainty: Effectiveness of four options for managing Hector's dolphin bycatch. *Endangered Species Research*: 3, pp 169-179.

Effectiveness of current trawl measures

MFish acknowledges that current voluntary initiatives in place are likely to reduce the threat of trawling. Since SEFML implemented its ban on trawling within 1nm in the Canterbury Bight, there have been no reported trawl mortalities in this area (although the level of fisher self-reporting is unknown).

Nevertheless, MFish considers that risk to Hector's dolphins from trawling on the ECSI exists under the current management regime, in particular because:

⇒Trawl-related mortalities have occurred on the ECSI in recent years, including one incident in 2006 that resulted in three Hector's dolphin deaths (off the Wairau Bar in Cloudy Bay).

7.4.4.2. Need and scope for additional threat management

Whether the Minister considers it necessary to implement further measures to manage the effects of fishing related mortality on Hector's dolphins depends ultimately on the balance between sustainability and utilization the Minister considers appropriate. This will involve consideration of a range of factors, including:

⇒Population biology (for example, size and productivity)

⇒Nature and extent of fishing threats to the population

⇒Effectiveness of current management measures

⇒Effectiveness of measures proposed to avoid, remedy or mitigate the effects of fishing

⇒Costs to fishers of measures proposed to avoid, remedy or mitigate the effects of fishing

Information on population biology, nature and extent of fishing threats and effectiveness of current measures has been outlined in the sections above. An analysis of the effectiveness and costs of proposed measures is provided in the ensuing sections. In summary, MFish considers that the following points are particularly relevant to the Minister's decision-making:

⇒Hector's dolphin is a threatened species;

⇒The ECSI population is the second largest Hector's dolphin population in New Zealand;

⇒PBR analysis indicates that the ECSI population can withstand 2-4 human-induced mortalities per year and still increase in size, while the current abundance of around 1800 individuals could be maintained at mortality levels closer to 13 animals per year when applying the recovery factor default value of 0.5 and not taking into consideration possible population fragmentation;

⇒There is evidence the population has undergone a decline in genetic diversity and may have undergone a decline in abundance;

⇒Fishing is the most significant known threat facing Hector's dolphins on the ECSI (being attributable to 75% of all Hector's dolphin mortalities with a confirmed cause since 1988);

⇒Set netting has caused around 58% of the dolphin deaths on the ECSI since 1988 where cause of death can be determined;

⇒Trawling and rock lobster potting pose lesser risk to the population but nevertheless contribute to the overall effect that fishing is having on the ECSI population;

⇒An un-quantified number of fishing-related mortalities go unreported;

⇒The genetic continuity of the population may be susceptible to fishing impacts (through localised depletion);[109] and

⇒The effectiveness of current measures is uncertain but there is evidence that fishing-related Hector's dolphin mortalities are continuing under the current management regime.

MFish considers relevant to the Minister's decision is uncertainty in information around the status of the ECSI population and the nature and extent of fishing impacts. In particular:

⇒There is evidence to suggest that in the past fishing has had an adverse effect on the population (there is evidence of population decline and set netting is the most significant known threat) but this is uncertain due to a lack of comparable population abundance estimates through time and difficulties with estimating past fishing-related mortality levels;

⇒The nature of PBR analysis, or any modelling exercise relying on estimated biological and variable inputs, does not necessarily lend itself to decision making with certainty;

⇒Fishing is the most significant known threat to the ECSI population but the actual number of fishing-related deaths cannot be ascertained. MFish does not believe that reported mortalities reflect all fishing related mortalities. MFish has had anecdotal reports of net-marked Hector's dolphin carcasses that have been placed above the beach and out of sight. MFish cannot determine the extent of this practice but considers it is one indicator that fishing related Hector's dolphin mortalities are likely to be higher than reported, and that this introduces uncertainty relevant to the Minister's deliberations.

MFish notes that the Minister should take this uncertainty into account when making decisions on the need for further measures on the ECSI. The Minister should take into account best available information; be cautious when information is uncertain; and should not use absence of, or uncertainty in, any information as a reason for postponing or failing to take any measure to achieve the purpose of the FA96.

7.4.5. Options

MFish has prepared a range of options for managing fishing threats to the ECSI Hector's dolphin population. The spectrum of options ranges from *status quo* through to more restrictive options that reduce residual risk of fishing-related mortalities to a greater degree, but accordingly have a greater impact on current users. When making final decisions on the proposals, the Minister of Fisheries will need to determine which course of action over what timeframe will result in an acceptable level of risk from fishing activities to Hector's dolphins on the ECSI, taking into account the utilisation implications associated with each option. It is within the Minister's discretion to choose a mix of options, as well as variations to the options proposed (for example, different proposal boundaries) based on relevant considerations (see previous section). Map 13 illustrates the proposed boundaries of the various options set out below.

7.4.5.1. Status quo

The nature and extent of fishing threats to the ECSI population, and an analysis of effectiveness of current measures (i.e. *status quo* management) and consideration of the need for further measures have been outlined in the sections above. In light of this information, the Minister may consider that the effects of fishing-related mortality are acceptable and consequently further measures to avoid, remedy or mitigate the effects of fishing-related mortality on the ECSI population are not necessary. MFish notes that the *status quo* is a valid option given uncertainty over the nature and extent of the impact of fishing-related

[109] Hector's dolphin do not move large distances. This characteristic means that local groups are connected by gene flow only with immediately adjacent groups, which increases the susceptibility of local dolphin groups to becoming reproductively isolated.

mortality on Hector's dolphins and the impact on fisheries users of further measures. MFish notes that the previous sections have outlined information about the existing threat of fishing to Hector's dolphins on the ECSI, and therefore further analysis of *status quo* is not provided below. Analysis of the effectiveness and costs of the alternative proposals has been undertaken relative to the current (*status quo*) situation.

7.4.5.2. Set netting

MFish proposes the following options to manage the effects of amateur and commercial set netting on the ECSI population.

As previously mentioned, these proposals do not apply to Tasman Bay, Golden Bay, Marlborough Sounds (**except** Queen Charlotte and Port Underwood), river mouths, estuaries, lagoons, inlets and harbours, with the following named exceptions. Estuaries and harbours that **are** included in the proposal boundaries are the Avon-Heathcote Estuary, Lyttelton Harbour, Akaroa Harbour and Timaru Harbour.

Status Quo – Existing management (refer Existing Threat Management Section)	
Option 1 – Existing mandatory management measures and codes of practice inside 12nm from the coast (mean high water mark - MHW) between Cape Jackson and Slope Point (extended to 18nm from the Waiau River to the Waitaki River) plus additional measures as follows:	
Amateur set netting:	
Mandatory measures:	Mandatory attendance with a set net; Maximum of one set net per person and per boat; No overnight setting of nets (between one hour before sunset to one hour after sunrise); and Maximum net length of 30 m (fishers are permitted to use a net that has a maximum length of 60 m when targeting flatfish)
Voluntary measures:	Hand in unused or unwanted nets to MFish
Commercial set netting:	
Voluntary measures:	Adherence to the existing voluntary set net code of practice
Mandatory measures:	Additional monitoring of set netting (for example, observer coverage or video monitoring[110])

[110] See Part III section on monitoring

Option 2 – Amateur and commercial set netting is prohibited inside 2nm or 4nm from shore (MHW) between Cape Jackson and Slope Point with provisions for some set netting for 6 or 9 months. All sub-options have the additional set net measures as per option 1		
Either:	Option 2(a)	Set net prohibition applies inside 2nm from shore – this option includes the following three alternatives: Prohibition applies all year round with set netting for butterfish and flatfish allowed in designated areas for nine months of the year (1 March to 30 November) with the restrictions listed below; or Prohibition applies all year round with set netting for butterfish and flatfish allowed in designated areas for six months of the year (1 April to 30 September) with the restrictions listed below; or Prohibition applies all year round
Or:	Option 2(b)	Set net prohibition applies inside 4nm from shore – this option includes the following three alternatives: Prohibition applies all year round with set netting for butterfish and flatfish allowed in designated areas for nine months of the year (1 March to 30 November) with the restrictions listed below; or Prohibition applies all year round with set netting for butterfish and flatfish allowed in designated areas for six months of the year (1 April to 30 September) with the restrictions listed below; or Prohibition applies all year round
MANDATORY RESTRICTIONS (amateur and commercial) Attendance with a set net Maximum of one set net per person and boat No overnight setting of nets (between one hour before sunset to one hour after sunrise) except in designated flounder areas; and Maximum net length of 30 m for butterfish[111] set nets and 60 m for flatfish set nets[112]		
DESIGNATED AREAS (approximate boundaries, refer to Appendix 6 or MFish website www.fish.govt.nz for indicative maps of the designated areas) **Designated flatfish set net areas** Queen Charlotte Sound – Inside Cape Jackson to Cape Koamaru and East Head to West Head Banks Peninsula - Inner Lyttelton Harbour, Port Levy, Pigeon Bay and Akaroa Harbour **Designated butterfish set net areas out to 100m from MHW**		

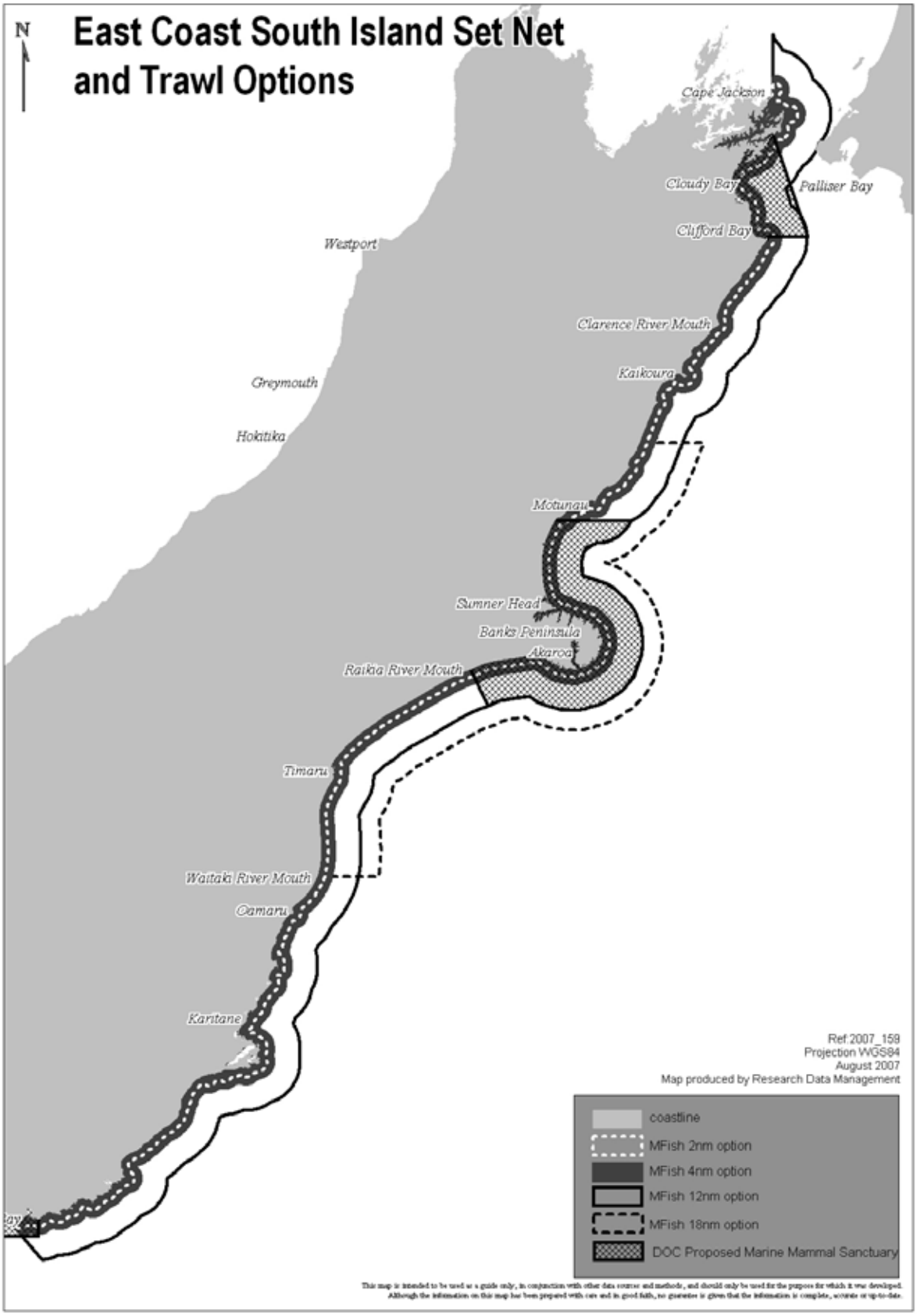
[111] Butterfish nets must be no more than 30 m long, 25 meshes deep, and a maximum diameter of the net mesh of 0.5 mm mesh diameter, and minimum of 114 mm mesh size (means revoking current 108 mm mesh size for butterfish), and anchored at each end with a weight no lighter than 5 kg and 14 net floats on the float line

[112] Flatfish nets must be no more than 60 m in length, 9 meshes deep, and 0.3 5mm mesh diameter and no less than 125mm mesh size, and anchored at each end with a weight no lighter than 3kg

.

Tory – Cape Koamaru to Robertson Point Northern Kaikoura – Waipapa Bay (200m north) to Rakautara (800m south of township) Kaikoura Peninsula – Port Kean to Atia Point Southern Kaikoura – Rileys Lookout to Karakanui Banks Peninsula areas – Sumner Head to Lake Forsyth except flatfish areas Timaru - Timaru Reef Area Kakanui – Kakanui to 1km south of Orere Point Moeraki – Moeraki Point to Tawhiroko Point Shag Point – Main north road to DOC reserve at Point Waikouaiti – Pleasant River to Cornish Head Seacliff – Karitane Point to Warrington Toko – Akatore Creek to Coal Point Kaka Point – 500m north of Kaka Point to Campbell Point
Option 3 – All amateur and commercial set netting is prohibited inside 12nm from shore (MHW) between Cape Jackson and Slope Point (extended to 18nm from the Waiau River to the Waitaki River)

MFish notes that the level of commercial set net monitoring required under Option 1 and 2 will be commensurate with the level of risk mitigation achieved. For example, Option 1 allows all current set net activity throughout Hector's dolphins' range on the ECSI to continue, whereas Option 2 prohibits set net activity throughout parts of the dolphins' range (2-4nm). As such, MFish considers it may be acceptable to have lower levels of monitoring under Option 2 compared to Option 1; given the costs to industry associated with monitoring programmes and the relatively lower level of residual risk associated with Option 2. Please refer to Part III for more information about the proposed monitoring approach.



Map 13: Indicative boundaries of measures proposed for the ECSI

Analysis of amateur set net options

Option 1

Option 1 applies to amateur set netting activities in areas where set netting is currently permitted on the ECSI.

Under Option 1, all recreational fishers will continue to comply with the existing amateur set net restrictions and codes of practice plus additional mandatory measures as follows:

⇒Mandatory attendance with a set net;

⇒Maximum of one set net per person and boat;

⇒No overnight setting of nets (between one hour before sunset to one hour after sunrise);

⇒Maximum net length of 30 m (60 m for flatfish set nets)

The proposed measures focus on requiring amateur fishers to stay with their net when set and reduce the number and length of nets used at any one time. The reason for a not proposing a reduction in length of nets set for flatfish is because these nets are configured and set in such a way that MFish considers they pose low risk of Hector's dolphin entanglement.[113]

Under Option 1, MFish would invite amateur fishers to hand in any unused or unwanted set nets. The handing in of unused or unwanted nets would remove the potential latent effort within the amateur set net fishery. MFish could consider ways to reward fishers who hand in nets such as t-shirts, posters, or school donations. Officials will also work to raise amateur fishers' awareness of good set netting practice, including retrieval of nets when dolphins are nearby.

♦ *Effectiveness*

Under Option 1, fishers must stay with their net at all times when set. This measure is likely to lower the risk of dolphin entanglement in amateur set nets in the following ways:

⇒Create the opportunity for fishers to remove their net from the water if a dolphin appears within the vicinity of the net. In addition, net attendance may enable fishers to release any net entangled dolphin that is alive (if the fisher is able to get to a netted animal within 2 – 3 minutes).

⇒Decrease the number of nets deployed – mandatory net attendance is likely to discourage fishers from using a set net in preference to other fishing methods (MFish Compliance report that mandatory net attendance at Kaikoura during last summer produced a notable decline in amateur set net usage).

⇒Reduced net soak times in the water due to the requirement for fishers to stay by their net while it is set.

Additional restrictions of no overnight setting and smaller maximum net length are likely to further reduce the risk of net entanglement.

Although the risk of Hector's dolphin mortality associated with amateur set netting will be reduced under this option, potential for dolphin entanglement will remain. Allowing set nets in areas and at times of the

[113] Flatfish nets are set within 0.5m of the bottom in the tidal headwaters of harbours and larger bays. The nets are made of a small number (usually 9) of fine mesh with a low breaking strain that hangs loosely to trap flatfish.

year where dolphins are present constitutes a greater, albeit unquantified, risk than excluding set nets from areas seasonally or totally within the dolphins range (as proposed under Options 2 and 3).

MFish notes that an additional benefit of this option is that the above proposed restrictions will likely result in better quality fish and less wastage (due to reduced soak times, for example), and there will also be a reduced likelihood of nets being lost in inclement weather.

- *Impacts on fishers*

Option 1 will provide for greatest amateur set netting use along the ECSI in comparison with proposed measures under Options 2 and 3. Option 1 will enable amateur fishers to continue to use set nets in all areas where set netting is currently permitted but require them to more actively manage their net when fishing. Presently, MFish encourages all set net fishers to voluntarily adopt the CoP but is unable to require fishers to comply. Under this option, the proposed measures will become mandatory and MFish will be able to take necessary actions if fishers fail to comply with these measures.

The main utilisation impact of Option 1 is the requirement for fishers to stay with their net. Possible implications include preventing fishers from using different fishing methods at any one time or setting more than one net in different locations. Fishers often set their net at the start of a fishing trip, travel to another area to hand gather or hook and line for fish, and then retrieve the net on the way home. A requirement for fishers to stay with their net while set would essentially prevent this activity.

It is possible that fishers will catch smaller quantities of fish during a single fishing trip as a direct result of a reduced soak time and net length. A requirement for fishers to stay with their net is also likely to reduce the amount of winter set netting due to unsuitable weather conditions.

MFish welcomes stakeholder views on the health and safety implications, and utilisation impacts, of Option 1.

Option 2 (a&b)

Option 2 proposes to prohibit all amateur set netting out to either 2nm (Option 2a) or 4nm (Option 2b), with provisions for some flatfish and butterfish set netting in designated areas at certain times of the year (sub options i and ii). Butterfish areas have been designated because available information suggests that, of all set netting practices, nets set solely to target butterfish and flatfish pose the least risk of Hector's dolphin mortalities. Given that nets set to target flatfish are believed to pose a lower risk of Hector's dolphin entanglement, MFish considers there is also rationale for allowing some flatfishing in certain designated areas outside the summer months.

The reason for proposing a maximum net length for butterfish nets that is shorter than the currently permitted 60m maximum length is because this will help ensure that nets set in reef areas for butterfish do not extend out into non-reef habitat. Nets set adjacent to reef areas, or extended out from reef areas, are known to have caught Hector's dolphins. Consequently, MFish considers that a maximum length of 30m for butterfish set nets should help reduce the likelihood of Hector's dolphin entanglement. MFish also notes that experienced butterfish fishers generally only use nets less than 30m in reef areas.

Amateur set netting along the coast would be restricted to the main butterfish or flatfish fishing grounds for 6 or 9 months, or essentially eliminated, depending on whether sub-option (i), (ii) or (iii) is chosen. Sub-option (i) would allow restricted set netting in designated areas for 9 months from 1 March – 30 November, while sub-option (ii) would allow this netting for a shorter 6 month period (1 April – 30 September). Proposed measures under Option 1 (i.e. mandatory net attendance, no overnight setting, etc) for amateur fishers would also apply at the time of year when set netting in designated areas is permitted. The only nets that could be used in these areas would be defined to prevent fishers using these areas to target other fish species. MFish notes that the Minister can choose to introduce some or all of the identified designated areas.

MFish considers that a 2nm set net closure is likely to effectively prohibit all amateur set netting on the ECSI. This is because most amateur fishers set their nets either directly from or very close to shore. MFish considers there is likely to be little difference (both in terms of mitigation effectiveness and impacts on use) in extending the closure out to 4nm as fishers are unlikely to travel further than 2nm from shore to set a single net, particularly if they need to stay in attendance with that net while it is set (as proposed). As such, based on information MFish currently has, all amateur set netting on the ECSI would probably be eliminated under sub-option (iii), which does not provide for any inshore amateur set netting.

- *Effectiveness*

MFish considers that Option 2 is likely to significantly reduce risk to Hector's dolphins from amateur set netting. Measures proposed under Option 2 will mean that amateur set netting considered to be of highest risk to Hector's dolphins (targeting small sharks, moki, red cod and herrings) is prohibited throughout the year.

While the full year closure to all set netting (sub-option iii) affords the greatest certainty around protection for Hector's dolphins, MFish considers that allowing set netters to target butterfish and flatfish in designated areas outside the summer months will probably constitute only a marginal increase in risk to Hector's dolphins (due to the relatively lower risk of Hector's dolphin entanglement associated with nets set solely for butterfish and flatfish).

October to March is the time of year when most amateur set net entanglements have occurred, with a large proportion of those occurring between the months of December and February. The longer (6 month) closure affords a greater level of protection than the shorter 3 month closure to all set netting.

MFish notes that the proposed shorter (3 month) closure will reduce the time over which set netting is prohibited in the Canterbury set net area. This will accordingly lead to an increased risk of dolphin entanglement within the Canterbury area than currently exists. However, this increased risk would be partially mitigated by the requirement to remain in attendance with the net. MFish notes that the Minister could choose to proceed with sub-option (i) but leave the current 6 month restriction in place across the Canterbury set net area, thereby ensuring that there is no increased risk of entanglement within the Canterbury region.

MFish notes that because amateur fishers are unlikely to set nets further offshore than 2nm, a full year closure to all set netting (sub-option iii) will likely eliminate the threat of amateur set netting under both Option 2a (2nm closure boundary) and 2b (4nm closure boundary). Nevertheless MFish considers Option 2b provides greater certainty that amateur fishers will not move further offshore to set their nets.

The area inhabited by the ECSI Hector's dolphin population is popular for amateur set netting, particularly over summer. As such, MFish considers that Option 2 will effectively reduce the likelihood of Hector's dolphin entanglement in set nets because it prohibits all amateur set netting at the time of year when dolphins are closer inshore. Allowing set netting in designated areas outside summer (sub-options i and ii) will constitute a greater, albeit unquantified, threat to Hector's dolphins than if set netting was banned year round, as proposed under Options 2a(iii), 2b(iii) and Option 3 below.

- *Impacts on fishers*

MFish considers the main utilisation impacts associated with Option 2 are that set netting for butterfish and flatfish will not be allowed for 3, 6 or 12 months of the year (sub-options i, ii, and iii, respectively), and set netting for other species will be eliminated. As mentioned above, MFish considers there is little difference in terms of impacts on use between option 2a and 2b because fishers are unlikely to travel further than 2nm from shore to set a net.

MFish therefore considers amateur set netting on the ECSI would likely be eliminated under both sub-options 2a(iii) and 2b(iii), resulting in a highly significant impact on use. This impact could be lessened

by providing for some restricted butterfish and flatfish set netting at certain times (i.e. 6 or 9 months) of the year, as proposed under sub-options (i) and (ii).

Amateur fishers catch flatfish and butterfish using set nets. Set netting is the only practical method to catch flatfish in the deeper parts of the shallow bays and harbours of Banks Peninsula, although flatfish can be drag netted in these areas but only out to about 300m from shore. Butterfish can only be caught in reasonable numbers using set nets – other methods such as lining and scoop nets are less effective and catch few butterfish.

There is already a seasonal amateur set net ban (1 October-31 March) out to 4nm along a large extent of the east coast of the South Island (between the Waiau and Waitaki Rivers). In the flounder areas within the Banks Peninsula Marine Mammal Sanctuary, amateur set netting is allowed at any time of the day from 1 March to 31 October. Therefore, fishing for flatfish in Banks Peninsula and in the Timaru reef designated areas would increase by one month under sub-option (i), and would be reduced by two further months under sub-option (ii). The present six month closure around Banks Peninsula would be reduced to 3 months under sub-option (i), thereby providing for greater utilisation than the *status quo* in this area. The proposed shorter (3 month) closure for all the ECSI has been put forward by Canterbury amateur fishers to significantly reduce the risk of amateur set netting to dolphins and to simplify administration and compliance. In addition, they support the prohibition period because it reduces the opportunity to catch small sharks and less netting will take place when butterfish are breeding. Furthermore they consider mandatory net attendance will effectively reduce the likelihood of Hector's dolphin interaction with set nets.

Set netting considered by MFish to be of highest risk to Hector's dolphins (targeting small sharks, moki, red cod and herrings) will no longer be permitted under this option. For these species, lining may be a viable method to catch these fish, although catch rates are likely to lower than achievable by set netting.

Sub-options (i) and (ii) provide for greater set net use than Option 3 (complete set net ban) because they allow butterfish and flatfish set netting in designated areas at certain times of the year. However, sub-option (iii) will likely have comparable impacts as a complete ban on amateur set nets from Cape Jackson to Slope Point due to the close inshore nature of amateur set netting.

MFish welcomes stakeholder views on the likely utilisation impacts associated with this option.

Option 3

Option 3 constitutes a full set net ban to 12nm and out to 18nm in the Canterbury area (between the Waiau and Waitaki Rivers) from Cape Jackson to Slope Point. The reason for including the 18nm distance offshore in the Canterbury set net area is because research on distribution around Banks Peninsula have seen Hector's dolphins out to about 18nm from shore in winter. Hector's dolphins are further offshore in the Canterbury area because waters around Banks Peninsula do not reach the 100m depth contour as close to shore as in other parts of the coast.

- *Effectiveness*

This option essentially eliminates the threat of amateur set netting (with the exception of any non-compliance) and therefore provides significant protection to Hector's dolphins on the ECSI. There are likely to be only small additional benefits in terms of risk avoidance to that achieved under sub-option (iii) of Options 2a and 2b (as MFish believes both of these options will also eliminate amateur set netting on the ECSI). Nevertheless, a closure to 12nm offshore will increase certainty that amateur fishers will not move further offshore to set their nets.

- *Impacts on fishers*

There are not likely to be any additional impacts on use to those which would occur under sub-option (iii)

of Options 2a and 2b. Namely, all amateur set netting will be prohibited on the ECSI, which clearly has significant implications for utilisation. The most significant impact will be on fishers who wish to target butterfish, which is an important amateur fishery. This is because butterfish cannot be easily caught using alternative methods. Fishers will still be able to drag net for flounder but some of the areas currently accessible for flounder fishing when using a set net will be beyond 300m from the shore. Other species targeted by set nets (for example, moki and small sharks) are able to be fished by alternative methods such as line fishing. A prohibition on set nets is likely to mean lower catch rates of these species for amateur fishers.

MFish welcomes stakeholder information on the likely utilization impacts associated with this option.

Analysis of commercial set netting options

Option 1

Option 1 is the *status quo* with increased monitoring of commercial set netting. As proposed, this option will require fishers to continue to apply 'safe netting' practices outlined in the CoP. Officials will work the SEFMC and CFMC to encourage fisher compliance with current CoPs.

A monitoring programme to estimate the level of interaction between commercial set netting and Hector's dolphins would be implemented by Government under this option. The monitoring programme would also be used to verify fisher compliance with CoPs.

- *Effectiveness*

Allowing fishing with set nets in areas and at times of the year Hector's dolphins are usually present constitutes a greater, albeit un-quantified, risk of fishing-related mortality than excluding set net fishing within parts, or the whole, of the dolphins range (Options 2 and 3).

Low levels of observer coverage of the commercial fishery make it difficult to determine the success of industry's initiatives to mitigate Hector's dolphin mortalities, and therefore to assess the current level of risk to Hector's dolphins on the ECSI under *status quo* management.

MFish notes that under the current voluntary arrangements, Hector's dolphins continue to be entangled in commercial set nets and commercial set netting has been responsible for the highest number of dolphin deaths with a confirmed cause over recent years. Information from fishers suggests compliance with the current CoP is good, and therefore ensuring "adherence to the voluntary CoP" as proposed under this option may not alter current levels of risk to Hector's dolphin on the ECSI. This approach, if agreed by the Minister would, therefore accept that commercial set netting on the ECSI under the existing management arrangement poses an acceptable risk to Hector's dolphins.

The key benefit of the monitoring programme is that it will allow the level of interaction between commercial set nets and Hector's dolphins to be observed with increased certainty.

- *Impacts on fishers*

MFish considers the main economic impact of this option is the cost of the monitoring programme. Most of the inshore target fisheries – sharks, elephant fish, flatfish, and butterfish – would be most affected but some of the deeper water fisheries would also be captured by the monitoring proposal (ie, fisheries prosecuted in inshore canyons).

There are approximately 66 set net vessels operating in the area covered by the ECSI Hector's dolphin section that may need to adopt monitoring under Option 1 (or elect to fish outside the area covered by the monitoring proposal). Fisheries Observers typically cost $800 to $1000 per day, and electronic monitoring equipment around $10,000 to install, such that total monitoring costs could potentially be

expensive.

MFish believes Option 1 would only be a reasonable course of action provided there is sufficient certainty that all fishers comply with the existing CoP. MFish invites the industry to submit information on the current level of compliance with the code including ways to measure the level of compliance and what actions could be taken on individual fishers who do not comply with specific measures. MFish considers there is also a need for independent verification that fishers comply with the CoP, including the placement of fisheries observers and/or monitoring equipment on set net vessels fishing within the dolphins' range

MFish welcomes stakeholder information on the likely utilisation impacts and costs associated with this option.

Option 2 (a&b)

Option 2 proposes to prohibit all commercial set netting out to either 2nm (Option 2a) or 4nm (Option 2b) between Cape Jackson and Slope Point, with provisions for some flatfish and butterfish set netting in designated areas at certain times of the year (sub options i and ii). Butterfish areas have been designated because best available information suggests that, of all set netting practices, nets set to target butterfish and flatfish pose the least risk of Hector's dolphin mortalities. Given that nets set to target flatfish are believed to pose a lower risk of Hector's dolphin entanglement than nets set to target other species (such as rig), MFish considers there is also rationale for allowing some flatfishing in certain designated areas outside the summer months. MFish notes that it is open to the Minister to choose to introduce some or all of the identified designated areas.

The reason for proposing a maximum net length for butterfish nets that is shorter than that proposed for flatfish is because this will help ensure that nets set in reef areas for butterfish do not extend out into non-reef habitat. Nets set adjacent to reef areas, or extended out from reef areas, are known to have caught Hector's dolphins, and therefore MFish considers that a maximum length of 30m for butterfish set nets should help reduce the likelihood of Hector's dolphin entanglement.

Commercial set netting for butterfish and flatfish along the coast would be restricted to the main fishing grounds for 6 or 9 months of the year depending on whether sub-option (i) or (ii) is chosen (flatfish and butterfish are valuable commercial and non commercial fisheries on the ECSI – see Table 11). The only nets that could be used in these areas would be defined to prevent fishers using these areas to target other fish species. Commercial set netting for these species on the ECSI would be eliminated under sub-option (iii).

Under sub-options (i) and (ii), additional restrictions would apply to commercial set netters fishing within the designated areas, as follows:

- ⇒Mandatory attendance with a set net
- ⇒Maximum of one set net per person and boat;
- ⇒No overnight setting of nets (between one hour before sunset to one hour after sunrise)
- ⇒Maximum net length of 30 m for butterfish set nets and 60 m for flatfish set nets.

Proposed measures for commercial fishers under Option 1 (i.e. strict adherence to the existing voluntary CoP and additional monitoring) would also apply to commercial set netting activities offshore from the 2nm or 4nm boundaries proposed under Option 2.

- *Effectiveness*

MFish considers that Option 2 is likely to significantly reduce the risk of Hector's dolphin entanglement in commercial set nets.

Measures proposed under Option 2 will mean that set netting considered to be of highest risk to Hector's dolphins (mainly targeting small sharks and moki) is prohibited throughout the year within 2nm or 4nm from the shore (where dolphin densities are highest, particularly in summer). Commercial set netting further offshore from the proposed offshore boundaries will be allowed to continue (under the current voluntary CoP) and therefore, this constitutes a greater, though unquantified risk, than prohibiting commercial set netting throughout the dolphin's range (Option 3).

The 4nm offshore boundary (Option 2b) clearly provides greater protection to Hector's dolphins than the closer inshore boundary proposed under Option 2a because there is less overlap between commercial set netting activity and Hector's dolphins' inshore range.

Under both options (2a and 2b), fishing close to shore for butterfish or flatfish will either be prohibited throughout the year (sub-option iii) or restricted to designated areas for 9 or 6 months under restrictions that reduce risk to the dolphin (sub-options i and ii).

Since 1988, the period from October to March is the time of year when all commercial set net entanglements have occurred, with most of those occurring between the months of December and February. While the longer (6 month) complete seasonal closure affords a lower level of certainty around threat mitigation than a year round closure to inshore set netting, MFish considers sub-option (ii) will still provide a substantial level of threat reduction because this is the time of year when all known commercial entanglements have occurred. The proposed shorter (3 month) closure covers off the period when a large proportion of entanglements have taken place. However, this shorter closure accordingly incurs an increased risk of dolphin entanglement in the designated fishing areas. Nevertheless, MFish considers that allowing set netters to target butterfish and flatfish in designated areas outside the summer months will probably constitute only a marginal increase in risk to Hector's dolphins (due to the relatively lower risk of Hector's dolphin entanglement associated with nets set solely for butterfish and flatfish).

Option 2 will more effectively mitigate risk from commercial set netting to the ECSI Hector's dolphin population than Option 1, as commercial set netting will not be allowed along much of the inshore part of the dolphins' range (thereby reducing the overlap between Hector's dolphins and the activity that poses a threat to them). Allowing set netting in designated areas outside the summer period will constitute a greater, albeit unquantified, threat to Hector's dolphins than if set netting was banned year round, as proposed under Options 2a(iii) and 2b(iii). Because commercial set netting will continue outside the proposed offshore boundaries under Option 2, the risk of interaction with Hector's dolphins is greater than if set netting was prohibited throughout the dolphins' range, as considered under Option 3 below.

- *Impacts on fishers*

Based on catch effort returns from last summer (first time this was available), the impact on commercial fishing of closures to set netting out to 2nm (Option 2a) or 4nm (Option 2b) is likely to be most significant for fishers that fish for rig, elephant fish and deep water species fished close to the shore. The impact will be greatest on those that set net in areas where deeper waters are closer to the shore. In these areas (such as the Kaikoura Canyon) the 4nm boundary could be reduced to allow deepwater set netting closer to the shore.

The impacts of prohibiting set netting out to 2nm or 4nm could be lessened by providing for some restricted set netting in designated areas at certain times of the year, as proposed under sub-options (i) and (ii).

However, the impact of only allowing set netting in designated areas over the 6 or 9 month periods

proposed may be significant as this precludes set netting over the summer months, when a lot of fishing currently occurs. These measures also mean commercial fishers will have to operate close inshore in a similar manner to amateur fishers to catch butterfish and flatfish, and will have to move further offshore to catch other species. Sub-option (iii) prohibits all inshore set netting throughout the year (including within designated areas) and this will have significant implications for the butterfish, and possibly moki and trumpeter fisheries – all of which are targeted by commercial fishers with short (up to 60m) nets within, or adjacent to, kelp/reef areas close inshore.

Analysis of the locations of sets of commercial fishers suggests that most fishers are able to fish outside 2 and 4nm. However a significant amount of set netting occurs within 4nm of the coast. The economic impact of commercial fishers having to set net outside 2nm or 4nm is not known but MFish considers points relevant to Option 2 include:

⇒2nm and 4nm set prohibitions will have considerable negative effects on commercial fishers. Fisheries most likely to be affected are butterfish, rig, and elephant fish. Potential effects include:

- Declining catches
- Increased cost as fishers are restricted to fishing further offshore
- Some fishers may retire from the fishery if increased costs outweigh returns
- ITQ for target fishstocks may devalue.

⇒Net setting requirements inside designated areas (i.e. one net per person per boat, smaller nets, and mandatory set net attendance) will have large impacts on fishing effort in the inshore set net fishery to the extent that catch may not reach the critical mass necessary for fishers to operate viable businesses. The species likely to be affected are flatfish and butterfish.

⇒MFish also notes that increased fishing costs may drive up fish prices.

Additional costs associated with this option are the costs of monitoring set net activity inside 12-18nm. MFish notes that the monitoring costs outlined under Option 1 are also relevant to Option 2, although the level of monitoring required may be less due to the lower level of residual risk achieved under Option 2.

Because commercial set netting will continue outside the proposed offshore boundaries under Option 2, the impact on commercial utilisation is less than if commercial set netting was prohibited throughout the dolphins' range (Option 3). MFish invites commercial fishers to provide information to better assess the utilisation impacts associated with Option 2.

Option 3

Option 3 constitutes a full set net ban to 12nm between Cape Jackson and Slope Point, extended out to 18nm in the Canterbury area (between the Waiau and Waitaki Rivers).

♦ *Effectiveness*

This option avoids potential interactions between Hector's dolphins and commercial set nets to a greater extent than Options 1 and 2, and therefore provides the greatest protection from fishing-related mortality. Option 3 is likely to effectively eliminate the threat of commercial set netting to Hector's dolphins on the ECSI (with the exception of any non-compliance), and therefore reduces residual risk to the lowest levels of all options proposed for commercial set netting.

♦ *Impacts on fishers*

The proposed 12-18nm closure is likely to incur the greatest utilisation impact of all options proposed. It would eliminate most commercial set netting on the ECSI. Elephant fish is able to be caught by trawlers but this method is not size selective and can catch large numbers of juveniles. Rig is mainly taken as part of the rig and school shark target species. Rig is caught as a bycatch of target fishing for red cod and flatfish but these species are not able to be easily targeted as they are able to swim faster than a moving trawl.

In addition, the proposed closures are likely to have a significant impact on the school shark and spiny dogfish fisheries along the ECSI because of the extended continental shelf. School shark and spiny dogfish can be caught on long lines but the method is not favoured at present. Set netting for ling, groper and other deeper water species could only occur outside the 12-18nm boundary unless provision is made for deepwater set netting inside 12-18nm in waters greater than 100m depth, which are outside the dolphins' range.

MFish considers points relevant to Option 3 include:

⇒A 12 to 18nm prohibition will have effectively stop all inshore set netting and most deep water set netting on the east coast of the South Island. Effects will include:

- Declining catches and fish supply
- Increased effort and cost as fishers are restricted to fishing further offshore (where able) or adopting other fishing methods that may be less efficient
- Some fishers may retire from the fishery if increased costs outweigh returns
- ITQ for target fishstocks may devalue.

MFish considers the characterizations in Table 11 are relevant to the assessment of cost associated with Option 3.

MFish welcomes stakeholder information on the likely utilisation impacts associated with this Option 3.

Customary set netting

MFish understands that currently Tangata Tiaki/Kaitiaki are not authorising customary fishers to set net on the open coast or within harbours, inlets or bays. As such, MFish considers there is currently no threat from customary set netting to Hector's dolphins on the ECSI. Accordingly, MFish considers that there is no need to consider measures to manage customary set netting at this time. It is possible that the proposed prohibitions on amateur set netting might lead to an increase in authorisation applications for customary set netting. MFish will work with Tangata Tiaki/Kaitiaki to raise awareness of the issues associated with set netting and Hector's dolphins, and support continuing non-issuance of authorisations for set netting in areas where Hector's dolphins are present. MFish invites tangata whenua to comment on how the proposed measures may affect them.

7.4.5.3. Commercial trawling (mid-water trawling, bottom trawling and pair trawling)

Proposals for managing the impacts of trawling on the ECSI Hector's dolphin population are outlined below.

As previously mentioned, these proposals do not apply to Tasman Bay, Golden Bay, Marlborough Sounds (**except** Queen Charlotte and Port Underwood), river mouths, estuaries, lagoons, inlets and

harbours, with the following named exceptions. Estuaries and harbours that **are** included in the proposal boundaries are the Avon-Heathcote Estuary, Lyttelton Harbour, Akaroa Harbour and Timaru Harbour.

Status Quo – Existing management (refer Existing Threat Management Section)
Option 1 – Further develop and implement voluntary code of practice and additional monitoring of trawling inside 12nm from shore (MHW) between Cape Jackson and Slope Point (extended to 18nm from the Waiau River to the Waitaki River)
Option 2 – Trawling prohibited inside 2nm from the shore (MHW) between Cape Jackson and Slope Point except for vessels targeting flatfish with low headline height nets, and the measures as per Option 1
Option 3 – Trawling prohibited inside 2nm from the shore (MHW) between Cape Jackson and Slope Point and measures as per Option 1

MFish notes that the level of monitoring required under each of these options will be commensurate with the level of risk mitigation achieved. For example, Option 1 allows all trawling activity throughout Hector's dolphins' range on the ECSI to continue, whereas Option 3 prohibits all trawling activity within 2nm (the distance within which all known trawl interactions have occurred). As such, MFish considers it may be acceptable to have lower levels of observer coverage to monitor interactions outside 2nm; given the costs to industry associated with monitoring programmes and the relatively low level of residual risk associated with Option 3. Refer to Part III for more information about the proposed monitoring approach.

Analysis of options

Option 1

Option 1 requires trawl fishers fishing inside 12nm from shore (inside 18nm from shore between the Waiau and Waitaki Rivers) to develop and implement a CoP to mitigate the risk of all forms of trawling (mid-water, pair, and bottom trawl) on Hector's dolphins. Presently, the SEFMC CoP is limited to the 1nm closure in the Canterbury Bight.

A monitoring programme of commercial trawl activity to assess the extent to which trawl vessels interact with Hector's dolphins would also be implemented by Government under this option. The monitoring programme would also be used to independently verify fisher compliance with the CoP.

♦ *Effectiveness*

This option requires fishers to adopt further 'safe-fishing' practices when trawling within the dolphins' range. These practices could include using trawl gear that reduces the likelihood of interacting with dolphins such as low headline gear, no wing doors and low tow speed. Other measures could include:

⇒Fishing away from areas where dolphins are sighted or known to occur;

⇒Fishing away from discoloured or murky waters;

⇒Quickly retrieving trawl gear if dolphins appear;

⇒Maintaining a constant lookout when gear is deployed; and

⇒Keeping tow duration to a minimum.

MFish invites industry to submit information about developing an improved code for trawl fishing on the ECSI including how the level of compliance could be measured, and what actions could be taken on

individual fishers who do not to comply with, or breach, specific measures. As noted, MFish considers there is also a need for independent verification that fishers comply with the CoP and to quantify any trawl mortalities of Hector's dolphins.

A CoP would help mitigate potential trawl/Hector's dolphin interactions, while a monitoring programme would help ensure compliance with a CoP and provide additional information on the nature and extent of trawl/dolphin interactions.

♦ *Impacts on fishers*

The main economic impact of this option is likely to be the cost of the monitoring programme. MFish cannot determine with accuracy the number of vessels that need to cover monitoring costs that can, for fisheries observers, reach up to $1000 per day. There are approximately 108 inshore trawl vessels (<46m) operating on the ECSI that may require fisheries observer coverage under Option 1. Video monitoring equipment is also an option that MFish can investigate with fishers, although installation and operating costs are also expensive (eg, around $10,000 installation cost and ongoing operating and auditing costs).

MFish welcomes stakeholder views on the costs associated with implementing a comprehensive trawl CoP, as well as increased monitoring of inshore trawl fishing.

Option 2

All known trawling-related Hector's dolphin mortalities have occurred within 2nm from shore. MFish notes that trawling for flatfish is likely to have a lower likelihood of dolphin bycatch (compared with other trawl gear) because flatfish trawl gear has a low headline height, no wing doors, and a smaller sweep area.

Option 2 proposes, in addition to Option 1, banning trawling (mid-water, bottom, and pair) within 2nm from shore. Under this option, vessels targeting flatfish using low headline gear (<1 m high) would still be allowed to fish within the proposed 2nm closure.

Similarly to Option 1, Option 2 also has an increased monitoring component associated with all trawl activity within 12-18nm from shore. Vessels trawling within 12-18nm will also be encouraged to operate under voluntary measures to reduce the likelihood of trawl interactions (as outlined in Option 1).

♦ *Effectiveness*

MFish considers that risk of interactions between trawlers on the ECSI and Hector's dolphins would be reduced further than Option 1 if trawl vessels were excluded within 2nm of the coast because:

⇒All reported interactions between Hector's dolphins and trawlers on the ECSI have occurred within 2nm of the shore

⇒Hector's dolphin density is highest in close inshore areas than further out (particularly in summer)

⇒Trawling in shallow waters probably presents a greater risk to dolphins because there is less available water column above or below trawl gear for the dolphins to swim away from the net.

Lower density of dolphins and deeper water offshore suggests low probability of interactions between trawlers and Hector's dolphins outside 2nm. Increased monitoring can be used to determine with greater certainty the level of interaction, if any, of trawl vessels and Hector's dolphins outside 2nm.

Option 2 makes allowance for flatfish trawling because the trawl gear designed to target flatfish has a low headline height net type that dolphins can rise above in shallow water. Used in conjunction with

proposed measures under Option 1, MFish considers flatfish trawling will pose a relatively low risk to Hector's dolphins.

♦ *Impacts on fishers*

This option provides for some utilisation within the proposed 2nm closure as commercial fishers will still be able to target flatfish. MFish is unable to determine the extent of effects of this option on other trawl fisheries because trawl fishers are generally not required to provide position and depth of bottom trawl information. However, target trawl fisheries that might be affected include red cod, tarakihi, and barracouta. For example 104 vessels caught red cod, 96 vessels caught red gurnard and 76 vessels caught tarakihi and the 2005-06 fishing year. Given the distributional nature of these fisheries it is likely fishers would face some additional costs to target these species only outside 2nm. As such, it is possible that the catch and value of these local fisheries may decrease (see Table 13). MFish welcomes stakeholder information to better quantify the costs of this proposed option.

MFish acknowledges that introducing a restriction that allows low headline trawl nets only to be used within 2nm may be difficult to enforce. However, similarly to Option 1, Option 2 also has an increased monitoring component associated with all trawl activity within 12 - 18nm from shore, and this should assist with compliance monitoring (see monitoring cost comments in Option 1).

MFish invites submissions from fishers that discuss the utilization impacts of Option 2.

Option 3

Option 3 proposes to prohibit all trawl fishing within 2nm from shore. Measures proposed under Option 1 (i.e. CoP) would also apply when trawling outside 2nm.

Option 3 also has an increased monitoring component associated with trawl activity inside 12nm – 18nm (as outlined in Option 1).

♦ *Effectiveness*

Proposed measures under Option 3 will give greater certainty of avoiding the risk of trawling on Hector's dolphins, and is the most risk averse option. MFish considers the benefit of Option 3 over Option 2 is likely to be marginal given that the risk associated with low headline height trawl gear is thought to be low. Prohibiting all forms of trawling within 2nm effectively encompasses waters out to about 10-20m water depth in many areas and will protect a significant proportion of the ECSI Hector's dolphin population from the threat of trawl gear.

♦ *Impacts on fishers*

A 2nm trawl closure may have a significant impact on the inshore commercial trawl fishery. Presently commercial fishers target a range of inshore species, particularly flatfish. It is therefore likely that the impact on use for trawl flatfishing will be most significant, as flatfishing is generally carried out closer inshore than targeting for other species. During the 2005-06 fishing year at least 97 vessels caught flatfish. Impacts on other fisheries are more difficult to assess but MFish considers the impact assessment in Option 2 above gives an indication of other trawl fisheries that may also be impacted by Option 3.

MFish is unable to quantify the economic impact of the proposed 2nm closure on the inshore trawl fisheries. MFish invites industry to provide information to better assess this impact, as well as any other costs that might be associated with this Option.

7.4.5.4. Rock lobster potting (amateur and commercial)

Option – CRA 5 fishers at Kaikoura to voluntarily weigh their pot buoy lines when setting pots in areas where tidal movements are strong.

Assessment of management option

MFish considers that the best option to reduce the likelihood of Hector's dolphin entanglement in rock lobster pot buoy lines is to work with Te Korowai, CRA 5 quota holders and amateur fishers to ensure their code of practice includes the use of appropriate weights at suitable distances along pot buoy lines to prevent pot lines from hanging loose in the water.

MFish has little information to propose technical specifications under this option but considers CoPs are the most appropriate way to do so until further information is available. MFish also believes that it likely that weights and distances along the buoy line will vary according to fishing conditions and that it is unlikely there will be a solution that fits all that could be made mandatory.

MFish invites submissions from stakeholders on measures that could be incorporated in a code of practice to address this issue.

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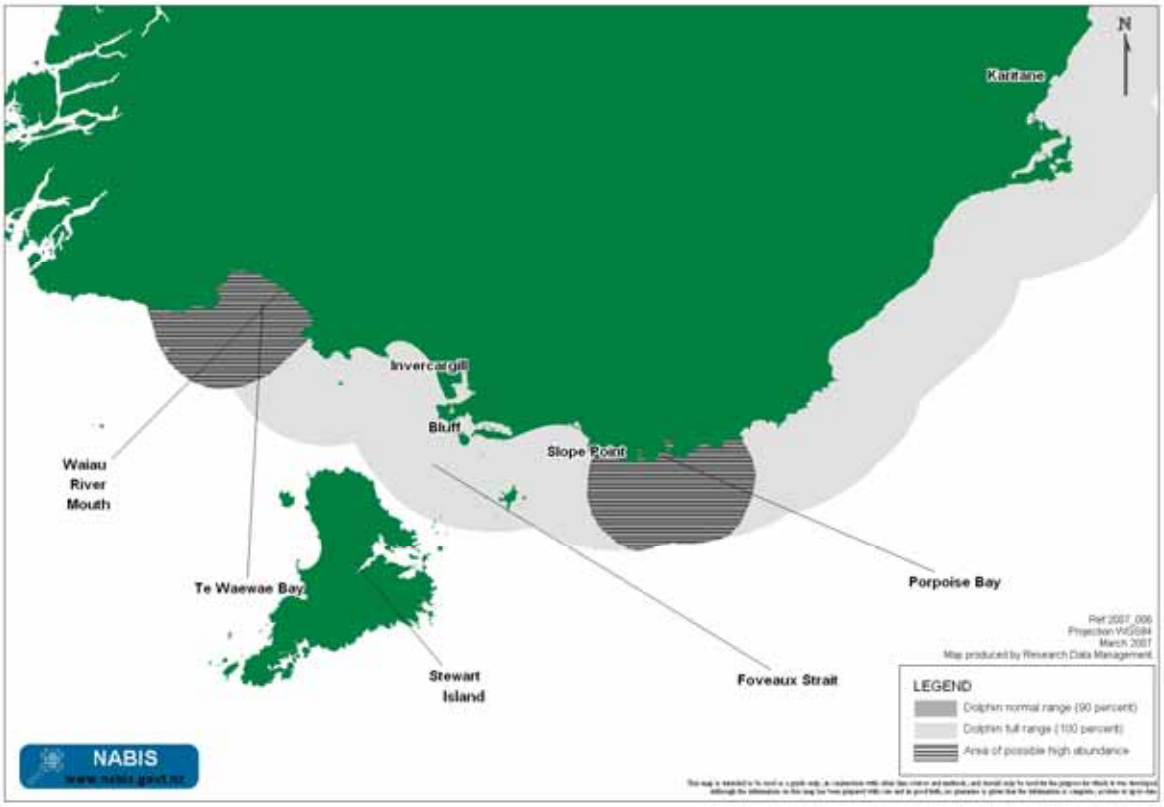
7.5. South Coast of the South Island

The south coast of the South Island (SCSI) Hector's dolphin population extends from Slope Point (south of Waikawa Harbour in the Catlins) in the east through to Sandhill Point (western point of Te Waewae Bay) in the west (Map 14). This area covers the south-eastern part of Fisheries Management Area 5 but excludes lagoons, coastal lakes, river mouths, estuaries, inlets and harbours. The SCSI population falls within the Southland region of the Department of Conservation.

All lagoons, coastal lakes, river mouths, estuaries, inlets and harbours on the SCSI are excluded from the proposals because these areas are not part of the known Hector's dolphin range on the SCSI.



Map 14 Distribution of SCSI Hector's dolphin population

7.5.1. Population characteristics

The south coast supports the smallest population of Hector's dolphins around the South Island. By far the largest numbers of the dolphins are found in Te Waewae Bay. Dolphins have also been sighted in Toetoe Bay, off Oreti Beach and on occasion in the Fiordland Sounds. Hector's dolphins on the SCSI are found close inshore, often in the breaker zone, mostly inside 3nm, and rarely beyond 5nm. It is unknown whether dolphins found in Porpoise Bay are more closely affiliated with the east or south coast populations of Hector's dolphins[114].

[114] For the purposes of the TMP, Hector's dolphins found in Porpoise Bay have been incorporated into the ECSI population. This is because the ECSI population estimate includes the extent of coastline that incorporates Porpoise Bay.

SCSI Hector's dolphins are more closely related genetically to west coast South Island Hector's dolphins than east coast South Island Hector's dolphins, suggesting there is some movement between these populations. This is supported by confirmed reports of Hector's dolphins in Shark Cove, Dusky Sound and Milford Sound and anecdotal reports in Preservation Inlet.

Hector's dolphin distribution off the south coast appears to follow a similar pattern to elsewhere (e.g. ECSI), with dolphins strongly concentrated close to shore during summer and more widely dispersed with respect to water depth in winter.

There is no abundance estimate for Hector's dolphins that reside along the extent of the SCSI (i.e. abundance estimates have been published for Hector's dolphins in Te Waewae Bay but not for the full extent of the SCSI).

The most recent published and peer reviewed population estimate for Te Waewae Bay is 89 (95% confidence interval = 36-218). This abundance was estimated from a study conducted in 1998-99, which entailed a single boat-based line transect survey of the area[115]. There has been a more recent study undertaken on Hector's dolphins in Te Waewae Bay. This research involved boat-based surveys of the population from April-June 2004 and from December 2004-February 2005. The findings of this study are currently being peer reviewed, but preliminary results suggest that the number of dolphins that use Te Waewae Bay may substantially exceed 89 individuals. DOC has indicated that while the study's results are currently not suitable for public release (due to review status), the final results of this study should be available for final advice to the Minister of Fisheries. MFish notes that in light of this more recent study, there is uncertainty around the number of Hector's dolphins that use Te Waewae Bay; thereby adding to the uncertainty around the total size of the SCSI Hector's dolphin population.

