



Wonders of the Sea

The protection of New Zealand's marine mammals



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marine mammals

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Kate Mulcahy and Raewyn Peart

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manager@eds.org.nz

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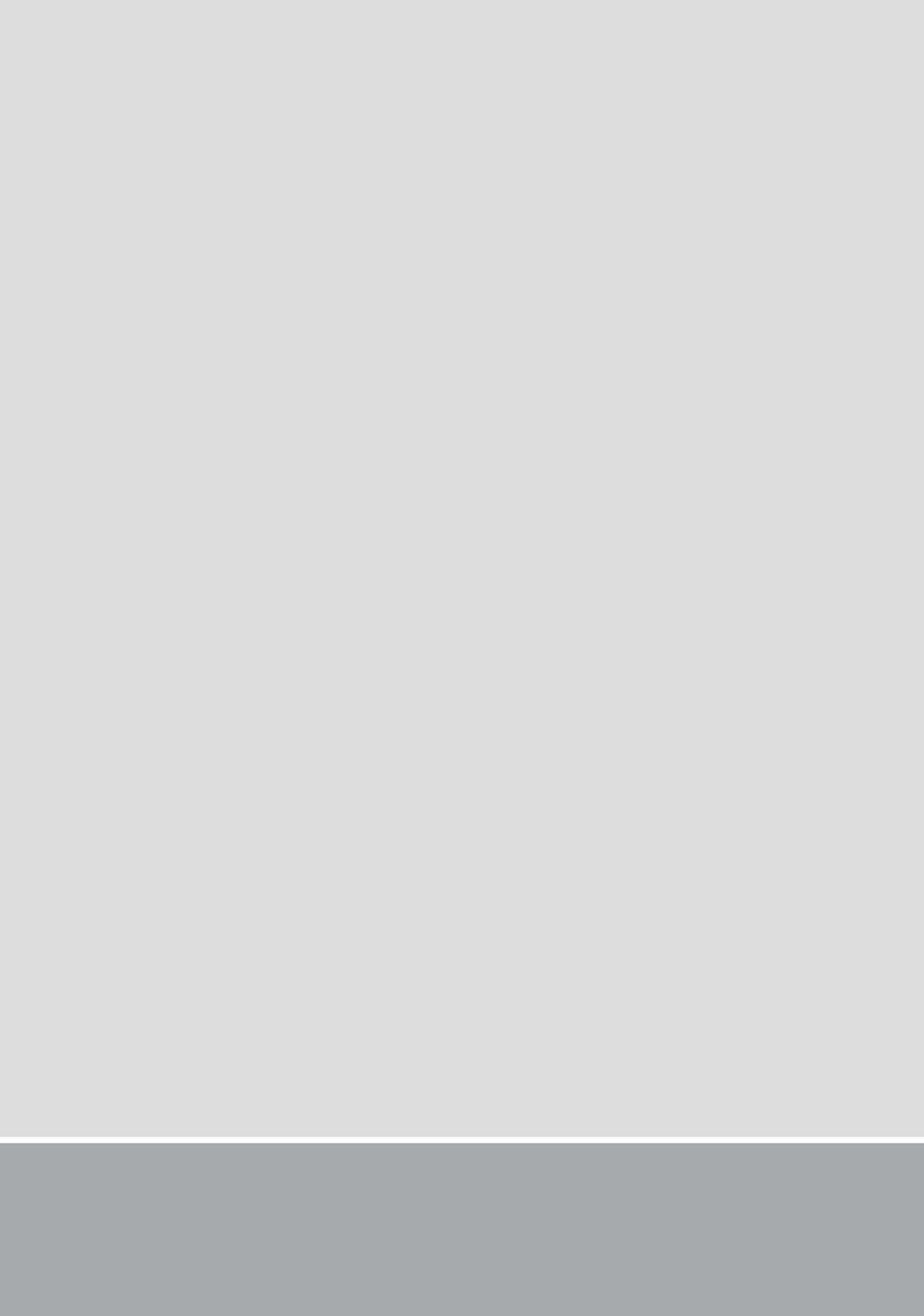
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PART ONE



chapter one



Introduction

Marine mammals in New Zealand

Marine mammals include cetaceans (whales and dolphins) and pinnipeds (seals and sea lions). New Zealand waters support a large variety of marine mammals – in fact almost half the world’s cetaceans have been sighted here (see Figure 1.1).

New Zealand’s Maui’s and Hector’s dolphins and New Zealand sea lions are found nowhere else in the world. There is a small resident population of orca in New Zealand, and a population of Bryde’s whales living in the Hauraki Gulf, in close proximity to Auckland. In Kaikoura, where there is a deep ocean canyon, sperm whales come unusually close to land. We also have inhabitants about which very little is known, such as the species of beaked whale which are almost never observed alive, but are occasionally found stranded on New Zealand’s beaches.¹

Historical context

Marine mammals were an important factor in New Zealand’s development as a nation. When the first Polynesians arrived in around 1250 to 1300 AD, they survived in part by hunting small cetaceans, seals and sea lions. Whales in particular have special significance to Māori, as several tribes tell of the arrival of their ancestor, Paikea, on the back of a whale. Māori did not generally catch and kill whales at sea, but when stranded they were regarded as a gift from Tangaroa, God of the Sea, for the people’s use. Māori traditionally ate their meat, used their oil for lighting and wood preservation, and used their bones for tools, ornaments and weapons.

Reports from Captain James Cook’s first visit to New Zealand in 1769 told of abundant marine life and encouraged sealers to the southern seas.² In the early 1800s, many more Europeans were enticed to New Zealand by the prospect of rich whaling grounds. As a result, the whaling and sealing industries strongly influenced the course of the early European contact period, and helped shape the creation of a new nation state.

Sealing reached its peak in 1809, but continued sporadically until 1946. The final open season permitted sealing under licence in part of the Catlins, around Stewart Island, and in parts of the west coast of the South Island.³ Whilst sealing activity declined, whaling remained an important industry. In 1949, New Zealand acceded to the International Whaling Commission, where it sought to reduce over-exploitation of whales on the high seas in order to protect the local whaling industry. But New Zealand did not advocate for whale conservation where the

stocks were not of direct interest. For example, when there was an international call for a halt to the exploitation of blue whales to allow the species to recover, New Zealand publicly recognised that urgent action was necessary to prevent the species becoming extinct, but also said that the blue whale was not its concern.⁴

After the crash of humpback stocks in the early 1960s, and the sudden drop in world whale oil prices, New Zealand's whaling industry collapsed. The last whaling station in Tory Channel closed in 1964. Whaling issues became less important to the New Zealand government as the economic significance of the industry shrank. In addition, government representatives felt that New Zealand was becoming increasingly powerless at the International Whaling Commission. It did not seem worth shouldering the costs and obligations of membership when the country was no longer a whaling nation. New Zealand thus withdrew from the Convention in 1968, despite the concern of other members that this might precipitate defections from others.

During the 1970s, there was a significant shift in opinion in New Zealand, strongly influenced by the global 'Save the Whale' movement. In 1974 Project Jonah was set up, becoming influential in the promotion of the 'right to life' of marine mammals. In 1975 New Zealand banned the importation of all whale products.⁶ The country re-joined the International Whaling Commission in 1976, taking a more conservationist stance, whilst nevertheless keeping open the possibility of exploiting whale stocks in the future once they had recovered.

New Zealand's position on whaling during this period was somewhat equivocal. In 1976 a briefing noted that *"the general opinion is that whales should not be killed even if it could be shown that whaling does not threaten the existence of the species."* But in 1978, a briefing to the New Zealand delegation expressed a contrary view. It said *"in the long term, with the hoped for consolidation of whale stocks and our own location in an area populated by substantial numbers of sei, minke, and to a lesser extent sperm whales, we are keeping open the possibility of exploiting this natural resource in the future in accordance with the Commission's guidelines."*⁷

This ambiguity helped New Zealand to develop a new position at the International Whaling Commission. As an ex-whaling nation, without any current interest in the exploitation of whales, New Zealand assumed a role as mediator and was relatively successful at brokering concessions from both pro- and anti-whaling member states.⁸

Nevertheless, as a result of public pressure and a perception that the scientific advice used at the International Whaling Commission was inadequate to protect whale stocks, in the late 1970s the New Zealand government altered its position. It supported moves to implement a moratorium on commercial whaling (which

was finally passed in 1982) and from that point on was firmly on the side of anti-whaling proposals at the Commission.

Concern for customary rights has led Te Ohu Kai Moana (The Māori Fisheries Trust) to support indigenous aspirations at the International Whaling Commission. This is not an advocacy for commercial whaling, but to ensure that indigenous communities, such as the Inuit, who have exercised an enduring customary right to harvest whales, can continue to do so in the context of sustainable management.

The Marine Mammals Protection Act was passed in 1978 based on the United States Marine Mammals Protection Act 1972. Under this legislation, marine mammals are 'fully protected' in New Zealand waters. Its provisions were developed with strong support from Project Jonah and other environmental organisations, reflecting the popular anti-whaling, conservationist approach to marine mammals which replaced pro-whaling sentiment during the 1970s. This sentiment was bolstered by the development of a fledgling marine mammal tourism industry in the late 1970s and early 1980s, which encouraged a new interest in both whales and dolphins as resources worth conserving in their own right.

As a result, marine mammals in New Zealand enjoy special legislative protection, whilst other species are managed more generally under the Wildlife Act 1953. Despite considerable changes in attitudes towards conservation since the 1970s, there is no sign that this special treatment has fallen out of favour. New Zealanders have consistently shown support for continued protection of marine mammals and for eradicating existing threats to them.⁹

Purpose of report

New Zealand's marine mammals are as important to New Zealanders today as they were to the first Polynesians and Europeans who arrived here. But rather than their value being found in their meat, skins, bones or oil, they are an important draw card for domestic and international tourists and a highlight of New Zealand's natural heritage, which forms a key part of our national identity.¹⁰

Despite this, management measures implemented since the promulgation of the Marine Mammals Protection Act over thirty years ago have not ensured the health of New Zealand's marine mammal populations. Many species are suffering from significant stresses and the very survival of some is at stake.

This EDS policy report reviews New Zealand's current marine mammal protection legislation and investigates how this has been applied in practice

to address conflicts between human activity and marine mammals in a variety of situations. It canvasses approaches to marine mammal protection in other countries and identifies current weaknesses in New Zealand's management framework. It then identifies measures that could be taken to enable the legislation to better ensure the 'full protection' of New Zealand's marine mammals. The paper is intended to contribute to a constructive dialogue with all stakeholders, in order to identify how we can better protect marine mammals in New Zealand.

Structure and methodology

This report is structured in two parts. The first part provides a description of marine mammals in New Zealand and discusses some key threats to their survival. It also includes an overview of New Zealand's legislative framework; an assessment of New Zealand's performance in addressing threats to marine mammals; matters to be considered in the design of amendments to the legislation; and some legislative options. The second part sets out five case studies which describe the threats to particular marine mammal populations in New Zealand and management responses. Two further case studies describe overseas arrangements for marine mammal protection.

The material for the case studies was obtained from literature reviews and interviews with people involved in marine mammal science and management in New Zealand. The case study material has been synthesised and lessons learnt identified. The key findings from the case studies have been incorporated into the main body of the report and have informed the development of recommendations, which are set out in Chapter 12.

Conclusion

New Zealand is fortunate to have a particularly large and diverse range of marine mammals in its waters. They are highly valued by New Zealanders and the international community. Historically, exploitation drove many species close to extinction, and human activities still threaten a number of marine mammal species today. The Marine Mammals Protection Act has been in force for over thirty years and a comprehensive review is long overdue. The legislation urgently requires updating, so that it fully reflects current risks to marine mammals, and the challenges managers face in addressing them.

Figure 1.1: Marine mammals in New Zealand

Species	Distribution	Department of Conservation Threat Classification	Description	Food	Habitat
Baleen whales					
Bryde's whale	Breeds in New Zealand, principally in the Hauraki Gulf	Nationally critical (46 to 159 individuals, estimated 2008)	Curved, pointed dorsal fin located far down its back and broad flukes Broad, centrally notched tail flukes and small slender flippers The back is generally dark grey or blue to black. The ventral area is a lighter cream, shading to greyish purple on the belly Females grow to between 12 and 15 metres long. Males are usually slightly smaller than females	Small fish and crustaceans	Common in the Hauraki Gulf to North Cape, and Bay of Plenty
Southern right whale	Breeds in New Zealand, principally in the Sub-Antarctic	Nationally endangered (<1000 adult individuals, estimated 2002)	Large and stocky with large paddle shaped flippers and no dorsal fin Black, sometimes with irregular white patches. Grows to between 11 and 18 metres long	Planktonic crustaceans	Can be found around the Auckland Islands and Campbell Island, and sometimes off the New Zealand mainland, during winter and spring

Dwarf minke whale	Breeds in New Zealand, northern regions	Not threatened	Has a sharply pointed head and chunky body Dark grey back with variable whitish markings. Sometimes there is a distinctive white band on the flipper Grows to around 7 metres long	Fish, squid and krill	
Antarctic minke whale	Migrant	Not threatened	Has a sharply pointed head and chunky body Dark grey back with variable whitish markings Grows to between 8 and 10 metres long	Fish, squid and krill	Occurs in large numbers south of 60° S, throughout the Antarctic. Occasionally moves into New Zealand waters in winter
Sei whale	Migrant	Migrant	Lean and sleek, steely grey, and has a high dorsal fin. Looks similar to Bryde's whale Grows to between 15 and 18 metres long	Fish, squid and krill	Moves into New Zealand waters during seasonal migrations between Antarctica and the tropics
Blue whale	Migrant	Not listed	Mottled blue-grey with a yellowish sheen from algae on the skin. The small dorsal fin is set far back on the body Grows to between 28 and 30 metres long	Mainly krill	Moves into New Zealand waters during seasonal migrations between Antarctica and the tropics. Rarely seen close to shore, although pre-whaling it used to swim through the Cook Strait

Pygmy blue whale	Migrant	Migrant	Looks similar to the blue whale but has broader and shorter baleen plates, a shorter tail, a proportionately longer body in front of the dorsal fin, and a larger head relative to body size Grows to 24 metres long	Mainly krill	Moves into New Zealand waters during seasonal migrations between Antarctica and the tropics
Fin whale	Migrant	Migrant	Long, sleek streamlined body with grooves running down the throat Dark grey and black sides with white underside Second largest species of whale – grows to up to 25 metres long	Krill and small schooling fish	Found in deep offshore waters, moving into New Zealand waters during seasonal migrations between Antarctica and the tropics
Humpback whale	Migrant – part of the southwest Pacific stock moving through New Zealand waters between May and December	Migrant	Up to 15 metres long Has a small dorsal fin with a distinctive hump in front of it, and knobbly lumps on the head, jaw and flippers Black with white patches. The flukes have a black and white pattern, which is unique to each individual	Krill and small schooling fish	Visits the coast of New Zealand during seasonal migrations between the Antarctica and the tropics

Pygmy right whale	Migrant	Data deficient	Large head with arched jaw and throat grooves Grey or dark grey. The color lightens on the sides and the underside is white. Darker pectoral flippers Grows to 6.5 metres long – the smallest baleen whale found in New Zealand	Squid and krill	Inhabits New Zealand waters, but rarely seen
Sperm whales					
Sperm whale	Migrant – semi-permanent residence in Kaikoura	Not threatened	Dark grey or purplish brown, with white underneath Males grow up to 18 metres long, whilst females grow up to 14 metres long	Squid, sharks and rays	Prefers water deeper than 200 metres and so is usually found offshore in areas with submarine canyons In New Zealand it is found west of Stewart Island, off East Cape and North Cape, at Kaikoura and in some places to the west of New Zealand
Pygmy sperm whale	Breeds in New Zealand	Data deficient	Small, compact body that tapers near the tail and has a small, low, rounded dorsal fin Brownish to dark bluish-gray coloration on the dorsal side. The underside is paler with whitish to pinkish coloration Grows to 3.5 metres long	Squid, crustaceans and fish	Inhabits New Zealand waters

Beaked whales						
Beaked whales (14 species, about which little is known)	Data deficient or vagrant	Small head, a beak and bulging forehead, and pockets for the flippers. Males of some species have teeth that emerge from the bottom jaw like tusks Varies in length from about 3 metres to 13 metres	Squid and other deep water species	Inhabits the open ocean in New Zealand waters Very rarely seen alive		
Dolphins and porpoises (toothed whales)						
Hector's dolphin	Endemic	Nationally endangered (7,873 individuals, estimated 2007)	Distinctive rounded dorsal fin and a blunt beak Black and grey with a mainly white underside Grows to between 1.2 and 1.5 metres long	Small surface and benthic fish, squid and bottom dwelling invertebrates	Prefers shallow water Found along parts of the South Island coast Three distinct populations in the South Island – east coast, west coast and south coast of the South Island	
Maui's dolphin	Endemic	Nationally critical (55 adult individuals, estimated 2012)	Distinctive rounded dorsal fin and a blunt beak Black and grey with a mainly white underside Grows to between 1.2 and 1.5 metres long	Fish, squid and crustaceans	Found only on the west coast of the North Island of New Zealand	

Common dolphin	Breeds in New Zealand	Not threatened	Purplish black, grey, white, and yellowish tan with a distinctive criss-cross or hourglass pattern on its flanks Grows to between 1.7 and 2.4 metres long	Surface schooling and midwater fish	Found throughout New Zealand waters Usually within a few kilometres of the coast, particularly in the Hauraki Gulf and Northland and between Kaikoura and Hawkes Bay
Dusky dolphin	Breeds in New Zealand	Not threatened	Virtually no beak and a blunt dorsal fin Bluish black on the back and tail and white on the underside of the body, with tapered diagonal stripes along the sides Grows to between 1.6 and 2.1 metres long	Small fish and squid	Lives mainly on the coast, and prefers water less than 200 metres deep Found mainly around the South Island, lower North Island and Sub-Antarctic Islands. There are large populations off Kaikoura and during the winter months in Admiralty Bay in the Marlborough Sounds
Southern right whale dolphin	Breeds in New Zealand	Not threatened	No dorsal fin, with wide shallow body Usually has a black back and white undersides, although completely black individuals have been seen Grows to between 1.8 and 2.9 metres long	Squid and fish	Inhabits New Zealand waters, mainly offshore, so rarely seen

Orca (type A)	Breeds in New Zealand	Nationally critical (64 to 117 individuals, estimated 2000)	Torpedo shaped with black and white markings; including a white blaze just above the eye Grows to between 7 and 8 metres long	Fish, squid, sea turtles, octopus, rays and seabirds	Prefers cool deep water but also found in inland seas, shallow bays and estuaries Three New Zealand populations – one off the North Island, one off the South Island, and one that spends its time moving between the two regions Inhabits New Zealand waters, mainly offshore
False killer whale	Breeds in New Zealand	Not threatened	Resembles orca in shape. Its flippers are somewhat unusual in that they feature an 'elbow' Mostly black on the dorsal surface, fins, flanks and flippers, with lighter coloring on the underside Grows to between 4.3 and 5.9 metres long	Squid and large pelagic fish	Inhabits New Zealand waters, mainly offshore
Bottlenose dolphin	Breeds in New Zealand	Nationally endangered (inshore population less than 1000)	Long, blunt beak and a prominent dorsal fin Dark or light grey back, grading to white on the underside Grows to between 2.4 and 4 metres long	Inshore – bottom dwelling fish and invertebrates Offshore - pelagic fish species and oceanic squid	Inhabits New Zealand waters Three or four main coastal New Zealand populations – Bay of Islands area, Fiordland, Marlborough Sounds to Westport and Stewart Island. Offshore populations are occasional visitors to the coast

Short-finned pilot whale	Migrant	Migrant	Stokey body, bulbous forehead, no prominent beak, long flippers sharply pointed at the tip, black or dark grey color, fin set forward on body Black or dark grey, with grey or almost white patches on the underside and throats, and a grey or white stripe which goes diagonally upwards from behind each eye Grows to between 3.5 and 6.5 metres long	Fish, squid and octopus	Inhabits waters north of New Zealand but occasionally enters New Zealand waters
Long-finned pilot whale	Breeds in New Zealand	Not threatened	Spherical head and long tapering trunk. Low dorsal fin set back on the body Black with a white underside Grows up to 8 metres long	Fish, squid and octopus	Migratory species which passes through New Zealand waters. Generally inhabits offshore areas
Seals and sea lions					
New Zealand fur seal	Breeds in New Zealand	Not threatened	Visible external ears and flippers that rotate forwards, pointed nose with long whiskers Dark grey brown on its backs, with a lighter stomach Males grow to 2.5 metres long	Squid and fish	Found around mainland New Zealand, the Chatham Islands and the Sub-Antarctic islands

New Zealand (Hooker's) sea lion	Endemic	Nationally critical (less than 12,000 adult individuals, estimated 2008)	Blunt nose and short whiskers Females are creamy grey with darker flippers. Males are brown to black, with a mane	Squid, as well as fish, sharks, rays octopus and invertebrates	Breeds on the Auckland Islands plus North West Bay on Campbell Island and Otago Peninsula Can be found around the coast of the South Island and lower North Island
Southern elephant seal	Breeds in New Zealand at Campbell and Antipodes Islands	Nationally critical (250 to 260 individuals, estimated 2005)	Boars have an inflatable snout Reddish, greyish and brown, returning to dark grey following moulting Males grow to between 4 and 5 metres long and females to between 2 and 3 metres long	Squid, cuttlefish and large fish	Visit New Zealand in winter especially the Auckland, Antipodes and Snares Islands, sometimes the Chatham Islands and occasionally various mainland locations

Sometimes spotted in New Zealand waters (vagrant):

- Dwarf sperm whale
- Ross seal
- Weddell seal
- Crabeater seal
- Antarctic fur seal
- Sub-Antarctic fur seal
- Leopard seal
- Pan-tropical spotted dolphin
- Striped dolphin
- Rough-toothed dolphin
- Melon-headed whale
- Risso's dolphin
- Hourglass dolphin

Endnotes

1. Van Waerebeek K *et al*, 2010
2. Hutching G and C Walrond, 2009
3. Smith I, 2002
4. Cawthorn M, 1999
5. Project Jonah at <http://www.projectjonah.org.nz/About+Us/History.html> (accessed 17 July 2012)
6. The Customs Import Prohibition (Whales and Whale Products) Order 1975
7. Cawthorn M, 1999
8. Cawthorn M, 1999
9. Epstein C, 2008
10. Department of Conservation, 2006, 3
11. Baker C *et al*, 2010

chapter two



Threats to Marine Mammals in New Zealand

Introduction

Although marine mammals in New Zealand are now protected from the threat of direct hunting, many populations are facing an uncertain future due to the impact of other human activities.

There are five marine mammal species listed by the Department of Conservation as ‘nationally critical’, meaning that they are severely threatened in New Zealand because they have a very small population size, and/or a dramatic decline in population is predicted.¹ Of these, Maui’s dolphins (around 55 adult individuals) and New Zealand sea lions (around 12,000 individuals but numbers declining dramatically) are endemic to New Zealand, so eradication of the population in New Zealand would mean total extinction.

In addition, Hector’s dolphins, bottlenose dolphins and southern right whales are classified by the Department of Conservation as ‘nationally endangered’ which means that whilst the threat is less severe, the health of the population is poor. A further 13 species are listed as data deficient, indicating that insufficient information is known about the species to make an assessment of population health.²

Significant known threats to marine mammals are discussed in this chapter.

Fishing

Set nets

Entanglement in set nets is a particular concern for species which frequent coastal areas, such as Hector’s and Maui’s dolphins, as well as orcas, bottlenose dolphins, dusky dolphins and fur seals.

A set net is a type of gill net. Gill nets are constructed out of fibres that are loosely woven together to leave openings large enough for undersized fish to swim through, but small enough to trap the target fish by their gills. Gill nets are either allowed to drift in the current (drift nets) or they are anchored to the seabed (set nets). Drift nets over a kilometre long were banned in the South Pacific through the Wellington Convention in 1989, and globally by a resolution of the United Nations in 1990.³ The ban was implemented because the nets were too indiscriminate, causing the deaths of many more species of fish, birds and marine mammals, other than the targeted species.

Set nets pose a problem because they form large walls in the water which marine mammals may fail to detect. The nets are frequently left unattended for hours at a time, even overnight. If a marine mammal becomes entangled in the net, it is unable to reach the surface to breathe, and as a result asphyxiates through breath-holding or drowns. Set nets can pose a continuing risk to marine mammals, as they are sometimes discarded at sea, or lost when they come loose from their anchors. These nets can continue to 'ghost fish' for many years, especially because modern nets break down only very slowly over time.

Modern set nets are made of monofilament plastic which is designed to be see-through, with the same density as water. This makes it difficult for marine mammals to detect the nets in the water column.⁴ It is not entirely clear why they fail to detect the nets, although a number of theories have been posited. Nets are often set in waters of poor visibility or at depth where light levels are low. As a result, marine mammals may not be able to see the net. Even echolocating marine mammals such as dolphins may have trouble detecting the net, either because they are not continually echolocating,⁵ or because the monofilament nets are hard to detect by this means. Modern monofilament netting does not reflect sound well, so it may be difficult for echolocating marine mammals to detect it, or nets may not be perceived as a solid obstacle.⁶

Both commercial and recreational fishers use set nets. Regulations under the Fisheries Act 1996 govern the location and size of recreational set nets, and the length of time that they can be in the water, but these are probably insufficient to prevent marine mammal bycatch. It is also likely that a significant amount of illegal set netting occurs.

There are some measures that can be implemented to reduce the susceptibility of marine mammals to entanglement in set nets. However these are of limited value, so that the only truly effective method of preventing marine mammal bycatch is to prohibit the use of set nets, especially in areas of critical habitat. Pingers (acoustic alarms) have been used successfully to deter dolphins from set nets, but there is concern that they may permanently displace the animals from an area, forcing them into less desirable habitat. Conversely, there is also uncertainty about the long term efficacy of pingers as the marine mammals become habituated to their presence.⁷ Other measures include restricting the size of nets and using specific twine sizes and floatation devices which marine mammals find easier to detect. The problem with this last measure is that it makes the nets more easily detected by fish as well.

Trawling

Trawl fishing is a significant threat to a range of marine mammals. New Zealand sea lions, fur seals, common dolphins and Hector's dolphins are at particular risk from entanglement in trawl nets.

The bulk of the commercial catch in New Zealand is harvested by trawling, and this method is used to catch a range of species, including orange roughy, hoki, ling, hake, squid, southern blue whiting and barracouta.⁸ Recreational fishers are not permitted to use trawl nets.

Trawling involves one or two fishing vessels towing a large net. Most New Zealand trawlers are single, rather than pair trawlers. Nets are usually towed for two or three hours at a speed of three or four knots.⁹ The trawl net can be dragged along the seabed (bottom trawling) or through the water column (midwater trawling), depending on the species targeted. Nets for both bottom and mid-water trawling are held open by two heavy metal 'doors', which act as paravanes, or underwater kites.

Marine mammals may be drawn to trawlers because of the food they offer. A study of Hector's dolphins on the Banks Peninsula showed that they followed trawlers to feed on the fish stirred up, but not caught, by the net. Not surprisingly, dolphins that spent large amounts of time behind trawlers had an increased risk of being caught by the nets.¹⁰

New Zealand sea lions and dolphins (especially common dolphins) are particularly associated with trawl fishery bycatch. New Zealand sea lions are caught in trawl nets targeting squid off the Auckland Islands, where the main sea lion breeding colonies are located. In an effort to reduce sea lion mortality, which is of serious concern for the future survival of this endemic species, exclusion devices have been used on all trawl vessels targeting squid around the Auckland Islands since 2007. However, there is no consensus over the extent to which these are effective – whilst the Ministry for Primary Industries¹¹ has concluded that they are effective,¹² some scientists suggest that this has not been proven.¹³ This problem is described in detail in chapter 16.

Ministry for Primary Industries data indicates that, between 1995 and 2008, 143 dolphins were observed caught in New Zealand fisheries. Of these, 123 were common dolphins, of which 121 were caught in trawl fisheries.¹⁴ The jack mackerel mid-water trawl fishery off the west coast of the North Island was the main culprit, with 108 common dolphins observed caught in this fishery during the period.¹⁵ The rest were caught by vessels targeting hoki, skipjack tuna, barracouta, snapper

and trevally.¹⁶ Observer coverage in New Zealand's trawl fisheries varies (and is generally low) so it is difficult to make a reliable estimate of the total number of dolphins caught each year. For example, between 1995 and 2008, observer coverage in each of the Fisheries Management Areas for jack mackerel ranged from four to 27 per cent, meaning that of the 18,807 tows reported by the fishery over this 14-year period, only 4,299 were observed.¹⁷

Mid-water trawling is more likely to result in dolphin bycatch than bottom trawling.¹⁸ Mid-water trawls tend to be towed faster, leaving dolphins less time to escape, and use bigger nets. They are also commonly undertaken in order to catch the same types of pelagic fish that are prey for dolphins.¹⁹ In the jack mackerel fishery, it has been observed that the majority of captures occur at night, particularly when there is little or no moonlight and when shallow trawls are undertaken (common at night because the mackerel are at the surface). As a result, it has been suggested that prohibiting trawling at night, or prohibiting shallow trawls, may help to reduce dolphin bycatch.²⁰

Food competition

Fishing may also threaten marine mammal populations by reducing food supply. Fishing may directly remove the prey species targeted by the marine mammal or cause changes in the ecosystem which in turn lead to a loss of available food. For example, it is believed that competition for the squid caught in the trawl fishery off the sub-Antarctic Islands may be a partial cause of the decline in sea lion pup production in the Auckland Islands.²¹

Similarly, the decline in blue cod stocks in Doubtful Sound caused by fishing activity, may have contributed to a decline in the resident bottlenose dolphin population.²² Even when fishing activity ceases, stocks may not recover quickly, resulting in longer term impacts for the marine mammal species. For example, despite having been closed to fishing since 2005, stock levels of blue cod in Fiordland have shown little improvement.²³

Tourism

On the face of it, marine mammal watching may appear to be a benign activity, focusing on the intrinsic value of marine mammals rather than on their value as a harvestable resource. To some extent this is true, and the growth of whale, dolphin

and seal tourism creates a powerful economic argument for conserving marine mammals and their ecosystems. It also has the potential to raise awareness and appreciation of marine mammals amongst the public, create revenue for the conservation of both areas and species, contribute to economic development, fund infrastructure and services, provide employment and funds for sustainable practices, and provide alternative ways for communities to raise revenue from biological diversity.²⁴ However, marine mammal tourism also has the potential to generate a number of negative impacts on the species targeted, including vessel strike, disruption to normal behaviour and habitat displacement.

Tourism focused on marine mammals started with whale watching in San Diego. In 1950, the Carbillio National Monument was declared a public spot for the observation of Grey whales. In 1955, the first water-based whale watching commenced in the same area, charging customers \$1 per trip.²⁵ Over the following decade, similar enterprises were started in other areas along the western coast of the United States, and in the 1970s the industry grew significantly across all of North America. During the 1980s, the concept spread to Europe, and has since been imitated across the world. In 2001, nine million people went on marine mammal watching trips in 66 countries and 21 overseas territories or dependencies.²⁶

The first commercial marine mammal watching trips in New Zealand began in Kaikoura in the late 1980s and proved to be a means for the local tribe, Kati Kuri to escape the economic decline facing the town. The first tourist trips targeted sperm whales only, and were undertaken aboard a small inflatable vessel. As sperm whale tourism became a success, trips specifically targeting dolphins were established. The first swim-with-dolphin trips were undertaken in 1989 by Dolphin Mary Charters (which later became Dolphin Encounter).

The activity quickly caught on in New Zealand, and by 1997 there were 74 operational permits for marine mammal tourism. By 2012 the industry was contributing over \$120 million to the national economy each year.²⁷ Today in New Zealand you can swim with dolphins and pinnipeds, take boat trips and aeroplane flights to observe whales, dolphins and seals, or watch them from land-based viewing areas in locations around the country.

Marine mammal tourism in New Zealand has grown to the extent that it has begun to generate negative effects on the species targeted. Although responses may differ between species, it is generally the case that the presence of significant numbers of tour boats can change the natural behaviour of individual animals. For example, research by the University of Otago found that the presence of whale watching boats caused changes in the breathing rate and behaviour of sperm whales.²⁸

The presence of tourist boats around common dolphins in the Bay of Islands²⁹ and dusky dolphins at Kaikoura³⁰ has been shown to reduce the time the dolphins spend foraging and resting. Instead, more time was spent milling and socialising. In addition, it took longer for the dolphins to return to a resting or foraging state, having been interrupted by tour boats, than if they were interrupted by other vessels.

The presence of tourist boats may cause some species to avoid the areas of their natural habitat where they are pursued. In general, dolphins will avoid boats either by diving vertically or by avoiding their path horizontally. However, a study in Milford Sound found that when boat presence became too frequent (with less than 68 minutes between visits), the dolphins switched to long term avoidance of the area. This meant spending significantly less time in Milford Sound during tourism peak seasons, and potentially spending more time in the open ocean, where dolphins are at greater risk from shark predation.³¹ Similarly, a recent population study on bottlenose dolphins in the Bay of Islands has indicated that fewer dolphins are now present, possibly because they have begun to avoid the area which is frequented by large numbers of tour and recreational boats.³²

Whilst studies have observed behavioural changes in individual animals caused by the presence of tourists in many species, it is harder to accurately assess what the significance of these changes is for the population as a whole. Marine mammals are slow-breeding, long-lived species with complex social systems, so it may take many years for the effects of tourism to be conclusively identified.³³ However, there is some evidence to indicate that animals which are unable to forage and rest in the normal way may experience a reduced energy budget, which in turn makes it less likely that they will be able to breed successfully and rear healthy calves.

Where populations do exhibit negative changes over time, it is difficult to show that tourism is the exclusive cause. Nevertheless, in some areas tourism appears to be having a negative impact on long-term population survival. Research on bottlenose dolphins in the Bay of Islands indicates that the population is declining,³⁴ and in the absence of other documented significant adverse effects, it is apparent that tourism must be a significant factor.

Changes to dolphin behaviour may have consequences for other species. For example, Australasian gannets and Bryde's whales in the Hauraki Gulf rely, at least in part, on common dolphins to find their prey. Thus the presence of tour boats may disrupt these other species as well.³⁵

Some marine mammal species and populations are more susceptible to disruption by marine mammal tourism than others. For example, the large pod sizes and night-time feeding behaviours of the dusky dolphin mean that the impacts of tourism are less than those on the smaller groups of bottlenose dolphins which forage during the day. In many cases, the potential negative impacts of marine mammal tourism can be addressed through more careful management of the volume and nature of interactions.

Vessel strike

Collisions with boats are a significant threat for some species of marine mammal. Large whales and other slow moving species that spend a lot of time at or near the water's surface seem to be at particular risk, although the reasons why some species are more prone to collisions than others are not fully known. A particular risk to small cetaceans occurs from commercial dolphin watching boats and recreational vessels which gather to watch dolphins.³⁶

Many types of vessel are implicated in vessel strike – from private recreational boats to ferries, container ships and cruise ships, although the larger boats are believed to be more likely to result in a fatality.³⁷ Around the world, collisions have been on the increase, a trend which is attributed to an increase in the number, size and speed of vessels passing through marine mammal habitats.

The number of vessel strikes that occur in New Zealand waters each year is unknown, as not all carcasses are recovered and many incidents are not reported, or even noticed. The crews of large vessels in particular, such as container ships and cruise ships, may not realise that a collision has occurred. In some cases whales become lodged on the bulbous bows of large vessels and the crew may only become aware of this when the ship enters port. So, for every incident that is observed and reported, there will be many others that are missed.³⁸

Vessel strike is known to be a particular concern for Bryde's whales in the Hauraki Gulf, and for bottlenose dolphins in Fiordland. A detailed account of the problems in relation to Bryde's whales is set out in chapter 17. Between 1989 and 2011, 40 Bryde's whales have been found dead in the Hauraki Gulf, and 14 of these are considered to have been caused by vessel strike. However, the correct figure is likely to be higher as the cause of death for many of the whales was unknown, and others may have died and sunk at sea without being recorded.

A study undertaken between 2000 and 2002 showed that eight to ten per cent of dolphins in Milford Sound bore propeller scars and other injuries caused by boats.³⁹ In 2002 a calf disappeared, and was presumed killed, shortly after being wounded by a propeller on a tour boat. Since only two calves were born in Milford Sound that year, the death of the calf reduced the reproductive success of the population by 50 per cent.⁴⁰

It is difficult to quantify accurately the significance of vessel strike to marine mammal populations, because of the lack of data available. In general, we have limited knowledge of the populations, and it is very difficult to determine the number of strike events that actually occur. Some data is available for the Bryde's whale, and this indicates that ship strike could be having a major impact. With only an estimated 200 individuals in the Hauraki Gulf, and at least an average of two strikes per year, the mortality rate may well be unsustainable for the local population.⁴¹

Aquaculture

The aquaculture industry has grown significantly in the last ten years. Marine farms, growing mainly green-lipped mussels and Chinook 'King' salmon (but increasingly a wider range of species), have been developed over large areas of New Zealand's coastal marine area. They are particularly concentrated in coastal marine areas in the Marlborough Sounds, Golden Bay, the Coromandel Peninsula, Canterbury and Stewart Island. In April 2012, the Government's *Aquaculture Strategy and Five-Year Action Plan to Support Aquaculture* was released. This is designed to support the industry's goal of growing annual sales to \$1 billion in value by 2025, from the current \$350 million. One of the performance measures is that 4,000 hectares of new aquaculture space will be developed by 2016.⁴²

In recent years there has been a growing concern that marine farms could adversely affect species such as dolphins if they block access to food sources, limit the space available for hunting, or interfere with normal behaviour. Marine farms can appear as visual or acoustic three-dimensional barriers to marine mammals using sonar. Studies in Admiralty Bay have observed significantly fewer dusky dolphins inside mussel farms than outside them.⁴³ A study by Markowitz showed that dolphins rarely used areas within existing farms, despite the fact that according to the model used by the researchers, those areas should have been

important dolphin habitat. In five years, only eight of 621 dolphin groups were observed inside the mussel farms.⁴⁴

Entanglement in gear is a further problem in relation to smaller marine mammals, especially dolphins. Predator nets are often installed around salmon farms to prevent pinnipeds such as fur seals accessing farm stock and structures. However other marine mammals can become entangled in these nets. The New Zealand salmon fishery has adopted net design and operational practices to minimise the risk of this occurring, although since 1999 six dolphins have died in salmon farm nets.

Marine farms may also increase the risk of vessel disturbance, where marine mammals are injured or killed through hitting boats, or are disrupted by increased underwater noise.

Other threats

Other threats to marine mammals in New Zealand include disease and pollutants as described below, underwater noise (from vessels and underwater activity such as mining and marine energy generation), seismic testing (undertaken by petroleum, gas and minerals prospectors), and disruption from extraction activities. In addition, New Zealand has an unusually high marine mammal stranding rate and the reasons for this are not fully understood. Strandings and New Zealand's response to them are further discussed in Appendix 2.

Disease

Marine mammals are at risk from numerous diseases, some of which may be passed to marine mammals from other species, including humans. Pup production in New Zealand sea lions has been seriously affected by outbreaks of bacterial infection during several breeding seasons. The infections may have been caused by *campylobacter* or *klebsiella*, both of which can be transmitted from humans to animals. There has been speculation that sea lions visiting Otago harbour, may have contracted the bacteria from the Dunedin sewage outflow, and have transported it back to the breeding colonies on the Auckland Islands. Other possible sources are researchers visiting the colonies to undertake pup counts, or human waste dumped from vessels at sea. The risk of similar events occurring in

the future will likely increase, as sea lions recolonise the mainland, bringing them into closer contact with people.

Evidence of a bacterial agent called *brucella* has been found in numerous marine mammal species. Notably in November 2006 it was discovered in a dead baby Maui's dolphin found at the mouth of the Waikato River.⁴⁵ The dolphin was born alive but did not make it to the surface to take its first breath. In livestock, brucellosis, which is the disease caused by the *brucella* bacterium, causes abortions and reproductive failure. However, it is not yet clear how the disease manifests itself in marine mammals.⁴⁶

Pollution

During the past century, over 20,000 chemicals have been introduced into the environment, many of which have entered food chains. It is difficult to estimate exactly how much, of what substances, is released each year. The long-term environmental effects of releasing such a large number of human-made substances into the environment are still poorly understood. Pollutants reach the ocean from the air, as a result of run-off from land, and from being discharged directly into the sea. To some extent oceans can neutralise pollutants due to their sheer size, but in some areas they are no longer able to do this, due to the large volume of pollutants entering the water.

Persistent organic pollutants such as DDT, PCBs and dioxins are a key concern. These are chemical substances that are not part of natural cycles. They are known to be particularly soluble in fatty tissues, and because the body is unable to excrete these substances, they accumulate over each animal's lifetime. In mammals, they are also passed onto the young in their mother's milk. Once these substances enter the food chain, they travel up the different trophic levels. This means that animals at the top of the food chain, such as marine mammals, ingest much higher levels from their prey than those lower down. Furthermore, being relatively long-lived, there is time for these pollutants to accumulate in marine mammals to critical levels.

Although the effects of persistent organic pollutants on marine mammals are not well understood, negative effects on the reproductive success of some species have been documented. Such chemicals may interfere with the production and metabolism of hormones responsible for homeostasis and the regulation of reproductive processes.⁴⁷ The substances are also thought to suppress the immune system, making the animals more susceptible to disease.⁴⁸ These negative effects

can be magnified, through a synergistic effect, when more than one substance is present.

Samples from dead marine mammals in New Zealand waters have contained lower quantities of toxic chemicals than those found in more populated parts of the world, such as Europe or Japan, but pollutant levels are still significant. Marine mammals that live close to New Zealand's coastline have the highest levels of pollutants. For example, samples from Hector's dolphins and orca have been found to contain DDTs, PCBs, dioxins and other human-made compounds such as flame retardants.⁴⁹ Similarly, Stockin *et al* examined the tissues of stranded and bycaught common dolphins in New Zealand and found traces of PCBs and a range of pesticides including DDT.⁵⁰

Conclusion

Human activities create a wide range of threats to marine mammals in New Zealand. A summary of the key threats, and species particularly affected by them, is shown in Figure 2.1. Collectively these threats are having a significant impact on marine mammal populations in New Zealand. In many cases a marine mammal population may be affected by a number of threats, making it more difficult to isolate the particular impact of an individual activity, and to develop appropriate management measures.

Figure 2.1: Summary of threats to marine mammals in New Zealand

Threat	Species particularly affected
Set nets	Hector's dolphin Maui's dolphin
Trawling	New Zealand sea lion New Zealand fur seal Common dolphin Hector's dolphin Maui's dolphin
Tourism	Bottlenose dolphin Common dolphin Hector's dolphin Dusky dolphin Sperm whale New Zealand fur seal New Zealand sea lion
Aquaculture	Dusky dolphin Hector's dolphin
Ship strike	Bryde's whale Bottlenose dolphin (Milford Sound)
Disease	Maui's dolphin New Zealand sea lion
Pollution	Hector's dolphin Maui's dolphin Orca Common dolphin Dusky dolphin

Endnotes

1. Townsend A *et al*, 2008
2. Baker C *et al*, 2010
3. United Nations Resolutions 44/225, 45/197 and 46/215
4. Rowe A, 2004, 14
5. Rowe A, 2004, 14
6. Mooney T *et al*, 2004
7. Report of the Scientific Committee of the International Whaling Commission, 1999
8. Ministry for the Environment, 2010
9. <http://www.fish.govt.nz/en-nz/Commercial/About+the+Fishing+Industry/Fishing+Methods.htm?WBCMODE=PresentationUnpublished> (accessed 30 April 2012)
10. Rayment W and T Webster, 2009
11. The Ministry of Fisheries was incorporated into a new Ministry for Primary Industries in 2011. For the purposes of consistency, this Ministry, and the corresponding Minister, are referred to as the Ministry and Minister for Primary Industries throughout this paper
12. Ministry for Primary Industries, 2011
13. See e.g. Robertson B and L Chilvers, 2011
14. Thompson F *et al*, 2010
15. Thompson F *et al*, 2010
16. Stockin K and M Orams, 2009
17. Thompson F *et al*, 2010
18. Du Fresne S *et al*, 2007
19. Du Fresne S *et al*, 2007
20. Thompson F *et al*, 2010
21. Robertson B and L Chilvers, 2011
22. Beentjes M and G Carbines, 2005; Lusseau D and S Wing, 2006; and Currey R *et al*, 2007
23. Ministry of Fisheries, 2007
24. Gillespie A, 2011
25. Hoyt E, 1995
26. Hoyt E, 2001
27. Constantine R, 1999; Government of New Zealand, 2012, 3
28. Richter S *et al*, undated
29. Constantine R *et al*, 2003
30. Lundquist D, 2011
31. Lusseau D *et al*, 2006
32. Tezanos Pinto G, 2009
33. Constantine R, 1999
34. Tezanos Pinto G, 2009
35. Stockin K *et al*, 2008
36. Van Waerebeek K *et al*, 2007
37. Constantine R *et al*, 2012
38. International Whaling Commission: Whales and Ship Strike, at [www.iwcoffice.org/ship strikes](http://www.iwcoffice.org/ship%20strikes) (accessed 17 July 2012)
39. Lusseau D, 2002
40. Lusseau D, 2002
41. Constantine R *et al*, 2012
42. New Zealand Government, 2012
43. See e.g. Markovitz T *et al*, 2004
44. Markovitz T *et al*, 2004
45. Ministry of Agriculture and Fisheries, Massey University and Department of Conservation, 2007, 'Evidence of brucella found in Maui's dolphins', press release, 23 April
46. Iowa State University, 2007

47. Stockin K *et al*, 2007
48. Department of Conservation and Ministry of Fisheries, 2007a, 26
49. Buckland S *et al*, 1990
50. Stockin K *et al*, 2007

chapter three



New Zealand Legislative Regime

Introduction

Primary responsibility for the management and protection of marine mammals in New Zealand rests with the Minister and Department of Conservation. The principal legislative instrument is the Marine Mammals Protection Act 1978, which establishes a protection regime for all marine mammals. Several other agencies also have powers and responsibilities relevant to marine mammals. Specifically, the Fisheries Act 1996 empowers the Minister and Ministry for Primary Industries to manage the impacts of fishing on marine mammals, the Resource Management Act 1991 empowers local authorities to manage the impacts of coastal activities on marine mammals, and the Maritime Transport Act 1994 empowers the Minister of Transport and Maritime New Zealand to manage the impacts of vessel activity and offshore platforms on marine mammals. These legislative instruments are described in more detail in this chapter.

Marine Mammals Protection Act 1978

The Marine Mammals Protection Act was initially administered by the Ministry of Agriculture and Fisheries, in the absence of an authority specifically aimed at the conservation and protection of native species in New Zealand. This responsibility was then transferred to the Department of Conservation, in April 1987, upon the establishment of the new department.

Taking marine mammals

The Act protects all species of seal, whale, dolphin, porpoise, dugong and manatee within New Zealand waters. Taking marine mammals, whether alive or dead, from their natural habitat or 'any other place' is an offence without a permit from the Department of Conservation. The term 'take' includes the following activities:

- a) *To take, catch, kill, injure, attract, poison, tranquillise, herd, harass, disturb, or possess*
- b) *to brand, tag, mark, or do any similar thing*
- c) *to flense, render down, or separate any part from a carcass*
- d) *to attempt to do any act specified in paragraph (a) or paragraph (b) or paragraph (c)¹*

Offences carry penalties of up to six months in prison, or fines of up to \$250,000, and further fines of up to \$10,000 for every additional marine mammal involved in the offence. The Act provides that fisheries officers and police officers are also marine mammals officers, and have the power to board vessels and aircraft for the purpose of inspecting them where takes of marine mammals are suspected. Those who accidentally kill or injure a marine mammal cannot be prosecuted, so long as they report the incident to a fisheries officer or a marine mammals officer, as soon as practicable.

Thus, people wishing to hold or take marine mammals, or to import or export them, are required to apply for a permit from the Department of Conservation. In the case of whales and dolphins in particular, it is unlikely that any such permits will be granted for the purposes of holding animals in captivity. There are no longer any captive cetacean facilities in New Zealand, the last captive common dolphin having died at the Napier Marineland in 2008.² In 2010, Minister Kate Wilkinson advised in a letter to the World Society for the Protection of Animals³ that the Government was in favour of bringing the Act into line with the Department of Conservation's General Policy 4.4k which states "*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.*"⁴ As yet this has not been done.

Population management plans

Originally it was not an offence under the Marine Mammals Protection Act to kill any number of marine mammals as incidental bycatch during fishing activity, as long as the mortalities were reported in a timely fashion. In October 1996, a new Fisheries Act came into force. As part of the legislative reform process, new provisions were inserted into both the Marine Mammals Protection Act and the new fisheries legislation, to provide for the preparation of population management plans. These plans were intended to provide a mechanism through which the level of marine mammal bycatch in fisheries could be capped at a sustainable level.

The plans were to determine the maximum allowable level of fishing-related mortality for specific marine mammal species. This was to ensure that threatened species were able to "*achieve non-threatened status as soon as reasonably practicable, and in any event within a period not exceeding 20 years,*" and that fishing-related mortality will not cause other species to experience a "*net reduction in the size of the population nor seriously threaten the reproductive capacity of the species.*"⁵

A population management plan may include:

- An assessment of the biology and status of the species;
- An assessment of known fisheries interactions;
- An assessment of the degree of risk caused by fishing-related mortality and other human-induced sources of mortality;
- An estimate of the range of human-induced mortality which would enable the species to achieve non threatened status as soon as reasonably practicable, and in any event, within 20 years;
- An estimate of the range of fishing-related mortality which would enable the species to achieve non threatened status as soon as reasonably practicable, and in any event, within 20 years; and
- Recommendations to the Minister for Primary Industries on measures to mitigate the fishing-related mortality of the species.

The Director General of Conservation is responsible for the preparation of population management plans, in consultation with relevant stakeholders. Their preparation is not mandatory, and is entirely at the discretion of the Director General, irrespective of the conservation status of any marine mammal species. If the Director General does decide to prepare a plan, a draft is to be made available for a 40-day public consultation period. Having amended the draft plan as appropriate, the Director General must forward the plan to the Minister of Conservation for approval. The Minister may not approve the plan without the concurrence of the Minister for Primary Industries.

The Minister for Primary Industries 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 the Minister considers relevant.

Despite several attempts to develop population management plans,⁶ no plans have ever been finalised. An assessment of the reasons for this is set out in chapter 6.

Marine mammal sanctuaries

Section 22 of the Marine Mammals Protection Act also empowers the Minister of Conservation to establish marine mammal sanctuaries in any place within New Zealand's territorial sea and exclusive economic zone, by notice in the *Gazette*.

There is then a 28-day consultation period after which the Minister may, after considering any submissions in writing, vary, redefine or abolish the sanctuary.⁷

Figure 3.1 sets out the six marine mammal sanctuaries which have been established since the legislation was passed in 1978. As can be seen, the rules attached to the sanctuaries primarily regulate seismic surveying (which may cause a range of problems for marine mammals such as auditory damage, behavioural disruption and decompression sickness). The West Coast North Island sanctuary also places restrictions on mining in part of the sanctuary. Only the Auckland Islands sanctuary currently places restrictions on fishing activity, but the area is now also a no-take marine reserve, so the rules attached to the sanctuary are not relevant in practice. Regulations under the Fisheries Act control fishing activity within the other sanctuaries.

Figure 3.1: List of current marine mammal sanctuaries

Name	Date of establishment	Species protected	Protection measures
Banks Peninsula	1988	Hector's dolphins	<ul style="list-style-type: none"> • Restrictions on set netting and trawling (revoked 2008 – restrictions on fishing now implemented under the Fisheries Act 1996) • Restrictions on seismic surveying (added 2008)
Auckland Islands	1993	Southern right whales, New Zealand sea lions	<ul style="list-style-type: none"> • Prohibition on commercial fishing
Catlins Coast	2008	Hector's dolphins	<ul style="list-style-type: none"> • Restrictions on seismic surveying (restrictions on fishing implemented under the Fisheries Act 1996)
Clifford and Cloudy Bay	2008	Hector's dolphins	<ul style="list-style-type: none"> • Restrictions on seismic surveying (restrictions on fishing implemented under the Fisheries Act 1996)
Te Waewae Bay	2008	Hector's dolphins	<ul style="list-style-type: none"> • Restrictions on seismic surveying (restrictions on fishing implemented under the Fisheries Act 1996)
West Coast North Island	2008	Maui's dolphins	<ul style="list-style-type: none"> • Restrictions on seismic surveying • Prohibition on mining in part of the sanctuary (restrictions on fishing implemented under the Fisheries Act 1996)

The Minister is empowered to state in the declaration any restrictions on activity within the sanctuary area. The ability to establish marine mammal sanctuaries is therefore a broad power which enables the Minister to establish spatial restrictions in any part of the marine area. The term 'marine mammal sanctuary' is not defined in the legislation, and there are no legislative preconditions about what protection measures such a place should establish.⁸

Marine Mammals Protection Regulations

Following the development of commercial whale watching enterprises in Kaikoura in the late 1980s, the Department of Conservation developed Marine Mammals Protection Regulations in 1990, under section 28 of the Marine Mammals Protection Act. These focused on managing vessel interactions with sperm whales (mainly commercial tourist vessels). The regulations were revised in 1992, to better regulate dolphin watching and swimming activities in Kaikoura, which were primarily focused on the dusky dolphins.

The purpose of the regulations is to make provision 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; and*
- b) to prescribe appropriate behaviour by commercial operators and other persons seeking to come into contact with marine mammals.¹⁰*

The regulations provide that commercial operations undertaken for the purpose of taking people to 'view or come into contact with any marine mammal in New Zealand' must hold a permit issued by the Director General of Conservation. He or she may only issue the permit if satisfied that there is substantial compliance with a range of criteria including those shown in Figure 3.2.

The Minister is required to consider the detailed plan submitted by the applicant, including types and number of vessels, aircraft or vehicles to be used, proposed trip duration and frequency, number of passengers and species to be contacted. The applicant is required to make the proposal public and seek submissions. Permits have specific requirements for how the commercial activity can be undertaken, and may be revoked or amended if the operator breaches the terms of the permit.

Figure 3.2 Criteria for issuing commercial marine mammal tourism permits

- a) That the commercial operation is not contrary to the purpose and provisions of the Marine Mammals Protection Act and general policy;
- b) That the commercial operation should not have any significant adverse effect on the behavioural patterns of the marine mammals to which the application refers, having regard to, among other things, the number and effect of existing commercial operations;
- c) That it should be in the interests of the conservation, management, or protection of the marine mammals that a permit be issued;
- d) That the proposed operator, and such of the operator's staff who may come into contact with marine mammals, should have sufficient experience with marine mammals;
- e) That the proposed operator, and such of the operator's staff who may come into contact with marine mammals, should have sufficient knowledge of the local area and of sea and weather conditions;
- f) That the proposed operator, and such of the operator's staff who may come into contact with marine mammals, should not have convictions for offences involving the mistreatment of animals; and
- g) That the commercial operation should have sufficient educational value to participants or to the public.

The Director General is empowered to impose a moratorium on the grant of permits for particular commercial operations, if he or she believes on reasonable grounds that this is necessary for the protection, conservation or management of any marine mammals.¹¹ There are currently moratoria in place on the grant of permits in a number of areas, including in respect of southern right whales in the Auckland Islands and Campbell Island, and bottlenose dolphins in the Bay of Islands.

The regulations also establish rules about the way in which both commercial and non-commercial interactions with marine mammals may occur. For example, vessels within 300 metres of marine mammals must travel at idle or no-wake speed; vessels must approach from behind a whale (not head-on) and come no closer than 50 metres to the animal; and no more than three vessels are allowed within 300 metres of a whale. Throwing food or rubbish near marine mammals is prohibited. Under the regulations, people may swim with dolphins and seals but not with juvenile dolphins or a pod of dolphins that includes juvenile dolphins.

People in the water may not approach within 100 metres of a whale without approval from the Director General potentially excluding swimming with whales. The rules are set out in full in Appendix 3.

Fisheries Act 1996

The Fisheries Act is administered by the Ministry for Primary Industries. The fact that fishing is an important cause of marine mammal mortality means that decisions made under this Act are frequently directly relevant to marine mammal populations. Its purpose is to “*provide for the utilisation of fisheries resources while ensuring sustainability.*” “Ensuring sustainability” means:

- a) *maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and*
- b) *avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment*

‘Utilisation’ means “*conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.*”¹² The definition of ‘fisheries resources’ in the Act is very wide and effectively includes all species of marine life including marine mammals. This means that provision for the conservation and enhancement of marine mammals, and addressing the impacts of fishing on them, are integral parts of the purpose of the Act. However, this is very different to the provisions of the Marine Mammals Protection Act: whereas the purpose of the Fisheries Act is focused on sustainable use, the Marine Mammals Protection Act is concerned with protection.

The purpose of the Fisheries Act is further elaborated by a set of environmental principles in section 9, which the Minister must take into account (but not necessarily give effect to), when making any decision under the Fisheries Act. They state specifically that:

- a) *associated or dependent species should be maintained above a level that ensures their long term viability;*
- b) *biological diversity of the aquatic environment should be maintained; and*
- c) *habitat of particular significance for fisheries management should be protected.*

'Associated or dependent species' are defined in the Act to mean "any non-harvested species taken or otherwise affected by the taking of any harvested species". This would include marine mammals caught directly as bycatch in fishing gear, as well as species affected through less direct impacts, such as a reduction in prey species harvested by fishers.

Similarly, under section 10 of the Act, decision-makers are required to take into account the following information principles:

- a) *decisions should be based on the best available information;*
- b) *decision makers should consider any uncertainty in the information available in any case;*
- c) *decision makers should be cautious when information is uncertain, unreliable or inadequate; and*
- d) *the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.*

Fishing-related mortality

Section 15 of the Act governs the bycatch of marine mammals. Under section 15(1) the Minister for Primary Industries is required to take 'all reasonable steps' to ensure that the maximum allowable fishing-related mortality limit that has been set by the relevant population management plan prepared under the Marine Mammals Protection Act is not exceeded.

Where a population management plan has not been approved, "*the Minister may, after consultation with the Minister of Conservation, take such measures as he or she considers 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.*"¹³ As no population management plans have been approved, this section currently applies in respect of all marine mammal bycatch issues.

Unlike the provisions guiding the development of population management plans, which set out a clear goal and timeframe that must be met for achieving non-threatened status, this provision of the Fisheries Act has no mandatory conservation goal specified. The Minister must take into account the principle that affected marine mammals should be 'maintained above a level that ensures their long term viability', but can then choose to override this in favour of social,

economic and/or cultural considerations. In addition, the Minister of Conservation must be consulted, but is not required to approve the measures adopted.

Similar to the position under the Marine Mammals Protection Act, there is no requirement for the Minister to take action to address fisheries bycatch issues, even where a marine mammal species is critically threatened.

Sustainability measures

As well as setting a maximum fishing-related mortality, under section 11, the Minister for Primary Industries may establish other sustainability measures to control the effects of fishing on marine mammals. These measures may include restrictions on fishing methods and where and when fishing may be undertaken.

Resource Management Act 1991

The Resource Management Act sets up a framework for the environmental management of the coastal marine area, which extends seawards 12 nautical miles, along with associated catchments. Most activities which impact on marine mammals, apart from fishing activity, can be managed under this legislation. It therefore overlaps, in some areas, with the Marine Mammals Protection Act.

The purpose of the Act is to promote the sustainable management of natural and physical resources. Sustainable management is defined as *“managing the use, development, and protection of natural and physical resources in a way which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while:*

- a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.”¹⁴*

Those exercising functions and powers under the Act are required to recognise and provide for specified ‘matters of national importance’, including *“the protection of significant indigenous vegetation and significant habitats of indigenous fauna.”¹⁵*

All marine mammals in New Zealand come within the definition of indigenous fauna. However, they are not specifically protected under this provision, although marine habitats which are significant to them are.

New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement 2010 sets out further national priorities for the coast. Of particular relevance to marine mammals is Policy 11, which requires decision-makers to protect indigenous biodiversity in the coastal environment, including avoiding adverse effects of activities on:

- indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists;
- taxa that are listed by the International Union for Conservation of Nature and Natural Resources as threatened.

This means that adverse effects must be avoided on the Bryde's whale, southern right whale, Hector's dolphin, Maui's dolphin, Orca, Bottlenose dolphin, New Zealand sea lion and southern elephant seal. The requirement to avoid adverse effects of activities on threatened marine mammals is a strong policy direction. In case law decided in a different context, the Court held that effects to be considered are 'any adverse effects' regardless of scale and including minor effects.¹⁶

Policy 11 has additional direction which is relevant to marine mammal conservation. Significant adverse effects need to be avoided, and other adverse effects avoided, remedied or mitigated on:

- Habitats in the coastal environment that are important during vulnerable life stages of indigenous species (such as marine mammal calving and nursery areas); and
- Habitats, including areas and routes, important to migratory species (such as the areas used by the humpback whale and blue whale).

Council policies and plans

Regional councils are charged with managing the environmental impacts of most activities which impact on marine mammals within the coastal marine area. They also primarily manage activities which result in the discharge of sediment and pollutants from land into the sea. They achieve this through developing a policy and rules framework in several different types of documents:

- Regional policy statements – which provide an integrated policy framework for the management of catchments and the marine area;
- Regional coastal plans – which provide objectives, policies and rules for the management of activities within the marine area. They address the impacts of activities such as aquaculture, moorings, marinas, marine energy generation, dredging, discharges to water, reclamation, impoundment and structures such as wharves and boat ramps. The Minister of Conservation approves these plans; and
- Regional plans – which manage activities within the catchment.

The plans determine whether activities require consent and what matters will be considered when a consent application is decided. Councils must give effect to the New Zealand Coastal Policy Statement, including to the policies described above, by changing their plans if necessary ‘as soon as practicable’. This provides some compulsion for councils to proactively address anthropogenic pressures on threatened marine mammals other than those arising from fishing.

Territorial authorities primarily manage land use and achieve this through the development of district plans and grant of land use consents. These authorities also often operate wastewater and stormwater systems which discharge into the marine environment.

Under the Resource Management Act it is an offence to carry out any activity in any coastal marine area in a manner which contravenes a rule in a regional coastal plan, or a rule in a proposed regional coastal plan unless the activity is expressly allowed by a resource consent. However, the 2011 amendment to the Resource Management Act now makes it clear that such plans are not able to control the *“taking, allocation or enhancement of fisheries resources for the purpose of managing fishing or fisheries resources controlled under the Fisheries Act 1996”*¹⁷ as these functions are the responsibility of the Minister for Primary Industries.

Maritime Transport Act 1994

The Maritime Transport Act is primarily focused on the safety of shipping. However, the legislation also addresses some matters of significance to marine mammals. These include the speed and routing of ships (and associated risk of ship strike) and marine pollution, particularly that arising from discharges from ships and offshore platforms, as well as from dumping at sea.

The Act does not have an explicit purpose, but it does set out the following objectives for the Minister of Transport under the Act:

- To undertake the Minister's functions in a way that contributes to an integrated, safe, responsive, and sustainable transport system; and
- To ensure that New Zealand's obligations under the conventions are implemented.

These do not include any environmental objectives, in the absence of any specific international obligations in this area. The Act is implemented on a day-to-day basis by Maritime New Zealand, which is a Crown entity governed by an independent board.

Maritime and Marine Protection Rules

Maritime activity is largely regulated by the issuing of maritime rules and marine protection rules. Such rules can apply in all New Zealand waters (including the exclusive economic zone) or specified parts of New Zealand waters.

Under section 36 of the Act, the Minister, is empowered to make maritime rules for a number of purposes relating to shipping safety but also including:

- Ensuring environmental sustainability
- Any matter related to the Minister's functions under section 5A (*"to promote protection of the marine environment ... to administer New Zealand's participation in the conventions and any other international maritime or marine protection convention, agreement or understanding to which the Government of New Zealand is a party ..."*)

As yet, no maritime rules have been aimed at environmental issues, being solely focused on matters related to ship operations, personnel, health and safety, equipment design, documentation and pilotage.

Under section 386, the Minister is also empowered to make Marine Protection Rules for a range of purposes primarily focused on marine pollution. Current rules regulate dumping of waste at sea, oil spill contingency plans and controls over harmful substances.¹⁸

Under section 392, when developing Marine Protection Rules, the Minister or Director must have regard to, and shall give such weight as he or she considers appropriate in each case to, the need to protect the marine environment and to maintain and improve maritime safety, amongst other things. There is no mention in the legislation of marine mammals, and to date, no rules have been

promulgated under the Act for the purpose of addressing the impacts of shipping or marine pollution on marine mammals.

Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill 2011

The Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill was introduced into Parliament in August 2011. The Bill is intended to establish a framework for managing the environmental effects of activities (that are not already managed under other legislation) in the exclusive economic zone and on the continental shelf.

The Bill provides for the classification of activities as permitted, discretionary or prohibited, depending on the degree of potential harm which they could cause. Applicants who wish to undertake discretionary activities, will be required to submit an application with accompanying impact assessment, to the Environmental Protection Authority. Regulations to be established under the legislation will classify activities and set out the detail of the application requirements.

The Bill was reported back to the House by the Local Government and Environment Committee in May 2012. The Committee was unable to achieve consensus on many of the key issues, and it is unclear at the time of writing whether further changes to the Bill will be made before it is passed into law.

Lead agency for marine mammal protection

Although the Department of Conservation is the lead agency responsible for management and protection of marine mammals in New Zealand, it has never been adequately funded for these activities. Despite this, in the years after the Department was first established it was quick to act on marine mammal conservation issues, such as with the establishment of the Banks Peninsula Marine Mammal Sanctuary in 1988.

The Department also achieved notable successes in the mid-1990s, after the creation of a dedicated Marine Conservation Unit, with the establishment of extensive set net bans to protect Hector's and Maui's dolphins. However, more recent restructuring and downsizing, has meant that the Department now has

a reduced marine capacity. A more detailed summary of the changes in the Department of Conservation's marine capabilities is set out in Appendix 1.

In 2011, the Department's marine conservation section developed a new strategy towards marine conservation entitled 'PlanBlue'. This focuses on the development of a web-based marine information tool to better inform a range of stakeholders and decision-makers.

Since the 1990s, the Ministry for Primary Industries has taken on a much stronger role in the management of fisheries impacts on marine mammals. The Ministry and Department of Conservation have very different corporate cultures, priorities and values. At times this has made it difficult for the two agencies to work effectively together to resolve marine mammal conservation issues.¹⁹

Conclusion

Several pieces of legislation apply to the protection of marine mammals in New Zealand as summarised in Figure 3.3. These provide roles for a range of agencies and make available a number of tools which can be deployed. The lead agency responsible for the protection of marine mammals in New Zealand is the Department of Conservation. But the Department has downsized its marine capacity in recent years, and the Ministry for Primary Industries now plays a prominent role in the management of fisheries-related pressures on marine mammals.

Figure 3.3: Summary of legislation applying to marine mammals

Act	Administering authority	Statutory Tools
Marine Mammals Protection Act 1978	Minister and Department of Conservation	<ul style="list-style-type: none"> • Population management plans • Marine mammal sanctuaries • Marine mammal tourism permits • Marine mammal protection regulations
Fisheries Act 1996	Minister and Ministry for Primary Industries	<ul style="list-style-type: none"> • Setting of fisheries-related mortality limits • Sustainability measures
Resource Management Act 1991	Regional councils Minister of Conservation	<ul style="list-style-type: none"> • Objectives and policies in regional policy statements • Objectives, policies and rules in regional plans and coastal plans • Resource consents
Maritime Transport Act 1994	Ministry of Transport and Maritime New Zealand	<ul style="list-style-type: none"> • Maritime rules • Marine protection rules

Endnotes

1. Section 2, Marine Mammals Protection Act 1978
2. Department of Conservation, 2008, 'End of an era', media release, 15 September
3. World Society for the Protection of Animals, 2010, 'New Zealand Government committed to banning captive dolphin facilities', media release, 30 August
4. Department of Conservation, 2005, *General Policy* (as amended 2007)
5. Section 3E, Marine Mammals Protection Act 1978
6. For Hector's and Maui's dolphins and New Zealand sea lions
7. Section 22(1), Marine Mammals Protection Act 1978
8. Section 22(3), Marine Mammals Protection Act 1978
9. See e.g. Gordon J *et al*, 2004 and Weir C and S Dolman, 2007
10. Section 4, Marine Mammals Protection Regulations 1992
11. Section 15, Marine Mammals Protection Regulations 1992
12. Section 8, Fisheries Act 1996
13. Section 15(2), Fisheries Act 1996
14. Section 5, Resource Management Act 1991
15. Section 6(c), Resource Management Act 1991
16. *Duncan v Wanganui District* (1992) 2 NZRMA 101, 4
17. Section 30(2), Resource Management Act 1991
18. www.maritimenz.govt.nz
19. The difficult working relationship between the Ministry for Primary Industries and the Department of Conservation was emphasised by several of the people interviewed for this project who had been involved in the interface between the two agencies.

chapter four



Overseas Approaches

Introduction

The USA and Australia have developed regimes for managing human impacts on marine mammals which include elements from which New Zealand could learn. The key features are described briefly in the sections below and in more detail in the case studies set out in Part Two of the policy paper. The elements of the management approach applied in these two countries are then compared with the current New Zealand legislative framework and conclusions drawn.

Marine mammal management and protection in the USA

The Marine Mammal Protection Act 1972 is the principal legislation under which marine mammals are protected in USA waters. It is largely administered by the National Oceanic and Atmospheric Administration. The Act establishes a Marine Mammal Commission which is intended to provide independent oversight of the marine mammal conservation policies and programmes carried out under the Act. The Act establishes a *moratorium* on the taking and importation of marine mammals and marine mammal products.

There is no permitting system for marine mammal tourism in the USA. Such activities must be undertaken in a manner that does not constitute a ‘take’ under the Act, which is defined to include ‘harass, hunt, capture, or kill’ or to attempt to do so. It is illegal to swim with dolphins or whales in the USA as this is considered to be harassment, having the potential to disrupt behavioural patterns.

The Secretary of State is required to maintain *stock assessments* for each marine mammal species found in USA waters. These keep track of the health of marine mammal populations, and are used to inform decisions about whether to authorise the taking of marine mammals incidental to human activities (permitting), about the design of conservation measures, and to evaluate the progress of fisheries in reducing incidental mortality rates.

Conservation plans must be developed for species that are designated as ‘depleted’. Depleted stocks are those which are below their ‘optimum sustainable population’, which is defined in the Act as “*the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent part.*” In addition, the Endangered Species Act 1973 requires

the National Marine Fisheries Service to develop and implement *recovery plans* for threatened and endangered species, including threatened and endangered marine mammals.

Incidental taking of marine mammals in commercial fishing operations is allowable by permit or under authorisation from the Secretary of State. The Act establishes a zero mortality rate goal for bycatch in section 118(b)(1) where it states “*Commercial fisheries shall reduce incidental mortality and serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate within 7 years after the date of enactment of this section*” (which was enacted on 30 April 2001). Government must establish a programme to monitor incidental mortality and serious injury of marine mammals during the course of commercial fishing operations.

All fishing operations must be designated into one of three categories, based on the frequency with which marine mammals interact with the particular fishery. *Category One* fishing operations are those that give rise to frequent serious injuries and mortalities to marine mammals, *Category Two* operations are those that give rise to occasional serious injuries and mortalities, and *Category Three* operations have a remote likelihood of causing serious injuries or mortalities, or have no reported incidents at all.

Allocation to a particular category is calculated on the basis of the number of animals injured or killed per year, relative to a stock’s potential biological removal, which is the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or sustain its optimum sustainable population (see Figure 13.3).

Those participating in Category One or Two fisheries are required to obtain authorisation permits. Fishers must also comply with take reduction plans, which are to be developed for all ‘strategic’ stocks, including for marine mammals which are threatened. Although achieving notable successes, the implementation of the take reduction plan system has experienced some problems, primarily due to a lack of resourcing. This highlights the need for adequate resources to be made available, alongside rigorous legislative provisions, in order to achieve successful marine mammal conservation.

Marine mammal management and protection in Australia

The Environment Protection and Biodiversity Conservation Act 1999 is the principal piece of legislation applying to cetaceans in Australia. The Act applies to Commonwealth waters (which extend from three nautical miles seawards to the outer extent of the exclusive economic zone) as well as to matters of 'national environmental significance' within state and territorial government jurisdictions. In state and territory waters it is the responsibility of the relevant state or territory government to protect marine mammals, and all have put in place similar protections to those under this Act.

The Act has a special section devoted to whales and other cetaceans. It is accompanied by the Environment Protection and Biodiversity Conservation Regulations 2000 which provide more detailed rules around human interactions with cetaceans and marine mammal tourism activities. All intentional interactions with cetaceans are prohibited unless they are authorised by a permit granted by the Minister for the Environment. All seal and sea lion species are listed marine species under the Act and so are also protected within Commonwealth waters.

The Act establishes the *Australian Whale Sanctuary*, which covers the entire Commonwealth marine area, and in this area it is an offence to take, trade, keep, move or interfere with a cetacean. There is provision in the legislation to declare 'important cetacean habitat areas' within the whale sanctuary¹ and any marine mammal tourism operations undertaken within these areas require a permit. This enables additional management measures to be implemented within these sensitive areas. However, no important cetacean habitat areas have been declared so far.

The Act provides that activities which will or are likely to have a significant impact on 'matters of national significance', including species that are listed under the Act as threatened or migratory, must be subject to an environmental assessment and approval process. Five species of whale are listed as nationally threatened under the Act (blue whale – endangered, southern right whale – endangered, sei whale – vulnerable, fin whale – vulnerable and humpback whale – vulnerable). Eighteen cetacean species are listed as migratory species under the Act. There are also national recovery plans in place for these species with which fishing operations must comply.

Whale and dolphin watching operations only require a permit in Commonwealth waters when they contravene the regulations which set out how

boats must operate around whales and dolphins. In some state waters, such as in New South Wales, marine mammal tourism can occur anywhere so long as a permit is obtained. In other states such as Queensland, the activity can only take place within designated marine parks, and only after obtaining a permit. In some areas, caps have been placed on the number of operators permitted in prescribed areas.

All fishing undertaken in Commonwealth waters, and where the fish is exported, is subject to the Environment Protection and Biodiversity Conservation Act. The fisheries under Commonwealth jurisdiction are managed by the Australian Fisheries Management Authority which is a statutory agency governed by an independent board. Other fisheries in state and territory waters are managed by the relevant state or territorial government.

Fisheries which fall under the Environment Protection and Biodiversity Conservation Act are required to undertake a strategic environmental impact assessment. To assist with the assessment process, the government has developed the 'Guidelines for the Ecologically Sustainable Management of Fisheries'. Principle 2 of the Guidelines states that *"Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem"*. It has an accompanying objective that *"The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities."*

Under the Fisheries Management Act 1991, the Australian Fisheries Management Authority prepares plans of management for fisheries. These plans are required to contain *"measures directed at reducing to a minimum the incidental catch of other species"* amongst many other things.² All Commonwealth fishing enterprises must comply with fisheries management plans. The Authority also prepares bycatch plans, but these have not proved successful in resolving bycatch issues, and the programme is under review.

Fisheries management plans can be accredited by the Environment Minister under the Environment Protection and Biodiversity Conservation Act, but only where it *"requires persons engaged in fishing under the plan ... to take all reasonable steps to ensure that members of listed threatened species ... are not killed or injured as a result of fishing."* When the Minister considers whether to accredit the fishery plan, compliance with national recovery plans must be considered. As long as operators are fishing in accordance with the accredited management plan, it is not an offence to interact with a cetacean. It is however an offence to fail to record any interaction in the fish logbook.

Inter-country comparison

A comparison of the main statutory management measures used to manage human interactions with marine mammals is summarised in Figure 4.1. All three countries have placed a moratorium on the intentional take of marine mammals without a permit, and have effectively ended the hunting of marine mammals.

Only New Zealand has a dedicated spatial management tool for marine mammals, through the general provision enabling the establishment of marine mammal sanctuaries. A one-off whale sanctuary was established in Australian waters and there is provision for more detailed management of marine mammal tourism within this. In the USA, there is provision under other legislation for the establishment of national marine sanctuaries, but these are not specific to marine mammals.

The USA has strong provisions requiring the assessment of all marine mammal stocks and the development of conservation plans when those stocks are found to be depleted. Such plans allow all threats to the species to be assessed together and management actions to be developed. There is no statutory mention of marine mammal stock assessments in Australia or New Zealand and therefore no requirement to undertake them.

There is statutory provision in Australia for the preparation of recovery plans for threatened species including marine mammals. However, their preparation is discretionary. In New Zealand, the only statutory provision for marine mammal recovery plans are those relating to population management plans. However, these plans are primarily focused on considering fisheries rather than all potential threats, are discretionary, and none have been completed.

New Zealand is the only country out of the three studied which requires permitting for all marine mammal tourism. Permitting is not provided for in the USA. However all tourism operations must comply with the regulations governing vessel and human interactions with marine mammals. This effectively means that swimming with dolphins is banned. The Australian system is part-way between that applied in USA and New Zealand, with permits required in Commonwealth waters where the regulations are not complied with. This means that swimming with marine mammals can be authorised under permit.

The USA has the most rigorous provisions to deal with fisheries bycatch issues. The legislation sets out an ambitious goal for reducing bycatch which is to approach zero mortality. All fisheries must undergo a risk assessment and those that result in significant marine mammal bycatch must be authorised. By-

catch reduction plans are mandatory for strategic marine mammal populations and must be complied with by fishers. The government is also required to put in place a monitoring programme in order to obtain statistically reliable estimates of marine mammal bycatch.

Australia has also set an ambitious target of avoiding cetacean mortality. Similar to the case in the USA, fisheries resulting in marine mammal bycatch need to be authorised. Commonwealth and export fisheries are required to undergo a strategic environmental assessment process and to put in place measures to avoid capture and/or mortality of marine mammals. The Government has developed a bycatch policy and bycatch reduction plans are prepared. These are not statutory, but inform the content of fisheries management plans, which are. There is no requirement to monitor ongoing bycatch levels.

Of the three countries reviewed, New Zealand has the weakest statutory provisions to address fisheries interactions with marine mammals. There is no clear overall statutory guidance for bycatch levels. However if a population management plan is developed, the legislation sets out requirements for what it should achieve, including causing no net reduction in population. So unlike the case in the other two countries, there is no presumption that marine mammal bycatch should be avoided.

In New Zealand, marine mammal bycatch is legal if reported, and there is no need for fisheries that result in significant bycatch to be specifically authorised. Nor is there any requirement for fisheries to undergo any form of environmental assessment. As already indicated, there is provision for the development of population management plans as a statutory mechanism to reduce bycatch, but these are not mandatory, and none have been completed to date. Similar to the case in Australia, there is no requirement to monitor ongoing bycatch levels.

Conclusion

The review of marine mammal protection measures in the USA and Australia indicates that there is a range of approaches and tools being deployed. When compared with the legislation regime in New Zealand, as described in chapter 3, it is clear that the New Zealand system is comparatively strong on managing marine mammal tourism but comparatively weak on integrated approaches to threat management and on the management of fisheries bycatch. These are matters which will need to be specifically addressed in any review of the Marine Mammals Protection Act.

Figure 4.1: Inter-country comparison of marine mammal management measures

Statutory management measure	USA	Australia	New Zealand
<i>Moratorium on take</i>	Yes	Yes	Yes
<i>Marine mammal sanctuaries</i>	Not specifically	One-off whale sanctuary	Yes
<i>Marine mammal stock assessment</i>	Mandatory	Non-statutory	Non-statutory
<i>Conservation/recovery plans</i>	Mandatory	Discretionary	Discretionary
<i>Permitting commercial tourism</i>	No	Partial	Yes
<i>By catch goal</i>	Insignificant levels approaching zero mortality	Avoid mortality	Achieve non-threatened status; not cause net reduction in population; not seriously threaten reproductive capacity
<i>By-catch authorisation</i>	Mandatory for high-risk fisheries	Mandatory	No
<i>Environmental/risk assessment of fisheries</i>	Mandatory	Mandatory	No
<i>By-catch reduction plans</i>	Mandatory for strategic stocks	Non-statutory	Discretionary
<i>Monitoring</i>	Mandatory	Non-statutory	Non-statutory

Endnotes

1. Section 228A, Environment Protection and Biodiversity Conservation Act 1999
2. Sections 17, Fisheries Management Act 1991

chapter five



Overview of Case Study Findings

Introduction

The results of the literature review and 42 interviews undertaken for this project have been incorporated into five case studies. These describe the challenges that are currently being faced in managing threats to marine mammals in New Zealand waters, how managers have sought to address those challenges, and what still needs to be done. The key findings from each of the case studies are described in the sections below and summarised in Figure 5.1.

Case study one: Hector's and Maui's dolphins

This case study sets out the problems faced in the management and protection of Hector's and Maui's dolphins. Maui's dolphins, which inhabit the west coast of the North Island, are classified as 'nationally critical' under the Department of Conservation's Threat Classification System, numbering only around 55 adult individuals.¹ Hector's dolphins are classified as nationally threatened, with around 7,000 individuals.² The key known threat facing both Hector's and Maui's dolphins is entanglement in fishing nets, and in particular set nets, which are used by both commercial and recreational fishers in coastal areas. Other threats may include food competition, pollution and disease. The case study charts the history of management measures deployed by the Department of Conservation and Ministry for Primary Industries.

Having been made aware of the threats facing the Hector's dolphin at Banks Peninsula, the Department of Conservation acted quickly to establish protection measures. In 1988, the Banks Peninsula Marine Mammal Sanctuary was established, within which restrictions on fishing with set nets were implemented. Although this provided much needed protection for the dolphins, the sanctuary did not extend over the dolphin population's entire range, and dolphin bycatch continued albeit at reduced levels.

Following that early success, the Department of Conservation took a less prominent role in the regulation of fishing threats to the Hector's and Maui's dolphin, with the lead being taken by the Ministry for Primary Industries. This meant that fisheries bycatch issues were managed solely under the Fisheries Act 1996. Measures under this legislation have been the subject of lengthy and complex court proceedings.

In 2002, the Minister of Fisheries decided to establish a set net ban along the west coast of the North Island to protect the critically endangered Maui's dolphin. The decision was challenged by representatives of the affected commercial fishers and was overturned by the High Court. This was on the basis that the Minister had been mistaken about the level of bycatch which would result in the extinction of the dolphins, and that he had inadequate information on the economic consequences of his decision on the set-netters.

Following public consultation, the Minister reinstated the protected area which had been overturned by the High Court, and also extended it to include the entrance of the Manukau Harbour. However similar to the case with the Banks Peninsula marine mammal sanctuary, scientists were still concerned that the measures did not cover the dolphins' entire range, and that dolphin bycatch in nets would continue.

During the mid-1990s, the Department of Conservation attempted to draft a population management plan for the Hector's dolphin. A final draft was never completed, due to problems with the legislation, and the inability of the stakeholders to agree. As an alternative, in 2005, work began on a non-statutory 'Threat Management Plan' which aimed to take a collaborative approach towards identifying responses to the threats faced by the dolphins.

The drafting of the plan was time consuming and contentious. The final version that emerged was weak and failed to include any measurable goals for management. Instead the document identified the generalised goals "*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.*"³ Although this implies that Hector's and Maui's dolphins should not be driven to extinction, it does not necessarily imply a rebuild of currently depleted populations.

Despite its deficiencies, the Threat Management Plan did result in the implementation of additional measures to protect the dolphins. In 2008, four new marine mammal sanctuaries were established to protect the Hector's dolphin and the newly identified sub-species, Maui's dolphin. The sanctuaries included rules applying to seismic surveying and mining, but not fishing. New measures to regulate fishing were implemented separately under the Fisheries Act, including set net bans in areas around the South Island and an extension of the set net ban on the west coast of the North Island from four to seven miles from the shore.

The fishing regulations in the Banks Peninsula Marine Mammal Sanctuary were repealed and re-established under the Fisheries Act.

Representatives of the fishing industry once again took legal action, but this time the decision was largely upheld by the High Court, following eight months of deliberations (during which time interim relief had allowed the fishers to continue fishing in some limited areas). The Court referred back to the Minister the measures restricting butterfish set netting, on the basis that butterfish set netting poses only a limited threat, as it is practised in areas not frequented by dolphins. It also referred back the extension of the west coast North Island set net ban, on the basis that there was not enough evidence that Maui's dolphins used the area further out to sea. The Minister made a final decision in May 2011, allowing the exemption for butterfish set netting, but confirming the protection for Maui's dolphins out to seven nautical miles.

A 2012 study found that, while the protection measures established in the Banks Peninsula marine mammal sanctuary have probably been enough to slow the population decline, they may not have halted it. The model deployed indicated that the population is still declining slowly. While the sanctuary has helped to protect the dolphins, it does not cover the entirety of their range, so they are still at risk of capture in nets. The researchers recommend extending the fishing restrictions further out to sea, to increase protection, but this has not been done.⁴ No other measures have been implemented to address threats to the dolphins.

Also in 2012, new research revealed that the population of Maui's dolphins is likely to number only 55 individuals over one year of age. This makes it one of the most endangered marine mammals in the world, and puts New Zealand perilously close to being the only country since China, to see the extinction of a type of dolphin.

Around the same time as these results were made public, two Maui's dolphins were found dead off Taranaki, an area outside what was believed to be their normal range. The Department of Conservation and Ministry for Primary Industries initiated proposals to extend the set net regulations and the West Coast North Island marine mammal sanctuary further south into the Taranaki region. The fisheries restrictions were confirmed on 28 June 2012 and came into effect 28 days later.

The Department of Conservation's proposals for the extension of the marine mammal sanctuary include restrictions on seismic surveying but no other protection measures, calling into question exactly what the 'marine mammal sanctuary' concept is intended to achieve.

It is now 27 years since scientists first alerted government agencies to the dangers of set nets for Hector's dolphins. After the initial establishment of the Banks Peninsula marine mammal sanctuary, action to address the threat of bycatch to Hector's dolphin has been slow and only partial at best. It took a further 20 years before protection was put in place for Hector's dolphin populations outside the Canterbury region. Action regarding Maui's dolphin was rapid once it was identified as a sub-species, but non-existent prior to this. By then the population size was at such a low level, that recovery prospects are uncertain, even if all human impacts can be effectively be removed. Complete loss of Maui's dolphins would be a very significant event in global conservation history.

Case study two: New Zealand sea lion

This case study sets out the management response to the declining New Zealand sea lion population. The New Zealand sea lion is a nationally critical endemic species. While these animals were once found all around the New Zealand coast, they are today limited to the Sub-Antarctic Islands, and a very small breeding population on the Otago Peninsula.

The population at the main breeding colony in the Auckland Islands has been monitored since 1995, and each year a pup count is undertaken which enables an estimate of population size to be undertaken. The pup count has declined 40 per cent since the late 1990s. In 1998, 2002 and 2003 bacterial outbreaks are known to have impacted upon the populations. However, despite significant investment in research over a long period, the reasons for long term decline are poorly understood.

Although the area out to 12 nautical miles surrounding the Auckland Islands is a marine mammal sanctuary and marine reserve where all commercial fishing is prohibited, the SQU6T squid trawl fishery operates in the area outside the reserve. New Zealand sea lions forage for squid in the reserve area and outside its boundary, where the trawl fishery operates. As a result, numerous sea lions have become caught in the trawl nets.

To help address this problem, the fishing industry has developed a sea lion exclusion device (SLED). This consists of a metal grid fitted inside the net to stop sea lions travelling to the end, whilst squid can pass through, and an escape hatch so that the sea lions can swim out of the net once they reach the grid. The efficacy of SLEDs is hotly debated, particularly the extent to which sealions are injured whilst escaping from the net, but observed mortalities have been declining since 2004.

The Department of Conservation attempted to draft a population management plan for the New Zealand sea lion. Work began on a draft in the late 1990s, but due to the contentious nature of the process, it was not completed until 2007. In 2009, the Director General of Conservation decided not to proceed with the proposed plan because it was out-of-date, and was considered not to be based on the best available information.

During the time that the plan was being drafted, the threat status of the New Zealand sea lion had been reclassified (from ‘nationally threatened’ to ‘nationally critical’) and the management model used had been substantially revised.⁵ The population management plan was eventually downgraded and released as the non-statutory ‘New Zealand Sea Lion Species Management Plan 2009–14.’

In the absence of a population management plan, sea lion bycatch is managed by the Ministry for Primary Industries under section 15(2) of the Fisheries Act. Every year the Ministry sets a fisheries-related mortality limit calculated using a model that establishes the number of trawls which can occur, based on an assumed ‘strike rate’, and a discount rate for the use of SLEDs.