The lack of comparative population surveys means that change in abundance over time cannot be estimated, and there is consequently a high level of uncertainty around trends in the SCSI population's abundance. Based on genetic analysis to date, there is no evidence of population decline on the SCSI. Although there was a relatively low sample size, genetic analysis has found no evidence of lower genetic diversity than expected and no evidence of inbreeding. [116]

The boat-based surveys carried out by DOC between April 2004 and February 2005 found that Hector's dolphins were concentrated within 1 km of the coast, along the extent of Te Waewae Bay, with somewhat lower densities along the eastern and western edges of the bay (see Maps 15 and 16).

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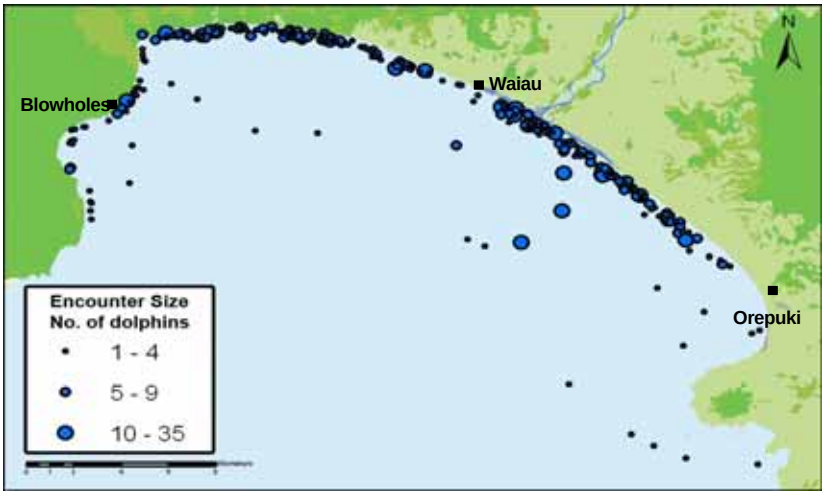
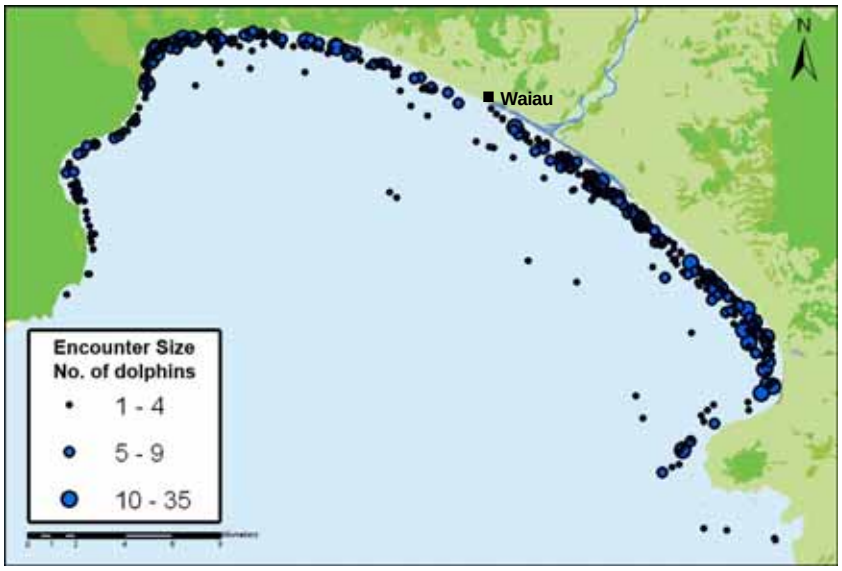
[115] The 1998-99 study was undertaken using a single line transect survey taken from a boat that could not get too close to shore. This figure should be considered a snapshot of the situation at the time.

[116] Pichler, F. B. 2002. Genetic assessment of population boundaries and gene exchange in Hector's dolphin. Department of Conservation Science Internal Series 44. 37 p



Map 15: Locations of Hector's dolphin sightings in Te Waewae Bay during autumn 2004



Map 16: Locations of Hector's dolphin sightings in Te Waewae Bay during summer 2004/05

7.5.2. Fishing and non-fishing threats

Life history characteristics (maturity, fecundity, and longevity) and abundance means the SCSI population is threatened by low levels of human-induced mortality. Population Biological Removal (PBR) analysis based on the published abundance estimates suggests that the population cannot sustain any human-induced mortalities each year. [117] MFish notes that while results from the more recent study may identify that more than 89 dolphins use Te Waewae Bay, the level of human-induced mortality that

[117] When applying the Recovery Rate Goals; see Appendix 3 for a description of the PBR analysis for Hector's dolphins. PBR is only one of a number of factors in determining appropriate management action. There is currently debate around the inputs to the PBR analysis for Hector's dolphins, leading to a range of estimated potential removals. MFish and DOC intend to have the Hector's dolphin PBR analysis independently reviewed to resolve this issue.

the population can sustain probably remains low.

Fishing threats identified as facing the SCSI Hector's dolphin population are:

⇒Set netting (commercial, amateur)

⇒Commercial trawling

The DOC incident database indicates there have been nine reported Hector's dolphin mortalities associated with the SCSI population since 1988[118]. Of these, there are six mortalities where the cause of death was able to be assessed. The number of mortalities definitely attributable to a cause of death (three) is set out in Table 14. In the remaining three cases where a cause of death was able to be assessed, cause of death could not be established by the pathologist in two cases, and in one case, probable entanglement was the cause of death established.[119]

Table 14: Reported Hector's dolphin mortalities with a confirmed cause of death on the SCSI since 1988.

Cause of death	Number
Trauma – unknown source	1
Natural	2

7.5.2.1. Nature and extent of fishing threats

MFish notes that the level of threat to Hector's dolphins from fishing is difficult to quantify, as there is no formal monitoring of amateur set netting and there has been low levels of observer coverage of the commercial set net fishery. There has been no observer coverage of inshore trawl vessels on the SCSI. Therefore, reliance is placed on fisher self-reporting or interview surveys of marine mammal incidental capture. Reporting of the incidental capture of marine mammals is mandatory under the MMPA but it is unknown what proportion of interactions goes unreported. Consequently, the one known fishing-related Hector's dolphin death on the SCSI represents a minimum level of mortality.

Further detail about fishing threats facing the SCSI population is provided below.

Set netting

Set netting is a threat to Hector's dolphins on the SCSI. Both commercial and amateur set netting is practiced; information on the nature and extent of the threat from these fisheries is set out below.

Amateur set netting

Amateur set netting occurs in Te Waewae Bay and overlaps with Hector's dolphin distribution. The rough and exposed conditions on the open coastline mean that little amateur set netting occurs outside Te Waewae Bay on the SCSI. A small amount of amateur set netting occurs in reef areas for butterfish and moki between Bluff Harbour and Te Waewae Bay.

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[118] The DOC incident database contains information about all reported Hector's dolphin incidents (mortalities, strandings, etc.). An unknown number of incidents go unreported, and therefore the figures presented represent a minimum number of mortalities. Further detail around the DOC incident database, and its limitations, is provided in Part I of this document.

[119] "Probable" net entanglements relate to carcasses that show evidence of entanglement (for example, some sign of net marks). An assessment of the cause of death was not undertaken in 2 cases and in one case the animal was too decomposed to allow a cause of death to be assessed.

Amateur set netting in Te Waewae Bay is confined to within 500m off the shore for small sharks (such as elephant fish and rig) during summer and reef fish (such as butterfish and trumpeter). At the eastern end from Monkey Island to Pahia Point the rocky area is fished for reef fish. At the western end near the Waikoau River mouth and back along the beach to the eastern end set netters target small sharks.

Fishing mainly takes place over summer and is primarily confined to a limited number of local people who fish on the weekends. There is a campground at Monkey Island, which is located on the eastern side of Te Waewae Bay. Visitors from outside the local area stay at the campground, particularly over the Christmas/New Year holiday, which leads to increased fishing effort (including set netting).

Amateur fishers set net and drag net for flounder in the lagoon of the Waiau River that flows into Te Waewae Bay (i.e. outside the area where Hector's dolphins are present).

Available information suggests that set netting for butterfish poses a low risk of dolphin mortalities[120]. MFish is not aware of any dolphin mortalities caused by nets set only for butterfish. Butterfish nets are confined to kelp/reef areas in the SCSI (habitat that is not favoured by Hector's dolphins).

Set netting for moki adjacent to reefs and small sharks (elephant fish, rig and school shark and spiny dogfish) is considered by MFish to have a higher risk of dolphin entanglement than netting for butterfish (in reef areas) and flatfish[121]. This is because fishing for these species involves using nets with large mesh sizes in areas where dolphins are known to frequent, and which have more than double the number of meshes used to catch flatfish. The nets are usually made of courser mesh set tightly to form a wall that acts to catch the fish by their gills.

There is uncertainty around the actual number of dolphin deaths caused by amateur set net fishing in Te Waewae Bay because the level of fisher self-reporting is unknown. Of the known deaths on the south coast South Island, there has been one dolphin death attributed to probable net entanglement (unknown sector cause). This dolphin was recovered on Orepuki Beach, on the eastern side of Te Waewae Bay.

Customary set netting

MFish does not know of any customary set net effort off the SCSI that overlaps with Hector's dolphins' range.

Customary fishing is now managed under a regulatory framework as a result of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992. Ngāi Tahu Whānui has implemented the South Island customary fishing regulations, through the appointment of Tangata Tiaki/Kaitiaki. In order to undertake customary fishing within a particular location of the Ngāi Tahu Whanui Takiwā (which includes the SCSI), prospective customary fishers must first obtain an authorisation from a Tangata Tiaki/Kaitiaki appointed for that area. Te Rūnanga o Ngāi Tahu (the Ngāi Tahu Tribal Council) manages and administers the Ngāi Tahu customary fisheries database. The nine years of customary fishing catch landing returns compiled within this database indicates that Ngāi Tahu customary fishers set net within coastal lagoons and lakes only. At this point in time Ngāi Tahu Tangata Tiaki/Kaitiaki are not authorising customary fishers to set net on the open coast of the SCSI.

As such, MFish considers there is currently no threat from customary set netting to Hector's dolphins on the SCSI. MFish welcomes stakeholder views on this.

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[120] From the DOC incident database and fisher interviews

[121] Some amateurs set nets for moki off sandy/muddy areas next to kelp/reef areas by extending their nets that have been set for butterfish, and this scenario has been known to catch dolphins.

Commercial set netting

Some commercial set netting on the SCSI overlaps with Hector's dolphin distribution. Fishers target sharks with nets up to 800m long; elephant fish and rig normally in waters less than 50m deep, 1-20nm offshore; spiny dogfish and school shark normally in waters between 10m-100m deep, ~1nm offshore, to waters 100m deep, ~ 5-20nm offshore. Fishers also catch butterfish, moki, and trumpeter with short (up to 60m) nets in kelp/reef areas close inshore (occasionally in the Pahia Point area). Some set netting for flatfish currently occurs outside the dolphins' range in the New River Estuary and Aparima Estuary at Riverton.

Approximately 11 commercial set netters (operating about 12 vessels) fish on the SCSI. Available information suggests that at least 4 or 5 operate in Te Waewae Bay. Table 15 below characterizes the main commercial set net fisheries on the SCSI using estimated catch and effort data reported from statistical reporting areas 025 and 030 over the past three fishing years. Not all the catch and effort (and value) listed in Table 14 can be attributed to the SCSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area. However, the characterization illustrates the nature and extent of set netting on the SCSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Hector's dolphins (see later in this section). Additional fishery characterization for selected SCSI fisheries is in Appendix 4.

Table 15 SCSI set net characterisation captured from estimated catch and effort reporting in statistical reporting areas 025 and 030. Value is estimated from the port price for the corresponding fishing year[122].

Fishery		**2003-04**	**2004-05**	**2005-06**
School shark	Catch (tonne)	280	304	316
	Fishers	11	10	8
	Vessels	11	12	9
	Value ($)	$619,122	$577,600	$725,220
Spiny dogfish	Catch (tonne)	121	126	124
	Fishers	8	10	7
	Vessels	7	12	8
	Value ($)	$60,258	$54,810	$62,000
Rig	Catch (tonne)	87	100	84
	Fishers	11	10	9
	Vessels	10	11	10
	Value ($)	$282,211	$357,000	$253,860
Elephant fish	Catch (tonne)	5	17	23
	Fishers	6	10	8
	Vessels	6	11	9
	Value ($)			$32,430
Butterfish	Catch (tonne)	30	18	15
	Fishers	3	2	1
	Vessels	5	4	2

[122] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

Fishery		2003-04	2004-05	2005-06
	Value ($)	$87,633	$58,320	$57,600
Flatfish[123]	Catch (tonne)	0.3	6	4
	Fishers	1	3	3
	Vessels	1	3	3
	Value ($)	$980	$19,020	$11,840
Moki	Catch (tonne)	4	7	3
	Fishers	6	5	5
	Vessels	8	7	6
	Value ($)	$4,252	$7,280	$2,415
Trumpeter	Catch (tonne)	2	2	1
	Fishers	1	2	1
	Vessels	3	4	2
	Value ($)	$4,572	$3,320	$1,920
Stargazer	Catch (tonne)	3	4	2
	Fishers	7	6	7
	Vessels	6	6	7
	Value ($)	$4,138	$4,320	$8,995

There has been some limited observer coverage of the commercial set net fishery off the SCSI in recent years, with no Hector's dolphins observed caught. In 2005-06, 29 set net events were observed (17 in statistical area 025[124] and 12 in statistical area 030[125]). Seventy-one sets have been observed off the SCSI in the current fishing year (59 sets in statistical area 25[126], and 12 sets in statistical area 30[127]).

Low levels of monitoring means there is uncertainty around the actual number of dolphin deaths caused by commercial set net fishing on the SCSI. As mentioned above, necropsy results have attributed one dolphin death to probable net entanglement (unknown sector cause) in Te Waewae Bay. MFish cannot determine whether the absence of reported dolphin commercial set net entanglements on the SCSI reflects zero interactions between commercial set nets and Hector's dolphins or fisher non-reporting.

Trawling (mid-water, bottom and pair)

Trawling is a method known to occasionally interact with Hector's dolphins (records from the east and west coasts of the South Island). There has been no observer coverage of inshore trawl fisheries on the SCSI.

There are approximately 30 trawl fishers operating about 31 vessels (under 46m) on the SCSI. These fishers catch a wide range of inshore fish species. Many fishers target flatfish in water depths less than 30m using low headline nets (Foveaux Strait and Te Waewae Bay). A larger number of fishers also catch stargazer in deeper waters outside 50m (off the west coast of Stewart Island and in western Foveaux Strait). A number of trawlers also target barracouta in deeper waters outside 12nm.

Table 16 below characterizes the main commercial trawl fisheries on the SCSI (<46m) using estimated catch and effort data reported from statistical reporting areas 025 and 030 over the past three fishing years. Not all the catch and effort (and value) listed in Table 16 can be attributed to the SCSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area.

[123] All flatfish codes included.
[124] Targeting rig, school shark and spiny dogfish.
[125] Targeting school shark and rig.
[126] Targeting school shark and rig.
[127] Targeting school shark.

However, the characterization illustrates the nature and extent of trawling on the SCSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Hector's dolphins (see later in section).

Table 16 SCSI trawl characterisation captured from estimated catch and effort reporting in statistical reporting areas 025 and 030. Value is estimated from the port price for the corresponding fishing year[128]. Analysis excludes vessels >46m except for * that may include vessels greater than 46m.

Fishery		**2003-04**	**2004-05**	**2005-06**
Stargazer	Catch (tonne)	781	790	824
	Fishers	26	28	27
	Vessels	26	29	29
	Value ($)	$1,077,650	$853,257	$1,058,960
Spiny dogfish	Catch (tonne)	164	375	294
	Fishers	8	17	15
	Vessels	8	18	16
	Value ($)	$81,884	$163,042	$147,073
Red gurnard	Catch (tonne)	160	177	172
	Fishers	26	26	28
	Vessels	26	27	29
	Value ($)	$220,934	$240,872	$218,011
Flatfish[129]	Catch (tonne)	102	140	212
	Fishers	27	30	25
	Vessels	27	31	26
	Value ($)	$333,054	$444,789	$626,928
Red cod*	Catch (tonne)	118	164	134
	Fishers	32	35	28
	Vessels	40	48	41
	Value ($)	$69,360	$96,760	$72,360
Elephantfish	Catch (tonne)	82	89	100
	Fishers	25	21	21
	Vessels	25	22	23
	Value ($)	$212,543	$154,557	$149,974
Barracouta	Catch (tonne)	82	65	102
	Fishers	6	6	4
	Vessels	6	6	4
	Value ($)	$32,722	$17,420	$29,181
Tarakihi	Catch (tonne)	43	41	31
	Fishers	17	20	15
	Vessels	17	21	16
	Value ($)	$57,197	$58,495	$40,144
Leatherjacket	Catch (tonne)	14	40	44
	Fishers	5	7	10

[128] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

[129] Includes all flatfish species codes.

Fishery		2003-04	2004-05	2005-06
	Vessels	5	7	10
	Value ($)	$6,455	$20,000	$23,320
Warehou	Catch (tonne)	4	31	53
	Fishers	4	5	4
	Vessels	4	5	4
	Value ($)	$2,930	$26,725	$48,754
School shark	Catch (tonne)	30	14	24
	Fishers	20	18	17
	Vessels	20	19	18
	Value ($)	$65,817	$47,011	$44,986
Rig	Catch (tonne)	11	12	14
	Fishers	20	22	20
	Vessels	21	23	20
	Value ($)	$35,918	$42,040	$41,519
Blue cod	Catch (tonne)	2	6	7
	Fishers	9	10	13
	Vessels	9	10	13
	Value ($)	$7,088	$18,604	$20,526

There is no reported information confirming that trawlers have caught dolphins off the south coast. However, trawl vessels operating within the dolphins range are a potential threat to the population – although this may be low for flatfish trawling.

Fishers believe that slow trawling for flatfish using a small low headline, no wing doors, and a smaller sweep area, together with low tow speed (4-6kn) enables dolphins to swim away from the net, and is therefore of low risk to Hector's dolphins. However, there has been no observer coverage on trawlers to determine interaction with Hector's dolphins in other trawl fisheries, and it is possible that mortalities may have gone unreported.

7.5.3. Existing threat management – status quo

There are a number of voluntary and regulatory measures in place on the SCSI to reduce the impacts of fishing on Hector's dolphins; these are outlined below.

7.5.3.1. Current measures for amateur set netting

A mandatory measure is currently in place to mitigate dolphin bycatch in amateur set nets in Te Waewae Bay. This measure was introduced in December 2006 to mitigate the threat of amateur set netting to Hector's dolphins in Te Waewae Bay while the TMP was under development, and requires non-commercial fishers to stay in attendance with their nets while set (see Map 17).

Similarly to elsewhere in New Zealand, MFish actively promotes a voluntary set net CoP for amateur fishers on the SCSI. Some of the provisions of this code can also help to reduce the likelihood of Hector's dolphin mortalities. This code encourages wise set netting practices (refer ECSI section for examples of measures set out in the CoP).

As outlined in the ECSI section, there are also a number of laws that apply nationally to amateur set

netting that may help to reduce the likelihood of Hector's dolphin bycatch[130].

Map 17: Current mandatory amateur set net restriction on the SCSI

[130] For example: the use of stakes to secure nets is prohibited; set nets must not exceed 60 m in length; only one set net (maximum 60 m) and one bait net (maximum 10 m with a mesh size of 50 mm or less) can be carried on a boat at any one time; nets must not be set within 60 m of another net.

7.5.3.2. Current measures for commercial set netting

No mandatory measures are in place to mitigate the impacts of commercial set netting on SCSI Hector's dolphins.

However, there are some mandatory measures that apply nationally to commercial set netting and may help reduce the chance of Hector's dolphin entanglement. These measures include:

- ⇒Commercial fishers cannot use more than 3000m of net per day[131]
- ⇒Commercial fishers must not leave set nets in the water for more than 24 hours without under-running the net and removing fish that have been caught.[132]

Commercial set netters fishing in FMA 5, which encompasses the SCSI, operate under the SEFMC voluntary CoP. This includes where possible using best endeavours to avoid set netting inside the 40m depth contour in Foveaux Strait. Additionally, under SEFMC CoP, fishers are required to adopt a number of fishing practices that reduce the likelihood of dolphin incidental bycatch (refer ECSI section for examples of measures set out in the CoP).

7.5.3.3. Current measures for trawling

MFish is not aware of any specific voluntary measures and there are no specific mandatory management measures in place to mitigate the effects of trawling on Hector's dolphins off the SCSI.

7.5.4. Additional threat management

This section considers whether additional threat management is necessary to manage the effects of fishing on SCSI Hector's dolphins by discussing:

- ⇒The effectiveness of current threat management
- ⇒Relevant considerations for the Minister when determining whether measures are necessary to avoid, remedy or mitigate the effects of fishing on the SCSI population.

7.5.4.1. Effectiveness of current threat management

Amateur set nets

Some of the provisions of the voluntary CoP would, if applied, help to reduce Hector's dolphin bycatch on the SCSI. MFish doesn't know whether the CoP is followed by amateur fishers in this area. MFish welcomes information from stakeholders of the level of compliance with the voluntary CoP by amateur fishers. Because an unknown proportion of Hector's dolphin mortalities go unreported, the nature and extent of the current risk to the population from amateur set netting cannot be quantified. The level of amateur set netting appears to be relatively low and mainly restricted to locals. Because use is low and sporadic, MFish cannot determine whether the interim measure requiring amateur set netters to stay with their nets in Te Waewae Bay has resulted in any changes to fishing effort.

Based on available information, the degree of interaction between amateur set nets and Hector's dolphins appears to be low. There is one official report of a dolphin mortality with "probable" net entanglement as the cause (unknown sector), although it is an isolated part of the country and therefore beach cast animals may not be readily detected.

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[131] Regulation 65 (3), Fisheries (Commercial Fishing) Regulations 1986
[132] Regulation 3C, Fisheries (Southland and Sub-Antarctic Commercial Fishing) Regulations 1986

MFish considers that a risk to Hector's dolphins from amateur set netting on the SCSI exists under the current management regime, in particular because:

⇒Set netting is the most significant known threat to Hector's dolphins (and is known to cause mortalities in other parts of the dolphins' range)

⇒Amateur set netting on the SCSI occurs within Hector's dolphins range

Commercial set nets

Use and application of the SEFMC CoP on the SCSI is unknown, although MFish is aware that some commercial set net fishers in Te Waewae Bay and other areas use pingers. MFish welcomes information from stakeholders of the level of compliance with the CoP by commercial fishers. Low levels of observer coverage make it difficult for MFish to evaluate the success of industry's initiatives to mitigate Hector's dolphin mortalities. However, there has been some limited observer coverage of the commercial set net fishery off the SCSI in recent years, with no Hector's dolphins observed caught.

Although information on the actual level of dolphin deaths attributable to commercial set netting is uncertain, MFish considers the use of this method poses a risk to the south coast Hector's dolphin population for the same reasons as amateur set netting, namely:

⇒Set netting is the most significant known threat to Hector's dolphins (and is known to cause mortalities in other parts of the dolphins' range)

⇒Commercial set netting on the SCSI occurs within Hector's dolphins range

Commercial trawling

No trawl mortalities are known to have occurred in the SCSI. MFish is unable to accurately assess the effectiveness of the current management measures to address trawl interactions with Hector's dolphins because the level of fisher self-reporting is unknown. The absence of reports may signal a low risk of inshore trawl fishing on the SCSI population or a failure by fishers to report any dolphin interactions. Evidence of trawl-related mortalities off other parts of the South Island's coastline suggests that where trawling overlaps with Hector's dolphins range, a risk of interaction exists.

7.5.4.2. Need and scope for additional threat management

Whether the Minister considers it necessary to implement further measures to manage the effects of fishing related mortality on Hector's dolphins depends ultimately on the balance between sustainability and utilisation the Minister considers appropriate. This will involve consideration of a range of factors, including:

⇒Population biology (for example, size and productivity)

⇒Nature and extent of fishing threats to the population

⇒Effectiveness of current management measures

⇒Effectiveness of measures proposed to avoid, remedy or mitigate the effects of fishing

⇒Costs to fishers of measures proposed to avoid, remedy or mitigate the effects of fishing

Information on population biology, nature and extent of fishing threats and effectiveness of current measures has been outlined in the sections above. An analysis of the effectiveness and costs of proposed measures is provided in the ensuing sections. In summary, MFish considers that the following points are particularly relevant to the Minister's decision-making:

⇒Hector's dolphin is a threatened species;

⇒The SCSI population is the smallest South Island Hector's dolphin population;

⇒PBR analysis indicates zero human-induced mortalities can occur each year (based on published abundance estimate);[133]

⇒Genetic analysis has not detected evidence of population decline; [134]

⇒There has been one known "probable" fishing-related mortality (net entanglement) on the SCSI;

⇒An unquantified number of fishing-related mortalities go unreported;

⇒The genetic continuity of the population may be susceptible to fishing impacts (through localised depletion);[135] and

⇒The effectiveness of current measures is uncertain.

MFish considers relevant to the Minister's decision is uncertainty in information around the status of the SCSI population and the nature and extent of fishing impacts. In particular:

⇒There is uncertainty around the number of dolphins that use Te Waewae Bay, as well as the total number of dolphins that make up the SCSI population;

⇒The nature of PBR analysis, or any modelling exercise relying on estimated biological and variable inputs, does not necessarily lend itself to decision making with certainty;

⇒MFish does not believe that reported mortalities reflect all fishing related mortalities. MFish has had anecdotal reports of net-marked Hector's dolphin carcasses that have been placed above the beach and out of sight in other parts of the South Island. MFish cannot determine the extent of this practice but considers it does indicate that fishing related Hector's dolphin mortalities are likely to be higher than reported, and that this introduces uncertainty relevant to the Minister's deliberations. Lack of monitoring of amateur fishing on the SCSI, and limited monitoring of the commercial fishery, also increases the opportunity for non- reporting offences.

MFish notes that the Minister should take this uncertainty into account when making decisions on the need for further measures on the SCSI. The Minister should take into account best available information; be cautious when information is uncertain; and should not use absence of, or uncertainty in, any information as a reason for postponing or failing to take any measure to achieve the purpose of the FA96.

7.5.5. Options

MFish has prepared a range of options for managing fishing threats to the SCSI Hector's dolphin population. The spectrum of options ranges from *status quo* through to more restrictive options that reduce residual risk of fishing-related mortalities and therefore the effect on the population and species to a greater degree, but accordingly have a greater impact on current users. When making final decisions on the proposals, the Minister of Fisheries will need to determine which course of action over what timeframe will result in an acceptable level of effect from fishing activities to Hector's dolphins on the SCSI, taking into account the utilisation implications associated with each option. It is within the Minister's discretion to choose a mix of options, as well as variations to the options proposed (for

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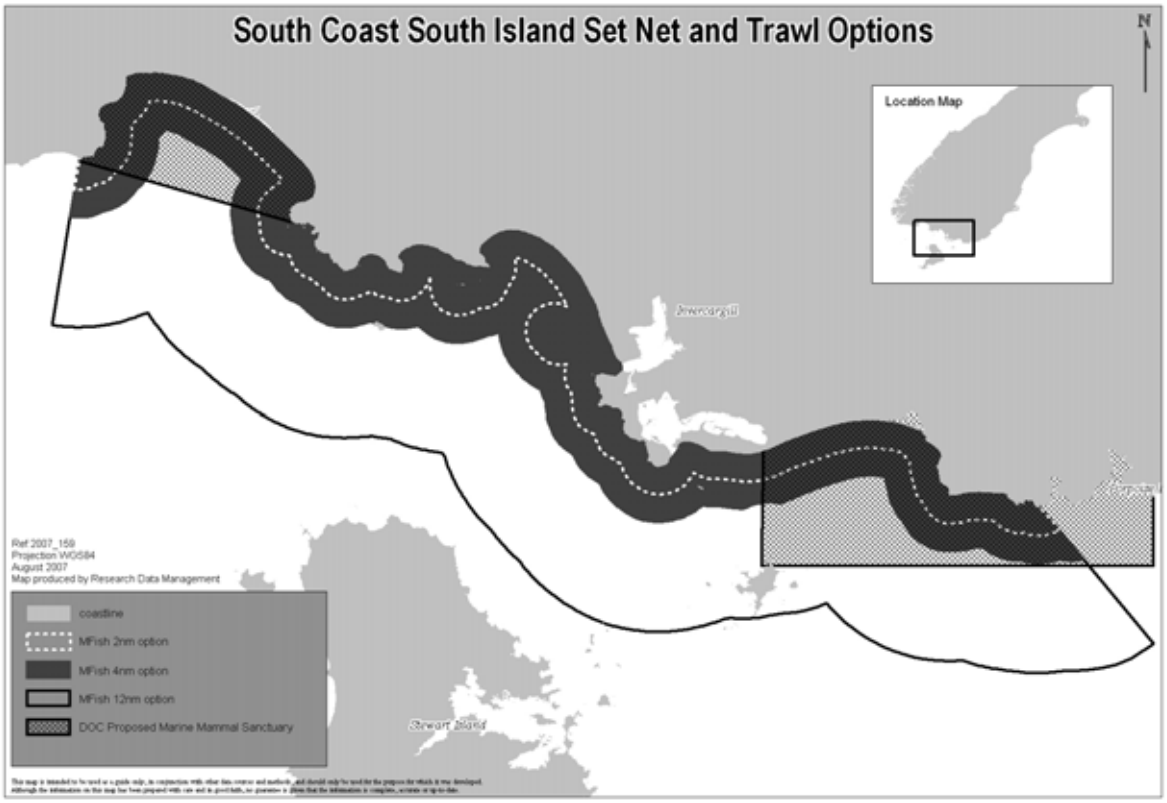
[133] See Appendix 3 for details of the PBR analysis

[134] Although sample size was small.

[135] Hector's dolphins do not move large distances. This characteristic means that local groups are connected by gene flow only with immediately adjacent groups, which increases the susceptibility of local dolphin groups to becoming reproductively isolated

example, different proposal boundaries) based on relevant considerations (see previous section). Map 18 illustrates the proposed boundaries of the various options set out below.



Map 18 Measures proposed for SCSI

7.5.5.1. *Status quo*

The nature and extent of fishing threats to the SCSI population, and an analysis of effectiveness of current measures (i.e. *status quo* management) and consideration of the need for further measures have been outlined in the sections above. In light of this information, the Minister may consider that the effects of fishing-related mortality are acceptable and consequently further measures to avoid, remedy or mitigate the effects of fishing-related mortality on the SCSI population are not necessary. MFish notes that the *status quo* remains a valid option given uncertainty over the nature and extent of the impact of fishing-related mortality on Hector's dolphins and the impact on fisheries users. MFish notes that the previous sections have outlined information about the existing threat of fishing to Hector's dolphins on the SCSI, and therefore further analysis of *status quo* is not provided below. Analysis of the effectiveness and costs of the alternative proposals has been undertaken relative to the current (*status quo*) situation.

7.5.5.2. *Set netting*

MFish proposes the following options to manage the effects of amateur and commercial set netting on the SCSI population. The options do not apply to lagoons, coastal lakes, river mouths, estuaries, inlets and harbours on the SCSI.

Status Quo – Existing management (refer Existing Threat Management Section)		
Option 1 – Existing mandatory management measures and codes of practice inside 12nm[136] from shore (MHW) between Slope Point and Sandhill Point plus additional measures as follows:		
Amateur set netting		
Mandatory measures		Mandatory attendance with a set net; Maximum of one set net per person and per boat; No overnight setting of nets (between one hour before sunset to one hour after sunrise); and Maximum net length of 30 m (fishers are permitted to use a net that has a maximum length of 60m when targeting flatfish)
Voluntary measures		Hand in unused or unwanted nets to MFish
Commercial set netting		
Voluntary measures		Adherence to the existing voluntary set net code of practice
Mandatory measures		Additional monitoring of set netting[137]
Option 2 –Amateur and commercial set netting is banned inside 2nm or 4nm from shore (MHW) between Slope Point and Sandhill Point with provisions for some set netting for 6 or 9 months. All sub-options have the additional set net measures as per Option 1		
Either	*Option 2(a)*	Set net prohibition applies inside 2nm from shore – this option includes the following three alternatives: Prohibition applies all year round with set netting for butterfish allowed in designated areas for nine months of the year (1 March to 30 November) with the restrictions listed below; or Prohibition applies all year round with set netting for butterfish allowed in designated areas for six months of the year (1 April to 30 September) with the restrictions listed below; or Prohibition applies all year round

[136] MFish notes that the 12nm boundary generally incorporates the 100 m depth contour line off the SCSI. There are some places where the 100 depth contour is further offshore than 12nm. However, MFish is not aware of any Hector's dolphin sightings further offshore than 12nm in these places. MFish therefore considers that the 12nm boundary should encompass Hector's dolphins' range n the SCSI.

[137] See Part III section on monitoring.

Or	*Option 2(b)*	Set net prohibition applies inside 4nm from shore (as well as closure of Te Waewae Bay) – this option includes the following three alternatives: Prohibition applies all year round with set netting for butterfish allowed in designated areas for nine months of the year (1 March to 30 November) with the restrictions listed below; or Prohibition applies all year round with set netting for butterfish allowed in designated areas for six months of the year (1 April to 30 September) with the restrictions listed below; or Prohibition applies all year round
MANDATORY RESTRICTIONS (amateur and commercial) Attendance with a set net Maximum of one set net per person and boat No overnight setting of nets (between one hour before sunset to one hour after sunrise) except in designated flounder areas; and Maximum net length of 30m for butterfish[138] set nets and 60m for flatfish set nets[139]		
DESIGNATED AREAS (approximate boundaries, refer to Appendix 6 or the MFish website www.fish.govt.nz for indicative maps of the designated areas) **Designated butterfish set net areas out to 100m from MHW** **Bluff** – Stirling Point to Bombay Rock **Pahia** – 2km east of Wakaputa Point to Pahia Point		
Option 3 – All amateur and commercial set netting is prohibited inside 12nm from shore (MHW) between Slope Point and Sandhill Point		

MFish notes that the level of commercial set net monitoring required under Option 1 and 2 will be commensurate with the level of risk mitigation achieved. For example, Option 1 allows all current set net activity throughout Hector's dolphins' range on the SCSI to continue, whereas Option 2 prohibits set net activity throughout parts of the dolphins' range (2 - 4nm). As such, MFish considers it may be acceptable to have lower levels of monitoring under Option 2 compared to Option 1; given the costs to industry associated with monitoring programmes and the relatively lower level of residual risk associated with Option 2. Refer to Part III for more information about the proposed monitoring approach.

Analysis of amateur set net options

Option 1

Option 1 applies to amateur set netting activities between Slope Point and Sandhill Point out 12nm from

[138] Butterfish nets must be no more than 30m long, 25 meshes deep, and 0.5mm mesh diameter(means revoking current 108mm mesh size for butterfish), and minimum of 114 mm mesh size, and anchored at each end with a weight no lighter than 5kg and 14 net floats on the float line

[139] Flatfish nets must be no more than 60m in length, 9 meshes deep, and 0.35mm mesh diameter and no less than 125mm mesh size, and anchored at each end with a weight no lighter than 3kg

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shore.

Under Option 1, all recreational fishers will continue to comply with the existing amateur set net restrictions and codes of practice plus additional mandatory measures as follows:

⇒Mandatory attendance with a set net

⇒Maximum of one set net per person and boat

⇒No overnight setting of nets (between one hour before sunset to one hour after sunrise)

⇒Maximum net length of 30m (60m for flatfish set nets)

The proposed measures focus on requiring amateur fishers to stay with their net when set and reduce the number and length of nets used at any one time. The reason for not proposing a reduction in length of nets set for flatfish is because these nets are configured and set in such a way that MFish considers they pose low risk of Hector's dolphin entanglement.[140]

Under this option, MFish would invite recreational fishers to hand in any unused or unwanted amateur set nets. The handing in of unused or unwanted nets would remove the potential latent effort within the amateur set net fishery. MFish will consider ways to reward fishers who hand in nets such as t-shirts, posters, or school donations. Officials will also work to raise amateur fishers' awareness of good set netting practice, including retrieval of nets when dolphins are nearby.

♦ *Effectiveness*

Under Option 1, fishers must stay with their net at all times when it is set. This measure is likely to lower the risk of dolphin entanglement in amateur set nets in the following ways:

⇒Create the opportunity for fishers to remove their net from the water if a dolphin appears within the vicinity of the net. In addition, net attendance may enable fishers to release any net entangled dolphin that is alive (if the fisher is able to get to a netted animal within 2 – 3 minutes).

⇒Decrease the number of nets deployed – mandatory net attendance is likely to discourage fishers from using a set net in preference to other fishing methods.

⇒Reduced net soak times in the water due to the requirement for fishers to stay by their net while it is set.

Additional restrictions of no overnight setting and smaller maximum net length are likely to further reduce the risk of net entanglement.

Although the risk of amateur set netting to Hector's dolphins will be reduced under this option, potential for dolphin entanglement will remain. Allowing set nets in areas and at times of the year where dolphins are present constitutes a greater, albeit un-quantified, risk than excluding set nets from areas seasonally or totally within the dolphins range (as proposed under Options 2 and 3).

MFish notes that an additional benefit of this option is that the above proposed restrictions will likely result in better quality fish and less wastage (due to reduced soak times, for example), and there will also be a reduced likelihood of nets being lost in inclement weather.

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[140] Flatfish nets are set within 0.5m of the bottom in the tidal headwaters of harbours and larger bays. The nets are made of a small number (i.e. usually 9-12) of fine mesh with a low breaking strain that hangs loosely to trap flatfish.

- *Impacts on fishers*

Option 1 will provide for greatest amateur set netting use along the SCSI in comparison with proposed measures under Options 2 and 3. Option 1 will enable amateur fishers to continue to use set nets in all areas but require them to more actively manage their net when fishing. Presently, MFish encourages all set net fishers to voluntarily adopt the CoP but is unable to require fishers to comply. Under this option, the proposed measures will become mandatory and MFish will be able to take necessary actions if fishers fail to comply with these measures.

The main utilisation impact of Option 1 is the requirement for fishers to stay with their net. Possible implications include preventing fishers from using different fishing methods at the same time or setting more than one net in different locations. Fishers often set their net at the start of a fishing trip, travel to another area to hand gather or hook and line for fish, and then retrieve the net on the way home. A requirement for fishers to stay with their net while set would essentially eliminate this activity.

It is possible that fishers will catch smaller quantities of fish during a single fishing trip as a direct result of a reduced soak time and net length. A requirement for fishers to stay with their net is also likely to reduce the amount of winter set netting due to unsuitable weather conditions.

MFish welcomes stakeholder views on the health and safety implications, as well as likely utilisation impacts, of Option 1.

Option 2 (a&b)

Option 2 proposes to prohibit all amateur set netting out to either 2nm (Option 2a) or 4nm (Option 2b), with provisions for some butterfish set netting in designated areas at certain times of the year outside Te Waewae Bay (sub options i and ii). Butterfish areas have been designated because best available information suggests that, of all set netting practices, nets set to target butterfish pose the least risk of Hector's dolphin mortalities. Amateur set netting (for flatfish) that currently occurs in the lagoon of the Waiau River that flows into Te Waewae Bay would still be permitted because this is outside the proposed closure boundaries.

Amateur set netting along the coast would be restricted to the main butterfish grounds outside Te Waewae Bay for 6 or 9 months depending on whether sub-option (i) or (ii) is chosen. Sub-option (i) would allow restricted set netting in designated areas for 9 months from 1 March – 30 November, while sub-option (ii) would allow this netting for a shorter 6 month period (1 April – 30 September). Proposed measures under Option 1 for amateur fishers (i.e. mandatory net attendance, no overnight setting, etc) would also apply when set netting in designated areas is permitted. The only nets that could be used in these areas would be defined to prevent fishers using these areas to target other fish species. MFish notes that the Minister could choose to implement one of the designated areas, rather than the two identified (Bluff and Colac).

The reason for proposing a maximum net length for butterfish nets that is shorter than the currently permitted 60m maximum length is because this will help ensure that nets set in reef areas for butterfish do not extend out into non-reef habitat. Nets set adjacent to reef areas, or extended out from reef areas, are known to have caught Hector's dolphins. Consequently, MFish considers that a maximum length of 30m for butterfish set nets should help reduce the likelihood of Hector's dolphin entanglement. MFish also notes that experienced butterfish fishers generally only use nets less than 30m in reef areas.

MFish considers that a 2nm set net closure is likely to effectively prohibit all coastal amateur set netting on the SCSI. This is because most recreational fishers set their nets either directly from, or very close to, shore. MFish considers there is likely to be little difference (both in terms of mitigation effectiveness and impacts on use) in extending the closure out to 4nm as fishers are unlikely to travel further than 2nm from shore to set a single net, particularly if they need to stay in attendance with that net while it is set (as proposed). As such, all amateur set netting on the SCSI would probably be eliminated under sub-option

(iii), which does not provide for any inshore amateur set netting.

- *Effectiveness*

MFish considers that Option 2 is likely to significantly reduce (or possibly eliminate, sub-option iii) risk to Hector's dolphins from amateur set netting. While the area inhabited by the SCSI Hector's dolphin population is not a popular area for set netting, some amateur set netting does take place, particularly over summer months.

Measures proposed under Option 2 will mean that amateur set netting on the south coast considered to be of highest risk to Hector's dolphins (targeting small sharks, moki adjacent to reefs, red cod and herrings) is prohibited throughout the year. Information from other parts of New Zealand's coastline suggests that set netting for butterfish in reef areas poses a lower risk of dolphin mortalities compared to set netting for these other species. While the full year closure to all set netting (sub-option iii) affords the greatest certainty around protection for Hector's dolphins, MFish considers that allowing set netters to target butterfish in designated areas outside the summer months (when dolphins are thought to be further offshore) will only constitute a marginal increase in risk to Hector's dolphins – particularly because Te Waewae Bay (where dolphins are concentrated on the SCSI) is not included as a designated area. Therefore, set netting would be prohibited out to 2nm or 4nm throughout the year in Te Waewae Bay under all sub-options (i, ii and iii). Where the designated areas apply (Bluff and Colac), the longer (6 month) closure period would afford a greater level of protection than the shorter 3 month closure to all set netting.

MFish notes that because amateur fishers are unlikely to set nets further offshore than 2nm, a full year closure to all set netting (sub-option iii) will likely eliminate the threat of amateur set netting under both Option 2a (2nm closure boundary) and 2b (4nm closure boundary), with the exception of any non-compliance. Nevertheless, Option 2b provides greater certainty that amateur fishers will not move further offshore to set their nets.

Under Option 2, amateur set netting for flounder will be able to continue in the Te Waewae Bay lagoon. MFish considers this activity is likely to not constitute a threat to Hector's dolphins because the dolphins are not known to use the lagoon; combined with the fact that set netting for flatfish has a relatively low risk of dolphin entanglement (due to low headline height and lower mesh breaking strain).

MFish considers that Option 2 will effectively reduce the likelihood of Hector's dolphin entanglement in set nets because it effectively prohibits all amateur set netting year round in Te Waewae Bay, which is where Hector's dolphins are concentrated and most amateur set netting currently occurs. Allowing set netting in the designated areas outside the summer period (sub-options i and ii) will constitute a marginally greater, albeit unquantified, threat to Hector's dolphins than if set netting was banned year round throughout the whole SCSI, as proposed under Options 2a(iii), 2b(iii) and Option 3 below.

- *Impacts on fishers*

The main utilisation impacts associated with Option 2 are that set netting for butterfish will not be allowed for 3, 6 or 12 months of the year (sub-options i, ii, and iii, respectively), and set netting for other species will be eliminated along the coast. Under all sub-options of Option 2, set netting will effectively be eliminated throughout the year in Te Waewae Bay.

As mentioned above, MFish considers there is little difference in terms of effects on use between option 2a and 2b because fishers are unlikely to travel further than 2nm from shore to set a net, and therefore a 2nm offshore boundary is likely to have the same impact as a 4nm boundary (and a 12nm boundary as proposed under Option 3).

Because most amateur set netting occurs in Te Waewae Bay, MFish considers that Option 2 will largely stop all coastal amateur set netting on the SCSI, resulting in a significant impact on use. This impact will

be somewhat lessened by providing for restricted butterfish set netting in designated areas at certain times of the year, as proposed under sub-options (i) and (ii).

Set netting for butterfish is an important amateur fishery. Butterfish can only be caught in reasonable numbers using set nets – other methods such as lining and scoop nets catch few butterfish.

Option 2 will have impacts on set netting for small sharks, moki, red cod and herrings. For these species, lining may be a viable method to catch these fish, but this is likely to achieve lower catch rates of these species. As mentioned above, amateur set netting that currently occurs in the lagoon of the Waiau River would still be permitted under Option 2, and therefore set netting for flounder can continue in this area.

Sub-options (i) and (ii) provide for greater set net use than Option 3 (complete set net ban) because this option allows for butterfish set netting in designated areas at certain times of the year. Sub-option (iii) will have comparable impacts as a complete ban on amateur set nets throughout the SCSI due to the close inshore nature of amateur set netting. MFish welcomes stakeholder information on the likely utilisation impacts of Option 2.

Option 3

Option 3 constitutes a full set net ban to 12nm and is the most risk averse option.

- *Effectiveness*

Option 3 essentially eliminates residual risk of amateur set netting to the SCSI population (with the exception of any non-compliance). However, MFish considers there is unlikely to be additional benefit in terms of risk mitigation to that achieved under sub-option (iii) of Options 2a and 2b – both these options are likely to eliminate amateur set netting on the SCSI. Option 3 is appropriate if the Minister considers amateur set nets pose such great risk to the SCSI population that potential threats must be eliminated to the greatest extent possible.

- *Impacts on fishers*

There are similarly not likely to be any additional impacts on use to those which would occur under sub-option (iii) of Options 2a and 2b. Namely, all amateur set netting will be prohibited on the SCSI, which clearly has significant implications for utilisation. The most significant impact will be on fishers who wish to target butterfish, which is an important amateur fishery. This is because butterfish cannot be easily caught using alternative methods. A prohibition on set nets is likely to mean lower catch rates for amateur fishers of species such as moki and small sharks. Fishers will still be able to line drag and set net for flounder in the lagoon of the Waiau River. MFish welcomes stakeholder views on the likely utilisation impacts of Option 3.

Analysis of commercial set netting options

Option 1

Option 1 is the *status quo* with increased monitoring of commercial set netting. This option will require fishers to continue to apply 'safe netting' practices outlined in the SEFMC CoP. Officials will work with set netters to increase compliance with the CoP.

A comprehensive monitoring programme for commercial set netters to determine the interaction of their set netting and Hector's dolphins would be implemented by Government under this option. The monitoring programme would also be used to independently verify fisher compliance with the CoP.

- *Effectiveness*

Low levels of observer coverage of the commercial fishery make it difficult to evaluate the success of industry's initiatives to mitigate Hector's dolphin mortalities, and therefore the effectiveness of Option 1 is uncertain.

Option 1 provides the least mitigation of potential threat to Hector's dolphins from commercial set netting of the options proposed. Allowing set nets in areas and at times of the year where dolphins are usually present constitutes a greater, though unquantified, risk than excluding set nets within parts, or the whole, of the dolphins range (Options 2 and 3).

MFish notes that under the current voluntary arrangements (which apply to both the ECSI and SCSI), Hector's dolphins continue to be entangled in commercial set nets on the ECSI. Information from fishers suggests compliance with the current CoP is at least reasonable, and therefore ensuring "adherence to the voluntary CoP" as proposed under this option may not alter current levels of risk to Hector's dolphin on the SCSI. This approach, if agreed by the Minister would, therefore accept that commercial set netting on the SCSI under the existing management arrangement poses an acceptable risk to Hector's dolphins.

The key benefit of the monitoring programme is that it will allow the level of interaction (if any) between commercial set nets and Hector's dolphins to be observed with increased certainty.

- *Impacts on fishers*

MFish considers Option 1 would only be a reasonable course of action providing there is sufficient certainty that all fishers comply with the CoP. MFish invites the industry to submit information on the current level of compliance with the code including ways to measure the level of compliance and what actions could be taken on fishers who do not comply with, or breach, specific measures. MFish considers there is also a need for independent verification that fishers comply with the CoP, and this could be simultaneously achieved through the placement of fisheries observers and/or monitoring equipment on set net vessels fishing within the dolphins' range for the purpose of monitoring dolphin-set net interactions.

The main economic impact of this option on fishers is the cost of the monitoring programme. There are approximately 10 set net vessels operating in the area covered by the SCSI Hector's dolphin section that may need to adopt monitoring under Option 1 (or elect to fish outside the area covered by the monitoring proposal). Fisheries observers typically cost up to $1000 per day, and electronic monitoring equipment around $10000 to install (with ongoing operating and auditing costs) such that total monitoring costs could be expensive.

MFish welcomes stakeholder information on the likely utilisation impacts and costs of this option.

Option 2 (a&b)

Option 2 proposes to prohibit all commercial set netting out to either 2nm (Option 2a) or 4nm (Option 2b), with provisions for some butterfish set netting in designated areas at certain times of the year (sub options i and ii).

Commercial set netting for butterfish along the SCSI would be restricted to the main fishing grounds outside Te Waewae Bay for 6 or 9 months of the year depending on whether sub-option (i) or (ii) is chosen. The only nets that could be used in these areas would be defined to prevent fishers using these areas to target other fish species. Commercial set netting for butterfish on the SCSI would be eliminated under sub-option (iii) because effort occurs close inshore in reef areas.

Under sub-options (i) and (ii), additional restrictions would apply to commercial set netters fishing within the designated areas (Bluff and Colac), as follows:

⇒Mandatory attendance with a set net

⇒Maximum of one set net per person and boat;

⇒No overnight setting of nets (between one hour before sunset to one hour after sunrise)

⇒Maximum net length of 30m for butterfish nets.

MFish notes that the Minister could choose to implement one of the designated areas, rather than both of those identified.

Proposed measures for commercial fishers under Option 1 (ie, strict adherence to the existing voluntary CoP and additional monitoring) would also apply to commercial set netting activities inside 12nm but offshore from the 2nm or 4nm boundaries proposed under Option 2.

♦ *Effectiveness*

MFish considers that Option 2 is likely to substantially reduce the risk of Hector's dolphin entanglement in commercial set nets.

Measures proposed under Option 2 will mean that set netting considered to be of highest risk to Hector's dolphins (targeting small sharks, moki and red cod) is prohibited throughout the year within 2nm or 4nm from the shore (where dolphin densities are highest, particularly in summer). No set netting (including for butterfish) would be allowed within 2nm or 4nm throughout the year in Te Waewae Bay. Commercial set netting further offshore from the proposed offshore boundaries will be allowed to continue (under the current voluntary CoP) and therefore, this constitutes a greater, albeit unquantified risk, than prohibiting commercial set netting throughout the dolphin's range (Option 3).

The 4nm offshore boundary (Option 2b) provides greater protection to Hector's dolphins than the closer inshore boundary proposed under Option 2a, and will cover almost the full extent of Te Waewae Bay.

Available information suggests that set netting for butterfish poses the least risk of dolphin mortalities out of all set net practices. Under both Options (2a and 2b), fishing close to shore for butterfish will either be prohibited throughout the year (sub-option iii) or restricted to designated areas (outside Te Waewae Bay) for 9 or 6 months under restrictions that reduce risk to Hector's dolphins (sub-options i and ii).

While the longer (6 month) closure to all set netting, including for butterfish, affords a lower level of certainty around threat mitigation than a year round closure, MFish considers sub-option (ii) will likely still provide a substantial level of threat reduction because inshore set netting will still only be allowed in two restricted areas outside Te Waewae Bay. The shorter 3 month closure to all set netting incurs an increased risk of dolphin entanglement in the designated fishing areas over summer when Hector's dolphins are likely to be closer inshore.

MFish considers that Option 2 will more effectively mitigate risk from commercial set netting to the SCSI Hector's dolphin population than Option 1, as commercial set netting will not be allowed along much of the inshore part of the dolphins' range (thereby reducing the overlap between Hector's dolphins and the activity that poses a threat to them). Allowing commercial set netting in designated areas outside summer will constitute a greater, albeit unquantified, threat to Hector's dolphins than if set netting was banned year round, as proposed under Options 2a(iii) and 2b(iii). Because commercial set netting will continue outside the proposed offshore boundaries under Option 2, the risk of interaction with Hector's dolphins is greater than if set netting was prohibited throughout the dolphins' range, as considered under Option 3 that follows.

♦ *Impacts on fishers*

Option 2 may limit fishers operating in the target rig and elephant fish fisheries that are typically

prosecuted closer to shore than other shark fisheries. Option 2b (ie. a 4nm set net prohibition) has greater potential to limit catch than Option 2a (ie. a 2nm prohibition). Table 15 suggests that the elephant fish and rig set net fisheries on the SCSI returned about $286,000 in the last fishing year. It is likely that some of the catch was taken inside 4nm such that shark fishers will need to move offshore to maintain similar levels of catch. Analysis of the location of sets nets during the current fishing year suggests that most fishers are able to fish outside 4nm but a significant amount of set netting occurs within 4nm of the coast.

Some set netting for flatfish currently occurs in the New River Estuary and Aparima Estuary at Riverton. This will not be affected, as estuaries are excluded from the area to which the proposals apply (note that these areas are the only areas that flatfish are commercially set netted).

Catch and effort information shows that butterfish is caught year round on the SCSI (although most fishing is in summer) such that winter "open seasons" in designated areas may offer some relief (and fishing opportunities) to commercial butterfish fishers. However, the additional fishing restrictions that would also apply as part of Option 2 (set net attendance, prohibited overnight fishing, limits on net size, and one net per person per boat) would probably limit fishing activity inside designated areas, although MFish understands that most butterfish target fishing on the SCSI occurs around Stewart Island where Option 2 does not apply. Additional monitoring described in Option 1 is also part of Option 2 and would be a significant cost for fishers opting to target butterfish and flatfish in designated areas inside the set net prohibition.

MFish welcomes stakeholder information on the likely utilisation impacts and costs of this option.

Additional costs associated with this option are the costs of monitoring set net activity inside 12nm. MFish notes that the monitoring costs outlined under Option 1 are also relevant to Option 2, although the level of monitoring required may be less due to the lower level of residual risk achieved under this option.

Because commercial set netting will continue outside the proposed offshore boundaries under Option 2, the impact on commercial utilisation is less than if commercial set netting was prohibited throughout the dolphins' range (Option 3). MFish seeks stakeholder views on the likely utilisation impacts of Option 2.