The original model used to determine this limit was based on a simple approach which calculated the number of sea lions that could sustainably be removed from the population. This model was largely based on the one used to manage marine mammals in the USA. In 2005, the model was replaced by a Bayesian model, which takes account of a large number of variables to calculate the probability that chosen management measures will meet pre-established management criteria.

The decisions produced by the model have been the subject of litigation brought by the fishing industry, which has challenged the legal bases for decisions under the Fisheries Act. In 2003 the Minister for Primary Industries closed the squid fishery when the fisheries-related mortality rate of 70 sea lions was exceeded. The Squid Fishery Management Company challenged the decision in the High Court and succeeded in having it overturned. In 2004, the Minister for Primary Industries again closed the squid fishery, when it exceeded the prescribed number of sea lion deaths. The Squid Fishery Management Company again went to the High Court but this time lost. Not giving up, the Company then appealed to the Court of Appeal and this time succeeded in overturning the Minister’s decision.

The tight timeframe in which the management decision is made, and the length of the fishing season, mean that every year that a legal challenge is made the fishing industry may be able to secure a few more weeks of fishing, sometimes for the full length of the fishing season. In addition, the success of the legal challenges

may have had a 'chilling' effect on the Minister. Part-way through the 2006 fishing season, the Minister adjusted the fisheries-related mortality for the SQU6T squid fishery to 150 sea lions, more the double the level of 62 set two years previously. And this was despite pup numbers having reduced.

Despite all the effort put into complex modelling, the sea lion population has continued to decline year-on-year. In 2011, the Ministry for Primary Industries released the results of research which applied biomechanical modelling, such as that used to test car safety, to assess the likelihood that sea lions interacting with the SLED will die of head injuries. The modelling was partially based on data from footage of seals interacting with mackerel trawls in the Tasmanian mackerel fishery, and found that the likelihood that sea lions die as a result of impact with the SLED is very low.

As a result, the Ministry proposed no fishing-related mortality limit for the 2011/12 fishing season, essentially on the basis that the research shows that the squid fishery is not the cause of the decline in the sea lion population. This proposal was met with significant opposition and publicity, as some scientists and others argued that the 'reductionist' approach to the risk was not adequate to establish that the fishery was not causing sea lion deaths.

The Ministry for Primary Industries subsequently produced a much more detailed Final Advice Paper, on the basis of which the Minister decided to retain the fishing related mortality limit of 68 sea lions, but to increase the SLED discount rate, so that significantly more tows are permitted.

Despite significant resources having been invested in scientific study of the New Zealand sea lions, over a long period of time, the population continues to reduce. It is most likely that a combination of factors is the cause of the decline, but the management focus over the 20-year period has increasingly narrowed to details of SLED mortality rates and the like. There is no plan in place to manage threats to the sea lion population in a holistic way.

At the time of writing, the Minister for Primary Industries had delayed making a decision on the fishing-related mortality limit for the 2011/12 year and in the absence of a decision, the fishery has operated on the basis of the previous year's limit. The absence of a comprehensive plan to manage threats to the population is particularly serious given that the New Zealand sea lion, which is one of New Zealand's only two endemic marine mammal species, is critically endangered.

Case study three: Bryde's whale

This case study sets out the threat to New Zealand's Bryde's whales from ship strike, and the failure of management agencies to address that threat to date.

The Bryde's whale is a small baleen whale which inhabits the Hauraki Gulf, in close proximity to Auckland. Around 150 individuals are believed to spend time in the Gulf seasonally, whilst around 50 live there year round. The resident coastal population is unusual, because this species of whale usually ranges in deeper areas offshore. The New Zealand population of Bryde's whales is listed as 'nationally critical' by the Department of Conservation, because the population is so small, and predominantly reliant on one location (the Hauraki Gulf).

The Gulf is an extremely busy marine area, with recreational vessels, ferries, container ships, cruise ships and other boats using its waters in high numbers. The large volume of vessel traffic means that collisions between whales and boats occur relatively frequently. The resident population of Bryde's whales spend 90 per cent of their time in water less than ten metres deep, so they are nearly always at risk of being hit by large vessels such as container ships, which can draw up to 12 metres.

Between 1989 and 2011, 40 Bryde's whales were found dead, of which 14 were believed to have been killed as a result of collision with a vessel. In many of the other cases the cause of death was not known, so more of the recorded deaths may have resulted from vessel strike. Furthermore, Bryde's whales tend to sink when they die, so it is very possible that other ship strike victims have not been discovered. This mortality rate averages around two a year, so is very likely to be having a significant impact on the health and long-term viability of the small population.

Recent research has identified that the principal reason why Bryde's whales are at particular risk of vessel strike is that they spend 90 per cent of their time in waters less than ten metres deep, whilst the large container and cruise ships passing through the Gulf may draw up to 12 metres.⁶ In addition, it is possible that anthropogenic noise such as that caused by approaching vessels or other activity in the area, may affect the way that marine mammals respond to the presence of a vessel. In tests where an underwater alarm was sounded, whales responded by rising to the surface in apparent panic.⁷ It has also been noted that *"One of the key problems identified with our larger, faster ships is that they have a 'noise shadow' directly ahead of the vessel, which may lull the animals into a false sense of security that they can surface to breathe safely, only to be struck."*⁸

A large number of vessel strikes that are fatal to large whales occur when vessels travel at 14 knots or more. Vanderlaan and Taggart have shown that, at speeds under 8.6 knots, the probability that a collision will be fatal is 20 per cent. At 15 knots, the probability was a significantly greater 80 per cent.⁹ In open water, container ships generally travel between 15 and 22 knots, cargo ships between 12 and 17 knots, and fishing vessels between 8 and 12 knots, so there is significant potential for high speed collisions with cetaceans.

A range of measures have been used to manage the threat of vessel strike overseas. For example, regulations have been successfully implemented off the eastern seaboard in the United States and Canada to protect the North Atlantic Right Whale. The measures used include establishing traffic separation schemes, 'areas to be avoided' by vessels and speed restrictions. The semi-enclosed geography of the inner Hauraki Gulf, and the presence of Bryde's whales in much of the area, means that re-routing vessels, or preventing access to certain areas, may not be feasible to prevent the conflict. However, the imposition of speed limits appears more promising.

In 2008, scientists presented a paper on the Bryde's whale ship strike issue to the meeting of the Scientific Committee of the International Whaling Commission in Santiago, Chile. This alerted the Commission to the whale ship strike issue in New Zealand, and in 2009 the Chairman of the Commission's Ship Strike Working Group travelled to Auckland to attend a stakeholder workshop held in November. Although this raised the profile of the issue and helped prompt more research into the issue, no management responses eventuated.

In March 2012, after two high profile ship strike incidents and the release of new research findings, the University of Auckland, the Hauraki Gulf Forum and the Environmental Defence Society jointly convened a further workshop with the relevant parties to try to identify a way forward.

The workshop canvassed the range of regulatory tools available to address the issue amongst other things. It was evident that no regulatory regime had been designed to specifically address the impacts of ship strike on marine mammals although action was theoretically possible under the Maritime Transport Act, the Resource Management Act, and the Marine Mammals Protection Act. At the time of writing, no concrete action had been taken to reduce the risk to the whales, although discussions between the parties were continuing.

Case study four: Bottlenose dolphins in Fiordland

This case study describes the management measures that have been taken to protect the isolated populations of bottlenose dolphins in Fiordland.

There are three resident groups of bottlenose dolphins in Fiordland, found largely in the northern Sounds, in Dusky Sound and in Doubtful Sound. They live at the southern extreme of bottlenose dolphin distribution. The waters of Fiordland are much colder than the sub-tropical and tropical climates inhabited by most bottlenose dolphin populations elsewhere. This is not only because Fiordland is located much further south, but also due to the thick layer of cold freshwater which overlays the sea in the inner fiords. As a result, the bottlenose dolphins found in Fiordland are specially adapted for a colder climate, with larger bodies and smaller appendages (rostrum, flukes and tail) in order to retain heat. They also display unique social behaviour which reflects their isolation and hostile environment.

The northern population is little studied because much of its habitat is difficult to access, and the size and health of the population is not known. The population in Dusky Sound is believed to be stable, although a long term data set is not available. The population in Doubtful Sound, which is the most studied, is believed to be in decline.

Low calf survival appears to be the reason that the Doubtful Sound population is declining – while the survival rate was calculated to be 86 per cent in the 1990s it had reduced to 38 per cent in 2008.¹⁰

Some scientists have suggested that tourism must be a factor in the elevated stress levels experienced by the dolphins. From its beginnings in the late 1950s, the tourism industry in Fiordland has grown exponentially, to more than one million visitors in 2009.¹¹ A very large proportion of these visitors take a scenic cruise on the fiords, and thus vessel numbers have increased dramatically over the last decades.

Vessel activity is governed by the Southland Regional Coastal Plan, which requires commercial tour operators to obtain a resource consent to operate in the fiords. In order to provide for new demand, whilst protecting the wilderness experience valued by visitors in some parts of the fiords, the council's policy is to allow unlimited expansion in Milford Sound whilst limiting new activity in Doubtful Sound through the imposition of caps on vessel numbers. There is no cap on activity in Dusky Sound, but applications for resource consents are to be considered in accordance with the Council's policy that the wilderness values of

the Sound should be retained. In addition, most commercial operators also hold a marine mammal viewing permit from the Department of Conservation.

Another potential stressor on the dolphins is the Manapouri hydroelectric power station, which discharges water from Lake Manapouri into Doubtful Sound. This increases the thickness of the cold, low-salinity layer on the surface of the water in some parts of the fiord. When the power station opened in 1969 the amount of freshwater entering the fiord tripled. Since then, changes to resource consents and the opening of a second tail race, have allowed further small increases in the amount of water discharged.

Some scientists have suggested that the extra thick layer of fresh water, which is much colder than the saltwater below, could have a negative impact on calves which spend the vast majority of their time in the top metre of water.¹² In addition, the increased amounts of fresh water have had a significant impact on the marine environment, possibly reducing overall productivity and potentially food availability for the dolphins.

However, the studies produced on the dolphins in Fiordland have not found universal acceptance amongst local people and managers. Other stressors such as disease, food competition and natural predation have been raised as potentially relevant factors, but studies have not been undertaken to test their significance. Whilst differing conclusions have been reached about what the cause of the decline might be, the implementation of a comprehensive management regime has been difficult to achieve.

In 2007 the Department of Conservation released a non-statutory threat management discussion paper which canvassed the threats to the dolphins and possible management responses. Although the Department recognised that there was a range of potential threats to the dolphins, and that decisive action was necessary, the management measures identified focused on the threat posed by tourism as this was the most high profile and easiest to address. The result of the consultation was a 'Voluntary Code of Management' for tourism in Doubtful Sound, together with a programme of on-going research, monitoring and public education.

The voluntary code has two key elements. First, vessel operators are not permitted to seek out dolphins, and must comply with the Marine Mammals Protection Regulations (already a requirement anyway). Secondly, 'dolphin protection zones' are established, in which motorised vessel activity is restricted.

Compliance with the voluntary code has been mixed. It appears to have reduced the number of vessel interactions with dolphins, but it is too early to

say whether this reduction is sufficient to have a positive impact on long-term population health. Recent research indicates that calving success has improved and the population has increased slightly. However, this increase may reflect the fact that a particularly 'good' group of mothers has given birth this year, and therefore may not be indicative of long term recovery. There is also anecdotal evidence that the Doubtful Sound dolphins are now being seen in other fiords, so it is possible that human-induced pressures in Doubtful Sound are pushing them out of their preferred habitat.

To date, the science-based management framework has been unable to respond effectively in the absence of clear evidence showing what the impacts are of these multiple stressors on the dolphins. Although scientific research has been able to track changes in population size, and the rate of decline, it has been less effective in identifying what the causes of the decline are. Although the operation of vessel-based tourism and the Manapouri power station have been identified as potential stressors, there has been a lack of agreement amongst the scientific community as to their relative importance.

The only management action taken to date has been a voluntary code to reduce vessel interactions, and this seems unlikely to be enough to save the bottlenose dolphin population in Doubtful Sound.

Case study five: Dusky dolphin

This case study describes the measures that have been taken to protect dusky dolphins off the north east coast of the South Island. Dusky dolphins are the second most numerous species of dolphin in New Zealand (the common dolphin is believed to be the most numerous). They are mainly found around the South Island and southern North Island – in particular from the East Cape down to Kaikoura, and as far east as the Chatham Islands. They are commonly found at particular 'hotspots' – particularly around Kaikoura, the Otago peninsula, and Marlborough Sounds.

Although the species is listed as 'not threatened' in the Department of Conservation's threat classification system list, due to the large size of the population, the dolphins' core habitat is threatened by a number of activities. For example, a group of dusky dolphins divide their time between Admiralty Bay in the Marlborough Sounds, where demand for marine farming has the potential to

exclude them from their preferred habitat, and Kaikoura, where their behaviour is disrupted by the presence of dolphin watching tour boats.

Aquaculture

A large number of New Zealand's mussel farms are found in the Marlborough Sounds. During the 2000s, proposals were developed to significantly increase the amount of marine farming being undertaken in Admiralty Bay, a location where dusky dolphins concentrated during winter months.¹³

Research into the behaviour of the dusky dolphins in Admiralty Bay found that they appeared to be using the areas in the vicinity of, but not in, the mussel farms for foraging. This may be because the mussel farms are attracting prey fish which the dolphins feed on. The dolphins do not venture into the farms themselves, probably due to the presence of numerous lines and buoys which make it difficult for the dolphins to hunt cooperatively. In addition, the dolphins use the areas near farms less for travelling.¹⁴

Over the past few years, the government has identified aquaculture as being a potential growth industry in New Zealand and has put in place a new legal and policy framework to support it. Rules applying to aquaculture activity are contained in the Marlborough Sounds Resource Management Plan which sets out assessment criteria for marine farm applications. These refer to the consideration of ecological factors in very broad terms, but no mention is made of the potential impacts on dusky dolphins.¹⁵ This was because the provisions of the plan were developed prior to the availability of science indicating the potential effects of marine farms on the dolphins.

In 2005 the Environment Court criticised the policy framework provided by the Marlborough Sounds Resource Management Plan, finding it weak and difficult to apply. Over the subsequent years, several applications for marine farm development in Admiralty Bay have been processed. In 2006, the Environment Court accepted that the existing marine farms had displaced the dusky dolphins from that area of habitat, at least for feeding purposes. But that this had not, as far as could be measured, yet resulted in harm to the population. However, the Court accepted that there would be a point where the expansion of farms in the Bay would adversely affect the habitat, although it was *“not possible to precisely predict what that point was.”*¹⁶

In light of the Court's interim findings in 2006, the applicants developed novel mitigation measures to reduce the impacts on the dolphins. These

involved removing the surface structures and long lines from the farms over the winter period when the Bay was used the most intensively by the dolphins, and undertaking a three year monitoring programme to establish how many dolphins were present in the Bay at various times prior to establishing new farms. At the time of writing, the monitoring study is continuing.

Tourism

Tourism targeting dusky dolphins at Kaikoura began in 1989. The industry quickly grew from 1,300 customers during the summer of 1990 and 1991 to 5,000 the following year. In 1995, 11,000 tourists swam with the dolphins. During the 2000s, between 23,000 and 27,000 tourists were being taken to view and/or swim with the dolphins each year.¹⁷

There are currently five commercial operators that are permitted by the Department of Conservation to offer tours to view or swim with dusky dolphins. Of these, three operators use planes or helicopters. Only two operators are permitted to use boats and to swim with the dolphins: Whale Watch Kaikoura which holds four permits and Dolphin Encounter which holds three permits. Currently, only Dolphin Encounter operates swim-with-dolphin trips. The company's permits authorise up to 50 trips per week which can take up to 650 passengers to swim with the dolphins.¹⁸

During the 1990s, the Department of Conservation decided to implement a moratorium on dolphin watching permits, until comprehensive research on the effects of existing tourism activity had been undertaken. The 10-year moratorium on new commercial dolphin watching permits expired in 2009. In anticipation of the expiry, the Department commissioned a comprehensive study to inform its decision about what to do next.

The study found that the behavioural changes caused by the presence of boats were likely to be short term, and thus unlikely to affect long term health of the population. It noted that the dusky dolphin population is resilient because of the large pod sizes, the fact that they inhabit a wide area, feed at night (when not interrupted by tour boats) and undertake seasonal migrations. This means that they are, theoretically, only in the presence of tour boats for part of the year. Nevertheless, the report noted numerous warning signs, through changes to behaviour, which suggest that tourism is reaching its sustainable maximum. Therefore it was recommended that no new boat-based permits should be issued for a defined period. As a result, the moratorium on new vessel permits was extended for a further five years.

Figure 5.1: Summary of the key characteristics of the marine mammal case studies

	Hector's and Maui's dolphins	New Zealand sea lions	Bryde's whales	Bottlenose dolphins	Dusky dolphins
Department of Conservation Threat Classification	Hector's dolphins – nationally threatened Maui's dolphins – nationally critical	Nationally critical	Nationally critical	Nationally threatened (Fiordland subpopulation listed as critically endangered by IUCN)	Not endangered
Population trend	In decline	In decline	Unknown, probably in decline	In decline (Doubtful Sound) Stable (Dusky Sound) Unknown (Northern population)	Unknown, probably stable
Key Threats	Entanglement in set nets, mining, seismic surveying, pollutants, disease	Entanglement in trawl nets, food competition, disease	Vessel strike	Tourism, freshwater from Manapouri power station tailrace (Doubtful Sound), food competition, disease (unproven)	Habitat displacement due to aquaculture development, tourism
Management measures	<ul style="list-style-type: none"> • Five Marine mammal sanctuaries • Restrictions on set netting and trawling under section 15(2) of the Fisheries Act • Draft threat management plan 	<ul style="list-style-type: none"> • Marine mammal sanctuary over part of natural range • Fishing-related mortality limit for bycatch in the SQU6T squid fishery set annually under the Fisheries Act 	None at present	<ul style="list-style-type: none"> • Marine mammal protection regulations and permits • Resource consents issued in accordance with Southland Regional Coastal Plan • Doubtful Sound Voluntary Code of Management 	<ul style="list-style-type: none"> • Regional coastal plan and consenting • Marine mammal protection regulations and permits

<p>Key management issues</p>	<ul style="list-style-type: none"> • Maui's dolphin population extremely small • Marine mammal sanctuaries and set net exclusions do not cover entire range • Fisheries closures under Fisheries Act have been contentious and subject to legal challenge • Attempts to draft population management plan have failed 	<ul style="list-style-type: none"> • Marine mammal sanctuary covers only part of foraging range • Attempts to draft population management plan have failed • Bycatch limit set under Fisheries Act has been legally challenged • Decision making has focussed on one part of problem and does not address the big picture 	<ul style="list-style-type: none"> • Currently no management measures in place • Marine Mammals Protection Act does not specifically address this issue • Measures could also be implemented under the Resource Management Act or Maritime Transport Act 	<ul style="list-style-type: none"> • Current research does not establish cause of population decline • Impact of increased freshwater discharge not managed • Breaches of voluntary code of practice for tourism are common, with limited understanding of whether the code is effective. 	<ul style="list-style-type: none"> • High pressure to develop aquaculture in Admiralty Bay • Regional coastal plan does not directly address the issue • Marine mammal protection regulations only give limited power to manage marine mammal tourism • No integrated management considering both threats
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Endnotes

1. Hanmer R *et al*, 2012
2. Slooten E *et al*, 2006
3. Department of Conservation and Ministry of Fisheries, 2007a,17
4. Gormley A *et al*, 2012
5. Department of Conservation, 2010
6. Constantine R *et al*, 2012
7. Cumming G, 2009, 'How ship strikes are killing Auckland's whale population', *New Zealand Herald*, 14 November
8. Ingram K, 2007, 'Ship collisions strike down whales', *Professional Skipper Magazine*, September/October
9. Vanderlaan A and C Taggart, 2007, 149
10. Currey R, 2008, 37 and 59
11. Ministry of Economic Development, 2010
12. See e.g. Curry R, 2008
13. Markowitz T *et al*, 2004, 135 and 146
14. Pearson H, 2008, 29 and 30
15. Rule 35.4.2.9, Marlborough Sounds Resource Management Plan
16. *Friends of Nelson Haven and Tasman Bay and others v Marlborough District Council* W36/2006, para 16
17. Lundquist D, 2011, 75
18. Lundquist D, 2011, 10; Würsig B *et al*, 2007, 15

chapter six



Addressing Fishing Impacts

Introduction

The legislative framework provides for marine mammal bycatch to be managed by the Department of Conservation and the Ministry for Primary Industries together. Population management plans and marine mammal sanctuaries under the Marine Mammals Protection Act, and the sustainability provisions in the Fisheries Act, may be used to manage and protect marine mammals from fishing bycatch.

However, attempts to develop population management plans for New Zealand sea lions and Hector's and Maui's dolphins failed, and marine mammal sanctuaries do not currently include rules relating to fishing.¹ Thus, in practice, the Ministry for Primary Industries manages fishing impacts using the sustainability provisions in the Fisheries Act.

This approach has achieved some successes: for example, set net bans for Hector's dolphins have probably reduced the speed of population decline.² Nevertheless populations of New Zealand's two endemic marine mammal species, both of which are known to be threatened by fishing, continue to decline.

There are a number of reasons why the available tools have not been utilised, and where they have been used, why they have failed to resolve fishing issues. These are identified and described below.

Marine Mammals Protection Act

No obligation to minimise bycatch

Despite the general protection of marine mammals from 'take' without a permit, the capture of marine mammals as bycatch during the course of fishing activity is permitted under the Act. This is provided that it is reported, and it does not exceed a limit on bycatch set out in any population management plan, which has been incorporated into sustainability measures under the Fisheries Act.

Thus, there is no *general* obligation to minimise bycatch, or where a population management plan is in place, to reduce it beyond the level required by the plan. This contrasts with the system in the USA in which marine mammal bycatch is prohibited unless a permit to take it is obtained. There, the legislation sets out a goal of zero bycatch. The system establishes a presumption against the acceptability of marine mammal bycatch, and encourages fishers to develop measures to reduce it.

Similarly, the Australian system requires that fisheries are conducted in a manner in which bycatch of threatened marine mammals is avoided. Fisheries Management Plans are required to contain measures directed at reducing bycatch levels to the minimum, and these plans can be accredited by the Environment Minister when they meet this requirement.

No obligation to monitor bycatch

Although section 16 of the Marine Mammals Protection Act provides that any incidental take of marine mammals must be reported, and that failure to do this may result in a penalty of up to \$10,000, the legislation does not create an obligation to monitor fishing to verify the rate of bycatch.

This contrasts with the system in the USA, where the Marine Mammals Protection Act requires the government to monitor bycatch to enable a statistically robust reliable estimate of bycatch rates, reliability of reporting and the impact of different fishing methods.³

In New Zealand, observers are placed on vessels by the Ministry for Primary Industries, but in varying numbers across different fisheries. For example, the observer rates on the SQU6T squid fishery have varied between 8 and 100 per cent between 1992 and 2009. In other inshore fisheries, where there are numerous small vessels operating, there is very little observer coverage.

Although fishers are legally required to report all marine mammal bycatch, there are strong incentives for them not to do so, as such reports may result in their fishery being closed down. As a result, self-reported information is not an adequately robust source of data to enable the identification of the scale of threats and appropriate management measures.⁴ Effective management of fisheries impacts on marine mammals therefore requires high levels of observer coverage on boats at risk of marine mammal interactions.

The importance of observer coverage to monitor bycatch has been recognised in the recent decision by the Minister for Primary Industries establishing further protections for the Maui's dolphin. Any commercial fisher wanting to use set nets between two and seven nautical miles off the Taranaki coast must now have an observer onboard.⁵

No obligation to develop and implement population management plans

The Marine Mammals Protection Act anticipates that caps on bycatch will be established by means of population management plans, but there is no obligation for this to occur. The Act states that “*the Minister may, from time to time, approve a population management plan*”⁶ and *may include in the plan a maximum allowable level of fishing-related mortality.*⁷

In practice this discretionary approach means that plans will not necessarily be developed or finalised, even if the population in question is critically threatened. In fact, no such plans have been completed despite the Hector’s and Maui’s dolphin and New Zealand sea lion being threatened species and subject to bycatch. Population management planning is resource intensive and often highly contentious, so it is not a process that the Department of Conservation will necessarily choose to embark on, particularly in an era where government funds – particularly at the Departmental level – are stretched.

In addition, the discretionary approach encourages a combative culture where conservationists and users dispute the necessity of protection measures, a problem that would be minimised if the Act provided for a more mechanistic system such as that used in the USA. There recovery plans *must* be developed and implemented for all species which fit particular criteria establishing that they are threatened.⁸

Cross agency support required for population management plans, with no process for resolution of conflict

If the Minister of Conservation does decide to prepare a population management plan, the legislation provides that the Minister for Primary Industries must provide concurrence with the parts of the plan that relate to fishing-related mortality, “*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.*”⁹ This means that it is very difficult for the Department of Conservation to finalise a population management plan which does not have the support of the Ministry for Primary Industries, which advises the Minister.

The agencies have very different cultures, one focused on ‘sustainable utilisation’ of marine resources and the other on conservation. There is no provision for a process through which disagreements can be resolved. Where the Department of Conservation has attempted to prepare population management

plans, the lack of inter-agency agreement has led to drawn out processes, and ones which ultimately failed to reach any conclusion.

Complex establishment process for population management plans

The legislation provides for a lengthy and unnecessarily complex establishment process for population management plans. This involves the preparation of three drafts and provides for an excessively long consultation period of 40 days as can be seen in Figure 6.1.

Figure 6.1: Statutory process to prepare population management plans

1.	Consultation with Conservation Boards, Māori and environmental, commercial and recreational organisations
2.	Draft PMP prepared by Director General of Conservation (<i>Draft 1</i>)
3.	Publicly notify draft PMP. Submission period of at least 40 working days
4.	Hearing before Director General
5.	Director General prepares summary of submissions and public opinion
6.	Director General may revise draft (<i>Draft 2</i>)
7.	Draft and summary of submissions sent to Minister for Primary Industries and to New Zealand Conservation Authority
8.	New Zealand Conservation Authority provides comments to Director General and Minister of Conservation
9.	Director General may revise draft (<i>Draft 3</i>)
10.	Director General sends draft PMP to Minister of Conservation
11.	Minister of Conservation approves draft PMP and refers it to Minister for Primary Industries for concurrence
12.	Minister for Primary Industries concurs with draft PMP
13.	PMP approved

Targets for population management plans unworkable

The legislation requires that any maximum allowable fisheries-related mortality limit that is set must “*allow the species to achieve non-threatened status as soon as reasonably practicable, and in any event within a period not exceeding 20 years.*” In relation to non-threatened species, the maximum allowable fisheries-related mortality limit must identify “*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.”¹⁰

The problem with this target, as identified by the Department of Conservation in its 2010 review of the matter, is that it is “*biologically impossible for many species due to the age at which sexual maturity is attained and the low fecundity rates of many species.*”¹¹ That is, even if the by-catch for species such as the Hector’s and Maui’s dolphin was set at zero, they would still not achieve a non-threatened status within 20 years.

Attempts to develop a population management plan for Hector’s and Maui’s dolphins failed in part because it was recognised that a maximum allowable fisheries-related mortality that would meet the requirements of the Act would have to be zero. This would be impossible to achieve in practice, without closing the set net fishery in all Hector’s and Maui’s dolphin habitat, with significant impact on the fishing industry.

Non-statutory plans developed instead of population management plans

Following failed attempts to draft a population management plan for Hector’s and Maui’s dolphins during the mid-1990s, non-statutory plans were developed. The use of non-statutory documents to set out conservation goals for marine mammals considerably weakens the protective legal framework which has been specifically designed for these species. This is because they are drafted on an *ad hoc* basis, rather than in accordance with a set of specific management requirements, and thus are not required to set out strong measures for managing key fishing threats. They also have no direct statutory effect. This approach makes it much more likely that political and other factors are able to influence the outcome.

In contrast, the population management plan provisions envisage that a cap on marine mammal bycatch will be developed within the framework of the Marine Mammals Protection Act (which is designed to protect marine mammals), and that this will then drive decisions under the Fisheries Act. When such statutory plans are not in place, decisions on bycatch are made solely within the legislative framework of the Fisheries Act, which has a much stronger utilisation purpose and is more often subject to legal challenge.

Marine mammal sanctuaries fail to address all threats

Governmental preference in recent times has been to use the Fisheries Act to establish spatial regulation of fishing activity as well as limits on bycatch, instead of marine mammal sanctuaries. The apparent rationale is that the Ministry for Primary Industries is better resourced to enforce the rules. However, given that the Marine Mammals Protection Act provides for fisheries officers to also become marine mammals officers, it appears that the legislation envisaged that the Ministry for Primary Industries would cooperate with the Department of Conservation in enforcement matters.

In 2012, following the death of a Maui's or Hector's dolphin outside the West Coast North Island marine mammal sanctuary, the Department of Conservation commenced consultation on extending the sanctuary south into Taranaki. The proposals included the extension of restrictions on seismic surveying but no extension of the existing regulations on mining. Restrictions on fishing activity were extended into the same area, but via Fisheries Act regulations. As a result, the latest 'marine mammal sanctuary' proposal is the creation of an area where all activities can continue as normal, apart from some limited restrictions on seismic surveying.

This highlights the approach in recent Ministerial decision-making, which is to use the marine mammal sanctuary tool to address some activities, but not necessarily to provide marine mammals with 'sanctuary' where they are protected from all key threats.

Fisheries Act

Since no fishing threats are currently addressed under the Marine Mammals Protection Act, this has left the issue to be managed by the Minister for Primary Industries under the Fisheries Act. There have been several problems with this approach, as described below.

Purpose does not promote marine mammal protection

The purpose of the Fisheries Act is to “*provide for the utilisation of fisheries resources whilst ensuring sustainability.*” The Supreme Court has interpreted this provision as requiring utilisation to be balanced against sustainability.¹² The Minister has broad discretion to determine how much weight to give to the promotion of social, economic and cultural wellbeing and the cost of mitigation measures.¹³

Thus decision making under this Act occurs on a significantly different basis than that occurring under the Marine Mammals Protection Act, which is aimed solely at the effective protection of marine mammals.

Unlike the Marine Mammals Protection Act, the Fisheries Act contains no specific goals relating to the protection of marine mammals from fishing threats. It does include general environmental principles. Although these are expressed in terms of environmental bottom lines (for example, “*associated or dependent species should be maintained above a level that ensures their long-term viability*”), decision-makers under the Act are only required to ‘take account of’ them rather than ‘give effect to’ them. This means they can be outweighed by other considerations.

No obligation to restrict fishing

Section 15 of the Fisheries Act provides that in cases where a population management plan has not been adopted, the Minister for Primary Industries may 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. The Minister’s power to act is therefore discretionary, and confers on the Minister a wide discretion to choose to, or to decline to, implement measures to restrict fishing. As a result, the only species of marine mammal for which a fishing-related mortality limit has been established is the New Zealand sea lion. Section 15 has also been used to implement spatial restrictions on set netting to protect Hector’s and Maui’s dolphins. High levels of bycatch-related mortality in other species, such as the common dolphin which is frequently caught in the jack mackerel trawl fishery, are not regulated at all.¹⁴

Where the Minister does decide to act, the requirement is that the measure is ‘necessary to avoid, remedy or mitigate the effect of fishing related mortality’ on marine mammals. This language couches the required effects of measures in broad terms, with none of the obligations about species recovery that are set out in the population management plan process. The Minister has a broad discretion to select strong or weak measures provided that they meet the requirements of the legislation.

Decision-making does not address the bigger picture

In the Fisheries Act ‘fishing-related mortality’ is defined as “*the accidental death or incidental death of any protected species that occurs in the course of fishing*”. The Ministry for Primary Industries thus considers only the impact of bycatch when setting fishing-related mortality limits. For example, fishing-related mortality limits governing the incidental take of New Zealand sea lions in the SQU6T fishery around the Auckland Islands are based solely on estimates of direct catch of sea lions in trawl nets, and do not take into account the issue of food competition which may be an important factor in the decline of the population.¹⁵

Although the same definition of maximum allowable fisheries-related mortality appears in the Marine Mammals Protection Act, the term ‘fishing-related mortality’ has been interpreted differently by the Department of Conservation. In its discussion paper on the population management plan review, the Department notes that “[f]ishing related mortality can be broadly categorised into two types:

- *Direct mortality results from interactions with fishing equipment such as trawl nets and warps, longlines or setnets.*
- *Indirect mortality which may occur where fishing depletes food availability, modifies habitat important for all or part of the life cycle of the species, or modifies the behaviour of the species in question.”*

Whilst in practice, setting a limit on the number of individuals that may be indirectly killed by fishing activity may be difficult, such issues should be recognised and taken into account when fishing-related mortality limits are established. Nevertheless, Ministry advice to the Minister for Primary Industries in relation to the effects of the SQU6T fishery on the New Zealand sea lion, has never referred to the need to take into account the effects of indirect mortality.

This approach contributes to a situation where decisions about measures to mitigate bycatch are taken in a vacuum, without reference to the other relevant fisheries factors that are impacting on the health of a marine mammal population.

Decisions highly susceptible to judicial review

Decisions under the Fisheries Act are more susceptible to judicial review than those under the Marine Mammals Protection Act. This is because the legislation provides much more detail on the requirements that the Minister must adhere to when reaching a decision.

Section 10 of the Fisheries Act provides that when making decisions under the Act, the Minister must take into account a set of information principles. The information principles include in section 10(d) an expression of the precautionary principle: *“the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.”* However, precautionary decisions made under the Act have been liable to be overturned on the basis of section 10(a), which requires that *“decisions should be based on the best available information.”*¹⁶

Where it cannot be definitively proved that the Minister has been provided with the best available information, courts are liable to overturn the Minister's decision.¹⁷ Furthermore, if the Minister decides to implement a measure under section 15(2), the measure must be ‘necessary’ (a high standard to meet) to ‘avoid, remedy or mitigate’ the impact of fishing-related mortality. This requirement provides a further basis on which to challenge the decision. As already outlined, measures to protect the Hector's dolphin, Maui's dolphin and New Zealand sea lion have been challenged in the courts under the Fisheries Act.

The Ministry for Primary Industries appears to have moved away from using section 15(2) of the Fisheries Act to address marine mammal bycatch issues. In its 2012 consultation on measures to extend the ban on set netting off the west coast of the North Island, it proposed using section 11 of the Fisheries Act, although the existing spatial restrictions were established under section 15(2).

Section 11 allows the Minister to set or vary sustainability measures for stocks or areas. This is a broader power than that set out in section 15 but is not specifically related to marine mammal bycatch. However, the advantage is that it does not have the requirement that the measure be ‘necessary’, and therefore is less susceptible to judicial review on this point.

Conclusion

Despite a legislative presumption in favour of protecting marine mammals, fisheries impacts including bycatch are permitted under the existing management framework. Although there are provisions available to manage these issues, no agency has an obligation to do so.

The Marine Mammals Protection Act provides two tools to address this issue but neither are currently used for this purpose. Population management plans were found to be unworkable as a result of a combination of unrealistic goals, an

overly complex establishment process, and the need for the concurrence of the Minister for Primary Industries. Meanwhile, marine mammal sanctuaries have been established without reference to fishing threats.

Action on bycatch issues has therefore been left to the Fisheries Act which is not designed to protect marine mammals and does not set out any specific goals for threatened species. Several Ministerial decisions under the legislation have been judicially reviewed by the fishing industry. The section which specifically refers to management of bycatch (section 15) may now be bypassed in favour of section 11 which provides a broader power less susceptible to legal challenge.

Figure 6.2 Summary of issues with application of current statutory tools to address marine mammal bycatch

Marine Mammals Protection Act	
No obligation to minimise bycatch	<ul style="list-style-type: none"> • Act permits unlimited bycatch (unless population management plan in place) • Even if population management plan sets limit, no obligation to minimise beyond limit
No obligation to monitor bycatch	<ul style="list-style-type: none"> • Marine mammal bycatch must be reported, but there are strong incentives not to do so • Observer rates on commercial vessels vary significantly • Difficult to implement effective management measures without good understanding of scale of problem
No obligation to develop and implement population management plans	<ul style="list-style-type: none"> • No population management plans have been completed • Encourages combative culture where conservationists and industry stakeholders debate necessity of measures
Cross agency support required for the development of population management plans	<ul style="list-style-type: none"> • Agencies have different goals. At times the working relationship between the Ministry for Primary Industries and Department of Conservation has been difficult
Complex establishment process for population management plans	<ul style="list-style-type: none"> • Three drafts required and lengthy public consultation
Targets for population management plans unworkable	<ul style="list-style-type: none"> • Biologically impossible for many marine mammal populations to recover within 20 years as required in legislation
Non statutory plans developed instead of population management plans	<ul style="list-style-type: none"> • No particular requirements setting out what they should cover • Targets have been weak or non-existent • No direct statutory effect

Marine mammal sanctuaries do not manage fishing threats	<ul style="list-style-type: none"> • Legislation does not define the concept or specify what marine mammal sanctuaries should achieve • Have been established without restrictions on fishing (a key threat in each instance)
Fisheries Act	
Purpose does not promote marine protection	<ul style="list-style-type: none"> • Decision-making under this Act occurs on a significantly different basis to that under the Marine Mammals Protection Act • Purpose is sustainable use of fisheries resources, not protection • Act contains no clear objectives for marine protection
No obligation to restrict fishing	<ul style="list-style-type: none"> • The Act empowers the Minister to regulate fishing to protect marine mammals but does not require him/her to do so.
Decision-making does not address the bigger picture	<ul style="list-style-type: none"> • Decision-making focuses on bycatch and does not consider other fishing-related impacts such as food competition and changes to the ecosystem
Decisions susceptible to judicial review	<ul style="list-style-type: none"> • The legislation provides much more detail on the requirements that the Minister must adhere to when reaching a decision • Decisions made under section 15 of the Fisheries Act must be 'necessary' • Decisions must be made using the best available information – often unclear what this is

Endnotes

1. The exception is the Auckland Islands Marine Mammal Sanctuary, but since establishment this area has become a marine reserve in which fishing is prohibited, so the marine mammal sanctuary rules have effectively been superseded.
2. Gormley A *et al*, 2012
3. Section 118(b)(1), USA Marine Mammals Protection Act 1972
4. A Ministry for Primary Industries study (Bremer *et al*, 2009) identified inconsistencies in reported and unreported bycatch in a South Island hoki fishery. This study relates to the bycatch of unwanted fish species rather than marine mammals, so is not directly comparable, but highlights the fact that discrepancies can and do occur between reported and actual catches
5. Minister for Primary Industries, 2012, decision letter, 28 June
6. Section 3E(1), Marine Mammals Protection Act 1978
7. Section 3E(1)(g), Marine Mammals Protection Act 1978
8. Wheen N, 2008
9. Section 3H(1)(n), Marine Mammals Protection Act 1978
10. Section 3F, Marine Mammals Protection Act 1978
11. Department of Conservation, 2010,4
12. See e.g. *New Zealand Recreational Fishing Council & Ors v Minister of Fisheries & Ors* [2009] 3 NZLR 438; *Sanford Ltd v New Zealand Recreational Fishing Council* [2008] NZCA 160
13. Department of Conservation and Ministry of Fisheries, 2007b, 57
14. Thompson F *et al*, 2010
15. Robertson B and L Chilvers, 2011
16. Wheen N, 2012; Gullett W, 2006; Modeste D, 2011
17. E.g. *Northern Inshore Fisheries Company Ltd v Minister of Fisheries* (High Court Wellington, 4 March 2002); *Squid Fishery Management Company Ltd v Minister of Fisheries* (High Court Wellington, 27 February 2004); *New Zealand Federation of Commercial Fishermen Inc v Minister of Fisheries* (High Court Wellington, 23 February 2010)

chapter seven



Addressing Tourism Impacts

Introduction

The activities of marine mammal tourism operators are regulated under the Marine Mammal Protection Regulations 1992. There are approximately 120 active marine mammal viewing permits, of which around 50 per cent have been issued by the Nelson Marlborough conservancy, which includes the important tourism destinations of Kaikoura, the Marlborough Sounds and Abel Tasman National Park.¹

These regulations were developed when the New Zealand marine mammal tourism industry was in its infancy. They were largely based on the Kaikoura experience which consisted of a small number of operators interacting with sperm whales and dusky dolphins. As the industry took off in other parts of New Zealand, and focused on a wider range of species, the regulations were found wanting.

In 1998 the Department of Conservation commenced work to amend the regulations to address their failings, but this was never completed, largely because the project failed to receive sufficient priority within the Department's work programme. As such, the regulations are now over 20 years old and need urgent updating.

Some of the problems experienced in managing the impacts of tourism on marine mammals under the current regulations are described below.

Not all commercial operations require permits

Under the regulations, a permit is required if the purpose of a commercial trip is "*to view or come into contact with any marine mammal.*" This means that technically, a permit is not required for a tourist operator which operate trips for a different purpose, such as to fish or view wildlife in general, and which 'just happens' to come across a pod of dolphins. This legal loophole enables commercial operators to interact with marine mammals without a permit.

In the Bay of Islands, for a time it became common practice for gamefish charter boats to follow dolphin-watching boats as they headed out of the Bay, so that their passengers could view dolphins as part of their fishing trip. Other commercial cruise vessels would also follow the boats. In October 1994 Fullers skipper Stephen Whitehouse made a written complaint to the Department of Conservation regional conservator stating:

It is now becoming increasingly obvious that most “commercial” operators in the BOI are now targeting marine mammals during their normal cruises, but often travelling outside their normal route. These vessels visit and look for the existing licenced operators during swims with dolphins and in some cases actually put swimmers into the water also. Often these boats call on VHF for sightings/reports of dolphins in the bay as the licensed operators do. Recently whilst with a pod of dolphins I was visited by 3 charter game boats ... along with “Hole in the Rock” vessels ... one of them ... going astern at speed (est. 10 knots) to get the dolphins to ride so the passengers could get a good view, all these vessels altered course to come over to my position to see the dolphins.²

In addition, during the 1990s, some dolphin-watching operators started to offer additional trips to those authorised under their permits to meet rapidly escalating demand. They described these trips as ‘wildlife tours’ and argued that under the regulations they did not need to be permitted. This was despite the fact that they were being undertaken in vessels which also undertook dolphin-watching tours.³

This problem of loose permitting requirements is more acute in enclosed waters, such as those in Akaroa harbour and Doubtful Sound, where most commercial boats will regularly encounter dolphins. The key problem is that the regulations do not prevent non-permitted vessels from interacting with marine mammals if they encounter them incidentally to their other activities. Therefore, the prosecution of non-permitted operators can only take place when intentional interactions with dolphin schools can be demonstrated, and such an intention can be very difficult to prove in a court of law.⁴

In the Marlborough Sounds, the Department of Conservation has sought to address this issue by issuing permits that govern ‘incidental marine mammal viewing’, to commercial operators seeking to offer a broader visitor experience than solely marine mammal viewing (such as water taxis and those offering eco-tours). Under the regulations these types of vessels do not require a permit. However, this approach is problematic, as the drafting of the regulations does not anticipate this type of arrangement.⁵

The other regulatory mechanism which can be used to control the level of vessel traffic in marine mammal habitat is the inclusion of appropriate rules in the regional coastal plan under the Resource Management Act. This is most effectively used in enclosed marine areas where there is limited vessel traffic from outside the region. For example, under the Southland Regional Coastal Plan, operators of commercial surface water activities in some parts of the fiords must first obtain

a resource consent. Vessel numbers are governed by specific rules in the plan relating to the number of vessels that may operate in particular parts of the fiords.

This has enabled the number of vessels operating in Doubtful Sound to be effectively capped. However, this management approach is intended to preserve the wilderness values of the fiords, and any protection of marine mammals is merely an indirect consequence of this. The 'cap' is not related to level of vessel traffic which may have an adverse effect on the dolphins.

Initial management presumption that marine mammal tourism was benign

Section 5 of the Marine Mammal Protection Regulations provides that commercial operations targeting marine mammals are illegal, unless a permit has been issued by the Department of Conservation. The intention of the provision is *“to regulate human contact or behaviour with marine mammals”* in order to *“prevent adverse effects on and interference with them.”*

The Director General of Conservation is only able to issue a permit for commercial marine mammal tourism operations if satisfied that there is substantial compliance with a range of criteria including that *“the commercial operation should not have any significant adverse effect on the behavioural patterns of the marine mammals”* and that *“it should be in the interest of the conservation, management, or protection of the marine mammals that a permit be issued.”*⁶ The regulations are therefore intended to put the welfare of the whales and dolphins first, irrespective of the economic value of the tourist operations.

Despite the strong presumption in the regulations in favour of marine mammal welfare, the approach to management of the industry has not always reflected this. When marine mammal tourism commenced in New Zealand, little research had been undertaken on the potential impacts of such activities anywhere in the world. Nevertheless, there was a presumption, despite a lack of robust science, that *“a well-run and carefully managed operation [can]...provide valuable advocacy for marine mammal conservation, without adversely affecting the welfare of the animals under observation.”*⁷

In the context of a world where whaling was not yet outlawed, tourist activity was perceived to be a benign activity which could play a valuable role in demonstrating that wild whales and dolphins had considerable economic value if left alive, rather than being hunted.⁸ The practical result of this paradigm was that

numerous marine mammal permits were granted around New Zealand at a time when managers had little idea of what their potential effects might be.

Inadequate information to determine the impacts of tourism

When the first marine mammal tourism permits were granted in the Bay of Islands, no-one knew how many dolphins were actually present in the Bay, so it was not possible to make informed decisions about the level of pressure on them. The only information available was from sighting data provided by the dolphin-watching operators themselves.

One justification for issuing the permits, in the absence of adequate information, was that it enabled the Department of Conservation to access funds to pay for the necessary research to fill the information gap. Tourism operators agreed to pay a per-head levy, based on passenger numbers, which was used to fund research projects. These projects sought to identify what impacts the tourist vessels were having on the marine mammals they interacted with.

This proved to be a scientifically difficult question to answer. With research following behind the development of the industry, there was no directly comparable baseline data against which impacts on the marine mammal populations could be measured. In addition, a PhD research project which did attempt to compare the behaviour of pods of bottlenose dolphins in the Bay of Islands, with others in un-touristed areas, was thwarted when the Department granted marine mammal permits in the research 'control' areas.⁹

As a result of these difficulties, most decisions under the regulations have been made without considering the broader population effects of tourism. For example, the Department of Conservation's 2012 consultation on the expiry of a moratorium on permits to watch sperm whales in Kaikoura is based on a study of the short term impacts of whale watching. The Department's discussion paper notes that the study used to justify renewing or cancelling the moratorium "*did not, nor could it attempt to make any links between whale watching and the health of the wider sperm whale population seen in New Zealand waters. The data available for decision making rests solely on a study of sperm whale behaviour in the presence of tour boats and aircraft.*"¹⁰

Lack of a robust scientific understanding about the size and range of marine mammal populations has also contributed to the difficulty in managing the

cumulative effects of different tourism operations. For example, permits were granted for bottlenose dolphin interactions at multiple locations along the north-east coast of the North Island, before it was fully understood that they were all targeting the same population of dolphins that ranged along the area.

Scientific uncertainty has also made it difficult for the Department of Conservation to refuse permit applications in the absence of strong evidence of negative impacts. In some cases, applicants have threatened legal action if their permit is not granted, which the Department of Conservation has been reluctant to risk.¹¹

Section 15 of the Marine Mammal Protection Regulations does provide for moratoria to be established for specified periods, “*where the Director General believes on reasonable grounds that it is necessary for the protection, conservation, or management of any marine mammals or any class of marine mammals.*” This provision has been utilised to establish moratoria on sperm whale, dusky dolphin and New Zealand fur seal tourism at Kaikoura, New Zealand fur seal tourism in Abel Tasman, southern right whale tourism in the Auckland Islands and bottlenose dolphin tourism in the Bay of Islands.¹²

However, the Department of Conservation has been reluctant to act to implement moratoria without hard evidence that there is a problem, something which for the reasons set out above, it has been difficult for scientists to provide. As a result, it can take years for a moratorium to be put in place, after potential problems are identified. For example, a moratorium on new permits was first proposed in the Bay of Islands in 1997, but was not implemented until twelve years later in 2009.

Difficulty in reducing permit numbers

Where scientific research has indicated that the level of marine mammal tourism activity should be reduced to lower the impact on marine mammals, there are several mechanisms available under the regulations to achieve this. However, such a reduction has been difficult to achieve in practice.

Section 12(4) of the regulations provides that “*the Director-General may issue a permit for any period of time not exceeding 10 years and may renew the permit from time to time.*” In addition, section 13(2) provides that the Director General can suspend, revoke or restrict permits “*where the Director-General believes*

on reasonable grounds that it is necessary for the protection, conservation, or management of any marine mammal or marine mammals of any class.”

An additional mechanism which the Department can use to reduce the number of permits, is to refuse to approve transfers. Under section 14 of the regulations, no permit can be transferred without prior approval of the Director General. He or she may refuse to consent to the transfer, or consent to it with or without conditions. An application to transfer a permit usually occurs when a dolphin-watching enterprise is sold to a new owner or ceases to operate.

Permits have generally been issued for less than the ten year maximum, allowing a more frequent review. When the permits come up for renewal, the Department of Conservation can decline the renewal or place more stringent conditions on the permit. In practice, renewals have not been declined in order to reduce the level of impact on marine mammals. Once a permit has been issued, and a commercial operator has made an investment in establishing the operation and employed staff, there is strong pressure on the Department of Conservation to continue to permit the operation so long as conditions are complied with.

However, the Department has declined to renew permits where the operator has shown poor compliance. For example, the permit granted to Dolphin Rendezvous 2004 Limited which operated out of Paihia and Mangonui, was placed under suspension in February 2009.

In addition, whilst not forcibly reducing the overall number of permits, the Department has amended the conditions of permits to reduce the level of interaction on each trip. For example, in the Bay of Islands, the interaction with bottlenose dolphins was reduced from 90 to 50 minutes per trip.¹³

Instead of applying for new or additional permits to increase the scale of their operations, at times marine mammal tourism operators have sought to achieve this through ‘amendments’ to their existing permits. For example, in May 1995, Dolphin Discoveries applied to the Department to amend its permit from authorising two boats operating two trips a day to three boats operating three trips a day.¹⁴ The amendment application was later changed to replace one of the existing boats which carried 12 passengers with a larger catamaran which would carry 32 passengers.¹⁵ This amendment was granted on the basis that there be no increase in the number of swimmers placed in the water on each trip.

Regulations not appropriate for all species and locations

Part three of the regulations sets out the behaviour required of commercial operators and other people when around marine mammals. These rules are reproduced in Appendix 3. Like the rest of the regulations, these sections were initially designed to manage the impacts of tourism on sperm whales off the Kaikoura coast and were amended in 1992 to provide for a new enterprise targeting dusky dolphins.

Marine mammal tourism has expanded to take in a range of different species and locations since then, and our understanding of the effects that these operations have on the target species has grown significantly.

Section 20(e) of the regulations provides that *“no vessel shall approach within 300m of a pod of dolphins or herd of seals in order to watch the dolphins and seals when there are more than three vessels or aircraft already present.”* Whereas dusky dolphins congregate in very large pods of up to 1000 animals in Kaikoura, in other areas such as the Bay of Islands, the pods are much smaller (less than 10 animals), so that often three vessels are targeting a very small number of dolphins.

The regulations make no reference to pod size in relation to appropriate vessel numbers. This issue was highlighted by the Northland Regional Conservator in relation to the Bay of Islands as early as 1993 in a letter to the Director General: *“We would like to limit the number of boats targeting small pods and our strong recommendation would be for one permitted vessel to be within 300m of a pod of 10 or fewer dolphins. However, we understand from discussions with the Legal Division ... that we cannot include such a condition in permits.”*¹⁶

Furthermore, the need to ensure that no more than three vessels is present at any one time has led to permitted trips being staggered throughout the day, so that in many areas the target species are in the presence of boats for most daylight hours, every day. Research by Rochelle Constantine has indicated that, in respect of bottlenose dolphins, an increase in the number of vessels beyond two does not have a significant impact on behaviour. So the focus of the regulations on boat numbers may be misplaced.¹⁷

Constantine found that the length of time during which the animals are exposed to tourism operators was more important, and this is not addressed in the regulations. Mid-day breaks have been scheduled into operating schedules in some areas by means of voluntary agreements and permit conditions. These have

not been implemented in all locations, and may not be sufficient to avoid negative impacts.

It is apparent from studies of marine mammal tourism impacts on different species, that whilst there are similarities in the impact of marine mammal tourism across different species and locations, each scenario entails different problems. As such, the Marine Mammals Protection Regulations as currently drafted are insufficient to regulate all the various types of marine mammal tourism in operation.

Regulations unclear

Section 20(b) states that in regards to *“any commercial operation and any person coming into contact with dolphins or seals ...persons may swim with dolphins and seals but not with juvenile dolphins or a pod of dolphins that includes juvenile dolphins.”* This wording creates two legal uncertainties which make its enforcement difficult.

First, it implies that any number of persons may swim with dolphins at any one time. This has created difficulties as, in the Bay of Islands, the Department of Conservation had been issuing swimming permits with restrictions on the number of swimmers that could enter the water. Staff had been approving the use of larger vessels by existing operators on the basis that they agreed to reduce the swimmer numbers.¹⁸ This, the Departmental staff had believed, would result in a decrease in the pressure on the dolphins. However, a legal assessment of the regulations in 1998 indicated that the Department had no legal basis on which to do this.¹⁹ If it was not possible to restrict the numbers in the water, the effect of approving larger vessels was to increase the potential pressure significantly.²⁰ Secondly, the Act and regulations contain no definition of what age group a ‘juvenile’ covers.²¹

In a similar vein the Department of Conservation has attempted to regulate ‘opportunistic’ marine mammal viewing by issuing permits to some commercial operators, with conditions setting out a protocol for chance marine mammal encounters. In a recent case, the Nelson District Court found that this approach was not permitted by the regulations, which are limited to the particular matters set out therein. A representative of the Department of Conservation justified the approach as follows:

[The regulations] are not comprehensive and alone do not provide the level of protection needed to manage all effects in all situations. Moreover, these

regulations were established in 1992 based on the international knowledge available at the time. We now know much more about the effects of marine mammal tourism.

Nevertheless, the judge found that *“the endeavour...to give off the cuff rules the force of law by appending them to a permit, and making compliance with the rules a condition of the permit, is inherently unsound. Parliament makes law, and specifies how delegated legislation can be made. There is a power under the Marine Mammals Protection Regulations 1992 to issue permits, but not to create another set of regulations.”*²²

Regulations difficult to enforce

Although the Department of Conservation marine mammal protection officers maintained a strong presence on the water in the early years after the implementation of the regulations, this gradually reduced. There is evidence that, when officers are not present, violations of the regulations are more frequent.²³

Where the Department of Conservation has been made aware of violations, it has found it difficult to enforce the legislation. In 1996 the Department attempted to prosecute Kings Tours and Cruises for alleged breaches of the regulations and operating without a permit. However, despite significant resource invested by the Department, the judge dismissed the charges on a technicality. The Department had failed to link the party prosecuted, Nightingale Trading Limited, with Kings Cruises which operated the vessel involved in the infringements.²⁴ The difficulties in mounting successful prosecutions under the regulations remain and are illustrated by the 2011 case in the Nelson District Court discussed above.

Following the earlier incident, the Crown solicitor was reluctant to prosecute even when there was strong documentary evidence of offences. This was because of a perception that the chances of succeeding were not high and the Department of Conservation did not want to spend *“hundreds if not thousands of dollars to have a result less than satisfactory.”*²⁵

The behaviour of recreational vessels is governed by the regulations, but recreational boaters may not be aware of the rules, and have less incentive to abide by them than commercial operators. At Kaikoura, few recreational vessels were known to venture out to observe the whales and dusky dolphins along the exposed coastline, so this issue was not addressed adequately when the regulations were

drafted. In the Bay of Islands there can be thousands of recreational boats on the water on any one summer's day.

Recreational boats have been known to follow the commercial dolphin vessels as a way of locating the dolphins. The commercial vessels provide a prominent visual sign-post to others out on the water, of where dolphins can be found. Recreational boaties can also listen to the messages broadcast between commercial operators which identify where the dolphins were last seen.

Failure to address iwi interests

The Marine Mammals Protection Act and regulations do not directly address the role of iwi in the marine mammal tourism industry. Ostensibly, iwi were to be treated the same as any other applicant for a permit. This legal situation changed when the statutory provisions were tested in the Court of Appeal by Ngāi Tahu, seeking to prevent the Department from issuing an additional whale-watching permit in Kaikoura to other parties.²⁶

The Court of Appeal noted that, under the Conservation Act 1987, the Director General of Conservation was required to administer the Marine Mammals Protection Act so as to give effect to the principles of the Treaty. It found in favour of Ngāi Tahu on the basis that the Treaty principles are relevant to commercial whale-watching and that this required the Crown to actively protect Māori interests. As a result of the case, the Crown Solicitor provided advice to Departmental staff that iwi-based applications should receive preference over other applicants.

This decision had a significant impact for the Kaikoura community. Prior to the establishment of Whale Watch, Kaikoura's economy and employment depended largely on farming and fishing industries and on government organisations such as the Railways, Public Works and Post Office. With the closure of many of these organisations Kaikoura witnessed a growing trend in Māori unemployment – in particular, a worrying 90 per cent Māori youth unemployment.²⁷

Over the years, Whale Watch Kaikoura has grown from a small business with a vessel carrying ten passengers in 1987, to a large enterprise with a fleet of 48-seater, custom built vessels and extensive onshore facilities.²⁸ As noted by Pouharama *et al*, Whale Watch “*demonstrated for local iwi a sense of sovereignty in that they are a people whose customs come from a marine environment, and it is from this environment that they derive their kawa or 'ways of doing things'.*”²⁹

The success of the Whale Watch enterprise has meant that Kaikoura has rapidly become an important tourist destination for both international and local tourists, with a corresponding improvement in the economy and increase in employment prospects. A large proportion of Kaikoura's residents are directly or indirectly reliant on tourism for their income.

Māori involvement in marine mammal tourism has been less significant in other areas. In the Bay of Islands, the Department received two applications for dolphin-watching permits from operators who claimed to be iwi-based. Despite concerns about the pressure on the dolphin population from existing operations these permits were granted. Only one became operational, but when this enterprise started to financially struggle, an application was made to transfer the permit to one of the larger corporate tourism operators which was approved by the Director General. As a result, there is no direct iwi involvement in the industry in the Bay of Islands, but an additional permit is in operation increasing pressure on the dolphin population.

Conclusion

In summary, the Marine Mammal Regulations contain some strengths and when introduced were a positive and innovative measure. However, they were designed at a time when the impacts of marine mammal tourism were not fully understood, and it was not known how much the industry would grow. Whilst in the context of whaling, the development of marine mammal tourism appeared to be a benign and positive influence, we now know that it can have significant detrimental effects. The marine mammal regulations do not equip the Department of Conservation with the tools to manage that risk effectively and need to be urgently revised.

Figure 7.1: Summary of difficulties with current Marine Mammals Protection Regulations

- Not all commercial operations require permits
- Management presumption that marine mammal tourism is benign
- Inadequate information to determine the impacts of tourism
- Increasing scale through amendments to permits
- Difficulty in reducing permit numbers
- Regulations not appropriate for all species and locations
- Regulations unclear
- Regulations difficult to enforce
- Failure to address iwi interests

Endnotes

1. Boren L, 2010
2. Letter from Steve Whitehouse to Northland Regional Conservator, 24 October 1994
3. Minutes of dolphin operators meeting, 10 November 1994
4. See e.g. *Department of Conservation v Fullers Bay of Islands Limited and Rivington* (Judge Blackie, District Court, Kaikohe 23 November 2000)
5. See *Department of Conservation v Cougar Line Limited* (Judge Wainwright, District Court, Nelson 19 December 2011)
6. Section 4 and 6, Marine Mammals Protection Regulations 1992
7. Letter from Gerry Rowan, Regional Conservator to the Director-General of Conservation, 21 December 1993
8. Constantine R and L Bejder, 2008
9. R Constantine, *pers comm*.
10. Letter from Jo Gould, Community Relations Manager to Neil Clifton, Nelson Marlborough Conservator, 'Draft Recommendations on Sperm whale watching review Kaikoura,' 26 March 2012, 20
11. Department of Conservation, Northland Conservancy, Draft minutes of operator's meeting, 6 November 1996
12. Browne B, 2009
13. Browne B, 2009
14. Dolphin Discoveries Limited, 1995, Application for marine mammal permit amendment
15. Letter from Stephen Stemberge Dolphin Discoveries to Maurice Keans, Commercial Tourism Concessions, Department of Conservation, 11 March 1996
16. Letter from Gerry Rowan, Regional Conservator to the Director General of Conservation, 'Marine mammal permits in the Bay of Islands Fullers Northland', 21 December 1993
17. Constantine R and L Bejder, 2008
18. In more recent times, a study of swim with dolphin tours targeting dusky dolphins in Kaikoura found that the permit condition limiting the number of swimmers in the water at any one time to 13 could actually have a more detrimental impact than permitting a larger number of swimmers: operators carrying more passengers aboard the vessel would sometimes allow a few swimmers to enter the water when others leave to maintain a constant total of 13 swimmers. This resulted in the vessel

- approaching the dolphins more times, something that caused greater disruption than the number of swimmers.
19. Email message from Gerry Rowan, Department of Conservation to Whangarei Area Office, 5 August 1998
 20. Section 20(b), Marine Mammals Protection Regulations 1992
 21. Section 20(b), Marine Mammal Protection Regulations 1992
 22. *Department of Conservation v Cougar Line Limited* (Judge Wainwright, District Court, Nelson 19 December 2011)
 23. Jo Halliday, 2011, *pers comm*.
 24. Simmonds G, 1996, 'Flipper flap sequel to come', *Northern News*, 6 June
 25. Northland Conservancy Office, Marine mammal monitoring meeting minutes, 3 December 1997
 26. *Ngai Tahu Maori Trust Board v Director-General of Conservation* [1995] 3 NZLR 534
 27. Poharama A *et al*, 1998
 28. Te Korowai o te Tai o Marokura (Kaikoura Coastal Marine Guardians), 2007
 29. Poharam A *et al*, 1998

chapter eight



Addressing Vessel Impacts

Introduction

Ship strike is currently a major threat to the Bryde's whales in the Hauraki Gulf. The impacts of vessel activity on marine mammals can be regulated under three different regimes. First, the Minister of Transport (with the assistance of Maritime New Zealand) may make maritime rules under the Maritime Transport Act. Although there is no mention of marine mammals in the legislation, the scope of maritime rules include 'ensuring environmental sustainability' and 'promoting the protection of the marine environment.' No maritime rules currently address ship strike issues.

Secondly, regional councils can include rules in regional coastal plans under the Resource Management Act to control vessel activity. These need to be approved by the Minister of Conservation before becoming operative. Section 6 of the Act sets out matters of national importance which the council is required to recognise and provide for and these include "*the protection of ... significant habitats of indigenous fauna*"¹ including that of marine mammals.

Policy 11 of the New Zealand Coastal Policy Statement, which provides more direction on what needs to be addressed in regional coastal plans, requires councils to protect indigenous biological diversity in the coastal environment. This includes avoiding adverse effects of activities on indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists. Several marine mammals, including the Bryde's Whale, are listed as 'nationally critical' and therefore fall within this provision. No such regional coastal plans currently address ship strike issues, but Environment Southland has included rules in its regional coastal plan to control vessel traffic in Fiordland.

Finally, action can be taken under the Marine Mammals Protection Act. The Minister of Conservation can declare a marine mammal sanctuary and impose restrictions on vessels within the sanctuary. Alternatively regulations could be promulgated under the Act to address ship strike. No controls have been placed on vessel movements under this legislation to address ship strike.

Despite the array of regulatory tools available to address the ship strike issue, none have yet been deployed. Some of the possible reasons for this lack of action are outlined below.

No obligation to act

Addressing ship strike under the Marine Mammals Protection Act and the Maritime Transport Act is discretionary, and there is no obligation placed on the Ministers of Conservation and Transport respectively to take action. In fact, whilst the Marine Mammals Protection Act specifically requires the Department of Conservation to take responsibility for the rescue or recovery of stranded marine mammals, and the Department invests considerable resource in doing so, it does not require that it act to protect marine mammals from incidents likely to cause them to strand.

Taking action requires the expenditure of scarce organisational resources, often by redirecting them from other activities, and is also likely to result in conflict and enhanced political risk. This means that the incentives not to act are strong, and action may therefore not be forthcoming in the absence of any statutory compulsion to do so. For example, scientists have resorted to such tactics as embarrassing the Government at the International Whaling Commission, in order to prompt action which was not otherwise forthcoming despite clear scientific evidence of a problem.²

Arguably there is an obligation on the Auckland Council to act to address the Bryde's whale ship strike issue. The council is required to prepare a regional coastal plan, and the New Zealand Coastal Policy Statement requires the council to avoid adverse effects on the Bryde's whale (being a threatened species). The Coastal Policy Statement came into force on 4 November 2010 and councils are required to give effect to it 'as soon as practicable' including by amending their regional coastal plans if required to do so. Despite this obligation, the Auckland Council has yet to act on the issue. The Council is in the process of developing a new unitary plan, which will include the regional coastal plan, and this provides an opportunity to include rules to address the issue. However, it is as yet unclear whether the Council will do so.

No one agency has responsibility for the issue

Several agencies could potentially manage vessel strike issues but no one agency has clear overall responsibility to do so. This means that each agency can argue that it is not them, but one of the others, which should take action (and incur the costs and political risks of doing so). Arguably the Department of Conservation is

the lead agency on marine mammal issues, but to date the Department has been reluctant to deploy the tools under the Marine Mammals Protection Act to address whale strike issues, on the basis that there are other tools available.

No purpose-designed tools available

No legislation specifically contemplates the issue of ship strike and therefore provides purpose-designed tools to address it. The Maritime Transport Act, which is designed specifically to manage vessel activities, is primarily focused on ship safety rather than conservation issues. Regional coastal plans under the Resource Management Act are primarily designed to manage the impacts of new activities establishing in the marine area, rather than national and international shipping movements. The Marine Mammals Protection Act primarily addresses the deliberate ‘take’ of marine mammals. It does not adequately manage activities which cause unintentional injuries or deaths to marine mammals. Each of the tools available is therefore rather ‘clunky’ and not entirely suitable for the job required.

Conclusion

Ship strike is potentially threatening the long-term viability of the Bryde’s whale population in the Hauraki Gulf. However, no action has yet been taken to address this issue. The inaction is due to a range of factors including a lack of obligation on statutory authorities to act (and strong countervailing incentives not to act), no one agency having the clear responsibility to address the issue, and the lack of any purpose-designed tools which can be deployed.

Endnotes

1. Section 6(c), Resource Management Act 1991
2. See e.g. Behrens S and R Constantine, 2008 and Lusseau D *et al*, 2006

chapter nine



Addressing Aquaculture Impacts

Introduction

Several dolphin species in New Zealand live in shallow coastal waters which are also the preferred location for aquaculture. This creates the potential for conflict, as marine farms effectively exclude the dolphins from the portions of the marine area which are occupied by the farms. To date this conflict has been greatest in Marlborough Sounds, an area which has the bulk of New Zealand's mussel farms and which is also frequented by large numbers of dusky dolphins.

Aquaculture is managed by regional councils under the Resource Management Act. This is primarily through the inclusion of provisions in regional coastal plans. Section 6(c) of the Act requires decision-makers to protect 'significant habitats of indigenous fauna', which includes excluding activities such as aquaculture from marine mammal habitats if necessary. This can be achieved through including restrictive rules in the regional coastal plans or attaching conditions to resource consents.

The legal and policy framework for aquaculture management has changed significantly over time. Originally, under the Resource Management Act, marine space was allocated to marine farms on a first-come first-served basis. This generated a 'goldrush' where numerous resource consent applications were lodged in order to claim large areas of marine space. This prompted government to put in place a moratorium on the lodging and processing of resource consents for aquaculture, to enable councils to put in place a stronger planning framework to manage the activity. This was to be achieved through the creation of aquaculture management areas in regional coastal plans, with the provision that no applications could be made for marine farms outside these areas.

The new policy brought the 'goldrush' to a halt, but councils struggled to identify and incorporate the aquaculture management areas into their plans. This meant that the marine farming industry was unable to expand significantly, as it could only access new space which had been established prior to the aquaculture management area regime coming into force. Wishing to promote the growth of the industry, government then changed the rules again, providing that applications for marine farms would be treated in the same way as other activities and would not require specific planning zones. The government also sought to encourage councils to actively promote the growth of the industry. One of the mechanisms used to achieve this was the incorporation of provisions in the New Zealand Coastal Policy Statement, which requires councils to include in regional policies and coastal plans 'provision for aquaculture activities in appropriate places in the

coastal environment’ and to take into account ‘the social and economic benefits of aquaculture.’

The Marlborough Sounds Resource Management Plan seeks to manage aquaculture through the identification of two coastal zones: one where aquaculture is a prohibited activity and another where it is a discretionary activity subject to compliance with a set of standards. Farms which do not comply with these standards become non-complying activities. The standards require no part of the farm to be located closer than 50 metres or further than 200 metres from mean low water mark. This therefore effectively excludes the establishment of mid-bay farms. The plan provisions make no mention of the potential impacts of marine farms on marine mammals and the provisions were not developed with marine mammals in mind. When addressing the impacts of aquaculture on marine mammals, the Environment Court has criticised the provisions of the plan as being too woolly and difficult to apply.

Although mid-bay farms in Admiralty Bay have been turned down on the basis of the section 6(c) requirement to protect significant habitats of the dusky dolphins, these decisions were made before the promulgation of the 2010 New Zealand Coastal Policy Statement, which contains stronger support for aquaculture. It is therefore unclear how this will shift the relative importance of aquaculture versus the dusky dolphins in future decision-making.

Some of the weaknesses in the current approach to address the impacts of aquaculture on marine mammals under the Resource Management Act are set out below.

Marine mammals issues not specifically addressed in the Resource Management Act

The Resource Management Act does not specifically mention or address marine mammal conservation issues. There is no presumption in the legislation that marine mammals should be protected. In addition, when it comes to conservation issues the focus in the legislation is on the protection of habitats, rather than on species or individual animals themselves. This is quite different to the approach taken by the Marine Mammals Protection Act which specifically focuses on protecting individual marine mammals, with habitat protection through the establishment of marine mammal sanctuaries, being a tool through which this can be achieved.

New Zealand Coastal Policy Statement fails to protect non-threatened marine mammal species

The New Zealand Coastal Policy Statement provides strong direction for the protection of threatened species, on which adverse effects must be avoided, but no specific protection for marine mammals such as the dusky dolphin which are not currently threatened. In addition, it also provides no specific guidance of relevance to the protection of Admiralty Bay as an important habitat for the dusky dolphin. For example Policy 11(b) includes a requirement to ‘avoid significant effects and avoid, remedy or mitigate other adverse effects of activities’ on a range of matters. These include such matters within the coastal environment as:

- Areas of predominantly indigenous vegetation (seems primarily targeted at terrestrial coastal environments and not relevant to Admiralty Bay);
- Habitats that are important during the vulnerable life stages of indigenous species (not relevant to the dusky dolphin use of Admiralty Bay as it is mainly adult males who use the area for feeding);
- Habitats of indigenous species that are important for recreational, commercial, traditional or cultural purposes (dusky dolphins are not used for these purposes in Admiralty Bay);
- Habitats, including areas and routes, important to migratory species (not clear if this would apply to the dusky dolphins movement from Kaikoura to Admiralty Bay, but seems targeted at migratory whales).

When this lack of protection for the dusky dolphins is considered in the context of specific support provided for aquaculture in policy 8, it is evident that the New Zealand Coastal Policy Statement fails to ensure that adverse impacts of aquaculture on the dolphins are addressed.

Regional coastal plan fails to specifically address impacts of aquaculture on marine mammals

The provisions of the Marlborough Sounds Resource Management Plan relating to aquaculture do not mention potential impacts on marine mammals, and they were not developed with such impacts in mind. This has meant that, when considering impacts of mid-bay farms on the dolphins, the Environment Court

has had to primarily rely on section 6(c) of the Resource Management Act, rather than on any guidance providing by the planning document.

In addition, the area of Marlborough of most importance to the dusky dolphins (Admiralty Bay) is zoned under the plan as potentially suitable for aquaculture. The plan contains another marine zone which excludes marine farms by categorising them as a prohibited activity, but this zone has not been deployed to protect the dolphins, being primarily focused on landscape issues.

In contrast to the situation in Marlborough, proposed Plan Change 4 to the Northland Regional Coastal Plan does refer to the Maui's dolphin. In the matters identified for consideration in the establishment and development of aquaculture management areas and aquaculture activities, the document states that *"AMAs and any aquaculture activities should have no adverse effects on ... the management purpose or objectives of ... any area for which fisheries restriction methods have been established under the Fisheries Act 1966 and Regulations, including any Maori Oyster Reserve or set netting ban ... [and] areas of the coastal marine area where a Marine Mammal Sanctuary has been established."* The explanation to this policy goes on to identify the set net ban to protect the critically endangered Maui's dolphin and the need to take this into account when considering aquaculture activities.

The proposed Plan Change also states that *"AMAs and any aquaculture activities should have no more than minor adverse effects on ... species ... that are rare or endangered"* and *"should avoid significant adverse effects on ... significant migration routes, breeding, feeding or hauling out areas for marine mammals"*.

Conclusion

No specific protection is provided for the dusky dolphins under the Resource Management Act, the New Zealand Coastal Policy Statement or the Marlborough Sounds Resource Management Plan. The Marlborough Sounds Resource Management Plan specifically provides for aquaculture in Admiralty Bay close to shore, and mussel farms have been permitted to establish right around the fringe of the Bay, in areas that were thought to be previously utilised by the dusky dolphins. To the extent that resource consents have been turned down to protect the dolphin's mid-bay habitat, this has relied on the broad reference to habitat protection in section 6(c) of the Act, rather than on any provisions in the Council's plan. Protection for the dolphins may have been further weakened by new provisions in the New Zealand Coastal Policy Statement specifically designed to support the growth of the aquaculture industry.

chapter ten



Key Issues

Introduction

Before considering specific matters related to strengthening the legal and policy regime governing human interactions with marine mammals, there are several broader issues which must be considered. These include whether there should be continued protection for marine mammals; if so whether they should continue to be protected under special legislation, and which agency should administer marine mammal matters. These issues are discussed in the sections below.

Should there be continued protection for marine mammals?

The existence of the Marine Mammals Protection Act means that all marine mammals are 'protected' irrespective of their conservation status, and they are managed according to different criteria than other species. The Act was developed at a time when the 'Save the Whale' movement was in full swing and anti-whaling sentiment was high. There was also a growing affinity with dolphins as a result of the 'Flipper' movie and television series, which screened during the 1960s, and showed the close relationship between a bottlenose dolphin and a young boy.

Human interactions with lone dolphins which have sought human company also illustrate the special relationship that New Zealanders have with these marine mammals. When the bottlenose dolphin 'Opo' appeared in Hokianga harbour in 1955, thousands of New Zealanders drove to the small remote Opononi township to see the dolphin for themselves. When in 2007, the bottlenose dolphin 'Moko' appeared off the Mahia Peninsula, there was a similar phenomenon where thousands of people sought to interact with the dolphin. In both cases, when the dolphin died, there was a national outpouring of grief.

The frequent stranding of whales and dolphins has also helped to cement the close relationship between New Zealanders and these animals. Around 700 marine mammals strand each year around New Zealand's coast, with the most common species being the long finned pilot whale, sperm whale, false killer whale, pygmy sperm whale, Gray's beaked whale and the common dolphin. At many of these strandings, Project Jonah mobilises a network of volunteers who assist with keeping the animals alive and refloating them. Often the animals are stranded for many hours, and close bonds develop between them and their rescuers, who often talk and sing to them, and stroke their bodies.

It is clear that marine mammals in New Zealand continue to be seen as iconic and important species. Many are highly intelligent creatures, with complex societies and cultures that are passed on down the generations. Along with the great apes, some marine mammals are probably the closest species to humans, in terms of intelligence and sociability.¹ It may be this reason that many people feel a special bond with them.

Furthermore, marine mammals are subject to a range of serious threats which need urgent attention. Many marine mammal species are in decline and some are critically threatened. Public discourse on marine mammal protection very rarely documents opposition to the principle that marine mammals should not be killed, even amongst those involved in activities which threaten them. Rather, opposition to protection measures generally focuses on the significance of the threat to marine mammals caused by the activity in question, whilst the need to protect them remains broadly accepted.²

New Zealand also has obligations under international agreements including the Convention on Biological Diversity to protect indigenous biodiversity, which includes species diversity. These obligations have been expressed in part in the New Zealand biodiversity strategy 2000, which includes the following objectives

- *Protect and enhance populations of marine and coastal species threatened with extinction, and prevent additional species and ecological communities from becoming threatened.*³
- *Protect a full range of natural marine habitats and ecosystems to effectively conserve marine biodiversity, using a range of appropriate mechanisms, including legal protection.*⁴

In our view there is a compelling case to continue to protect marine mammals in New Zealand waters and the recommendations that we have developed are based on this underlying premise.

Should marine mammals be protected under special legislation?

Arguably, the management of threats to marine mammals should be undertaken within broader wildlife legislation which addresses all protected species. There are good arguments which can be made for having separate legislation for marine

mammals, because of their particular history (sealing and whaling), and the special relationship that New Zealanders have with them.

However, there appears no particular reason why these considerations could not be reflected in broader legislation. For example, in Australia, marine mammals are managed under the broader Environment Protection and Biodiversity Conservation Act 1999. In that case, cetaceans have their own chapter and this provides for additional protective measures through the establishment of the Australian whale sanctuary. In New Zealand, other species (such as seabirds) are managed under the Wildlife Act 1953, which contains similarities to the Marine Mammals Protection Act including a presumption in favour of protection and provision for the development of population management plans.

Although incorporation of marine mammal protection into a broader review of wildlife legislation remains an option for the future, there is no current proposal to conduct such a review. As a result, the recommendations in this report are focused on amendments to the Marine Mammals Protection Act. However, similar provisions to those recommended could be incorporated into broader wildlife legislation if this was to eventuate at some stage in the future.

Which agency should be responsible for marine mammal protection?

Currently the Department of Conservation is the lead agency for marine mammal issues. A key issue to be considered is whether the Department should continue to hold this role, or whether it might be better undertaken by another agency, and in particular one more focused on marine issues.

As well as administering the Marine Mammals Protection Act, the Department has a broader role in conservation, through its functions under the Conservation Act 1987. These include the management of, and advocating for, the conservation of natural resources. The Department also advises the Minister on approving regional coastal plans which provide the management framework for coastal activities which may impact on marine mammals.

The Department has been very active in species conservation work, particularly for endangered birds, and has achieved notable successes such as the recovery of the kakapo. As a result, the Department currently holds the majority of the government's knowledge and expertise in species conservation as well as in marine mammals protection.

However, the Department has reduced its capacity to undertake marine conservation work in recent years, choosing to focus its efforts more strongly on terrestrial matters. There is currently only one staff member in head office working as a marine mammal scientist (who has expertise in sea lions). The Department is also adopting a more hands-off approach to marine issues, such as through developing information management tools, rather than proposing marine reserves (see Appendix 1). In addition, the Department has largely left fisheries impacts on marine mammals to be managed by the Ministry for Primary Industries, despite having stronger tools available to do so under the Marine Mammals Protection Act.

Other agencies which have jurisdiction in the marine area, and therefore which could potentially take over the role of marine mammal management, include the Ministry for Primary Industries, the Environmental Protection Authority, Maritime New Zealand and regional councils. However, in our view, none of these agencies are well placed to do so.

The Marine Mammals Protection Act was originally administered by a predecessor of the Ministry for Primary industries (Ministry of Agriculture and Fisheries) prior to the Department of Conservation taking it over in 1987. During the mid-1980s, scientists undertaking the research that revealed the plight of the Hector's dolphin, which were dying in large number in set nets, reported their findings to the Ministry of Agriculture and Fisheries. But the agency showed little interest in the issue and took no action. Once a conservation-orientated agency had taken charge of the Act there was a marked change in approach. The Banks Peninsula marine mammal sanctuary was created the year following the establishment of the Department of Conservation. The current Ministry for Primary Industries, as the name suggests, is primarily focused on the welfare of primary industries in New Zealand including fishing rather than conserving protected species. Thus, marine mammal protection does not easily fit within its portfolio.

None of the other agencies appear particularly suitable for the task. Maritime New Zealand has expertise in shipping, not species conservation. The Environmental Protection Authority is largely focused on processing complex resource consent applications, and this focus is likely to continue when its jurisdiction extends to the Exclusive Economic Zone. Regional councils lack the national presence which is required to address marine mammal issues which typically span multiple regions.

As such, we have concluded that the management and conservation of marine mammals is most appropriately undertaken by the Department of Conservation. However the Act needs to be strengthened so that the Department is empowered to act efficiently and decisively to protect marine mammals. It will also require new or reallocation of investment to ensure that the Department has adequate resources available to be able to fully discharge its functions. If the legislation *required* the Department to act to protect threatened marine mammal species (for example by developing threat management plans) this would help incentivise the Department to allocate a larger proportion of its budget to these responsibilities.

Endnotes

1. See e.g. Roth G and U Dicke, 2005
2. See e.g. Ingram K, undated, 'Own up! Who's killing the Maui dolphins?', *Professional Skipper*, in which he stated "*no one likes to or wants to catch a marine mammal in their set nets*" and Taranaki commercial fishermen and processing companies spokesman Keith Mawson "*We're not trying to hide anything here. We want to see the Maui's dolphin population grow and recover*" quoted in J Anthony, 2011, 'Set nets 'not to blame' for dolphin loss', Stuff, 11 April
3. Objective 3.6, New Zealand Biodiversity Strategy 2000
4. Objective 3.7, New Zealand Biodiversity Strategy 2000

chapter eleven



Proposals for Amendments to the
Marine Mammals Protection Act 1978

Introduction

This chapter sets out proposals for amendments to the Marine Mammals Protection Act. These are aimed at strengthening protection for marine mammals and at improving the effectiveness of the current management framework. They draw on the extensive case studies contained in Part Two of this report and the analysis of weaknesses in the current regime undertaken in previous chapters.

It has been over 30 years since the Marine Mammals Protection Act came into force. Despite this long time period, our analysis has indicated that the legislation is in large part still sound. However, some aspects of the legislation do urgently require updating, to reflect current scientific understandings and management experience. These aspects are discussed below. Our recommendations for legislative amendment are summarised in Chapter 12.

Purpose

There is no provision in the Marine Mammals Protection Act setting out the purpose of the legislation. However, policy 4.4 (f) of the Department of Conservation's General Policy provides that "*protected marine species should be managed for their long-term viability and recovery throughout their natural range.*"¹ It would be helpful for the legislation to set out its purpose clearly, and suitable wording could be developed, based on this policy. For example, a new purpose clause could state:

The purpose of this Act is to protect marine mammals within New Zealand waters and to promote their long-term viability and recovery throughout their natural range.

Treaty provision

There is no explicit Treaty provision in the Act. While the Act is administered by the Department of Conservation, the Treaty provisions of section 4 of the Conservation apply, which state that "*This Act shall so be interpreted and administered as to give effect to the principles of the Treaty of Waitangi.*" However, explicit inclusion of this provision in the Marine Mammals Protection Act would provide protection consistent with other relevant legislation.

Marine Mammals Recovery Plans

A particular problem with the current management approach is its apparent inability to address multiple stressors or cumulative impacts over time. Many marine mammals are subject to a range of human-induced stresses, the relative importance of which is not fully understood. Cumulative impacts may become apparent only over many years. The current management approach is to study population decline until there is clear evidence that one activity or the other is causing the problem, and then to act, by which time it may be too late.

A better approach would be to adopt a more holistic decision-making framework, using a management plan (which could be called a marine mammals recovery plan) developed through a statutory process. To help to ensure that the plan is effective, decisions made under other legislation should be required to give effect to the plan, so that it operates in a similar manner to national policy statements under the Resource Management Act which flow out to decision-making by all local authorities.

Population management plans were intended to achieve this objective, but they have proved unworkable in practice. The Department of Conservation has attempted to draft alternative 'threat management plans', but these have often lacked clear goals, have become narrowly focused on one issue (such as fisheries bycatch or vessel interactions) and their non-statutory status has made the achievement of their goals more difficult.

Requirement to prepare recovery plans

Currently, there is no compulsion for the Department of Conservation or the Ministry for Primary Industries to act to implement measures to protect marine mammals. As a result, management response can be very slow or not occur at all. We consider that the adoption of a mandated process by which the Department of Conservation is *required* to develop management plans would ensure that protection measures are identified and implemented in a timely way. Such an approach may also limit the potential for conflict amongst stakeholders, as there would be no longer any room for argument about whether a plan should be prepared.

The development of a recovery plan could be made compulsory for all marine mammal species which fall into the threatened category in the Department of Conservation's threat classification system. This is not to suggest, however, that management action should be delayed until plans are prepared.

Scope of plans

Plans should be required to set out an assessment of all human-induced threats to the species in question including direct and indirect fishing-related mortality. Management plans should be able to recommend a range of management actions to achieve species recovery, including, for example restrictions on fishing methods, the protection of important habitats, and ensuring the availability of food sources. The plan should set out a flexible, biologically appropriate timeframe for recovery of the population, as proposed in the Department of Conservation's 2010 discussion paper on population management plans.²

Process for plan preparation

The process for establishment of a population management plan should be simplified and streamlined, for example along the lines of the board of inquiry process used in the consideration of matters of national significance under the Resource Management Act. Key features of this process are the review of the draft plan by an independent body and a public hearing where submitters are heard and can present evidence in support of their submissions. The independent body should be made up of expert members, with a judicial chair. Further appeals could be made on points of law only.

A proposed process is set out in Figure 11.1. In this process the Minister of Conservation could make a final decision without requiring concurrence from the Minister for Primary Industries. Some of the current difficulty in finalising population management plans is as a result of the concurrence requirement. The independent board of inquiry process provides an alternative means through which any concerns of the Ministry for Primary Industries and the fishing industry about provisions in the plan, can be fully taken into account externally to the Department of Conservation.

Providing for sole decision-making power should considerably speed up the process and is consistent with the principle that the power to make a decision should be aligned with the person who has accountability for the outcome of that decision.

Effect of plans

Where relevant, decision making in respect of activities managed under other legislation such as the Resource Management Act, the Fisheries Act and the Maritime Transport Act should be required to give effect to the Marine Mammals

Recovery Plans. This will enable the plans to address the full range of threats in an integrated manner.

Figure 11.1 Current and proposed process for preparing statutory marine mammal plans

Current	Proposed
1. Consultation with Conservation Boards, Māori and environmental, commercial and recreational organisations	1. Consultation with Minister for Primary Industries, Māori and environmental, commercial and recreational organisations
2. Draft PMP prepared by Director General (Draft 1)	2. Policy paper prepared by Minister of Conservation setting out plan options and recommending a preferred option for the plan (Draft 1)
3. Publicly notify draft PMP. Submission period of at least 40 working days	3. The Minister appoints a board of inquiry which calls for submissions within 20 working days
4. Hearing before Director General of Conservation	4. Board of inquiry holds a public hearing
5. Director General prepares summary of submissions and public opinion	
6. Director General may revise draft (Draft 2)	
7. Draft and summary of submissions sent to Minister for Primary Industries and to New Zealand Conservation Authority	
8. New Zealand Conservation Authority provides comments to Director General and Minister of Conservation	5. After considering the submissions and other relevant information, the board of inquiry prepares a written report and recommendations for the Minister of Conservation
9. Director General may revise draft (Draft 3)	
10. Director General sends draft PMP to Minister of Conservation	
11. Minister of Conservation approves draft PMP and refers draft PMP to Minister for Primary Industries for concurrence	6. The Minister of Conservation considers the report and recommendations and may revise the preferred option (Draft 2) . Minister of Conservation approves plan.
12. Minister for Primary Industries concurs with draft PMP	
13. PMP approved	7. Plan approved

Marine mammal sanctuaries

A key tool available to the Department of Conservation in order to manage the impact of activities on marine mammals is the marine mammal sanctuary. The legislation does not set out a definition of the term ‘marine mammal sanctuary’, establish its purpose, nor provide any requirements for the level of protection that the sanctuary should provide. The Oxford English Dictionary definition of the term ‘sanctuary’ is *“a place providing refuge or safety from pursuit, persecution, or other danger”*.

Equally, the Marine Mammals Protection Act lacks any specific rule-making provision (apart from the general regulation-making power) which enables the Department of Conservation to directly control activities impacting on marine mammals outside sanctuaries. This is quite different, for example, to the situation under the Maritime Transport Act where the Minister of Transport can directly promulgate maritime and marine protection rules.