Option 3

Option 3 constitutes a full set net ban to 12nm between Slope Point and Sandhill Point, and is the most risk averse option.

- *Effectiveness*

This option avoids potential interactions between Hector's dolphins and set nets to a greater extent than Options 1 and 2, and therefore provides the highest level of risk mitigation. Because Hector's dolphins on the SCSI are usually sighted within 3nm and rarely outside 5nm, Option 3 may provide only marginal benefit to SCSI Hector's dolphins compared with Option 2b. Nevertheless, Hector's dolphins are known to range further offshore (out to the 100 m depth contour) in other parts of the coastline, and therefore the 12nm offshore boundary provides greater certainty that commercial set netting activity does not overlap with Hector's dolphins' range on the south coast. MFish welcomes information from stakeholders on the offshore range of Hector's dolphins on the south coast, and notes that the Minister could choose a variation on the 12nm boundary when making his final decisions.

- *Impacts on fishers*

Option 3 (ie, 12nm set net prohibition) would close some, and limit other, set net fisheries on the SCSI. Butterfish and inshore shark fisheries (rig, elephant fish, spiny dogfish, and school shark) would be restricted to areas outside the prohibition.

Butterfish and flatfish fisheries may persist (because they are also prosecuted outside the proposed

prohibition on the SCSI) but it is possible the inshore shark fisheries would no longer be viable. Option 3 will probably eliminate set netting for rig and elephant fish. Set netting for school shark, ling, groper and other deeper water species could only occur outside the 12nm boundary unless provision is made for school shark and deepwater fishing inside 12nm in waters deeper than 100m, where Hector's dolphins are not found. MFish notes though that exemptions would be extremely difficult to enforce.

Some set netting for flatfish currently occurs in the New River Estuary and Aparima Estuary at Riverton. This will not be affected, as estuaries are excluded from the area to which the proposals apply. MFish welcomes stakeholder input on the likely cost and utilisation impacts of Option 3.

Customary set netting

Currently, Ngāi Tahu Tangata Tiaki/Kaitiaki are not authorising customary fishers to set net on the open coast or within harbours, inlets or bays. As such, MFish considers there is currently no threat from customary set netting to Hector's dolphins on the SCSI. Accordingly, MFish considers that there is no need to consider measures to manage customary set netting at this time. It is possible that the proposed prohibitions on amateur set netting might lead to an increase in authorisation applications for customary set netting. MFish will work with Tangata Tiaki/Kaitiaki to raise awareness of the issues associated with set netting and Hector's dolphins, and support continuing non-issuance of authorisations for set netting in areas where Hector's dolphins are present. MFish invites tangata whenua to comment on how the proposed measures may affect them.

7.5.5.3. Trawling (mid-water, bottom and pair)

Proposals for managing the impacts of trawling on the SCSI Hector's dolphin population are outlined below. As previously mentioned, these options do not apply to lagoons, coastal lakes, river mouths, estuaries, inlets and harbours on the SCSI.

Status Quo – Existing management (refer Existing Threat Management Section)
Option 1 – Develop and implement a voluntary code of practice inside 12nm between Slope Point and Sandhill Point and additional trawl monitoring
Option 2 – Trawling prohibited inside 2nm between Slope Point and Sandhill Point except for vessels targeting flatfish with low headline height nets, and measures as per Option 1
Option 3 – Trawling prohibited inside 2nm between Slope Point and Sandhill Point and measures as per Option 1

MFish notes that the level of monitoring required under each of these options will be commensurate with the level of risk mitigation achieved. For example, Option 1 allows all trawling activity throughout Hector's dolphins' range on the SCSI to continue, whereas Option 3 prohibits all trawling activity within 2nm (the distance within which all known trawl interactions have occurred). As such, MFish considers it may be acceptable to have lower levels of observer coverage to monitor interactions outside 2nm; given the costs to industry associated with monitoring programmes and the relatively low level of residual risk associated with Option 3. Please refer to the monitoring section Part III for more information about the proposed monitoring approach.

Analysis of options

Option 1

Option 1 requires trawl fishers to develop and implement a CoP to mitigate the risk of trawling (mid-water, pair, and bottom trawl) on SCSI Hector's dolphins inside 12nm between Slope Point and Sandhill

Point.

A comprehensive monitoring programme (e.g. observers or video monitoring) of commercial trawl activity within 12nm to assess the extent to which trawl vessels interact with Hector's dolphins would also be implemented by Government under this option. The monitoring programme would also be used to independently verify fisher compliance with the CoP.

- *Effectiveness*

A CoP that includes the following minimum requirements could help fishers avoid potential interactions with Hector's dolphins within inshore areas:

⇒Low headline gear, no wing doors and low tow speed

⇒Fishing away from areas where dolphins are sighted or known to occur;

⇒Fishing away from discoloured or murky waters;

⇒Quickly retrieving trawl gear if dolphins appear;

⇒Maintaining a constant lookout when gear is deployed; and

⇒Keeping tow duration to a minimum.

The key benefit of the monitoring programme is that is will allow the level of interaction (if any) between trawling and Hector's dolphins to be estimated with increased certainty.

- *Impacts on fishers*

CoP development and monitoring costs are the main costs associated with Option 1 – all trawling inside 12nm between Slope Point and Sandhill Point must comply with a CoP, and compliance will be independently verified.

CoP development will require cooperation between SCSI trawl fishers and validation from MFish to ensure the CoP meets minimum standards.

MFish considers Option 1 would only be a reasonable course of action providing there is sufficient certainty that all trawl fishers comply with the CoP. MFish invites the industry to submit information on the current level of compliance with the code including ways to measure the level of compliance and what actions could be taken on trawl fishers who do not comply with, or breach, specific measures. MFish considers there is also a need for independent verification that fishers comply with the CoP, and this could be simultaneously achieved through the placement of fisheries observers and/or monitoring equipment on trawl vessels fishing within the dolphins' range for the purpose of monitoring dolphin-trawl interactions.

The nature of ongoing costs under this option depends on the nature and extent of monitoring the Minister deems most appropriate. Fisheries observers typically cost $800 to $1000 per day while video monitoring equipment may cost around $10000 to install.

MFish invites the industry to submit how it might monitor CoP compliance and manage non

compliance[141].

The extent of costs associated with Option 1 is difficult to quantify because of the uncertainty in information on the nature and extent of trawling on the SCSI between Slope Point and Te Waewae Bay. However, MFish notes that there are approximately 31 trawl vessels <46m that operate in the statistical reporting areas that encompass the SCSI. Not all these vessels would fish inside 2nm between Slope Point and Sandhill Point because some of the species targeted are normally caught in larger quantities in deeper water (eg, stargazer, red cod, and barracouta). Only flatfish is targeted en masse inside 2nm[142]. Trawl fisheries prosecuted inside 12nm that may require additional monitoring as part of Option 1 are characterized in Table 16.

Option 1 relies on industry agreeing, in a timely manner, to develop and adopt a CoP with the minimum requirements outlined above. MFish welcomes stakeholder information on the likely utilisation impacts and costs of Option 1.

Option 2

Option 2 proposes a trawl ban (mid-water, bottom, and pair) within 2nm from shore with the exception of vessels targeting flatfish that use low headline gear (<1m high). MFish notes that trawling for flatfish is likely to have a lower likelihood of dolphin bycatch (compared with other trawl gear) because flatfish trawl gear has a low headline height, no wing doors, and a smaller sweep area. All vessels trawling within 12nm would be required to implement measures required under Option 1 (i.e. implement CoP and additional monitoring).

- *Effectiveness*

MFish considers that risk of interactions between trawlers on the SCSI and Hector's dolphins would be reduced further than Option 1 if trawl vessels were excluded within 2nm of the coast because:

⇒Despite no reported interactions between Hector's dolphins and trawlers on the SCSI, all known trawl-related interactions with Hector's dolphins in other parts of New Zealand's coast have occurred within 2nm of the shore

⇒Hector's dolphin density is probably higher within 2nm of the SCSI shore than further out

⇒Trawling in shallower waters probably presents a greater risk to dolphins because there is less available water column above or below trawl gear for the dolphins to swim away from the net.

Lower density of dolphins and deeper water offshore suggests low probability of interactions between trawlers and Hector's dolphins outside 2nm (there are no known trawl interactions on the SCSI).

Option 2 makes allowance for flatfish trawling because the trawl gear designed to target flatfish has a low headline height net type that dolphins can rise above in shallow water. Used in conjunction with proposed measures under Option 1, MFish considers flatfish trawling will pose a relatively low risk to Hector's dolphins. Option 2 makes allowance for flatfish trawling because the trawl gear designed to target flatfish has a low headline height net type that dolphins can rise above in shallow water. Used in conjunction with proposed measures under Option 1, MFish considers flatfish trawling will pose a relatively low risk to Hector's dolphins. MFish recognizes that mandatory gear design in the target flatfish fishery operating inside 2nm will be difficult to enforce under current compliance monitoring

[141] MFish notes that Option 1 proposes no penalty for CoP breaches but, should breaches be common, MFish would advise the Minister on regulatory options to implement CoP measures.
[142] MFish is currently unable to determine the feasibility of supplying observer services to the SCSI trawl fleet.

capacity. Additional monitoring that accompanies Option 2 (assuming the Minister chooses to monitor all target flatfish vessels) will help mitigate non compliance risk. MFish also welcomes comment from fishers on their proposals to ensure compliance with mandatory gear design should the Minister allow target flatfish fishing inside 2nm.

- *Impacts on fishers*

Option 2 provides for some trawling within 2nm as commercial fishers will still be able to target flatfish, providing they meet gear design requirements (see above) and CoP measures discussed in Option 1[143].

The overall impact of Option 2 on commercial fishers is difficult to quantify because of the uncertainty in, and absence of, information on the nature and extent of trawling on the SCSI between Slope Point and Sandhill Point out 2nm. However, MFish considers relevant points include:

⇒Trawlers <46m catch about around 13 main fish species in the Statistical Reporting Areas that include the SCSI Hector's dolphin population. Most of these species are probably caught in bulk outside 2nm (see Table 16).

⇒Only flatfish is probably targeted en masse inside 2nm. Fishers can still target flatfish inside 2nm under Option 2 providing vessels meet gear requirements

- Tarakihi, red gurnard, and red cod are most likely the only other high volume SCSI trawl fisheries taken in large amounts inside 2nm, probably as flatfish bycatch. Providing fishers do not target these species inside 2nm there are no additional costs for catching them associated with Option 2

- Any other target trawl fisheries inside 2nm will bear costs of shifting effort outside 2nm or to the west and east of the prohibited area. MFish cannot determine the extent of these costs because, other than the flatfish fishery, MFish has no information on target trawl fisheries inside 2nm.

Additional costs associated with this option are the costs of monitoring trawl activity inside 12nm. MFish notes that the monitoring costs outlined under Option 1 are also relevant to Option 2, although the level of monitoring required may be less due to the lower level of residual risk achieved under this option.

MFish welcomes stakeholder input on the likely utilisation impacts of Option 2.

Option 3

Option 3 proposes to prohibit all trawl fishing within 2nm from shore between Slope Point and Sandhill Point. Trawl vessels between 2nm and 12nm would be required to implement measures required under Option 1.

- *Effectiveness*

Option 3 is the most risk averse option and reduces residual risk that trawlers will catch Hector's dolphins on the SCSI by prohibiting trawling from area where dolphin densities are highest. MFish considers that risk reduction between Option 2 and 3 is marginal but notes that prohibiting all forms of trawling within 2nm will protect a significant proportion of the SCSI Hector's dolphin population from the threat of trawl gear.

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[143] MFish notes that the CoP cost assessment in Option 1 is relevant to the assessment of cost in Option 2

- *Impacts on fishers*

A 2nm trawl prohibition between Slope Point and Sandhill Point will close a large, but unquantifiable, proportion of the SCSI flatfish target fishery. The SCSI flatfish fishery is a regionally large and valuable target fishery – around 26 vessels catch flatfish inside statistical reporting areas 030 and 025. Anecdotal information suggests less than a third of the catch is taken inside 2nm. MFish cannot determine losses in other fisheries because of limited information about other target trawl fisheries inside 2nm. MFish invites industry to provide additional information to assess this impact.

Option 1 measures (if applied to all trawl vessels operating out to 12nm between Slope Point and Sandhill Point) would impose significant costs. However, MFish notes that the level of monitoring required under Option 3 may be less than Options 1 and 2 due to the lower level of residual risk achieved.

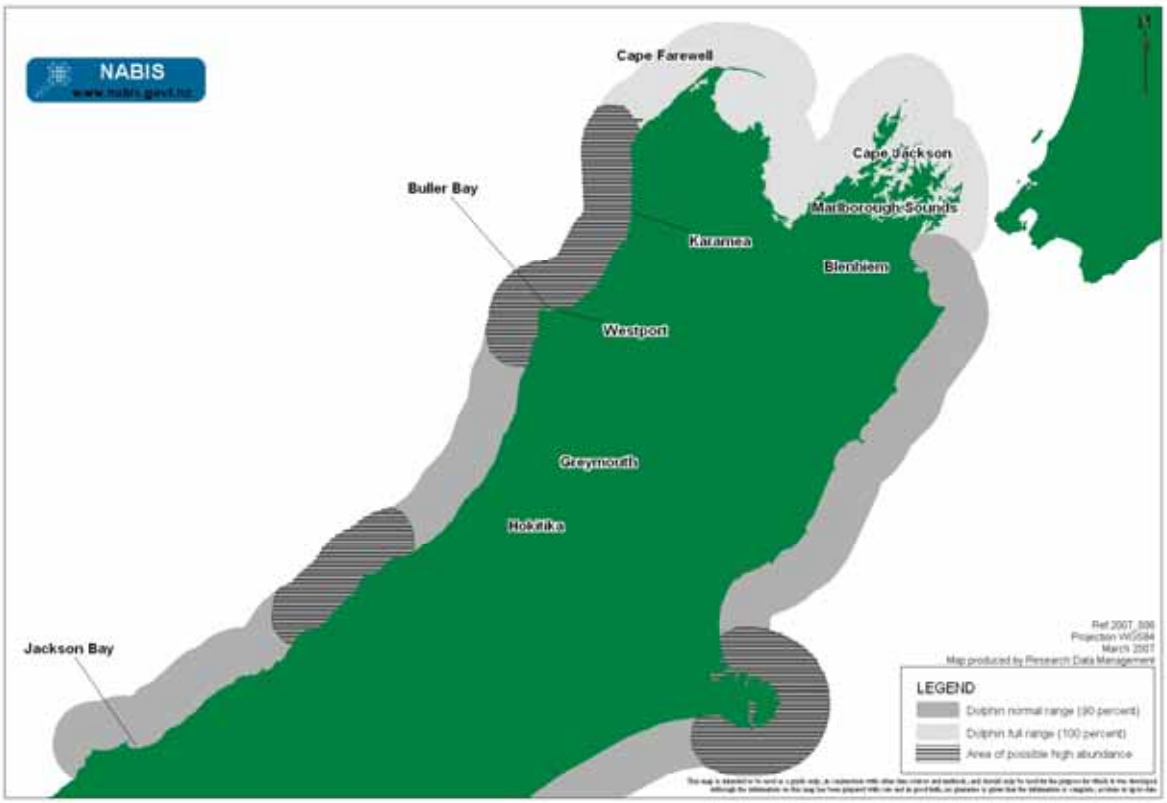
7.6. West Coast of the South Island

The West Coast South Island (WCSI) Hector's dolphin population extends between Cape Farewell in the north and Awarua Point in the south (just north of Fiordland). This area covers the southern part of Fisheries Management Area (FMA) 7 and includes Fisheries Statistical Areas 033, 034, 035, and 036. The WCSI population encompasses DOC's West Coast Conservancy.

All river mouths, estuaries, and lagoons are excluded from the WCSI proposals, as these areas are not part of Hector's dolphins range on the west coast.

7.6.1. Population characteristics

Hector's dolphins are present throughout the WCSI region but densities are higher in (i) Karamea to Punakaiki (including Buller Bay) (ii) Okarito Lagoon to Arnott Point and (iii) Neils Beach to Jacksons Bay (Map 19).



Map 19: Distribution of the WCSI Hector's dolphin population.

WCSI Hector's dolphins are most common in waters less than 20m deep and/or less than 2nm from shore (sightings outside 6nm are rare). They are regularly sighted within the surf zone during summer and are usually associated with murky waters around river mouths and estuaries. Hector's dolphins are not normally sighted in clearer offshore waters.

Based on observed movements of Hector's dolphins in other localities, it appears that individual dolphin groups are generally restricted to localised areas with little movement between areas. Seasonal offshore movement of individual dolphins along the WCSI is limited compared with the ECSI population (probably because the continental shelf drops away closer on the WCSI).

The WCSI population comprises about 5400 individuals[144] (95% confidence interval = 3613-8034), representing about 70% of the national species abundance. Groups typically include 4-6 animals but larger groups of up to 30-40 animals are relatively common in some places on the WCSI.

MFish cannot determine whether there have been changes in the WCSI Hector's dolphin population size over time because of the lack of comparative population surveys. However, genetic studies have not detected a decline in recent abundance.

7.6.2. Fishing threats

The WCSI Hector's dolphin population is susceptible to low levels of human-induced mortality. Population Biological Removal (PBR) analysis suggests 7 to 12 dolphins can be removed from the WCSI population each year (excluding natural mortalities)[145] without preventing the population increasing in size. PBR analysis using the Recovery Factor default value of 0.5 suggests that the population could sustain around 38 human-induced mortalities annually (not taking into consideration possible population fragmentation.)

As Hector's dolphins typically move only small distances over their lifetime, they are particularly susceptible to genetic fragmentation and this can affect the overall well-being of the WCSI population. Genetic fragmentation can occur when groups of dolphins are isolated throughout their range to such an extent that little mixing between groups occurs. Human-induced (non fishing-related and fishing-related) mortalities could exacerbate this threat. The main fishing threats to the WCSI Hector's dolphin population are set netting (amateur and commercial) and trawling (mid-water, bottom, and pair).

The DOC incident database lists 116 mortalities from the WCSI since 1988[146]. Of these reported mortalities, a cause of death was able to be assessed in 59 cases. Fishing activity is the identified cause of death in 29% of these cases (ie, 17 animals). There are another 23 mortalities that have been identified as "possible" or "probable" net entanglements. These incidents relate to carcasses that were not recovered from a net but where there is evidence of entanglement (for example, net marks). Definite human interaction with the dolphins was identified in 3 cases (5%) and in another 3 cases possible human interaction was identified. In 5 cases, the pathologist could not determine a cause of death. Of the remaining 57 cases, 13 were not assessed for cause of death, 26 animals were too decomposed or fragmented and the information is currently not available for 18 animals. Table 17 shows the number of cases where a definite cause of death was found.

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[144] Based on stratified line transect aerial surveys over four periods since 1998 (Slooten *et. al.* 2004)

[145] When applying the Recovery Rate Goal; see Appendix 3 for a description of the PBR analysis for Hector's dolphins. PBR is only one of a number of factors in determining appropriate management action. There is currently debate around the inputs to the PBR analysis for Hector's dolphins, leading to a range of estimated potential removals. MFish and DOC propose to have the Hector's dolphin PBR analysis independently reviewed to resolve this issue.

[146] The DOC incident database lists Hector's dolphin mortalities reported to DOC. An unknown number of mortalities probably go unreported.

Table 17 Total number of reported Hector's dolphin mortalities in the West Coast Conservancy and their attributed cause of death (since 1988)

Cause of death	Number	Percentage of reported deaths with confirmed cause	Percentage of total reported mortalities
Known set net entanglement	13 (9 known recreational, 4 from unknown set net)	52% (36% recreational, 16% unknown)	11% (8% recreational, 3% unknown)
Known trawl bycatch	4 (2 incidents, each resulting in 2 mortalities)	16%	3%
Trauma (unknown source)	3	12%	3%
Natural	5	20%	4%

Fishers are required by law to report dolphin entanglement (Marine Mammal Protection Act 1978) but MFish knows that not all entanglements and mortalities are reported (the fishing-related mortalities in Table 17 are likely to be underestimates). For example, MFish has received reports of dead Hector's dolphins hidden in areas immediately above high tide in the Buller Bay area – presumably by fishers attempting to hide evidence of entanglement. As such, MFish cannot determine the actual extent of mortalities caused by fishing.

Most fishing-related dolphin mortalities on the WCSI occur between early spring and late summer. MFish cannot determine whether this incidence pattern is correlated with increased fishing activity *per se* or with a higher likelihood of people reporting beached carcasses during the warmer summer months. However, MFish believes it is reasonable to expect that fishing (particularly amateur set netting) outside the summer months poses a lower risk to dolphins because of lower effort and a decrease in number of Hector's dolphins very close to shore (including the surf zone).

7.6.2.1. Set nets

The vulnerability of Hector's dolphins to entanglement in fishing gear, particularly in inshore set nets, has been well established through a combination of interviews and autopsies of bycaught and beach-cast animals. Hector's dolphin has a close inshore distribution which results in an overlap with commercial and amateur set net fisheries, and Hector's dolphins are known to have been entangled in set nets throughout their range. Illegal set net practices (eg, staking set nets on the beach and nets set directly off the beach) increase the chance of dolphin entanglement. From the beach, amateur fishers generally position set nets 90° to the shore and into the surf zone where dolphins occur, particularly over summer.

On the WCSI, set nets are responsible for 52% of reported Hector's dolphin mortalities where the cause of death is known (13 animals) – see Table 17.

Amateur set nets

Low levels of amateur set netting occurs along the WCSI and this is largely due to the exposed nature of the inshore environment - seas are often rough for long periods of time that preclude fishers from using set nets. There are occasional long periods of calm weather, particularly during the summer, when fishers are able to use set nets to catch fish. Main target species are elephant fish, tarakihi, and rig. Most set netting occurs in close proximity to towns and settlements.

Anecdotal information suggests most amateur set netting along the WCSI is undertaken by visitors to the area during the summer months. The WCSI is becoming an increasingly popular holiday destination and

the number of fishers visiting the coast has increased (particularly in areas around Jacksons Bay, Granity, Hector). Visiting fishers will often take advantage of calm weather during summer and set nets regularly during their stay. Some local fishers suggest most amateur set netting problems (eg, net loss, excessive soak time) are due to visitors' unfamiliarity with local conditions (eg, nets placed in inappropriate locations or left at sea in rough weather). Most set nets are generally set directly from shore with few nets set from boats due to the exposed nature of the coast.

There is anecdotal information to suggest that some fishers illegally set nets due to either local sea conditions or because they perceive the risk of being caught is low. These nets are staked into the ground (often using railways sleepers permanently buried into the sand) and/or stranded at low tide. Often these nets are left to continuously fish over many days (including overnight).

On the WCSI, amateur set netting is the main known cause of reported Hector's dolphin mortality. Of the reported mortalities on the DOC incident database amateur set nets are responsible for at least 36% (9 animals) of cases where set nets were attributed as the cause of death. MFish cannot determine if the remaining 4 confirmed set net mortalities were caused by commercial or amateur set nets.

Commercial set nets

Commercial set netting on the WCSI overlaps with Hector's dolphin distribution. Fishers target rig and school shark but take other species in smaller quantities (eg, gurnard, moki, stargazer, and elephant fish).

Approximately 12 commercial set netters (operating about 12 vessels) fish on the WCSI. However, only 3 to 5 who target rig and school shark reside on the WCSI and restrict their fishing activities to local areas. The remaining fishers predominantly fish in Golden and Tasman Bays, but will fish along the northern WCSI when sea conditions are suitable.

Most rig catches (about 60%) in the regional target set net fishery come from Golden and Tasman Bays. Much of the remaining catch comes from Cape Foulwind to Awarua Point on the WCSI (ie, Statistical Reporting Areas 033 to 034). Most school shark catches (about 75%) in the regional target set net fishery come from northern Cape Foulwind to Cape Farewell area (ie, 035 and 036). Much of the remaining catch comes from Golden and Tasman Bays (038).

Most set netting for rig occurs within relatively shallow inshore waters, with catches mainly taken during spring and summer, and tapering off between March and August. School shark catches are usually taken in deeper waters, although some catches are taken close to shore in some areas. There appears to be little seasonality in target school shark set net catches although catches tend to be higher between January and April.

Table 18 below characterises the main commercial set net fisheries on the WCSI using estimated catch and effort data reported from statistical reporting areas 033, 034, 035, and 036 over the past three fishing years. Not all the catch and effort (and value) listed in Table 18 can be attributed to the WCSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area. However, the characterisation illustrates the nature and extent of set netting on the WCSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Hector's dolphins (see later in section). Additional fishery characterization for selected WCSI fisheries is in Appendix 4.

Table 18 WCSI set net characterisation from estimated catch and effort reporting in statistical reporting areas 33, 34, 45, and 36. Value is estimated from the port price for the corresponding year[147].

Fishery		**2003-04**	**2004-05**	**2005-06**
School shark	Catch (tonne)	63	58	68
	Fishers	10	10	9
	Vessels	10	10	9
	Value ($)	$109,578	$111,650	$117,300
Rig	Catch (tonne)	40	39	59
	Fishers	10	10	8
	Vessels	10	10	8
	Value ($)	$118,400	$102,960	$156,350
Spiny dogfish	Catch (tonne)	1	4	10
	Fishers	2	3	3
	Vessels	2	3	3
	Value ($)	$498	$1,760	$4,700
Flatfish[148]	Catch (tonne)	0.6	0.2	0.7
	Fishers	6	5	5
	Vessels	6	5	6
	Value ($)	$1718	$626	$2279

There have been no confirmed Hector's dolphin mortalities in the commercial set net fishery off the WCSI. However, MFish considers commercial set netting is a threat to the population because nets are set in the same areas where Hector's dolphins occur and there are confirmed reports in other set net fisheries where commercial set nets have caught Hector's dolphins (ie, ECSI). MFish cannot determine whether the absence of reported dolphin entanglements on the WCSI reflects zero interactions between commercial set nets and dolphins or fisher non-reporting.

MFish notes there is uncertainty around cause of death in reported Hector's dolphin mortalities – the DOC incident database lists 4 set net mortalities not attributed to either amateur or commercial set nets. Commercial fishers may be responsible for some of these mortalities. In addition, the database includes 23 more mortalities where the cause of death is unknown but are "possible" and "probable" net entanglements, and some of these may be commercial set net related.

There has been no observer coverage of the WCSI commercial set net fishery and, as such, levels of bycatch cannot be quantified with certainty. Scientists have undertaken population modelling using data collected from the ECSI population (biological information and bycatch rates) and WCSI commercial set net effort data to estimate the impacts of commercial set netting on the WCSI Hector's dolphin population (the absence of data for other threats precludes their inclusion in the analysis). Some of this work indicates that the WCSI population will have a positive growth rate under current levels of

[147] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

[148] Includes all flatfish species codes.

commercial set net mortality[149]; whereas other studies indicate the WCSI population has declined and will continue to decline under *status quo* management[150]. The main reason for the differences in results is that the former study took into account the spatial dynamics of the WCSI commercial set net fishery (i.e. a more spatially realistic approach), which led to less overlap between commercial set net effort and Hector's dolphin distribution compared to other studies, which have taken a broader spatial scale approach. The contrasting results from these studies highlight the uncertainty around the impacts of commercial set netting on the WCSI population. MFish welcomes stakeholder submissions on this issue.

Customary set nets

MFish understands that no or very little customary fishing using set nets occurs along the WCSI. The DOC incident database lists no mortalities attributable to customary set net fishing on the WCSI. MFish believes the use of set nets for customary fishing on the WCSI poses a low risk to Hector's dolphins. MFish welcomes submissions from tangata whenua on this issue.

7.6.2.2. Commercial trawling (mid-water, bottom, and pair)

Commercial trawling is responsible for some reported Hector's dolphin mortalities on the WCSI. Of the reported mortalities listed in the DOC incident database at least 16% (4 animals) where the cause of death is known are attributed to trawling (see Table 17 above). These 4 mortalities occurred in 2 separate events in 1988; each resulting in the death of 2 Hector's dolphins.

There are approximately 50 trawl fishers operating about 57 vessels (under 46m) on the WCSI. These fishers catch a wide range of inshore fish species including red cod, barracouta, tarakihi, stargazer, flatfish, and red gurnard. Most fishers operating within inshore areas target barracouta in deeper waters typically 6nm+ from shore. Many of these same fishers also catch a wide range of other species inside 6nm at varying water depths including flatfish, red cod, tarakihi, stargazer, and elephant fish.

Trawling can occur relatively close to shore dependent on species targeted and water depth relative to shore. For example, flatfish is mainly targeted in water depths less than 30m (using low headline height fishing gear). Red cod is mainly targeted in water depths between 20 and 50m and tarakihi between 50 and 100m. Commercial vessels trawl throughout the WCSI but MFish cannot determine the precise location of individual trawl events using existing data – although much trawl effort is concentrated between Westport and Hokitika[151].

Table 19 below characterizes the main commercial trawl fisheries (vessels <46m) on the WCSI using estimated catch and effort data reported from statistical reporting areas 33, 34, 35, and 36 over the past three fishing years. Not all the catch and effort (and value) listed in Table 19 can be attributed to the WCSI area that overlaps with Hector's dolphins because the statistical reporting areas cover a much wider area. However, the characterization illustrates the nature and extent of trawling on the WCSI and helps to assess potential costs to fishers of measures to avoid, remedy, and mitigate the adverse effects of fishing on Hector's dolphins (see later in section).

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[149] Secchi, E. R. (2006). Modelling the population dynamics and viability analysis of the Franciscana (*Pontoporia blainvillei*) and Hector's dolphins (*Cephalorynchus hectori*) under the effects of bycatch in fisheries, parameter uncertainty and stochasticity. PhD thesis, University of Otago.

[150] For example, Slooten, E. (2007). Conservation management in the face of uncertainty: Effectiveness of four options for managing Hector's dolphin bycatch. *Endangered Species Research*: 3, pp 169-179.

[151] WCSI inshore trawl fisheries are managed as part of the wider Fisheries Management Area 7 (FMA 7) that includes the top of the South Island and WCSI, but fishers report estimated catches by finer scale Statistical Reporting Areas.

Table 19 WCSI trawl characterisation captured from estimated catch and effort reporting in statistical reporting areas 33, 34, 45, and 36. Value is estimated from the port price for the corresponding year[152]. Analysis excludes vessels >46m except for * that may include vessels greater than 46m

Fishery		**2003-04**	**2004-05**	**2005-06**
Red cod	Catch (tonne)	1067	1899	1690
	Fishers	53	44	46
	Vessels	63	50	51
	Value ($)	$659,574	$1,130,200	$1,013,711
Barracouta	Catch (tonne)	845	884	648
	Fishers	41	35	30
	Vessels	52	35	34
	Value ($)	$354,033	$247,426	$187,936
Tarakihi	Catch (tonne)	594	574	675
	Fishers	38	30	28
	Vessels	45	36	31
	Value ($)	$1,164,403	$995,717	$1,333,960
Stargazer	Catch (tonne)	354	437	436
	Fishers	33	40	37
	Vessels	38	34	30
	Value ($)	$460,615	$465,748	$472,924
Warehou	Catch (tonne)	422	401	359
	Fishers	32	29	25
	Vessels	38	32	28
	Value ($)	N/A	N/A	N/A
Red Gurnard	Catch (tonne)	406	423	322
	Fishers	55	46	47
	Vessels	64	53	53
	Value ($)	$585,850	$613,982	$451,102
Flatfish	Catch (tonne)	389	505	572
	Fishers	50	43	43
	Vessels	61	50	48
	Value ($)	$1,112,913	$1,580,060	$1,862,334
Spiny dogfish	Catch (tonne)	112	148	112

[152] Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. Survey replies may be skewed because (i) industry know they are used to set cost recovery levies (ii) the survey does not differentiate harvest method – fish caught by one method over another may command a price premium (iii) ownership structure can influence port price and (iv) port price does not reflect price differential for different grades of fish.

Fishery		2003-04	2004-05	2005-06
	Fishers	15	14	17
	Vessels	21	15	21
	Value ($)	$55,626	$65,209	$52,694
School shark*	Catch (tonne)	47	40	36
	Fishers	40	34	31
	Vessels	49	38	36
	Value ($)	$81,883	$77,000	$62,100
John dory	Catch (tonne)	35	37	40
	Fishers	27	19	22
	Vessels	31	22	22
	Value ($)	$133,295	$146,175	$158,485
Snapper	Catch (tonne)	25	35	27
	Fishers	28	25	21
	Vessels	34	30	24
	Value ($)	$98,539	$133,536	$94,343
Trevally	Catch (tonne)	24	28	26
	Fishers	16	16	17
	Vessels	20	20	18
	Value ($)	$15,979	$25,271	$22,310
Rig	Catch (tonne)	16	21	30
	Fishers	42	36	35
	Vessels	51	39	40
	Value ($)	$48,296	$54,367	$79,656
Elephant fish	Catch (tonne)	6	22	20
	Fishers	29	28	31
	Vessels	31	33	34
	Value ($)	$13,419	$30,250	$28,200
Sea perch*	Catch (tonne)	12	7	11
	Fishers	18	18	14
	Vessels	25	22	24
	Value ($)	$10,200	$5,110	$6,600

Despite the lack of recent reported trawling-related mortalities, MFish considers there remains the potential for trawling/dolphin interactions because commercial trawling occurs inside 6nm. MFish relies on fishers to report dolphin interactions because Fisheries Observer coverage in the inshore WCSI trawl fishery is very limited – it is possible that some interactions are not reported.

Anecdotal information indicates inshore trawl fishers regularly see Hector's dolphins when setting and retrieving trawl gear on the WCSI. These fishers consider their activities do not pose a risk to dolphins because of the type of net they use (low headline nets (<1m high), no wing doors, smaller sweep area),

together with low tow speed (4-6kn) that enable dolphins to easily swim away from an approaching net. Some fishers consider their nets do not catch dolphins as MFish would have received reports of trawl-related dolphin mortalities given the very extensive trawling effort along the west coast in the past 20 years.

7.6.3. Existing threat management – status quo

There are no specific legislative or regulatory measures on the WCSI to avoid, remedy, or mitigate the effects of fishing on Hector's dolphins. However, nationally applicable set net regulations may help reduce the chance of fishing-dolphin interactions. In addition, there are voluntary mechanisms that apply to non commercial and commercial set netters on the WCSI that may also reduce the likelihood of interactions.

7.6.3.1. Set Nets

Amateur set nets

Regulations that apply nationally to amateur set netting may help reduce the chance of Hector's dolphin entanglement. The following amateur set net rules apply throughout New Zealand:

⇒Amateur nets must not exceed 60m in length[153]

⇒The use of stakes to secure amateur nets is prohibited[154]

⇒Amateur set nets must not be set in a way that causes fish to be stranded by the falling tide[155]

⇒Amateur nets must not be set within 60m of another net[156]

MFish promotes a voluntary set net code of practice (CoP) for amateur fishers on the WCSI to reduce the likelihood of Hector's dolphin entanglements. The code encourages good set netting practices, including:

⇒Using a net designed for the fish species being targeted

⇒Deploying a net with anchors that are suitable for sea conditions to prevent losing nets

⇒Setting a net that can be easily retrieved

⇒Staying with and regularly checking the net

⇒Avoiding setting nets when Hector's dolphins are present

⇒Deploying a net for the shortest soak time possible

⇒Avoiding setting nets overnight

Commercial set nets

Regulations that apply nationally to commercial set netting may help reduce the chance of Hector's dolphin entanglement. These measures include:

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[153] r 12(1)(a) of the Fisheries (Amateur Fishing) Regulations 1986
[154] r 11 of the Fisheries (Amateur Fishing) Regulations 1986
[155] r 10 of the Fisheries (Amateur Fishing) Regulations 1986
[156] r 12(1)(c) of the Fisheries (Amateur Fishing) Regulations 1986

⇒Commercial fishers cannot use more than 3000m of net per day[157]

⇒Commercial fishers must service their net while it is set at least every 24 hours[158]

The Challenger Finfisheries Management Company Limited (CFMC) has developed a voluntary set net CoP for all commercial set net fishers represented by the Company[159]. The CoP in FMA 7 and encourages set net fishers to implement practices that minimise interactions with Hector's dolphins. These practices include:

⇒Avoid setting nets in shallow estuaries, harbours and river mouths when water is cloudy or discoloured

⇒Avoid setting nets when Hector's dolphins are around and maintaining a lookout when gear is deployed

⇒Encourage the use of acoustic pingers on nets

⇒Keep set net duration to a minimum

⇒Set nets as tight as possible

⇒Recover nets as quickly as possible.

7.6.3.2. Commercial trawling (mid-water trawling, bottom trawling, and pair trawling)

There are no specific legislative, regulatory, or voluntary management measures to avoid, remedy, or mitigate the effects of trawling on Hector's dolphins on the WCSI.

7.6.4. Additional threat management

This section of the consultation document considers whether additional threat management is necessary to manage the effects of fishing on WCSI Hector's dolphin population by:

⇒Discussing the effectiveness of current threat management; and

⇒Relevant considerations for the Minister when determining whether measures are necessary to avoid, remedy or mitigate the effects of fishing on the WCSI population.

7.6.4.1. Effectiveness of current threat management

Amateur set nets

Hector's dolphin entanglements in amateur set nets continue to occur on the WCSI under existing set net regulations and voluntary CoP measures.

MFish has direct evidence of 9 Hector's dolphin mortalities caused by amateur set nets since 1988.

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[157] r 65(3) of the Fisheries (Commercial Fishing) Regulations 1986
[158] r 2BB of the Fisheries (Challenger Area Commercial Fishing) Regulations 1986
[159] CFMC is the regional commercial stakeholder organisation for Fisheries Management Areas (FMA) 7 and 8. FMA 7 (WCSI, Tasman Bay, Golden Bay, and the Marlborough Sounds) encompasses the WCSI Hector's dolphin population.

MFish is unable to effectively monitor amateur set netting and therefore cannot determine if these mortalities reflect non-compliance with regulatory and voluntary measures, or whether the mortalities occur despite existing measures.

Commercial set nets

MFish cannot determine if existing regulatory and voluntary measures are effective at avoiding, remedying, or mitigating Hector's dolphin mortalities from commercial set netting on the WCSI. MFish does not monitor or assess effectiveness of these measures or monitor compliance with these measures.

There have been no confirmed Hector's dolphin mortalities caused by commercial set nets on the WCSI since 1988. The absence of reports may be due to the effectiveness of existing mandatory and voluntary measures, the failure of fishers to report dolphin entanglements, and an inability to determine cause of death.

MFish considers risk to Hector's dolphins from commercial set net activity exists because:

⇒There are 4 known set net mortalities since 1988 that cannot be attributed to amateur or commercial fishers

⇒Commercial set nets are set in the same areas where Hector's dolphins occur on the WCSI and

⇒There are confirmed reports from other localities that commercial set nets have caught Hector's dolphins (eg, ECSI).

Commercial trawling (mid-water trawling, bottom trawling, and pair trawling).

MFish considers there is a risk of Hector's dolphin entanglement in the WCSI trawl fishery (there are no measures in place to manage this risk). The DOC incident database lists 4 trawling-related Hector's dolphin mortalities on the WCSI (in 1988) and there is more recent evidence of trawl-related mortalities in the ECSI inshore trawl fishery (see ECSI section).

The absence of more recent reports from the WCSI, despite extensive trawling effort, may signal a comparatively low risk of inshore trawl fishing on the population (*cf* set nets) or a failure by fishers to report any dolphin interactions.

However, there has been some limited coverage of the WCSI inshore trawl fishery in the current fishing year (2007-07). Ninety tows have been observed with no Hector's dolphins observed caught.

Low levels of Fisheries Observer coverage in the WCSI trawl fishery means MFish cannot determine the actual extent of trawl-related mortalities.

7.6.4.2. Need and scope for additional threat management

Whether the Minister considers it necessary to implement further measures to manage the effects of fishing related mortality on Hector's dolphins depends ultimately on the balance between sustainability and utilization the Minister considers appropriate. MFish considers that the following are relevant to the Minister's considerations:

⇒Hector's dolphin is a threatened species.

⇒The WCSI population is the largest Hector's dolphin population in New Zealand.

⇒PBR analysis indicates that the WCSI population can withstand 7-12 human-induced mortalities

per year and still increase in size, while the current abundance of around 5400 individuals could be maintained at mortality levels closer to 38 animals per year when applying the recovery factor default value of 0.5 and not taking into consideration possible population fragmentation

⇒There is no genetic evidence of a recent decline in abundance

⇒Fishing is the most significant known threat facing Hector's dolphins on the WCSI (being attributable to 86% of all Hector's dolphin mortalities with a confirmed cause since 1988)

⇒Set netting has caused around 52% of the dolphin deaths on the WCSI since 1988 where cause of death can be determined

⇒Trawling poses a risk to dolphins but existing information suggests there is a low probability of interaction

⇒An unquantified number of fishing-related mortalities go unreported

⇒The genetic continuity (and overall wellbeing) of the population may be susceptible to fishing impacts (through localised depletion) and

⇒The effectiveness of current measures is uncertain but there is evidence that fishing-related Hector's dolphin mortalities are continuing under the current regulatory and voluntary measures.

The WCSI Hector's dolphin population is the biggest of all of the populations. Total number of recorded mortalities which can be directly attributed to fishing are 17 since 1988. However, this information is uncertain due to lack of observer coverage of commercial fishing activity and lack of incentives to report dolphin mortalities from commercial and non-commercial fishing.

The effect on the population of fishing related mortality is probably the lowest of all of the Hector's dolphin populations given the size of the WCSI population. Based on population size, and level of recorded information on impacts of fishing, the need for action to reduce fishing-related mortality immediately is less for the WCSI population than for other Hector's dolphin populations. However, there is considerable uncertainty in information on population status and trends. There is no scientific information to indicate whether the WCSI population is increasing, maintaining current population size, or decreasing.

Despite uncertainty in information on nature and extent of known risks, and the effect of those risks on the population and subsequently the species as a whole, MFish consider the Minister could take action to avoid, remedy or mitigate the effects of fishing-related mortality if he considered it necessary. Such action could be taken having regard to:

⇒Uncertainty in information on the nature and extent of impacts of fishing on the population linked to the ability to manage past, present and future effects of fishing meaning the Minister could be cautious to prevent impacts of fishing causing or exacerbating any current or future decline in the population (and consequently the species overall)

⇒A desire to reduce fishing-related mortality as far as possible to maximise potential for the WCSI population to contribute to an increase in the numbers of Hector's dolphins overall

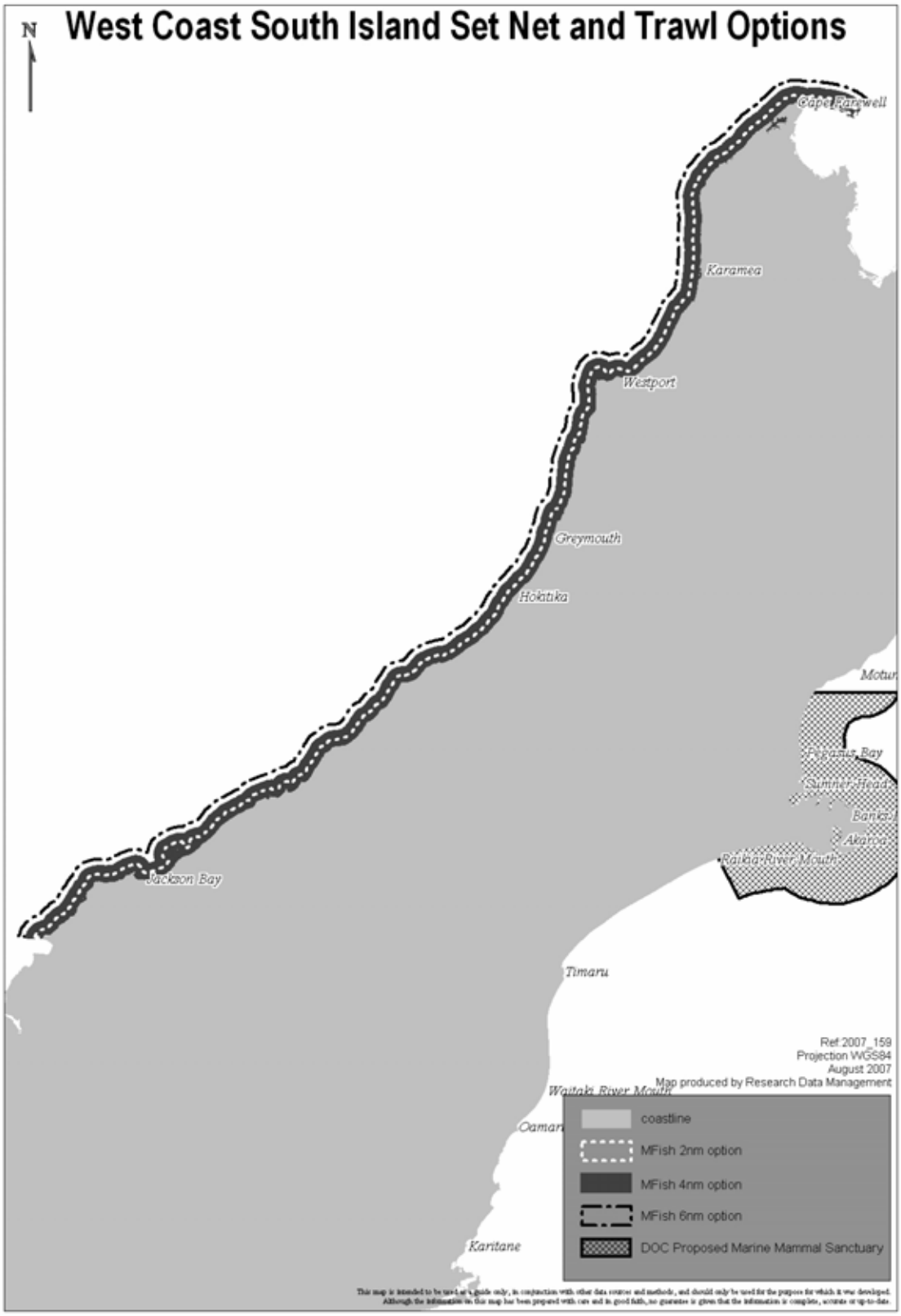
⇒Societal values which would suggest human-induced mortalities (including fishing-related mortality) should be reduced as far as possible.

However, MFish notes that FA96 does not oblige the Minister to take management action in relation to Hector's dolphins on the WCSI given the factors noted above. Need for action in relation to the WCSI population is at the discretion of the Minister having regard to the balance between sustainability and

utilisation he considers appropriate for this population and/or the species overall.

7.6.5. Options

This section outlines options to manage the effects of fishing on the WCSI Hector's dolphin population, if the Minister deems it necessary. Implicit in the Minister's decision is a careful consideration of the balance between sustainability and utilisation. Some options give more weight to sustainability relative to use. In considering the options the Minister should have regard to the information discussed above which outlines the nature of the effects of fishing-related mortality on the population, uncertainty in information, and basis for considering management action. The Minister should weigh up those factors and consider effectiveness and cost of measures when determining whether or not additional measures are necessary and what, if any measures should be implemented. Measures proposed for the WCSI are illustrated in Map 20.



Map 20 Measures proposed for WCSI

7.6.5.1. Status quo

The nature and extent of fishing threats to the WCSI population, and an analysis of effectiveness of current measures and consideration of the need for further measures have been outlined in the sections above. In light of this information, the Minister may consider that the risks of fishing-related mortality are acceptable and consequently further measures to avoid, remedy or mitigate the effects of fishing-related mortality on the WCSI population are not necessary. MFish notes that the *status quo* remains a valid option given uncertainty over the nature and extent of the impact of fishing-related mortality on Hector's dolphins and the impact of proposed measures on fisheries users. An analysis of the *status quo* has been presented above. No further analysis of the *status quo* is carried out in this option section.

7.6.5.2. Set netting

MFish proposes the following three options to manage the threats of amateur and commercial set netting on the WCSI population. The proposals are in addition to existing regulatory and voluntary measures and do not apply to river mouths, estuaries, and lagoons.

Status Quo – Existing management	
Option 1 – Implement mandatory and voluntary threat management measures inside 6nm from shore (MHW) between Cape Farewell and Awarua Point	
Amateur set netting	
Mandatory measures	Mandatory attendance with a set net; Maximum of one set net per person and per boat; No overnight setting of nets (between one hour before sunset to one hour after sunrise); and Maximum net length of 30m (fishers are permitted to use a net that has a maximum length of 60m when targeting flatfish within estuaries)
Voluntary measures	Hand in unused or unwanted nets to MFish
Commercial set netting	
Voluntary measures	Adherence to the existing voluntary set net code of practice
Mandatory measures	Additional monitoring of set netting

Option 2 – Amateur and commercial set netting is prohibited inside 2nm or 4nm from shore between Cape Farewell and Awarua Point with provision for some amateur set netting for 6 or 9 months. All sub-options have the additional set net measures as per Option 1		
Either:	**Option 2(A)**	Set net prohibition applies inside 2nm from shore – this option includes the following three alternatives: Prohibition applies all year round with set netting allowed for nine months of the year (1 March to 30 November) or Prohibition applies all year round with set netting allowed for six months of the year (1 April to 30 September) or Prohibition applies all year round
Or:	**Option 2(B)**	Set net prohibition applies inside 4nm from shore – this option includes the following three alternatives: Prohibition applies all year round with set netting allowed for nine months of the year (1 March to 30 November) or Prohibition applies all year round with set netting allowed for six months of the year (1 April to 30 September) or Prohibition applies all year round
Option 3 – All amateur and commercial set netting is prohibited inside 6nm between Cape Farewell and Awarua Point		

Analysis of amateur set netting options

Option 1

Existing amateur set net restrictions and code of practice measures will continue to apply with the addition of the following new mandatory requirements:

⇒Attendance with a set net;

⇒Maximum of one set net per person and boat;

⇒No overnight setting of nets (between one hour before sunset to one hour after sunrise); and

⇒Maximum net length of 30m (fishers will be permitted to use a net that has a maximum length of 60m when targeting flatfish in estuaries).

♦ *Effectiveness*

Option 1 will reduce the number and length of nets used at any one time and, therefore, lower risk of fishing-related mortality to Hector's dolphins by:

⇒Discouraging fishers from using set nets in preference for other fishing methods (MFish Compliance report that mandatory net attendance at Kaikoura during last summer produced a

notable decline in amateur set net usage)

⇒Reducing set net soak time (fishers will not be able to leave their set net)

⇒Enabling fishers to immediately remove their set net from the water if a dolphin appears in the vicinity, and enable fishers to attempt to release any net entangled dolphin.

Prohibitions on overnight setting will further reduce the risk of net entanglement.

MFish invites recreational fishers to hand in any unused or unwanted amateur set nets to remove latent effort in the amateur set net fishery. MFish could reward fishers who hand in nets with t-shirts, posters, school donations, etc.

Option 1 will leave residual risk because placement of nets within the water will still pose a threat to Hector's dolphins. However, MFish considers that overall risk reduces under Option 1.

♦ *Impacts on fishers*

Option 1 removes flexibility in the exercise amateur fishing activity. Option 1 will enable amateur fishers to continue to use set nets to target important recreational species, but limitations on fishing activity proposed in Option 1 may impact the amateur fishing experience, effort, and daily catch. For example, some amateur fishers set nets then move on to set additional nets or line fish in another area. Requirements to stay with nets will effectively prevent this activity.

MFish considers that lower overall recreational effort and catch is the most likely outcome even though Option 1 provides for greatest amateur set netting use along the WCSI in comparison with Options 2 and 3.

Option 2

Option 2 proposes to prohibit amateur set netting inside 2nm (Option 2A) or 4nm (Option 2B) between Cape Farewell and Awarua Point for a 12 month, 6 month, or 3 month period. Option 2 will give greater certainty of mitigating the risk of set nets to Hector's dolphins and is appropriate if the Minister considers residual risk in Option 1 (ie, ability to place set nets in the water) is too high.

♦ *Effectiveness*

The best available information suggests the WCSI Hector's dolphin population is restricted to 4-6nm from shore (and less than 100m depth), with the majority of dolphins found within 2nm or less than 20m depth. Hector's dolphins are regularly seen within the surf zone in many areas during summer. An amateur set net prohibition out to 2nm effectively encompasses waters out to about 15-20m deep in many areas and will protect a significant proportion of the population from the threat of set nets. Option 2B gives additional certainty that amateur set nets will not overlap with Hector's dolphin distribution. MFish understands that Hector's dolphins along the WCSI generally remain close to shore throughout the year, with little offshore movement during the colder winter months. As such, MFish believes there is little reason to alternate the closed areas between 2nm and 4nm between seasons to reflect seasonal movements of dolphins.

MFish understands the majority of amateur set netting occurs in summer when visitor numbers to the WCSI increases and recreational fishing effort increases accordingly. It is also during the summer period when the sea can be relatively calm for extended periods and conditions are more suitable for amateur set netting. MFish believes the greatest risk of dolphin entanglement by amateur set nets is in summer by virtue of highest amateur set net activity being largely undertaken by non-local fishers not familiar with local weather and sea conditions. A seasonal closure for the WCSI may significantly reduce the risk of

set net entanglement and allow some restricted set netting (ie, mandatory net attendance, no overnight fishing, etc) during all other times of the year when the risk of dolphin entanglement is much lower.

- *Impacts on fishers*

The proposed 2nm set net closure will effectively prohibit all amateur set netting on the WCSI. This is because most amateur fishers set their nets either directly from or very close to shore due to the exposed nature of the coast. MFish considers there is little merit in extending the closure out to 4nm as fishers are unlikely to travel further than 2nm miles from shore to set a single net given the risks associated with travelling significant distances from shore on the WCSI, together with the proposed requirement to stay with their net.

Restricting the proposed set net closure to 3 or 6 months (to coincide with the summer period) will mitigate impacts on some local recreational fishers who will still be able to set nets outside summer. MFish invites submissions from fishers that discuss the utilisation impacts of Option 2.

Option 3

Option 3 imposes a total prohibition on all set netting in all waters inside 6nm from shore.

- *Effectiveness*

Option 3 is the most risk averse option and is appropriate if the Minister considers it necessary to avoid interactions (with a very high level of certainty) between amateur set nets and Hector's dolphins (sightings of WCSI Hector's dolphins outside 6nm are rare). However, the majority of the population is found in waters less than 2nm from shore with only a few animals venturing out to 6nm such that the benefits of a 6nm closure (compared to less onerous options in Option 2) are marginal.

- *Impacts on fishers*

Option 3 is unlikely to prevent utilisation beyond the more onerous options in Option 2 - nearly all recreational fishers set their nets directly from, or very close to, the shore.