This means that if the Department wishes to directly control an activity such as seismic surveying, without making new regulations, it has to declare a marine mammal sanctuary first and then attach rules to it. Thus in practice, marine mammal sanctuaries have been used to manage specific threats in particular areas, (specifically the threats posed to Hector’s and Maui’s dolphins by seismic surveying and mining) rather than to provide for areas where marine mammals have real ‘sanctuary’ and are protected from all threats to the extent possible.

The arrangement undermines the sanctuary concept, and requires the Department of Conservation to consider the use of a broad tool where targeted measures would be more appropriate, were they available. We suggest that there needs to be clarity over the purpose of marine mammal sanctuaries and that an additional tool needs to be provided to address specific activities (which is described in the next section).

Purpose

The legislation should set out the purpose of marine mammal sanctuaries and make it clear what they are intended to achieve. In our view, marine mammal sanctuaries should be areas where marine mammals are protected from all threats, to the extent possible. They should also be used to protect critical marine mammal habitat. Critical habitat may include the following areas:

- Areas regularly used for feeding, breeding, calving, nursing and social behaviour
- Migration routes and corridors and related resting areas
- Areas where there are seasonal concentrations of cetacean species
- Areas of importance to cetacean prey
- Oceanographic processes that support continued productivity of cetacean foraging species (upwellings, ocean fronts)
- Topographic structures favourable for enhancing foraging opportunities for cetacean species (such as seamounts and canyons)³

Establishment process

The establishment process could remain largely as it is with one key amendment: currently the establishment process does not require the Minister of Conservation to consult with other Ministers, despite the fact that decisions made under this provision could have significant impacts on the work of other ministries. It would therefore be appropriate to require the Minister of Conservation to consult with other relevant Ministers during the establishment process, although the final decision to establish the sanctuary should rest with the Minister of Conservation.

Prospective marine mammal sanctuaries could be initially identified as part of processes designed to identify marine protected areas or those for marine spatial planning.

Marine Mammals Protection Measures

As indicated above, we consider that a new tool should be introduced which enables the Department of Conservation to establish targeted regulation of particular activities to protect marine mammals. The legislation could provide for new 'Marine Mammals Protection Measures' to achieve this. Such measures could be adopted by the Minister of Conservation after a public consultation process. This approach could be used to establish vessel speed limits in areas where whales are at risk of ship strike (such as the Hauraki Gulf), rules related to fishing practices, seismic activity, noise, habitat competition and any other activity which poses a particular threat to marine mammal populations in a specified area.

An alternative approach would be for such matters to be addressed through the promulgation of new regulations, which is already provided for under the Act. This approach has the advantage of avoiding the addition of new complexity to the Act. Furthermore, it may be argued that the use of regulations creates a management measure with more substance, as regulations must be made by the Governor General by Order in Council, rather than by a lesser authority.

On the other hand, the development of regulations is time consuming and challenging, and once they are made they are difficult to alter. This is illustrated by the fact that the existing Marine Mammals Protection Regulations have not been updated since 1992, despite a well-recognised need to do so. The proposed 'Marine Mammals Protection Measures' could be easier to establish and more flexible, and thus particularly useful in circumstances where adaptive management is appropriate. They could also be more easily tailored to recognise the different needs of regions and species.

Bycatch provisions

Bycatch is implicated in the decline of a number of marine mammal species. Despite this, the current legislative regime contains an implicit suggestion that bycatch of marine mammals is generally acceptable. This approach does not create an incentive for fishers to reduce bycatch. Even if a limit on bycatch is established, fishers are not encouraged to reduce bycatch beyond the limit.

Currently, attempts to manage bycatch under both the Marine Mammals Protection Act and the Fisheries Act are focused on the identification of an amount of bycatch that can be sustained by the marine mammal population. In all cases, the available data is insufficient to allow an accurate assessment of an appropriate bycatch limit. Specifically, we do not have sufficiently accurate data on the size of marine mammal populations, bycatch rates, or the influence of other factors on the population to enable accurate assessments to be made.

These uncertainties have meant that where limits have been set, much management effort and industry resource has focussed on debating the merits of and further developing the model used, rather than focusing on actually reducing bycatch. Also, threatened species which have been subject to bycatch are still in decline, so the approach does not appear to have worked.

We consider that a new approach to the management of bycatch is required. One possibility is to develop a management framework loosely based on the

USA system, where the legislation contains a presumption against the taking of bycatch. Fisheries which are known to take marine mammal bycatch must reduce bycatch each year, with the goal of reducing bycatch to insignificant levels within a specified timeframe.

It could be argued that some bycatch is inevitable and that therefore such an approach is unrealistic. However, the fishing industry itself has stated that it has been able to reduce bycatch to insignificant levels. For example, sea lion exclusion devices used on squid trawls are claimed by the industry to have reduced sea lion deaths to minimal levels.⁴

A variation on the USA arrangement may be worth investigating for New Zealand. Such an approach would remove the need to develop complex models seeking to identify an appropriate level of bycatch, through providing a simple requirement that fishers reduce bycatch rates over time. They can achieve this either through the use of available technology, or through the development of new technology, such as occurred with the sea lion exclusion device. Resources that would have been spent on modelling exercises to determine how many animals can be killed, can be instead focused on developing solutions to reduce the mortality rate.

The Act could set out a management goal to reduce all bycatch to no more than minimal levels over time. A risk assessment of each fishery would ascertain the risk the fishery poses to marine mammals. Fisheries posing a high risk would be required to obtain a bycatch permit and would need to demonstrate each year what measures have been taken to reduce bycatch towards zero.

For non-threatened species, there could be no time limit on this goal, only a year-on-year reduction would be required. In this case the obligation to reduce bycatch to minimal levels would be aspirational with no fixed end point. The most important factor would be that continual improvements are made over time. For threatened species, the time limit could be five years, and for critically threatened species with small populations, the measure could be required sooner, in accordance with a statutory Marine Mammals Recovery Plan.

Greater levels of observer coverage (which may include newer technology such as surveillance cameras) would be required to confirm levels of bycatch in each high risk fishery. Financial penalties for failing to reduce bycatch could be set.

Marine Mammals Protection Regulations

New Zealand's marine mammal tourism regulations are among the world's best. However, they have failed to keep in step with developments in knowledge about the impacts of marine mammal tourism and have some practical problems which would be best addressed through amendment. In our view the Marine Mammals Protection Regulations should be updated as a matter of urgency to reflect the current state of knowledge about marine mammal tourism, the potential impacts of marine mammal interactions, and overall should reflect a renewed commitment to the precautionary approach. This is to ensure that high international reputation of New Zealand's marine mammal tourism industry is maintained and that the industry can continue to flourish in the long-term. We have proposed some specific amendments below.

Rules applying to marine mammal interactions

The rules applying to marine mammal interactions need to be reviewed and updated. They should be clear, appropriate and enforceable. In addition, experiences from around New Zealand indicate that the rules do not always fit well with the varying circumstances in which marine mammal tourism operates. Accordingly, it would be appropriate to allow for regional and species variations in the rules which apply. Provision should be made for a review of the rules after a specified period to ensure that they are working as intended.

Requirement to hold a marine mammal tourism permit

A problem identified during this research, is that marine mammal tourism permits are only required for commercial vessels which are specifically targeting marine mammals. Thus, those operating 'wilderness tours,' water taxis and other commercial operations are not required to obtain a permit. Some conservancies have opted to issue permits to these operators essentially on a 'goodwill' basis although, as evidenced in the 2011 case in the Nelson District Court, these are effectively unenforceable.

The definition of 'commercial operator' in the regulations should be extended to cover all commercial operators which approach marine mammals, rather than just those who run trips with the purpose of viewing or interacting with marine mammals. Thus, any commercial vessel (or aircraft) would not be permitted to approach marine mammals unless they hold a marine mammal tourism permit.

In instances where an approach is disputed, it would be the responsibility of the operator to provide evidence that they did not change course in order to move closer to the marine mammal.

Issue of marine mammal tourism permits

All permits for operators targeting the same marine mammal populations, or for those operating in the same area, should be issued together in cycles over a specified period. This is so that the impact of tourism can be evaluated against monitoring and research data, and management measures updated as global best practice evolves. A five-year cycle for evaluation would promote timely responses to change (such as in environmental effects, community support and visitor satisfaction) whilst providing enough time for the collection of sufficient monitoring data to influence decision-making. If permits are granted for longer periods (such as the existing ten year maximum) it may be more difficult to make changes to permit conditions, as they will have become entrenched.⁵

As a result of this proposed new system, at the beginning of each five-year cycle, a specified number of marine mammal permits would be available in respect of marine mammal viewing in a particular area. At the end of each five-year cycle, decisions about whether to increase or decrease the number of available (i.e. renew existing or grant new) marine mammal permits should be taken on the basis of the available monitoring and research data. This system is employed, in effect, in some areas where moratoria on new permits have been established

Conditions attached to permits

To avoid uncertainty, and to broaden the Department of Conservation's power to regulate commercial marine mammal tourism, the regulations should provide for a list of matters in relation to which the Department of Conservation may attach conditions to permits – for example in relation to the following:

- Visitor numbers
- Trip numbers
- Swimmer numbers
- Number of approaches to marine mammals
- Length of interaction
- Vessel behaviour around specific species

- Vessel type (e.g. vessels with quiet motors must be used)
- Reporting (e.g. requiring GPS on board in order for the Department of Conservation to track routes)
- Educational content of interpretation – currently the regulations provide that tours should have ‘sufficient’ educational value which is vague. Instead there should be specific requirements about the level and quality of information that the tour operators must provide to customers.
- Specific training for marine mammal tourism operator staff

Levies on permit holders

In some conservancies, marine mammal permit holders must pay a levy (e.g. per passenger) which is used to fund research into the impacts of marine mammal tourism activities in the area in question. Formalisation of this arrangement in the regulations would reflect the user pays approach and would ensure that the Department has a funding stream which can be contributed towards ongoing research.

Monitoring and enforcement

More resources need to be invested in the monitoring of compliance with the regulations, using the secret shopper method and any other forms of monitoring (e.g. shore based monitoring) that are appropriate in the particular area in question. Work should be undertaken to establish automated methods of collecting data (for example the use of GPS tracking devices). More resources should also be invested in general monitoring of vessel behaviour around marine mammals, particularly during key tourism seasons e.g. the summer holidays.

Amendments to the regulations should make it easier for marine mammal viewing permits to be revoked where the regulations are breached and make it easier for breaches of the regulations to be prosecuted.

Cetaceans in captivity

To bring the Act into line with current Department of Conservation policy, the Act should be amended to clearly state that the holding of cetaceans in captivity,

or export or import of live cateceans, is prohibited except where essential for the conservation management of the species.

Marine mammal science

New Zealand's marine mammals have been studied for many years, but we still know little about them, and there remains a paucity of information on which to base management responses. In addition, science has often been at the heart of conflicts over marine mammal management issues. There have been disputes between marine mammal scientists themselves, between scientists and managers, and between scientists and stakeholders.

The study of marine mammal populations is particularly challenging because they are long-lived, slow-growing species, so changes in the population may take many years to become apparent. Equally, they inhabit an environment which is difficult and expensive to study and which in many cases is subject to multiple stressors. Nevertheless, there are measures which could be taken to improve the way that science supports the management framework.

Part of the reason for the lack of adequate science to support decisive management decisions, has been a paucity of funding available for research. The conservation services levy and the marine mammal tourism levy fund some research on fishing and tourism respectively. The Department of Conservation has also supported a small amount research from its core funding. But in most cases there has been no other readily available funding source to study matters not directly related to these activities, or cumulative impacts of a range of activities.

Furthermore, a significant proportion of the research undertaken on marine mammals has been undertaken by Masters and PhD students as part of their degree studies. This has enabled the research to be undertaken on a very cost-effective basis, but has meant that it has had to fit within the university academic structure, and also with the personal preferences and aptitudes of the students. Individual research projects are of necessity short-term, so that they fit within the timeline of the specific degree sought. Different methodologies are often used between projects, making comparisons difficult. There may also be issues in respect of data ownership.

The lack of funding for marine mammal research has also meant that there are few career options for researchers. Despite New Zealand having a particularly rich variety of marine mammals in its waters, only a handful of marine mammal

scientists are on the academic staff of New Zealand universities.⁶ There are no dedicated marine mammal scientists on the staff of the Crown Research Institute which focuses on marine studies, the National Institute of Water and Atmospheric Research. The non-governmental research entity, the Cawthron Institute, employs two marine mammal scientists.⁷ In the past, the Department of Conservation employed a small team of marine mammal scientists, but this has now been reduced to one sea lion scientist.⁸

This lack of jobs has meant that there has been a constant turn-over of students involved in marine mammal research in New Zealand, with few being able to establish a career here in the field. Many PhD students focusing on marine mammal studies here are overseas students, and they typically leave the country once their thesis has been completed. As a result, much of the expertise developed through marine mammal research, is lost to the country.

A new approach is required for marine mammal research in New Zealand, so that a more coherent body of knowledge is developed over time, and so that it is sufficient to answer key management questions. This will require the development of a strategic research plan and the provision of more dedicated funding. The approach could be modelled at least in part on that taken in both Australia and the USA, which both have established government entities for marine mammal research (the Australian Marine Mammal Centre and the USA Marine Mammal Commission, respectively). A potential source of additional funding is the Ministry of Business, Innovation and Employment's investment funds which provide core research funding for Crown Research Institutes and also award funds to research organisations through annual contestable rounds.

How we manage New Zealand's marine mammal populations is of considerable national and international importance. It is therefore appropriate that 'public good' science funding should be deployed to assist with this.

Conclusion

These proposals are aimed at making it easier for government agencies to effectively manage threats to marine mammals in a strategic way. However, the effectiveness of any legislative amendments will ultimately be dependent on a commitment from government to reverse the decline in the health of our marine mammal populations. Strong leadership, cross-departmental cooperation and effective resourcing will all be key to improving our management framework.

Government departments have exhibited this type of commitment in respect of the Maui's dolphin, but only because the sub-species is on the very brink of extinction. A new approach should ensure that we do not reach this point in respect of other species.

Endnotes

1. Policy 4.4(f), Conservation General Policy (Marine species, habitats and ecosystems)
2. Department of Conservation, 2010
3. Hoyt E, 2011, 58
4. See e.g. Seafood Industry Council, 2012, 'MAF plan shows fishing innovation saves sea lions', press release, 26 March
5. Lundquist D, 2012
6. The University of Otago has 2 marine mammal scientists on its academic staff (Steve Dawson and Liz Slooten); the University of Auckland has one (Rochelle Constantine) and one 20 per cent appointment (Scott Baker); and Massey University has one academic in Albany (Karen Stockin) and two marine mammal pathologists in Palmerston North
7. Deanna Clement and Deanna Elvines
8. Louise Chilvers

chapter twelve



Recommendations

Recommendation 1: Marine Mammals Protection Act purpose

Amend the Marine Mammals Protection Act, so that it contains a clear statement of the purpose of the Act, such as the following:

The purpose of this Act is to protect marine mammals within New Zealand waters and to promote their long-term viability and recovery throughout their natural range.

Recommendation 2: Treaty clause

Amend the Marine Mammals Act to include a Treaty of Waitangi clause, such as the following:

This Act shall be interpreted and administered so as to give effect to the principles of the Treaty of Waitangi.

Recommendation 3: Marine Mammals Recovery Plans

Amend the Marine Mammals Act to replace population management plans with Marine Mammals Recovery Plans, and require them to be prepared for all threatened marine mammal species. The plans should include:

- All known threats, listed in the order of the level of risk to the population in question, including direct and indirect fishing threats
- Measures to be implemented to achieve the recovery of threatened populations within a flexible, biologically appropriate timeframe
- A strategic research plan which identifies the research required to support effective management of threats to the species

The plans should be prepared under the Marine Mammals Protection Act through a streamlined process which includes scrutiny by an independent board of inquiry and finalisation by the Minister of Conservation. All decisions under the Fisheries

Act, Resource Management Act and Maritime Transport Act should be required to give effect to the provisions in Marine Mammals Recovery Plans.

Recommendation 4: Marine Mammal Sanctuaries

Amend the Marine Mammals Protection Act to clearly state the purpose of marine mammal sanctuaries, and the level of protection that they must provide, which should include the exclusion of all threats to the extent possible.

Recommendation 5: Marine Mammals Protection Measures

Amend the Marine Mammals Protection Act to provide for new Marine Mammals Protection Measures, which enable the Department of Conservation to address specific threats to marine mammals in a flexible and timely manner.

Recommendation 6: Fisheries bycatch reduction

Establish a new regime for managing fisheries marine mammal bycatch including a new goal of reducing bycatch to minimal levels over time. The regime should include:

- Risk assessment of all fisheries to establish which pose the greatest bycatch risk
- A requirement that all high risk fishers obtain a permit to take bycatch
- A requirement that all bycatch permit holders provide evidence annually that their bycatch of marine mammals has been reduced, and if they have not already reached insignificant levels, that measures are being taken to reduce bycatch rates further
- A requirement that bycatch of threatened species must be reduced to zero within five years, with no deadline for the reduction of bycatch of non-threatened species to zero.

- Greater observer coverage with use of new technologies where appropriate
- Financial penalties where bycatch reduction targets are not met

Recommendation 7: Marine Mammals Protection Regulations

Update the Marine Mammals Protection Regulations to give effect to the current level of knowledge about the impact of marine mammal tourism including:

- Revising the rules applying to marine mammal interactions so that they are clear, appropriate and enforceable and include region and species specific rules
- Requiring all commercial operators to hold a permit if they approach marine mammals, with the burden of proof in prosecutions on operators to demonstrate that they did not change course in order to approach marine mammals
- Establishing a permitting cycle of five years in each conservancy
- Providing for a new list of matters in relation to which conditions can be attached to permits, which should include prescribing the training requirements for marine mammal tourism operator staff and the required educational content of tours
- Making explicit provision for levying commercial operators to provide a funding stream for marine mammal research
- Making explicit provision for monitoring to ensure compliance with the regulations
- Making it easier to revoke marine mammal tourism permits in the event of non-compliance

Recommendation 8: Cetaceans in captivity

Amend the Marine Mammals Protection Act to clearly state that the holding of cetaceans in captivity, and export or import of live cetaceans, is prohibited except where essential for the conservation management of the species.

Recommendation 9: Marine mammal science

Prepare a national strategic research plan for marine mammal science in New Zealand and prioritise funding to undertake the research programme in the future allocation of the Ministry of Business, Innovation and Employment's investment funds.

PART TWO

Case Studies



chapter thirteen



USA Approaches to
Marine Mammal Protection

Introduction

The Marine Mammal Protection Act 1972 is the principal legislation under which marine mammals are protected in USA waters. The Act establishes a federal responsibility to conserve all marine mammals, and was the first legislation anywhere in the world to promote an ecosystem-based approach to marine management. The drafting of the legislation was motivated by a growing realisation that some marine mammal species and populations were under threat from human activities. In particular, there was concern about the tuna purse-seine fishery in the eastern tropical Pacific, which caught extremely high numbers of dolphins during the course of fishing.¹ Accordingly, the legislation sought to address that issue, in particular, by providing for specific regulation of purse-seine fishing activity.

In passing the Act, Congress declared that marine mammals are resources of great international significance. They should be protected and encouraged to develop to the greatest extent possible, commensurate with sound policies of resource management. The primary management objective was to maintain the health of the marine ecosystem, with the goal of obtaining an optimum sustainable population, within the carrying capacity of the habitat.

Administration of the Act is the responsibility of the Department of Commerce, delegated to the National Oceanic and Atmospheric Administration (NOAA) for cetaceans and pinnipeds except walrus, and the Department of the Interior, through the USA Fish and Wildlife Service, for all other marine mammals (including walrus, sea otter, dugongs and manatees).

Marine Mammal Commission

The Act establishes a Marine Mammal Commission which is intended to provide independent oversight of the marine mammal conservation policies and programmes carried out under the Act. The Commission has seven functions as shown in Figure 13.1.

The Commission is comprised of three members nominated by the President and confirmed by the Senate. The Act requires that the members 'are knowledgeable in marine ecology and resource management.' The Commissioners are assisted by a nine member committee of scientific advisors on marine mammals, appointed by the Chairman of the Commission after consultation with the Chairman of the

Council on Environmental Quality, the Secretary of the Smithsonian Institution, the Director of the National Science Foundation and the Chairman of the National Academy of Sciences. The Act requires that committee members also be knowledgeable in marine ecology and marine mammal affairs.

Figure 13.1: Functions of the USA Marine Mammals Commission

1. To undertake a review and study of the activities in the USA under domestic law and international rules in relation to marine mammals
2. To conduct a continuing review of the condition of the stocks of marine mammals, methods for their protection and conservation, humane means of taking marine mammals, research programmes conducted under the Act, and applications for permits for scientific research, public display or enhancing the survival or recovery of a species or stock
3. To undertake any other studies it deems necessary in connection with its assigned duties for the conservation and protection of marine mammals
4. To recommend to the Secretary and to other federal officials such steps as are necessary for the protection of marine mammals
5. To recommend to the Secretary, federal officials and Congress appropriate policy regarding international arrangements for the protection of marine mammals
6. To recommend to the Secretary revisions of the endangered species list and threatened species list as are appropriate with regard to marine mammals
7. To recommend to the Secretary appropriate policies to further the policies of the Act

Moratorium on taking marine mammals

The Act established a moratorium on the taking and importation of marine mammals and marine mammal products. The legislation was amended in 1994 to provide for some exceptions to the no-take rule (in relation to small takes incidental to specified activities, permits for scientific research, and for Alaska Natives access to marine mammals for subsistence purposes). The amendments also provided for a programme to authorise and control the taking of marine mammals incidental to commercial fishing operations and the preparation of stock assessments for all marine mammals in USA waters.

The Secretary of Commerce may issue permits for activities which may impact on marine mammals. All persons wishing to take, import or display a marine mammal in USA waters, and all USA citizens wishing to take a marine mammal on the high seas, must apply for a permit. There are a number of different types of permit, for scientific research, public display, photography, incidental take and incidental harassment. Applicants wishing to undertake activities which may impact on endangered marine mammals must also apply for a permit under the Endangered Species Act 1973. Applicants must apply to NOAA Fisheries (or to the USA Fish and Wildlife Service for walruses, polar bears, sea otters and manatees).

Applicants are required to apply for their permit at least six months in advance, or 12 months where a permit in relation to a species listed under the Endangered Species Act is required. Permits for interaction with endangered species require consultation with all relevant federal agencies. There must also be the production of a biological opinion, which is a written statement from the Secretary based on the consultation, indicating that the proposed activity is not going to jeopardise any protected species. The biological opinion will set out whether the activity should be permitted, the extent of interaction permitted and 'reasonable and prudent measures' required to minimise the impact of the activity.

Applications for all permits must be reviewed by the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals. They are also subject to a 30-day public consultation. Violation of the Marine Mammal Protection Act carries a civil penalty of more than \$1000 per violation (per marine mammal), and knowing violation of the Act carries a criminal penalty of more than \$20,000 or a period of imprisonment, or both.

Marine mammal tourism

Somewhat surprisingly, there is no permitting system for marine mammal tourism in the USA. Such activities must be undertaken in a manner that does not constitute a 'take' under the Act, which is defined to include 'harass, hunt, capture, or kill' or to attempt to do so. It is illegal to swim with dolphins or whales in the USA as this is considered to be harassment, having the potential to disrupt behavioural patterns.²

Stock assessments

Following the 1994 amendments, under section 117 of the Act, the Secretary of Commerce is required to maintain stock assessments for each species found in USA waters. The stock assessments are a means of keeping track of the health of marine mammal populations, and are used to inform decisions about whether to authorise the taking of marine mammals incidental to human activities (permitting), in the design of conservation measures, and to evaluate the progress of certain fisheries in reducing incidental mortality rates.

The stock assessments are prepared by the National Marine Fisheries Service and the USA Fish and Wildlife Service (in relation to the marine mammals for which they have responsibility). The National Marine Fisheries Service has a number of Fisheries Science Centers, each of which has a marine mammal research programme, which undertakes the research with assistance from the Scientific Review Groups and other researchers.

There are three Scientific Review Groups which are regionally based; Alaskan waters, Atlantic Ocean (including the Gulf of Mexico) and Pacific Ocean (including Hawaii). The Scientific Review Groups advise the National Marine Fisheries Service and the Fish and Wildlife Service on draft stock assessment reports, assist in the preparation of abundance estimates and population trends, and undertake any research considered necessary to better understand the health of marine mammal populations in their subject region.

Stock assessment reports

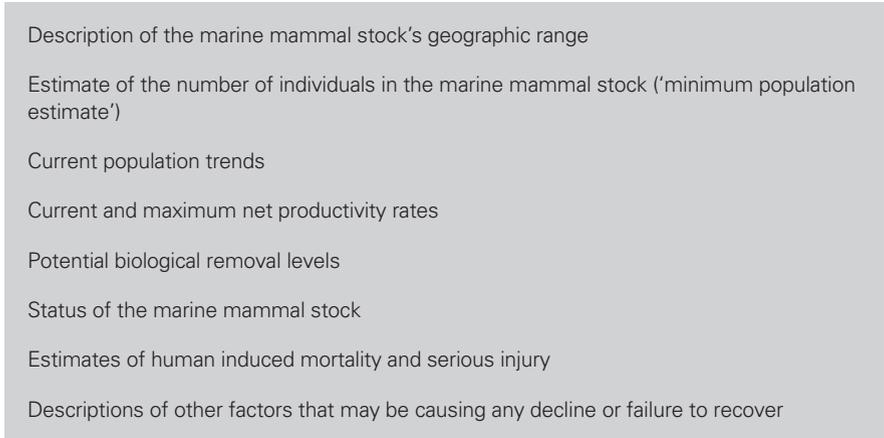
Stock assessment reports are made available for public review and comment. Each report contains the information set out in Figure 13.2 and identifies whether a stock is a 'strategic' stock. Strategic stocks are those which:

- Are listed as threatened or endangered under the Endangered Species Act; or
- Are declining and likely to be listed as a threatened species under the Endangered Species Act in the near future; or
- Are designated as depleted under the Marine Mammal Protection Act; or
- Have a level of direct human-caused mortality and serious injury that exceeds the stock's potential biological removal level.

The National Marine Fisheries Service reviews reports for strategic stocks annually, and for all other stocks every three years, or when new information

becomes available. If the reviews indicate that the status of the stock has changed, or there is new information available, the report is revised and reopened for public comment.

Figure 13.2 Contents of USA marine mammal stock assessment reports



- Description of the marine mammal stock's geographic range
- Estimate of the number of individuals in the marine mammal stock ('minimum population estimate')
- Current population trends
- Current and maximum net productivity rates
- Potential biological removal levels
- Status of the marine mammal stock
- Estimates of human induced mortality and serious injury
- Descriptions of other factors that may be causing any decline or failure to recover

Conservation plans

The Marine Mammal Protection Act requires that conservation plans must be developed for species that are designated as 'depleted.' Depleted stocks are those which are below their 'optimum sustainable population' which is defined in the Act as *"the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent part."*

Conservation plans set out the factors affecting the health of the population and a conservation strategy which is intended to guide decision-making affecting the stock. The plans are required to be implemented 'expeditiously'. There are currently two marine mammal conservation plans in place – for the Beluga Whale (Cook Inlet) and the Northern Fur Seal (Pribilof Island/Eastern Pacific).³

Recovery plans

In addition to the requirement to prepare conservation plans, section 4(f) of the Endangered Species Act requires the National Marine Fisheries Service to develop

and implement recovery plans for threatened and endangered species, including threatened and endangered marine mammals. The recovery plan must include a description of the site-specific management actions necessary to achieve recovery of the species, criteria against which achievement of this goal can be measured, and estimates of the time and cost required to achieve the goal. Recovery teams can be appointed to develop and implement the plans. These teams are made up of National Marine Fisheries Service personnel and in some cases, stakeholders with an interest in the species.

Incidental take

Incidental taking in commercial fishing operations is allowable by permit or under authorisation from the Secretary of Commerce. The Act establishes a zero mortality rate goal for bycatch in section 118(b)(1) where it states “*Commercial fisheries shall reduce incidental mortality and serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate within 7 years after the date of enactment of this section*” (which was enacted on 30 April 2001).

The Act also requires the government to establish a programme to monitor incidental mortality and serious injury of marine mammals during the course of commercial fishing operations. The monitoring programme has three purposes:

- To obtain statistically reliable estimates of incidental mortality and serious injury
- To determine the reliability of reported incidental mortality and serious injury
- To identify changes in fishing methods or technology that may increase or decrease incidental mortality and serious injury

Categorisation of fisheries

Under the Act, all fishing operations must be designated in one of three categories, based on the frequency with which marine mammals interact with the particular fishery.⁴ *Category One* fishing operations are those which give rise to frequent serious injuries and mortalities to marine mammals, *Category Two* operations are those which give rise to occasional serious injuries and mortalities, and *Category Three* operations have a remote likelihood of causing serious injuries or mortalities to marine mammals, or have no reported incidents at all.

Allocation to a particular category is calculated on the basis of the number of animals injured or killed per year, relative to a stock's potential biological removal, which is the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or sustain its optimum sustainable population (see Figure 13.3).

Those participating in Category One or Two fisheries are required to register with the Fisheries Service under the Marine Mammal Authorisation Programme. Authorisation permits the fisher to kill or injure marine mammals incidentally to their fishing activity. If a fisher undertaking an activity in Category One or Two kills or injures a marine mammal, *without* a Marine Mammal Authorisation, they can be prosecuted under the Marine Mammal Protection Act. In many regions, authorisation is integrated with applications for fishing permits, so only those fishers not required to obtain a permit must apply to the Fisheries Service for authorisation.

Authorisation under the Marine Mammal Authorisation Programme brings with it a number of responsibilities.⁵ Authorised Category One or Two fishers must carry their authorisation certificate at all times when fishing and display an authorisation sticker on their vessel. They must accommodate observers from the Fisheries Service, to determine the reliability of reports submitted, to identify changes in fishing practices that might affect marine mammal interactions, and to determine reliable estimates of injury frequency. All incidental injuries and mortalities of marine mammals must be reported within 48 hours of the end of the fishing operation. If the fisher fails to do this, his or her licence can be revoked.

Fishers must also comply with take reduction plans. These plans are developed by Take Reduction Teams comprised of groups of stakeholders, including commercial fishermen, conservationists, scientists and state and federal fishery managers. The teams are created to develop strategies to reduce marine mammal bycatch and injury in relation to specific stocks. Under the Marine Mammal Protection Act, take reduction plans must be developed for all 'strategic' stocks.

A 'strategic stock' is defined in the legislation as being a marine mammal stock:

- For which the level of direct human-caused mortality exceeds the potential biological removal level; or
- Which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the Endangered Species Act of 1973 within the foreseeable future; or

- Which is listed as a threatened species or endangered species under the Endangered Species Act of 1973 or is designated as depleted.

Figure 13.3: Categorising USA fisheries according to bycatch risk

If total annual mortalities are less than 10 per cent of the potential biological removal for a particular marine mammal stock, across *all* fisheries, all fisheries interacting with this stock would be placed in *Category Three*.

If not, an analysis is undertaken to determine the effects of *particular* fisheries on a stock. If a fishery causes mortalities and serious injuries at up to one per cent of the potential biological removal, the fishery is placed in *Category Three*.

If the fishery causes mortalities or serious injuries at between one and 50 per cent of the potential biological removal, the fishery is *Category Two*, and 50 per cent or over is *Category One*.

As fisheries are categorised on a per stock basis, the fishery might be in one category in relation to one stock and in another in relation to a different stock. A fishery will therefore usually be categorised according to its highest level of classification.

The Marine Mammal Protection Act requires that a take reduction plan must be created within 30 days of a stock being identified as ‘strategic’. The Take Reduction Team must develop a draft plan and submit it to the Fisheries Service within six months. The Fisheries Service must publish the draft plan in the Federal Register within 60 days, and must hold a public comment period for 90 days after publication. Sixty days after the public comment period ends, the final take reduction plan must be published in the Federal Register.

The plans developed by the Take Reduction Teams can include regulatory and non-regulatory measures. The plans are often accompanied by measures such as outreach and gear research projects. The process takes into account the economics of the fishery, the availability of existing technology, and existing measures in state or regional fishery management plans.

In 2008, the US Government Accountability Office reported on the effectiveness of the take reduction plan system,⁶ and identified some failings. It found that the Fisheries Service relies on incomplete, out-of-date or imprecise data to calculate the health of stocks and whether incidental take is above acceptable levels, and thereby whether the stock should be classified as ‘strategic’ and have a take reduction scheme. The Office was advised that funding constraints limited the ability of the Fisheries Service to gather accurate data. In some cases a lack of

information caused delays in the establishment of some teams, and an inability to reach consensus, had at times resulted in missed deadlines for completion of the draft plans.

However, some of the take reduction plans have been very successful. The tuna fishery in the eastern tropical Pacific has significantly reduced annual dolphin mortalities by over 90 per cent. The Gulf of Maine Harbor Porpoise Take Reduction Team has reduced harbor porpoise bycatch, using pingers and time-area closures. Similarly the Pacific Offshore Cetacean Take Reduction Plan succeeded in reducing cetacean by-catch in the California/Oregon drift gillnet fishery.⁷ With the exception of a few initiatives (in particular the Atlantic Large Whale Take Reduction Team), the process has overall been a successful way to encourage multiple stakeholders to work together to reduce bycatch.

Summary

The USA Marine Mammal Protection Act provides a comprehensive framework for addressing threats to marine mammals. It establishes a Marine Mammal Commission to provide independent oversight of marine mammal conservation. It requires a stock assessment to be undertaken for all marine mammal species within the nation's jurisdiction. It then requires conservation plans to be developed where a species is depleted.

The legislation addresses fisheries bycatch through a risk assessment and take-reduction framework. There is a requirement that take reduction plans be developed for all 'strategic' marine mammal stocks (including endangered and depleted species) within a specified time frame. All fisheries are assessed according to marine mammal bycatch risk, and those which are identified as having high risk are subject to additional requirements. These include obtaining an authorisation for the bycatch and complying with take reduction plans.

The implementation of the take reduction plan system has experienced some problems, primarily due to a lack of resourcing, and this highlights the need for adequate resources to be made available alongside rigorous legislative provisions in order to achieve successful marine mammal conservation. Nevertheless, the successes achieved through the take reduction plans highlight the potential for stakeholders to develop new and effective processes to reduce bycatch.

Figure 13.4: Key elements of the USA Marine Mammal Protection Act 1972

- Places a moratorium on the taking and importation of marine mammals and marine mammal products
- Establishes an independent Marine Mammal Commission
- Requires a stock assessment for all marine mammal species found in USA waters
- Requires the development and expeditious implementation of conservation plans for species designated as 'depleted'
- Requires the government to establish a monitoring programme for marine mammal bycatch
- Requires the development of take reduction plans for all 'strategic' marine mammal stocks which interact with commercial fishing
- Establishes a zero mortality rate goal for marine mammal fisheries bycatch
- Requires the categorisation of all fishing operations in accordance with the risk of marine mammal bycatch
- High risk fishers must obtain a marine mammal authorisation and comply with take reduction plans

Endnotes

1. Perrin W F *et al*, 2002
2. Constantine R, 1999
3. <http://www.nmfs.noaa.gov/pr/species/mammals/conservation.htm> (accessed 31 July 2012)
4. See NOAA Fisheries Office of Protected Resources at <http://www.nmfs.noaa.gov/pr/species/mammals/> (accessed 31 July 2012)
5. NOAA, 2008, Northeast region marine mammal authorisation programme factsheet http://www.nero.noaa.gov/prot_res/mmap/MMAP%20Commonly%20Asked%20Questions_2009.pdf (accessed 31 July 2012)
6. United States Government Accountability Service, 2008
7. Cox T M *et al*, 2007

chapter fourteen



Australian Approaches to Marine Mammal Protection

Introduction

Australia has around 46 species of whale and dolphin, 10 species of seals, and the dugong within its waters. Whaling in Australia ceased in 1978, and since then all marine mammals have been protected.¹

The Environment Protection and Biodiversity Conservation Act 1999 is the principal piece of legislation applying to marine mammals in Australia. The Act applies to Commonwealth waters (which extend from three nautical miles seawards to the outer extent of the exclusive economic zone) as well as to matters of 'national environmental significance' within state and territorial government jurisdictions.

The Act has a special section devoted to whales and other cetaceans. It is accompanied by the Environment Protection and Biodiversity Conservation Regulations 2000 which provide more detailed rules around human interactions with cetaceans and marine mammal tourism activities. All seal and sea lion species are listed marine species under the Act and so are also protected within Commonwealth waters.²

In state and territory waters it is the responsibility of the relevant state or territory government to protect marine mammals, and all have put in place similar protections to those under the Environment Protection and Biodiversity Conservation Act which are described here.

The Australian Marine Mammal Centre is a national research centre which aims to understand, protect and conserve marine mammals in Australian waters. The Centre produces scientific research and advice to support decision making in respect of marine mammal management.

Moratorium on taking cetaceans

Under the Environment Protection and Biodiversity Conservation Act, all interactions with cetaceans are prohibited unless they are authorised by a permit granted by the Minister for the Environment. Research permits are granted after appropriate consideration of all the impacts of the activity. Permits cannot be issued to kill a cetacean or to take one for live display. If a person unintentionally injures or causes the death of a marine mammal, this is not an offence if reported to the authorities with seven days.

Marine mammal sanctuaries

The Act establishes the Australian Whale Sanctuary *“in order to give formal recognition of the high level of protection and management afforded to cetaceans in Commonwealth marine areas and prescribed waters.”*³ The sanctuary covers the entire Commonwealth marine area including the exclusive economic zone and continental shelf. In this area it is an offence to take, trade, keep, move or interfere with a cetacean. ‘Interfere’ is further defined as to include ‘harass, chase, herd, tag, mark or brand.’⁴

The Environment Minister has responsibility for issuing permits, and the circumstances where he or she can do so for activities which may negatively effect on the wellbeing of cetaceans are very rare. Exceptions to a need for a permit include situations where:

- The action is provided for in, and undertaken in accordance with, a recovery plan for the species
- There is an emergency involving a serious threat to human life or property
- The action is reasonably necessary to relieve, or prevent, suffering of the animal

There is provision in the legislation to declare important cetacean habitat areas within the whale sanctuary,⁵ and any marine mammal tourism operations undertaken within these areas require a permit. However, no important cetacean habitat areas have been declared so far.⁶ The Commonwealth government has identified the need to map important cetacean habitat, building on the work undertaken for marine bioregional planning. This could enable important cetacean habitat areas to be declared in order to better manage activities such as marine mammal tourism.⁷

Some protection for cetaceans is also provided by marine reserves where the protection of habitat important to cetaceans is part of the reason for the reserve declaration. All marine mammal tourism operations within marine reserves require a permit.

In addition, the Commonwealth government has committed to establishing a national network of cetacean sanctuaries, working with state governments and local communities. Work is currently underway to identify areas within Commonwealth waters to include in the network, and the states and northern territory are being asked to identify areas within their marine reserves that are suitable for inclusion.⁸

Environmental assessment

The Environmental Protection and Biodiversity Conservation Act provides that activities which will, or are likely to have a significant impact on 'matters of national significance', including species that are listed under the Act as threatened or migratory, must be subject to an environmental assessment and approval process. Five species of whale are listed as nationally threatened under the Act (blue whale – endangered, southern right whale – endangered, sei whale – vulnerable, fin whale vulnerable, and humpback whale – vulnerable). Eighteen cetacean species are listed as migratory species under the Act.

If a proposed activity is likely to have a significant impact on the above species, it must be referred to the Minister to decide whether the activity will need formal assessment and approval. The Minister is required to decide whether a proposed activity should be subject to an environmental assessment within 20 business days. There is a 10-day public comment period.

Assessments can be undertaken using a range of approaches, depending on the complexity of the proposal and other considerations. They include:

- Accredited assessment
- Assessment on referral information provided with the original referral application
- Assessment on preliminary information (original referral form and other relevant material requested by the Minister)
- Assessment by Environmental Impact Statement or Public Environment Report
- Assessment by Public Enquiry⁹

National recovery plans

Some cetaceans have extra protection under the Environment Protection and Biodiversity Conservation Act because they are migratory or because they are listed as vulnerable (sei whale, fin whale and humpback whale) or endangered (blue whale and southern right whale). There are national recovery plans in place for these species with which fishing operations must comply.

Marine mammal tourism

Whale watching is a substantial industry in Australia, with over 1.6 million people viewing cetaceans in 2008. During that year it is estimated that the industry created over 600 jobs and \$31 million in economic value.¹⁰ Most whale watching activity takes place in state jurisdictional waters although some extends out into Commonwealth waters.

Within Commonwealth waters, cetacean tourism is regulated under the Environment Protection and Biodiversity Conservation Act regulations. These reflect the Australian National Guidelines for Whale and Dolphin Watching 2005 which have also been adopted by state jurisdictions around the country.¹¹ The Guidelines include two categories. Tier 1 national standards apply to all whale watching activities and Tier 2 standards contain additional management considerations that may apply to specific areas or activities.

Whale and dolphin watching operations only require a permit in Commonwealth waters where they contravene the regulations. These set out how boats must operate around whales and dolphins. Boats must be operated at a low speed within 'caution zones' of 300 metres around whales and 150 metres around dolphins. They must not approach whales closer than 100 metres and dolphins closer than 50 metres. The regulations also address whale watching from aircraft and swimming near cetaceans. Swimming with cetaceans requires a permit and feeding them within Commonwealth waters is prohibited.

Breaching the regulations can lead to a penalty of up to \$110,000 and/or up to two years' imprisonment. If a person has killed, injured, or taken a cetacean without a permit and an exception applies, (for example, it was necessary to relieve suffering of the animal) then it is not an offence, but the person must report the event within seven days. Failure to do so is an offence that carries a fine of up to \$11,000.

In some state waters, such as in New South Wales, marine mammal tourism can occur anywhere so long as a permit is obtained. In other states such as Queensland, the activity can only take place within designated marine parks, and after obtaining a permit. In some areas, caps have been placed on the number of operators which will be permitted in prescribed areas.¹²

Other specific controls have been introduced from time to time. For example, in 2009 a rare white humpback whale was given special protection during its migratory journey past the Queensland coast. State authorities declared it a

‘special interest whale’ and banned anyone from going within 500 metres of it while it travelled through the area.¹³

The Commonwealth government is currently reviewing the management of whale and dolphin tourism in Australia, with the aim of developing an integrated response strategy based on education and compliance, a review of the guidelines, and development of additional management measures.¹⁴ In an earlier review of the industry off the Gold Coast, a range of potential management measures were identified to better control the industry and these included a capped permit system, use of the market to allocate permits, an administrative levy, improved regulatory and education programmes and an operator ‘rating’ or accreditation system.¹⁵

Fishing

All fishing undertaken in Commonwealth waters, and where the fish is exported, is subject to the Environment Protection and Biodiversity Conservation Act. The fisheries under Commonwealth jurisdiction are managed by the Australian Fisheries Management Authority which is a statutory agency with an independent board. Other fisheries in state and territory waters are managed by the relevant state or territorial government.

Strategic environmental assessment

Fisheries which fall under the Environment Protection and Biodiversity Conservation Act are required to undertake a strategic environmental impact assessment. To assist with the assessment process, the government has developed the *Guidelines for the Ecologically Sustainable Management of Fisheries*.¹⁶ The guidelines were updated in 2007. They are designed to implement an ecosystem-based approach to fisheries management.

Principle 2 of the Guidelines states that *‘Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem’*. It has an accompanying objective that *‘The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities.’*

Where there is an interaction with marine mammals (which are protected species), the Guidelines require the following actions to be taken:

- Reliable information to be collected on interactions with these species
- An assessment of the impact of the fishery on the species to be undertaken
- Measures to put in place to avoid capture and/or mortality of the species, which such measures having a high chance of achieving the objective (of avoiding injuries or mortality to the species concerned)

Accreditation of fisheries management plans

Under the Fisheries Management Act 1991, the Australian Fisheries Management Authority prepares plans of management for fisheries. These plans are required to contain ‘measures directed at reducing to a minimum the incidental catch of other species’ amongst many other things.¹⁷ All Commonwealth fishing enterprises must comply with fisheries management plans.

The Australian Fisheries Management Authority drafts the plans, using a detailed decision-making system known as the ‘Strategic Assessment Process.’ The Authority has a Cetacean Mitigation Working Group which is comprised of representatives of industry, government, research and conservation organisations. The role of the group is to identify strategies to mitigate cetacean bycatch and to advise on the need for further research in particular areas. Ecological risk assessments are undertaken to identify risks to the sustainability of cetacean life caused by fishing activity.

Fisheries management plans can be accredited by the Environment Minister under the Environment Protection and Biodiversity Conservation Act, but only where it “*requires persons engaged in fishing under the plan ... to take all reasonable steps to ensure that members of listed threatened species ... are not killed or injured as a result of fishing.*” When the Minister considers whether to accredit the fishery plan, compliance with national recovery plans must be considered. As long as operators are fishing in accordance with the accredited management plan, it is not an offence to interact with a cetacean. It is however an offence to fail to record any interaction in the fish logbook.

Fisheries bycatch management plans

In 2000 the Commonwealth government released a policy on fisheries bycatch.¹⁸ This set out a process to develop bycatch action plans for each fishery. The plans

are designed to identify bycatch issues, data requirement, options and possible solutions. Provisions identified in the actions plans can be incorporated into fishing permit conditions or management plans. The plans are to be reviewed every two years. Despite this policy being place for over ten years, bycatch issues are still occurring, and as result the fisheries bycatch policy is currently under review.

Special management programmes

As in the rest of Australia, all whales and dolphins within the Great Barrier Reef Marine Park are protected species. The Park Authority has established special management programmes for high priority species, which have been identified as being at particular risk because:

- a) They are the focus of whale watching activities and are therefore susceptible to damage from human interaction; or
- b) They are coastal species at risk of negative impacts from human activities; or
- c) Because their numbers were once depleted and having begun to recover, their interests are increasingly likely to conflict with those of humans who began undertaking other activities in the area in the years that populations were depleted. This applies to humpback whales in the Great Barrier Reef Marine Park.

The management plan centres around three core aims. The first is protecting key areas of habitat from threats, including by setting aside special areas for extra protection. In particular, these protected areas are used to ensure that whale watching activities do not occur along the entire length of the whales' migratory journey through the park, and that the whales have refuge from humans. The second aim is to ensure that environmental assessment processes and research activities are in place, in important areas, to determine the level of impact and threat of human activities. The third aim is to encourage best practice by fishermen, boaties and other water users, through a programme of education and cooperation. This is to reduce the likelihood of whales becoming entangled in marine debris, or fishing and aquaculture equipment.

Summary

The Environment Protection and Biodiversity Conservation Act 1999 provides a strong framework for the management of threats to marine mammals. All Australian Commonwealth waters are included in an Australian Whale Sanctuary within which all cetaceans are protected. Any activities which are likely to have significant impacts on marine mammals are subject to a Commonwealth environmental assessment process. National recovery plans can be developed for threatened species including marine mammals and most actions under the Act must be consistent with the plans.

Fisheries bycatch of marine mammals is addressed during the strategic environmental assessment required for all Commonwealth fisheries as well as through the process of accrediting fisheries management plans. Marine mammal bycatch is illegal without such accreditation. Not all marine mammal tourism requires a permit, but regulations set out how vessels and people must behave around dolphins and whales.

Figure 14.1: Key elements of the Australian Environment Protection and Biodiversity Conservation Act 1999

- Places a moratorium on taking, trading or interfering with a cetacean
- Establishes the Australian Whale Sanctuary
- Requires an environmental assessment and approval process for all activities which will, or which are likely to have, a significant impact on threatened or migratory marine mammals
- Provides for the development of recovery plans
- Regulates how vessels and humans interact with cetaceans
- Provides for a permitting system where the regulations are breached
- Requires a strategic environmental assessment to be undertaken for all Commonwealth and export fisheries
- Requires the accreditation of fisheries management plans for fisheries which interact with cetaceans

Endnotes

1. Department of Sustainability, Environment, Water, Population and Communities, 2011, 6
2. Department of Agriculture, Fisheries and Forestry, 2006, 18
3. Section 225(1), Environment Protection and Biodiversity Conservation Act 1999
4. Section 229B, Environment Protection and Biodiversity Conservation Act 1999
5. Section 228A, Environment Protection and Biodiversity Conservation Act 1999
6. Department of Sustainability, Environment, Water, Population and Communities, 2011, 8
7. Department of Sustainability, Environment, Water, Population and Communities, 2011, 13
8. <http://www.environment.gov.au/coasts/species/cetaceans/conservation/sanctuary.html> (accessed 31 July 2012)
9. <http://www.environment.gov.au/epbc/assessments/pubs/flow-chart.pdf> (accessed 31 July 2012)
10. Department of Sustainability, Environment, Water, Population and Communities, 2011, 6
11. <http://www.environment.gov.au/coasts/species/cetaceans/whale-watching/index.html> (accessed 31 July 2012)
12. Department of Sustainability, Environment, Water, Population and Communities, 2011, 8
13. BBC News, 1 July 2009, <http://news.bbc.co.uk/1/hi/sci/tech/8129136.stm> (accessed 31 July 2012)
14. See Department of Sustainability, Environment, Water, Population and Communities, 2011
15. Department of Sustainability, Environment, Water, Population and Communities, 2011, 14
16. Department of the Environment and Water Resources, 2007
17. Sections 17, Fisheries Management Act 1991
18. Australian Fisheries Management Authority, 2000

chapter fifteen



Hector's and Maui's Dolphin

Hector's (*Cephalorhynchus hectori hectori*) and Maui's (*Cephalorhynchus hectori mauī*) dolphins are small cetaceans found only in New Zealand. Although they were once found around the majority of the New Zealand coast, populations have declined significantly. The Maui's dolphin is critically endangered, and the Hector's dolphin is also threatened. To date, management measures have failed to reverse the population decline.

Distribution

Ninety-five per cent of the Hector's dolphin population can be found around the coast of the South Island. There are three genetically distinct populations that are geographically separated – found on the east, west and south coasts. Relatively dense concentrations are found at Banks Peninsula, Te Waewae Bay in Southland, and along the west coast.

Until recent decades, Maui's dolphin was probably present all along the west coast of the North Island,¹ but it is now concentrated along part of the west coast of the North Island, in the area between Maunganui Bluff and just south of New Plymouth.

Hector's and Maui's dolphins inhabit coastal areas, preferring areas with shallow cloudy water. They are generally found very close inshore in the summer breeding season and are more evenly spread out in the winter months. The dolphins generally live in small groups of three to five individuals, but larger groups of up to 30 to 40 individuals are sometimes seen. They have a complex, high frequency sonar system which they use sparingly to find food and to communicate. Clicks are emitted in short bursts. Adult dolphins are strongly attracted to small boats, especially if travelling at less than four knots. This makes them particularly attractive targets for tourism, as they are perceived to be playful and friendly animals.

Description

Hector's and Maui's dolphin belong to the genus *Cephalorhynchus*, which comprises four related species that are all found in the Southern Hemisphere. The others are:

- *Commerson's dolphin*, which is found only on the eastern coast of the southern tip of South America and along the southern Chilean coast, around the Falkland Islands, and 4,000 kilometres away around the Kerguelen islands in the Southern Indian Ocean.
- *Black dolphin (or Chilean dolphin)*, which inhabits parts of the Chilean coast.
- *Heaviside's dolphin*, which is found off the Atlantic Coast of Southern Africa.

Genetic analysis indicates that the *Cephalorhynchus* genus first evolved in South Africa, followed the eastward-moving Antarctic circumpolar current to New Zealand, and then continued further east to South America.²

Māori traditionally used several names for the Hector's dolphin, with *Tutumaireikurai* being the most common. This referred to the dolphin as a 'special ocean dweller', with some Māori believing that the dolphins were the spirits of their dead.

Maui's dolphin

Until recently it was believed that the Maui's dolphin was just a North Island population of the Hector's dolphin, and it was thus referred to as the North Island Hector's dolphin. During the mid-1990s, genetic research indicated that it may in fact be a separate subspecies, which has been isolated from the South Island groups for thousands of years. This distinction was proposed in 2002.³

Hector's dolphins live in shallow coastal waters and generally do not travel far. So for many years it was believed that the twenty kilometre wide Cook Strait, with depths averaging around 130 metres, formed a barrier between previously neighbouring populations.⁴ However, in 2012 two Hector's dolphins were found swimming with the Maui's dolphins off the west coast of the North Island, indicating that they may in fact be able to travel much further than previously thought.⁵

Hector's and Maui's dolphins are among the smallest in the world. They grow to around 1.2 to 1.5 metres long, and weigh up to 50 kilograms, although Maui's dolphins tend to be slightly larger. The dolphins have a distinctive rounded dorsal fin and a blunt rostrum. They are black and grey with a mainly white belly.

Conservation status

Hector's dolphin

Hector's and Maui's dolphins are amongst the rarest in the world. Currently the Hector's dolphin is classified as 'nationally endangered' by the Department of Conservation and 'endangered' by the IUCN.

The first study of Hector's dolphin abundance was carried out by Liz Slooten and Steve Dawson during 1984 and 1985. They had minimal funding and used a small inflatable boat to conduct a strip-transect search for dolphins. Despite the limitations of this approach, it provided the first quantitative data on distribution and abundance. In 2004, more accurate line-transect methodology was used, using a 15-metre catamaran and a twin engine aircraft. This put the South Island Hector's dolphin population at 7,270.⁶

Research by Slooten indicates that the maximum population growth for a group of Hector's dolphins is less than two per cent a year, one of the slowest rates recorded for a marine mammal species (the average is 2.7 per cent). This means that when compared with other cetaceans, the Hector's dolphin population is particularly susceptible to the actions of humans. Slooten and Dawson have estimated that the potential biological removal level (or the number of dolphins that can be killed each year without having a detrimental effect on the population) is currently less than one individual per year for most areas, and ten individuals a year across the entire species.⁷

Maui's dolphin

The Maui's dolphin is listed as 'nationally critical' by the Department of Conservation. The *IUCN Red List of Threatened Species* has formally classified the Maui's dolphin as 'critically endangered'. The next category is 'extinct in the wild' followed by 'extinct'. This listing is based on the evidence of catastrophic decline of the population over three generations since 1970 and the small number of individuals remaining.

The listing was re-assessed in 2008 and the critically endangered classification was maintained. It referred to an estimated 93 per cent decline in the population from 1970 to 2009. It is estimated that there would have been around 577 Maui's dolphin in 1970, and around 135 in 1985.⁸ A 2006 study estimated that the population numbered 111 individuals,⁹ whilst a further study in 2012, using different methodology to the 2006 study, estimated that there are only around 55 adult individuals remaining.¹⁰

Threats

Entanglement in fishing gear

Hector's and Maui's dolphins can become entangled in gillnets which are set and retrieved in shallow coastal waters. Some of the commercial nets are up to 10 metres deep and several hundred metres long.¹¹ The nets create large transparent 'walls' in the water which fish swim into and become trapped, usually by their gills. They can also catch Hector's and Maui's dolphins, which may not detect the presence of the net. The dolphins, unable to swim backwards, become trapped and asphyxiate because they cannot reach the surface to breathe.

In 1997 Steve Dawson estimated, based on interviews with fishermen, that 230 Hector's dolphins were killed between 1984 and 1988 in the Canterbury region, or an average of just over 57 a year.¹² Also in 1997, an observer programme was undertaken, funded by the Department of Conservation and managed by the New Zealand Seafood Industry Council, to obtain better information about the number of dolphins being caught in fishing nets. The project focused on vessels involved in either set netting or trawling off the Canterbury coast.

Observers saw eight Hector's dolphins caught in nets. Six were already dead and two were released alive. One dolphin was also observed caught in a trawl net.¹³ When the number of caught dolphins was adjusted for the proportion of set nets observed, it was estimated that eighteen dolphins had been caught that year in the fishery.¹⁴

The Department of Conservation calculated that the maximum number of Hector's dolphins that could be removed from the Canterbury population through human-induced mortalities, whilst still enabling the population to increase in size, was between two and four individuals a year (referred to as the 'potential biological removal'). So it was evident that this limit was being breached.

Tourism

Following the development of dusky dolphin tourism in Kaikoura, Hector's dolphin watching and swimming trips commenced from Akaroa in 1990. By 2001, four tourism operators were offering dolphin trips on Akaroa harbour, and every year around 50,000 tourists were going out on the harbour to watch and/or swim with dolphins. Dolphins had become a major industry for the town. In 2007, the Department of Conservation issued three new permits including one to Ngāi

Tahu. The population of Akaroa was swelling from only 550 residents in winter to over 10,000 on peak days during the summer.

By 2007 there were up to thirty-two daily dolphin trips on the harbour, a total of 175 a week. Eighteen of these trips involved swimming with the dolphins.¹⁵ Because the cruises were typically staggered throughout the day, there was often at least one boat out on the harbour seeking to interact with the dolphins during daylight hours, and frequently more. It had also become common practice for cruise captains to 'hand over' a dolphin group to a subsequent cruise, with the second boat joining the dolphin group as the first vessel was departing.¹⁶ During the busy summer months, when tourist numbers were high, the dolphins got little break from disturbances.

In 2005 a study indicated that, whilst the high level of tourism activity did not seem to have driven the dolphins out of the harbour, it may have affected the animals' food intake. A group of dolphins swimming or diving, which are behaviours associated with foraging for food, would often stop and mill about when approached by a vessel. The dolphins therefore had less time to hunt their prey. And that prey may also have become harder to find. Around 60 per cent of the dolphins' diet was thought to be red cod, a species also targeted by fishing, and there were concerns about the state of the stock which appeared to be diminishing.¹⁷

Because of their small size, Hector's dolphins have a greater surface to volume area, and therefore a higher rate of heat loss than larger marine mammals. To compensate, they have a high metabolic rate to generate more heat, and therefore need to surface more frequently to breathe. Hector's dolphins are also quite chunky and not as streamlined as other marine species. They therefore swim more slowly and it takes a greater effort for them to travel and forage for food. So disruption to foraging activity is likely to have more impact on Hector's than other dolphin species.¹⁸

Persistent organic pollutants

Testing of the blubber of dead Hector's dolphins in the late 1970s showed high levels of pollutants. In particular, a group of substances called persistent organic pollutants, were present in the samples. Of particular concern were the levels of DDT, which were second only to those found in Canadian beluga whales living in the more heavily industrialised northern hemisphere.¹⁹

In 2010, the results of further analysis of toxins found that concentrations of DDT in Hector's dolphins were up to ten times higher than those reported for common dolphins in New Zealand. There were also significant geographical differences, reflecting the varied concentrations of farming activity, and levels of DDT application. For example, concentrations of DDT in Hector's dolphins living on the east coast of the South Island, were three times higher than those for dolphins from the west coast.²⁰

Although the levels of toxins found in the dolphins were high, they were still below the threshold where scientists think negative biological effects are likely to result. However, the study did not examine other emerging contaminants in our coastal waters, and it remains unclear what the combined synergistic effect of different chemicals might be on individual dolphins.

Other coastal activities

Other coastal activities are also a potential threat to the dolphins. In March 2011, Crest Energy obtained consent to its proposal to place 200 turbines on the seabed in the entrance to the Kaipara Harbour, an area within the Maui's dolphin habitat. Strong conditions were placed on the consent, requiring staged installation of the turbines while monitoring work is undertaken.

There is growing interest in mining the rich ironsands that lie off the North Island's west coast. Prospecting and exploration permits for the resource already cover the majority of the Maui's dolphin's range. There is limited understanding of what the impacts of these activities on the dolphins might be, although potential impacts include auditory damage and behavioural disruption from noise and seismic activity, and depletion of food sources from alteration of the seabed.

Disease

Whilst undertaking a post mortem of a newborn Maui's dolphin retrieved from Port Waikato in 2006, it was discovered that the dolphin was infected with the bacteria *Brucella*, which causes the disease brucellosis. This has been found to be widespread in marine mammals, but the effect of the disease on them is unknown. In farm animals the disease can result in high numbers of abortions as well as sore joints. It is also not known what proportion of the dolphin population might be infected.²¹

Low genetic diversity

A study published by Franz Pichler and Alan Baker in 2000 found low genetic diversity in Hector's and Maui's dolphins. Because he was able to extract DNA from skeletons of dolphins held in museums, which had lived at various times over the past 130 years, Pichler was able to analyse changes in genetic diversity over this time period. This provided some insight into what might have happened to population numbers. A reduction in genetic diversity would indicate fewer breeding adults contributing to the genetic pool and therefore a smaller population size.²²

Pichler found that the gene flow between the four populations of Hector's dolphins around New Zealand (North Island, and west coast, east coast and south coast of the South Island) is low, indicating that there is very little interbreeding between the populations. This means that if numbers are driven to low levels in one population, it will not necessarily be replenished by individuals from others.

Genetic diversity within the Maui's dolphin population is unusually low when compared with other dolphin species, and has decreased significantly, indicating a recent population decline. From 1988 to 1998, the number of maternal lineages has reduced from three to only one. The size of the population means that problems with inbreeding are likely. This is supported by data on dolphin standings which shows that all of the eight Maui's dolphins which were found washed up on the beach from 1990 to 1999 were female. This high proportion of female mortality, in Pichler's view, could indicate that *"this population is suffering fertility-and-birth related problems that are often coincident with inbreeding depression resulting from a recent, severe population crash."*²³

Pilcher also found that in the east coast Hector's dolphin population the number of female lines of descent (maternal lineages) had decreased from nine to five. There was a particularly steep decline in diversity from 1988 to 1998 indicating that the Banks Peninsula marine mammal sanctuary, which was established in 1988, was not adequately protecting that dolphin population. Pilcher predicted that if the rate of decline continued, there would be a complete loss of genetic (haplotype) diversity by 2018.²⁴

Management and protection

Banks Peninsula Marine Mammal Sanctuary

The research undertaken by Liz Slooten and Steve Dawson, during the mid-1980s, served to bring to public awareness the plight of the Hector's dolphin. In response to the findings, in 1988 the Department of Conservation formally gazetted the Banks Peninsula Marine Mammal Sanctuary. It was the first sanctuary to be established under the Marine Mammals Protection Act and was administered by the Department.

No specific objectives were stated for the sanctuary. But there was agreement between the Department of Conservation and the Ministry for Primary Industries that the main objective was to conserve the segment of the Hector's dolphin population that breeds around Banks Peninsula from incidental entanglement in set nets. Government decided that the sanctuary would extend along the coastline from Sumner Head to the Rakaia River, and out to a distance of four nautical miles offshore, covering a marine area of 1140 square kilometres.

In defining the area for the sanctuary the Department of Conservation applied the following criteria:

- The sanctuary should cover areas where there were high densities of Hector's dolphins
- The sanctuary should cover areas where there was a recent history of substantial gillnet entanglements
- The creation of the sanctuary should, if possible, avoid putting any commercial fishers out of work

This was a significant decision given the long history of fishing, and in particular set netting, around Banks Peninsula. Since the 1850s, the area had been a very popular place for amateur set netting as it provides sheltered waters unavailable elsewhere along the coastline. Many set netters established homes and bachs on the peninsula and practised set netting as a way of life for several generations.

Recreational fishers in the area set nets mainly for butterfish and flatfish, and less often, for small sharks and moki. Commercial set netters targeted spiny dogfish, moki, butterfish, tarakihi, shark, rig, elephant fish, warehou and stargazer.

When drafting the plans for the sanctuary, the government sought public submissions on what level of protection it should provide against set netting. The majority of submissions received were in support of year-round restrictions,

but the fishers opposed it. The Department of Conservation ultimately reached a compromise where restrictions were put in place for only part of the year.²⁵

In response to complaints from recreational set netters that they had nowhere else to go, in July 1989 the Department of Conservation amended the regulations. This was to permit recreational set netting outside the four month summer period, from November to February, when the dolphins were closer inshore, subject to conditions.

The restrictions that were eventually implemented, under the Marine Mammals Protection Act, were as follows:

- Set netting was prohibited at all times in the Sanctuary except between 1 April to 30 September in daylight hours. The net had to be no longer than 30 metres and each boat was allowed to set only one net at a time. Boats were not allowed to set nets overnight, and the boat had to be crewed, and remain no more than 30 metres from the net when set. These rules applied to both commercial and recreational fishers.
- In 'designated flounder areas' (first created in 1990) amateur and commercial set netting for flatfish using special flatfish nets was allowed at any time of day or night, from 1 March to 31 October. Attendance at the nets was not required, and nets up to 60 metres long were allowed.

In 1994 the performance of the sanctuary was reviewed. Over 6,000 submissions were received in response to the Banks Peninsula sanctuary review document – showing that the sanctuary was of considerable public interest. There was strong recognition of the need for more research to establish adequate data on which the need for the sanctuary could be assessed. A clear majority of submitters supported the sanctuary (99 per cent) with around half (55.2 per cent) wanting the same size sanctuary, and 44.6 per cent wanting it to be increased in size.

In 2002, Slooten and Dawson undertook a survey to investigate the effectiveness of the sanctuary. They found that during summer months 79 per cent of the dolphins sighted were within the boundary of the sanctuary, but in winter when the dolphins moved further offshore, the number dropped to only 35 per cent. This meant that the other 65 per cent were potentially exposed to net entanglement. Based on this new information, the researchers calculated that there was a 60 per cent chance that the population was declining, that is, decline was more likely than not.²⁶

A (controversial) satellite-tagging programme subsequently undertaken by the Department of Conservation confirmed that dolphins did indeed travel outside the boundaries of the marine mammal sanctuary as it was then defined.

The Selwyn-Banks Peninsula coastal marine area became a statutory acknowledgement area under the Ngāi Tahu Claims Settlement Act 1998. Schedule 101 of the Act sets out the statutory acknowledgement for Te Tai o Mahaanui (Selwyn – Banks Peninsula Coastal Marine Area). This acknowledges Ngāi Tahu's cultural, spiritual, historic and traditional associations with the area. The Act recognises that “[t]he whole of the coastal area offered a bounty of mahinga kai, including...marine mammals providing whale meat and seal pups...”. Consent authorities are required to have regard to the statutory acknowledgement and to forward summaries of resource consent applications to Te Runanga o Ngāi Tahu.

Canterbury set net area

The research findings made it clear, that further measures to reduce dolphin bycatch needed to be developed, if the population was to have a hope of recovery. A 1997 observer programme in Canterbury provided new evidence on bycatch levels. This led to additional seasonal set netting restrictions being placed on a much larger marine area extending from the Waiiau River just north of Cheviot south to the Waitaki River just north of Oamaru. All set netting was prohibited out to four nautical miles between 31 October and 1 March each year. The restrictions came into force in December 2001.

In May 2002, the Minister for Primary Industries announced a maximum allowable fishing-related mortality for Hector's dolphin of three dolphins per year within the Canterbury set net area, and indicated that if this limit was reached, fishing would be shut down for the rest of the season.²⁷ However, without observers on the boats, it proved difficult to enforce.

Maui's dolphin set net ban

The discovery that the Maui's dolphin was a separate sub species helped to catalyse efforts to protect the population off the west coast of the North Island. The Government investigated establishing measures to manage fishing under section 15(2) of the Fisheries Act, which enables the Minister for Primary Industries to “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.” Unlike the situation

with the Hector's dolphins off Banks Peninsula, a marine mammal sanctuary was not considered to be the prime tool to protect the dolphins.

Seeking to pre-empt such action, a body comprised of fishers from the Northern Inshore Fisheries Company developed a management proposal to reduce the risk of their activities to the Maui's dolphins. The company consulted with a range of interested parties, produced a draft proposal on which written submissions were sought, and then submitted a revised management plan to the Minister for Primary Industries on January 2001 asking him to approve and implement it.²⁸

The plan involved a ban on set nets from the South Head of the Manukau Harbour south to Taranaki Point (which is just north of Aotea harbour), out to four nautical miles, as well as closures outside the entrances of the Manukau, Aotea and Kawhia harbours. It also involved the application of a voluntary code in terms of how nets were set in other areas.

The plan was strongly attacked by Forest and Bird which argued that the proposed controls were weak and did not include a ban on set nets throughout the entire dolphin's range.²⁹

The Ministry for Primary Industries prepared an advice paper for their Minister which included the industry's proposals and three other options including a complete ban on set nets within the dolphin's habitat. Although the Ministry's advice favoured an option which was a variant of that proposed by the fishers, the Minister decided to impose a full set net ban over what was thought to be the entire dolphin's range, because of the serious risk of extinction of the dolphins.

The Minister announced his decision in August 2001, under which set netting was prohibited within four nautical miles of the coast from Maunganui Bluff north of Bayleys Beach, to Pariokariwa Point, north of Waitara on the Taranaki coast. Harbour entrances were excluded from the ban.

The Northern Inshore Fisheries Company sought to overturn the decision through judicial review in the High Court. It argued that the Minister had based his decision on flawed information. In the interim the set netters agreed to a smaller closure area from the Manukau Harbour south to near Kawhia. The case was heard in Wellington on 18 and 19 February 2002. This resulted in the Judge overturning the Minister's decision to put the set net bans in place, on the grounds that the Minister had been mistaken about level of bycatch which would result in the extinction of the dolphins, and that he had inadequate information on the economic consequences of his decision on the set netters.

Accordingly, the Ministry for Primary Industries commenced work to develop an alternative proposal. Following talks with a diverse group of scientists,

the Ministry released a consultation paper. The paper included two potential management options, the first being that earlier proposed by the Northern Inshore Fisheries Company and the second being the option adopted in the Minister's decision which was overturned by the High Court. In addition, the Ministry also proposed extending the set net ban into the Manukau Harbour entrance.

Following public consultation, the Minister announced his decision. He reinstated the protected area which had been overturned by the High Court and also extended it to include the entrance of the Manukau Harbour. In addition, trawling was prohibited out to one nautical mile and in specific areas such as the Kaipara, Raglan and Kawhia harbours (although these were restrictions under the 1986 commercial fishing regulations which were not put in place for the purpose of protecting Maui's dolphins). A voluntary trawl agreement required vessels not to trawl within two nautical miles from the shore between the Awakino River mouth and Port Taranaki. The purpose of this was to separate trawling from local regional fishing areas, but it is also likely to have benefited Maui's dolphins.

Population management plan or threat management plan

During the mid-1990s, the government had invited tenders for the preparation of a population management plan for the Hector's dolphin. The Seafood Industry Council, which represented the fishing industry nationally, was awarded the contract to prepare the plan. Several drafts were prepared but the plan was never completed.

Some of the difficulties stemmed from the legislative framework. The focus of such plans under the Marine Mammals Protection Act is to establish the maximum allowable fishing-related mortality of dolphins which would then be applied through fisheries regulations. The theory is that once the limit is reached, the fishery would be closed for the season. But in many cases for cetaceans, this limit is very low, and in places close to zero. Such a limit is also essentially unenforceable, as without observers or cameras on most boats in the fishery, it is very difficult to determine when the limit has been reached and therefore when the fishery should be closed.

In 2004, a coalition of non-governmental organisations and scientific experts (including two from the University of Auckland University and two from the University of Otago) met to discuss a comprehensive package of protection measures for the Hector's dolphin. Their discussions resulted in the 'Challenge Report' which proposed management objectives for Hector's dolphins. These

were to achieve a population of 16,304 dolphins by 2025; 20,016 dolphins by 2055; recovery to natural historic range; reduced population fragmentation; fewer sub-populations; and reduced pressures to achieve maximum recovery.

Partly in response to the Challenge Report, the Department of Conservation initiated work on a non-statutory 'Threat Reduction Plan' for the Hector's and Maui's dolphins. The aim was to start with a blank slate and to work with the fishing industry and environmental groups in a collaborative manner to develop a response to all the threats to the dolphins, including but not limited to fishing. Work on the plan started in early 2005.

An advisory group of stakeholders was established to assist with developing the plan. The group comprised representatives from the commercial and recreational fishing sectors, environmental groups, local government, scientists, iwi and the tourism industry. In addition, an expert panel provided science advice. The intention was to develop a broad plan, that would look at all of the threats to the dolphins, as well as at how they might be mitigated through a range of different mechanisms.

During the process the report was renamed a 'Threat Management Plan'. Although the reason for the name change was not formally stated, the evolution from 'threat reduction plan' to 'threat management plan' suggested a weakening of the management goal from species recovery to managing the Hector's dolphin population at its current seriously depleted level.

In May 2006 the Department of Conservation indicated that a draft threat management plan was expected by the end of the year.³⁰ When it became clear that this deadline also would not be met, the Minister for Primary Industries started to look at interim measures which could be brought in to protect the dolphins ahead of the plan. When they emerged, these measures were weak, simply requiring people engaged in recreational set netting in North Canterbury and in Te Waewae Bay in Southland, to stay with their nets. At the same time, the Minister indicated that the threat management plan was now only due to be completed towards the end of 2007.³¹

In April 2007, the Ministry for Primary Industries and Department of Conservation finally released a Hector's dolphin threat management discussion document. The purpose of the document was to "*assist regional stakeholder discussions about how best to address the threats facing the dolphins.*"³² Officials from the Department of Conservation and the Ministry for Primary Industries proposed to have meetings with different stakeholder groups to provide local input into the identification of options to mitigate threats to the dolphins.

The discussion document summarised what was known about all the different threats to the dolphins including fishing activity, vessel traffic, marine mammal tourism, pollution, aquaculture, exploration and mining, coastal development, climate change, disease, predation and inbreeding. Set netting and trawling were identified as posing the biggest threat to the dolphins.

Several months later a draft threat management plan was published. The document focused on fisheries measures to reduce the threat to the dolphins, recognising that fishing had been identified as the biggest threat. The draft plan failed, however, to include any measurable goals for management. Instead the document identified generalised goals “*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.*”³³ Although this implied that Hector’s dolphins should not be driven to extinction, it did not necessarily imply a rebuild of currently depleted populations.

The document presented a range of options for the protection of the dolphins, ranging from the status quo, to prohibition of set nets within areas that overlap with the dolphin’s habitat. The measures were based on potential biological removal analysis which indicated that Maui’s dolphins can sustain no more than 0.2 human induced deaths each year (one every five years) and that Hector’s dolphins can sustain no more than two to 13 human induced deaths per year.

The plan also relied upon distribution studies which had found that, in summer, dolphins were most abundant closer to the shore – 88 per cent of sightings were within two nautical miles but there were sightings out to 9.64 nautical miles. However, in winter dolphins were most common close to shore (45 per cent of sightings were within four nautical miles) but were distributed much further out to sea – out to 18 nautical miles, and they were more evenly distributed.³⁴

The draft plan set out a number of options for new protection measures. The Ministry for Primary Industries recommended a choice of options, the strictest of which was banning commercial set netting out to two nautical miles, and placing a complete ban on recreational set netting (except for butterfish and flounder fishing between 1 October and 30 March). There was no discussion in the final advice about extending the Banks Peninsula marine mammal sanctuary and associated set net controls further off the coast to encompass the Hector’s dolphin’s range.

The Minister for Primary Industries was required to choose appropriate management measures from the options set out in the draft threat management

plan. After a considerable delay, the Minister announced protection measures that represented a compromise between protection of the dolphins and negative impacts on fishing interests. Such a compromise had been necessary to ensure that the package of measures would gain the support of Cabinet.

In respect of Maui's dolphins, the set net ban was extended seawards from four to seven nautical miles from the coast, but not into the harbours and not further south to the Taranaki coast where the dolphins had been sighted.

Along the east coast of the South Island, set netting was prohibited only out to four nautical miles, despite strong scientific evidence that the dolphins travelled at least out to 15 nautical miles from shore around the Banks Peninsula. Along the Kaikoura coast, the protected distance from shore was reduced to one nautical mile, on the basis that depths dropped off close to land and the dolphins were only present in shallow water.

Along the west coast of the South Island commercial set netting was only prohibited out to two nautical miles and then only over summer months. These minimal controls were put in place despite scientific evidence demonstrating that the dolphins ranged much further out to sea along this coastline and that there were no seasonal changes in their distribution. However, this was the first time set netting had been controlled along this part of the coastline.

Under measures taken to implement the threat management plan, the regulations governing fishing in the Banks Peninsula Marine Mammal Sanctuary under the Marine Mammals Protection Act were repealed, and they were replaced with new measures under the Fisheries Act. Thus responsibility for controlling fishing in the sanctuary moved from the Department of Conservation to the Ministry for Primary Industries.

The new measures also extended the boundaries of the Banks Peninsula Marine Mammal Sanctuary (but not fishing restrictions) and created four new marine mammal sanctuaries to protect Hector's and Maui's dolphins.³⁵

The establishment of the marine mammal sanctuaries included implementation of restrictions on the carrying out of acoustic seismic surveys. They required that those wishing to carry out a seismic survey in a marine mammal sanctuary:

- Must notify the Department of Conservation of the intention to carry out a survey and give a written undertaking to report back afterwards on all interactions with cetaceans, information on the vessels, equipment and crew;
- May not carry out seismic survey using vibrations caused by explosions;

- Must ensure that there are two trained observers on the vessel at all times who have experience of cetacean identification and behaviour;
- Must ensure that the observer maintains watch and passive acoustic testing for cetaceans;
- Must comply with restrictions on using acoustic sources when there are cetaceans in the vicinity.

In addition, \$6 million over three years was allocated to increase observer coverage on commercial vessels ('including in the areas that dolphins live'). Those costs were to be recovered from the industry through levies. The Minister of Fisheries at the time, Jim Anderton, said that the new measures would have a significant impact on the commercial fishing industry, so that in total \$79.1 million will be lost over a five to 10 year period (\$32.7 million in lost quota and \$46.4 million in lost income), together with the loss of up to 295 jobs.³⁶

Liz Slooten and Steve Dawson calculated that *"the new protection measures would come close to halting population declines but are unlikely to result in recovery."*³⁷ Under the new measures, the west coast South Island population would most likely decline by just over 1000 individuals by 2050. The east coast population was expected to recover very slowly, gaining about 450 individuals by 2050.

Before the measures could come into effect as proposed on 1 October 2008, fishing industry representatives took the Minister to the High Court on judicial review. The industry originally challenged the entire decision, but then refined this to specific challenges against the extension of the set net prohibition on the west coast of the North Island from four to seven nautical miles; the establishment of a seasonal set net prohibition on the west coast of the South Island; and the prohibitions on the south coast of the South Island.

The grounds of the challenge included assertions that the Minister did not take into account the best available information; that the measures were not necessary; that the Ministry and Minister had breached consultation obligations; and that the decision on the west coast of the South Island was unreasonable.

The fishing industry sought interim relief to allow continued fishing in some areas whilst the matter was resolved. This was heard on 25 September 2008 and was granted.³⁸ The fishers presented affidavit evidence to demonstrate the economic effects of the closures. One fisher in Raglan claimed that he would lose 50 per cent of his catch and an annual income of \$73,000. A butterfisher in the Marlborough Sounds claimed he would lose 85 to 90 per cent of his income and

'go to the wall'. Another stated that 100 per cent of his family's income would be lost and the rig quota rendered virtually useless.

On 23 February 2010, the final judgment was released, following eight months of deliberations. Most of the protections were upheld by the Court, with the exception of the extension of the set net prohibition from four to seven nautical miles on the west coast of the North Island to protect the Maui's dolphin, and the inclusion of butterfish set netting at the top of east coast South Island in the restrictions. The Judge found that, in both cases, the Minister had been given inaccurate advice. In respect to Maui's dolphins, the information provided had suggested that the evidence of dolphin sightings between four to seven miles out to sea, was more reliable than it actually was. In respect of butterfish netting, the information provided to the Minister had suggested that the mortality risks to Hector's dolphins from recreational butterfish fishing, was more serious than it actually was. These two matters were referred back to the Minister for reconsideration.

After providing opportunity for stakeholder input, the Minister made his final decision on 18 March 2011. He confirmed the set net protection for Maui's dolphins out to seven nautical miles offshore but allowed the exemption for butterfish netting in the north of the South Island.

The Department of Conservation continued to monitor the abundance of Maui's dolphin and in March released new findings which indicated that the Maui's dolphin population was as low as 55 animals older than one year of age.³⁹ Shortly thereafter, a Maui's dolphin was discovered dead on a beach south of New Plymouth,⁴⁰ confirming that the dolphins ranged further south than the extent of the set net ban.

In April 2012, the Minister of Conservation and Minister for Primary Industries jointly announced proposed urgent interim measures to further protect the dolphin. These included extending the ban on set nets further south around the Taranaki coast as well as extending the marine mammal sanctuary and associated restrictions on seismic activity. In June 2012, the Ministry for Primary Industries announced that the set net ban would be extended out to two nautical miles along the Taranaki coast, and that observers would be required on commercial set netting vessels operating between two and seven nautical miles. These measures were intended to stay in place at least until the Maui's threat management plan could be reviewed later in the year.⁴¹

The measures resulted in opposition from the fishing industry. A spokesperson for the Taranaki commercial fishers and processing companies was reported as

saying that “*shark and orca predation, pollution and disease were likely to be the main reasons for declining numbers*” and that “*The proposed ban would put an end to commercial fishing in Taranaki and do nothing to protect Maui’s dolphins.*”⁴²

Conclusions

A summary of the key events in efforts to address human impacts on Hector’s and Maui’s dolphins is set out in Figure 15.1. This shows that it is now 27 years since scientists first alerted government agencies to the dangers of set nets for Hector’s dolphins. Action to provide some protection for the dolphin population around the Banks Peninsula was taken promptly, with the establishment of the Banks Peninsula Marine Mammal Sanctuary in 1988. However the protection was only ever partial, as it was soon clear that the dolphins ranged far beyond the sanctuary’s boundaries, and that bycatch continued.

Further action on this issue was exceedingly slow. It took a further 20 years before protections were put in place for other Hector dolphin populations around the South Island through the set nets bans announced in 2008 (and only finally confirmed in 2011). The resultant protections were again only partial, representing a compromise between conservation of the dolphins and the interests of fishers. In introducing them, government accepted that a significant level of bycatch would continue. It was not clear that the additional controls would be sufficient to stop ongoing population decline, particularly on the west coast. Even so, the fishing industry challenged the restrictions in the High Court, but was only successful in obtaining an exemption for butterfish netting.

Once the Maui’s dolphin was identified as a distinct sub-species, and in light of the small population thought to number not more than 100, management response was again prompt with set net restrictions put in place in 2001. These were again challenged in the Court by the fishing industry, and although the industry was initially successful in overturning the decision, the Minister reinstated the measures and also extended them.

Again, in 2012 when a dead Maui’s dolphin was reported off Taranaki, the management response was prompt with Government announcing the intention to put in place interim measures to extend the set net exclusion area, amongst other things. This suggests that when a (sub)species is on the edge of extinction, and therefore provides a compelling case for action, such action is forthcoming. But by then, actions need to be radical and may be too late, due to the problems

that small populations with little genetic variability can have in sustaining themselves over time. This is particularly the case with slow-breeding animals such as dolphins, and where captive breeding programmes (which have been successful for endangered birds), are not feasible.

Although bycatch issues were initially managed by the Department of Conservation under the Marine Mammals Protection Act through the establishment of a marine mammal sanctuary, all subsequent measures taken were under the Fisheries Act and managed by the Ministry for Primary Industries. Eventually the Banks Peninsula fishing restrictions were transferred to the Fisheries Act. This made legal challenge easier, as there were more grounds under the Fisheries Act on which such a challenge could be mounted, than under the Marine Mammals Protection Act. Despite the restrictions being managed by the Ministry for Primary Industries, observer coverage on fishing boats has remained very low, and as a result there are no reliable figures available as to the extent of the bycatch occurring.

There have been several attempts to develop plans to address conservation issues associated with the dolphins. An early effort to prepare a population management plan for the Hector's dolphin in 1994 was abandoned. It was 13 years later (and more than 20 years after the problem was first identified), in 2007, that the first plan to address the issue nationwide was formally released by government. This took the form of a draft threat management plan. The draft plan that emerged was non-statutory, addressed only fisheries bycatch, and focused on 'managing' threats rather than eliminating them or achieving recovery of the population. In addition, the plan itself was never finalised.

In summary, action to address the threat of bycatch to Hector's dolphin has been slow and only partial at best. Action in respect of the Maui's dolphin was rapid once it was identified as a subspecies, but non-existent prior to this. By then the population size was at such a low level, that recovery prospects are uncertain, even in the unlikely event that all human impacts can be effectively be removed.

Figure 15.1 Key events in addressing human impacts on Hector's and Maui's dolphins

1872	Hector's dolphin scientifically described and named
1985	First abundance estimate for Hector's dolphin
1988	Banks Peninsula Marine Mammal Sanctuary established
1989	Amendment to sanctuary rules allowing some set netting outside the summer season
1990	Beginning of Hector's dolphin tourism based in Akaroa harbour
1994	Marine mammal sanctuary reviewed, receives strong support, and is retained Government invites tenders to prepare population management plan for Hector's dolphin. Contract awarded to the Seafood Industry Council but plan never completed
2001	Set net restrictions extended along the Canterbury coastline Northern Inshore Fisheries Company submits proposed management plan to Minister to address impacts on Maui's dolphin Minister for Primary Industries declines to adopt plan and prohibits set netting along the north-west coast of the North Island Northern Inshore Fisheries Company judicially reviews Minister's decision in the High Court
2002	Maui's dolphin confirmed as sub-species High Court overturns Minister's decision on Maui's dolphin protections Minister reconsiders and reinstates set net bans including an extension into the mouth of the Manukau Harbour
2005	Department of Conservation begins developing threat reduction plan for Hector's and Maui's dolphins
2007	Hector's dolphin threat management discussion document released followed by draft threat management plan which focuses on fisheries bycatch issues
2008	Minister for Primary Industries and Department of Conservation announce a package of new measures to protect the Hector's and Maui's dolphins including the establishment of 4 new marine mammal sanctuaries and extensive set net bans under the Fisheries Act. Set net restrictions removed from the Banks Peninsula Marine Mammal Sanctuary and reinstated under the Fisheries Act. The New Zealand Federation of Commercial Fisheries judicially reviews the Minister's decision in the High Court
2010	High Court upholds most of the Minister's decision but refers two matters back for reconsideration
2011	Minister for Primary Industries confirms extension of set net ban to protect Maui's dolphin but allows a butterfish netting exemption in the South Island
2012	Research indicates only 55 Maui's dolphins over one year old remaining Minister for Primary Industries and Minister of Conservation announce the intention to put in place interim measures to protect the Maui's dolphin, primarily extending restrictions further south to include Taranaki, and to review the Maui's threat management plan

Endnotes

1. Ferreira S and C Roberts, 2003
2. Pichler F, 2001, 103-104
3. Baker A *et al*, 2002
4. Pichler F, 2001, 124
5. Hamner R *et al*, 2012
6. Dawson S *et al*, 2004; Slooten E *et al*, 2006
7. Slooten E and S Dawson, 2008
8. Burkhart S and E Slooten, 2003, 557
9. Slooten E *et al*, 2006
10. Hamner R *et al*, 2012
11. Department of Conservation and Ministry of Fisheries, 2007a, 22
12. Dawson S and E Slooten, 1993, 210
13. Starr P and A Langley, 2000, 19
14. Baird S and E Bradford, 2000, 17
15. Martinez E, 2010, 8
16. Martinez E, 2010, 117
17. Martinez E, 2007
18. Martinez E, 2010, 144
19. Department of Conservation and Ministry of Fisheries, 2007a
20. Stockin K *et al*, 2010, 839-840
21. World Wildlife Fund, 2007, 'Virus new threat to rare dolphin', *New Zealand Herald*, 24 April
22. Pichler F and C Baker, 2000
23. Pichler F, 2001, 78
24. Pichler F and C Baker, 2000
25. Hughey K, 2000
26. Slooten E *et al*, 2006, 341
27. Department of Conservation and Ministry of Fisheries, 2007a, 75; McElderry H *et al*, 2007, 6
28. *The Northern Inshore Fisheries Company Limited v Minister of Fisheries and Chief Executive of Ministry of Fisheries*, High Court decision CP235/01, para 17
29. Royal Forest and Bird Protection Society, 2000, 'Industry proposals will not save Hector's dolphin', press release, 19 September
30. McCarthy P, 2006, 'DOC to look at reducing deaths', *The Southland Times*, 8 May
31. New Zealand Government, 2006, 'Stronger protection measures for native dolphin', press release, 21 December
32. Department of Conservation and Ministry of Fisheries, 2007a, 7
33. Department of Conservation and Ministry of Fisheries, 2007b, 17
34. Slooten E *et al*, 2006, 341
35. Department of Conservation and Ministry of Fisheries, 2007b
36. Ministry of Fisheries, 2008, 'Minister announces new measures to protect dolphins', press release, 29 May
37. Slooten E and S Dawson, 2010, 343
38. *The NZ Federation of Commercial Fishermen et al v The Minister of Fisheries and the Chief Executive of the Ministry of Fisheries* CIV-2008-485-2016
39. Hamner R *et al*, 2012
40. Anon, 2012, 'Maui's dolphin found dead', *New Zealand Herald*, 29 April
41. See Ministry of Agriculture and Forestry, 2012 and Department of Conservation, 2012
42. Anon, 2012, 'Dolphin demise not due to set nets', *Waikato Times*, 11 April, 7

chapter sixteen



New Zealand Sea Lion

The New Zealand, or Hooker's, sea lion (*Phocartos hookeri*) is one of the rarest and most endangered of the world's five species of sea lion.