Analysis of commercial set netting options

Option 1

Option 1 requires commercial set net fishers to demonstrate adherence to the CFMC set net CoP inside 6nm from shore (MHW) between Cape Farewell and Awarua Point. Option 1 also requires a level of set net monitoring commensurate with residual risk to dolphins after application of the CoP. Part of this monitoring programme should revolve around CoP compliance monitoring.

- *Effectiveness*

Allowing set nets in areas and at times of the year where dolphins are usually present constitutes a greater, albeit unquantified, risk of fishing-related mortality than excluding set nets within parts, or the whole, of the dolphins range (ie. Options 2 and 3). Option 1 accepts that commercial set netting on the WCSI under the existing management arrangement poses an acceptable risk to Hector's dolphins.

MFish also notes that, because this option is the least risk averse, fishery monitoring would also provide additional certainty that CoP measures mitigate potential effects on Hector's dolphins. Low levels of observer coverage of the commercial set net fishery make it difficult to determine the success of industry's initiatives to mitigate Hector's dolphin mortalities, and therefore to assess the current level of risk to Hector's dolphins on the WCSI under *status quo* management.

- *Impacts on fishers*

Fine-scale set net distribution information available since 2006 (but not shown here) shows that most shark set netting occurs inside 6nm on the WCSI. There are approximately 12 set net vessels operating in the area covered by the SCSI Hector's dolphin section that may need to adopt monitoring under Option 1 (or elect to fish outside the area covered by the monitoring proposal). Fisheries Observers typically cost $800 to $1000 per day, and electronic monitoring equipment around $10,000 to install, such that total monitoring costs could potentially be expensive.

MFish believes Option 1 would only be a reasonable course of action providing there is sufficient certainty that all fishers comply with the existing CoP. MFish invites the industry to submit information on the current level of compliance with the code including ways to measure the level of compliance and what actions could be taken on individual fishers who do not comply with specific measures. MFish considers there is also a need for independent verification that fishers comply with the CoP, including the placement of fisheries observers and/or monitoring equipment on set net vessels fishing within the dolphins' range.

MFish invites submissions from fishers that discuss the utilization impacts of Option 1.

Option 2

Option 2 proposes to prohibit commercial set netting inside 2nm (Option 2A) or 4nm (Option 2B) between Cape Farewell and Awarua Point for a 12 month, 6 month, or 3 month period. Option 2 will give greater certainty of mitigating the risk of commercial set nets to Hector's dolphins and is appropriate if the Minister considers residual risk in Option 1 (ie, ability to place nets in the water) is too high.

- *Effectiveness*

The best available information suggests the WCSI Hector's dolphin population is restricted to 4-6nm from shore (and less than 100m depth), with the majority of dolphins found within 2nm or less than 20m depth. Prohibiting set netting within 2nm from shore effectively encompasses waters out to about 15-20m water depth in many areas and will protect a significant proportion of the population from the threat of set nets; this protection is further increased if the closure extends out to 4nm.

Measures proposed under Option 2 will largely prohibit the summer rig and school shark fisheries from the inshore area of the WCSI. When the fisheries are permitted, risk to Hector's dolphins will be managed by the CoP and additional fishery monitoring.

- *Impacts on fishers*

The proposed set net closures will have a significant impact on the commercial rig and school shark set net fisheries. Presently commercial fishers target rig and school shark on the WCSI across a range of water depths ranging from 5m out to 50m. The degree of impact will be less if the closure applies to 2nm from shore.

The majority of rig and school shark catches caught on the WCSI are taken by 3-5 resident commercial fishers based around the three main ports (Westport, Greymouth and Hokitika). These fishers generally operate small vessels (less than 13-15m in length) and carry up to 3-4 crew. These fishers generally operate in areas close to port on a 1-3 day basis, but some can fish further afield for up to 5-6 days. Most fishers target rig and school shark from their home port to maximise fishing efficiency (ie, reduce travel time, fuel and crew costs to a minimum). Several fishers from the top of the South Island also target rig and school shark on the WCSI and mainly restrict their activities to more northern areas (ie, around Cape Farewell). The economic return of the rig fishery has decreased in recent years as a direct result of a reduction in the SPO 7 TACC (ie, reduced from 350 tonnes to 221 tonnes at the start of the 2006-07

fishing year), as well as a voluntary quota shelving arrangement in response to concerns about overfishing.

In the last three fishing years (2003-04 to 2005-06), the set net rig fishery had an annual 'gross' value of about $118 400, $102, 960, and $156 350. For the same period, the set net school shark fishery had an annual 'gross' value of about $109 578, $111 650, and $117 300. MFish is unable to further quantify the economic impact of the proposed 2nm (Option 2A) and 4nm (Option 2B) set net closures on the rig and school shark fisheries without more information. MFish invites industry to provide information to better assess this impact. However, MFish believes these impacts will be lower if the closure applies to 2nm only, as fishers will still continue to catch rig and school shark within their local waters further offshore. Individual fisher set net positions have only become recently available and these clearly suggest that rig and school shark catches occur across a wide depth range with a significant proportion outside the proposed 2nm closure. This indicates that fishers have vessels that are capable of fishing offshore. As such, the proposed 2nm closure will impact on local fishers, but fishers will still be able to catch rig and school shark by moving further offshore.

MFish notes the proposed 4nm closure will have a bigger impact on local fishers and this may require them to significantly modify their fishing operations (including possibly acquiring a larger vessel) to continue to catch rig and school shark. MFish accepts there will be economic implications under the proposed closures as fishing costs will be higher as fishers will have to move away from existing fishing grounds. These impacts will be higher under the option of extending the closure out to 4nm.

MFish expects that set net effort would shift closer to Golden Bay as WCSI set net prohibitions became more extensive (ie, 2nm to 4nm). The target school shark fishery would probably be affected more by Option 2 because a greater proportion of the fishery is caught on the WCSI (although fishers can target school shark outside 4nm on the WCSI in deeper water than in rig fishery).

The implications of the proposed commercial set net closures could be further mitigated if the restrictions applied over the summer months only. As school shark catches are generally taken throughout the year (although they tend to peak between January and April), a closure over the summer months would have a lower impact on the school shark fishery. However, the impacts would remain unchanged on the rig fishery, as most catches are generally taken during spring and summer. The benefits of implementing a seasonal closure are largely negated due to the presence of Hector's dolphins in inshore areas throughout the year, and therefore the risk of dolphin entanglement would remain.

The proposed set net closures will have no or very little impact on the set net ling fishery that occurs in waters more than 100m depth. This fishery occurs in areas well away from the Hector's dolphin range. Fishers will still be able to set net for ling under Options 2A and 2B.

MFish invites submissions from fishers that discuss the utilisation impacts of Option 2.

Option 3

Option 3 imposes a total net prohibition on all set netting in all waters inside 6nm from shore between Cape Farewell and Awarua Point.

- *Effectiveness*

This option provides the greatest protection to the WCSI population as all Hector's dolphins are found in waters less than 6nm from shore. This option would effectively eliminate the threat of Hector's dolphin entanglement with commercial set nets. However, the majority of the population is found in waters less than 2nm from shore with only a few animals venturing out to 6nm. As such, the benefits of a 6nm closure when compared to the proposed year round closure (sub-option iii) under Option 2 are marginal.

♦ *Impacts on fishers*

A proposed 6nm closure would effectively prohibit most, if not all commercial set net fishing for rig and school shark along the WCSI. These fisheries are generally found in waters less than 6nm and the proposed closure would have significant economic implications on affected fishers. While the risk of commercial set nets on Hector's dolphins would be eliminated (providing compliance is adequate) under this option, the impacts on the industry would be substantial. MFish expects that set net effort would significantly increase in Golden Bay as WCSI set net measures became prohibitive.

MFish is unable to quantify the economic impact of the proposed 6nm closure on these fisheries but considers the following points are important:

⇒Majority of rig and school shark catches caught on the WCSI are taken by 3-5 resident commercial fishers based around the three main ports (Westport, Greymouth and Hokitika). These fishers generally operate small vessels (less than 13-15m in length) and carry up to 3-4 crew. These fishers generally operate in areas close to port on a 1-3 day basis, but some can fish further afield for up to 5-6 days. Most fishers target rig and school shark from their home port to maximise fishing efficiency (ie, reduce travel time, fuel and crew costs to a minimum).

⇒The economic return of the rig fishery has decreased in recent years as a direct result of a reduction in the SPO 7 TACC (ie, reduced from 350 tonnes to 221 tonnes at the start of the 2006-07 fishing year), as well as a voluntary quota shelving arrangement in response to concerns about overfishing.

MFish does not know the extent to which Option 3 will impact on local support businesses (eg, Licensed Fish Receivers) and invites comments.

The Minister should consider whether the marginal benefits in Option 3 outweigh the economic costs when compared with Option 2. MFish invites industry to provide information to better assess this impact.

7.6.5.3. Commercial inshore trawling

MFish proposes the following options to manage the threats of trawl fishing on the WCSI population as follows. The proposed options apply to mid-water, bottom, and pair trawl as defined in regulation 3 of the Fisheries (Commercial Fishing) Regulations 2001.

Status Quo – Existing management
Option 1 – Develop and implement a voluntary code of practice and additional monitoring of trawling inside 6nm from shore (MHW) between Cape Farewell and Awarua Point
Option 2 - All trawling is prohibited inside 2nm from shore (MHW) between Cape Farewell and Awarua Point except vessels targeting flatfish with low headline height nets, and measures as per Option 1
Option 3 – All trawling is prohibited inside 2nm from shore (MHW) between Cape Farewell and Awarua Point and measures as per Option 1

Analysis of options

Option 1

Option 1 requires the trawl fishers to develop and implement a CoP to mitigate the risk of trawling (mid-

water, bottom, and pair) on Hector's dolphins. A comprehensive monitoring programme of commercial trawl activity to assess the extent to which trawl vessels interact with Hector's dolphins would also be implemented by Government under this option. The monitoring programme would also be used to independently verify fisher compliance with the CoP.

- *Effectiveness*

This option requires fishers to adopt 'dolphin safe-fishing' practices when trawling within inshore areas. These practices could include using trawl gear that reduces the likelihood of interacting with Hector's dolphins such as low headline gear, no wing doors and low tow speed. Other measures could include fishing away from areas where dolphins are sighted or known to occur, fishing away from discoloured or murky waters, and quickly retrieving trawl gear if dolphins appear, maintaining a constant lookout when gear is deployed, and keeping tow duration to a minimum, etc. This approach accepts the use of such voluntary measures would mean trawling throughout the dolphins' range poses an acceptable risk.

MFish believes this option is only acceptable providing there is sufficient certainty that all trawl fishers will comply with a CoP. MFish invites the industry to submit information about developing a code for trawl fishing on the WCSI including how the level of compliance could be measured, and what actions could be taken on individual fishers who do not comply with specific measures. Alternatively, this option may only be acceptable if there is independent verification that fishers comply with the code and this could include the placement of fisheries observers and/or cameras on trawl vessels fishing within the dolphins' range.

- *Impacts on fishers*

The main utilisation impact of Option 1 is the requirement for trawl fishers to comply with a CoP that will require a modification to their fishing practices when fishing within 6nm from shore. Possible implications could include retrieving trawl gear when dolphins appear within the vicinity of the vessel, and this may lead to lower catch rates as a result of reduced tow duration.

If the Minister was to determine a monitoring programme was necessary to monitor compliance with the CoP and to help determine the nature and extent of residual risk to Hector's dolphins from trawling, economic impacts could potentially be significant. MFish cannot determine with accuracy the number of vessels that need to cover monitoring costs that can, for Fisheries Observers, reach up to $1000 per day. There are approximately 57 inshore trawl vessels (<46m) operating on the WCSI that may require Fisheries Observer coverage under Option 1. Fishers could potentially avoid monitoring costs by shifting effort outside 6nm and only incur the costs if wishing to fish inside 6nm. Video monitoring equipment is also an option that MFish can investigate with fishers, although installation and operating costs are also expensive (eg, around $10,000 installation and $100 per day to operate).

Option 1 will provide for greatest commercial trawl fishing along the WCSI in comparison with Options 2 and 3. Option 1 will enable commercial fishers to continue to use trawl nets in all areas but require them to more actively manage their fishing operations to mitigate Hector's dolphin bycatch.

MFish invites submissions from fishers that discuss the utilisation impacts of Option 1.

Option 2

Option 2 proposes, in addition to Option 1, prohibiting trawling (mid-water, bottom, and pair) within 2nm from shore between Cape Farewell and Awarua Point. Under this option, vessels targeting flatfish using low headline gear (<1m high) would still be able to fish within the proposed 2nm closure.

- *Effectiveness*

All known trawl-related interactions with Hector's dolphins have occurred within 2nm of the shore[160]. MFish considers that this is likely to be because there are relatively higher dolphin densities in the close inshore area (therefore increasing likelihood of interaction). Trawling in shallower waters may also present a greater risk to dolphins because there is less available water column above or below trawl gear for the dolphins to swim away from an approaching net – thereby increasing the chance of entanglement. MFish considers that vessels using a low headline height net type to target flatfish, in conjunction with proposed measures under Option 1, will pose a relatively low risk to Hector's dolphins.

MFish considers that because there is a lower density of dolphins and increased depth further offshore (combined with an apparent low level of interaction outside 2nm), risk to dolphins from trawling outside 2nm is lower than risk inside 2nm.

- *Impacts on fishers*

This option provides for some utilisation within the proposed 2nm closure as commercial fishers will still be able to target flatfish. MFish is unable to determine the effects of Option 2 on other WCSI trawl fisheries because fishers are generally not required to provide position and depth of bottom trawl information (MFish cannot determine the extent of fishing inside 2nm).

Nevertheless, MFish considers a trawl prohibition within 2nm from shore other than when targeting flatfish using low headline gear would likely have a limited impact of trawl vessels operating within the WCSI. Most of vessels working within 2nm are targeting flatfish, and typically catch a range of bycatch inshore species such as tarakihi, red gurnard and red cod. These vessels would be unaffected 2nm under this option providing low headline nets are used. While there will be additional costs of some fishers to shift effort outside 2nm, vessels will still be able to operate in most existing fisheries that typically occur in more deeper waters. MFish considers the major WCSI barracouta and red cod fisheries would still continue under this option.

MFish recognizes that mandatory gear design in the target flatfish fishery operating inside 2nm will be difficult to enforce under current compliance monitoring capacity. Additional monitoring that accompanies Option 2 (assuming the Minister chooses to monitor all target flatfish vessels) will help mitigate non compliance risk. MFish also welcomes comment from fishers on their proposals to ensure compliance with mandatory gear design should the Minister allow target flatfish fishing inside 2nm.

MFish invites submissions from fishers that discuss the utilisation impacts of Option 2.

Option 3

Option 3 proposes to prohibit all trawling (mid-water, bottom, and pair) within 2nm from shore between Cape Farewell and Awarua Point. Measures proposed under Option 1 would also apply where appropriate (ie, between 2nm and 6nm offshore between Cape Farewell and Awarua Point).

- *Effectiveness*

Proposed measures under Option 3 will give greater certainty of mitigating the risk of trawling on Hector's dolphins than Options 1 and 2.

Prohibiting trawling within 2nm effectively encompasses waters out to about 15-20m water depth in many areas and will protect a significant proportion of the Hector's dolphin population from the threat of

[160] Where the incident location is known

trawl gear.

- *Impacts on fishers*

A complete trawl prohibition within 2nm from shore would impact on a significant proportion of the WCSI target flounder fishery. This fishery is a significant component of the WCSI trawl fishery complex with annual catches ranging between 346 and 539 tonnes in the past three fishing years (2003-04 to 2005-06). During this period, the flatfish fishery had an annual 'gross' value of about $991 048, $1 491 132, and $1 754 445.

Most flatfish catches are taken in water depths less than 30 nm using low headline nets. As this fishery generally occurs within shallow waters close to shore, most target flatfish fishers would be required to shift effort outside 2nm and this is likely to have a major effect on the catch and value of this local fishery. During the 2005-06 fishing year, 48 vessels <46m caught flatfish on the WCSI. MFish is unable to quantify the extent to which these vessels could shift effort outside 2nm to continue to operate in the flatfish fishery.

As the proposed measures under this option would apply to all vessels operating within 2nm, MFish cannot determine the extent to which this will impact on local support businesses (eg, Licensed Fish Receivers).

MFish invites submissions from fishers that discuss the utilisation impacts of Option 3.

7.7. Regulatory Impact Statement

A Regulatory Impact Statement (RIS) is a Cabinet Office requirement for any policy which requires regulatory intervention. The RIS will accompany any future Cabinet paper required by the Minister of Fisheries if he decides, in consultation with the Minister of Conservation that measures are necessary to avoid, remedy or mitigate the effects of fishing related mortality on Hector's dolphins.

The Regulatory Impact Statement seeks to clearly identify rationale for management action and costs and benefits of measures proposed. As such it forms a useful more detailed executive summary of measures proposed under the Fisheries Act. Your comments are sought on the arguments and analysis of costs and benefits outlined in the Regulatory Impact Statement.

7.7.1. Executive summary

Public and Government concern over the effect of human induced mortality on Hector's and Maui's dolphins led to an initiative by DOC and MFish to develop a TMP for Hector's and Maui's dolphins. The TMP seeks to describe the nature and extent of threats to Hector's & Maui's dolphins and implement strategies to reduce human induced mortality from those threats down to levels acceptable to Government.

The draft TMP builds on material released in a discussion document in May 2007 and incorporates feedback from discussion on that document, and regional forums that were held with stakeholders. The draft TMP is comprised of three separate sections. Part I provides a broad context of the situation, and outlines a summary of draft options to treat fishing and non-fishing related threats. Section two outlines draft measures to treat fishing related threats. Section three outlines draft options to treat non-fishing related threats and includes detail on proposed marine mammal sanctuaries.

This Regulatory Impact Statement relates to measures proposed to treat fishing related threats outlined in Part II of the draft TMP.

The TMP contains a variety of options for reducing the risk of fishing related mortality. The information on the nature and extent of threats is highly uncertain. The Minister of Fisheries in consultation with the Minister of Conservation will make a final decision on whether additional measures are necessary and what measures may be required based on the level of risk of fishing related mortality the Minister considers acceptable (balance between sustainability and use) for the species as a whole and consequently for each population. MFish does not have a preferred option(s) at this stage. We are seeking information from stakeholders to help inform the Minister's determination of appropriate balance.

7.7.2. Status quo and problem

Hector's dolphins are endemic to New Zealand, meaning they are only found in New Zealand's waters. The species is divided into two subspecies (based on genetic differences), one of which occurs principally in South Island waters (Hector's dolphin), and the other in the waters of the north-west coast of the North Island (Maui dolphin).

Hector's and Maui's dolphins are inshore coastal species with a limited home range. They are most often seen in murky waters close to shore and generally live in small groups – usually three to five individuals but larger groups (up to 30-40 individuals) are sometimes seen.

Both species are short lived (about 20 years), have a low reproduction rate (calving every 2-3 years) and have late onset of sexual maturity (7-9 years). These biological factors result in a low overall maximum population growth rate, meaning that Hector's and Maui's dolphin can be threatened by even low levels of human-induced mortality.

Hector's dolphin is considered to be one of the world's rarest dolphin species. Following their decline in numbers, the Minister of Conservation declared Hector's dolphins as a "threatened species" in 1999 and further classified the species as "nationally endangered" in 2003. The South Island Hector's dolphin is ranked as nationally endangered by DOC and endangered by the World Conservation Union (IUCN), and is estimated to number around 7270 individuals. The North Island Maui's dolphin, with an estimated population size of about 111 individuals, is ranked as nationally critical by DOC and critically endangered by the IUCN.

There is uncertainty over trends in population size. South Island and West Coast North Island populations indicate local group differences or loss of genetic diversity due to local group decline.

Government have a general policy position that threatened species numbers should be increased to reach non-threatened status. However in the absence of a Population Management Plan issued under the Marine Mammal Protection Act there is no legislative obligation in other legislation, including the Fisheries Act to require such a rebuild to occur.

There has been general public concern regarding the impact of human induced mortality on the Hector's and Maui's dolphins. This has been evidenced by petitions to Parliament and proposed management strategies from Non-Governmental Organisations and significant amounts of correspondence to Ministers regarding the impact of human induced mortality on the Hector's and Maui's dolphins.

There are a number of actual and potential threats facing the dolphins, including fishing related mortality (for example, through net entanglement), boat strike, pollution, disease, mining and tourism impacts. Some of these threats are a direct cause of dolphin mortality, whereas others may impact on the population through sub-lethal impacts (for example, reducing reproductive success).

Hector's and Maui's dolphins have a close inshore distribution, which results in an overlap with commercial and amateur set net fisheries, as well as inshore trawl fisheries. Review of reported mortalities of Hector's and Maui's dolphins indicates that entanglement in set nets poses the greatest risk of human induced mortality to the dolphins. Trawl fishing also poses a risk to dolphins but review of reported mortality information indicates the risk posed to dolphins is significantly less than that posed by set netting. Overall, the nature and extent of fishing related impacts is highly uncertain due to poor information on level of mortalities which is linked to low observer coverage of fishing and poor incentives to voluntarily report incidents.

A mix of spatial and temporal controls are in place to mitigate the impacts of fishing on specific populations of Hector's and Maui's dolphins. The effectiveness of current management controls is difficult to quantify because of the lack of monitoring and suspected low levels of voluntary reporting.

No confirmed incidents of fishing related mortality of Maui's dolphins have been recorded since measures were introduced in 2003. However, the population of Maui's is small (about 111). Scientific information suggests the population cannot sustain one human induced mortality and rebuild. Set net poses a known risk to dolphins. Trawling also poses a lesser but known risk. Use of set nets was banned from the West Coast North Island in 2003 (from an Area just North of the Kaipara Harbour through to an area just North of New Plymouth. Harbours (with the exception of the entrance to the Manakau Harbour) within this area were not included in the set net prohibition. It is uncertain the extent to which dolphins use the harbours within the closed area. The question for the Minister is whether the risk of set net use in Harbours and South of the existing closed area is sufficient to warrant further management measures on this method and whether the risk of trawling within the dolphins habitat is sufficient to warrant measures impacting on this method.

There have been 36 confirmed incidents of fishing related mortality of Hector's dolphins from the East Coast South Island population since the marine mammal sanctuary was introduced in 1988. No mitigation measures are in place for the West Coast population.

The effect on fishing related mortality on the South Island Hector's populations is uncertain because the nature and extent of fishing related mortality is poorly estimated as is trend in the populations and species numbers overall. As noted, there is some evidence of overall population decline at a species level as well as within individual populations. The extent of this decline and how much of the decline, if any, can be attributed to the effects of fishing is unknown. However, the effects of fishing are the greatest cause of human induced mortality to the dolphins overall.

In general terms the effect of fishing varies between populations due to levels of fishing effort and mortality and population size. The effect of fishing related mortality is likely to be greatest on populations that are small because the level of mortality they can sustain will be less. However, again, the extent of this risk depends on the true level of mortality and the size of the population. For the South Island populations the smallest population is the South Coast South Island Hector's (population size uncertain but several hundred animals at the most) followed by the East Coast and West Coast population.

Desire to consider whether the status quo level of risk of fishing related mortality is appropriate stems from:

- ⇒Biological characteristics, population status and trends of Maui's and Hector's dolphins
- ⇒Increased public awareness and general societal trends toward being more risk averse in relation to human impacts on vulnerable species
- ⇒Government concern over the status and trends of Hector's and Maui's dolphins including overall desire to rebuild threatened species
- ⇒Information (scientific and anecdotal) indicating that fishing is the biggest known cause of human induced mortality of Hector's and Maui's dolphins.

Risk, or residual risk (after implementation of specific measures to mitigate fishing related mortality) of fishing related mortality exists for each of the Hector's populations. Whether it is necessary to take further measures to avoid, remedy or mitigate the impacts of fishing related mortality on Hector's dolphins is uncertain. The nature and extent of fishing related impacts on the population is uncertain and risk from fishing varies depending on the size of the population and extent of fishing activity. MFish does not consider the Minister is obliged to take any action. However, he has the discretion to take action if he considers it necessary to do so, on the basis that the risk of fishing related mortality is considered unacceptable either in relation to a specific population (i.e Maui's) because the population size is small and consequence of impact is high or to the species as a whole.

7.7.3. Objectives

The objectives of the process are to:

- ⇒Ensure the long term viability of Hector's and Maui's dolphins is not threatened by human activities; and

- ⇒To further reduce impacts of human activities as far as possible, taking into account advances in technology and knowledge, and financial, social and cultural implications.

In considering the degree to which fishing related mortality is reduced Minister will need to determine an acceptable level of residual risk (if any) of fishing related mortality to the Hector's dolphins.

7.7.4. Management options

MFish has developed a range of options to avoid, remedy or mitigate the effects of fishing-related mortality on Hector's and Maui's dolphins for inclusion in the draft TMP. These options are outlined in Table 1.

Options have been developed for each of the four populations of Maui's and Hector's dolphins because the nature and extent of fishing related mortality varies between populations. However, the Minister will also be making a decision at a species level in considering impacts of measures across populations.

Options have been developed to address each threat (fishing method) which has been identified as creating a risk of fishing related mortality. There are three broad mitigation options for each threat. Only two options are provided for drift netting because risk of this option is considered less than for other methods and the range of options is less given the specific nature of problem (very localised use). The options are categorised by their ability to reduce risk of fishing related mortality caused by each threat and cost to fishers. The nature and extent of each threat varies between method and between populations. The range of options form a matrix. The Minister is able to choose different options for each threat and for each population. The Minister could also choose to transition the implementation of various options which would impact on the risk of fishing related mortality over time. The Minister's decision will be based on the level of risk of fishing related mortality (balance between sustainability and use) the Minister considers appropriate for the species as a whole and for each individual population.

Status quo will not reduce the risk of fishing related mortality from the threat. This option would be chosen by the Minister if he considers the existing level of fishing related mortality based on best available information was acceptable, and/or the risk of fishing related mortality from that threat was acceptable.

The discussion below elaborates on the matrix of options for trawl and set net mitigation which create the highest risk of fishing related mortality to dolphins.

Option 1

Option 1 (lower cost measures) will not reduce the risk of fishing related mortality from the threat significantly. The measures proposed under Option 1 will allow the method creating a risk of fishing related mortality to continue to be used subject to a set of restrictions which vary between populations. This option will result in the greatest residual risk of fishing related mortality of dolphins (risk after application of additional measures). The actual level of residual risk is unknown. Whether the level of risk/mortality is acceptable will be based on a determination of acceptable risk by the Minister. Views on the level of acceptable risk are being sought from stakeholders as part of the consultation process.

Over 150 trawl and set net vessels operate within the areas covered by the TMP. The range of measures proposed under Option 1 will impose lower cost on fishers relative to other mitigation measures proposed under options 2 and 3. The actual cost of measures will vary based on measures proposed for each population and threat. Option 1 (in most areas) includes additional commercial fishery monitoring to gather information on the nature and extent of interactions between fishing and dolphins. Option 1 also places limitations on how amateur fishers can fish (eg, prohibited overnight fishing, mandatory net attendance). Whilst not as onerous as prohibiting fishing, monitoring is costly (eg, fisheries observers cost $800 to $1000 per day). With over fifteen thousand vessel days last year in the trawl and set net fisheries encompassed by the TMP, potential costs are high (costs will depend on the level of monitoring the Minister deems necessary). Amateur fishers can still utilise fisheries resources under Option 1 albeit the flexibility to do so, the experience gained, and total recreational catch, will probably decrease. Option 1 on WCNI is slightly different than other areas in that it involves set net prohibitions in two harbour entrances and at Port Waikato that will limit access to important WCNI fisheries including rig, grey mullet, and kahawai. MFish is seeking additional information from stakeholders as part of consultation to aid in a better determination of cost implications of this and other options.

The Minister would choose the measures under this option if he considered the degree of risk/residual risk of fishing related mortality did not require significant reduction from the status quo but that some additional measures were necessary. If this option was chosen the Minister is implicitly willing to accept

a degree of residual risk slightly reduced from the status quo from a fishing method to a population and the species as whole.

Option 2

Option 2 (medium cost-medium risk reduction measures) will reduce the risk of fishing related mortality for the threat to a greater degree than those measures proposed under Option 1 based on a range of spatial and temporal measures designed to restrict fishing effort by methods which pose a risk to Hector's dolphins. The amount that risk of fishing related mortality is reduced will depend on the measures chosen.

All the measures outlined under Option 2 continue to provide for use of the fishing method that poses a risk of Hector's dolphin fishing related mortality. There is therefore a residual risk of mortality remaining under Option 2 measures. The degree of risk is unknown but will be less than for measures proposed under Option 1.

The cost of measures under Option 2 is greater than those measures outlined under Option 1 because they impose greater restriction on use of methods. Under Option 2, set netting and trawling is prohibited within 2nm or 4nm of most of the South Island coast. Option 2 enables the Minister to relax the trawl prohibition for vessels targeting flatfish, and relax the set net prohibition at certain times of the year for certain species in designated areas. The WCNI is broadly subject to the same trawl prohibition as the South Island but commercial and amateur set netters (set netting is already prohibited along much of the WCNI coast) are instead subject to restrictions on how they can fish (eg, prohibited overnight fishing, mandatory net attendance). The threat management options are cumulative so the Minister can also impose monitoring and other costs as per Option 1.

Option 2 will limit access to New Zealand's main commercial inshore target fisheries including flatfish, butterfish, moki, red gurnard, tarakihi, trevally, leatherjacket, elephant fish, kahawai, snapper, red cod, and some shark species (particularly rig and school shark). MFish cannot determine with accuracy the number of vessels, fishers, and catch that might be impacted if the Minister chose Option 2 because fisher reporting requirements are not aligned with the threat management options. Fishers predominantly report catch based on Quota Management Area (QMA). Measures proposed under this option cover a smaller spatial scale than the QMA. However, over 150 trawl and set net vessels operate over the area covered by the TMP, most of which target the main inshore target species. Some vessels may be able to fish further offshore from the Option 2 prohibitions (eg, vessels targeting sharks and deeper water species) but MFish expects some inshore fisheries may become less viable using methods covered by the prohibition.

Option 2 will limit access to inshore set fisheries for most recreational fishers because they do not typically have the capability (vessels and gear) to fish in deeper water. MFish cannot quantify the impact but considers most recreational set netting will be precluded except where provided for by the Minister (ie, Option 2 includes the potential for to relax the prohibition in certain places at certain times of year). MFish considers WCNI fishers will be most affected because the harbour fisheries support large and important recreational fisheries.

The actual cost of the measures proposed is uncertain and MFish is seeking more information from stakeholders on the impact of measures under this option.

The Minister would choose the measures outlined under Option 2 if he considered risk of fishing related mortality should be reduced by more than those measures proposed under Option 1, but did not think that a total ban on use of methods which pose a risk of fishing related mortality was warranted.

Option 3

Option 3 (high cost-high risk reduction measures) contains measures which will reduce risk of fishing related mortality from each threat the most from the status quo. These measures impose spatial prohibitions on the use of methods which create risk of fishing related mortality of Hector's dolphins. Restrictions on the use of set nets cover the range of each dolphin population under this option. Restrictions on trawl fishing cover the inshore areas where risk of interaction between trawling and dolphins is greatest. There will be some residual risk of fishing related mortality remaining from trawl fishing. The degree of residual risk cannot be quantified but MFish considers it to be small. MFish considers residual risk of fishing related mortality from set net fishing is removed.

The cost of measures proposed under Option 3 will be highest because fishing using methods which pose a threat of fishing related mortality will be reduced by the greatest amount. Option 3 prohibits trawling inside 2nm on the ECSI, SCSI and WCSI, and inside 4nm on the WCNI. Set netting is prohibited inside 12nm in all areas considered by the TMP. The largest set net fisheries in the areas considered in the TMP – rig, school shark, mullet, butterfish, and flatfish – will only remain viable along the coast outside prohibited areas (areas offshore from the prohibition are unlikely to support large set net fisheries for these species). MFish expects a large proportion of the value will be removed from these fisheries.

The WCSI has approximately 12 set net fishers catching around 140 tonne of fish, the SCSI 11 set netters catching over 550 tonnes of fish, the WCNI 119 set netters catching over 1000 tonnes of fish, and the ECSI 62 set netters also catching over 1100 tonnes of fish. Port pricing information and catch estimation indicates the set net fishery considered in the TMP returned $5.85 million in the last fishing year (over 40% of the return came from the WCSI and most of that from WCSI harbour fisheries). MFish cannot quantify what proportion of that return would be captured by Option 3 but considers it would be more than would be captured by Option 2 or Option 1. In some areas ability to harvest certain species (especially butterfish) will may be significantly affected. There are no known alternative methods to harvest this species in commercial quantities.

Potential costs to the trawl fishery are more difficult to estimate because most of the trawl vessels that are encompassed by the TMP could target fish outside 2nm around the South Island and 4nm on the WCNI. However, MFish acknowledges that fishers will need to shift effort to recover a large proportion of the trawl catch no longer catchable inside the prohibition. The target flatfish fishery is probably not viable much further offshore than 2nm while other key target fisheries (eg, snapper, elephant fish, and tarakihi) will be more difficult to catch.

Actual costs are uncertain and will vary between each population. MFish is seeking more information for stakeholders on the costs of this option.

There are two drift net threat management options in the TMP. The second option closes a larger proportion of Port Waikato to drift netters than the first option. MFish cannot quantify the relative cost between the two options apart from to note that Option 1 provides for some residual drift net fishing. There is a maximum of four drift netters operating in Port Waikato catching a maximum between 30-50 tonnes of mullet (although some of this catch may come from areas outside Port Waikato) that would be affected by the TMP drift net options.

The Minister would choose the measures outlined under Option 3 if he wished to reduce residual risk of the threat down to low levels either for a particular population or the species as a whole.

Costs noted above are worst case scenarios assuming prohibitions on both trawl and set nets are implemented. Actual costs will vary depending on options chosen and ability of fishers to shift effort and change methods. MFish also notes that the value estimation technique relied on port price and estimated catch data that is often considered unreliable. Socio economic research currently underway will give a better estimation of costs associated with each TMP option.

7.7.5. Implementation and review

Government has indicated a desire to have any measures necessary to reduce risk of fishing related mortality in place before the end of 2007. In order to meet this timetable the intention is to implement any measures considered necessary first by Gazette Notice under section 11 of FA96. It is intended that such measures would be replaced by regulations as soon as possible in 2008.

MFish and DOC are developing a communications plan which involves decisions being publicized via a letter from the Minister to any affected fishers and interested stakeholder groups, magazines and news paper articles along with development of posters for use in areas covered by any amended regulations.

Depending on the options agreed to by Ministers, increased levels of monitoring (via observer coverage and electronic monitoring) and research are proposed to enable ongoing analysis of effectiveness of measures. The actual costs of monitoring will be determined following decisions by Ministers and analysis of residual risk to fishing related mortality following implementation. Further analysis will also be needed on the level of monitoring required to ensure effective coverage of fishing using methods which risk dolphin mortality. MFish note in general terms, given the infrequent interaction between fishers and dolphins, high levels of coverage may be required to ensure statistical robustness of monitoring information at a fishery level.

8. PART III - MARINE MAMMAL SANCTUARY PROPOSALS

8.1. Purpose of the Marine Mammal Sanctuary Proposals

The purpose of the proposed marine mammal sanctuaries is to fulfil the goals, management objectives and vision statement of the Hector's Dolphin TMP.

Specific Marine Mammal Sanctuary Objectives:

⇒To protect key sites in New Zealand waters of significance to Hector's dolphins including the subspecies Maui's dolphin.

⇒To maintain or restore the distribution and abundance of Hector's dolphins, including the subspecies Maui's dolphin, in New Zealand waters.

⇒To achieve self sustaining populations of Hector's dolphins, including the subspecies Maui's dolphin, throughout their natural range.

⇒To significantly reduce or eliminate human related threats to Hector's and the subspecies Maui's Dolphin throughout their range.

8.2. Marine Mammal Sanctuary Site Selection

The following sites are proposed for their importance to regional populations of Hector's and subspecies Maui's dolphins. The proposed sites represent areas of significant dolphin habitat along the West Coast of the North Island, central New Zealand, Canterbury and Southland. These areas are also strongholds for Hector's dolphins and cover the whole range and a buffer zone for Maui's dolphins. They also provide habitat for a range of endangered marine mammals e.g. New Zealand Fur Seal, New Zealand Sea lions and Southern Right Whales. Clifford and Cloudy Bay are important routes for migrating Humpback whales.

8.3. Proposed Fisheries Restrictions

Proposed measures to control fishing activity within the Hector's Dolphins range will be considered by the Minister of Fisheries following consultation with the Minister of Conservation. The proposed measures are outlined in Part II of this document. MFish and DOC have a preference for putting in place consistent measures which cover the range of the dolphins for compliance and effectiveness reasons. Accordingly, the proposed measures will cover geographical areas which overlap with preliminary proposals for marine mammal sanctuaries. DOC has developed preliminary proposals for marine mammal sanctuaries.

Of the options set out in Part II of this document which could overlap with any proposed MMS areas, DOC has a preference for the range of measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

8.4. Fishing methods allowed

All fishing methods that do not pose a threat to Hector's or Maui's dolphins are not under consideration for possible restrictions. These include all line fishing (rod and line, surf casting, Kontiki, long line), spear fishing, potting, scoop netting and drag netting.

8.5. Process to establish marine mammal sanctuaries

DOC has the responsibility to manage marine mammals in accordance with the Marine Mammals Protection Act 1978, Marine Mammals Protection Regulations 1992 and in line with Conservation General Policy.

The purpose of the Marine Mammals Protection Act is to "make provision for the protection, conservation and management of marine mammals within New Zealand and within New Zealand Fisheries waters".

Under the Marine Mammals Protection Act 1978 the Minister of Conservation may, by way of a gazette notice, define any place to be a marine mammal sanctuary. Submissions on any proposed sanctuary can be received up to 28 days following the publication of the notice. Where any other Minister of the Crown that has the control of any Crown-owned land, foreshore, seabed, or waters of the sea which is declared to be a marine mammal sanctuary or which forms part of one, the consent of that Minister to the declaration needs to be notified concurrently with any notice given by the Minister of Conservation under section 22 of the Act. The Minister of Conservation must then consider any written submissions he has received within the 28 day period. The Minister must then by notice indicate his intention to vary, redefine, or abolish the sanctuary if any submission is upheld. After taking into consideration any submissions during the 28 period and no submissions are upheld then the marine mammal sanctuary will take effect.

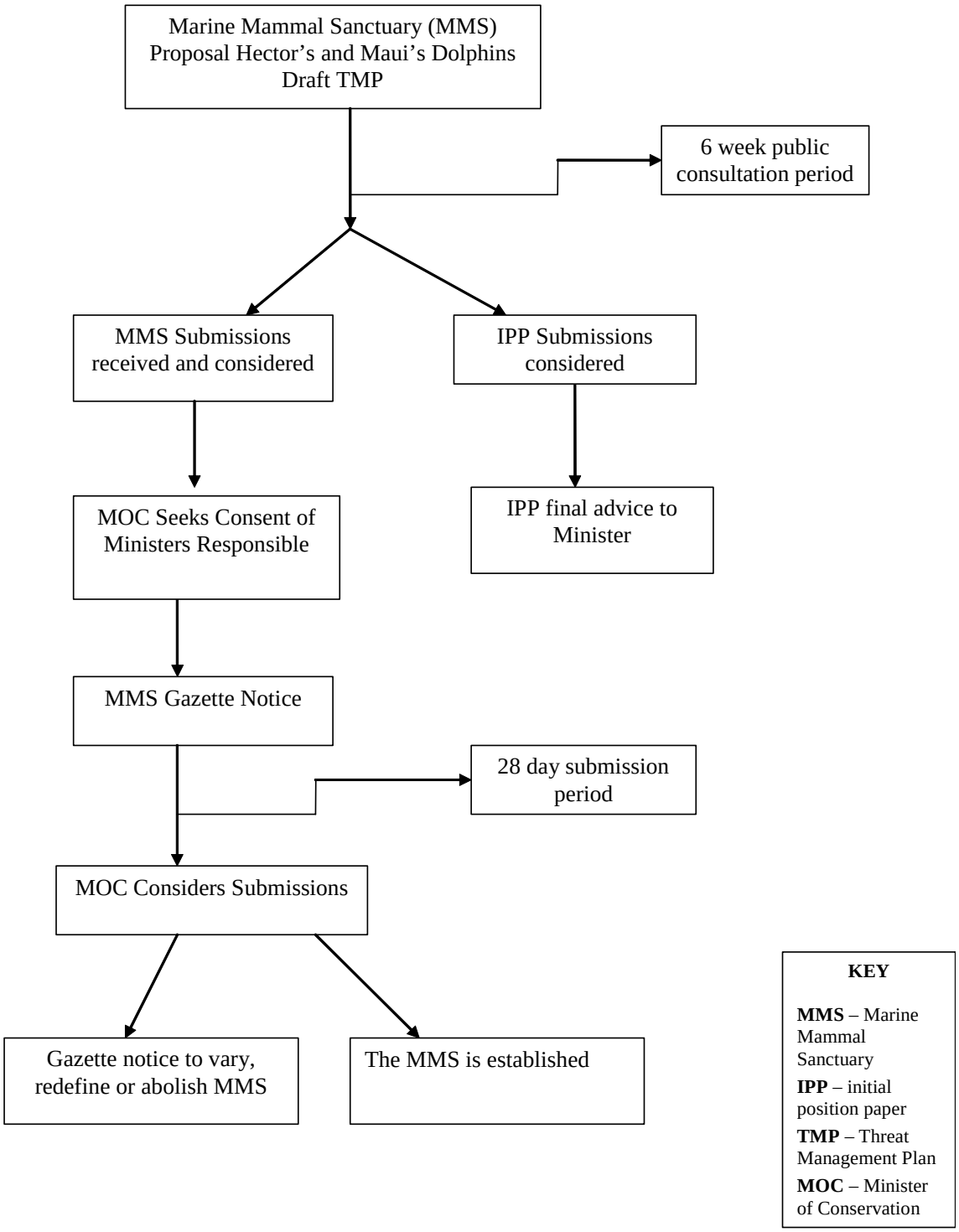


Figure 4 Marine Mammal Sanctuary process.

8.6. Multiple marine mammal sanctuary proposals

The following proposed sanctuaries will be notified in the gazette under one notice.

8.6.1. West Coast North Island proposal

8.6.1.1. Area description

The area from Maunganui Bluff to Oakura Beach contains a huge variety of coastal and marine habitats, from long sandy beaches to enclosed harbours. The exposed sandy beaches are intersected by rocky shores and dramatic cliffs, and some beaches are backed by high foredunes. A number of rock stacks and small islands are located in this area, as well as sea caves and rock arches.

The Westland and West Auckland currents are the key hydrographic features of this coast and the coast is exposed to the wind and swells primarily from the south west, although the coast east of New Plymouth does receive some shelter from Cape Egmont. The coast north of Cape Egmont is high energy coast, with waves of 1.5 to 2.5 m on average.

There are a number of large harbours along this coast, including Kaipara, Manukau, Raglan, Aotea and Kawhia Harbours. In addition, the Waikato River flows into this area, with the river mouth forming a large delta, with an extensive network of small islands. The harbours contain a range of habitats, including sandflats, mangrove forests, wetlands and dune lakes. They are important areas for not only a range of shore and estuarine birds, but a variety of other coastal and marine species. For example, they are known to be important foraging and breeding areas for a number of fish species.

The world's Maui's dolphin population is centred on this area of New Zealand. There are also a number of New Zealand fur seal haul outs in this area, primarily on the rocky headlands and islets.

8.6.1.2. Proposed boundaries

The proposed boundaries for the marine mammal sanctuary (Map 21) extend longshore from Maunganui Bluff in Northland to Oakura Beach, Taranaki in the south. The sanctuary's offshore boundary extends from MHW to the 12-mile limit. The total area of the sanctuary is approximately 1,200,086 hectares covering 2,164km of coastline.

8.6.1.3. Current restrictions

The area between Maunganui Bluff and Pariokariwa Point is currently closed to all commercial and non-commercial set netting.

Much of the area is closed to commercial trawling and Danish seining, out to one nautical mile from the coast. In addition, trawling and Danish seining are prohibited from Kawhia Harbour, Aotea Harbour, Raglan Harbour, Manukau Harbour, Kaipara Harbour, Waikato River mouth and adjacent seas within 2nm. There is also a voluntary trawl agreement in place requiring vessels to not trawl within 2nm from shore between Awakino River and Port Taranaki.

8.6.1.4. Proposed restrictions

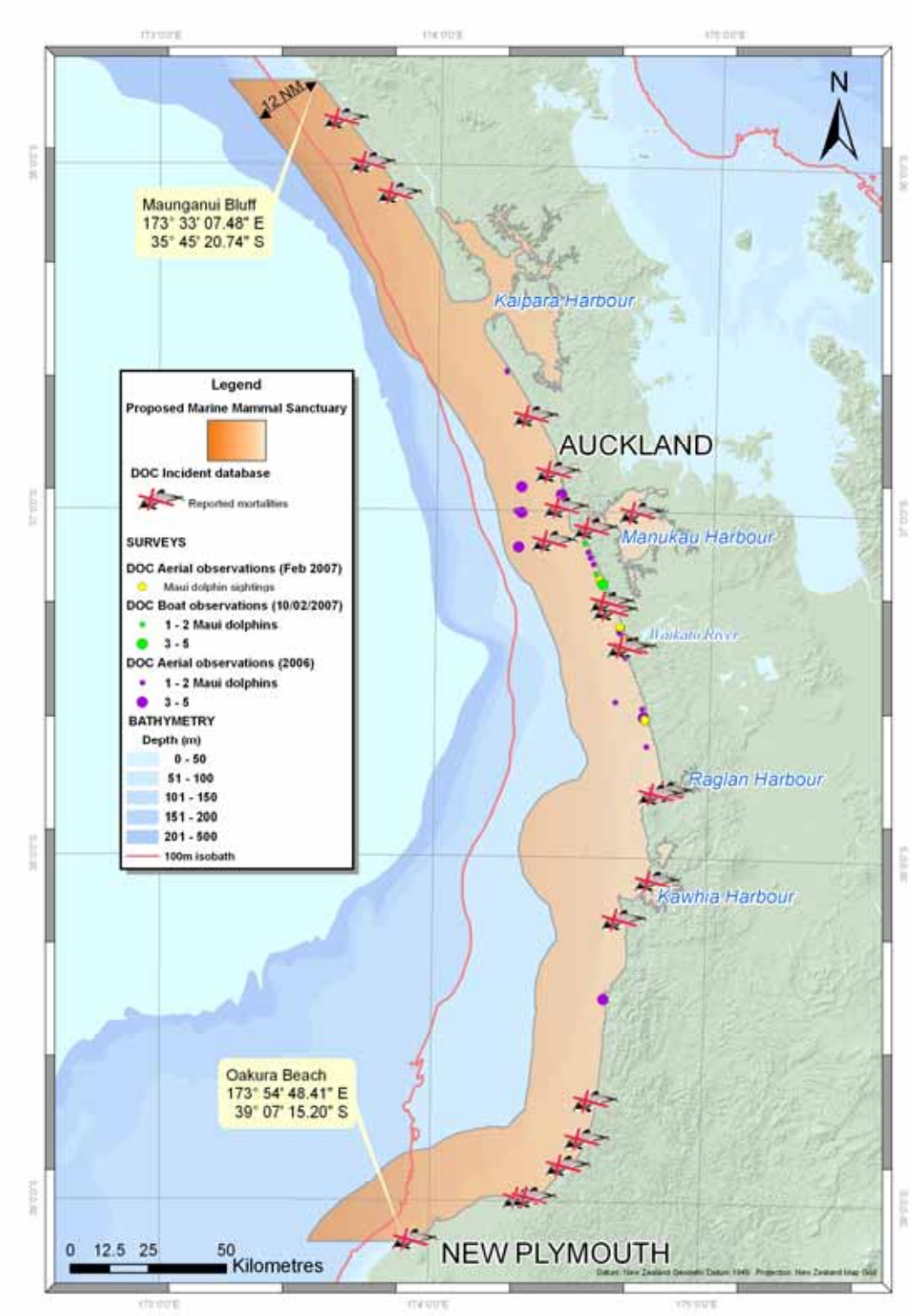
Fishing related – preferred option

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Non-fishing related

⇒Implement non-fishing related mitigation national actions as a matter of priority.

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.



Map 21: Proposed boundaries of the West Coast North Island Marine Mammal Sanctuary.

8.6.2. Clifford and Cloudy Bay

Located at the northeastern tip of the South Island, east of the Marlborough Sounds, Cloudy Bay is a large, shallow-sloping embayment with sand and gravel beaches, extending offshore into sand, mud and gravel. Cloudy and Clifford Bays are influenced by weather and tidal patterns from the Cook Strait and both bays are also exposed to weather from the northeast. The sediment-laden freshwater from the Wairau and Awatere Rivers and erosion of the soft rock characterising the coast results in very poor water clarity.

Reefs in the vicinity of Port Underwood and Cape Campbell support relatively diverse communities of algae and encrusting invertebrates, including mussels. The fish community is comprised of both warm and cold temperate species. Bivalve molluscs and mobile epifauna are common in the adjacent soft sediment areas.

A diverse shorebird fauna occurs in this area, with a significant feature being the presence of a breeding colony of royal spoonbills. A variety of seabird species also frequent the area. Clifford and Cloudy Bays support the largest population of Hector's dolphins in the Nelson/Marlborough region. Humpback whales and southern right whales migrate through the area and orca and bottlenose dolphins are also occasional visitors. Cloudy Bay was historically an important calving area for southern right whales and was also the centre of shore whaling for this species in the early-mid 1800s.

8.6.2.1. Proposed Boundaries

The proposed boundaries for this sanctuary extend from Cape Campbell to a point 12 miles offshore in a direct line to Tory Channel. The area of the proposed sanctuary is approximately 142,716 hectares covering 338km of coastline (Map 22).

8.6.2.2. Proposed Restrictions

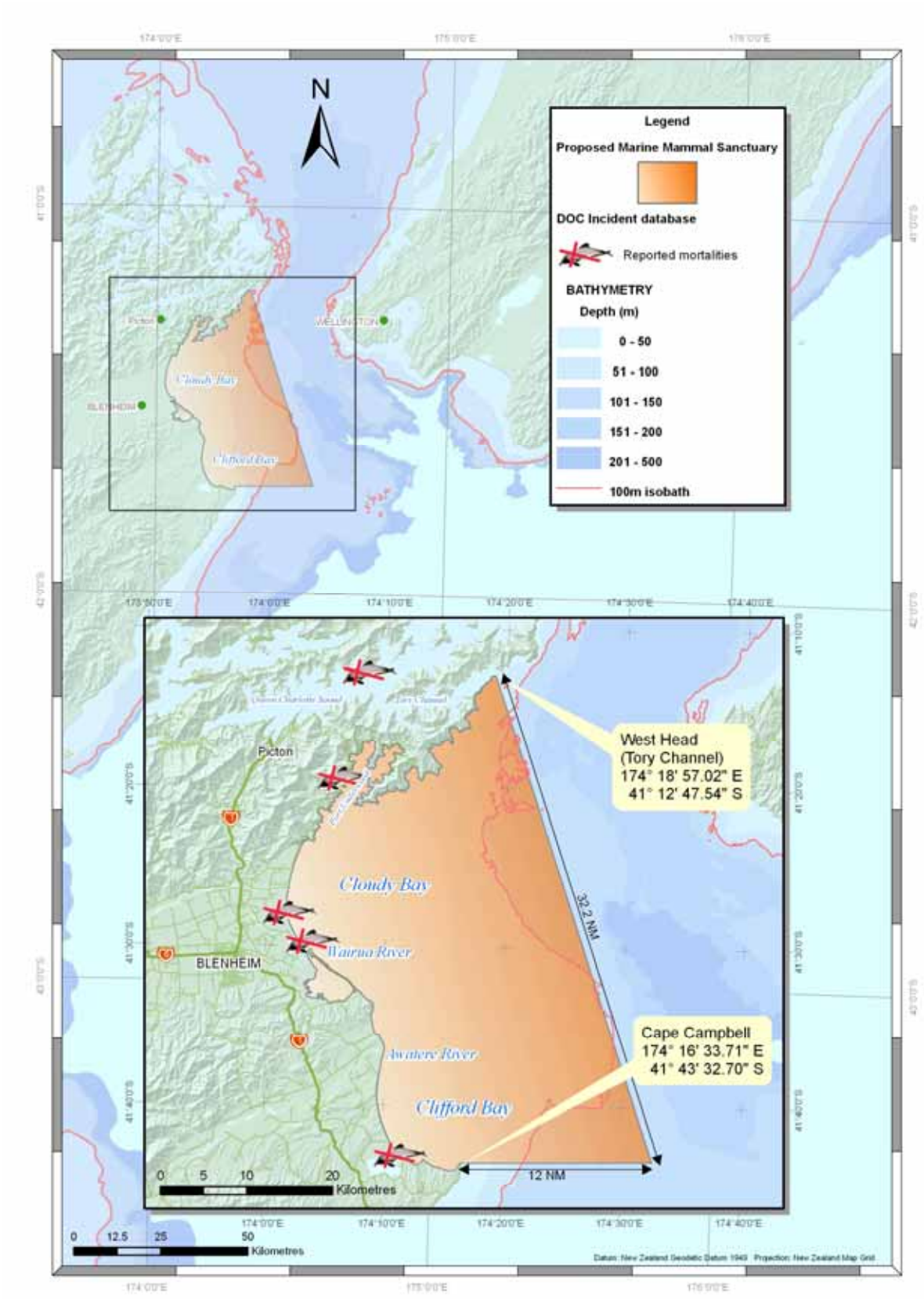
Fishing related

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Non-Fishing

⇒Implement non-fishing related mitigation national actions as a matter of priority.

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.



Map 22: Proposed boundaries of the Cloudy and Clifford Marine Mammal Sanctuary.

8.6.3. Banks Peninsula Marine Mammal Sanctuary Alterations

Banks Peninsula is a prominent feature of the Canterbury coastline and is characterised by harbours, small bays, exposed rocky headlands and cliffs. Strong tide-generated currents, the Southland Current and weather from the southeast, east and northeast are the primary influences on local hydrographic conditions. North and south of the Peninsula, the seabed is shallow-sloping, but the southeastern-most margin of the Peninsula is relatively steep, dropping into 40 metres depth within 1 nautical mile of the shore.

The harbours of Banks Peninsula (Lyttleton Harbour, Port Levy, Pigeon Bay and Akaroa Harbour) have steep-sided rocky shores, with estuaries / saltmarshes at their heads. Lytteton and Akaroa Harbours both contain tidal mudflats. Beyond the harbours, the shallow reefs are dominated by giant kelp and bull kelp, with a variety of other algae and associated species extending subtidally.