Distribution

New Zealand sea lions are found around the Sub-Antarctic Islands and the south-east coast of the South Island from Oamaru southwards. Whilst males may move between different colonies, females nearly always return to their birthplace to breed.

Breeding colonies are found at only a few sites on the Sub-Antarctic Islands and one site on the mainland. Around 71 per cent of pups are born in the Auckland Islands, especially on Dundas Island, as well as Enderby Island and Figure of Eight Island. There is also a population on Campbell Island and one small population of approximately 150 individuals in Otago. These individuals are descendants of a single individual which began breeding on the mainland during the 1993-4 season. The colony now produces four to five pups per year, although the mainland is not yet recognised as an official breeding colony.¹

Description

Although New Zealand sea lions are sometimes mistaken for fur seals by locals not accustomed to their presence in Otago, they actually look quite different. They are much larger and have a blunt nose and short whiskers. Male New Zealand sea lions grow up to three metres long and up to 400 kilograms in weight. They are dark grey or brown and have a mane of long hair around their necks. Females are smaller, reaching around two metres and up to 180 kilograms. They are much lighter in colour and do not have a mane. Juvenile males look similar to females, whilst pups are chocolate brown with paler heads.

New Zealand sea lions are a confident, inquisitive species, generally showing little fear of humans. They spend much of their time hauled out on land, where they sleep, mate and play. They prefer sandy beaches, where they can flick sand over themselves to keep cool. However, they can travel as far as a kilometre inland in search of a quiet, shady spot – females with pups in particular may do this in order to locate a safe place for their pup. They can move reasonably fast on land (reaching speeds of up to 20 kilometres per hour) by lifting their bodies off the

ground and walking on their flippers. However, they are much more agile in the water.

New Zealand sea lions are opportunistic feeders, eating a wide range of species, including fish, squid, octopus, crabs and occasionally seabirds and fur seals.² Accordingly, the primary prey of the populations in the Sub-Antarctic Islands and on the mainland is different: the mainland colony eats mainly barracouta and jack mackerel,³ whilst the Sub-Antarctic colonies eat arrow squid, rattails, octopus, hoki and red cod.⁴

Sea lions are able to travel many kilometres from the coast to feed. Chilvers and Wilkinson found that individual sea lion foraging behaviour falls into two distinct types. Meso-pelagic foragers undertake both deep and shallow dives in relatively deep water. In contrast, benthic foragers dive to consistent depths in relatively shallow water (down to around 120 metres) presumably to prey on benthic species. Benthic foragers tended to travel further from their breeding colonies.⁵

A satellite tagging project in the Sub-Antarctic Islands has found that female sea lions typically forage for three days, up to 175 kilometres out to sea. In contrast, animals from the small population in Otago travel only around 25 kilometres out to sea, and tend to dive to shallower depths. As the average weight of females in the two areas has been found to differ, from 112 kilogrammes in the Sub-Antarctic Islands, to 140 to 150 kilogrammes in Otago, it has been suggested that individuals in the Sub-Antarctic Islands have to work harder to sustain themselves.⁶

Female New Zealand sea lions can start breeding at two years of age, but most do not breed until they are six years old.⁷ The maximum recorded age at reproduction is 26 years⁸ although it has been estimated that the median total reproductive output of a female New Zealand sea lion was 4.4 pups.⁹ Males become sexually mature at around four years, but they are not likely to become socially mature (i.e. big enough to hold a breeding territory) until around eight years old.¹⁰ Males arrive at breeding sites to establish a territory in November, before the females arrive a few weeks later. Females form harems of up to 25 individuals, with a single dominant male. Other males hang around the periphery and occasionally challenge the dominant male or attempt a surreptitious mating.

Females give birth shortly after arriving at the breeding site, in December or early January. Mating occurs again about one week later, with the fertilised ovum undergoing delayed implantation in the uterus, so that the pup is born at the optimum time in the short sub-Antarctic summer. After mating, the harems break up and the males disperse. The females give birth on the beach but move their pups to nearby vegetation after around six weeks. Females then alternate their

time between foraging trips at sea, and suckling their pups, which remain on land. Pups are dependent on their mothers for milk and protection during this time. They are likely to be weaned at around 10 to 11 months old, or may stay with the mother longer, if she does not have a new pup.

Conservation status

Archaeological evidence indicates that New Zealand sea lions once inhabited much of New Zealand’s coastline, right up to the top of the North Island, although most occurred in the southern half of the South Island.¹¹ They were extensively hunted for food by Māori, and then, following the arrival of Europeans in the Auckland Islands in 1806, for their hides and oil. The sea lions were almost extinct by the mid-1800s, and were protected from hunting in 1893. Now, there are less than 12,000 mature individuals remaining, of which 71 per cent breed on three beaches in the Auckland Islands.¹² For this reason the species is particularly vulnerable to threats.

New Zealand sea lions have been studied extensively, so the health of the population has been followed in detail, although the factors influencing changes are not fully understood. The size of the sea lion population is estimated from the number of pups born each year in the Auckland Islands. Sea lion pups are much easier to survey than adults, as they are restricted to land.

The first pup counts were undertaken intermittently from the 1940s, and from 1995 mark recapture estimates of pup population size at all breeding areas of the Auckland Islands, have been undertaken annually on the same date each year.¹³ Pup production estimates in the Auckland Islands, where the large majority of sea lions are found, have declined since the late 1990s, with the most significant decline occurring over the last four years.¹⁴

Figure 16.1 Pup production estimates for the Auckland Islands rookeries combined 1997-2012

(Source: Department of Conservation)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003
Pup numbers	2,518	2,685	2,975	3,021	2,867	2,856	2,859	2,282	2,518
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Pup numbers	2,515	2,148	2,089	2,224	2,175	1,501	1,814	1,550	1,684

This decline in pup production is a very significant concern, given the rate of decline and the limited number of sites at which the New Zealand sea lion breeds. Pup counts at the Campbell Island colony indicate that the population there is growing, but it is possible that this trend may at least partially reflect differences in methodology.¹⁵

In August 1997, the New Zealand sea lion was listed as a threatened species in the Department of Conservation's threat classification system list, and was reclassified as 'nationally critical' – the highest threat classification available – in 2009. The IUCN Red List identifies the species as vulnerable under criterion A3b, which means that the population is expected or projected to decline further. Given the population decline, and endangered status of some individual colonies, the IUCN recommends that the categorisation should be reassessed in 2018.

Threats

Whilst progress has been made in understanding the pressures that are faced by New Zealand sea lions, and in understanding population trends, the question of what is causing the population decline experienced by the Auckland Islands colonies remains contentious. Both the Campbell Island and Auckland Islands populations inhabit very similar environments, so a comparison of the differences could help to establish why pup production in the Auckland Islands is declining, whilst the Campbell Island population is growing.¹⁶

Natural predation

Sea lions in the Auckland Islands appear to be at risk from attacks by Great White sharks, and although the rate of attacks at Campbell Island has not been properly quantified, there is no evidence to suggest that the risk to the Campbell Islands population is any different from that of the Auckland Islands population.¹⁷

Bacterial infection

Since the first accurate pup production and population estimates in 1995, New Zealand sea lions have been affected by several outbreaks of bacterial infection. At the Auckland Islands, this resulted in the death of 53, 32 and 21 per cent of pups in the first month of their lives in the 1998, 2002 and 2003 seasons, respectively. The 1998 outbreak was *Campylobacter*,¹⁸ whilst the 2002 and 2003 outbreaks were *Klebsiella pneumoniae*.¹⁹ Both of these bacteria can be spread between humans and

animals. The origin of the outbreaks could be sewage outflow in Dunedin, taken to colonies in the Sub-Antarctic Islands by sea lions returning from the mainland.²⁰ Whilst the bacterial outbreaks have had a significant impact on pup production in specific years, they may also affect the fecundity of surviving pups, reducing their breeding rate.²¹ A 2011 study by Chilvers modelled the population viability of the Auckland Islands population, and found that the bacterial epizootics reduce the population growth rate, reducing the ability of the population to sustain any other forms of mortality.²²

Fishing

Fishing is a known risk to sea lions in the Sub-Antarctic. Whilst sea lions from the Campbell Islands colony appear to have only a limited risk of being caught as bycatch, the Auckland Islands fisheries have a much higher risk.²³

The SBW6I southern blue whiting fishery is the only major trawl fishery to operate around the Campbell Islands. There is limited overlap with the area in which sea lions forage, as the fishery operates far offshore.

Two main fisheries operate in the area outside the Auckland Islands' territorial sea (this part of the territorial sea has been a marine reserve since 2003). These are the arrow squid trawl fishery (SQU6T) and the New Zealand scampi trawl fishery (SC1A). The squid fishery is believed to pose the greatest risk to sea lions, although bycatch in the scampi fishery is poorly known. The squid fishery operates mainly in two specific areas off the Auckland Islands, in depths of between 150 and 200 metres, which are also used by foraging sea lions similarly targeting squid.

The SQU6T fishing season begins each year at the beginning of February, and ends some time between mid-May to mid-August, which is when female sea lions are breeding and foraging to feed pups at their colony.

The fishery is managed under the 'individual transferable quota' system. Each year the Ministry for Primary Industries sets a 'total allowable commercial catch' for squid. Holders of an individual transferrable quota are entitled to fish the percentage of the total allowable commercial catch proportional to their quota holding. Owners of quota can buy and sell parts of their entitlement. The amount that a quota owner is allowed to catch in any one year is known as the 'annual catch entitlement'. This can be sold to other fishers.

There are currently around 20 vessels in the fishery, which is a reduction of about two-thirds over the last 30 years. The squid fishery has historically been important to New Zealand trawlers, and foreign-owned trawlers operating under

charter to New Zealand companies, because it fills a gap in annual fishing plans. In recent seasons, 80 per cent of the vessels have been foreign-chartered vessels. The vessels take the financial risk, in that they purchase or lease the annual catch entitlement from quota holders, who then in many instances purchase the catch from them.

The SQU6T fishery is variable – for example, in 2010 the total catch was 14,786 tonnes, and in 2011 it was 20,934 tonnes.²⁴ Squid have a lifespan of about one year, and annually arrive in waves from the west in numbers that are highly unpredictable. Accordingly, the global value of squid varies from year to year, dependent on supply. The Arrowhead squid found around the Auckland Islands is considered inferior to the more desirable Argentine squid, so its value on the global market varies dependent on the availability of Argentine squid. The entire New Zealand squid fishery (of which a large proportion is derived from the SQU6T trawl fishery), was worth \$98.2 million in 2011.²⁵ The majority of the squid is exported to Europe, Korea and China.

Whereas squid jigs are sometimes used to fish for squid in other parts of New Zealand, the SQU6T fishery is an entirely trawler-based fishery. Squid on the Auckland Islands shelf are highly accessible to trawlers and can be caught with little finfish bycatch.²⁶ No jigging is undertaken in the area – fishers suggest that it is not practical or economical in the Sub-Antarctic Islands because the practice requires calm waters and a lot of energy to power the necessary lights at night. On the other hand, squid jigging is undertaken in some comparable parts of the southern ocean, such as off the Falkland Islands.²⁷

Sea lion bycatch

In the 1970s a German research vessel, the *Westermunde*, sustained high levels of sea lion bycatch while investigating squid and fish resources around the Auckland Islands. Since 1992 government observers have been placed on fishing vessels to monitor the number and location of sea lions captured by the fleet. Observer coverage has varied from eight to 100 per cent, although in all years except one, it was less than 50 per cent.²⁸ As set out in Figure 16.2, observed mortalities increased until 2001 as trawls became longer and nets larger, and have been dropping ever since.

Figure 16.2 Observed sea lion mortalities in the SQU6T squid fishery

(Source: Ministry for Primary Industries, 2011)

Year	1996	1997	1998	1999	2000	2001	2002	2003
Observed tows	535	747	338	153	435	577	560	426
Observed mortalities	13	25	14	5	25	39	21	11
Observed mortalities per 100 tows	2.4	3.3	4.1	3.3	5.7	6.8	3.8	2.6
Maximum allowable fishing-related mortality (MALFiRM)	73	79	63	64	65	75	79	70
Year	2004	2005	2006	2007	2008	2009	2010	2011
Observed tows	778	812	542	541	582	728	220	517
Observed mortalities	16	9	9	7	5	3	2	0
Observed mortalities per 100 tows	2.1	1.1	1.7	1.3	0.9	0.4	0.9	0
Maximum allowable fishing-related mortality (MALFiRM)	62	115	96/ 150*	91	81	113/ 95**	76	68

*MALFiRM initially set at 96 but raised to 150 midway through the season

**MALFiRM initially set at 113 but fishers voluntarily withdrew at 95 after reports of drops in pup production

Of the individual sea lions observed caught between 1992 and 2009, 59 per cent were female. The proportion appears to be increasing: since 2004, 71 per cent of the individuals caught have been female. It is very unusual for female sea lions to have lower survival rates than males, and it is particularly concerning for the health of the population.²⁹ This is because the sea lions are captured during the breeding season when, having just given birth, they are responsible for the survival of their pup back on land. They are also likely to have mated again and are therefore carrying another pup. Thus the death of a lactating female in a trawl

net may actually result in the deaths of three sea lions – the female, her dependent pup and her unborn pup.³⁰

Sea Lion Exclusion Devices (SLEDs) are fitted to vessels with the intention of allowing sea lions caught in trawl nets to escape unharmed. A SLED is a metal grid that is fixed inside the net at an angle to the water flow, just before the cod end. It is designed so that smaller animals, such as squid, pass through the metal grid into the cod end, whilst larger animals, such as sea lions, are directed to an escape-hole opening at the top of the net.

Such devices have been in use in the fishery for the last 10 to 15 years and since 2007 have been used by all vessels in the fishery. Research and development of SLED design was originally undertaken by the Department of Conservation, or controlled by contracts under the Conservation Services Programme, funded by levies from the industry. Responsibility was eventually transferred to industry bodies, which were doing the work as subcontractors to the Department of Conservation anyway. The work is then reviewed by the Ministry for Primary Industries' Aquatic Environment Working Group.

Since 2007, all vessels in the SQU6T fishery have used SLEDs. During this period, observed sea lion captures have declined, and thus the Ministry for Primary Industries posits that *“improvements to SLED design and use are likely to have contributed to this trend.”*³¹ However, there is disagreement over whether this is correct,³² because the use of SLEDs necessarily makes accurate observation of mortality rates exceedingly difficult. Sea lions are able to pass through the exit, so that without the use of underwater cameras, it is not possible to say how many sea lions have entered the net and whether any sea lions that passed through the SLED were in a survivable condition when they were ejected.

It has been suggested that sea lions may drown whilst passing through the net and SLED.³³ Sea lions are able to dive for up to 15 minutes. Provided that they are able to navigate effectively through the net, it is believed that passage through it the net takes less time than this, so the likelihood of drowning will depend on the point in the dive at which the sea lions are caught.

In addition, it has been suggested that the sea lions may sustain fatal injuries, in particular head injuries, upon impact with the SLED. This was studied in the early 2000s by putting covers over the escape hole of the SLED, so that sea lions escaping through the SLED would be caught. Their bodies were frozen, they were shipped back to shore, and necropsies were performed on them to try to establish the cause of death.

In 2010, an international panel of veterinary pathologists and neurologists concluded that the necropsy data was of little use in interpreting the likelihood that the sea lions would die while interacting with a trawl. This was because it was not possible to tell whether the injuries found on the sea lions had caused their death, or whether they had been sustained in the freezing process, because freezing can both mimic and obscure injuries. Instead, the panel recommended that research should be focused on developing other means to determine whether sea lions escape the nets alive.³⁴

Recent research by the Ministry for Primary Industries has adopted an approach to address this recommendation. The Ministry sponsored research using biomechanical modelling to estimate the likelihood that a sea lion colliding with a SLED would survive.³⁵ The research used technology normally applied to vehicle crash testing, and used data derived from underwater video footage of seals interacting with Seal Exclusion Devices in an Australian trawl fishery.³⁶

The biomechanical modelling study estimated that the probability of a sea lion sustaining a fatal traumatic brain injury was zero, and the probability of single head-first collision causing a mild traumatic brain injury, which could cause the sea lion to drown, was 3.3 per cent.³⁷ Some scientists have questioned the reliability of this research – given that it is based on data from a different species and fishery and takes a ‘reductionist’ approach which considers only one element of the interactions that sea lions can have with trawl nets.³⁸

Recent research by Chilvers concluded that, with any level of bycatch, the population will continue to decline. Combined with the occurrence of bacterial epizootics, and excluding any other causes of mortality, all modelled scenarios show the Auckland Islands population declining. The most pessimistic model predicts a 98 per cent chance of functional extinction of the Auckland Islands population within 59 years.³⁹ This research has been criticised in advice given to the Minister for Primary Industries as being of a ‘low quality’ which ‘should not be used in management decisions.’⁴⁰

Indirect effects of fishing

Another possible cause of the decline in the Auckland Islands population is food competition, although the gaps in our understanding of sea lion foraging ecology make it difficult to ascertain the extent to which this is the case.⁴¹ Sea lions in the Auckland Islands eat the squid that is also targeted by the fishing vessels, although as opportunistic feeders they also eat other species. Activity in the SQU6T and

SC16A fisheries coincides with the time that female sea lions are breeding and lactating. This is a time when their ability to forage is restricted by the need to return to pups on land and they have higher energy needs due to lactation.

These factors combined may result in a situation where the foraging females are unable to provide for their pups adequately. A comparison of the foraging behaviour of female sea lions in the Auckland Islands, and on the mainland, indicated that those in the Auckland Islands are often forced to operate at their physiological limit; they have to work harder to find food than those on the mainland. Studies have indicated that milk fat production has declined in females around the Auckland Islands. In contrast the mainland sea lions are bigger, have higher milk fat production, and begin to reproduce earlier.⁴²

Conclusion on threats

Despite long term monitoring, and a large amount of study effort, the exact reasons for the decline in pup production in the Auckland Islands have not been established. Whilst bycatch and disease events are the principal known cause of sea lion deaths, observed mortalities have been declining, and the fishing industry and Ministry for Primary Industries has found that the deployment of SLED technology has greatly reduced the risk. Food competition from the fishery may also be relevant, but the extent to which this is the case is also difficult to determine, as squid forms only a part of the sea lion's diet.

It may be that the cause of the decline is a combination of factors, some of which may not yet be known. Sea lions operating at their physiological limit, whether as a result of geographical location (the Sub-Antarctic islands are the southern-most limit of the sea lions' natural range) or because of anthropogenic factors, are in turn more susceptible to other impacts.

Management and protection

The lack of clarity surrounding the reasons for the decline in sea lion pup counts has meant that managing the threats to the population has been challenging and highly contentious. There have been attempts to manage the issue both under the Marine Mammals Protection Act and the Fisheries Act.

Population management plans

Under the Marine Mammals Protection Act, sea lions are fully protected, but taking a sea lion as bycatch is not illegal if it is reported unless it is in breach of a rule in a population management plan approved by the Minister of Conservation.

Work began on a draft population management plan in the late 1990s, but due to the contentious nature of the process, it was not completed until 2007. In 2009, the Director General of Conservation decided not to proceed with the proposed plan because it was out of date, and was not based on the best available information. The Department of Conservation found that it was not possible to meet the requirements for a population management plan, as set out in the Marine Mammals Protection Act, because the population status of the New Zealand sea lion meant that it could not return to healthy status within 20 years. Furthermore, during the time that the plan was being drafted, the threat status of the New Zealand sea lion had been reclassified (from ‘nationally threatened’ to ‘nationally critical’) and the management model used had been substantially revised.⁴³

Instead, in 2009, the Department of Conservation published a non-statutory ‘New Zealand Sea Lion Species Management Plan 2009–14’.⁴⁴ The stated objective of the Plan is to “*make significant progress in facilitating an increase in the New Zealand sea lion population size and distribution.*”

The implementation plan states that the Department will respond to fishing related mortality, by

- *support[ing] the development of effective fishing related mortality mitigation devices and strategies;*
- *develop[ing] and implement[ing] management tools as a means to avoid or minimise fishing related mortalities; and*
- *addressing the indirect effects of fishing by exploring any perceived indirect effects of fishing and...develop[ing] relevant management outcomes based on research findings.*

The Plan also sets out a programme for research and monitoring. However, it states that “*managing an increase in population abundance and distribution to the point of recovery, in terms of threat status, will not be achievable within the 5-year time frame of this plan.*” This is because of the species’ low population size, and rates of fecundity, and the fact that the impact of human interactions is not fully understood. The plan does not provide for a timeframe within which to bring the

sea lion population back to health, nor does it provide for measures which must be undertaken by the Ministry for Primary Industries or others to protect the sea lions.

Sustainability measures under the Fisheries Act

In the absence of a population management plan, sea lion bycatch in the Auckland Islands squid fishery is managed by the Minister for Primary Industries who is required under section 15(2) of the Fisheries Act to 'avoid, remedy or mitigate the effect of fishing-related mortality' on the sea lion population.

The approach that the Minister has taken since 1992 is to set an annual limit on the number of sea lions that can be caught in the squid fishery. Once that limit is reached, the fishery is closed for the season. At the time that the measure was first implemented, this was a ground-breaking approach, as there were few fisheries in the world that were employing similar management measures.

The approach has been highly contentious, and the fishing industry has twice challenged the legal basis for the decisions in the courts. In 2003 and 2004, attempts to close the fishery when the fishing-related mortality limit was reached, were overturned by court orders.⁴⁵

Between 1992 and 2004, the number of sea lions caught per trawl (derived from observer coverage data) was used to set a limit on the number of trawls that could be undertaken. This was based on a calculation of the maximum potential biological removal that the population could sustain. This in turn produced a maximum allowable level of fishing-related mortality. If the estimated bycatch exceeded this level, the fishery was closed. This simple model was developed by the USA National Marine Fisheries Service and was adapted for use for New Zealand sea lions by Dr Paul Wade. It can be applied to any marine mammal species for which the population trends are not fully understood.

Opposition to this approach, which it was argued was designed for USA legislation and was not specific to New Zealand sea lion biology, led to work to develop a new Bayesian model. Initially some work was undertaken by the Department of Conservation, but eventually it was transferred to NIWA. Bayesian models are used to manage some fish stocks. They integrate data from a wide range of sources to test the probability of a hypothesis. At the time such models were popular in fishery management in some areas, such as the west coast of the USA and Asia, but less favoured in other areas, such as the USA east coast and Europe.⁴⁶

In 2004 the Breen Kim model was introduced (it has since been modified slightly and is now called the Breen Fu Gilbert model). The annual maximum allowable level of fishing-related mortality (MALFiRM) was replaced by a 'Fishing Related Mortality Limit' (FRML). The Breen Fu Gilbert model evaluates the performance of 'harvest control rules' (limits on the number of sea lions that can be caught) against the following management criteria:⁴⁷

- *A harvest control rule must provide for an increase in the sea lion population to more than 90% of carrying capacity, or to within 10% of the population size that would have been attained in the absence of fishing, and that these levels must be attained with 90% certainty, over 20 year and 100 year projections.*
- *A harvest control rule must attain a mean number of mature mammals that exceed 90% of carrying capacity in the second 50 years of 100 year projection runs (to allow for build up of numbers in hypothetical depleted populations over time).*

The model takes into account parameters such as the rate of population growth, the pupping rate, the way that pup survival responds to population size, and the number of tows undertaken, to produce a result which indicates what effect a particular harvest control rule would have on the population.

The model has been criticised for a number of reasons. It is highly complex, and as a result poorly understood. Whereas the Wade model required only three pieces of information which interacted in a simple way, the Breen Kim model estimates dozens of parameters. This level of complexity means that sensitivity testing is difficult, because of the number of factors considered at once.

There have also been questions about whether the available data is adequate for use in a Bayesian model. Dawson has noted that for the model to work accurately, abundance data over a wide range of population sizes, and a better understanding of the carrying capacity of the population, would be required. Thus he asserts that, because there is only a limited amount of abundance data available, the model is unable to provide reliable information about the impact of management measures in relation to the carrying capacity of the population.⁴⁸

Two important inputs into the model are the strike rate and the SLED discount rate. Based on observer data from previous years, when some SLEDs had cover nets to retain any animals ejected, it is estimated by the Ministry for Primary Industries that for every 100 tows, 5.65 sea lions would be killed in the absence of SLEDs.

As the Ministry for Primary Industries notes, *“there is some uncertainty associated with the modelled strike rate which is likely to vary from season to season.”*⁴⁹

This uncertainty is partially a result of the figures used being based on a limited amount of observer data. There are a number of variables which can affect the accuracy of the strike rate – for example, the area of the fishery within which the tow is undertaken, the number of sea lions foraging, and the length of the tow.⁵⁰ Indeed, in the 2008/9 season it was agreed that the strike rate should be increased from 5.3 to 5.65 to take account of research showing that median tow length had increased from 4 to 5.8 hours.⁵¹

The SLED discount rate is applied to the strike rate where tows have been undertaken by vessels with an approved SLED, and where the vessel has complied with the monitoring and reporting requirements. This is to make allowance for the fact that the use of a SLED is believed to increase the possibility that the sea lion will survive the interaction with the trawl (i.e. they will pass through the net and be ejected by the SLED). In recent years the SLED discount rate has been set at 35 per cent. With a strike rate of 5.65 per cent, this meant that 1,852 tows are allowed in the fishery, equating to a FRML of 68 sea lions.

In the review of the FRML for the 2011/12 season, the Ministry for Primary Industries had access to the results of the 2011 biomechanical modelling study and was able to conclude that *“animals are very unlikely to sustain any life threatening injuries during the course of exiting the net via the SLED”* and stated that *“it is the Ministry’s view that the probability that animals have not had a life threatening trauma after exiting a trawl net via a SLED is 97 per cent”*.⁵² This meant that the SLED discount rate could be revised upwards, to 82 per cent. Robertson has argued that this reasoning is flawed, as it presumes that mild traumatic brain injury is the only potential cause of mortality in the SLED and therefore that 97 per cent of the animals exiting the SLED will survive, when there is no evidence that this is the case.⁵³

To take account of the possibility that sea lions might die while interacting with the trawl for other reasons, for example by exceeding their breath-holding capacity and drowning, the Ministry conducted a sensitivity trial assuming a lower survival probability. This applied a reduction to the discount rate of 10 per cent. This reduction was selected arbitrarily, due to a lack of data indicating the likelihood that sea lions interacting with a trawl net will die.

Application of the higher SLED discount rate to the model, and using the most recent data, resulted in the conclusion that no control rule was required to meet

the agreed management criteria. The Ministry proposed that such an approach should be adopted, conditional upon the following:

- All vessels continue to carry and deploy compliant SLEDs
- All vessels follow the reporting requirements specified in the operational plan
- No new information becomes available that suggests that the risk to sea lions is appreciably greater than the current available information

The Ministry proposed that the 'no FRML' approach should be reviewed after five years, unless an earlier review is triggered by any of the following events:

- Less than 98 per cent of tows are undertaken using a SLED that meets the required specification
- Less than 95 per cent of tows meet the reporting requirements
- More than 15 sea lions are observed captured in one season
- More than 4,700 tows occur
- A pup count of less than 1501 pups in the Auckland Islands
- Any new information becomes available which suggests that the risk to sea lions from the squid fishery is greater than current information suggests.

The initial position paper generated significant publicity and opposition. Some submitters to the consultation criticised the logic and apparent failure to consider the whole picture, as well as the transparency of the Ministry's decision-making.⁵⁴ In the meantime, the squid fishery operated on the basis of the 2010/11 management rules which had in place a FRML of 68 sea lions.

After a delay, in August 2012 the Minister released his decision, based on new detailed advice set out in a final advice paper from the Ministry for Primary Industries. He concluded that the fishing-related mortality limit should remain at 68, whilst the SLED discount rate should be increased to 82 per cent. The management approach is to be reviewed after four years and if one of the trigger points set out in the initial position paper (and described above) occurs. Observer coverage is to be increased to 50 per cent, although the new (separate) requirements in relation to observer coverage on foreign charter fishing vessels mean, that in practice, coverage may be higher. The Ministry also recommended that the Department of Conservation work with it to investigate other threats.⁵⁵

Ngāi Tahu Claims Settlement Act 1998

Under the Ngāi Tahu Claims Settlement Act, the Crown acknowledges the cultural, spiritual, historic, and traditional association of Ngāi Tahu with the taonga species, including the New Zealand sea lion.⁵⁶ The Act requires the Minister of Conservation to advise Te Rūnanga o Ngāi Tahu in advance of any relevant conservation management strategy reviews or the preparation of plans, policies, or documents relating to the New Zealand sea lion; and to consult with, and have particular regard to the views of, Te Rūnanga o Ngāi Tahu when the Minister makes policy decisions concerning the protection, management, or conservation of a taonga species. The Director General must also invite Te Rūnanga o Ngāi Tahu to nominate a person to join any species recovery group formed to protect the sea lion.

Conclusions

Measures to manage human impacts on the New Zealand sea lion population in the Auckland Islands have been in place for twenty years. Despite this, the sea lion population continues to decline, with pup counts currently little more than half their recorded peak in 1998. In 2009, 17 years after active management of impacts began, the sea lions were classified as nationally critical due to the actual and projected 50 per cent decline in pup production in the species' main breeding area. Clearly the management measures have not been successful in sustaining the sea lion population.

Attempts by the Department of Conservation to develop a population management plan ultimately proved unsuccessful. Although a draft plan was actually completed, it was then abandoned, ostensibly because by then it was out of date. It was replaced with a non-statutory species management plan. This identified a long list of research projects to be undertaken, but lacked any clear goals or concrete actions to address the conservation crisis in the population.

Management efforts have focused almost solely on the issue of sea lions being caught in trawl nets because, early on, this was identified as the greatest threat to the population. The Ministry for Primary Industries sought to address this issue by developing and deploying a complex fisheries model which was designed to identify the number of sea lions which could be killed in the fishery without threatening the population at large.

Various MALFiRMs/FRMLs have been calculated and applied over the years as sustainability measures under the Fisheries Act, ranging from 32 prior to the model being developed, to a high of 150 in 2006, and then back down to 68 in 2012. Despite these measures, since 2009, pup counts have been at much lower levels than previously experienced and recent research by Chilvers estimates that the current rate of decline in the Auckland Islands population will result in the population being functionally extinct by 2035.⁵⁷

It may well be that the cause of the decline is a combination of factors, including disease, bycatch and food competition, but management measures have focussed on bycatch alone. Work by the Ministry for Primary Industries, has resulted in decisions to weaken these existing management measures, whilst there is no new plan to address the population decline. As this critically threatened species continues to slide towards extinction, it is clear that a new approach which takes a holistic view of threats to the population to establish decisive management measures, is required.

Figure 16.3 Timeline of actions to address effects on New Zealand sea lions

1992	Minister for Primary Industries sets MALFiRM of 32 for the squid fishery
1995	Mark recapture sea lion pup counts initiated in the Auckland Islands
1997	New Zealand sea lion listed as threatened species
1998	Highest numbers of sea lion pups recorded (3,021)
2003	Minister for Primary Industries closes squid fishery when MALFiRM of 70 exceeded. Decision challenged in the High Court by the Squid Fishery Management Company and overturned
2004	Minister for Primary Industries closes squid fishery when MALFiRM of 62 exceeded. Decision challenged in the High Court by the Squid Fishery Management Company and upheld. The Company appeals to the Court of Appeal and overturns the Minister's decision.
2006	Pre-notification consultation document on a New Zealand sea lion population management plan released for public submission Minister for Primary Industries adjusts the FRML midseason to the highest level ever of 150 sea lions for the squid fishery (SQU6T)
2007	Draft population management plan completed and proposes a FRML of 89 for all fisheries and 76 for the SQU6T fishery off the Auckland Islands
2009	Lowest number of sea lion pups recorded (1,501) New Zealand sea lion reclassified as 'nationally critical' FRML of 113 set but squid fishers voluntarily withdraw after reaching 95 Population management plan abandoned and non-statutory species management plan released
2012	Ministry for Primary Industries releases an initial advice paper proposing no fisheries-related mortality limit be placed on the squid fishery Sea lion pup counts still low (1,684) No other management actions proposed to address population decline Minister releases decision to maintain FRML of 68 sea lions while SLED discount rate is increased to 82%

Endnotes

1. Robertson B and L Chilvers, 2011, 1
2. Meynier L, 2009
3. Meynier L, 2009
4. Augé A, 2010
5. Chilvers L and I Wilkinson, 2009
6. Augé A *et al*, 2011
7. Childerhouse S *et al*, 2010
8. Childerhouse S *et al*, 2010
9. Chilvers L *et al*, 2010
10. Cawthorn M *et al*, 1985

11. Childerhouse S and N Gales, 1998
12. Robertson B and L Chilvers, 2011
13. Robertson B and L Chilvers, 2011
14. Ministry of Agriculture and Fisheries, 2011
15. Maloney A *et al*, 2008
16. Robertson B and L Chilvers, 2011
17. Robertson B and L Chilvers, 2011
18. Wilkinson I *et al*, 2003; Robertson and Chilvers 2011
19. Wilkinson I *et al* 2006
20. Shaun McConkey, *pers comm*.
21. Gilbert D and L Chilvers, 2008
22. Chilvers L, 2011
23. In addition, the SQUIT squid fishery which operates principally around the Stewart-Snares shelf results in a small amount of sea lion bycatch
24. Ministry for Primary Industries, 2011
25. Ministry for Primary Industries, 2011
26. Ministry for Primary Industries, undated, Fishery Summary *Arrow Squid*, at http://fs.fish.govt.nz/Doc/21701/04_SQU_09.pdf.ashx (accessed 12 July 2012)
27. <http://www.falklands.gov.fk/Fisheries.html> (accessed 12 July 2012)
28. Ministry for Primary Industries, 2011
29. Robertson B and L Chilvers, 2011
30. Robertson B and L Chilvers, 2011
31. Ministry of Fisheries, 2011
32. See e.g Robertson B, 2011
33. Robertson B and Chilvers L, 2011
34. Roe W, 2010a
35. Ponte G *et al*, 2010 and Ponte G *et al*, 2011
36. Lyle J, 2011
37. Abraham E, 2011
38. Robertson B, 2011
39. Chilvers L, 2011
40. Ministry for Primary Industries, 2012
41. Bowen W, 2011 but see Augé A, 2011
42. Robertson B and L Chilvers, 2011
43. Department of Conservation, 2010
44. Department of Conservation, 2009
45. *Squid Fishery Management Co Ltd v Minister for Primary Industries* (CP 20/03, High Court, Wellington Registry, 11 April 2003); *Squid Fishery Management Company v MFiSh* 2004 2003-485-2706 27 February 2004 (Squid No 2; *Squid Fishery Management Company Limited v Minister for Primary Industries* CA 39/04
46. Ian West, *pers comm*.
47. Ministry for Primary Industries, 2011
48. Dawson S, 2011
49. Ministry for Primary Industries, 2011, 8
50. Thompson F and E Abraham, 2009 and Kahui V, 2011
51. Thompson F and E Abraham, 2009
52. Ministry for Primary Industries, 2011
53. Bruce Robertson, *pers comm*.
54. Robertson B, 2011
55. Ministry for Primary Industries, 2012
56. See e.g. Robertson B, 2011
57. Chilvers L, 2011

chapter seventeen



Bryde's Whale

Unbeknown to many Aucklanders, the marine area right next to the city is the home of a very unusual population of large whales. It is thought that the Bryde's whale has been resident in the Hauraki Gulf since well before humans set up residence in the area.

Description

The Bryde's whale is a baleen whale (meaning that it filters food through baleen 'plates' in its mouth), and a type of rorqual. Rorquals have grooved throats, and are the largest type of baleen whale – the family includes the blue whale and the minke whale. Female Bryde's whales usually grow to between 12 and 15 metres long, whilst males are slightly smaller. They have a sleek, dark grey body with a white underside.

Bryde's whales look very similar to sei whales, and prior to 1972, the two species were not distinguished in international whaling statistics.¹ However, it is now known that they are different species, and can be distinguished by the fact that the Bryde's whale has three prominent longitudinal ridges on the rostrum in front of the blow hole, whereas the sei whale has only one ridge. The heads of Bryde's whales are very large, making up about a quarter of the body. They have an erect dorsal fin located far down their backs.²

Historically, the taxonomy of the species has been somewhat confused. The Bryde's whale was first identified in 1878 and given the name *Balaenoptera edeni*. In 1913 *Balaenoptera brydei*, or the Bryde's whale, was identified. The name was taken from Johan Bryde, the Norwegian consul to South Africa who was involved in the creation of the first whaling station in Durban in 1908.³

Originally it was thought that *B. edeni* and *B. brydei* were the same species. Recent studies have confirmed that these are two distinct sub species – the Bryde's whale *B. brydei* is larger and usually inhabits offshore areas, and the Brydes/Edens whale *Balaenoptera edeni* is smaller and tends to prefer coastal areas. For the purposes of this paper, the term Bryde's whale is used to cover both of these subspecies. In addition, a 2003 study identified a further subspecies: the Omura's whale (*Balaenoptera omurai*), which is a pygmy version of the Brydes whale and is thought to occur only in the western Pacific and southeast Asia.⁴

Bryde's whales are usually observed alone or in pairs, and occasionally in groups of up to 20, around feeding areas. They dive for around five to 15 minutes, and can reach depths of up to 300 metres, although they spend much of their time

at depths of less than 10 metres.⁵ The whales usually swim at speeds of one to six kilometres per hour, but can reach up to 19 to 24 kilometres per hour. Bryde's whales display unusual and apparently erratic behaviour compared to other baleen whales: for example they change direction for unknown reasons, and surface irregularly. They feed on plankton, crustaceans and schooling fish such as anchovies, herring, sardines and mackerel.

Bryde's whales become sexually mature at eight to 13 years of age. They are thought to breed every other year, apparently in any season but frequently in autumn. They nurse their calves for up to 12 months.

Distribution

Bryde's whales are found in the Pacific, Indian and Atlantic oceans and in coastal locations around the world.⁶ Unusually for a rorqual, the Bryde's whale does not migrate to cold polar waters each summer but inhabits tropical and subtropical waters year-round, preferring waters warmer than 20 degrees centigrade. For this reason it is sometimes known as the 'tropical whale.'

The number of transient, resident or migratory whales in the Hauraki Gulf, their reproductive rates and natural mortality levels are not fully understood. A photo identification catalogue of Bryde's whales is held at the University of Auckland and this is helping scientists to develop a better understanding of the population.⁷

It is estimated that there are around 46 resident and 159 transient Bryde's whales in the Gulf.⁸ The resident population is unusual. Although it was previously assumed that these whales being resident in a coastal area must be the coastal subspecies, *B. edeni*, it has since been genetically confirmed that the whales are in fact the larger and usually oceanic subspecies, *B. brydei*.⁹ As University of Auckland scientist Dr Rochelle Constantine explains: "*We seem to have an offshore species of Bryde's inshore. They've decided the gulf is a good place to stay where they can reliably get enough food and give birth to their calves.*"¹⁰

The Hauraki Gulf is particularly attractive to the Bryde's whale because of its influence from two climatic and oceanographic systems. There are onshore winds and a warm southward-flowing East Australian Current in summer, and an upwelling of cooler nutrient-rich water following periods of offshore winds, in winter and spring. These help form productive plankton-laden water in the inner Gulf, which create ideal conditions for the development of large communities of small pelagic fish, which in turn provide an excellent food source for the Bryde's whale.¹¹

Bryde's whales are known to inhabit the whole of the Hauraki Gulf between Whangaparaoa and the Coromandel Peninsula. However, the area east of Great Barrier Island has not been studied in detail, so it is possible that whales are also common in that area. All year round, whale densities are significantly higher in the inner parts of the Gulf, in water warmer than 14 degrees. They are particularly concentrated in areas around headlands intersecting the East Australian Current.¹²

Conservation status

The Bryde's whale is currently listed as data deficient by the IUCN.¹³ The New Zealand population of Bryde's whales is listed as a nationally critical threatened species by the Department of Conservation because the population is small (less than 200 animals) and predominantly reliant on one location (the Hauraki Gulf).¹⁴

Threats

Historically, the Bryde's whale was not commonly targeted by whalers due to its relative lack of blubber, but it was taken in the years before the global whaling moratorium, as populations of other species collapsed. In New Zealand, a short-lived whaling programme took place on Great Barrier Island between 1956 and 1963, which, although taking mainly humpback whales, also took 19 Bryde's whales.¹⁵

Although hunting is now not a threat to the Bryde's whales in the Hauraki Gulf, they are threatened by other human activity. Like all rorquals, the Bryde's whale communicates using low frequency sound, so anthropogenic noise may disrupt their means of communication. In addition, Bryde's whales in the Hauraki Gulf have been known to die as a result of entanglement in mussel farm gear. The New Zealand Whale Stranding Database indicates that three whales are suspected to have died in this way since 1979.¹⁶

However, the most significant threat to the Bryde's whale in the Hauraki Gulf is vessel strike. The problem is viewed as extremely serious by the International Whaling Commission, who in 2010, came to Auckland to hold a workshop to investigate the problem further.

The Hauraki Gulf, as the primary sea access to Auckland, contains some of the busiest shipping lanes in New Zealand. Increasing numbers of ferries, cruise ships, container vessels and recreational vessels use the area.

Between 1996 and 2012, 42 Bryde's whale mortalities were recorded in the National Whale Stranding Database, with a further three reported dead but without their carcasses being recovered. The mortalities have occurred at all times of the year and include roughly equal numbers of male and females.¹⁷ Of the recorded mortalities, 19 are known or suspected to have been caused by vessel strike, and 16 of these were almost certainly caused in this manner.¹⁸ This means that an average of two Bryde's whales per year have been killed by vessels since 1989, a significant and concerning number, given the small size of the population.¹⁹

However, the problem is probably more serious than these figures indicate. It is likely that a significant number of deaths are not documented and consequently the figures are probably an underestimate of the mortality due to vessel strike in the Hauraki Gulf.²⁰ Rorquals have only a thin blubber layer compared to other whales, so their carcasses sink after death, and may wash out to sea or away from the area where the strike occurred. Similarly, injured animals may swim away from the area before dying. Although some carcasses may rise to the surface during decomposition, at this point it is often difficult to ascertain the cause of death. Conversely, critically ill animals may be more prone to vessel strike in the first place, and thus it is also difficult to be certain that vessel strike was the cause of death in itself.