The area around Banks Peninsula supports a large population of Hector's dolphins and this species is present in Akaroa Harbour during the summer months. New Zealand fur seals occur on many of the Peninsula's rocky outcrops. Colonies of yellow-eyed penguins, little blue penguins, spotted shags, black-backed gulls and red-billed gulls are located on the Peninsula and a variety of other seabird species frequent the area.

8.6.3.1. Current Restrictions

The Banks Peninsula Marine Mammal Sanctuary was established in 1988 and covers an area of 113,113 hectares from Sumner Head to the Rakaia River, out to 4nm offshore. Set netting is currently restricted in the area by a combination of Fisheries and Marine Mammal Sanctuary rules.

Trawling is banned in Pegasus Bay and there is also a seasonal closure in the Banks Peninsula Salmon Conservation Area. Seasonal closures also exist around several river mouths. Additional voluntary restrictions also exist.

A total fishing ban exists within the boundaries of the Pohatu Marine Reserve, at Flea Bay.

8.6.3.2. Alterations to existing sanctuary boundaries

The proposed alteration will extend from the existing southern boundary to the Rakaia river towards a seaward boundary at the 12-mile limit and north along the shore to the Waipara River. The area of the altered sanctuary will encompass approximately 413,000 hectares and cover 389.31km of coastline (Map 23).

8.6.3.3. Alterations to Existing Restrictions

The existing fishing related restrictions will be abolished and replaced by options under the Fisheries Act. This will better allow for a consistent approach to the fisheries rules within the region.

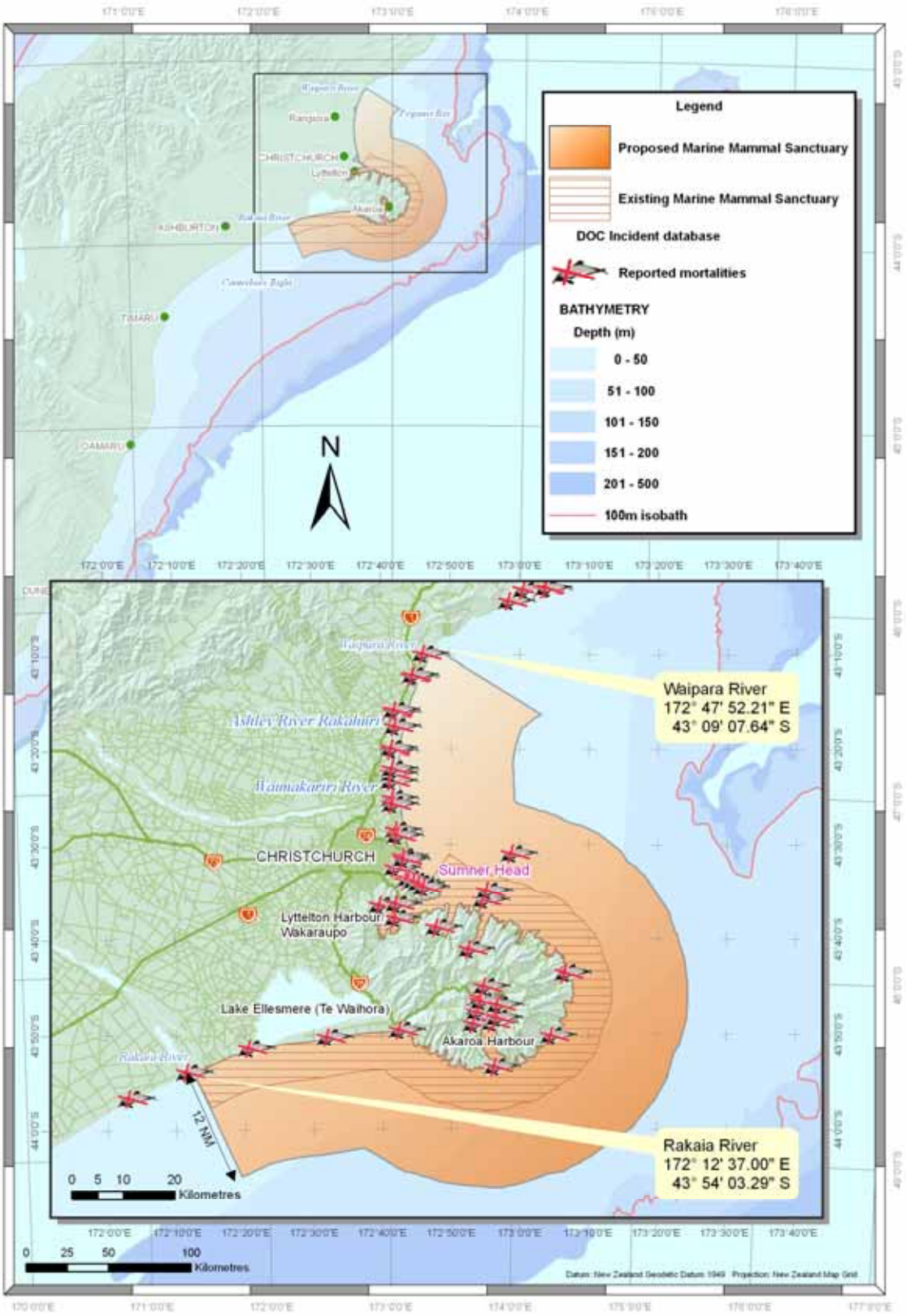
Fishing – preferred option

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Non-Fishing

⇒Implement non-fishing related mitigation national actions as a matter of priority.

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.



Map 23: Proposed Alterations to Banks Peninsula Marine Mammal Sanctuary

8.6.4. Catlins Coast

The Catlins coast, east of Invercargill on the Southland coast, is renowned for its rugged, exposed reefs and cliffs, which are interspersed with sandy beaches and small estuaries. The coast is exposed to wind and swell from the south and is also influenced by the Southland Current.

The seabed slopes steeply around the numerous headlands in the area, but is more shallow-sloping in the bays between headlands. The subtidal reef communities are characterised by extensive beds of bull kelp, extending into *Lessonia variegata* forests with a diverse foliose red algal understorey. Beyond the reefs, the seabed is comprised primarily of fine sand and broken shells, with some gravel in areas further offshore.

This area supports populations of several penguin species, including the yellow-eyed penguin. Marine mammals are also a conspicuous feature of the coastal and marine environment. New Zealand fur seals, sea lions and elephant seals, and a population of Hector's dolphins inhabit the area.

8.6.4.1. Proposed Boundaries

The proposed boundaries extend from Brother's Point offshore 5 miles to a point 6.9 miles offshore to Bushy Point Beacon. The proposed sanctuary is approximately 65,967hectares and covers 161km of coastline (Map 24).

8.6.4.2. Current Restrictions

There are currently no restrictions in place, but a long-standing agreement exists amongst local fishers to not set nets in the vicinity of Porpoise Bay.

8.6.4.3. Proposed Restrictions

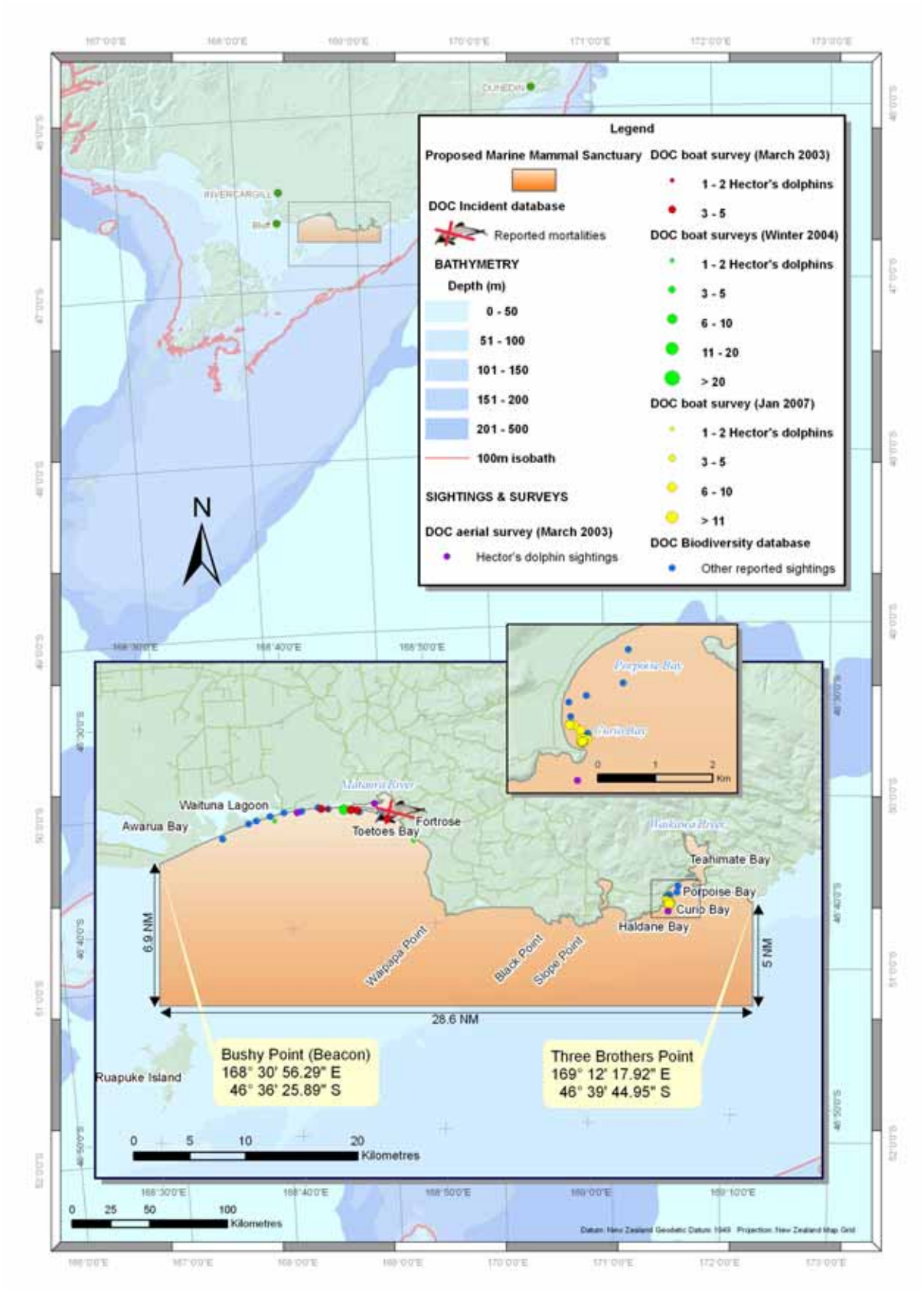
Fishing – preferred option

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Non-Fishing

⇒Implement non-fishing related mitigation national actions as a matter of priority.

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.



Map 24: Proposed boundaries of the Catlin's Marine Mammal Sanctuary.

8.6.5. South Coast - Te Waewae Bay

Te Waewae Bay, located on the Southland Coast, is a large embayment stretching approximately 30 km between Sand Hill Point to the west and Pahia Point to the east. The bay is comprised of a range of soft shores, including gravel, cobble, boulder and sandy beaches. The Waiau River is the major river flowing into the bay, inputting a significant amount of fresh water into the marine environment. At the mouth of the Waiau River, a shingle bar exists, forming a lagoon. Strong tidal currents also influence the area, in addition to flow from the Southland Current.

The seabed of Te Waewae Bay is shallow sloping, extending up to approximately 30 metres depth. The seabed is composed of fine sand and clay. The benthic fauna of the soft sediment habitat includes beds of bivalve molluscs, including the Bluff oyster. Mid Bay Reef, comprising two small pinnacles, is located approximately 5km east of Sand Hill Point and rises from a depth of around 30 metres, with the northern pinnacle breaking the surface.

Marine mammals are a conspicuous feature of the bay, with pods of Hector's dolphins regularly observed in the area. The area is also frequented by southern right whales, with recent observations of breeding activity. New Zealand fur seals haul out on beaches around the Southland coast, including Te Waewae Bay. The Southland coast, including the small islets, is known to be an important area for roosting and breeding sea birds, including red-billed gulls, little shags, spotted shags, blue penguins and white-fronted terns.

8.6.5.1. Proposed Boundaries

The proposed boundary of the proposed Te Waewae Bay Sanctuary is a line from Pahia point to Sand Hill Point. The area covers approximately 35,906 hectares and 112.93 km of coastline (Map 25).

8.6.5.2. Current Restrictions

Mandatory interim measures are currently in place, which require non-commercial set netters to stay in attendance with their nets while set.

8.6.5.3. Proposed Restrictions

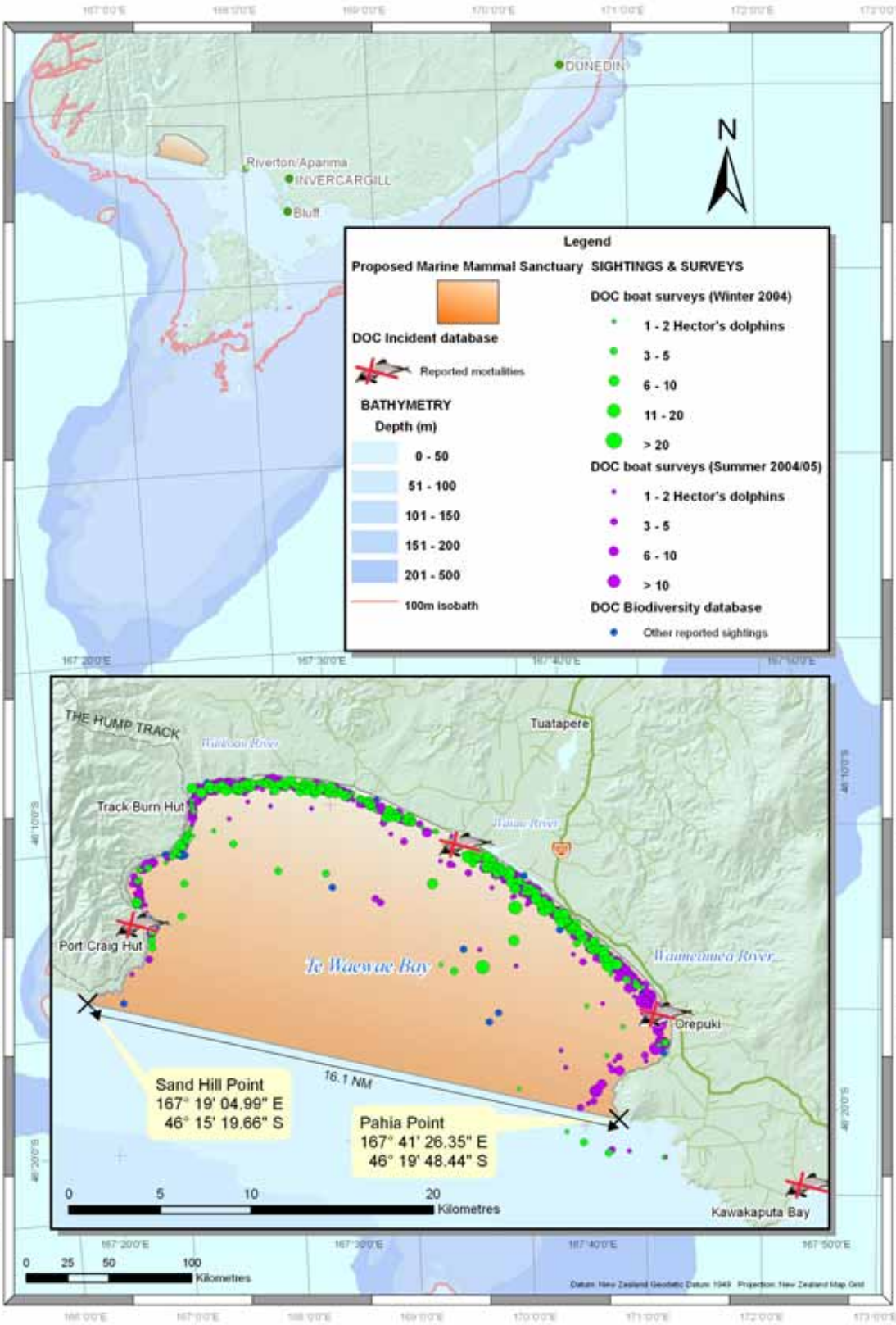
Fishing – preferred option

DOC has a preference for measures that reduce the likelihood of fishing related mortality to the lowest level possible. DOC considers these measures to be those most consistent with the intent of the MMPA and the objectives for the proposed MMS set out at the start of this section.

Non-Fishing

⇒Implement non-fishing related mitigation national actions as a matter of priority.

⇒Marine Mammals Protection Regulations 1992 will be strictly enforced.



Map 25: Proposed boundaries of Te Waewae Marine Mammal Sanctuary.

9. RESEARCH

9.1. Why do we need research?

Research on Maui's and Hector's dolphins is needed to aid future management decisions and enable the effectiveness of management measures, including any new measures implemented under the TMP, to be assessed.

If residual risk to Hector's dolphins from human activities remains after implementation of the TMP, Ministers should consider the level of information necessary to define and monitor the residual risk and enable future consideration of management action.

DOC and MFish consider that where there is an overlap between the dolphins' range and activities that threaten them, a high priority needs to be given to gathering more information on the status of the dolphin populations.

The following sections outline the joint agency view on the Government priorities for research in the short term (next 5 years). DOC and MFish consider that once this research is complete there should be a review of information gaps, and prioritisation of where new research efforts should be directed. Therefore, this section of the draft TMP does not outline all possible research questions, but instead highlights proposed priorities for the next 5 years.

9.2. Current situation

While some information is known about Hector's and Maui's dolphins, considerably more is unknown – previous research on dolphins has been limited because it is very expensive.

No Government funded research is currently being undertaken on Hector's and Maui Dolphins.

DOC and MFish consider that information on the abundance and distribution of Hector's dolphin populations and movements of individual dolphins needs to be expanded. In addition, the Threat Management Discussion Document for Maui's and Hector's dolphins identifies a number of information gaps. DOC and MFish suggest that research ideas should be prioritised to ensure that Government directs funding to areas where there are more critical information gaps.

9.3. Research Prioritisation

The research plan will ensure DOC and MFish can gather information in the short-term that will assist in the management of the four populations as well as assist with monitoring the effectiveness of management measures. DOC and MFish consider the following research areas to be of primary importance, and are ranked with the highest priority:

⇒Information on the distribution of all populations

⇒Information on the abundance of all populations

⇒Information on the genetic flow within and between populations

⇒Information on the life characteristics of the species (for example, age at first reproduction)

Described below are potential broad research projects for the four research portfolios listed above.

9.4. Distribution Research Portfolio

Determining the distribution of the populations provides a mechanism to examine whether management is focused at an appropriate spatial scale and to determine if there is any expansion or contraction in distribution.

Research to date has shown that Hector's dolphins are a relatively shallow water species, rarely found in waters deeper than 100m water depth. DOC and MFish consider there is merit in confirming the depth and offshore limits of the dolphins' range on a seasonal basis. If the currently recognised distribution is confirmed, there would be no need to undertake abundance surveys beyond the continental shelf. Conversely, there would be strong merit in surveying out to the 100m contour irrespective of how far offshore it may be.

In addition, information is currently lacking on where dolphins go at different times of the year, as well as what constitutes the limits of their individual ranges. Information on the movement of dolphins will enable assessments of residual risk to the populations (for example, the level of overlap between the dolphins' range and activities that impact on them), and will assist with understanding their susceptibility to population fragmentation (including genetic fragmentation). This is important both to ensure that the need for protection can be established and acted upon wherever dolphins are found, while also ensuring that utilisation is not curtailed unnecessarily if current information is uncertain about the dolphins' range. In particular, an accurate determination of the distribution of Maui's dolphin is considered essential by MFish and DOC.

Ideally, all distribution surveys (and abundance estimates) at the population level should be undertaken following the same internationally recognised protocol. For Hector's dolphin, DOC and MFish consider that aerial surveys would be the preferred methodology to use. This is because Hector's dolphins are attracted to boats – leading to potential bias in research findings.

Information can also be collected at a finer spatial scale to supplement aerial population distribution surveys. For example, data on where certain individuals go during winter and summer can be gathered by attaching satellite location tags to a sample of dolphins. This is a proven technique[161] that will provide much needed information on the seasonal distribution and movement patterns of Hector's dolphins. There is currently a lot of debate about the safety to dolphins when satellite tags are fitted. However, a pilot study has showed there were no mortalities associated with this methodology when trialled on Hector's dolphins. Satellite monitoring, if conducted on a large enough sample size will provide some very important information about the movements of this species. Photo-ID can also be used to investigate home ranges, though home range results will be influenced by distribution of survey effort. Satellite tags will provide more detailed information but, due to their expense, this information will likely be from relatively few individuals.

For highly directed and/or localised distribution and habitat use studies, passive acoustic monitoring devices such as Porpoise Detection Devices (PODs) are proving to be a useful research tool. Passive acoustic monitoring devices log the presence of cetaceans through the recording of vocalisations. The principal benefit offered by PODs or similar instruments is they are able to record during the hours of darkness and during inclement weather, when visual observations would otherwise not be feasible. They could be particularly useful for before/after impact studies of, for example, marine farms. There is also a need for complementary visual sightings information to be collected to corroborate POD acoustic detections (this could be achieved through boat or aerial surveys).

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[161] Stone, G., *et al.* 2005. Unpublished report: Hector's dolphin (*Cephalorhynchus hectori hectori*) satellite tagging, health and genetic assessment. Report to DOC, Auckland Conservancy, in fulfilment of a contract to the New England Aquarium, Central Wharf, Boston, MA 02110, USA. 77pp.

Objective

To determine the distribution of the four populations to ensure Hector's dolphins are managed across their entire range and determine any distribution changes as a result of any management measures implemented.

Research Question

⇒What is the spatial and temporal distribution of each population?

The following methodologies to answer the research question have been identified:

⇒Aerial surveys

⇒Satellite tagging

⇒PODs

While a distribution-wide survey undertaken during the winter and again during the summer would be ideal, it may be possible to identify a selection of groups to survey on a regular basis (*e.g.*, Banks Peninsula, Clifford/Cloudy Bays, Te Waewae Bay, Buller River region).

Research into the distribution of Hector's dolphins will tie in closely with abundance surveying (see portfolio described below).

9.5. Abundance Research Portfolio

The relatively long time-frames between abundance surveys makes it difficult to assess the current state of the populations. Focused research using consistent methodology over a five year period to determine baseline information will enable ongoing monitoring to determine trends in population size and, consequently, whether threats to the populations are being managed effectively.

DOC and MFish consider that estimates of population size either should be made during summer and winter (as there may be a seasonal shift in distribution and accompanying population size), or consistently during one time of year to identify any relative changes in population size over time. As mentioned above, DOC and MFish consider that aerial surveys would be the preferred methodology to use. Genetic analysis can also supplement systematic aerial surveying, in that it provides some indication of past trends in abundance.[162] Photo-ID also can be used to obtain population estimates, particularly from a relatively small and highly resident group such as that found in Porpoise Bay.

Objective

To gather base-line data on the abundance of each population

Research questions

⇒What is the current abundance of each population?

Are populations declining, stable or increasing and at what rate?

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[162] For example, a reduction in genetic diversity signals that the population may have undergone a decline in abundance

The following methodologies to answer the research questions have been identified:

⇒Aerial surveys

⇒Genetic analysis

⇒Photo-ID (within restricted areas)

9.6. Genetics Research Portfolio

Biopsy samples collected from living Hector's dolphins would provide a source of information on the genetic structure (and relatedness) of groups.[163] It may be possible to determine the degree of relatedness of Hector's dolphins within groups and along a line of progression from, for example, the northern end of the west coast of South Island to the southern end of their west coast South Island distribution. These studies will provide information on possible effects of fragmentation and on the possible genetic dispersion among groups.

DOC and MFish note that information on the movement of individual dolphins collected through the distribution research portfolio will also assist with understanding Hector's dolphins' susceptibility to population fragmentation (including genetic fragmentation).

Objective

To determine the level of gene flow within and between populations to assess current levels (and potential effects) of population fragmentation.

Research questions

⇒What is the level of genetic dispersion between adjoining groups within the regional populations?

⇒What is the degree of genetic relatedness between regional populations?

The following methodology to answer the research questions has been identified:

⇒Genetic analysis

9.7. Biology Research Portfolio

There are currently gaps in information that, if filled, would enable more accurate modelling of Hector's dolphin populations. A focus of future research is to identify parameters within models where more information can be obtained - perhaps through the expansion of existing necropsy and genetics programmes.

DOC and MFish consider that retrieved Hector's dolphin carcasses should continue to be sent to Massey University for detailed necropsy, acknowledging that the state of decomposition of many of the remains makes a full necropsy impossible. These studies will provide information of possible cause of death, sex, age and maturity status. These data are useful for modelling exercises and when describing the population biology of Hector's dolphin.

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[163] Biopsy samples can be taken relatively easily using a biopsy dart. A small plug of tissue would be collected from each animal, which should not jeopardise their survival

The necropsy of fresh animals also will provide information on possible disease issues and parasite load.

It is believed that there may be some risks to Hector's dolphin populations due to contaminants and pollutants in the marine environment. The impact of these on Hector's dolphins is largely unknown, but necropsy of dead animals and biopsy samples collected from living Hector's dolphins could provide an assessment of the heavy metal and pesticide load carried by individuals within groups.

Photo-ID remains one of, if not the best tool for estimation of certain population parameters such as adult survival rate (which is a highly influential parameter in population modelling) and calving intervals. However, photo-ID studies are relatively labour intensive, requiring an experienced boat driver and an experienced photographer as well as a long-term commitment. To date, the Hector's dolphins at Banks Peninsula have received the most intensive photo-ID effort, and the results from various studies (*e.g.*, adult survival) have subsequently been widely applied to groups from several other areas. More widespread photo-ID effort could allow for a higher degree of certainty when undertaking regional population modelling exercises.

Objective

To gather information to enable more robust assessment on the life history characteristics of Hector's dolphins and threats to the populations.

Research questions

⇒What are the life history characteristics of the population?

⇒How do life history characteristics constrain the recovery of the populations?

⇒What are the causes of death of recovered carcasses?

⇒Are there contaminants that are affecting the populations? If so, how are these effects permutated (for example, death or reduction in reproductive ability)?

The following methodologies, to answer the research questions, have been identified:

⇒Biopsy of live animals.

⇒Necropsy of carcasses

⇒Photo-ID

9.8. Process for implementation of research

DOC and MFish note that research on the abundance and distribution of dolphins is expensive. The first step in progressing any research portfolios is to establish funding. DOC have completed their allocation of funding for research for the 2008-09 research year, so there is no additional funding available. MFish is able to put proposals to the MFish Aquatic Environment Research Planning Group (AE RPG) for projects that look at the effects of fishing on the aquatic environment. A number of the suggested areas of research outlined above fall within the gambit of the AEWG/AERPG, including studies on distribution, abundance and genetics.

Proposed AEWG research projects must be submitted to MFish for inclusion in the annual research planning round, where they are discussed in an open forum that includes Government, stakeholders and research providers. A prioritised list of research projects is put forward for consideration and further

prioritisation by a Research Coordinating Committee. Final research services are approved by the Minister of Fisheries.

MFish notes that in line with the upcoming medium term research plan, MFish will accept research proposals on Hector's dolphins put forward by research providers for the 2008-09 research planning round. These proposals will be due with the Science Manager, Aquatic Environment, no later than 14 September 2007, with a research planning meeting to discuss the detail of draft projects scheduled for 21 September 2007.

10. MONITORING THE EFFECTS OF FISHING ON HECTOR'S AND MAUI'S DOLPHINS

10.1. Introduction

Information on the nature and extent of interactions between fisheries and dolphins is necessary for the Minister of Fisheries and the Minister of Conservation to make informed decisions on measures to avoid, remedy, or mitigate the adverse effects of fishing on dolphins. The Marine Mammals Protection Act 1978 and the Wildlife Act 1953 require fishers to report protected species interactions, including dolphin entanglements. This reporting helps MFish and DOC, and the Ministers determine the nature and extent of interactions. The extent to which fishers currently report entanglements is unknown, and there is evidence that suggests some fishers do not – people have found dead dolphins hidden near beaches presumably in an attempt to hide evidence of entanglement. Dolphins also occasionally wash ashore mutilated and with net marks and there is necropsy evidence to show that beach cast animals have sometimes died as a result of drowning. In addition, incentives to report entanglements are lacking and fishers fear they may be subject to onerous mitigation measures if reported mortalities are too high.

Lack of certainty over the extent and accuracy of reports means MFish and DOC cannot determine the extent of dolphin mortalities caused by fishing, or the relative contributions of commercial versus recreational fishing to dolphin captures. The Ministers are forced to make threat management decisions with considerable uncertainty.

Independent fisheries monitoring provides an opportunity to gather information on the nature and extent of interactions between fisheries and dolphins. Monitoring also enables MFish and DOC to examine compliance with rules developed to avoid, remedy, and mitigate the adverse effects of fishing.

10.2. Monitoring framework

This Draft TMP proposes a range of options to avoid, remedy, and mitigate the adverse effects of fishing on Hector's and Maui's dolphins. Some options are less onerous to fishers while others impose strict controls on fishing activity. The Minister of Fisheries in consultation with the Minister of Conservation will determine whether additional controls on fishing activity are necessary to reduce the effect of fishing related mortality. However, the Minister is not required to eliminate all risk to dolphins from fishing but must also consider the effect that options have on people's ability to use fisheries resources.

Where residual risk remains – stemming from uncertainty in information about the status of dolphin populations and the effects of fishing on the populations – the Minister should consider additional monitoring to verify the effectiveness of, and monitor compliance with, threat management[164].

The level of monitoring required to ensure adequate monitoring of fishing related mortality is uncertain and dependent on the set of measures agreed by Ministers to mitigate the effects of fishing.

In general terms, MFish and DOC consider the higher the degree of residual risk of fishing related mortality, the higher the level of monitoring required to determine the nature and extent of fishing related impacts. Dolphin mortalities are generally an event of low probability which means that monitoring levels across a fleet would need to be high in order to be able to achieve robust monitoring.

However the level of monitoring will also be influenced by the effects that fishing related mortality has

[164] Independent fisheries monitoring is not a threat management option in itself but is necessary to collect information on the nature and extent of interactions between fisheries and dolphins for decision making purposes.

on the population and species. Severity of impact of mortality on the population as a whole varies with size of the population and where the mortality occurs within the populations range (ie. risk of fragmentation).

In some cases a lower level of coverage may be acceptable to get a general indication of fishing trends and dolphin mortality. This would only be appropriate where the risk and the consequence of a fishing related mortality is relatively low. However, it would be unreliable to extrapolate fishing related mortalities recorded from a lightly monitored fleet across an entire fleet or dolphin population.

MFish considers there are two monitoring options the Minister should consider as part of the draft TMP:

⇒Observers on fishing vessels – already used to monitor Hector's dolphin interactions with fishing gear

⇒Electronic monitoring (video cameras) on fishing vessels – not currently used to monitor Hector's dolphin interactions with fishing gear.

Potential benefits and costs associated with each option are discussed below.

10.2.1. Observers on fishing vessels

MFish and DOC use Fisheries Observers (observers) to monitor interactions between fishing vessels and protected species including Hector's and Maui's dolphins[165]. Observers provide information on the types of interactions that occur and facilitate the return of carcasses of certain protected species for necropsy. In some instances observers collect biological samples for analysis (eg, genetic studies). Observers may also report on, or recommend, ways to avoid or mitigate the effects of taking protected species.

Benefits of observers include:

⇒Independent monitoring of marine mammal and seabird interactions with fishing vessels

⇒Can collect multiple pieces of information on the nature of interactions with dolphins

⇒Can communicate the legal requirements to report dolphin captures to fishers and the importance of reporting such captures

⇒Ensure that dead dolphins are retained for necropsy.

Costs include:

⇒Difficulty placing observers on boats (although this issue has been reduced in recent years):

- Some fishing vessels are too small to be able to take an observer and crew
- Some fishers do not wish to engage with the observer programme despite it being a legal requirement to take an observer if requested to do so.

⇒Inshore fishing is dependent on weather and other factors and changes to trips at short notice can be

[165] Observer coverage to monitor the incidental bycatch of Hector's and Maui's dolphins is managed through the Conservation Services Programme (CSP). CSP provides the majority of observer coverage to monitor the impacts of fishing on protected species and poor information fisheries.

difficult and costly to coordinate with the observer programme (although CSP regularly places observers at local ports for several months which enables them to leave at short notice)

⇒Inshore observer coverage is expensive (approximately $800-$1000 per day) and coverage, as a proportion of total fishing activity, is low (for example, in the 2007-08 fishing year there are 258 inshore trawl coverage days and 233 set net coverage days available). However, CSP maximises coverage in specific areas on a rotational basis meaning that costs to fishers are intermittent and spread around the country, and that at any one time, the level of observer coverage in certain areas can be very high. Expansion of the programme across a greater proportion of the inshore fleet would remove a large part of the profit margin from New Zealand's inshore fishery and could affect the viability of some individual fishing operations if not managed well.

⇒Expansion of the observer programme as a component of the TMP may probably require re-prioritisation of the allocation of observers to current projects.

⇒MFish doubts New Zealand has the immediate capacity to meet high observer demand.

10.2.2. Electronic Monitoring

Electronic monitoring (video cameras) is a form of monitoring used in many fisheries around the world. Units typically consist of a hard drive that records information from a video camera fixed above the vessel deck. There are two main ways that the camera is activated. The first (and method that involves the most amount of camera footage) is when the camera is turned on at the beginning of a fishing event. The second method is when the camera activates when the trawl winch starts. This records a much shorter period of time and does reduce the amount of video footage that needs to be reviewed. As fish are landed on the deck of the boat the camera records images in the field of view. The video footage is independently reviewed on shore and species identified.

Video technology has been trialed successfully in New Zealand aboard set net and trawl boats in Canterbury in 2003-04[166]. Trials showed that captured Hector's dolphins were identifiable using this technology when dolphins are caught[167].

The Minister can, under s 298 (b) and (d) to require fishers to have video monitoring on board vessels to avoid, remedy or mitigate the effect of fishing on Maui's and Hector's dolphins (as per s 15 of the Act).

Potential benefits of video monitoring include:

⇒Video monitoring can provide certainty about interactions with Hector's or Maui's dolphins

⇒Smaller boats currently unable to take observers are likely to be able to use video monitoring (currently AC or DC power is all that is needed to power the devices)

⇒Hard drives can store up to 30 days video footage

⇒The technology has been developed to the point where video footage does not have to be watched in "real time" to detect Hector's dolphins which cuts down on the number of hours required to observe fishing activity (compared to observers who are on board vessels in "real time")

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[166] McElderry et al 2007. DOC publication series

[167] During the course of the video monitoring there were 2 dolphins caught in set net gear and x dolphins caught in set nets. Positive identification that the mammals were Hector's'' dolphins in all cases was possible.

Costs include:

⇒Only interactions resulting in the dolphin being landed on the boat are recorded

⇒Initial purchase costs are expensive (see below) and there are ongoing monitoring costs

⇒Fishers would need to obtain a permit under the Wildlife Act to retain and return a dead dolphin for necropsy.

Because this method has not been widely used in New Zealand, MFish does anticipate some resistance to the concept of video monitoring from commercial fishers. However, MFish notes that if the Minister determines that monitoring is necessary in areas where dolphins are present in order for fishing to continue, electronic monitoring is in the long term likely to be more affordable to fishers than observers.

Video monitoring is widely used overseas in British Columbia in longline and crab fishers. MFish has been able to obtain information on possible costs associated of the hardware (cameras and hard drives) required to run video monitoring. An initial estimate is that the cost is $10,000 per boat to purchase and install the equipment (there will also be ongoing operating costs).

MFish and DOC acknowledge the one-off cost of the video camera units could be quite substantial for some fishers. If video monitoring was to be progressed MFish may look at adopting models of implementation similar to that used overseas (where smaller operators, or people who do not have a high number of fishing days can lease the equipment). In addition, MFish will investigate potential to rationalise costs through bulk purchase.

At this time, MFish does not have exact figures on the ongoing costs of video monitoring, but as mentioned above, based on overseas models, the cost of video monitoring should be significantly less than the cost of observers. MFish proposes to prepare a separate advice paper on the feasibility of electronic monitoring (ongoing logistical costs) to the Minister.

10.3. Monitoring Amateur Fishing

MFish and DOC consider it would be useful to gather more information from the amateur sector on rates of incidental bycatch. Currently MFish and DOC have no tools to do this. One option to further increase data on incidental bycatch of hector's dolphins is to have targeted questions in boat ramp surveys. MFish and DOC welcome comments from stakeholders on ways to effectively monitor protected species interactions and amateur fishing.

10.4. Conclusion

The Minister will need to consider what level of monitoring is appropriate for dolphins after implementing measures to minimize risk. In general, MFish considers that where there is a higher level of risk, there should be a greater emphasis placed on gathering more information to support ongoing management.

This may mean a trade-off for fishers of paying additional observer costs, to be able to have access to some areas for fishing. MFish and DOC accept that for some fishers it may become uneconomic to pay for the monitoring that is required, and this may in turn reduce peoples access to areas, and indirectly, the level of fishing activity and catch overlapping with Hector's and Maui's dolphins. In considering different ways to get better information on the nature and extent of fishing related mortalities, MFish has tried to canvass options that will still enable utilisation by fishers (ie, the cheaper option of electronic monitoring).

MFish and DOC note that better information on the nature and extent of fishing related mortalities will enable the Ministers to assess the success of TMP measures and review management decisions if necessary. MFish and DOC plan to provide a more detailed paper to the Ministers on ongoing monitoring once a decision has been made on management frameworks for each population as a whole.

11. APPENDICES

11.1. Appendix 1 - Section 11 Statutory considerations

In forming the management options, MFish has also considered the statutory obligations described in section 11 of the FA96. These are summarised below.

Section 11(1)(a): Hector's dolphins have a close inshore distribution that results in an overlap with commercial and recreational set net fisheries, as well as inshore trawl fisheries. In considering whether to set or vary the sustainability measures proposed, the Minister must take into account any effects of fishing on the aquatic environment, in particular the presence of Hector's dolphins in these areas. These effects are outlined in detail for each Hector's dolphin population in the main body of this document.

Section 11(1)(b): There are a range of existing measures that apply to areas in order to mitigate the impacts of fishing on Hector's dolphins, such as the west coast North Island closure to commercial and amateur fishing and the Canterbury amateur set net prohibition. These measures are outlined in more detail in the main body of this docuemnt. Existing controls have been considered when making recommendations for setting or varying any sustainability measure for areas where Hector's dolphins are present. Total Allowable Catches may also restrict fishing effort for fish stocks where there is potential for interactions with Hector's dolphins.

Section 11(1)(c): MFish has no information to suggest that Hector's dolphins are prone to significant fluctuations in abundance. Hector's dolphins have low reproduction rates resulting in low potential for population growth.

Section 11(2)(a), (b) and (c): There are no known statements in any regional policy statement, regional plan, or proposed regional plan under the Resource Management Act 1991 that are relevant to the setting or varying of any sustainability measure for areas where Hector's dolphins are present. There are objectives and implementation activities in the conservation management strategies made under the Conservation Act 1987 that generally support the protection and conservation of marine mammals, including Hector's dolphins. None of the proposals apply to areas within the Hauraki Gulf, and therefore sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 are not relevant here.

Section 11(2A)(a and c): Relevant conservation services are planned observer coverage on inshore trawlers in FMAs 3, 5, and 7 (258 days) and planned observer coverage for set net vessels in FMAs 3, 5 and 7 over the 2007/08 fishing year (233 days). Information from observer programmes could support decisions relating to commercial trawl and set net fisheries in the future.

Section 11(2A)(b): The Minister approved a fisheries plan for SPO 7 under s 11A(1) of the FA96 on 4 May 2006. The Challenger Finfisheries Management Company is the owner of the plan and is responsible for administering the major components of the plan including the commercial fishing area closure, catch limits, supporting research, ongoing education, and the set net CoP.

11.2. Appendix 2 - Summary of regional discussions

MFish and DOC officials met with representatives of tangata whenua and relevant commercial, environment, local Government and recreational groups from April-June 2007 to discuss the management of threats to Hector's and Maui's dolphins. An overview of the key points raised by stakeholders at the meetings are outlined below

11.2.1. West Coast of the North Island

11.2.1.1. Dargaville, Kaipara Harbour, 29th May 2007, 7.00 pm

⇒Resolutions agreed at the meeting:

- This meeting requires the Minister of Fisheries to prohibit trawling in the 4 nautical miles already described in the existing set-net ban. (From Maunganui Bluff to Pariokariwa Point) and to require trawlers fishing adjacent to the exclusion zone to carry transponders and either independent observers or secure video surveillance systems. Approximately 110 people voted for and approximately 2 voted against.
- This meeting requires the Minister of Fisheries to create a commercial and recreational set – net exclusion zone between the existing coastal boundary of statistical area 044 and a line joining Pouto Point with the inshore boundary of South Head. Approximately 110 people voted for and approximately 2 voted against.

⇒A commercial fisher said that this was an emotive discussion and all the people voting were not fishers but members of the public who will not be affected by the ban. A further ban would affect commercial fishers in the harbour.

⇒Fishers said that there had been 3000-5000 trawl tows in the Maui's core area in the last year.

⇒Fishers said that they have seen trawlers at 500 m and 1 nm from the shore.

⇒Submissions have been made that 3 Maui's dolphins have been taken by trawlers.

11.2.1.2. Hellensville, Kaipara harbour, 29TH May 2007, 7.00 pm

⇒Resolution of the meeting – This meeting supports a set net closure of the entrance to the Kaipara Harbour, west of the line that runs from Pouto Point to South Head (excluding the lagoon), where Maui's dolphin have been seen. 20 people voted for and 10 voted against.

⇒70 – 100 families rely on set netting. Approximately 300 t of flounder and 250 t of mullet are caught annually by set net. This amounts to 2.5 million dollars income for fishers.

⇒Fishers (commercial and non-commercial) said that they had never seen a Maui's dolphin east of the line. Fishers said that there was a group of 3 dolphins that has increased to 5 recently west of the line.

⇒None of the commercial fishers work west of the line that goes from Pouto Point to South Head.

⇒Fishers were concerned about propaganda which did not reflect the truth about dolphins

⇒Fishers had anecdotal evidence of people catching dolphins in trawl nets.

⇒Fishers said that there was ample evidence of trawlers taking dolphins in the South Island and that trawling should be banned out to 4nm in the core area of Maui's dolphins, as set netting had been. Fishers asked for observers on all trawlers.

⇒Fishers asked why trawling had not been banned to the 4nm zone as set nets had.

⇒Questions were asked about what was being done about other threats such as boat strike, turbines of the proposed power station, and pollution in the Kaipara River.

11.2.1.3. Wellsford, Kaipara Harbour, 23 May 2007, 7.00 pm

⇒People present generally supported resolution of meeting: "This meeting does **not** agree with banning of set nets in the Kaipara Harbour east of a line from Pouto Point to South Head, as we do not consider that such a ban would help with the protection of Maui's dolphin."

⇒There are 30 commercial fishers who depend entirely on fishing in the Kaipara Harbour and who would lose a large part of their livelihood through a ban on set nets in the harbour.

⇒There are 34 marae on the Kaipara, all of whom have been setting nets for generations for mullet and flounder and have never caught a dolphin. Banning set nets in the harbour would mean there was no mullet and flounder for hui and tangi.

⇒A ban was only supported in areas with confirmed sightings of Maui's dolphin.

⇒Regulations requiring attendance of set nets at all times could be supported. However, if a dolphin only has two minutes to get out of a net before it drowns, even if a fisher is attending the net he might not be able to save the dolphin.

⇒Fishers said that trawlers were reported to heavily fish the area outside the harbour, which is where the dolphins are, and it is inconceivable that dolphins do not come into contact with trawlers, particularly as trawlers are now twice as powerful and fast as they used to be.

⇒Fishers suggested that trawling needs to be the *main* focus of the TMP and it was questioned why trawling was not the first thing to be banned to protect Maui's. Trawlers should be removed from the dolphin range but given the option of moving to other places.

⇒One fisher said that the only place he had seen dolphins in the harbour entrance was at the proposed turbine site.

⇒It was noted that drift netting is still legal and may be a threat and stalling of nets in the Kaipara could be a threat.

11.2.1.4. Titirangi, Manukau Harbour, 28th May, 7.00 pm

⇒Fishers unanimously said that they had never seen Maui's dolphins in the Manukau Harbour and that they had never caught Maui's dolphins in the Manukau Harbour.

⇒Fishers said that drift nets are worse than set nets because they drift out especially at Port Waikato.

⇒Fishers noted that they had no confidence in the consultation process because they had been through a similar process in 2003 and their views were not acted on.

11.2.1.5. Commercial stakeholders, Manukau Harbour, 1st June 2007, Ministry of Fisheries, Auckland, 10.00 am

⇒The research from Otago University has shown that there have been 21 acoustic events in the Manukau Harbour

- Definitely Maui's dolphin in the Manukau beyond the protected area.
- Not all dolphin visits have been detected
- The pod off Corn Wallis has detected more than the pod off Kauri Point

- Dolphins appear to use the north side of the harbour more than the south side
- Hector's routinely use shallow water indicating that Maui's probably do too
- We don't know how many dolphins visit the harbour
- We don't know what the inner limit of the dolphin's movement is
- We do know that dolphins are coming past Corn Wallis and Kauri Point.

⇒Fishers unanimously agreed that they had never seen Maui's dolphin in the Manukau harbour and that they had never caught Maui's dolphin in the Manukau Harbour.

⇒Fishers said that set netting was a cheap source of food.

⇒Fishers said that drift netting is a risk to dolphins.

⇒Fishers were concerned that the Government would make decisions because of politicking but they really should focus on what fishers who fish every day are saying.

⇒Fishers said that if boat strike is a threat then boats should be banned from the harbours too.

⇒Fishers asked what compensation would be given to fishers if set netting was banned. Fishers said they would definitely go to court if set netting was banned. They asked how a decision could be made based on no evidence.

⇒Fishers asked how the process relates to the Treaty of Waitangi.

⇒Fishers said there was not really any good way other than set netting to catch mullet and flounder. Fishers asked if they would be allowed to experiment with different fishing methods if set netting was banned.

11.2.1.6. Raglan Harbour, 9th May, 7.00pm

⇒Fishers said that they had never seen Maui's dolphin in Raglan harbour. They had seen Maui's dolphin outside the harbour but not inside the harbour.

⇒Two fishers said they have been fishing in all parts of the harbour for 19 years and 60 years each and had never seen a Maui's dolphin.

⇒One fisher said he had been in Raglan 50 years and never even seen any news media reports about dolphins in the harbour.

⇒Dolphins were not at all likely to be found in the upper harbour where people fish for flounder.

⇒Fishers said that as commercial fishers for flounder and mullet they never leave their nets unattended. They said that some other fishers do leave their nets unattended.

⇒All agreed that there were many more sightings but these were not getting through to DOC and MFish.

⇒Fishers suggested an education approach not just a regulation approach. There should be more education before legislation.

⇒One fisher flagged some inconsistencies with the threat classification in the Discussion Document and asked for more detailed information about sightings in the discussion document.

⇒Fishers asked if they would have some assurance that if there was no information on dolphins in the harbour then there would be no ban on set netting.

⇒DOC to inform fishers when they know the outcome of the acoustic research in Raglan harbour.

11.2.1.7. Kawhia harbour, 24th May, 7.00 pm

⇒Fishers said they had not seen dolphins in the harbour since 1950.

⇒A dolphin researcher noted she had never had a report of dolphins inside the entrance of Kawhia Harbour

⇒Fishers see dolphins outside the harbour often

⇒Fishers stated that fishing with nets was a large part of their livelihoods and they were worried about what would happen to them if set netting was banned.

⇒Fishers said they don't fish near the harbour mouth because the water is too swift to set nets there.

⇒Fishers asked for more notice next time there is a meeting. Many of the fishers at this meeting are Tangata Kaitiaki and are very aware of what is going on locally.

11.2.1.8. The Northern Fisheries Management Stakeholder Company Limited – Auckland, 25th May, 10.00 am

⇒Maui's dolphin occur in depths that coincide with the 80m contour line and shallower. Trawling and Maui's occurs in the same area. MFish has maps which grade the intensity of trawling.

⇒In the South Island there are accidental catches of Hector's dolphin in trawls.

⇒In the North Island it is not known if there have been accidental catches of Maui's dolphin by boats that do not have observer coverage. There has been an anecdote by a fisher on a trawl boat that said a Maui's dolphin was caught at Raglan. There have been similar anecdotes from the Kaipara area.

⇒Northern Fisheries requested that the data on distribution and dolphin deaths and causes be clearly presented and thought that more observer information would be useful.

⇒The meeting agreed that if a trawler caught a Maui's dolphin there would be strong incentive for the skipper not to report it.

⇒Northern Fisheries noted that it is not easy to see a Maui's dolphin from a boat and that there is less trawling in the winter than in summer.

⇒Northern Fisheries noted that the lack of information on distribution was a problem and that more effort needed to go into mapping the distribution of Hector's'/Maui's dolphin.

⇒Northern Fisheries asked how much a tagging study would cost and noted that industry would be interested in overcoming the cost.

⇒MFish noted that the last time this issue was discussed 7-8 years ago with Ngati Whatua there was a confrontation because Maori perceived that the ministries were against them.

⇒Northern Fisheries said that the regulations work well and if any unnecessary measures were taken beyond those regulations the industry would consider that 'against utilisation'.

⇒Northern Fisheries raised concerns that there would be no second consultation on the options which could have a high impact. This may mean that industry will have to go to court again.

⇒Northern Fisheries felt that it would be very useful to have the process slowed down so that fishers could be properly consulted. MFish said it would include this concern in the advice to the minister.

11.2.1.9. Waiuku, Southern Manukau Harbour, 13th june, 7.30 pm

⇒Dolphin researchers reported that acoustic pods had detected 21 Maui's dolphin signals up to 2km beyond the eastern line of the current set net ban. One of these detections was confirmed by a sighting.

⇒Most of the persons present had used set nets and none of them had caught a dolphin. All persons present had only seen dolphin's within the protected area, at the harbour mouth or out on the coast.

⇒One fisher had been fishing for 30 years in the Waikato River and had never seen dolphins there.

⇒It was suggested that we must know what the minimum sustainable population is. Dolphin researchers advised that this modelling work could be done but had not been done yet.

⇒It was questioned whether anyone knew for certain why the Maui's dolphin population has declined. A dolphin scientist advised that there were records of 16 strandings in 10 years around Taranaki, north of New Plymouth in the 1970s and early 1980s. At that time, the area north of New Plymouth was a main area for gill netting. Now there are very few Maui's dolphins in that area.

⇒Some fishers suggested that the nets causing the problem were illegally set nets and that there was inadequate enforcement to stop this happening.

⇒Fishers queried whether there would be compensation for anyone who lost their livelihood due to fishing restrictions to protect dolphins. MFish advised that no compensation had been paid when the previous ban was brought in.

⇒One fisher noted that the club had over 1000 boats per year going out on the harbour, some with only a low power. If they all had to go beyond the bar to fish, it would take a long time to get there and back again.

11.2.1.10. Statement by the Counties Sport Fishing Club (CSFC)

The meeting was included a statement from the Counties Sport Fishing Club (CSFC). This was supported unanimously by the meeting. Key points of the statement included:

⇒The club is completely opposed to any changes to the current set net ban or the introduction of more regulations.

⇒Since 1 January 2000 the CSFC radio had logged 5,484 boats crossing the Manukau Harbour and Waikato River bars. Approximately 50 of these reported seeing Maui's dolphin. All but one of these sightings were in the currently protected area. The one reported sighting that was further inside the harbour was from a non-club member who refused to give their name and was unsure of the type of dolphin.

⇒No club boat has ever struck a Maui's dolphin nor has the club ever heard of this happening in the Manukau.

⇒Speed restriction of 5 knots when within 300 metres of a Maui's dolphin is ridiculous and would be unsafe as this is too slow a speed to safely navigate the bars.

⇒The two Maui's dolphin that were caught in nets and washed up in our area were caught by nets that had broken free and become drift nets. There is no record of any Maui's dolphin becoming entangled in properly set and managed nets.

⇒If further measures are needed, MFish and DoC should look towards enforcing the laws that already exist; funding more fishery officers and fisheries protection vessels to police the existing laws. In particular, get fishery officers onto commercial vessels. Also, educate people about what the existing laws are.

⇒No Maui's dolphin have been caught in nets since the current ban was introduced. Therefore: Northing is broken, nothing needs fixing!

11.2.1.11. Taranaki Fisheries Liaison Committee, New Plymouth, 26th April, 7.30 pm

⇒All members present stated that Maui's dolphins are not seen within local waters. Several commercial fishers stated that they have fished in the local areas for many years and they have never seen a Maui dolphin.

⇒Recreational members present stated that they could not recall any of their respective club members reporting a sighting of a single Maui dolphin within local waters. Participants stated that very little recreational set netting occurs within Taranaki waters. Some limited set netting does occur within local rivers to catch yellow-eyed mullet.

⇒Periodically there are calls from the general public about possible sightings of Maui dolphins but most of these are dismissed as being unreliable.

⇒A commercial fisher sighted a Maui dolphin within the Sugar Loaf Marine Park about two years ago.

⇒Commercial fishers present stated that no additional management measures are needed given the absence of dolphins in the Taranaki region. Participants stated that commercial set net fishers are being unfairly blamed for any Maui dolphin death.

⇒Several commercial fishers stated that an extension of the southern boundary of the existing set net closed area will put all Taranaki set net fishers out of business. Presently, there are about seven commercial set net operators within the Taranaki region and all rely on fishing access to local inshore areas to catch fish.

⇒During winter, most set net fishers target warehou (winter fishery) very close to shore (< 4m of water depth). During summer, these same fishers target school shark and rig throughout the area. Extending the closed area further offshore will have significant implications for all local school shark and rig set netters.

11.2.2. East coast of the South Island (ECSI)

11.2.2.1. Ngai Tahu Runanga meetings

⇒Want recognition and ability to exercise customary rights

⇒Strong spiritual connection to mahinga kai

⇒No customary authorisations given out to use set nets off the open coast.

⇒Akaroa Taiapure has no resources but ready to help

⇒Not enough money to reduce threat

⇒Runanga has eyes and ears to help

⇒Need more compliance on ground to enforce regulations

⇒Koukourarata happy with current rules

⇒Dried shark was an important customary fish – usually caught in upper harbours in December-February

⇒Governors Bay sewage outlet prevents use of kaimoana in Lyttelton Harbour

⇒Sharks used to be caught on lines and nets in Akaroa, Wainui and Lucas Bay areas

⇒Boat would be useful for Taiapure Committee

⇒Little mahinga kai available in South Canterbury as eels and shellfish depleted.

⇒Could use Mataitai Reserves for Hector's conservation

⇒Education is needed on the issue fairness/equity between non-commercial and commercial is seen as a big issue at Kaikoura.

⇒Pingers – do they work? Are there any fishermen using them in this area?

⇒Impacts on tourism raised – swimming with the dolphins

⇒Last summer in north bay five dolphins seen once

⇒Pod in south is not often present

⇒In southerly weather 95% will see them off the bluff (Haumuri)

⇒Dolphins north of Kaikoura off the peninsula and Conway river

⇒Another threat is jet skis and more education needed

⇒Registration of nets an option

⇒June is humpback and cray rope time – shorter buoy line at this time - Kaikoura "Code of Set Net Practice".

11.2.2.2. Kaikoura Amateur Fishers 16 April 07

⇒Kaikoura Boating Club voluntarily has a beach area ban and the club has 400 members

⇒Dolphins can be seen on open beaches from Conway to the Clarence River

⇒Still see them (a couple) along the beaches during the winter months

⇒Older fishers with small boats net for greenbone (butterfish) and moki close inshore in the rock reefs

⇒Don't see Hector's dolphins in around the rock and reef areas

⇒Amateurs can not use a small boat if forced out further, they will need a bigger boat and can't justify cost

⇒Will affect the "old boys" because set netting is their one and only enjoyment in life

⇒Staying with net will result in most locals giving up set netting

⇒Fishers coming to Kaikoura just disregarded the new regulations

⇒Amateurs use nets to target butterfish - rig is not so targeted

⇒A ban will close the amateur butterfish fishery

⇒Closure will affect the Kaikoura "way of life"

⇒Forced to return to spear fishing, but this is not an option for old boys

⇒Pole netting is coming back, two or five of them that do it

⇒Suggested MFish identify some set net areas (butterfish) and close open beaches to set netting

⇒Only want to net close in to rock reefs because it gets deep very quickly and have to hand haul net

⇒Some capable and willing to spear fish

⇒Interest in a survey of numbers set netting

⇒One fisher had mitigation for cray pot entanglement by weighing down the pot buoy line

11.2.2.3. Canterbury Amateur Fishers 17 April 2007

⇒Some inaccuracies and mistakes within the Threat Management discussion document and concerns about inaccurate press releases

⇒Noted that prior to the establishment of the Banks Peninsula Marine Mammal Sanctuary there were 24 amateur dolphin incidents per year, now it is 0.8 incidents per year

⇒No 386 incident at Petite Carenge Bay only amateur set net since 2001 but 8 from commercial

⇒Supported real time cameras for commercial set netters

⇒Amateur fishers are concerned and must accept responsibilities

⇒There are five different regimes along the ECSI coast and this led to confusion.

⇒It is the rare Maui dolphin where abundance is the least where the threat is most high and in other areas where it is less abundant, not the areas of high population

⇒Supported restriction of staying with net all year with a three month (1 December to 28/29 February) summer seasonal closure along all ECSI coast

⇒Flounder set netting should be allowed until 1 April

⇒Rest of year no night netting and must stay within a defined distance of the net

⇒Suggested options for as follows:

Option 1: Status Quo (Canterbury set net area)

⇒Six month closure (four month for flounder area) and 30m nets

⇒Stay with net – marine mammal sanctuary and four month closure

⇒60 m nets elsewhere and flounder area

Costs

⇒Confusion – problems with compliance

⇒Some unnecessary mortality in areas outside sanctuary (not covered by its stricter rules).

Benefits

⇒Provided information (that other measures may be unnecessary to reduce threats)

⇒Gives protection within protected area

⇒Decline in reported incidents

Option 2: All East Coast South Island

⇒Stay with nets at all times whether set from shore or vessel

⇒No set netting – December, January, February east coast South Island (Slope Pt to Tory Channel) extend to March for flatfish set netting

⇒No night setting of nets except for flatfish areas

⇒Rules consistent across whole ECSI (eg, net length)

⇒Stay within a certain distance of the net

⇒Adherence to set net Code of Practice and don't set nets when dolphins are around

- Option – 30 m length across ECSI
- Option – one net per boat across ECSI
- Option - two nets provided two or more fishers.

Costs and Benefits

⇒Lost opportunities while staying with net – social costs and economic costs

⇒Less incentive to set net

⇒No set netting = no greenbone (butterfish) except spearing and few moki.

Closed Period

⇒Workers unable to have opportunity to set net over Christmas holiday period

⇒Reduce opportunity to catch rig (and other elasmobranches) but benefit because they breed at that time

⇒Effort will be shifted to another time of year – less concentration on timing when butterfish breeding

⇒Reduce risk significantly to dolphins based on results of similar restrictions already imposed

⇒Administration and compliance/enforcement simplified.

Option 3: Complete Closure 4nm (not including estuaries/rivers apart from the Avon-Heathcote Estuary)

Benefits

⇒Complete protection for Hector's dolphin – is this a significant improvement when recreational entanglements are very low?

⇒Increased abundance of target fish species for fishers and Hector's dolphin

⇒Public perception that problem under control.

Costs

⇒Amenity costs – ramp deterioration

⇒Canterbury – limited opportunities for other fishing methods, ie, by lining

⇒Other methods can't target set net target species

⇒Loss of butterfish and moki fishers – butterfish highly desired

⇒Increased non-compliance

⇒Loss of most flounder fishing – limitations with drag netting

⇒Loss of a traditional fishery reason for holiday homes, etc

⇒Effects on boat sales, etc, flow-on effects

⇒Moki/butterfish main catch in Banks Peninsula that is a substantial and favoured catch.

11.2.2.4. Timaru Amateur Set Netters – 17 May 2007

⇒Dolphins not in Timaru Reef Area but present east of Timaru Harbour to Smithfield Freezing Works chimney

⇒Reef is looked after by locals who generally fish for family sustenance

⇒Moki net used to catch all species

⇒Butterfish – moki – tarakihi in reef area very important to Timaru fishers.

⇒November best fishing month

⇒Net set for around an hour and fishers stay within 100 m of the net and line fish

⇒Staying with net is not an issue as butterfish healthy and only takes half an hour to get a feed

⇒Timaru reef area only local area easily available to locals

⇒No out of town fishers on reef as there are few occasions when the right conditions prevail and you need local knowledge to fish there.

⇒Low visibility most of the time, so no good for spear fishing.

⇒Long-lining only produces wormy red cod and spiny dogfish

⇒Need larger boat to access offshore south and north rocks that are 32 km off Waimate and 7 hours steaming from Timaru, Top Rocks (53 km offshore) and 5 km of Makikihi

⇒Commercial set netters fish these offshore areas and deplete them.

⇒Support status quo because it works

11.2.2.5. Otago Amateur set netters May 2007

⇒Decisions should not be made until current dolphin research such as the new survey information for Te Waewae Bay is available

⇒A blanket set net ban would effectively remove at least 5 species of fish from the recreational bag/catch (flounder, rig, moki, greenbone, mullet etc)

⇒Ban would be profoundly unfair on amateur fishers as they are once again being told to give up a significant method of putting a "feed on the table" for an , at present, indefinable result

⇒No dolphin incidents on the South Otago coast and they are being punished for the perceived and largely unproven sins of others

⇒Accept dolphin is worthy and requires protection, the issue is about how

⇒Until we have all the information a voluntary code of practice in areas of dolphin habitat with education and consensus be established

11.2.2.6. Commercial Quota Holders - South East Finfish Management Ltd (SEFML) - 8 May 2007

⇒No need for meeting with SEFML as they are still getting ideas together

⇒OK for MFish to later ground truth economic information with SEFML

⇒SEFML supports status quo and is looking at ways to strengthen code of practice by monitoring compliance

⇒Looking at plotting vessel positions by satellite coverage using an independent company to monitor

11.2.2.7. Kaikoura commercial set netters 16 April 07

⇒Hot Spot for Hector's dolphin – Hāpuku River to Kaikoura Railway Station

⇒Pod at the Clarence River Mouth

⇒There are more Hector's now then 10 years ago

⇒Three baby Hector's inside 7-gillers around Motunau

⇒Orca attack of a Hector's off Kaikoura recently

⇒Fishermen are the endangered species with only 7 set netters now compared to 30 plus ten years ago

⇒Available ACE for deepwater set netting for tarakihi, groper and ling going to trawling further south so fishing is changing method

⇒Six of 7 fishers are ACE fishers fishing Ngāi Tahu, Sealord's, and Talley's quotas

⇒Butterfish – 2 t from front of Kaikoura Peninsula

⇒Rig and school shark caught in 15-30 m water depth and trawl area 20-25 m avoided because of gear conflict

⇒Set net south to Gore Bay for rig and school shark with 10% of catch caught north of Victoria Rocks to the Clarence River

⇒Fishers set 6 nets that are 500m long

⇒Most fish caught September to March with most October to December (16 to 18 degrees C) and elephant fish come into breed

⇒Last two years has been real bad for rig and school shark because fish aren't there – TACC to high

⇒One fisher used to catch 80-90 t rig but now only catching 20t, similar situation for school shark

⇒At least 5 t of elephant fish and 130 t spiky dogfish also caught

⇒Increasing numbers of carpet and sand sharks as rig predator declines

⇒Amateur surf casters doing well on small sharks

⇒Commercial set netters don't set net inside 15m except for butterfish nor set net from Queen Victoria Rocks south to Kaikoura Peninsula hotspot and favour a voluntary ban in these areas

⇒Education seen as the best way forward

⇒Would seek compensation if set netting banned out to 50m

⇒Trawl area for flatfish is Haumuri Bluff to Waiau river

⇒Look at review time (5 years) for measures introduced as part of the TMP process.

11.2.2.8. Christchurch (17 April 2007) and Timaru Commercial Set Net and Trawl Fishers (16 May 2007)

⇒Any mitigation measures will impact on the value of SPO 3 quota

⇒Set net season is from October to February.

⇒Code of practice supported by 90% of fishers but code of practice has got no teeth

⇒Want to upgrade code of practice to ensure compliance.

⇒In February male rig come close inshore and this is the time when lots of rig are available – banning would have a significant impact at this time

⇒They support the protection of females by not fishing October to January inshore

⇒Concern about large trawlers fishing hard on one nautical mile line targeting elephant fish

⇒Pingers from Sullivan and Spillane in Timaru frighten dolphins away based on putting pingers over the side of the boat when dolphins present

⇒Lots of dolphins around and seem to be more than 1970

⇒Elephant fish a success story

⇒Flats and red cod - a real concern about these fisheries

⇒No set netting and trawling inside 1nm except in Pegasus Bay

⇒Some fishers favour compensation for SPO3 and other quota if fisher substantially affected.

11.2.2.9. Otago Commercial Set Netters 10 May 2007

⇒4 fathoms water depth is inside half nautical-mile. (Hampden to Moeraki)

⇒Dolphins located at freshwater interface with dirty water

⇒Very localised areas of dolphins -Waikouaiti Bay, Warrington Beach, Moeraki Boulders, Kakanui, and Oamaru – Upwards

⇒Dolphins occur in Molyneaux Bay, off most rivers, Campbells Reef and at Brighton

⇒Pollution → Algae in Bay → Hector's disappear

⇒Monarch has records that show no dolphins in Otago Harbour

⇒November to December set net for rig

⇒Two dolphins caught 2-3 miles out.

⇒Fishers don't use pingers in this area

⇒By-catch trade of SPO for SCH or BCO would push set netters further offshore.

⇒Not so keen on buy-back or compensation

⇒Greenbone 4 x 50 m nets for one hour and stay with them

⇒Fishers supported new set net rules in east Otago Taiapure area

11.2.2.10. South Otago Commercial Set Netters and Trawlers April 07

⇒Do not fish Slope Point to Waipapa Point

⇒Set net for rig and school shark south of Chaslands (3.5nm off) to Slope Point (1.5nm off and Molyneaux Bay).

⇒One trawler works from Waikawa Harbour trawling for flats and gurnard with a low head line net up to 1.5nm offshore

⇒No trawling or set netting in Porpoise and Curio Bays supported by fisher

⇒Dolphins in Porpoise Bay mainly and some in Sisters Bay

11.2.2.11. Conservation Group Meetings

⇒Dolphins inshore all year with more in summer

⇒Pods around Gore Bay, Oaro, Kaikoura Railway Station to Hāpuku R and at Kekerengu

⇒In Queen Charlotte Sound up to 30 in discrete areas over summer

⇒No dolphins at Peloris Sound

⇒Now fewer dolphins in the Warrington, Karitane, Moeraki and Oamaru.

⇒Very few dolphins in Blueskin Bay this year but up to six at other times.

⇒30-40 dolphins at Moeraki.

⇒Sometimes dolphins seen at Karitane.

⇒Monarch sees dolphins off Otago Harbour.

⇒Dolphin vulnerable to threats because of genetic crash 1960-1990s

⇒ Set netting biggest threat and should be banned

⇒ Bag limits set too high to control recreational set netting

⇒ Commercial set netting in the Kaikoura Canyon very selective and at depths (up to 600m) outside the dolphins range

⇒ Any legislation needs to be simple, clear and able to be policed

⇒ Prefer protection over whole dolphin range to prevent fragmentation

⇒ Favoured national measures to mitigate threats to dolphin with banning of set nets being the preferred option

⇒ Favoured marine mammal sanctuary around the whole of the South Island to 100m deep

⇒ Want a marine mammal sanctuary for Kaikoura Coast

⇒ A compromise was banning recreational set netting, observers on trawlers (50-80% coverage), and a commercial set net ban phased in over time to five nautical miles or 80m deep.

⇒ Network of marine reserves will reduce problem

⇒ Suggested use of surf patrols to get dolphin numbers

⇒ Hector's in Kaikoura should be dealt with in the same manner as Maui's dolphin because Kaikoura puts itself forward as the marine mammal capital of New Zealand

⇒ Value of dolphins and beach important to Warrington.

⇒ Important intangible value of the dolphin.

⇒ Tourism is likely to displace set netting

⇒ Tourism most important industry for Akaroa and is based on Hector's dolphins

11.2.2.12. Dunedin City Council (DCC) – 25 May 2007

⇒ DCC favours status quo in regards to shark nets

⇒ DCC supports information that would make the nets more dolphin friendly, eg, pingers

⇒ Unknown if any dolphins found off St Clair or Brighton – maybe a research project topic.

11.2.2.13. Te Korowai O Te Tai Marokura 17 April 07 and later submission

⇒ Te Korowai O Te Tai O Marokura is a group dedicated to management of the ocean environment in the Kaikoura region

⇒ Consensus agreement was achieved through a process of question and answer, with each participant having the opportunity to speak and the experience of being listened to and heard

⇒ The group was able to align on a commonly shared outcome by finding shared values and agreeing on certain facts.

⇒ Te Korowai unanimously agrees that the Hector's Dolphins are under threat from human activity to some degree

⇒ There was agreement that the status quo is not acceptable and that something needs to be done

⇒ There was agreement on commitment to the survival and recovery of our local pod of Hector's at Kaikoura

⇒Concern expressed at the meeting about the lack of baseline data and will seek better scientific information from Dr Liz Slooten and may resubmit later

⇒The group agreed that netting should take place but with certain conditions (Forest and Bird may disagree at national level)

⇒The group does not support total net ban (except Forest and Bird - national position a ban to the 100m depth contour)

⇒Amateur interests agreed to no netting on open coast and attendance on gear, and will submit on the detail of this separately

⇒Commercial volunteered to stay out of inshore areas, and will submit separately on the detail

⇒Te Korowai recommends the use of local knowledge/feedback as a part of this ongoing monitoring programme and can advise on how this feedback could be collected/recorded regularly

⇒Kaikoura locals could have a role in compliance (e.g. public awareness – which is working very well in relation to the Rahui), and there is a need for a locally resident full time Fishery Officer.

11.2.3. South coast of the South Island

11.2.3.1. Amateur Stakeholders - Tuatapere 26 April 07

⇒The population hasn't changed based on 16 years of fishing observations. Line transit survey method of 89-100 dolphins seems low

⇒Need recent survey results to assist with a comparable assessment of 89 survey and queried the need for action until all the information is available

⇒The fish are where the dolphins are

⇒Dolphins mostly west of Orepuki

⇒1 fathom to 15 fathom (28 m) is the main Hector's range

⇒Very few amateur set netters in Te Waewae Bay who are usually mature people not wanting to stress themselves

⇒Set netting very controlled by weather and impact of set netting is negligible

⇒Fishers mainly based at fishing cribs along the coast

⇒Significantly less set net effort in Te Waewae Bay than Canterbury

⇒Very little set netting in Te Waewae Bay but a lot around Monkey Island in summer and west of Rowellen Burn

⇒A query whether a change from mono to multi filament might assist?

⇒There are differences between fishers (areas fished and boats) that need to be taken into account

⇒Need to clarify in any paper the differences between fishers and their individual practices

⇒Need a commitment from Government to make pingers available

⇒There are 600m herring bone cow milking sheds down coast 2km apart

⇒Anecdotal evidence of 2 set net captures at Monkey Island

⇒Need for education about amateur code of practice

⇒Summer holiday cribs and tradition of freedom to camp with feed of fish at risk is set netting banned

⇒Concern about loss of recreational traditions if set netting affected.

11.2.3.2. Commercial set netters

⇒Most dolphins inside 1nm at Te Waewae Bay and 3 or 4 individuals at Oreti river mouth.

⇒Dolphins mainly occur on western side of Te Waewae Bay, "Fudder" to "Waik" dolphin hot spot in Te Waewae Bay

⇒Dolphins mainly in Te Waewae especially in the Futter (Port Craig to Sandhill Point) and Monkey Island. Tend to stay in close inshore unless weather blows them out

⇒More dolphins Slope Point to Waipapa Point

⇒West Te Waewae Bay from Stony Creek to Sandhill Point not fished

⇒BUT 5 mainly caught at Stewart Island and Ruapuke in winter using 30 x 60m nets with 4.25 inch mesh

⇒Set netting November to January in Te Waewae Bay for rig inside 1nm (little this year because of vessel replacement) and out to 3nm

⇒Set netting for rig 1.5nm off Oreti Beach and 4nm offshore at Mid Bay Reef at in Te Waewae Bay

⇒Set netting occurs in Foveaux Strait, Fortrose to Waipapa Point, and the east and west coasts of Stewart Island

⇒New fishers entering rig set net fishery because of the high SPO 3 TACC and fishery declining because females not bearing live young

⇒Fishers using up to 3000m net to target rig and school shark made up of 4 – 9 nets and set for 3 hrs

⇒Fishers have up to 3 crew who are locally based.

⇒Acoustic pingers should be available from Crown to ensure supply and consistent specifications

⇒One fisher has a pinger on his net every 100m and another uses them when netting in water under 25m

⇒Broadbill seven gills and carpet sharks increasing Fortrose to Sandhill Point

⇒One fisher had 30 days of observer coverage last summer from Foveaux Strait to Fortrose and no dolphins were caught

⇒How was the dolphin catch years ago when there were a lot more set net boats?

⇒One fisher noted that trawlers were able to catch rig

11.2.3.3. Bluff Trawlers 27April 07

⇒Don't catch dolphins because of flatfish trawl gear has low headline height and is heavy and noisy and frightens dolphins away

⇒Lots of sand dollars in western part of Te Waewae Bay

⇒Futter on west side and Monkey Island main anchorages in Te Waewae Bay

⇒FLA3 fished in Te Waewae Bay from late July to April.

⇒Trawling moves towards outer bay when there are lots of flatfish

⇒No trawling inside one nautical mile where dolphins are, based on five years of data

⇒More than 60% of Bluff trawlers fish in the bay

⇒Three main areas fished – Te Waewae Bay, Ruapuki and Cod Fish Island

⇒Catch distributed about one-third to each of these areas

⇒No boat strikes as they tow at 1.8 to 2.2 knots and don't chase dolphins

⇒Prefer voluntary measures to mitigate dolphin issues.

11.2.4. Top of the South Island

11.2.4.1. Tangata whenua – Te Tau Ihu Fisheries Forum 9th of July

⇒Te Tau Ihu did not want the protection of marine mammals to be an excuse to diminish their customary right to harvest fish using set nets.

⇒Te Tau Ihu opposed any restrictions on their customary rights to use set nets

⇒Te Tau Ihu noted that only .07% of Hector's were caught by set nets (not sure where that figure has been taken from), and that an even smaller percentage would be taken by customary set netters, and that number would be reduced even further when looking at individual iwi areas, and therefore, Maori should not have to give up their customary set netting practices for such a small percentage

11.2.4.2. SoundsFish – Nelson, 17th of May

⇒SoundsFish were represented by Queen Charlotte Sounds Residents Association, SoundsFish, Ngati Kuia, a commercial fisher and a recreational fisher.

⇒Participants believe the Marlborough Sounds should be a separate core abundance area.

⇒Participants suggested two types of commercial set netting in the area: (i) butterfish set netting over rocky / kelp bottoms; and (ii) other inshore set netting. In Cloudy and Clifford Bays set net fishers target rig, elephantfish, and school shark.

⇒Participants noted that customary set netting for butterfish also occurs.

⇒Participants believe that dolphins do not go over rough ground, so set netting for butter fish should be retained as a method, but there is a case to restrict other set netting over muddy substrate.

⇒Participants reported sighting Hector's in both the inner and outer Queen Charlotte Sound, Waikawa Bay, East Bay, Bay of Many Coves, around Blue Mine Island, Port Underwood, Chetwood Islands, around Hardings Point, Cloudy Bay - Clifford Bay, Admiralty Bay, Cape Campbell-Canterbury Gully.

⇒Participants believe there is a resident group of Hector's in Queen Charlotte Sound that increases in number over the summer.

⇒Participants reported never sighting Hector's in Pelorus Sound, around French Pass, Robertson Point – Pereno-Cape Kaumaru area. Participants suggested these latter areas were too tidal and dirty for dolphins.

⇒Participants believe one of the main threats to Hector's is an influx of summer visitors who crowd around the dolphins when they are seen, disturbing them. Participants believe harassment is a huge risk to the dolphins.

⇒Participants believe both MFish and DoC must raise public awareness about possible entanglements and the need to report any incidents.

⇒Participants believe that more research is required to investigate protective measures including the impacts of dredging on dolphin habitat, and non-fishing threats.

⇒Participants suggested that a long term monitoring strategy is required to ensure that measures are effective.

11.2.4.3. Recreational - Nelson, 22nd of May

⇒The Top of the South Recreational Forum (ToSRF) were represented by Mapua Boat Club, TASFISH, Pelorus Boat Club, Dawnbreakers Fishing Club, Tarakohe Sea Anglers, Tennyson Inlet Boat Club, Marlborough Sounds Recreational Fishers Association, and the Nelson Underwater Club. Discussion focussed around Tasman and Golden Bays and Marlborough Sounds.

⇒ToSRF stated that a group of Hector's are resident in Golden Bay; Hector's are not seen in Pelorus Sound

⇒ToSRF stated that there is a lot of recreational set netting in Tasman Bay for rig and snapper, particularly off Rabbit Island, Motueka and D'Urville Island. Most recreational set netting in the Marlborough Sounds is for flounder using nine-mesh-high nets. Most recreational set netting in Queen Charlotte Sounds is for butterfish or moki over reefs.

⇒ToSRF stated that the public need to be made more aware of where Hector's are found and the need to report incidents.

⇒ToSRF stated that the requirement to stay with set nets is not practical, although some fishers would support a ban on set nets. Participants noted that set netting for flounder using nets that are only nine meshes high does not pose a threat to Hector's dolphin.

11.2.4.4. NGOs, Environmental Interest Groups – Renwick 11th of May

⇒The NGOs were represented by Forest & Bird, Friends of Nelson Haven and Tasman Bay, and Marlborough Environment Centre.

⇒NGOs reported seeing Hector's in Queen Charlotte Sound, Marlborough Sound, eastern Golden BayMarbells beach-Mussel Point,

⇒NGOs sated that Hector's are not seen in Tasman Bay or around Seddon

⇒NGOs do not support the core abundance approach, but prefer stronger protection for ToS Hector's population.

⇒ToS participants believed that recreational set netting in Golden Bay is much less frequent now than it was in the 1970s and 1980s. ToS participants noted some set netting occurs in Grove arm (Makuta Bay) by visitors over the summer, and Marbells Beach –Mussel Point area.

⇒ToS participants would prefer a set netting ban. Alternatively, a range of restrictions were proposed including the requirement that fishers remain with their set nets, prohibit set netting in waters less than 100m, a ban over summer, and stringent penalties for breaches.

11.2.4.5. Commercial – Nelson 16th of May

⇒Commercial were represented by Challenger Finfish Management Company, SeaFIC, Area 2 Management Company, Port Nelson Fishermen's Association, and several commercial fishermen.

⇒Commercial participants stated that commercial fishing within the Challenger area does not catch Hector's dolphins

⇒Commercial participants strongly believed that interactions with Hector's dolphins are caused by recreational set nets

⇒Commercial participants recommended that recreational set netting be banned.

⇒Commercial participants oppose any method restrictions for commercial fishers because they currently use a wide variety of fishing gear types.

⇒Commercial participants expressed concern that status quo management of Hector's dolphins is not an option, given their belief that status quo is a viable option in some areas.

⇒Commercial participants expressed concern that there is little up to date scientific data to base decisions upon, such as current population sizes.

⇒Commercial participants believe that the Hector's population is the same or even greater than in the past. Commercial believe it is important to emphasise the fact that Hector's also die of natural causes: mortalities not solely due to human interactions

⇒Commercial participants suggest that MFish and DoC need to make more effort to ensure the public is aware of the hazards posed by recreational set netting, rather than commercial set netting.

⇒Commercial participants stated that commercial set net fishers remain with their nets because they are unable to return to port.

⇒Commercial stated that the methods they normally use do not pose a threat to Hector's: low headline (1.5m) 'sole' nets for targeting sole, flatfish and gurnard, towed at low speed (2.8 – 3.5 knots); inshore trawling using low headline, no wing doors, smaller sweep area; and developing the use of pingers to deter dolphins.

⇒Commercial stated that three dolphin captures in the Cloudy / Clifford bay area was the result of using gear not normally used in inshore waters – wing trawl with high headline, and fishing in shallow waters.

⇒Commercial stated that the number of commercial set netters is very small – three operate from the West Coast, and four from the ToS, and fishers fishing rig quota have moved from set netting to trawl bycatch.

11.2.5. West coast of the South Island

11.2.5.1. Tangata whenua – Te Runanga o Makaawhio (Hokitika to Jacksons Bay rohe) 7th of May

⇒Discussions with Te Runanga o Makaawhio focussed around Bruce Bay, where the Makaawhio marae is based. Te Runanga o Makaawhio note that Hector's dolphins are seen clustering in local areas, including Bruce Bay.

⇒Te Runanga o Makaawhio state that local currents and tides cause accumulation of beach cast debris around Bruce Bay; this may be why there is a concentration of dolphin carcasses cast ashore.

⇒Te Runanga o Makaawhio note that very little customary set netting occurs at this time, nor is there much recreational set netting. Set netting that does occur generally happens around river mouths to target flounder, but the method is uncommon.

⇒Te Runanga o Makaawhio suggest there is a need for more publicity about set netting issues and the recreational code of practice for set netting. This could be accomplished by more posters in the

area.

11.2.5.2. Tangata whenua – Ngati Waewae (Hokitika to Kahurangi Point rohe) 15th of May

⇒Ngati Waewae note there is no customary set netting occurs at this time, however Ngati Waewae may wish to adopt this method in the future. Ngati Waewae are conscious that any new management measures may impact upon customary development rights.

⇒Ngati Waewae suggested that increased public awareness and more compliance resources are needed for the West Coast to ensure that any new management measures are effective.

⇒Ngati Waewae state there is a need to address protocol issues with regard to dead dolphins that are sent to Massey University for autopsy.

⇒Ngati Waewae are concerned about the impact of land-based activities on Hector's dolphins and the marine environment. Therefore, the Hector's dolphin TMP needs to advocate appropriate land management practices, and should be incorporated into the West Coast Coastal Management Plan.

11.2.5.3. NGOs, Environmental Interest Groups – Westport 8th of May

⇒The NGOs were represented by Hector for Hector's and Forest & Bird (West Coast branch).

⇒NGOs suggest the numbers of Hector's dolphins appears to have been constant for several years in some areas, and the level of dolphin bycatch appears to have decreased (Hector for Hector's). However the number of reported dolphin mortalities may be an underestimate of the true number of dolphins killed.

⇒NGOs believe that amateur set netting is the major threat to hector's dolphins, not commercial set netting. NGOs believe set netting is an undesirable practice and poses an unacceptable risk to Hector's dolphins. Consequently, these groups favour prohibiting amateur set nets throughout the west coast over the summer.

⇒NGOs note the prevailing sea conditions along the coast causes recreational fishers in some areas (particularly in Buller Bay) to illegally set their nets such as staking one end of their net directly into the beach and stranding of the net at low tide.

⇒NGOs note the use of these nets poses a very significant risk to dolphin entanglement as the nets are set 90° from shore within the surf zone and this is an area where dolphins are frequently observed during the summer months.

⇒NGOs believe that it should be mandatory for fishers to remain with their set nets, and that overnight fishing should be prohibited.

⇒NGOs believe better education, publicity and strict enforcement of the amateur set net fishing regulations is necessary to stop the use of these nets.

11.2.5.4. Recreational – Hokitika 9th of May

⇒Recreational fishers were represented by the Greymouth Fishing Club, South Westland Marine Consultative Group and the Hokitika Angling Club.

⇒According to recreational fishers, the Hector's dolphin problem is due to recreational set nets. This problem would be largely addressed with a summer ban on all recreational set nets and compulsory attendance with nets at all other times of the year, in the core abundance area. The set netting ban should not include lagoons/rivers.

⇒Recreational fishers note that although Hector's dolphins are seen throughout the year in the Greymouth, Hokitika, and Haast areas, they are more typically seen in summer than winter. Some participants believed that hector's dolphin population was either stable or was greater than in the past with some large pods (>20 animals) spotted, but this may be because the participants are more observant

⇒Recreational fishers note that not a lot of recreational set netting occurs on the West Coast (especially the Greymouth and Hokitika areas) compared to other regions – due to the nature of the surf and/or weather conditions (often rough, large surf).

⇒Recreational fishers note that recreational set netting mostly done by non-local fishers during the summer period. Set netting outside summer is negligible. There has been an increase in recreational set netting in the Jacksons Bay / Haast area as the area is becoming more popular with visitors.

⇒According to recreational fishers, visitors come to the region and either fish intensively or find a set net at the bach and take the opportunity to use it. The problem with recreational set nets is due to non-local fishers being unfamiliar with local conditions ie, set nets in unsuitable areas or unable to retrieve a net because the sea turns rough.

⇒Recreational fishers state that limited set netting done by local fishers (considered to be negligible in some areas). There is some evidence of illegal set netting practices along the coast (Buller Bay)– nets are staked using railway sleepers buried into the sand, and nets are stranded at low tide. These nets are continuously fished over many days (including overnight). The likelihood of getting caught are perceived to be consideration should be given to banning overnight setting of nets.

⇒Recreational fishers suggest the core abundance area may need to extend further south, to include Knight's Point and Ships Creek, and also include Jacksons Bay.

⇒According to recreational fishers, there is a strong need to increase public awareness (particularly school children) about dangers of set nets on Hector's dolphins and the need to report any fishing-related incidents.

11.2.5.5. Commercial – Greymouth 15th of May

⇒Commercial fishers were represented by Challenger Finfish Management Company, SeaFIC and several set net and trawl fishers.

⇒Commercial fishers report there has been a large decrease in commercial set netting activity along the west coast in recent years and that their activities do not pose a threat to the WCSI sub-population.

⇒Commercial fishers note they operate in a way that prevents dolphin entanglement including the use of various fishing practices under a voluntary set net code of practice.

⇒All commercial fishers spoken to state that regularly encounter Hector's dolphins on a daily basis when fishing and that they have not caught dolphins.

⇒Commercial trawl fishers state the type of trawl net used when fishing to close (ie, low headline, no wing doors, small sweep area, and slow two speed) does not pose a threat to Hector's dolphins. Furthermore, Hector's dolphins are aware of trawl fishing gear and avoid it.

⇒Commercial fishers state that most dolphins are found in 10 -20 metres, 2-3 nm from shore. It is rare to see Hector's dolphins >6 nm from shore.

⇒Most commercial fishers suggest that Hector's dolphin abundance has remained the same, if not increased, compared to previous years, and that the 2001 population estimate is too low.

⇒Commercial fishers state that not many Hector's dolphins are seen between Heaphy and Kaurangi. Therefore, they suggest the core abundance area should not extend this far north. However some are seen partially up some rivers, and in Fiordland.

11.3. Appendix 3 – Potential Biological Removal

The Potential Biological Removal (PBR) level is the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.[168] The PBR is calculated by the following formula:

- $PBR = N_{MIN} \frac{1}{2} R_{MAX} F_R$

Where:

- N_{MIN} = the minimum population estimate of the stock;
- $\frac{1}{2} R_{MAX}$ = one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size; and
- F_R = a recovery factor between 0.1 and 1.0[169]

The term Optimum Sustainable Population means, with respect to any population stock, the number of animals that will result in the maximum productivity (Maximum Net Productivity Level – MNPL) of the species, population, subpopulation or stock in question, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent part. For marine mammals, this level is thought to be between 50% and 85% of carrying capacity (K) and is more likely to be at the lower end of that range.[170]

The minimum population estimate of the stock (N_{MIN}) is defined as the 20th percentile of a log-normal distribution based on an estimate of the number of animals in the stock. This is equivalent to the lower limit of a 60% 2-tailed confidence interval.[171]

The default maximum theoretical productivity rate is 0.04 for cetaceans. This value is used as a default in the absence of species specific information. When data are available on the productivity rate, they should be used.

The recovery factor is intended to compensate for uncertainty and possible unknown estimation errors. A recovery factor of 0.1 often is the default used for endangered stocks of marine mammals.[3] A recovery factor of 0.5 has been suggested for stocks of indeterminate status.[172]

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[168] The PBR is a technique that was developed by the US National Marine Fisheries Service in response to the US Marine Mammal Protection Act. The PBR was never intended to be used to close a fishery; rather, it provides a trigger value, after which a Take Reduction Team was convened to identify ways to reduce the number of human-caused marine mammal mortalities to a level below the calculated PBR value.

[169] Wade, P.R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. Marine Mammal Science 14(1): 1-37.

[170] Taylor, B.L. and D.P. DeMaster. 1993. Implications of non-linear density dependence. Marine Mammal Science 9: 360-371.

[171] Barlow, J., S.L. Swartz, T.C. Eagle and P. Wade. 1995. U.S. marine mammal stock assessments: Guidelines for preparation, background, and a summary of the 1995 assessments. NOAA Technical Memorandum NMFS-OPR-95-6. September 1995.

[172] Wade, Paul R. and Robyn P. Angliss. 1997. Report of the GAMMS workshop: April 3-5, 1996, Seattle, Washington, NOAA Technical Memorandum NMFS-OPR-12.

The MNPL goal of the PBR approach was developed to achieve the goals given in the US Marine Mammal Protection Act, *i.e.,* to maintain the population above its maximum net productivity level. This level will be at 50% – 85% of carrying capacity.

The Recovery-Rate goal allows a population known to be at a low level relative to its pre-exploitation level to recover at a rate close to its maximum as possible. In this case, a recovery factor (F_R) of 0.15 will achieve the goal of not delaying the time to recovery by more than 10% with 95% probability.

Earlier studies suggested an R_{MAX} of about 1.8. The Hector's dolphin Technical Working Group meeting of 31 August 2006 suggested that an R_{MAX} of 3.4% is appropriate based on the modelling work of Davies and Gilbert (2003).[173] MFish and DOC propose to have the Hector's dolphin PBR analysis independently reviewed to resolve the issue around which R_{MAX} is most appropriate for Hector's dolphins[174].

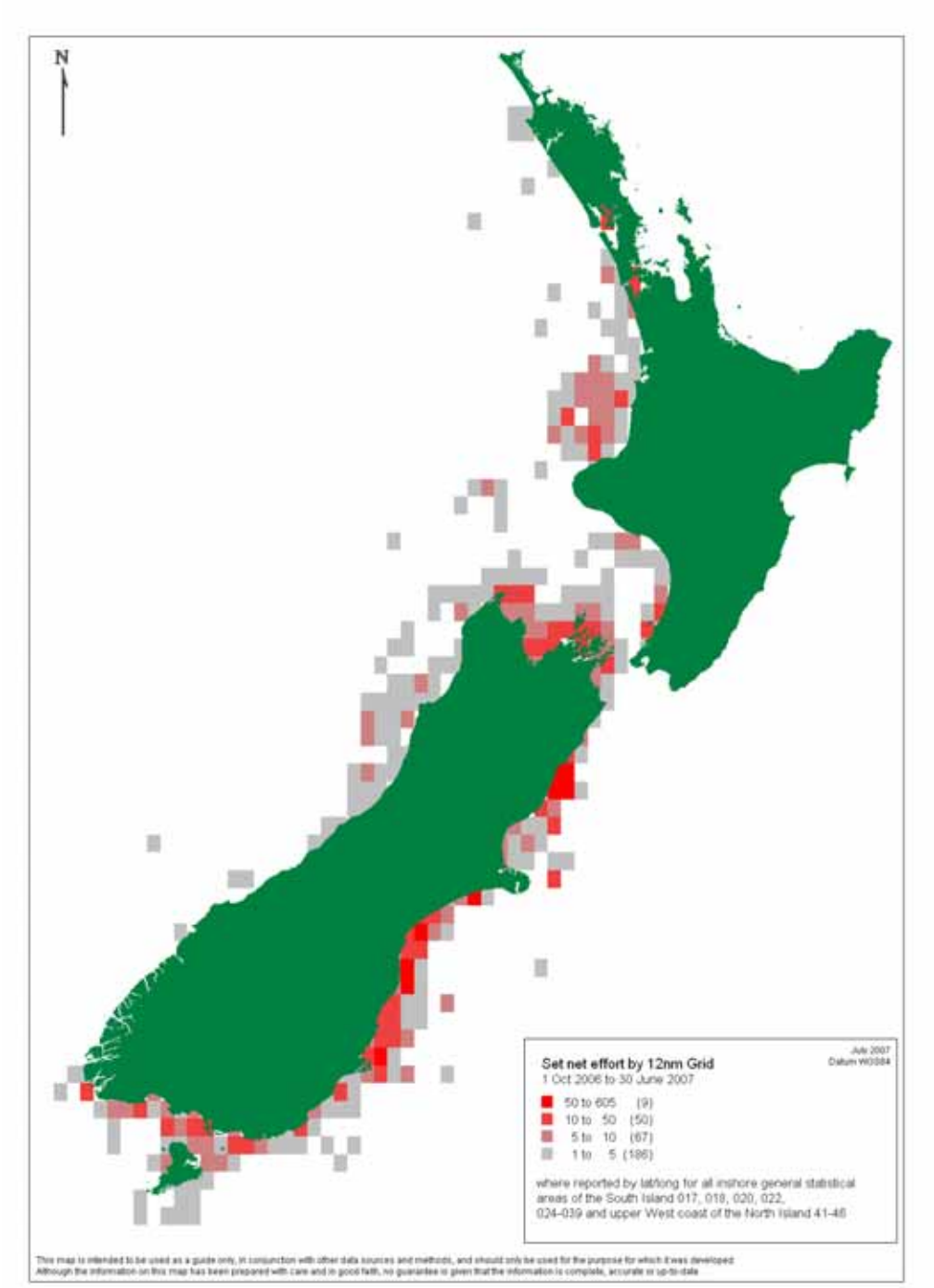
As applied here, values calculated by the PBR approach should be seen as indicative only and should not be taken as absolute values of maximum allowable Hector's dolphin human caused mortality.

[173] Davies, N.M. and D.J. Gilbert. 2003. A risk analysis of an endangered dolphin subspecies using a temporal-spatial age-structured model. Final report for MFish Research Project MOF2002/03D, Objectives 1, 2, & 3 (revised). November 2003.

[174] As part of this review, it is proposed that the recovery factor chosen for all of the Hector's dolphin populations is also reviewed for appropriateness.

11.4. Appendix 4 – Fisheries characterisation (general)

The location of commercial set net effort at a finer spatial scale than statistical area has not been available from the Fisheries Information System until 1 October 2006 (when a new reporting requirement was introduced). This more detailed information is helpful in assessing how set net effort is distributed, both along shore and offshore. A map illustrating set net effort from 1 October 2006 to 30 June 2007 is below. It should be noted that this map is not representative of year round fishing effort because data on set net effort from 1 July to 1 October is excluded from the data set.



Map 26 Commercial set net effort (number of events) around New Zealand's coastline (12nm grid)

11.4.1. East coast of the South Island

11.4.1.1. Characterisation of the amateur set net fishery

Set netting is an important amateur fishing practice within the area where the ECSI Hector's dolphin population is found. After blue cod, flatfish and butterfish are the most sought after finfish species by amateurs along the ECSI. During the 2000-01 national marine recreational fishing survey diarists harvesting blue cod numbered 162, those harvesting flatfish numbered 50 and those harvesting butterfish numbered 38. Set netting is the main fishing method used by amateur fishers to catch small sharks, flatfish and butterfish.

Amateur set netters fish for small sharks (elephant fish, rig, school shark and spiny dogfish) close inshore in open beach areas during summer. Butterfish (greenbone) is set netted all year in kelp/reef areas close inshore. Set netting for flatfish occurs in inner harbours and bays. There is set netting for moki on open mud and sandy substrates adjacent to submerged rocks and cliff faces.

Amateur fishers generally favour set netting in the warmer summer months, particularly fishers who recreationally fish away from where they live (for example, holiday makers). Set netting at any time of the year is favoured by local sustenance fishers who have retired to, or have holiday houses, near the areas they fish. For these fishers being able to set net is an important part of their way of life and for maintaining relationships with family and friends by sharing experiences and catch.

11.4.1.2. Characterisation of the commercial set net fishery

Fishers use nets up to 800 m long to fish for elephant fish and rig mainly in waters less than 450m (1-20 nm offshore) deep. Spiny dogfish and school shark are mainly caught between 10 m water depth (~1 nm) to 100m water depth (~5-20 nm except the Kaikoura Canyon). Butterfish (greenbone), moki and trumpeter are targeted by commercial fishers with short (up to 60 m) nets in kelp/reef areas close inshore. Commercial set netting generally takes place during summer months from October to March.

Significant targeting of small shark stocks of rig (SPO 3 and part of SPO 7) and school shark (SCH 3 and part of SPO 7) takes place by commercial set netters in the area associated with the ECSI Hector's dolphin population. Commercial set netters also target smaller amounts of elephant fish (ELE 3), spiny dogfish (SPD 3) and butterfish (BUT 3).

Most SPO 3 and SPO 7 catches are taken by the method of set netting (ie, 75%) and the remainder of catch is mostly taken by bottom trawling. In the last fishing year (2005-06) about around 220t of SPO 3 was caught by commercial set netters, with Timaru set netters catching around half of the catch. About 80 tonnes of SPO 7 and 20 tonnes of SCH 7 was caught by set netters during the last fishing year (2005-06) mainly in Tasman and Golden Bays.

About 45% of SCH 3 catches are taken by set nets (with bottom trawl accounting for a similar level of catches). The set net catch of SCH 3 is around 170 tonnes and the catch is spread along the coast. SCH 3 is mainly caught as bycatch of the SPO 3 set net fishery. A small set net fishery for SPD 3 follows the migration of the fish up the ECSI. The catch from the set net fishery for ELE 3 is usually less than 50 tonnes. Moki and trumpeter are caught as bycatch of the target butterfish fishery, but are also targeted.

11.4.1.3. Characterisation of the trawl fishery

Trawl fishers mainly target flatfish, red cod and tarakihi off the ECSI. Flatfish is mainly targeted in water depths less than 30 m using a low headline height net. Red cod is mainly targeted in water depths between 20 and 50 m and tarakihi between 50 and 100 m.

11.4.2. South coast of the South Island

11.4.2.1. Characterisation of the amateur set net fishery

Amateur set netting is practiced in Te Waewae Bay. Amateur set netting in the bay is confined to within 500 m off the shore for small sharks (such as elephant fish and rig) during summer and reef fish (such as butterfish and trumpeter). Fishing mainly takes place over summer and is primarily confined to a limited number of local people who fish on the weekends. There is a campground at Monkey Island, which is located on the eastern side of Te Waewae Bay. Visitors from outside the local area stay at the campground, particularly over the Christmas/New Year holiday, which leads to increased fishing effort (including set netting).

At the eastern end from Monkey Island to Pahia Point the rocky area is fished for reef fish. At the western end near the Waikoau River mouth and back along the beach to the eastern end set netters target small sharks. Some amateur fishers set their nets at low tide and retrieve them 13 hours later at low tide again. There is a considerable amount of recreational set netting/dragnetting for flounder in the lagoon of the Waiau River that flows into Te Waewae Bay.

11.4.2.2. Characterisation of the commercial set net fishery

In the Hector's dolphin population area on the SCSI, there are around 9 commercial set netters who use nets up to 800 m long to fish for elephant fish and rig mainly in waters less than 50 m (1-20 nm offshore) deep. Spiny dogfish and school shark are mainly caught between 10 m (~1nm) to 100 m (~ 5-20 nm) water depth. Butterfish (greenbone), moki and trumpeter are targeted by commercial fishers with short (up to 60 m) nets in kelp/reef areas close inshore. Commercial set netting generally takes place during summer months from October to March except for butterfish that generally occurs in the winter months in Foveaux Strait and around Stewart Island.

Significant targeting of small shark stocks of rig (SPO 3) and school shark (SCH 5) takes place by commercial set netters in the area associated with the SCSI Hector's dolphin population. Commercial set netters also target smaller amounts of elephant fish (ELE 5), spiny dogfish (SPD 5) and butterfish (BUT 5).

Most SPO 3 catch is taken by the method of set netting (ie, 75%) and the remainder of catch is mostly taken by bottom trawling. In the last fishing year (2005-06) about around 70 tonnes of SPO 3 was caught by commercial set netters.

About 90% of SCH 5 catches are taken by set nets (with bottom trawl accounting for 10% of catches). The set net catch of SCH 3 is around 650 tonnes and the catch is spread along the south coast and Stewart Island. A small set net fishery for SPD 3 follows the migration of the fish up the ECSI. The catch from the set net fishery for ELE 3 is usually less than 5 tonnes. The BUT catch by commercial set netters is around 40 tonnes and mostly taken by set netting. Moki and trumpeter are also caught as bycatch of the targeting butterfish, but are also targeted.

11.4.2.3. Characterisation of the commercial trawl fishery

Trawl fishers mainly target flatfish and stargazer off the SCSI. Flatfish is mainly targeted in water depths less than 30m using a low headline height net. Stargazer is generally targeted in deeper water outside 50m.

11.4.3. West coast of the South Island

11.4.3.1. Characterisation of the amateur set net fishery

Limited amateur set netting occurs along the WCSI due to the exposed nature of the inshore environment. Often seas are rough for long periods of time that generally precludes fishers from using set nets. There are occasional long periods of calm weather, particular during the summer, when fishers are able to use set nets to catch fish. Main target species are elephantfish, tarakihi, and rig. Most set netting occurs in close proximity to towns and settlements.

MFish understands that most amateur set netting along the WCSI is undertaken by visitors to the area during the summer months. The WCSI is becoming an increasingly popular holiday destination and the number of visitors to the coast to fish has increased (particularly in areas around Jacksons Bay, Granity, Hector). These visitors will often take advantage of the calm weather during the summer and set their nets of a regular basis during their stay. Local fishers report that many of the problems with amateur set nets is due to visitors being unfamiliar with local conditions, and this can lead to loss of nets or longer than anticipated soak times as fishers are unable to retrieve their nets when seas become rough. Most set nets are generally set directly from shore with few nets set from boats due to the exposed nature of the coast.

There is anecdotal information to suggest that some fishers illegally set nets due to either local sea conditions or perceive the risk of being caught is low. These nets are staked into the ground (often using railways sleepers permanently buried into the sand) and/or stranded at low tide. Often these nets are continuously fished over many days (including overnight).

11.4.3.2. Characterisation of the commercial set net fishery

Significant target set net fisheries exist for rig (SPO 7) and school shark (SCH 7) within inshore waters along the West Coast and top of the South Island.

Most rig catches are taken by the method of set netting (ie, 75%), with most of these caught as a target species (about 95%). The remainder of catches is taken by bottom trawling. In the last fishing year (2005-06) about 135 tonnes of rig were caught within the target set net fishery. The set net method mainly targets larger rig, particularly females (the bottom trawl fishery takes smaller rig that are primarily males).

About 40% of all school shark catches are taken by set nets (with bottom trawl accounting for similar level of catches). In the last fishing year (2005-06) about 65 tonnes of school shark were caught within the target set net fishery.

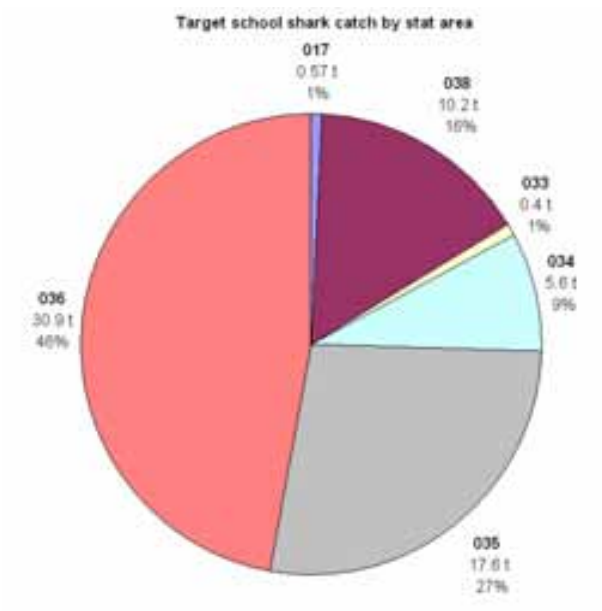
The majority of rig catches (about 60%) within the target set net fishery are taken from Golden and Tasman Bays, with most of the remaining catches being taken in the southern Cape Foulwind and Awarua Point region (ie, 033 to 034).

The majority of school shark catches (about 75%) within the target set net fishery is taken in the northern Cape Foulwind and Cape Farewell area (ie, 035 and 036). The remaining catches are mainly taken from Golden and Tasman Bays (038).

Currently, there are about 10-12 commercial set net fishers that target either rig or school shark, or both, within FMA 7; 4-5 of these fishers reside on the west coast and restrict their fishing activities to their local areas, while the remaining fishers predominantly fish in Golden and Tasman Bays. Information the size of rig and school shark catches is shown in Figure 5 below.

Most set netting for rig occurs within relatively shallow inshore waters, with catches mainly taken during

spring and summer, and tapering off between March and August. School shark catches are usually taken in deeper waters, although some catches are taken close to shore in some areas. There appears to be little seasonality in target school shark set net catches although catches tend to be higher between January and April.



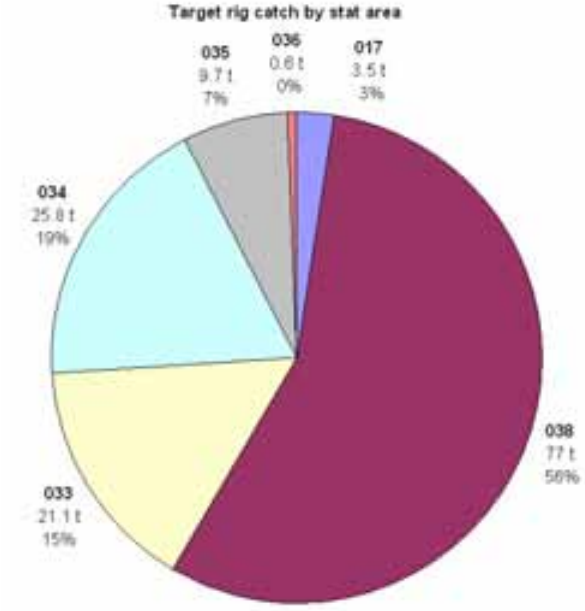


Figure 5: Commercial target rig and school catches (t) by set net in Fisheries Statistical Areas 017, 032-036, 038 for the 2005-06 fishing year

11.4.3.3. Characterisation of the inshore trawl fishery

The WCSI inshore trawl fisheries are managed within the wider Quota Management Area (QMA) 7 and includes the top of the South Island. All QMA 7 quota owners are entitled to fish in all areas of the QMA (including the WCSI) subject to specified area closures and restrictions.

Commercial trawling generally occurs throughout the WCSI, but the location of individual trawling activity within the particular area cannot be accurately determined from existing MFish data. Some fisheries are concentrated in one or two statistical areas, while others are fairly evenly distributed throughout the wider management area.

The majority of inshore trawlers use bottom trawl gear to target a wide range of species. The main WCSI trawl fisheries within inshore areas where Hector's dolphins are found (ie, 4-6 nm from shore) are flatfish, red cod, tarakihi, and elephantfish. Commercial trawling occurs throughout the WCSI but most fishing effort is concentrated between Westport and Hokitika (034 and 035).

Trawling can occur relatively close to shore dependent on species targeted and water depth relative to shore. For example, flatfish is mainly targeted in water depths less than 30 m using a low headline height net. Red cod is mainly targeted in water depths between 20 and 50 m and tarakihi between 50 and 100 m.

11.4.4. Analysis of selected commercial set net and trawl fisheries potentially affected by the measures proposed

Data was sourced from the Fisheries Information System (FIS). This data relates to commercial fishing

only. Data from the past 3 fishing years (2003/2004, 2004/2005 and 2005/2006) was analysed so that any trends in set netting effort could be identified.

The following information from FIS was examined:

⇒Data by fishing method in selected statistical areas by selected species

⇒Data on the number of Catch Effort Landing Return (CELR) records and forms by statistical area for selected species

⇒Data on the fishers (clients) fishing in a certain statistical area using a specific fishing method targeting specific species

⇒Vessel data for the fishers (clients) identified in c)

There are some limitations with this approach:

⇒Details of catch quantities recorded on CELR forms are an estimate only. This means it is not possible to say how much "actual catch" from each QMA came from particular statistical areas.

⇒It is difficult to match estimated quantities recorded on CELR forms with actual quantities on Monthly Harvest Return (MHR) forms as MHR report at a stock level not a statistical area level

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch on the CELR forms. Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. The following limitations are known about port prices:

⇒Survey replies may be skewed because industry know they are used to set cost recovery levies

⇒Does not differentiate harvest method – fish caught by one method over another may command a price premium

⇒Ownership structure can influence port price

⇒Port price does not reflect price differential for different grades of fish

11.4.4.1. Analysis of the Kaipara Harbour set net fishery using MFish internal data

This section sets out the relevant internal data that relates to set netting in the Kaipara Harbour which could be used to inform management advice on options proposed in the draft Hector's dolphin TMP.

Analysis

The analysis examines commercial set netting in the Kaipara Harbour to provide an assessment of the extent of this type of activity and the value associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the draft Hector's dolphin TMP and their relevance to the Kaipara Harbour will be examined by an external research provider

Data used

The Kaipara Harbour is statistical area 044 and this analysis focuses on the CELR form data that is attributed to this area.

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch on the CELR forms.

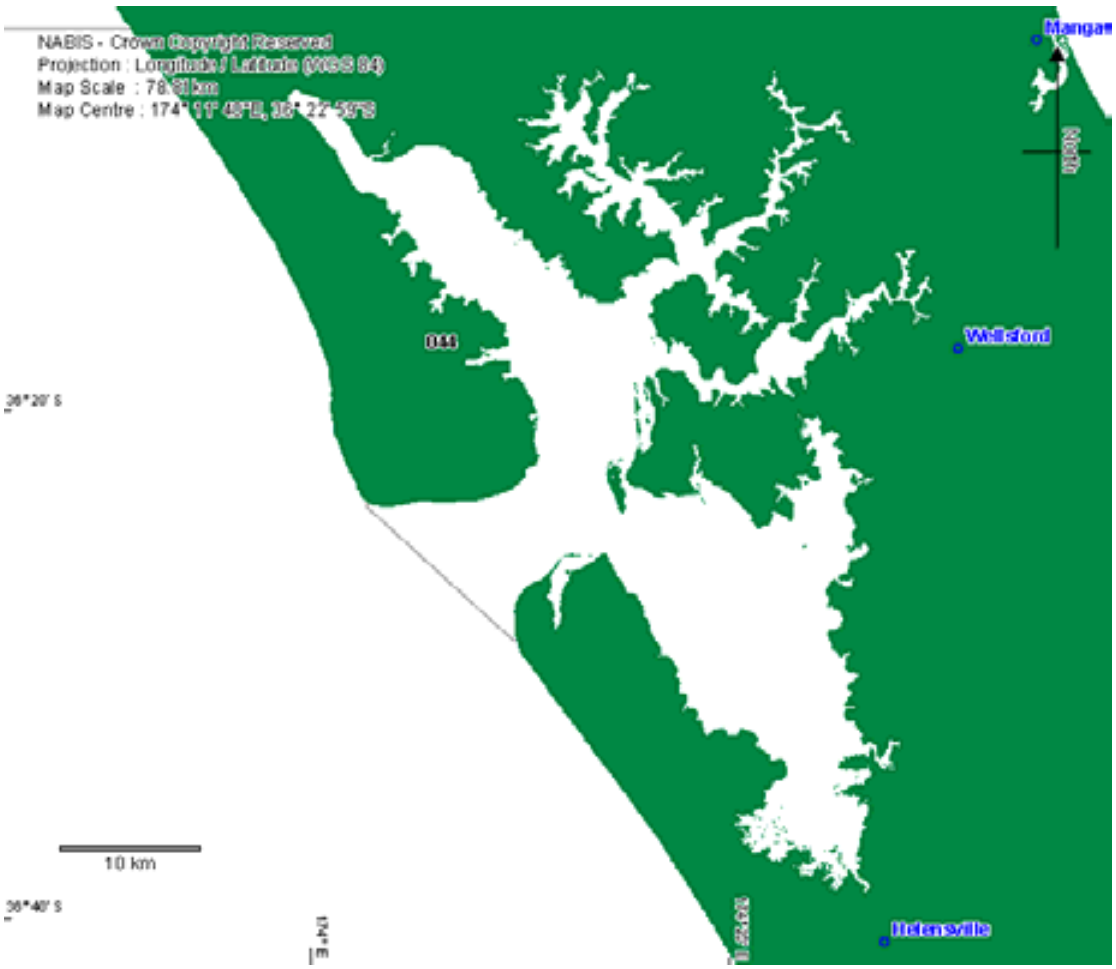
Table 1: Port prices for the species being targeted by set netters in statistical area 044 over the past 3 fishing years

Species	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
Flatfish (FLA)*	4.7500	5.2609	3.3500
Grey mullet (GMU)	2.6741	2.4114	2.2300
Kahawai (KAH)	0.4321	0.8125	0.4300
Spiny dogfish (SPD)	0.4980	0.4351	0.4700
Rig (SPO)	0.8886	3.5790	3.0000
Trevally (TRE)	0.8886	0.6700	0.8600
Yellow-eyed mullet (YEM)	2.1672	2.2505	2.4600

*Includes yellow-belly flounder (YBF)

Commercial Fishery

Danish seining and trawling are banned in the Kaipara Harbour so set netting is the main commercial fishing activity.



Map 27

The majority of Kaipara set netting vessels are based in the Kaipara Harbour and surrounding area with a few vessels operating out of Auckland, Thames and Whangarei. This would suggest that most of the vessels carrying out set netting in the Kaipara Harbour are local to the area.

Therefore, any ban or limitations placed on set netting may have a higher impact on local fishers than those based outside of the Kaipara Harbour.

The data from the CELR forms details the extent of set netting in Kaipara Harbour including the key target species of set netters (Table 2).

Table 2: Species being targeted by set netters in statistical area 044 over the past 3 fishing years

Target Species	Number of Fishers	% of Total Catch
Flatfish (FLA)*	40	23.50%
Grey mullet (GMU)	26	27.00%
Kahawai (KAH)	3	5.00%
Spiny dogfish (SPD)	2	0.12%
Rig (SPO)	22	15.00%
Trevally (TRE)	5	2.80%
Yellow-belly flounder (YBF)	6	26.50%
Yellow-eyed mullet (YEM)	2	0.08%

*could also include YBF

It is important to note that not all fishers report the species they are targeting as they are set netting for a mix of species rather than one specific target.

Using the data for the 8 target species above, the total extent of the set net fishery in the Kaipara Harbour (statistical area 044) can be estimated.

Table 3: Data on the use of set nets by commerical fishers in statistical area 044 for all target species over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	367,142	$1,283,296	4,572,695
2004/05	396,852	$1,449,222	4,584,642
2005/06	257,419	$720,343	3,808,812
Total	**1,021,413**	**$3,452,861**	**12,966,149**

Table 3 shows that the estimated catch over the past 3 fishing years by set netters in the Kaipara Harbour has been 1021 tonnes of fish worth an estimated $3.45 million.

There has been a significant decrease in the estimated catch between 2004/2005 and 2005/2006. The reasons for this decrease need to be investigated further to see what has caused the fishers/vessels to leave the fishery.

Species specific information follows:

Flatfish (FLA) and Yellow-belly flounder (YBF)

Flatfish (FLA) consists of eight species including yellow-belly flounder (YBF). Although for Quota Management System (QMS) purposes yellow-belly flounder is included in the flatfish stock code, given its importance to fishers in the Kaipara Harbour it is often recorded as a target species in its own right (Tables 4 & 5).

Table 4: Data on the use of set nets by commerical fishers in statistical area 044 targeting flatfish (FLA) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price ($ per kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	4.7500	103,773	$492,922	1325833.5	1,740	45	48
2004/05	5.2609	83,650	$440,074	1069110	1,480	44	47
2005/06	3.3500	54,144	$181,382	843527	1,153	38	40
	Total	**241,567**	**$1,114,378**	**3,238,471**			

Table 5: Data on the use of set nets by commerical fishers in statistical area 044 targeting yellow-belly founder (YBF) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price ($ per kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	4.7500	105,876	$502,911	1921002	2,153	14	18
2004/05	5.2609	90,537	$476,306	1700892	2,000	13	16
2005/06	3.3500	74,211	$248,607	1829511	2,107	14	16
	Total	**270,624**	**$1,227,824**	**5,451,405**			

Flatfish and yellow-belly flounder together account for 512 tonnes or 50% of the total estimated catch by set netters in the Kaipara Harbour over the past three fishing years. The estimated catch has an estimated value of $2.34 million. This makes it the largest set net fishery in the Kaipara Harbour.

The estimated catch of both flatfish and yellow-belly flounder has decreased over the past three fishing years. Fishing effort has decreased for flatfish and this may explain the decrease in estimated catch. In the yellow-belly flounder fishery, fishing effort has remained constant but catch has decreased.

Grey mullet (GMU)

Commercial fishing for grey mullet occurs predominantly in the Auckland Fisheries Management Area (GMU1) which includes the Kaipara Harbour.

Table 6: Data on the use of set nets by commerical fishers in statistical area 044 targeting grey mullet (GMU) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price ($ per kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	2.6741	85,508	$228,657	306337	556	36	39
2004/05	2.4114	109,901	$265,015	441890	866	36	41
2005/06	2.2300	80,593	$179,722	300424	616	27	30
	Total	**276,002**	**$673,395**	**1,048,651**			

The estimated catch of grey mullet was 276 tonnes. This is 27% of the total estimated catch for the Kaipara Harbour (statistical area 044) over the past three fishing years. The estimated catch has an estimated value of $673,395.

There was an increase in fishing effort during the 2004/2005 fishing year causing an increase in catch. Fishing effort and catch levels were at a similar level in both the 2003/2004 and 2005/2006 fishing years.

Rig (SPO)

Rig are caught in coastal waters throughout New Zealand. Most of the catch is taken from water less than 50 m deep during spring and summer, when rig aggregate inshore. The most important bottom set net fisheries are at 90-Mile Beach, Kaipara Harbour, Manukau Harbour, South Taranaki Bight, Tasman/Golden Bay, Canterbury Bight, Kaikoura and Hauraki Gulf.

Table 7: Data on the use of set nets by commerical fishers in statistical area 044 targeting kahawai (KAH) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	0.4321	11,302	$4,884	319590	458	29	31
2004/05	0.8125	29,772	$24,190	419390	655	34	39
2005/06	0.4300	9,106	$3,916	249940	381	23	27
	Total	**50,180**	**$32,989**	**988,920**			

The estimated catch of grey mullet was 153 tonnes. This is 15% of the total estimated catch for the Kaipara Harbour (statistical area 044) over the past three fishing years. The estimated catch has an estimated value of $380,750.

Combined flatfish (including yellow-belly flounder), grey mullet and rig accounted for 941 tonnes or 92% of the estimated catch for commercial set netters in the Kaipara Harbour over the past three fishing years.

Kahawai (KAH), Spiny Dogfish (SPD), Trevally (TRE) and Yellow-Eyed Mullet (YEM)

Commercial set netters have also targeted kahawai (KAH), spiny dogfish (SPD), trevally (TRE) and yellow-eyed mullet (YEM) in the Kaipara Harbour over the past 3 fishing years.

Table 8: Data on the use of set nets by commerical fishers in statistical area 044 targeting kahawai (KAH), spiny dogfish (SPD), trevally (TRE) and yellow-eyed mullet (YEM) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	17,132	$10,064	439421	634	53	57
2004/05	48,126	$36,487	660920	1015	66	74
2005/06	14,915	$9,963	407860	608	48	55
Total	**80,173**	**$56,514**	**1,508,201**			

These fisheries are low value fisheries and the estimated catch combined was only 80 tonnes. This is 8% of the total estimated catch for the Kaipara Harbour (statistical area 044) over the past three fishing years. The estimated catch has an estimated value of $56,514.

There was no catch report for spiny dogfish and yellow-eyed mullet in the Kaipara Harbour (statistical area 044) during the 2003/2004 and 2004/2005 fishing years by commercial set netters.

11.4.4.2. Analysis of Manukau Harbour internal data for the Dolphin TMP

Introduction

This paper sets out the relevant internal data that relates to set netting in the Manukau Harbour which could be used to inform management advice in support of the Dolphin TMP.

This data relates to commercial fishing only.

Analysis

Data was sourced from the Fisheries Information System (FIS). Data from the past 3 fishing years (2003/2004, 2004/2005 and 2005/2006) was analysed so that any trends in set netting effort could be identified.

The analysis examines commercial set netting in the Manukau Harbour to provide an assessment of the extent of this type of activity and the value associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the Dolphin TMP and their relevance to the Manukau Harbour will be examined by an external research provider.

Data used

The Manukau Harbour is statistical area 043 and this analysis focuses on the Catch Effort Landing Return (CELR) form data that is attributed to this area.

There are some limitations with this approach:

- ⇒Details of catch quantities recorded on CELR forms are an estimate only. This means it is not possible to say how much "actual catch" from FMA1 came from statistical area 043.
- ⇒It is difficult to match estimated quantities recorded on CELR forms with actual quantities on Monthly Harvest Return (MHR) forms as MHR report at a stock level not a statistical area level

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch on the CELR forms.

Table 1: Port prices for the species being targeted by set netters in statistical area 043 over the past 3 fishing years

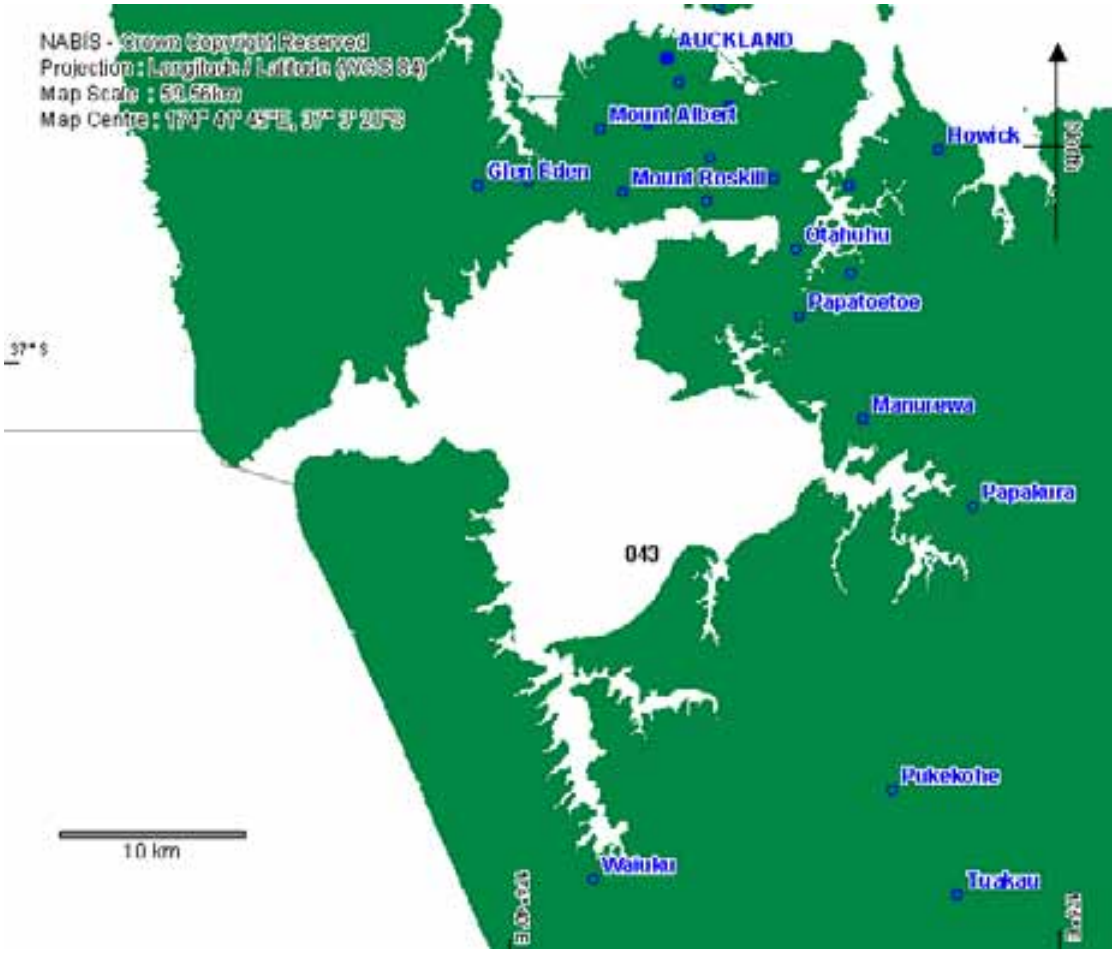
Species	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
Flatfish (FLA)	4.7500	5.2609	3.3500
Grey mullet (GMU)	2.6741	2.4114	2.2300
Kahawai (KAH)	0.4321	0.8125	0.4300
Rig (SPO)	0.8886	3.5790	3.0000
Trevally (TRE)	0.8886	0.6700	0.8600
Yellow-eyed mullet (YEM)	2.1672	2.2505	2.4600

Port prices are calculated by surveying Licensed Fish Receivers (LFRs) to see what they are paying for each species. The following limitations are known about port prices:

- ⇒Survey replies may be skewed because industry know they are used to set cost recovery levies
- ⇒Does not differentiate harvest method – fish caught by one method over another may command a price premium
- ⇒Ownership structure can influence port price
- ⇒Does not reflect price differential for different grades of fish

Commercial Fishery

Danish seining and trawling are banned in the Manukau Harbour so set netting is the main commercial fishing activity.



Map 28

The majority of Manukau set net vessels are based in the Manukau Harbour and Auckland with a few vessels operating out of the Kaipara Harbour, Raglan and Whangarei. This would suggest that most of the vessels carrying out set netting in the Manukau Harbour are local to the area.

Therefore, any ban or limitations placed on set netting may have a higher impact on local fishers than those based outside of the Manukau Harbour.

The data from the CELR forms details the extent of set netting in Manukau Harbour including the key target species of set netters (Table 2).

Table 2: Species being targeted by set netters in statistical area 043 over the past 3 fishing years

Target Species	Number of Fishers	% of Total Catch
Flatfish (FLA)	37	36.14%
Grey mullet (GMU)	24	36.24%
Kahawai (KAH)	32	5.24%
Rig (SPO)	29	16.66%
Trevally (TRE)	29	4.88%
Yellow-eyed mullet (YEM)	15	0.84%

It is important to note that not all fishers report the species they are targeting as they are set netting for a mix of species rather than one specific target.

Using the data for the 6 target species above, the total extent of the set net fishery in the Manukau Harbour (statistical area 043) can be estimated.

Table 3: Data on the use of set nets by commerical fishers in statistical area 043 for all target species over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	194,002	$552,070	3,010,271
2004/05	215,904	$754,719	2,535,432
2005/06	170,525	$438,140	2,426,737
Total	**580,431**	**$1,744,930**	**7,972,440**

Table 3 shows that the estimated catch over the past 3 fishing years by set netters in the Manukau Harbour has been 580 tonnes of fish worth an estimated $1.74 million.

There has been a significant decrease in the estimated catch between 2004/2005 and 2005/2006. The reasons for this decrease need to be investigated further to see what has caused the fishers/vessels to leave the fishery.

Species specific information follows:

Flatfish (FLA)

Flatfish (FLA) consists of eight species of flatfish. Yellow-belly flounder (YBF) is one of these eight species in the flatfish stock code and the Manukau Harbour is regarded as an area where YBF are easily caught.

Table 4: Data on the use of set nets by commerical fishers in statistical area 043 targeting flatfish (FLA) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price ($ per kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	4.7500	69,844	$331,759	1,300,930	1,950	37	45
2004/05	5.2609	75,176	$395,493	1,144,767	1,774	29	36
2005/06	3.3500	64,751	$216,916	989,355	1,514	28	34
	Total	**209,771**	**$944,168**	**3,435,052**			

Flatfish account for 210 tonnes or 36% of the total estimated catch by set netters in the Manukau Harbour over the past three fishing years. The estimated catch has an estimated value of $944,000. This makes it the highest value set net fishery in the Manukau Harbour.

The estimated catch of flatfish has decreased from the 2004/2005 fishing year to the 2005/2006 fishing year. Fishing effort has decreased for flatfish and this may explain the decrease in estimated catch.

Grey mullet (GMU)

Commercial fishing for grey mullet occurs predominantly in the Auckland Fisheries Management Area (GMU1) which includes the Manukau Harbour.

Table 5: Data on the use of set nets by commerical fishers in statistical area 043 targeting grey mullet (GMU) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price ($ per kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	2.6741	63,597	$170,065	379,129	580	24	28
2004/05	2.4114	87,087	$210,002	330,900	589	20	22
2005/06	2.2300	59,663	$133,048	369,000	686	19	23
	Total	**210,347**	**$513,115**	**1,079,029**			

The estimated catch of grey mullet was 210 tonnes. This is 36% of the total estimated catch for the Manukau Harbour (statistical area 043) over the past three fishing years. The estimated catch has an estimated value of $513,000.

There was an increase in catch during the 2004/2005 fishing year while fishing effort decreased. Fishing effort and catch levels were at a similar level in both the 2003/2004 and 2005/2006 fishing years.

Rig (SPO)

Rig are caught in coastal waters throughout New Zealand. Most of the catch is taken from water less than 50 m deep during spring and summer, when rig aggregate inshore. The most important bottom set net fisheries are at 90-Mile Beach, Kaipara Harbour, Manukau Harbour, South Taranaki Bight, Tasman/Golden Bay, Canterbury Bight, Kaikoura and Hauraki Gulf.

Table 6: Data on the use of set nets by commerical fishers in statistical area 043 targeting rig (SPO) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Port Price	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	0.8886	35,153	$31,237	448,843	577	29	36
2004/05	3.5790	37,760	$135,143	362,695	475	22	25
2005/06	3.0000	23,774	$71,322	328,195	456	25	26
	Total	**96,687**	**$237,702**	**1,139,733**			

The estimated catch of grey mullet was 96.6 tonnes. This is 16.7% of the total estimated catch for the Manukau Harbour (statistical area 043) over the past three fishing years. The estimated catch has an estimated value of $238,000.

Combined flatfish, grey mullet and rig accounted for 517 tonnes or 89% of the estimated catch for commercial set netters in the Manukau Harbour over the past three fishing years.

Kahawai (KAH), Trevally (TRE) and Yellow-Eyed Mullet (YEM)

Commercial set netters have also targeted kahawai (KAH), trevally (TRE) and yellow-eyed mullet (YEM) in the Manukau Harbour over the past 3 fishing years.

Table 7: Data on the use of set nets by commerical fishers in statistical area 043 targeting kahawai (KAH), spiny dogfish (SPD), trevally (TRE) and yellow-eyed mullet (YEM) over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)	Total Number of Records	Number of Clients	Number of Vessels
2003/04	25,408	$19,010	881,369	1218	74	90
2004/05	15,881	$14,081	697,070	1034	67	77
2005/06	22,337	$16,854	740,187	1181	67	75
Total	**63,626**	**$49,945**	**2,318,626**			

These fisheries are low value fisheries and the estimated catch combined was only 63.6 tonnes. This is 11% of the total estimated catch for the Manukau Harbour (statistical area 043) over the past three fishing years. The estimated catch has an estimated value of $50,000.

11.4.4.3. Analysis of set netting for Butterfish (BUT) in statistical areas 017, 018, 025 & 027 using internal MFish data

This section sets out the relevant internal data that relates to set netting for butterfish in the statistical areas 017, 018, 025 & 027.

Analysis

The analysis examines targeted (not bycatch) commercial set netting for butterfish in the statistical areas 017, 018, 025 & 027 to provide an assessment of the extent of this type of activity and the value

associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the draft Hector's dolphin TMP and their relevance to the statistical areas 018 & 027 will be examined by an external research provider.

Data used

This paper originally set out to investigate the extent and value of set netting in BUT3. The analysis of the data from BUT3 showed that the majority of set netting was occurring in statistical areas 018 & 027. This caused problems as statistical area 018 is split by BUT2, BUT3 and BUT7 while statistical area 027 was split by BUT3 and BUT5. Further analysis of CELR data showed significant catch was coming out of statistical areas 017 & 025. These have been included so the whole of the south island is covered by this paper.

It is not possible from the data available to know what percentage of catch in both statistical areas in coming from what QMA. This is why this analysis looks at the statistical areas and not a discrete QMA.

The analysis of statistical areas 017, 018, 025 & 027 will focus on the CELR form data that is attributed to these statistical areas. The CELR data is used to identify commercial fishers who are targeting BUT using set nets and trawlers. The CELR data for these fishers is then aggregated to calculate the amount of BUT caught during each fishing year.

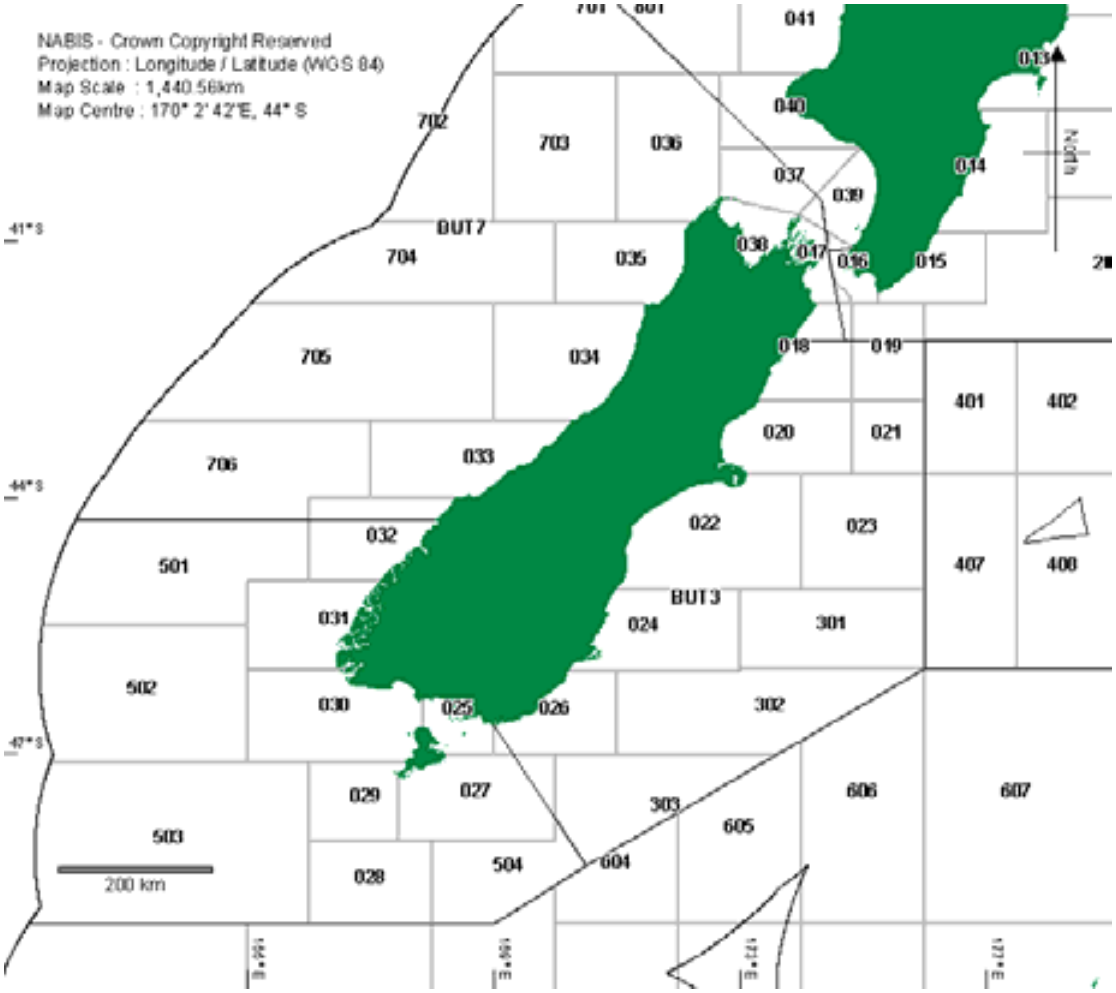
Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch on the CELR forms.

Table 1: Port prices for BUT in statistical areas 017, 018, 025 & 027 over the past 3 fishing years

Quota Management Area	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
BUT1	$1.8818	$3.3167	$1.5800
BUT2	$3.0043	$3.4414	$3.8400
BUT3	$3.5431	$3.1584	$3.8400
BUT5	$2.2991	$3.3167	$3.8400
BUT7	$2.9949	$3.4737	$3.3000

Commercial Fishery

There is no commercial trawling for butterfish in statistical areas 017, 018, 025 & 027 so set netting is the main commercial fishing method to catch butterfish in these statistical areas.



Map 29

Analysis of the FIS data shows that 18 fishers have deployed set nets targeting butterfish in statistical area 017 over the past 3 fishing years using 25 vessels and employing a total of 71 crew members.

Analysis of the FIS data shows that 6 fishers have deployed set nets targeting butterfish in statistical area 018 over the past 3 fishing years using 12 vessels and employing a total of 27 crew members.

Analysis of the FIS data shows that 6 fishers have deployed set nets targeting butterfish in statistical area 025 over the past 3 fishing years using 11 vessels and employing a total of 33 crew members.

Analysis of the FIS data shows that 6 fishers have deployed set nets targeting butterfish in statistical area 027 over the past 3 fishing years using 11 vessels and employing a total of 33 crew members.

The majority of these vessels are based in statistical areas 017, 018, 025 and 027 with a few vessels operating out of Wellington, Gisborne and Flat Point. This would suggest that most of the vessels carrying out the set netting for butterfish are local to the area.

Therefore, any ban or limitations placed on set netting may have a higher impact on local fishers than those based outside of statistical areas 017, 018, 025 and 027.

By averaging the port prices for the QMAs that split each statistical area and multiplying this by the estimated catch in that statistical area, the value of butterfish caught can be estimated.

Table 2: Data on the use of set nets by commerical fishers in statistical area 017 targeting BUT over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Average Port Price ($/kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	$2.6270	16,074	$42,226	6,015
2004/05	$3.4106	19,466	$66,391	10,390
2005/06	$2.9067	17,115	$49,748	5,640
	Total	**52,655**	**$158,365**	**22,045**

Table 2 shows that the estimated catch over the past 3 fishing years by set netters targeting butterfish in statistical area 017 has been 52.6 tonnes of fish worth an estimated $158,365.

There has been some fluctuation in catch over the past three years but this fluctuation has been in line with fishing effort (total length of nets hauled).

Table 3: Data on the use of set nets by commerical fishers in statistical area 018 targeting BUT over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Average Port Price ($/kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	$3.1808	1,896	$6,031	6,015
2004/05	$3.3578	3,110	$10,443	10,390
2005/06	$3.6600	1,726	$6,317	5,640
	Total	**6,732**	**$22,791**	**22,045**

Table 3 shows that the estimated catch over the past 3 fishing years by set netters targeting butterfish in statistical area 018 has been 6.7 tonnes of fish worth an estimated $22,791.

There has been some fluctuation in catch over the past three years but this fluctuation has been in line with fishing effort (total length of nets hauled).

Table 4: Data on the use of set nets by commerical fishers in statistical area 025 targeting BUT over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Average Port Price ($/kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	$2.9211	29,360	$85,763	6,015
2004/05	$3.2376	15,030	$48,660	10,390
2005/06	$3.8400	13,880	$53,299	5,640
	Total	**58,270**	**$187,723**	**22,045**

Table 4 shows that the estimated catch over the past 3 fishing years by set netters targeting butterfish in statistical area 025 has been 58.2 tonnes of fish worth an estimated $187,723.

In 2003/2004 there was a large catch from minimal fishing effort (total length of nets hauled) but in the following fishing years more or the same amount of have been put into the fishery for much low returns.

Table 5: Data on the use of set nets by commerical fishers in statistical area 027 targeting BUT over the past 3 fishing years from Catch Effort Landing Returns (CELRs)

Fishing Year	Average Port Price ($/kg)	Total Estimated Catch of Species Caught (kg)	Estimated Value of Catch	Total Length of Nets Hauled (m)
2003/04	$2.9211	8,078	$23,597	28,080
2004/05	$3.2376	9,055	$29,316	60,220
2005/06	$3.8400	5,180	$19,891	22,440
	Total	**22,313**	**$72,804**	**110,740**

Table 5 shows that the estimated catch over the past 3 fishing years by set netters targeting butterfish in statistical area 027 has been 22.3 tonnes of fish worth an estimated $72,804.

In 2004/2005 there was a doubling of fishing effort (total length of nets hauled) but this resulted in one

tonne of additional catch only.

11.4.4.4. Analysis of the FLA3 fishery using internal MFish data

This section sets out the relevant internal data that relates to set netting and trawling in FLA3.

Analysis

The analysis examines targeted (not bycatch) commercial set netting and trawling for FLA3 to provide an assessment of the extent of these types of activities and the value associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the draft Hector's dolphin TMP and their relevance to FLA3 will be examined by an external research provider.

Data Used

FLA3 covers the lower east and west coast of the South Island and this analysis focuses on the CELR form data that is attributed to the statistical areas that make up FLA3. The CELR data is used to identify commercial fishers who are targeting FLA3 using set nets and trawlers. The MHR data for these fishers is then aggregated to calculate the amount of FLA3 caught during each fishing year.

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch form the MHR form data.

Table 1: Port prices for FLA3 over the past 3 fishing years

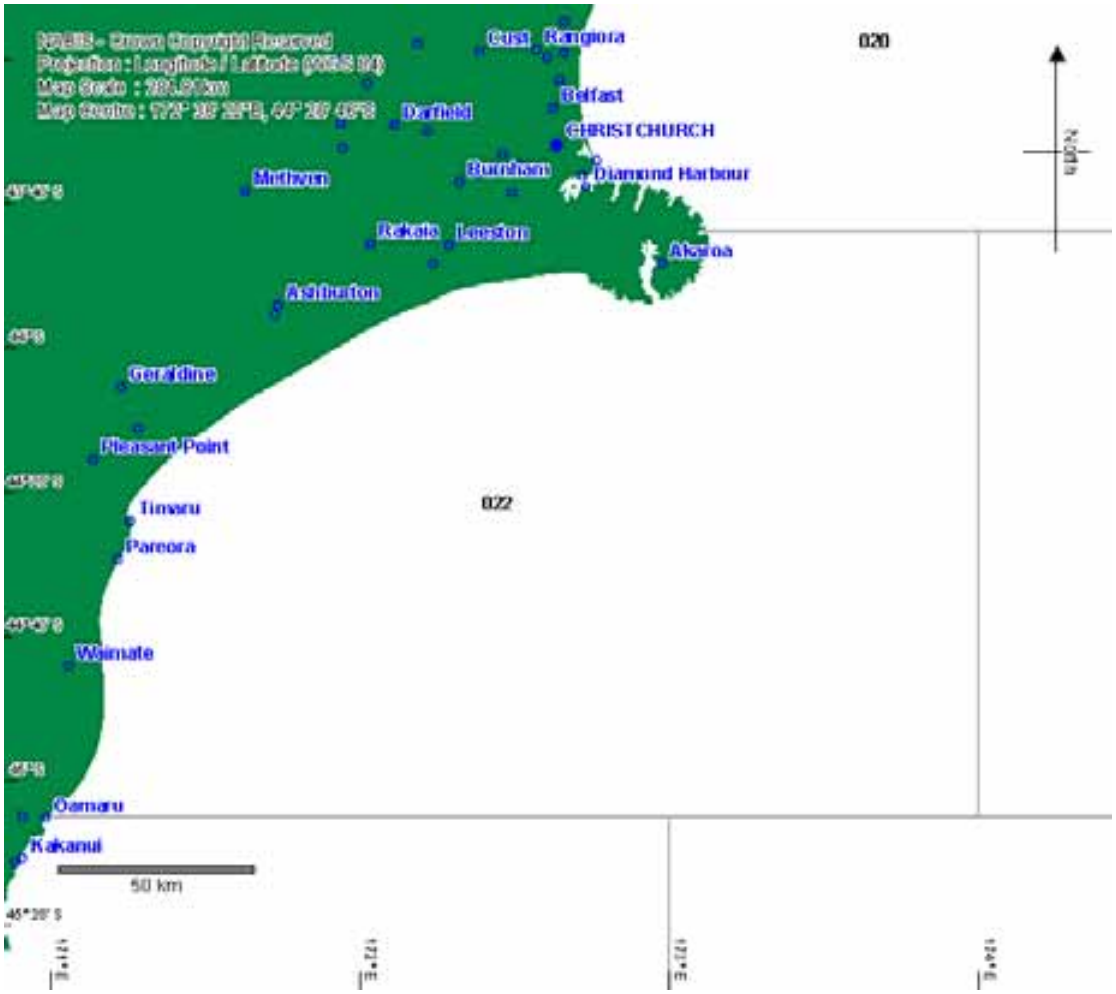
Species	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
Flatfish (FLA)	3.2693	3.1700	2.9600

Commercial Set Net Fishery

Table 2 below outlines where in FLA3 the majority of commercial set netting is taking place. It shows that almost all the set netting in FLA3 is occurring in statistical area 022:

Table 2: The statistical area identified in the CELR forms and records submitted for FLA3 over the past 3 years by commercial set netters

Statistical Area	Number of Forms	Number of Records
018	1	1
021	1	1
022	1159	1162
023	1	1
024	5	5
025	2	4
027	1	1
049	14	14
603	1	1
607	1	1
607	1	2
610	1	1
622	1	1



Map 30

Further examination of the catch in statistical area 022 shows that the 6 fishers are carrying out the majority of the set netting.

Only two of the fishers are quota holders. The impact of measures on property rights only apply to quota holders. The extent of the impact will depend on if any other regulations are placed on other fishing method in FLA3 (trawling regulations).

Of the four remaining set net fishers 3 are ACE fishers and could move their fishing into different fisheries assuming their vessels can be converted to carry out a different fishing method but this would add in additional costs to the operation of the vessel. This means the crew would have to learn how to carry out the fishing method and find new fishing ground where they could carry out this new fishing method.

One fisher has left the fishery after the 2003/2004 fishing year and no longer holds quota or ACE.

Analysis of the FIS data shows that all the vessels used in statistical area 022 are all based in statistical area 022. This means that the vessels used to carry out the set netting are based in the area they predominately fish. There is little travel involved to reach the fishing ground where they deploy their set nets.

MHR returns from the six fishers were used to estimate the total catch of FLA3 by set netters in statistical area 022. The total catch figure from the MHR forms can be multiplied by the port price to estimate the value of the FLA3 caught by set netters over the past three fishing years.

Table 2: Estimated value of FLA3 caught by set nets over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	3.2693	70,402	230,165
2004/2005	3.1700	95,133	301,572
2005/2006	2.9600	36,668	108,537
	Total	**202,203**	**640,274**

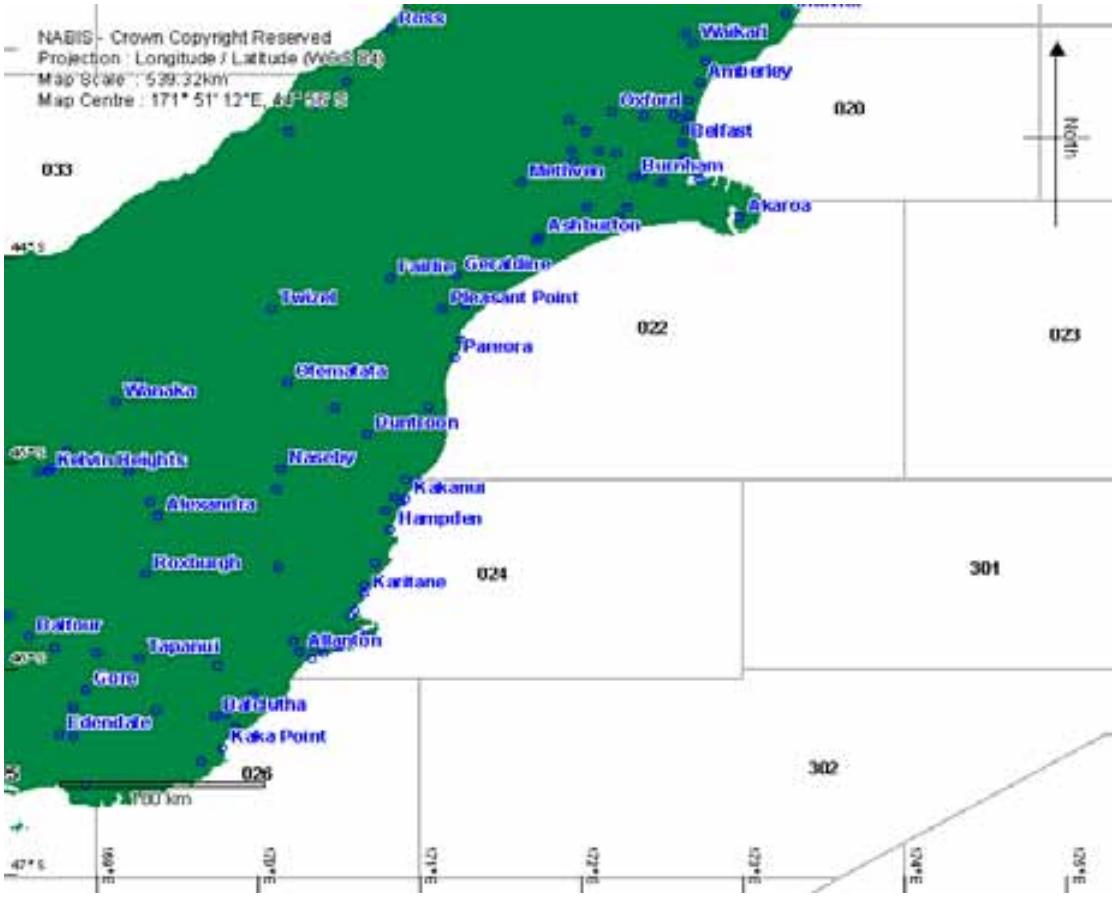
Table 2 shows that the value of the set net fishery in FLA3 is $640,274 over the past 3 years. This means the average value of the catch in the FLA3 set net fishery is $213,425 per year.

Commercial Trawl Fishery

Table 3 below outlines where in FLA3 the majority of commercial trawling is taking place. It shows that the majority of the commercial trawling for FLA3 is occurring in statistical areas 020, 022, 024 & 026:

Table 3: The statistical area identified in the CELR forms and records submitted for FLA3 over the past 3 years by commercial trawlers

Statistical Area	Number of Forms	Number of Records
018	180	194
019	1	1
020	2390	2708
021	11	11
022	2176	2644
023	2	2
024	2825	3090
025	498	763
026	2147	3651
027	8	12
028	5	5
030	295	737
032	2	2
620	1	1



Map 31

Due to large amount of commercial trawlers operating in FLA3, the analysis will concentrate on fishers who fish have recorded catching FLA3 in two or more of statistical areas 020, 022, 024 & 026.

Further analysis shows that 41 fishers have recorded catching FLA3 in two or more of statistical areas 020, 022, 024 & 026 over the past three fishing years.

23 of the fishers are ACE fishers while only 12 own quota for FLA3. The remaining 6 fishers have left the fishery (they stopped holding ACE or quota).

Anlysis of the FIS data shows that the majority of vessels used in statistical areas 020, 022, 024 & 026 are all based in statistical areas 020, 022, 024 & 026. This means that the vessels used to carry out the commercial trawling are based in the area they predominately fish. There is little travel involved to reach the fishing ground where they trawl.

MHR returns from the 41 fishers were used to estimate the total catch of FLA3 by set netters who fish have recorded catching FLA3 in two or more of statistical areas 020, 022, 024 & 026. The figures for total catch from the MHR forms can be multiplied by the port price to estimate the value of the FLA3 caught by trawlers over the past three fishing years.

Table 4: Estimated value of FLA3 caught by trawlers over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	3.2693	658,131	2,151,628
2004/2005	3.1700	620,100	1,965,717
2005/2006	2.9600	652,778	1,932,223
	Total	**1,931,009**	**6,049,568**

Table 4 shows that the value of the trawl fishery in FLA3 is just over $6.0 million over the past 3 years. The MHR figure only covers fishers who fished in two or more of statistical areas 020, 022, 024 & 026. This means the average value of the catch in the FLA3 trawl fishery is $2.0 million per year.

The significance of the MHR value figure can be determined by comparing the total catch by fishers who fished in two or more of statistical areas 020, 022, 024 & 026 using trawlers to the total catch for FLA3 (regardless of fishing method).

Table 5: Comparison of MHR figures to total catch in FLA3

	2003/2004 catch (t)	2004/2005 catch (t)	2005/2006 catch (t)
Commercial Trawlers MHR figures	658	620	653
Total catch in FLA3	1286	1353	1177
MHR figures as % of total catch	**51.17%**	**45.82%**	**55.48%**

Table 5 shows that by looking at the fishers who have fished in 2 or more of statistical areas 020, 022, 024 & 026 we have managed to capture 41 fishers that account for between 45%-55% of the total catch in FLA3.

ACE and quota information for FLA3

Table 6 below shows the transfer price of quota and ACE for FLA3 over the past 3 years.

Table 5: FLA3 quota and ACE transfer prices per tonne over the last 3 fishing years

Fishing Year	Average quota transfer price per tonne (number of valid trasfers)	Average ACE transfer price per tonne (number of valid trasfers)
2003/04	N/A	$542.90 (316)
2004/05	$3,621.19* (41)	$435.40 (329)
2005/06	$3,561.60* (47)	$632.70 (293)

*average price of all trades since October 2001

The ACE transfer price is the price fishers are willing to pay for the right to catch a tonne of FLA3 in one fishing year. Placing any limitations on set netting or trawling will likely reduce the ACE price. This is because due to the limitations on fishing methods it is unlikely that the TACC for FLA3 will be caught and this will lead to an abundance of ACE being available (supply will exceed demand).

The quota transfer price is the price fishers or quota holders are willing to pay to for rights to catch a tonne of FLA3 in perpetuity. Placing limitations on set netting or trawling may affect quota transfer prices. In the short term the price may drop as ACE prices will likely fall reducing the revenue quota holder can earn from selling their ACE. In the long term if the limitations mean the FLA3 stock has the ability to recover the quota transfer price may rise as the TACC could be increased generating additional ACE from the quota held.

The asset value of the FLA fishery can be estimated from the Fish Monetary Stock Account 1996-2006 produced by Statistics New Zealand.

The Monetary Stock Account estimates the asset value of each species as a whole fishery (all of New Zealand). The problem with this approach is that the individual QMA asset values are not calculated.

The whole FLA fishery is estimated to have an asset value of 16.7 million in 2006.

11.4.4.5. Analysis of the SPO3 fishery using internal MFish data

This section sets out the relevant internal data that relates to set netting and trawling in SPO3.

Analysis

The analysis examines targeted (not bycatch) commercial set netting and trawling for SPO3 to provide an assessment of the extent of these types of activities and the value associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the draft Hector's dolphin TMP and their relevance to SPO3 will be examined by an external research provider.

Data Used

SPO3 covers the lower east and west coast of the South Island and this analysis focuses on the CELR form data that is attributed to the statistical areas that make up SPO3. The CELR data is used to identify commercial fishers who are targeting SPO3 using set nets and trawlers. The MHR data for these fishers is then aggregated to calculate the amount of SPO3 caught during each fishing year.

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch from the MHR form data.

Table 1: Port prices for SPO3 over the past 3 fishing years

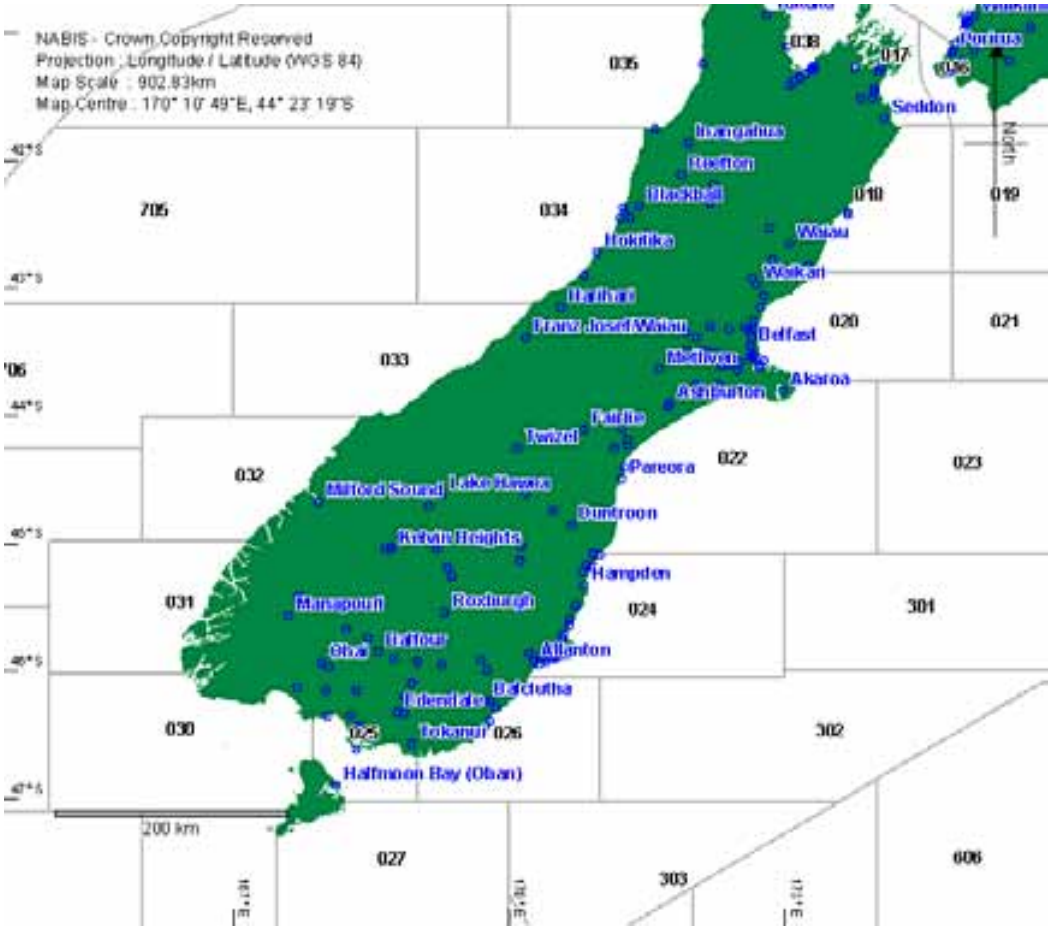
Species	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
Rig (SPO)	3.2438	3.5673	3.0200

Commercial Set Net Fishery

Table 2 below outlines where in SPO3 the majority of commercial set netting is taking place. It shows that almost all the set netting in SPO3 is occurring in statistical areas 018, 020, 022, 024, 025 & 030:

Table 2: The statistical area identified in the CELR forms and records submitted for SPO3 over the past 3 years by commercial set netters

Statistical Area	Number of Forms	Number of Records
018	625	659
020	102	113
021	1	1
022	668	803
023	1	1
024	474	490
025	195	242
026	2	5
027	2	2
029	1	1
030	68	169
031	3	5
032	11	23



Map 32

Examination of the catch in statistical areas 018, 020, 022, 024, 025 & 030 shows that 47 fishers are using set nets in these areas.

Analysis of the FIS data shows that fifteen of the fishers are quota holders who are active fishers. Of the remaining set net fishers twenty three are ACE fishers.

If there were any regulations introduced to ban set netting on the East Coast South Island all fishers will be affected. They all could move their fishing effort into other fisheries assuming their vessels could be converted to carry out a different fishing method but this would add in additional costs to the operation of the vessel. This means the crew would have to learn how to carry out the fishing method and find new fishing ground where they could carry out this new fishing method.

Nine fishers have left the fishery and no longer hold quota or ACE.

The majority of vessels used in statistical areas 018, 020, 022, 024, 025 & 030 are all based in those statistical areas. 2 vessels are operating out of Tauranga. This shows that the vessels used to carry out the set netting are based in the area they predominately fish. This means that there is little travel involved to reach the fishing ground where they deploy their set nets.

The figures from the MHRs give an accurate picture of how much commercial set netters are taking from SPO3.

The figures for total catch from the MHR form data can be multiplied by the port price to estimate the value of the SPO3 caught by set netters over the past three fishing years.

Table 2: Estimated value of SPO3 caught by set nets over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	3.2438	296,324	961,216
2004/2005	3.5673	284,746	1,015,774
2005/2006	3.0200	307,178	927,678
	Total	**888,248**	**2,904,668**

Table 2 shows that the value of the set net fishery in SPO3 is around $2.9 million over the past 3 years.

The significance of the MHR value figure can be determined by comparing the total catch by fishers who fish in statistical areas 018, 020, 022, 024, 025 & 030 using set nets to the total catch for SPO3 (regardless of fishing method).

Table 3: Comparison of MHR figures to total catch in SPO3

	2003/2004 catch (t)	2004/2005 catch (t)	2005/2006 catch (t)
Commercial set netter MHR figures	296	285	307
Total catch in SPO3	354	366	389
MHR figures as % of total catch	**83.62%**	**77.87%**	**78.92%**

Table 3 shows that by looking at the fishers who have fished in statistical areas 018, 022 & 024 we have managed to capture 47 fishers account for between 78%-84% of the total catch in SPO3.

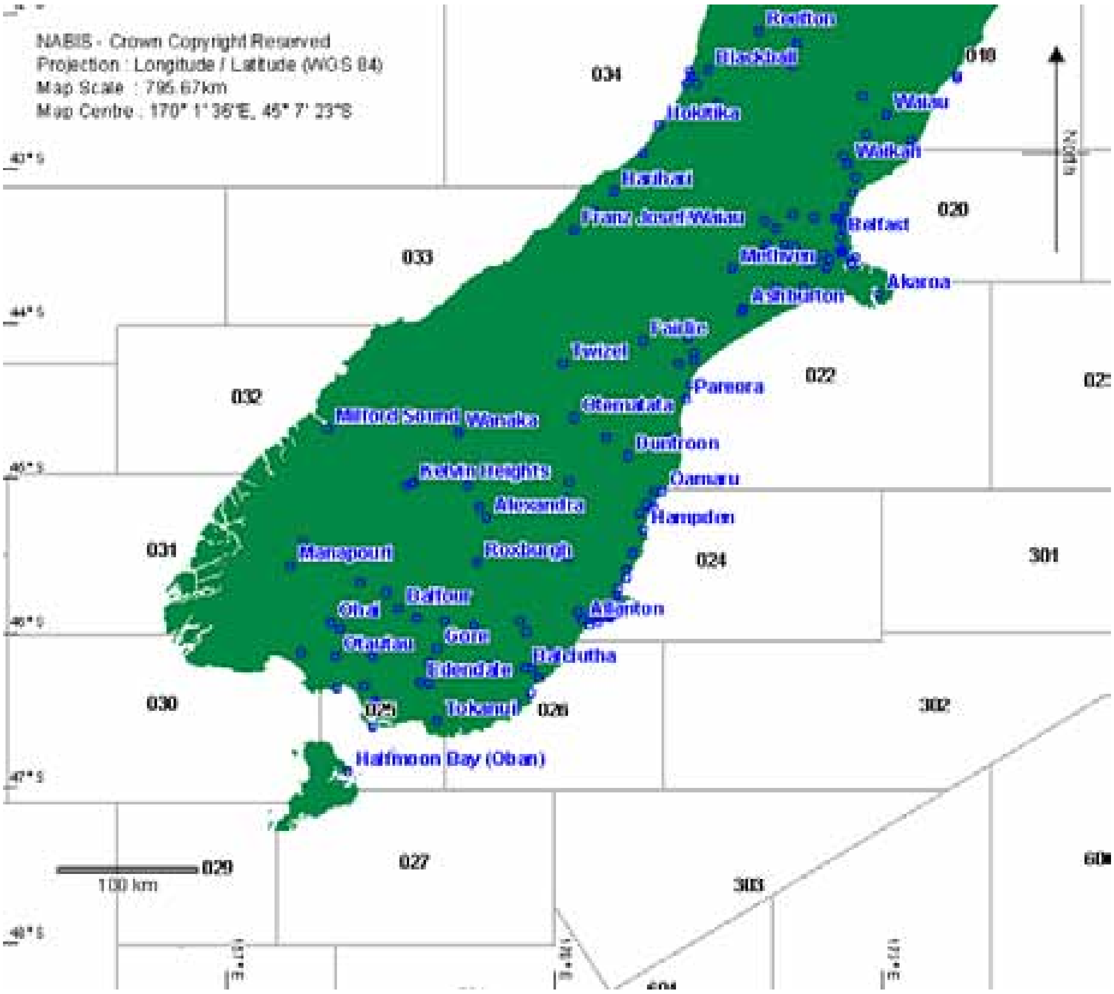
This is a significant amount of catch and shows that 80% of the SPO3 catch is worth roughly $1 million per year. This means that the total catch of the SPO3 fishery could be estimated to be worth around $1.25 million per year.

Commercial Trawl Fishery

Table 4 below outlines where in SPO3 the majority of commercial trawling is taking place. It shows that the commercial target trawling for SPO3 is occurring in statistical areas 020, 022, 025 & 030:

Table 4: The statistical area identified in the CELR forms and records submitted for SPO3 over the past 3 years by commercial trawlers

Statistical Area	Number of Forms	Number of Records
020	1	1
022	3	5
025	6	7
030	5	6



Map 33

Analysis of the FIS data shows that 7 fishers have recorded catching SPO3 through target trawling over the past three fishing years.

2 of the fishers are ACE fishers while the remaining 5 own quota for SPO3.

All the vessels that trawl in SPO3 are based in the region. This shows that the vessels used to carry out the commercial trawling are based in the area they predominately fish. This means that there is little travel involved to reach the fishing ground where they trawl.

The figures from the MHRs give an accurate picture of how much commercial rig trawlers are taking from SPO3.

The figures for total catch from the MHR forms can be multiplied by the port price to estimate the value

of the SPO3 caught by commercial trawler over the past three fishing years.

Table 5: Estimated value of SPO3 caught by trawlers over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	3.2438	20,687	67,104
2004/2005	3.5673	24,392	87,014
2005/2006	3.0200	39,378	118,922
	Total	**84,457**	**273,040**

Table 5 shows that the value of the trawl fishery in SPO3 is $273,040 over the past 3 years. The MHR figure only covers fishers who targeted SPO3 and doesn't cover any SPO3 caught as a bycatch of trawling for other species.

ACE and quota information for SPO3

Table 13 below shows the transfer price of quota and ACE for SPO3 over the past 3 years.

Table 6: SPO3 quota and ACE transfer prices per tonne over the last 3 fishing years

Fishing Year	Average quota transfer price per tonne (number of valid trasfers)	Average ACE transfer price per tonne (number of valid trasfers)
2003/04	N/A	$732.00 (293)
2004/05	$14,446.50* (35)	$796.10 (319)
2005/06	$14,569.70* (37)	$768.30 (309)

*average price of all trades since October 2001

The ACE transfer price is the price fishers are willing to pay for the right to catch a tonne of SPO3 in one fishing year. Placing any limitations on set netting or trawling will likely reduce the ACE price. This is because due to the limitations on fishing methods it is unlikely that the TACC for SPO3 will be caught and this will lead to an abundance of ACE being available (supply will exceed demand).

The quota transfer price is the price fishers or quota holders are willing to pay to for rights to catch a tonne of SPO3 in perpetuity. Placing limitations on set netting or trawling may affect quota transfer prices. In the short term the price may drop as ACE prices will likely fall reducing the revenue quota holder can earn from selling their ACE. In the long term if the limitations mean the SPO3 stock has the ability to recover the quota transfer price may rise as the TACC could be increased generating additional ACE from the quota held.

The asset value of the SPO fishery can be estimated from the Fish Monetary Stock Account 1996-2006 produced by Statistics New Zealand.

The Monetary Stock Account estimates the asset value of each species as a whole fishery (all of New Zealand). The problem with this approach is that the individual QMA asset values are not calculated.

The whole SPO fishery is estimated to have an asset value of 13.9 million in 2006.

11.4.4.6. Analysis of the SPO7 fishery using internal MFish data

This section sets out the relevant internal data that relates to set netting and trawling in SPO7.

Analysis

The analysis examines targeted (not bycatch) commercial set netting and trawling in SPO7 to provide an assessment of the extent of these types of activities and the value associated with it.

Note that the indirect and socio-economic impacts of the options proposed in the draft Hector's dolphin TMP and their relevance to SPO7 will be examined by an external research provider.

Data Used

SPO7 covers the west coast and north coast of the South Island and this analysis focuses on the CELR form data that is attributed to the statistical areas that make up SPO7. The CELR data is used to identify commercial fishers who are targeting SPO7 using set nets and trawlers. The MHR data for these fishers is then aggregated to calculate the amount of SPO7 caught during each fishing year.

Port prices for the relevant fish stock and fishing year are used to estimate the value of the estimated catch from the MHR form data.

Table 1: Port prices for SPO7 over the past 3 fishing years

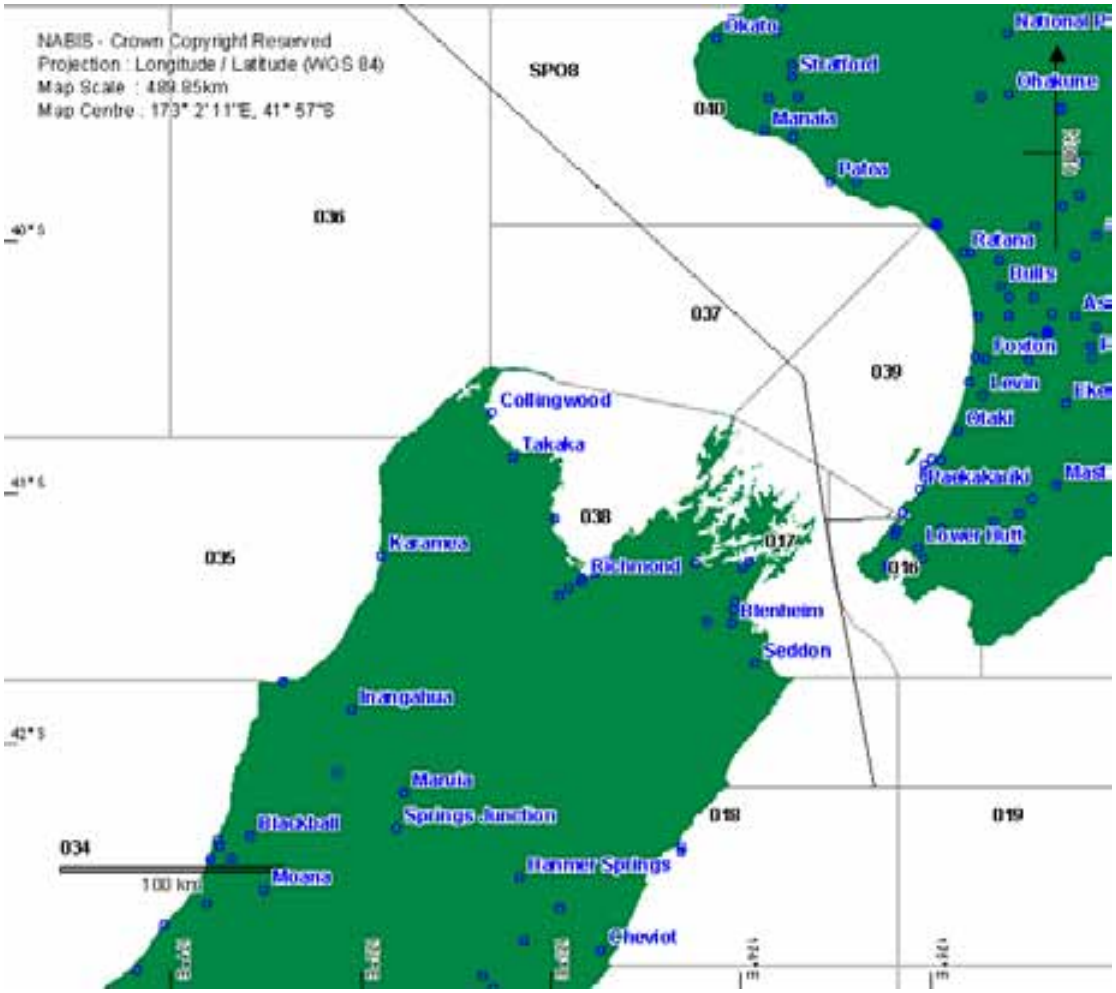
Species	2003/2004 Port Price ($/kg)	2004/2005 Port Price ($/kg)	2005/2006 Port Price ($/kg)
Rig (SPO)	2.9600	2.4948	2.6200

Commercial Set Net Fishery

Table 2 below outlines where in SPO7 the majority of commercial set netting is taking place. It shows that almost all the set netting in SPO7 is occurring in statistical areas 018, 037, 038, 039 & 040:

Table 2: The statistical area identified in the CELR forms and records submitted for SPO7 over the past 3 years by commercial set netters

Statistical Area	Number of Forms	Number of Records
017	51	106
018	624	658
032	11	23
033	53	114
034	54	122
035	29	56
036	10	18
037	101	172
038	314	898
039	228	339
040	341	476



Map 34

The map above shows that statistical areas 018, 037, 039 & 040 are split between two or more QMAs. Statistical area 018 is split by SPO2, SPO3 and SPO7. The analysis for SPO3 has included statistical area 018. Statistical areas 037, 039 and 040 are split by SPO7 and SPO8.

Analysis of the FIS data shows that in statistical areas 018, 037, 038, 039 & 040, SPO is targeted by 46 fishers using set nets. Out of these 46 fishers only seven own quota for SPO7 and seventeen hold ACE for SPO7.

The 29 fishers who don't hold ACE or quota will be excluded from further analysis.

If there were any regulations introduced to ban set netting in SPO7 all fishers will be affected. They all could move their fishing effort into other fisheries assuming their vessels could be converted to carry out a different fishing method but this would add in additional costs to the operation of the vessel. This means the crew would have to learn how to carry out the fishing method and find new fishing ground where they could carry out this new fishing method.

The majority of vessels used in SPO7 are all based in those statistical areas. One vessel is operating out of Leigh. This shows that the vessels used to carry out the set netting are based in the area they predominately fish. This means that there is little travel involved to reach the fishing ground where they deploy their set nets.

MHR returns from the selected seventeen fishers were used to estimate the total catch of SPO by set netters in SPO7. The figures for total catch from the MHR form data can be multiplied by the port price to estimate the value of the SPO7 caught by set netters over the past three fishing years.

Table 3: Estimated value of SPO7 caught by set nets over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	2.9600	145,178	$429,727
2004/2005	2.4948	137,128	$342,107
2005/2006	2.6200	154,640	$405,157
	Total	**436,946**	**$1,176,991**

Table 3 shows that the value of the set net fishery in SPO7 is around $1.17 million over the past 3 years.

The significance of the MHR value figure can be determined by comparing the total catch by the seventeen selected fishers using set nets to the total catch for SPO7 (regardless of fishing method).

Table 4: Comparison of MHR figures to total catch in SPO7

	2003/2004 catch (t)	2004/2005 catch (t)	2005/2006 catch (t)
Commercial set netter MHR figures	145	137	155
Total catch in SPO7	293	266	287
MHR figures as % of total catch	**49.49%**	**51.50%**	**54.01%**

Table 4 shows that by looking at the fishers who have fished in SPO7 using set nets we have managed to capture seventeen fishers that account for between 49%-54% of the total catch in SPO7.

This is a significant amount of catch and shows that 50% of the SPO7 catch is worth roughly $390,000 per year. This means that the total catch of the SPO3 fishery could be estimated to be worth around $780,000 per year.

Commercial Trawl Fishery

Table 5 below outlines where in SPO7 the majority of commercial trawling is taking place. It shows that the commercial target trawling for SPO7 is occurring in statistical areas 017, 035, 038 & 039:

Table 5: The statistical area identified in the CELR forms and records submitted for SPO7 over the past 3 years by commercial trawlers

Statistical Area	Number of Forms	Number of Records
017	1	1
035	1	2
038	5	5
039	1	1

Analysis of the FIS data shows that 4 fishers have recorded catching SPO7 through target trawling over the past three fishing years.

One of the fishers is an ACE fishers while two fishers own quota for SPO7. The other fisher has left the fishery.

The majority of vessels that trawl in SPO7 are based in the region. One vessel operates out of Auckland and another out of Napier. This shows that the vessels used to carry out the commercial trawling are based in the area they predominately fish. This means that there is little travel involved to reach the

fishing ground where they trawl.

The figures from the MHRs give an accurate picture of how much commercial rig trawlers are taking from SPO7.

The figures for total catch from the MHR forms can be multiplied by the port price to estimate the value of the SPO7 caught by commercial trawlers over the past three fishing years.

Table 6: Estimated value of SPO7 caught by trawlers over the past 3 fishing years (based on MHR figures)

Fishing Year	Port Price ($/kg)	MHR catch figure (kg)	Value of MHR catch ($)
2003/2004	2.9600	19,814	58,649
2004/2005	2.4948	30,441	75,944
2005/2006	2.6200	14,565	38,160
	Total	**64,820**	**$172,754**

Table 6 shows that the value of the trawl fishery in SPO7 is $172,754 over the past 3 years. The MHR figure only covers fishers who targeted SPO7 and doesn't cover any SPO7 caught as a bycatch of trawling for other species.

ACE and quota information for SPO7

Table 7 below shows the transfer price of quota and ACE for SPO7 over the past 3 years.

Table 7: SPO7 quota and ACE transfer prices per tonne over the last 3 fishing years

Fishing Year	Average quota transfer price per tonne (number of valid trasfers)	Average ACE transfer price per tonne (number of valid trasfers)
2003/2004	N/A	$879.10 (299)
2004/2005	$14,332.00* (20)	$898.20 (152)
2005/2006	$10,930.10* (26)	$934.30 (117)

*average price of all trades since October 2001

The ACE transfer price is the price fishers are willing to pay for the right to catch a tonne of SPO7 in one fishing year. Placing any limitations on set netting or trawling will likely reduce the ACE price. This is because due to the limitations on fishing methods it is unlikely that the TACC for SPO7 will be caught and this will lead to an abundance of ACE being available (supply will exceed demand).

The quota transfer price is the price fishers or quota holders are willing to pay to for rights to catch a tonne of SPO7 in perpetuity. Placing limitations on set netting or trawling may affect quota transfer prices. In the short term the price may drop as ACE prices will likely fall reducing the revenue quota holder can earn from selling their ACE. In the long term if the limitations mean the SPO7 stock has the ability to recover the quota transfer price may rise as the TACC could be increased generating additional ACE from the quota held.

The asset value of the SPO fishery can be estimated from the Fish Monetary Stock Account 1996-2006 produced by Statistics New Zealand.

The Monetary Stock Account estimates the asset value of each species as a whole fishery (all of New Zealand). The problem with this approach is that the individual QMA asset values are not calculated.

The whole SPO fishery is estimated to have an asset value of 13.9 million in 2006.

11.5. Appendix 5 - Relevant Conservation Legislation

Marine Mammals Protection Act 1978

The purpose of the Act is to make provision for the protection, conservation, and management of marine mammals within New Zealand and within New Zealand fisheries waters.

Section 2 provides by declaration in the Gazette, for any species of marine mammal to be designated a threatened species for the purposes of the Marine Mammals Protection Act 1978.

Section 3 provides for the Department of Conservation to administer and manage marine mammals and marine mammal sanctuaries in accordance with general policies developed under section 3B of the Act and any relevant conservation management strategy or conservation management plan. Section 3C provides for the establishment of conservation management strategies and objectives for the integrated management of marine mammals under this Act. Section 3D provides for the development of conservation management plans to develop objectives for the management of marine mammal sanctuaries.

Section 4 prohibits the holding of any marine mammal in captivity or the taking of any marine mammal (dead or alive) without first obtaining a permit to do so from the Minister of Conservation.

Section 16 requires that the holder of any permit or licence issued under the Fisheries Act who accidentally kills or injures a marine mammal to report the incident to the Director-General or an officer appointed under section 11 of the Act. The written report must include the following information:

(i) The location of the area where the accident took place;
(ii) The species (if known), or a general description of the marine mammal killed or injured, and,
(iii) A description of the conditions and circumstances of the accident.

Section 26(4) provides, where a person is charged with killing or injuring a marine mammal, for a defence if the defendant can prove the marine mammal death or injury was accidental and the reporting requirements of section 16 were complied with.

Section 28 (2) provides for the promulgation of regulations thought necessary or expedient for the protection, conservation, or management of any marine mammal

Marine Mammal Sanctuaries

Section 22 provides for the establishment of marine mammal sanctuaries. A sanctuary for Hector's dolphins was established in 1988 in the area around Banks Peninsula, and in 1993, the territorial sea (the body of water out to 12 nautical miles) around the Auckland Islands was declared a marine mammal sanctuary to prohibit commercial fishermen from taking any fish or aquatic life, or being in possession of any fish or aquatic life taken, within the marine mammal sanctuary. The underlying aim was to protect the New Zealand sea lion.

Summary of S22:

(1) Subject to this section, the Minister may, by notice of the Gazette, define any place and declare it to be a marine mammal sanctuary,…

(2) Where any other Minister of the Crown has the control of any Crown-owned land, foreshore, seabed, or waters of the sea which is declared to be a marine mammal sanctuary or which forms part of one, the consent of that Minister to the declaration shall be notified concurrently with the notice…

(3) When defining and declaring a [marine mammal] sanctuary…the Minister may specify the activities that may or may not be engaged in within the sanctuary, and may impose restrictions…

(4) No marine mammal sanctuary shall be declared in any Maritime or National Park, in any reserve…or in any marine reserve…

Population Management Plans

Legislation regarding establishment of population management plans is contained in the Marine Mammals Protection Act 1978.

Section 3E states:

(1) The Minister may from time to time approve a population management plan in respect of one or more species, being threatened species or other species of marine mammal, containing all or any of the following matters in respect of each species:

(a) An assessment of the biology and status of the species;

(b) An assessment of any known fisheries interaction with the species;

(c) An assessment of the degree of risk caused by fishing-related mortality and other human-induced sources of mortality to the species, whether within New Zealand fisheries waters or elsewhere within the range of the species;

(d) An estimate of the range of human induced mortality for the species which would allow the criteria in section 3F of this Act to be met;

(e) An estimate of the range of fishing-related mortality for the species which would allow the criteria specified in section 3F of this Act to be met;

(f) The maximum allowable level of fishing-related mortality for the species, in New Zealand fisheries waters, which would allow the criteria specified in section 3F of this Act to be met;

(g) Subject to section 3G of this Act, if a level has been set under paragraph (f) of this subsection, the maximum allowable level of fishing-related mortality for the species in specified areas within New Zealand fisheries waters;

(h) Recommendations to the Minister of Fisheries on measures to mitigate the fishing-related mortality of the species;

(i) Recommendations to the Minister of Fisheries on the standard of information to be collected on fishing-related mortality.

(2) In the case of any marine mammals ranging outside New Zealand fisheries waters, the maximum allowable level of fishing-related mortality set under paragraph (f) or paragraph (g) of subsection (1) of this section shall be based on a fair and equitable consideration of the proportion that the estimated fishing-related mortality of marine mammals within those waters bears to the total estimated mortality of marine mammals in all waters (including waters outside New Zealand fisheries waters).

Section 3F states:

In determining the maximum allowable level of fishing-related mortality for threatened species or any other marine mammals under section 3E (1)(f) of this Act, the Minister,-

(a) In the case of any threatened species, shall determine a level of fishing related mortality which should allow the species to achieve non-threatened status as soon as reasonably practicable, and in any event within a period not exceeding 20 years.

(b) In the case of any other marine mammal, shall determine a level of fishing-related mortality which should neither cause a net reduction in the size of the population nor seriously threaten the reproductive capacity of the species.

Section 3G states:

(1) Area based limits set under section 3E(1)(g) of this Act shall be set only-

(a) For populations of threatened species that are geographically or genetically discrete; and

(b) For areas corresponding to areas having effect under the Fisheries Act 1996 as fisheries management areas or quota management areas.

(2) In setting any area-based limit for a threatened species under section 3E(1)(g) of this Act, the Minister shall determine a level of fishing-related mortality for a discrete population referred to in subsection (1) of this section which should neither cause a net reduction in the size of the population nor seriously threaten the reproductive capacity of that population.

The Marine Mammals Protection Act 1978 as amended by the Fisheries Act 1996 includes several definitions relevant to the Population Management Plan:

'Aquatic life' means any species of plant or animal life which, at any time in the life history of the species, must inhabit water; and includes seabirds (whether or not in an aquatic environment):

'Fishing'-
(a) means the catching, taking, or harvesting of fish, aquatic life, or seaweed; and
(b) includes -

(i) Any activity that may reasonably be expected to result in the catching, taking, or harvesting of fish, aquatic life, or seaweed; and

(ii) Any operation in support of or in preparation for any activities described in this definition:

'Fishing-related mortality' means the accidental death or incidental death of any marine mammal in the course of fishing:

'Human-induced mortality' means the death of any marine mammal that can be attributed directly or indirectly to any human activity:

'Population management plan' means a plan approved under section 3E of this Act:

'Threatened species' means any marine mammal that is for the time being declared by notice under subsection (3) of this section to be a threatened species:

Subsection (3) states:

(3) The Minister after having regard to any relevant international standards and any relevant standards within New Zealand, may from time to time, by notice in the Gazette, declare any species of marine mammal to be a threatened species for the purpose of this Act.

The Marine Mammals Protection Act 1978 sets out the planning process in **section 3H**. Procedure for preparation and approval of population management plans -

(1) Population management plans shall be prepared and approved as follows:

(a) The Director-General shall prepare every population management plan in consultation with every Conservation Board and with such persons as the Director-General considers are representative of those classes of persons interested in the plan, including such persons or organisations as the Director-General considers are representative of Maori, environmental interests, commercial interests, and recreational interests:

(b) The Director-General shall then publish a notice of the draft plan at least once in each of the daily newspapers published in Auckland, Wellington, Christchurch, and Dunedin, respectively:

(c) Every notice under paragraph (b) of this subsection shall -

(i) State that the draft plan is available for inspection at the places and times specified in the notice; and

(ii) Call upon persons or organisations interested to lodge with the Director-General submissions on the draft before the date specified for the purpose in the notice, being a date not less than 40 working days after the date of publication of the notice; and

(iii) Require any person who wishes to be heard in support of the person's submission to so advise the Director-General:

(d) Any person or organisation may make written submissions to the Director-General on any draft plan, at the place and before the date specified for the purpose in the notice:

(e) From the time of publication of a draft plan until public opinion on it has been made known to the Director-General, he or she shall make the draft available for public inspection during normal office hours, in such places and quantities as are likely to encourage public participation in the development of the proposal:

(f) The Director-General shall give every person or organisation who or which, in making submissions on the draft, asked to be heard in support of his or her or its comments a reasonable opportunity of appearing before the Director-General or the Director-General's representative or representatives;

(g) The Director-General, or his or her representative or representatives; may hear submissions from any other person or organisation consulted on the draft:

(h) The Director-General shall prepare a summary of the submissions received on the draft and public opinion made known on the draft:

(i) After considering such submissions and public opinion, the Director-General may revise the draft:

(j) The Director-General shall send to the Minister of Fisheries and to the New Zealand Conservation Authority a copy of the summary prepared under paragraph (h) of this subsection together with a copy of the draft plan:

(k) The New Zealand Conservation Authority shall consider the summary of submissions and the draft plan and send to the Minister and the Director-General any comments on the draft:

(l) The Director-General after having regard to any comments received under paragraph (k) of this subsection, -

(i) May amend the draft:

(ii) Shall send to the Minister the summary prepared under paragraph (h) of this subsection together with a copy of the draft plan;

(m) After having regard to-

(i) The provisions of sections 3E, 3F, and 3G of this Act; and

(ii) All submissions made on the draft plan; and

(iii) Such other matters as the Minister considers relevant,- the Minister may approve the plan subject to the concurrence of the Minister of Fisheries refer it to that Minister for concurrence.

(n) The Minister of Fisheries may concur with the draft plan after having regard to the impacts of implementing the maximum allowable level of fishing-related mortality on commercial fishing and such other matters as that Minister considers relevant:

(p) The approved plan shall be available for public inspection at the head office of the Department of Conservation at such times as may be specified in the notice given in respect of the plan under subsection (2) of this section.

(2) The Director-General shall, by notice in the Gazette, specify-

(a) The species to which the approved plan relates; and

(b) The maximum allowable level of fishing-related mortality specified in the approved plan; and

(c) The times at which the approved plan is available for public inspection at the head office of the Department of Conservation.

(1) Any approved plan may be amended, and paragraph (a) and paragraph (l) to (p) of subsection (1) and subsection (2) of this section shall apply to every such amendment with any necessary modifications

Marine Mammal Protection Regulations 1992

Under the Marine Mammal Protection Regulations 1992 any person who engages in commercial viewing of marine mammals must comply with the purpose of those regulations, being:

Regulation 4 (Purpose):
To make provisions for the protection, conservation and management of marine mammals and, in particular, -

(a) To regulate human contact or behaviour with marine mammals either by commercial operators or other persons, in order to prevent adverse effects on and interference with marine mammals.

(b) To prescribe appropriate behaviour by commercial operators and other persons seeking to come in contact with marine mammals.

In permitting an operation, the Director-General has to be satisfied that the application substantially complies with criteria in the regulations. These are listed under **regulation 6, Criteria for issuing permits**. In brief these include:

• The commercial operations should not be contrary to Marine Mammal Protection Act 1978, General policy statements, or Conservation Management Strategies/Plans approved under the Act.

• The commercial operations should not have any significant adverse effect on the behavioural patterns of the marine mammals (having regard to the number and effect of existing commercial operations).

• That it should be in the interests of the conservation, management or protection of the marine mammals that the permit is issued.

• That commercial operators and staff who may come into contact with marine mammals should have sufficient experience of marine mammals, and sufficient knowledge of the local area and sea and weather conditions.

• That commercial operators and staff who may come into contact with marine mammals should have no convictions for offences involving mistreatment of animals.

• That the commercial operation should have sufficient educational value to participants or the public.

In applying for a permit, the onus to provide information relating to the proposed commercial vessel operation lies with the applicant. The regulatory requirements are outlined under **regulation 7 - Requirements to be satisfied before permit for commercial vessel operation is issued**. Subsections (a)(ii) and (e) in particular specify the need for applicants to provide "any known information relating to the noise level of each vessel both above and below the sea" and to submit details of any educational material to be provided or educational aspects of the proposed operation".

Regulation 12(3)(a) (Permits) provides that the Director-General shall not issue a permit unless she or he is satisfied that the proposal will not have or be likely to have "any adverse effect on the conservation, protection and management of marine mammals".
The Director-General may also suspend, revoke, amend or restrict in whole or in part any permit under regulation 13(2), where she or he believes on reasonable grounds that it is necessary for the protection, conservation, or management of any marine mammal or class of marine mammals.

Furthermore, the Director-General (regulation 15) may decline to grant permits during a specified period where he or she "believes on reasonable grounds that it is necessary for the protection, conservation or management of any marine mammal or marine mammals of any class", in considering whether or not to decline to grant permits he must have regard to:

(a) the number and effect of existing operations; and

(b) whether or not it is in the interests of the conservation, protection, or management of marine mammals to grant further permits.

Part 3 (regulation 18) stipulates the speed and distance vessels must adhere to when viewing all marine mammals:

(f) Where a vessel stops to enable the passengers to watch any marine mammal, the engines shall be either placed in neutral or be switched off within a minute of the vessel stopping.

(k) No person, vehicle, or vessel shall cut off the path of a marine mammal or prevent a marine mammal from leaving the vicinity of any person, vehicle, or vessel

(l) Subject to paragraph (m) of this regulation, the master of any vessel less than 300 metres from any marine mammal shall use his or her best endeavours to move the vessel at a constant slow speed no faster than the slowest marine mammal in the vicinity, or at idle or "no wake" speed

(m) Vessels departing from the vicinity of any marine mammal shall proceed slowly at idle or "no wake" speed until the vessel is at least 300 metres from the nearest marine mammal, except that, in the case of dolphins, vessels may exceed idle or "no wake" speed in order to outdistance the dolphins but must increase speed gradually, and shall not exceed 10 knots within 300 metres of any dolphin

Furthermore, Part 3, regulation 20 stipulates:

(f) Where 2 or more vessels or aircraft approach an unaccompanied dolphin or seal, the masters concerned shall co-ordinate their approach and manoeuvres, and the pilots concerned shall co-ordinate their approach and manoeuvres

(g) A vessel shall approach a dolphin from a direction that is parallel to the dolphin and slightly to the rear of the dolphin

Resource Management (Marine Pollution) Regulations and Marine Protection Rules

Under the Resource Management (Marine Pollution) Regulations and the Marine Protection Rules, oil discharge from ships and boats is regulated as follows:

• Within the 12 nautical mile limit oil may only be discharged if it does not come from ships cargo, the ship is proceeding on route, and the oil contents of the discharge before dilution does not exceed 15 parts per million. This applies to platform drainage of offshore installations.

• Beyond the 12 nautical mile limit the same restrictions apply to discharges of oil from all ships and offshore installations. Additional requirements apply to discharges of oil cargo residue from tankers.

• Under the Marine Protection Rules, ships of 400 tons gross or more (whether operating within or beyond the 12 nautical mile limit) must have oil filtering equipment, sludge tanks, implement an oil spillage contingency plan, restrict carriage of ballast water in fuel oil, tanks (ships of 4000 tons gross or more), report non-permitted discharges of oil, keep a record of operations involving oil, and hold an International Oil Pollution Prevention Certificate.

• Ships less than 400 tons gross (whether operating within or beyond the 12 nautical mile limit) must report non-permitted discharges and, where reasonable and practicable, have holding tanks for oily wastes.

Under the Resource Management (Marine Pollution) Regulations and the Marine Protection Rules, garbage discharge with regard to plastics is regulated as follows:

• Within the 12 nautical mile limit, disposal of plastics, dunnage, lining and packing materials is prohibited. Other garbage, including food wastes, paper, rags, metal, bottles, and crockery may be discharged provided that it is further than 3 nautical miles from the shore or 500 m from any offshore

installation and ground to a particle size of less than 25mm. Discharge of garbage from offshore installations is prohibited.

• Beyond the 12 nautical mile limit, disposal of plastics is prohibited. Dunnage, lining and packing material may be discharged no closer than 25 nautical miles from shore. Other garbage, including food wastes, paper, rags, glass, metal, bottles and crockery not ground to a particle size of less than 25mm may be discharged. Discharge of garbage from offshore installations, and from ships within 500 m of offshore installations, is limited to food wastes ground to a particle size of less than 25mm. Garbage does not include fresh fish and parts thereof both inside and outside the 12 nautical mile limit.

• Under Marine Protection Rules, all ships of 12 m or over are required to carry a notice alerting passengers and crew to garbage disposal requirements.

• Ships of 400 tons gross or more carrying 15 or more persons must implement a garbage management plan. A record of on-board garbage management is also required in some cases.

Marine Mammal Action Plan

The Marine Mammal Action Plan is an internal DOC document that "serves to underpin the legislation and policy mentioned above and provides specific outputs with regard to the conservation of marine mammals that the department can systematically work to achieve."

Its objective for species protection is:

- To actively protect marine mammal species and populations, and allow the recovery of those that are threatened with extinction or that have been depleted or otherwise adversely affected by human activities or unusual natural events.

The Marine Mammal Action Plan defines Hector's and Maui's dolphins as "Priority 1 species" and recreational and commercial fishing, and coastal development (especially marine farming) as "Priority 1 issues".

The Key Objectives for Hector's dolphins in the MMAP are:

1. Ecology. To better understand the population ecology, key habitat requirements and threats of the species.

2. Human impacts. To effectively protect Hector's and Maui's dolphins against any recreational and commercial fisheries-related mortality and other avoidable adverse effects of tourism and other coastal use and development.

3. Species recovery. To facilitate the recovery of the species and ensure that the local and national population dynamics (including the genetic diversity) of the species are maintained and restored to a viable self-sustaining state within its natural range.

Resource Management Act

The Purpose of the Resource Management Act 1991 (RMA) is to promote the sustainable management of natural and physical resources. Particularly relevant sections of the RMA include:

Section 5(2)(b) and (c) relate to "Safeguarding the life-supporting capacity of air, water, soil and ecosystems" and "Avoiding, remedying, or mitigating any adverse effects of activities on the environment".

Section 6(c) requires recognition and provision for "the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna."

Section 6(e) requires recognition and provision for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga, and 7(a) requires particular regard to be had to Kaitiakitanga.

Sections 7(d) and 7(f) identify the intrinsic values of ecosystems and the maintenance and enhancement of the quality of the environment as matters to which particular regard must be had.

Section 8 requires the Treaty of Waitangi to be taken into account

New Zealand Coastal Policy Statement (NZCPS)

The New Zealand Coastal Policy Statement (NZCPS) provides policy direction for the management of the coastal environment. Two principles of the NZCPS that are of particular relevance to the management of Hector's dolphins are:

- The protection of habitats of living marine resources contributes to wellbeing (principle 6).

- The importance of protecting significant natural ecosystems and maintaining indigenous coastal diversity (principle 11)

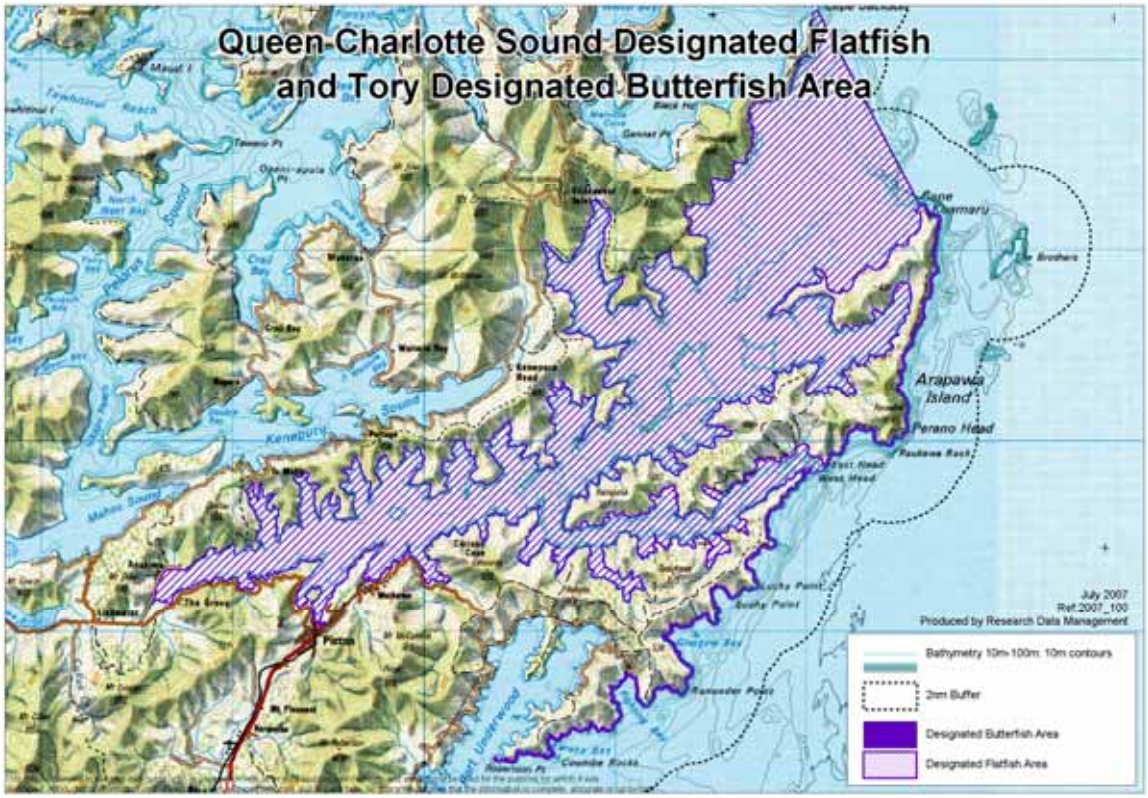
Two national priorities in the NZCPS which are of particular relevance to the assessment of effects on Hector's dolphin:

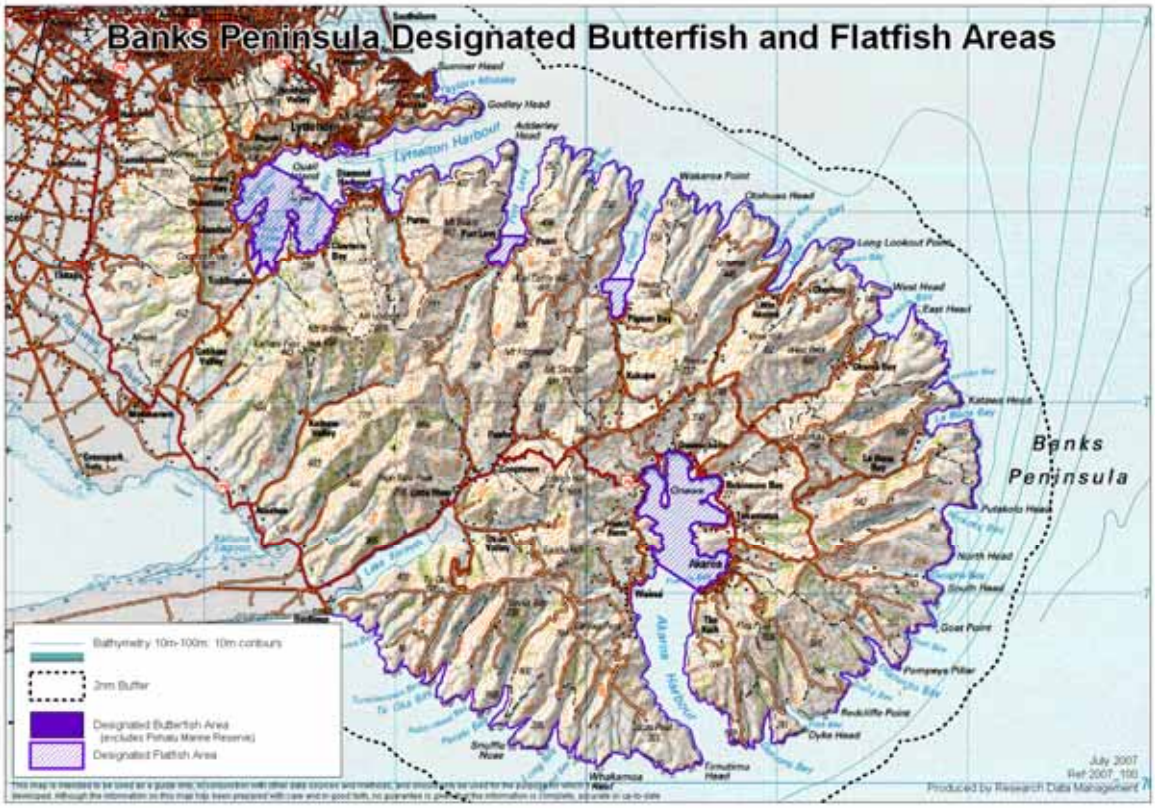
- Policy 1.1.2 states that: "It is a national priority for the preservation of natural character of the coastal environment to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna in that environment by:
  (a) avoiding any actual or potential adverse effects of activities on the following areas or habitats:
  (i) areas and habitats important to the continued survival of any indigenous species;"

- Policy 1.1.4 states that: "It is a national priority for the preservation of natural character of the coastal environment to protect the integrity, functioning, and resilience of the coastal environment in terms of:
  (b) natural movement of biota;...
  (e) natural biodiversity, productivity and biotic patterns, and
  (f) intrinsic values of ecosystems."

11.6. Appendix 6 – Designated butterfish and flatfish areas

11.6.1. ECSI designated flatfish and/or butterfish set net areas



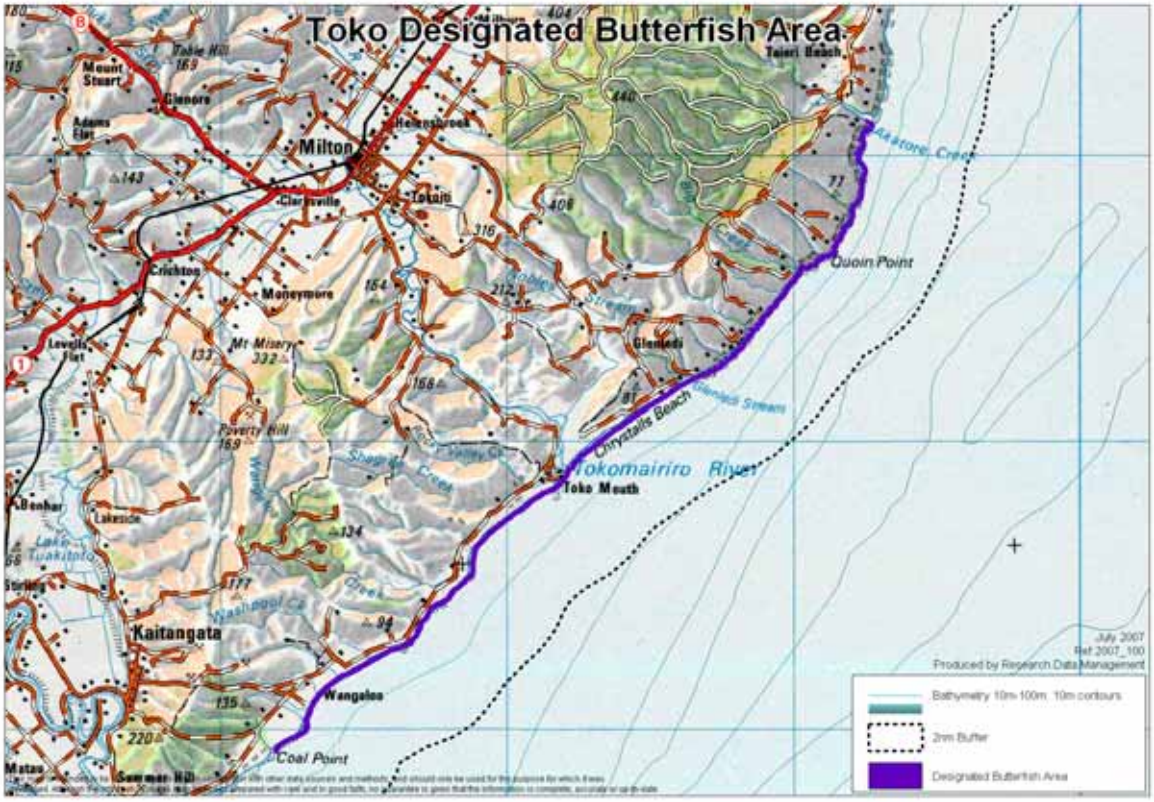

Banks Peninsula Designated Butterfish and Flatfish Areas
Banks Peninsula
Bathymetry 10m-100m: 10m contours
2nm Buffer
Designated Butterfish Area (includes Pohatu Marine Reserve)
Designated Flatfish Area
July 2007
Ref 2007_100
Produced by Research Data Management

Northern Kaikoura, Kaikoura Peninsula and Southern Kaikoura Designated Butterfish Areas
KAIKOURA
Kaikoura
Kaikoura Peninsula
Paparoa Point
Ohau Point
Half Moon Bay
Mangamaunu
Hapuku
Point Kean
South Bay
East Head
Atia Point
Pinnacle Rock
July 2007
Ref 2007_100
Produced by Research Data Management
Bathymetry 10m-100m: 10m contours
2nm Buffer
Designated Butterfish Area

Timaru Designated Butterfish Area
Orari River
Browns Beach
Opihi River
Pleasant Point
Waitawa
Kerrytown
Waipopo
Seadown
Levels Valley
Levels
Seaforth
Rosewill
Washdyke
Washdyke Lagoon
Puhuka
Smithfield
Hadlow
Caroline Bay
Gleniti
Claremont
TIMARU
Fairview
Adair
Redruth
Salisbury
Pareora West
Otipua
Tuhawaiki Point
Normanby
Pig Hunting Creek
Kingsdown
Pareora
Springbrook
Lyalldale
Pareora River
St Andrews
Otaio River
Otaio
Kohika Stm
July 2007
Ref.2007_100
Produced by Research Data Management
Bathymetry 10m-100m: 10m contours
2nm Buffer
Designated Butterfish Area

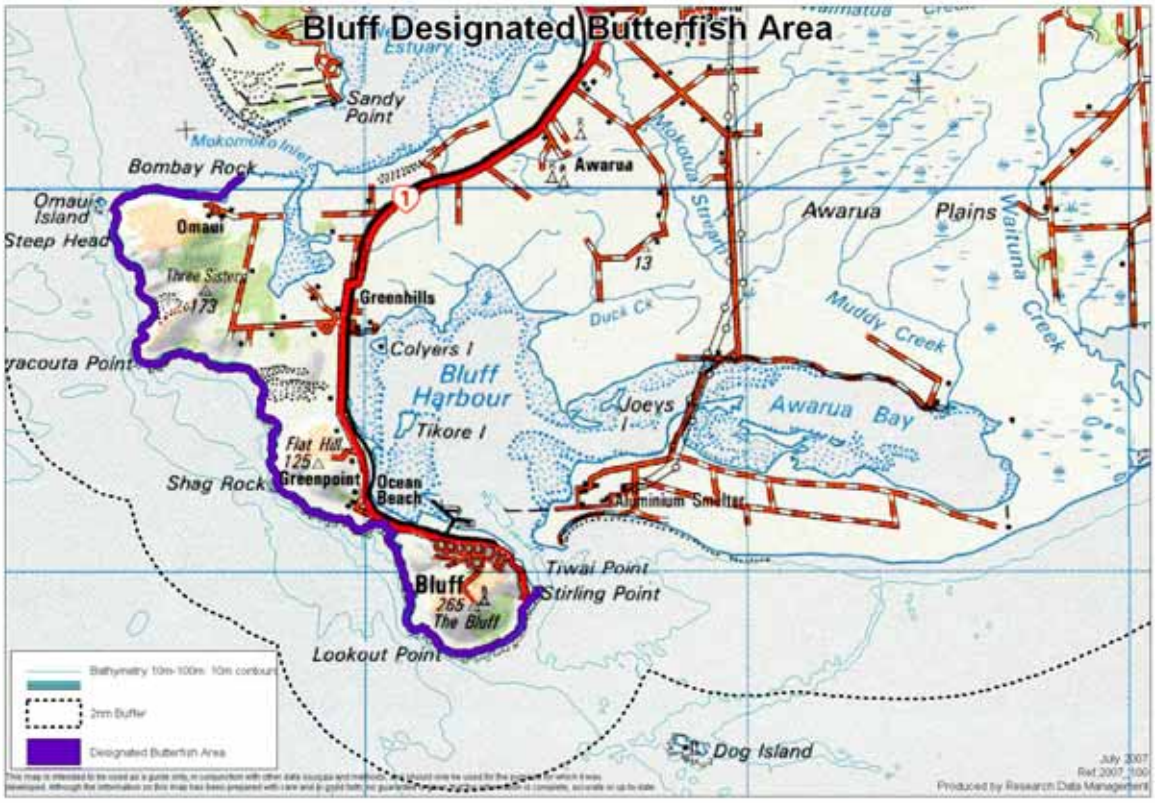
Shag Point , Moeraki and Kakanui
Designated Butterfish Areas
Kakanui
Kakanui River
Kakanui Point
Kakanui South
Waimotu
All Day Bay
Orere Point
Herbert
Otepopo
Waianakarua River
Waianakarua
The Bluff
Lookout Bluff
Kakaho Creek
Hampden
Hut
Big Kura Creek
Moeraki
Hillgrove
Tikoraki Point
Tawhiroko Point
Kaik
Moeraki
Okahau Point
Katiki
Katiki Point
Trotters Gorge
Katiki Beach
Pukehiwitahi
Shag Point
Bushey
Shag Point
July 2007
Ref:2007_100
Produced by Research Data Management
Bathymetry 10-100m: 10m contour
Designated Butterfish Area
2nm Buffer

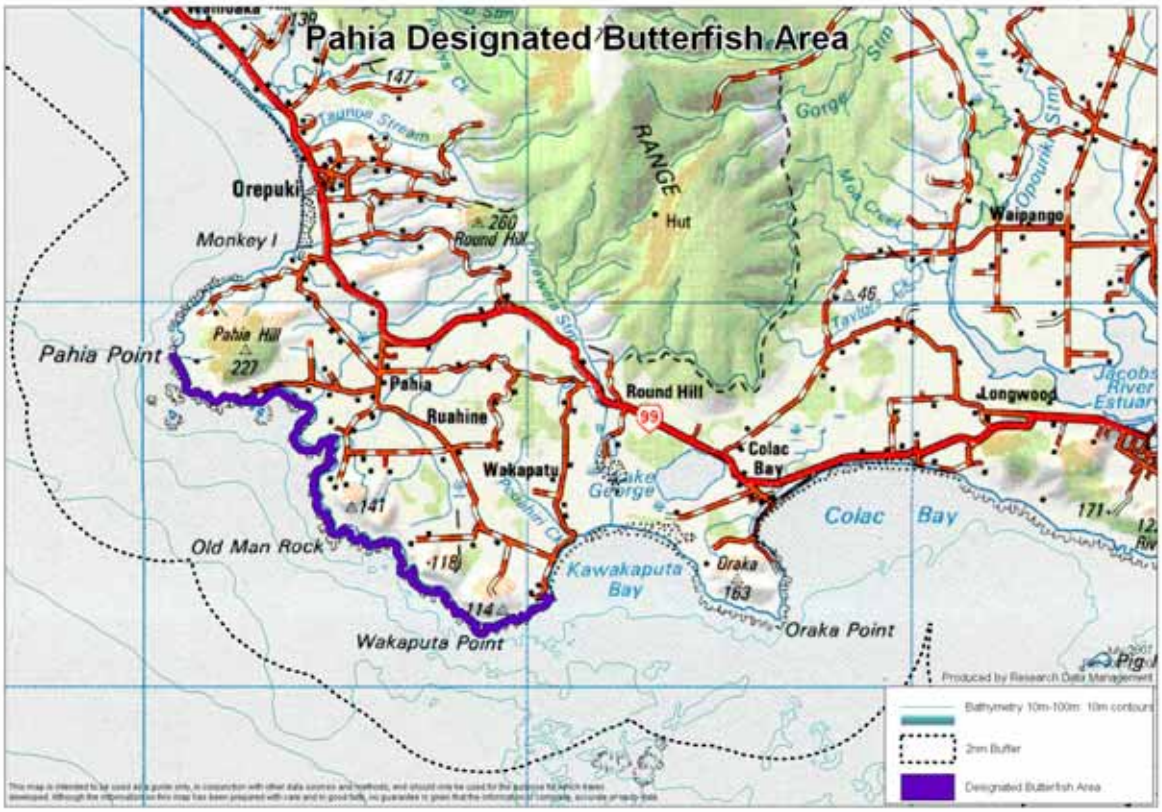
Seacliff and Waikouaiti Butterfish Areas
Poley Creek
Mt Scott
Mt Watkin
Hawksbury Bush
Tumai
Pleasant River
Waikouaiti
Mt Paul
Cornish Head
Merton
Waikouaiti River
Karitane
Puketeraki
Green Point
Brinns Point
Seacliff
Warrington
Evansdale
Purakanui Bay
Potato Point
Purakanui
Heyward Point
Taiaroa Head
Bathymetry 10m-100m 10m contours
2nm Buffer
Designated Butterfish Area
July 2007
Ref 2007_100
Produced by Research Data Management


Toko Designated Butterfish Area
Mount Stuart
Glenore
Milton
Clarksville
Tokoiti
Crichton
Moneymore
Quoin Point
Glenledi
Chrystalls Beach
Tokomairiro River
Toko Mouth
Kaitangata
Wangaloa
Coal Point
July 2007
Ref 2007_100
Produced by Research Data Management
Bathymetry 10m-100m 10m contours
2nm Buffer
Designated Butterfish Area

Kaka Designated Butterfish Area
Puerua
Paretai
Matau Branch
Clutha River
Koau Branch
Puerua R
Glenomaru
363
Romahapa
Port Molyneux
Molyneux Bay
Stream
Kaka Point
Glenomaru
225
Willsher Bay
Ahuriri Flat
280
Pollocks Hill
Karoro Ck
185
Fishermans Hill
Campbell Point
Nugget Stream
Hays Gap
Otekura
Tirohanga
319
Kaimataitai
133
Sandy Bay
Nugget Point
198
Newhaven
Bathymetry 10m-100m: 10m contours
2nm Buffer
Designated Butterfish Area
July 2007
Ref 2007_100
Produced by Research Data Management

11.6.2. SCSI designated butterfish areas





11.7. Appendix 7 - Acronyms

ACE	Annual Catch Entitlement
CELR	Catch Effort Landing Return
CFMC	Challenger Fisheries Management Company
CoP	Code of Practice
DOC	Department of Conservation
ECSI	East Coast South Island
FA96	Fisheries Act 1996
FMA	Fisheries Management Area
FRML	Fishing Related Mortality Limit
IPP	Initial Position Paper
ITQ	Individual Transferable Quota
LFR's	Licensed Fish Receivers
MFish	Ministry of Fisheries
MHR	Monthly Harvest Return
MHW	Mean High Water
MMS	Marine Mammal Sanctuary
MPA	Marine Protected Area
PBR	Potential Biological Removal
PMP	Population Management Plan
PoDs	Porpoise Detection Devices
RIS	Regulatory Impact Statement
RMA	Resource Management Act
SCSI	South Coast South Island
SEFMC	South East Fisheries Management Company
TMP	Threat Management Plan
WCNI	West Coast North Island
WCSI	West Coast South Island