The high number of Bryde's whale mortalities in the Hauraki Gulf relative to other cetacean species (87 per cent of mortalities are Bryde's whales)²¹ reflects, in part, the fact that the population is resident there. However, somewhat unfortunately given the nature of the area in which the New Zealand whale population has chosen to make its home, the data suggests that Bryde's whales are generally more susceptible to vessel strike than other whales. A recent study using D tags (which are electronic data loggers that are temporarily attached by suction cups to a whale and remain for up to 24 hours) has shown that the whales spend 90 per cent of their time in water less than 10 metres deep. Given that large container ships can draw up to 12 metres, the whales are almost always under threat of being hit by a vessel.²²

In addition, although Bryde's whales are very active during the daytime when they spend considerable periods of time foraging, at night they tend to remain closer to the surface and move more slowly – an indication of resting behaviour. Thus, Bryde's whales are particularly susceptible to vessel strike at night, when vessel crews are even less likely to spot a whale in their path.²³

Many types of vessel are implicated in vessel strike – from private recreational boats and whale watch boats to ferries, container ships and cruise ships. In New

Zealand, two of the recorded whale mortalities evidenced the 'zipper'-type marks that suggest an injury caused by the propeller of a small boat. On a global scale, ferries and whalewatch boats consistently obtain higher reported incident rates.²⁴ This may be due partly to these vessels operating in shallow areas where whales are more likely to be found. It may also be due to the fact that crews of ferries and whalewatch boats are more likely to be aware of, and to report, collisions. Crews of larger vessels such as container ships, are unlikely to spend time looking out for whales, and may be unaware that a collision has occurred due to the small relative size of the whale in comparison to the ship.²⁵

Theoretically, the bigger and faster the vessel is, the greater the probability that it could fatally injure a whale. The larger vessels passing through the Hauraki Gulf may draw up to 12 metres, which does not leave much room for a whale to dive to avoid a collision. In addition, it has been shown that a large number of fatal vessel strikes occur when vessels travel at 14 knots or more. Vanderlaan and Taggart have shown that the greatest rate of change in probability of lethal injury to whales²⁶ occurs between 8.6 and 15 knots.²⁷ Under 8.6 knots, the probability that a collision would be fatal was 20 per cent. At 15 knots, the probability was 80 per cent.²⁸

The growth in vessel activity in the Hauraki Gulf means that the threat is likely to grow in significance. Currently, around 2,000 ships call at the Port of Auckland each year, but this is projected to increase. The port has adopted a long term growth rate of 5 per cent per annum, equating to an increase from processing 886,000 containers per year in 2008 to 4,221,000 containers per year by 2040. Increases will be achieved through accommodating larger vessels and greater numbers of ship calls.²⁹ Similarly, the number of people living on the Gulf Islands is projected to grow, with increases in ferry traffic to service the residents, and likely growth in the 150,000 recreational vessels currently using the waters.³⁰

Management and protection

A range of measures have been used to manage the threat of vessel strike overseas. For example, regulations have been successfully implemented off the eastern seaboard in the USA and Canada to protect the North Atlantic Right Whale. The measures used include establishing traffic separation schemes, areas to be avoided by vessels and speed restrictions.³¹

The enclosed geography of the inner Hauraki Gulf, and the sightings of Bryde's across much of the area, means that establishing areas to be avoided or

traffic separation schemes for vessels entering the Port of Auckland may not be practical and/or effective in reducing collisions with whales. However, vessel speed restrictions could reduce fatalities in the event that whales are hit. In addition, crews could be encouraged to maintain a good lookout for whales, and to warn other vessels over the radio when whales are sighted. However, reporting requirements are unlikely to resolve the problem, because whales are found at the shallowest depths at night when they are unlikely to be seen.

At present there are few rules governing the speed of vessels in the Hauraki Gulf, with speed mainly determined by vessel size and capability. In open water, container ships generally travel at between 15 and 22 knots, tankers and cargo ships at between 12 and 17 knots and fishing vessels between eight and 12 knots.

Local Government Act 1974

The Auckland Regional Council Navigation Safety bylaw, which came into force on 1 July 2008, does govern the navigational safety of all craft and persons within the Auckland region (which encompasses the coastal marine area extending 12 nautical miles offshore). However, it does not place any restrictions on the speed of vessels in the Hauraki Gulf beyond stating that generally vessels should not travel faster than five knots within 200 metres of the shore, with the exception of ferries requiring high speed shore access. For these vessels, fast ferry lanes have been identified which are used by ferries capable of travelling over 15 knots. In addition, Ports of Auckland restricts vessels under pilotage to a speed of 15 knots outside North Head and 10 knots west of North Head.

In any event, such a bylaw probably could not directly address the issue of Bryde's whale strike. Under section 684B of the Local Government Act 1974, the regional council is empowered to make bylaws regulating navigational safety in its marine area, but only for:

- Generally regulating and controlling for the purposes of navigation and safety, the use or management of ships (including the mode and place of their mooring, anchoring, position unmooring and removal)
- Regulating and controlling, and preventing nuisance arising from, the speed, use, anchoring, mooring and management of ships and seaplanes

The purposes of bylaws under this section are therefore restricted to 'navigation and safety,' which is unlikely to include the impact on environmental matters such as the threat to whales, unless it is also a safety issue for the vessel. However,

there are other potential tools which could be used to manage the issue, which are summarised in Figure 17.1 and described in the sections below.

Figure 17.1: Regulatory tools available to address Bryde’s whale ship strike

Authority	Legislation	Regulatory Tool
Minister of Transport (assisted by Maritime NZ)	Maritime Transport Act 1994	Maritime rules
Regional Council and Minister of Conservation (assisted by the Department of Conservation)	Resource Management Act 1991	Rules and policies in regional coastal plan Conditions attached to resource consents
Minister of Conservation (assisted by the Department of Conservation)	Marine Mammals Protection Act 1978	Marine mammal sanctuary and associated rules Regulations

Maritime Transport Act 1994

The Minister of Transport, supported by Maritime New Zealand, is responsible for regulating shipping activity under the Maritime Transport Act. The purposes of the Act include: to enable the implementation of New Zealand’s obligations under international maritime agreements; to ensure that participants in the maritime transport system are responsible for their actions; and to protect the marine environment

Under Section 36, the Minister is empowered to make maritime rules for a number of purposes, including:

- Ensuring environmental sustainability (with the term ‘environmental sustainability’ not defined in the Act)
- Any matter related to the Minister’s objectives under section 5A (“to promote protection of the marine environment ... to administer New Zealand’s participation in the conventions and any other international maritime or marine protection convention, agreement or understanding to which the Government of New Zealand is a party ...”)

Despite the broad power to make maritime rules in order to protect the marine environment, in practice the focus of Maritime New Zealand’s work is maritime safety, and as such no maritime rules relating to environmental protection have been developed thus far.

Maritime New Zealand is also responsible for discharging many of New Zealand's obligations as a member of the International Maritime Organisation (IMO). The IMO is the United Nations' specialised agency responsible for improving maritime safety and preventing pollution from ships. It has also issued guidance on measures to minimise the risk of ship strike.³²

The International Convention for the Safety of Life at Sea provides for the IMO to establish and adopt ship routing measures to contribute to safety of life at sea, safety and efficiency of navigation, and/or protection of the marine environment. This means that member states can apply to the IMO to have domestic regulation of vessel movements adopted by the IMO. Although the large majority of measures adopted by the IMO are voluntary, IMO recognition has the benefit of ensuring that domestic rules are communicated at the international level. This is important when the vessels and crews frequently using the area are foreign. The mechanism has been used successfully off the east coast of the USA to establish areas where the northern right whale is protected.

Resource Management Act 1991

Under the Resource Management Act, the Auckland Council has a role in managing the environmental impacts of vessel activity in the Hauraki Gulf. Under the Act, every regional council is responsible for, in respect of their coastal marine area:

- The control of activities in relation to the surface of water
- The establishment, implementation and review of objectives, policies, and methods for maintaining indigenous biological diversity

The Council can control activities of vessels within the Hauraki Gulf, through rules and accompanying policies in its regional coastal plan, as well as through attaching conditions to resource consents. Section 12 provides that *“no person may carry out any activity in any coastal marine area or in relation to any natural and physical resources contained within any coastal marine area”* in a manner which contravenes a national environmental standard, a rule in a regional coastal plan, or a rule in a proposed regional coastal plan for the same region (if there is one) unless the activity is expressly allowed by a resource consent.

The Minister of Conservation also plays a role, through approving any provisions in the regional coastal plan. When preparing its regional coastal plan or issuing resource consents, the Council must achieve the purpose of the Resource Management Act, and operate within the policy framework provided by Part 2 of the Act and national policy statements prepared under it.

The purpose of the Act is to promote the sustainable management of natural and physical resources. Sustainable management means “*managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while:*

- (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
- (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment (defined as all forms of plants and animals).”*

Section 6 sets out matters of national importance which the council is required to recognise and provide for and these include “*the protection of ... significant habitats of indigenous fauna.*” Almost certainly, the Hauraki Gulf would constitute a significant habitat for the Bryde’s whale (which is indigenous fauna), under this provision.

Policy 11 of the New Zealand Coastal Policy Statement requires councils to protect indigenous biological diversity in the coastal environment, including avoiding adverse effects of activities on indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists. Bryde’s Whale is listed as ‘nationally critical’ and therefore falls within this provision.

Councils are required to give effect to this policy ‘as soon as practicable’ (it came into force on 4 November 2010). Under section 30(d), they are to do this by amending the regional coastal plan if required, to give effect to the policy. The regional coastal plan currently contains no provisions to protect the Bryde’s whale.

Marine Mammals Protection Act 1978

The purpose of the Marine Mammals Protection Act, as set out in its long title, is “*to make provision for the protection, conservation, and management of marine mammals within New Zealand and within New Zealand fisheries waters.*” The Department of Conservation has responsibility for administering the legislation, and therefore for the overall protection and conservation of Bryde’s whales.

Under section 22 of the legislation, the Minister of Conservation can declare a marine mammal sanctuary in any place, apart from within a maritime park, national park, reserve or marine reserve. When declaring the sanctuary, the Minister may specify the activities that may or may not be engaged in within the sanctuary, and may impose restrictions in respect of the sanctuary. This

means that a marine mammal sanctuary could be declared over the Hauraki Gulf (excluding areas of existing marine reserves) and rules could be attached to it to control vessel movement within the sanctuary.

Alternatively, it may be possible for regulations to be promulgated under the Act to manage ship strike. Section 28 of the Act states:

- (2) The Governor-General may, from time to time by Order in Council, make such regulations as the Governor-General in Council *thinks necessary or expedient for the protection, conservation, or management of any marine mammal.*
- (3) Any regulations under this section may apply generally throughout New Zealand or New Zealand fisheries waters or may be made to *apply only within such area or areas as may be specified in the regulations.*
- (4) Any regulations under this section may confer on the Minister or on the Director-General power to issue, in such manner as may be prescribed, *instructions, orders, requirements, permits, authorities, or notices* for the purpose of ensuring the protection, management, or conservation of any marine mammal and, where the regulations so provide, any such instruction, order, requirement, permit, authority, or notice shall have effect according to its tenor and shall be complied with by all persons affected by it.

The effect of the section is that regulations can be made if ‘necessary or expedient’ to protect any marine mammal including Bryde’s whale. They can apply to a ‘specified’ area such as the Hauraki Gulf. They can include requirements and/or permits such as those regulating vessel routes and speeds. Regulations were promulgated under this section to manage the impacts of marine mammal tourism and there seems no reason why regulations could not also be promulgated to address ship strike.

To date, no actions have been taken under the Marine Mammals Protection Act to address ship strike impacts on the Bryde’s whale.

Efforts to resolve the issue

In 2008, two University of Auckland scientists presented a paper on the Bryde’s whale ship strike issue to the meeting of the Scientific Committee of the International Whaling Commission in Santiago, Chile. The paper concluded that “... *potential measures to mitigate strike accidents, could contribute to a reduction in the number of future fatalities.*”³³

This alerted the Commission to the whale ship strike issues in New Zealand, and the following year the Chairman of the Commission’s Ship Strike Working

Group travelled to Auckland to attend a stakeholder workshop held in November. The workshop attendees identified a range of action points including:³⁴

- Improve the quality of reporting and consolidate the reporting process
- Improve necropsy and disposal of ship struck whales
- Develop a section on ship strike for inclusion in the Department of Conservation standard operating procedure on whale strandings
- Develop a targeted programme of research
- Develop an information/education package
- Investigate possible mitigation options of particular relevance to the Hauraki Gulf

As a result of the workshop, a leaflet was developed for users of the Hauraki Gulf.³⁵ It advises that commercial vessels should *“where possible reduce speed to 10 knots or below when within [the Hauraki Gulf area]... this may be possible when the vessel is proceeding into anchor, or the vessel has time available before its scheduled arrival on the pilot station.”*

In addition, more effort was put into obtaining necropsy information from whale carcasses so that the cause of death could be determined. Also, in April 2010, University of Auckland scientists began a research programme which involved attaching suction-cup D-tags to several Bryde’s whales in order to obtain more information about their movements and behaviours. However, no progress was made on mitigation options ‘of particular relevance to the Hauraki Gulf.’

In September 2011, a dead Bryde’s whale was spotted floating in the Hauraki Gulf by a Great Barrier Airlines pilot. A fishing boat then towed the carcass to the Coromandel Peninsula and a necropsy was undertaken to establish the cause of death. The veterinary team discovered that the whale had broken ribs, 15 fractured vertebrae and extensive bruising, injuries almost certainly caused by ship strike. The incident received high profile in the local news.³⁶

In late January 2012, another Bryde’s whale was found floating dead close to Waiheke Island. Necropsy results again indicated that the whale was killed by ship strike. This second death, occurring so soon after the one the previous year, heightened public concern. The report presenting the findings of the University of Auckland tagging research was finally released in February 2012. This indicated that the whales spent more than 90 per cent of their time in shallow depths where they were particularly susceptible to vessel strike.³⁷

In March 2012 the University of Auckland, the Hauraki Gulf Forum and the Environmental Defence Society jointly convened a further workshop with the relevant parties to try to identify a way forward. At the conclusion of the workshop, the key stakeholders agreed to work together in an endeavour to resolve the issue. Discussion are continuing, but by the time of writing, no concrete action had been taken to reduce the risk to the whales.

Conclusions

Until recently, the Bryde's whale in New Zealand was one of the least researched large whales in the world. The presence of Bryde's whale in the Hauraki Gulf was only identified in the late 1950s, as a result of efforts to hunt them. It was not until the mid-1990s, when stranding reporting improved, that the first probable ship strike fatality of a Bryde's whale was recorded.

Although there had been some patchy work to record sightings of Bryde's whale earlier, it was only in 1999 that a properly designed study was undertaken to identify the abundance and location of Bryde's whales. The results of this research were not published by the Department of Conservation until 2007, but when the report did finally emerge, it highlighted for the first time the risk to the whales from ship strike.

University of Auckland marine mammal scientists started to take an interest in the whales, and in 2008 alerted the international community to their plight through a presentation to the Scientific Committee of the International Whaling Commission. Although the Chairman of the Commission's Ship Strike Working Group subsequently visited New Zealand to investigate the issue, this failed to result in concrete action to protect the whales.

By the time of writing this report, such action was yet to occur. One of reason for the slow response by statutory agencies is the overlapping jurisdictions of the Minister of Conservation (and Department of Conservation), Minister of Transport (and Maritime New Zealand) and Auckland Council in this area. Each agency would prefer that another take the lead and incur the associated costs and political risks.

Figure 17.2 Timeline of actions to address ships strike on Bryde's whales

1956	Whaling commences in Hauraki Gulf from a shore station on Great Barrier Island Bryde's whale first identified in the Hauraki Gulf through examination of carcasses from the Great Barrier Island whaling station
1963	Whaling ceases in the Hauraki Gulf
1996	First probable ship strike fatality of a Bryde's whale recorded in whale stranding database
1999	First aerial survey undertaken to establish the abundance and location of Bryde's whales in the Hauraki Gulf and along the north-eastern coast
2007	Research report published by the Department of Conservation refers to three likely Bryde's whale fatalities as a result of ship strike
2008	University of Auckland scientists make a presentation to the Scientific Committee of the International Whaling Commission on the Bryde's whale ship strike issue
2009	Chairman of the International Whaling Commission's Ship Strike Working Group attends a stakeholder workshop in Auckland to consider the whale strike issue
2012	University of Auckland, Hauraki Gulf Forum and the Environmental Defence Society convene a workshop of key stakeholders to discuss measures to address Bryde's whale ship strike

Endnotes

1. IUCN Red List <http://www.iucnredlist.org/apps/redlist/details/2476/0> (accessed 31 July 2012)
2. NOAA Fisheries Office of Protected Resources, *Brydes Whale (balaenoptera edeni)*, <http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/brydeswhale.htm> (accessed 31 July 2012)
3. Hutching G and C Walrond, 2009
4. NOAA Fisheries Office of Protected Resources, *Brydes Whale (balaenoptera edeni)*, <http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/brydeswhale.htm> (accessed 31 July 2012)
5. Constantine R *et al*, 2012
6. Reilly S *et al*, 2008
7. See Wiseman N, 2008
8. Constantine R *et al*, 2012
9. Behrens S and R Constantine, 2008, 2
10. Quoted in Cumming G, 2009
11. Baker A and B Madon, 2007
12. Baker A and B Madon, 2007
13. Reilly S *et al*, 2008
14. Department of Conservation Threat Classification System List
15. Baker A and B Madon, 2007
16. Behrens S and R Constantine, 2008
17. Behrens S and R Constantine, 2008
18. Constantine R *et al*, 2012
19. 'Look Out Whales About: Important Information for Commercial and Recreational Hauraki Gulf Users Regarding Whales in the Hauraki Gulf Area', Auckland Regional Council
20. Behrens S and R Constantine, 2008
21. Constantine R and S Behrens, 2010
22. Constantine R *et al*, 2012
23. Constantine R *et al*, 2012
24. Behrens S and R Constantine, 2008
25. Behrens S and R Constantine, 2008
26. Note that this study related to the Northern Right Whale, but has been referenced in New Zealand discussions about the Bryde's whale.
27. Vanderlaan A and C Taggart, 2007
28. Vanderlaan A and C Taggart, 2007
29. Ports of Auckland, 2008
30. Auckland Council, *Hauraki Gulf Islands Strategic Plan*
31. Silber G *et al*, 2012
32. International Maritime Organisation, 2009, *Guidance document for minimising the risk of ship strikes with cetaceans*, 31 July, MEPC.1/Circ.674
33. Behrens S and R Constantine, 2008, 10
34. Government of New Zealand, 2010
35. 'Look Out Whales About: Important Information for Commercial and Recreational Hauraki Gulf Users Regarding Whales in the Hauraki Gulf Area', Auckland Regional Council
36. Jeffries L, 2011, 'Whale killed by ship', *Waiheke Marketplace*, 21 September, at <http://www.stuff.co.nz/auckland/local-news/waiheke-marketplace/5660139/Whale-killed-by-ship>
37. Constantine R *et al*, 2012

chapter eighteen



Bottlenose Dolphin in Fiordland

The bottlenose dolphins in Fiordland live at the southern limit of their worldwide range. The three resident groups are highly isolated, rarely venturing away from their core habitat. As a result of their isolation, the dolphins have developed particular physical and behavioural characteristics that make them unique among bottlenose dolphin populations. Although a lack of historical research means that our understanding of these populations is incomplete, studies have indicated that at least one population is in decline.

Distribution

Bottlenose dolphins (*Tursiops truncatus*) are an extremely adaptable species. Populations range from large pelagic groups to small coastal populations, and are found all around the world, in tropical zones and between latitudes of about 45 degrees north to 45 degrees south.

There are three resident groups of bottlenose dolphins within the Fiordland area: one group ranges around the northern fiords, including Milford Sound; another is found within Thompson and Doubtful Sounds; and a third within Dusky and Breaksea Sounds. Individual dolphins from each group only rarely interact with each other, although dolphins from Doubtful Sound have been spotted outside their core range more frequently in recent years.¹

The waters of Fiordland are much colder than the sub-tropical and tropical climates inhabited by most bottlenose dolphin populations, lying at the southern extreme of bottlenose dolphin distribution. This is not only because they are located much further south, but also because of the layer of cold freshwater which overlays the sea in the inner fiords.

Fiordland is one of the wettest places on earth. The annual rainfall exceeds 6,200 millimetres in Milford Sound and 6,700 millimetres on Wilmot Pass which drains into Doubtful Sound. The rain pours off the steep-sided mountains and floods the inner fiords, accumulating tannins from the humic material on the forest floor, and creating a layer of up to four metres thick. This freshwater can be warmer than the sea water in summer, but it is colder than the sea in winter, and at times freezes. This tannin-stained top layer attenuates sunlight, reducing available light and allowing deep water organisms to flourish closer to the surface.

Description

Fiordland bottlenose dolphins are thought to have the same genetic structure as other bottlenose dolphins, but their high degree of isolation and the fact that they operate at the limit of their physiological range, have given them particular physical characteristics. They are larger than other bottlenose dolphins, with rotund bodies and comparatively short flukes, fins and rostrum.² These appear to be adaptations to the cold environment, enabling the dolphins to reduce heat loss.

The dolphins exhibit different behavioural characteristics to other bottlenose dolphins, which they have developed as a result of their isolation. Bottlenose dolphins studied elsewhere live in very fluid 'fission-fusion' social systems, where the membership of dolphin groups change frequently. In contrast, the Fiordland dolphins form strong and long-lasting bonds with other individuals, both male and female.³ They are also found in much larger groups than elsewhere, that can comprise the whole population. In addition, the Fiordland dolphins use pebbly areas for bodily rubbing, something found in very few dolphin populations elsewhere.⁴

The dolphins' behaviour changes in response to water temperature. In winter they avoid the cooler areas in the inner regions of the fiords, staying further out to sea, whilst in summer they breed in the warmer waters in the inner areas of the fiords.⁵ This seasonally driven behaviour is very rare for bottlenose dolphins. The dolphins eat sub-tidal reef fish and dive to around 200 metres, feeding individually or cooperatively.

Females become sexually mature at 12 years old, and can start reproducing then, although possibly with limited success for the first few years. Males also become sexually mature at 12 years, but because of competition, are unlikely to start reproducing until the age of 18. The average calving interval is one offspring every three years (with a range of two to five years). In Fiordland, calving is strongly seasonal, whereas in tropical regions calving occurs for 10 to 12 months of the year.

Conservation status

Bottlenose dolphins are classified as 'nationally threatened' in the Department of Conservation's threat classification system.⁶ This system makes population assessments at the national level only, so in this case, includes all of New Zealand's bottlenose dolphins. However, in 2011 the IUCN assessed the Fiordland sub-

population of bottlenose dolphins as critically endangered, the most severe conservation rating internationally before 'extinction in the wild.'⁷

The inaccessibility of the fiords, and the consequent difficulty and expense of studying the dolphins there, means that population studies have only been undertaken for some of the populations. The northern fiords are the most inaccessible and as a result detailed studies have not been undertaken for this group.

Limited population studies have been carried out on the dolphins in Dusky Sound, but an abundance estimate in 2008 indicated that there were around 102 dolphins residing there,⁸ whilst an abundance estimate in March 2010 estimated that there were 113 dolphins.⁹ At the time of writing, population data for 2011 and 2012 had not yet been published.

The Doubtful Sound population has been subject to more detailed studies. These charted a decline in the population of 34 to 39 per cent over the 12 year period ending in 2007, by which time there were only an estimated 56 individuals remaining.¹⁰

The population decline is understood to be caused by poor survival rates of calves in their first year of life. Between 1994 and 1999, the survival of calves born in Doubtful Sound, was similar to that of bottlenose dolphins in wild populations studied elsewhere. Just over eight out of ten calves were still alive after one year (with 67 per cent surviving their first two years of life).¹¹

Then, in 2008, research showed that although the number of calves born each year had remained relatively constant, survival rates for calves had declined to extremely low levels, from the 86 per cent calculated in the late 1990s to only 38 per cent. This is thought to be the lowest estimate of calf survival rate ever reported for bottlenose dolphins (see Figure 18.1).¹² There had also been a reduction in the survival of calves between one and three years of age.¹³

The current low levels of calf survival are believed to be significant for the Doubtful Sound. There are fewer females reaching sexual maturity, which in turn, impacts upon the number of calves being born in the next generation. Such a rapid loss of population numbers, could both reduce genetic diversity, and result in the loss of social cohesion amongst the group. Social cohesion and strong bonding is unique amongst the Fiordland bottlenose dolphins and likely contributes to their survival in such a hostile environment.¹⁴

Figure 18.1 Summary of calf survival rates recorded for bottlenose dolphin populations

(Source Currey R, 2008)

Location of bottlenose dolphin population	Level of human intervention	Calf survival rate
Mikura Island, Japan	Wild population	0.866
Doubtful Sound, New Zealand (1994 and 1999)	Wild population	0.8621
Sarasota Bay, Florida	Wild population	0.811
Monkey Mia, Australia	Wild population	0.76
Various	Captivity	0.61-0.666
Monkey Mia, Australia	Regular feeding of wild population	0.44
Doubtful Sound, New Zealand (2002 – 2008)	Wild population	0.375

In 2010, the Doubtful Sound population had sustained a small increase in the population, to number 57 individuals.¹⁵ Despite this recent increase, it is not clear that the overall decline in the population has been reversed. Forthcoming work by Shaun Henderson of the University of Otago, suggests that the mortality rate of calves, is driven by the health of the females giving birth in any particular year. The population includes generations of ‘good’ mothers which are able to give birth to and raise healthy calves, and generations of ‘bad’ mothers which are unable to do so. The significant drop in calf survival in 2002 is thought to be linked to ‘bad’ mothers giving birth that year, whilst ‘good’ mothers gave birth in 2010.

Threats

A range of anthropogenic influences have been identified as potential causes of stress in the Doubtful Sound dolphins. These include vessel-based tourism, freshwater discharge from the Manapouri power station tail race, reduced food supply, disease and genetic limitations. However, it is still not clear what the relative importance of each potential threat is. The findings of scientific research designed to illuminate reasons for the population decline have not always been accepted by managers or stakeholders, and there have been disagreements amongst the scientists themselves on the relative importance of stressors.

Tourism

Fiordland is one of New Zealand's top tourism destinations both for international travellers and New Zealand visitors, and the numbers grew rapidly year on year, until the global economic crisis hit in 2008. Whilst visitor numbers are now flat or declining, it is expected that they will continue to increase, when economic stability returns.

In general, the main aim of tourists visiting Fiordland is to experience the beauty and wilderness of the area, and many take a scenic cruise. Doubtful Sound and Milford Sound are accessible for day trips, whilst multi-day tours can venture further afield, for example into Dusky Sound.

The first cruises on Doubtful Sound started in 1954 when local couple Les and Olive Hutchins bought the Manapouri-Doubtful Sound Tourist Company. The cruise was part of a four day excursion which included a cruise across Lake Manapouri, a trek up the hill and then down into Doubtful Sound across Wilmot Pass, a stay at a lodge in Deep Cove and a cruise on Doubtful Sound.¹⁶

During the late 1990s, the tourism industry in Fiordland started to flourish. Milford Sound became very busy, and tourists seeking a genuine wilderness experience, started to filter into the more remote Doubtful Sound. In 1999, during the height of the summer season, four vessels and one kayak company operated daily tours, with up to six cruises occurring on the fiord daily. One vessel continued to operate during winter months. The tourism industry continued to grow steadily. In 2002, 450,000 people visited Fiordland (primarily Milford Sound), being 58 per cent of all visitors to Southland.¹⁷

By 2006, the level of activity had further increased. Tourism in Fiordland had become extremely important for the regional economy, accounting for 12 per cent of all jobs in Southland, and generating \$368 million per year.¹⁸ There were eight tourism operators running cruises on Doubtful Sound, with up to seven vessels and two kayaking groups (one with a support boat) on the water each day.¹⁹

By 2009 there were more than one million tourists visiting the Fiordland region, with just over 70 per cent being international tourists. These were mainly from Australia, the United Kingdom and the USA. This figure was predicted to rise to 1.26 million visitors in 2016, although continuing global economic uncertainty makes it likely that this figure will not be achieved until the global economy recovers.²⁰

Studies from around New Zealand have shown that the presence of vessels can disrupt normal dolphin behaviour.²¹ Similarly, Lusseau found that interactions

with boats in Milford Sound and Doubtful Sound disrupted feeding and resting behaviour, and increased the amount of time the dolphins spend travelling.²²

Lusseau also found that when boat presence in Milford Sound became too frequent, so that there was less than 68 minutes between visits, the dolphins avoided the area altogether. During the late 1960s, prior to the development of a modern tourism industry, the dolphins were regularly sighted in the upper reaches of Milford Sound during the summer months. But now the dolphins appear to be spending significantly less time in Milford Sound during tourism peak seasons, avoiding the fiord entirely when boat activity is at its peak, and diving deeper and longer when boats are in the area.²³

Boat strike may pose a further threat to dolphins, especially when they are resting (which is when their brain activity is at a low ebb), which they do for at least half of every day.²⁴ A study undertaken between 2000 and 2002 showed that eight to 10 per cent of dolphins in Milford Sound bore propeller scars and other injuries caused by boats.²⁵

Increased vessel traffic also results in elevated noise levels in the fiords. A 2008 study found that noise levels in Milford and Doubtful Sounds were not high enough to produce permanent hearing damage in cetaceans. However, they were loud enough to produce temporary shifts in hearing sensitivity, and to introduce the behavioural changes that have been observed in other marine mammals subjected to vessel noise (e.g. changing activity more frequently, directional changes and group dispersion). The low salinity layer in the fiords forms a sound duct, trapping high frequencies, and sound levels were found to be highest in the top one metre of water.²⁶

Manapouri power station tailrace

Meridian Energy (and its predecessor the Electricity Corporation of New Zealand) has operated the Manapouri hydroelectric power station since 1969. The power station takes fresh water from Lake Manapouri to generate energy and discharges it into Deep Cove in Doubtful Sound. The Manapouri power station is a significant source of revenue for Southland, generating \$276 million in 2006. The electricity is sold to Rio Tinto for use at the Tiwai Point aluminium smelter, with the remainder serving the national grid.²⁷

Although rainwater running off the land meant that some freshwater was already finding its way into the fiord, creating the low salinity layer which characterises the marine environment in the area, the opening of the power

station tripled the amount of freshwater going into Doubtful Sound. The majority of the extra water is believed to flow down the main part of the fiord.²⁸

In 2002, a second tailrace was opened. Unexpectedly high levels of friction between the water and the walls of the first tailrace, had meant that the power station was not able to process the expected level of water, so it was unable to operate at its consented capacity. The new tailrace allowed Meridian to operate at full capacity, providing for an increase in the amount of water that could be processed, from 450 cubic metres per second to 510 cubic metres per second.²⁹

In May 2009, Meridian Energy applied for resource consent to further increase the amount of water that could be discharged via the tailrace at Deep Cove, by 2.6 per cent per year. The application was granted in 2010, for a period of 21 years.³⁰ This extra capacity allows Meridian to make use of additional water available in Lake Manapouri during times of heavy rainfall. It is a condition of Meridian's consent that Lake Manapouri must be maintained within specified levels, so the consent cannot be exercised unless levels in the lake are unusually high. At the time of writing, Meridian has not yet had an opportunity to utilise this additional capacity.

The extra freshwater may have impacted on the dolphins in several ways. First, it has altered the sub-tidal community structure within Doubtful Sound, reducing species richness,³¹ which together with historical fishing practices may have reduced the amount of prey available to the dolphins.³² This is potentially significant, given that the dolphins appear wholly reliant for their food on ecological productivity within the fiord itself.

Secondly, the additional freshwater discharge has changed water temperatures within the fiords. This is because the freshwater layer changes temperature with the seasons to a greater extent than seawater. The freshwater layer can be as cold as 8 to 10 degrees in winter and spring (and occasionally freezing over in winter) and as warm as 14 to 16 degrees in summer, while the seawater below stays at a more moderate 13 to 15 degrees.³³ The dolphins are already operating at the edge of their ecological capacity and these seasonally lower temperatures may exceed their ecological tolerance.

Thirdly, the freshwater discharge may be particularly detrimental to the dolphins, due to the seasonal calving pattern they have developed in response to the increase in seawater temperature in spring and summer. The highest tailrace flow is in spring, when snow is melting from the mountains, and this coincides with mothers entering the latter stages of pregnancy and the birth of the first calves. The low snowmelt temperatures may be beyond the physiological tolerance of newborn calves. They are small, with thin blubber, and so are particularly

susceptible to the cold. Furthermore, the thermal conductivity of freshwater is greater than seawater. This means that a dolphin will lose heat more quickly in freshwater than in seawater of the same temperature. Newborn calves rarely dive below the freshwater layer to the warmer water below. During the spring, the dolphins have been found to be furthest from the tailrace, apparently trying to avoid it.³⁴

The strong correlation between the decline in calf survival in Doubtful Sound, and the opening of the second tailrace, led researchers to believe that the tailrace must be a relevant factor in the decline in calf survival rate.³⁵ Following the publication of the research, Meridian Energy commissioned reports to examine the potential effect of the power station on the dolphins. These suggested that the researchers' conclusions may be flawed, because although the second tailrace came online in May 2002, there was no increase in the overall discharge of water until July 2003. Prior to this, discharge rates were higher for 16 per cent of the time, but were lower at other times so that the overall discharge did not increase.³⁶ Recent work by Henderson has indicated that, in fact, the condition of the particular set of mothers giving birth in 2002 may explain the drop in calf survival that year. Nevertheless, it remains possible that the freshwater discharge is a relevant factor in the overall decline of the population.

Management and protection

Despite being one of the most studied marine mammal populations in New Zealand, and a number of threats to the dolphins being recognised, there is still no consensus about what is causing the population decline in Doubtful Sound. There is also limited understanding of population trends in the other two Fiordland populations.

It seems likely that a combination of factors is responsible for the decline in Doubtful Sound. This makes it harder for agencies working on a science-based approach to management to identify appropriate responses. Strongly diverging views reported by scientists have not helped to encourage action, as authorities are reluctant to curtail commercial activity unless there is clear evidence of cause and effect.

Much of the management response has focused on the potential impacts of vessel-based tourism on the dolphins and this is managed both under the Marine Mammals Protection Act and the Resource Management Act. The Fiordland coastal

marine area is also a statutory acknowledgement area under the Ngāi Tahu Claims Settlement Act 1998. In addition, the Fiordland Marine Guardians, recognised in statute by the Fiordland (Te Moana o Atawhenua) Marine Management Act 2005, are community representatives who advise central and local government agencies on how to manage the Fiordland marine environment.

Ngāi Tahu Claims Settlement Act 1998

Schedule 102 of the Act sets out the statutory acknowledgement for Te Mimi o Tu Te Rakiwhanoa (Fiordland Coastal Marine Area). This acknowledges Ngāi Tahu's cultural, spiritual, historic and traditional associations with the area.

The fiords of this region represent, in tradition, the raised up sides of Te Waka o Aoraki. The waka (canoe) foundered on a submerged reef and its occupants, Aoraki and his brothers, Rāraki, Rakiroa and others, were turned to stone. They stand now as the highest peaks of Kā Tiritiri o te Moana (the Southern Alps). The fiords at the southern end of the Alps were hacked out of the raised side of the wrecked waka by Tū Te Rakiwhānoa, in an effort to make it habitable by humans. The deep gouges and long waterways that make up the fiords were intended to provide safe havens on the rugged coastline, and stocked with fish, forest and birds to sustain travellers.

There are many places within the fiords of significance to Ngāi Tahu as recorded in the statutory acknowledgement. Doubtful Sound was regularly visited for the gathering of kakapo meat and feathers. There was a well-known nohoanga (food gathering) site in Dagg Sound which also had a good canoe harbour known as Te Ra.

Consent authorities are required to have regard to the statutory acknowledgement and to forward summaries of resource consent applications to Te Rūnanga o Ngāi Tahu. There is no specific mention of the bottlenose dolphins in the statutory acknowledgement or in the Act itself.

Marine Mammals Protection Act 1978

French scientist David Lusseau undertook the first research which focused on the potential impacts of tourism vessels on the Fiordland bottlenose dolphin populations. He undertook his field research between 1999 and 2002, and became concerned about the potential impacts of increasing vessel activity on the Doubtful Sound population.

Lusseau argued that in order to protect the dolphin population, it was necessary to place a limit on the number of trips in the fiords, and to establish areas where

resting and socialising dolphins could be protected from vessel interference.³⁷ Lusseau identified spatial areas which he thought could form the basis of a multi-level marine mammal sanctuary (see Figure 18.2). By excluding 15 per cent of the fiord from vessel activity, he calculated that it was possible to protect areas where he sighted 53.1 per cent and 48.6 per cent of dolphin resting and socialising activity respectively.³⁸ In addition, he proposed that dolphin-watching permitted operators be allowed into areas where other boats would be excluded, to provide an incentive to obtain a permit.

Figure 18.2: Proposal for a multi-level marine mammal sanctuary in Doubtful Sound to protect the bottlenose dolphin

(Source: Lusseau D *et al*, 2006)



Lusseau's proposals were not welcomed within the Fiordland community and the scientific credibility of his findings was questioned. It was suggested that the presence of the researchers themselves was likely to have affected the behaviour of the dolphins. They may also have attracted more boats to the dolphins, as

the presence of the research vessel indicated where the dolphins were.³⁹ But the concerns Lusseau raised about the dolphins' welfare did prompt tourism operators to develop marine mammal viewing voluntary codes of practice, to govern their behaviour whilst in the presence of dolphins in Milford and Doubtful Sounds. The codes of practice were first developed in 2004, and were refined in 2006, based on Australian experiences.⁴⁰

The codes set out instructions for behaviour around dolphins, but these mainly restate the provisions of the Marine Mammal Protection Regulations, by which all vessels are already bound. The codes recognise that the specific conditions in Fiordland can make it difficult for vessels to comply with the regulations. For example, in the narrow confines of a fiord, it may be difficult for vessels to avoid passing through the middle of a pod of dolphins. In addition, it may be difficult to spot dolphins in choppy seas, in order to avoid them. So the codes had at least *"partially come about as a result of practical difficulties in implementing the Marine Mammal Protection Regulations"*.⁴¹ They represent a loose agreement between the operators and the Department of Conservation to the effect that vessels can breach the regulations and in doing so will not be prosecuted.

Becoming increasingly disillusioned by the lack of action, Lusseau, Slooten and Currey presented a paper to the 58th meeting of the scientific committee of the International Whaling Commission, held in June 2006, summarising the results of the research and concerns.⁴² The paper concluded that *"...current levels of boat-dolphin interactions are highly likely to jeopardise the viability of the dolphin population within the next 30 to 70 years. That is, the population is highly likely to go extinct within the next 50 years if current trends remain."*

The paper went on to state:

*We are urging the New Zealand government to take actions to protect the small and isolated populations of bottlenose dolphins in Fiordland. We re-iterate our recommendation to establish multi-level marine mammal sanctuaries in Doubtful Sound and Milford Sound to minimise dolphin-boat interactions in these fiords and still allow the tourism industry to flourish there.*⁴³

In response, the Scientific Committee of the International Whaling Commission formally expressed agreement with the researchers' conclusions and recommended *"that the Government of New Zealand increases protection for this population and other bottlenose dolphin populations in Fiordland as a matter of urgency."*⁴⁴

This international airing of a marine mammal management issue in New Zealand, was somewhat embarrassing for the government, which prided itself on high levels of environmental management and taking an anti-whaling stance. In particular, New Zealand's approach to managing marine tourism had been held out as being one of the best in the world, because of the regulations under the Marine Mammal Protection Act requiring tourism activities targeting marine mammals to be licensed. It was also felt that the matter as presented to the International Whaling Commission had been over-simplified, failing to recognise the uncertainties surrounding the impact of tourism, and the possibility that a number of factors were responsible for the population decline.

In response to the findings of the International Whaling Commission panel, in July 2007 the Department of Conservation released a threat management discussion paper, which canvassed the various threats to the dolphins and possible management responses.

The discussion paper made clear the problems caused by tourism in Doubtful Sound and suggested that strong new measures were required to halt the decline of the dolphins.⁴⁵ It emphasised that “[t]his decline is one of the steepest ever recorded for a dolphin population that is not exposed to direct or indirect takes from fishing,” and that “the existing range and intensity of impacts” were highly likely to lead to the population becoming extinct within 45 years.⁴⁶

Sixty responses were received to the consultation document, of which 49 agreed that increased protection of the dolphins was necessary. Twenty-three respondents recommended a reduction in the number of commercial vessels, whilst 25 respondents supported measures to close areas to vessels entirely.⁴⁷

The available scientific evidence was evaluated by a ‘science panel’ consisting of Karsten Schneider, Tim Markowitz and Helene Marsh. The scientists recommended a range of measures. One member recommended the establishment of a marine mammal sanctuary, while the two others both supported the establishment of areas from which vessels would be excluded. All members of the panel recommended the regulation of both commercial and recreational vessels.⁴⁸ This panel provided its findings to a ‘tools panel’ which developed management options for consideration.

Whilst recognising that there were a range of potential threats to the dolphin population, management options focused on addressing the impacts of commercial tourism operators, as theirs was the most high profile threat and the easiest to address.

The product of the threat management process was a Voluntary Code of Management for all vessel operators in Doubtful Sound, formalised in January 2008. This built on earlier versions of the voluntary code and added new measures that would provide further protection for the dolphins.⁴⁹ The consensus view was that voluntary measures would be quicker and easier to implement than changes to the regional coastal plan or the establishment of a marine mammal sanctuary. This proposal was supported by the Fiordland Marine Guardians which promotes a bottom-up, community based management approach. In addition, the support and cooperation of the operators was considered vital to ensure compliance in an area where monitoring and enforcement costs are high.

The Code provides for 'Dolphin Protection Zones' where motorised vessel activity is limited. These zones extend 200 metres from shore in regions of the fiord that include some of the population's most critical habitats (see Figure 18.3). If dolphins are not visible within this zone, entry is permitted by the most direct route for reasons such as viewing of shore features, access to anchorages and diving/fishing spots, or agency management work. If dolphins are spotted once the vessel is in the zone, it should leave immediately. Non-motorised vessels such as kayaks are allowed into the dolphin protection zones. The rationale for this is that the impact of kayaks and similar vessels is different, as they are quieter and travel much more slowly.

The large majority of commercial operators in Fiordland have been issued with marine mammal viewing permits under the Marine Mammals Protection Act. These enable them to advertise marine mammal watching as part of their trips. These permits are not used to manage the intensity of vessel activity as such, which is left to provisions in the regional coastal plan. They do enable the Department of Conservation to levy the operators, in order to fund research into tourism impacts on marine mammals, including the Fiordland bottlenose dolphin populations. Under the Code, permit holders in Doubtful Sound have agreed on a voluntary moratorium to forgo their right to seek encounters with the dolphins. All vessels outside the dolphin protection zones (and kayak encounters in the zones) must be left to chance and on the dolphins' terms.

In addition, the Code provides that commercial operators will ensure that their staff are fully trained in order to comply with the Code and the Marine Mammal Protection Regulations, and that marine mammal log books which log vessel routes and marine mammal sightings, will be kept and forwarded to the Department of Conservation monthly. Commercial operators are also expected

Compliance with the Code was reviewed in May 2009. The Department of Conservation found that compliance was mixed, including disregard for the dolphin protection zones by one operator, and inconsistencies in filling out log books. The review found that the dolphin protection zones could have resulted in a reduction in vessel dolphin interactions of up to 29 per cent.⁵⁰

The Department of Conservation also undertakes a 'mystery shopper' programme (usually undertaking 20 to 30 trips per year) in which a Departmental staff member poses as a member of the public on a commercial operator's tour. The mystery shopper carries a GPS tracker and reports any breaches of the Code and regulations. This programme has resulted in two instances where operators have been challenged about their behaviour, but no prosecutions under the regulations.

In addition to the voluntary Code of Management, the Department of Conservation's threat management discussion paper sets out the need for greater research into other potential threats. The Department has a two-year research programme, updated every year, which sets out research priorities. Each marine mammal viewing permit holder is required to pay a levy of up to 20 cents a passenger to fund research into marine mammals in Fiordland. The vast majority of the funding has, in the past, been allocated to the study of bottlenose dolphins in Doubtful Sound. Much of the current funding is allocated to the monitoring of the populations in Dusky Sound and Doubtful Sound.

The Department of Conservation has recently developed a Memorandum of Understanding with the University of Otago which provides for a joint research programme, whereby the University of Otago provides student time and the Department of Conservation provides funding, so that the resulting data can be possessed by both parties.

A condition of the permit granted to Meridian Energy in 2008, to increase freshwater discharge into Doubtful Sound, requires Meridian to fund research into the impact of the freshwater on the dolphins. At the time of writing a 'bottlenose dolphin research forum' including the Department of Conservation and Meridian Energy has met twice.

Resource Management Act 1991

Environment Southland has the prime responsibility for managing commercial vessel activity in Fiordland under the Resource Management Act. In accordance with the Southland Regional Coastal Plan, all operators must obtain a resource consent in order to run a water-based commercial operation in Fiordland.⁵¹

Chapter 16 of the regional coastal plan sets out the council's policies in relation to surface activities on Fiordland's internal waters, reflecting the desire of Environment Southland to carefully manage tourism volumes in the fiords (see Figure 18.4). The plan sets out the resource consent categories for some activities in parts of the fiords. Commercial surface water activities are limited, so that in some areas they are a discretionary activity, in some areas they are non-complying, and in some they are prohibited.

Commercial day trips and multi-day backcountry trips are subject to different caps and consent categories. This approach recognises the fact that a significant number of visitors to Fiordland go there specifically seeking a wilderness experience, which is impacted upon by the presence of large numbers of day trippers.

Because Milford Sound already receives very high visitor numbers, which has diminished the sense of remoteness, the plan allows tour boat volumes to grow there largely unconstrained. In contrast, there is a cap on vessel activity in parts of Doubtful Sound. On Doubtful Sound itself, Thompson Sound and Crooked Arm east of Turn Point, commercial day trips are a discretionary activity provided that the total number of day trips taken by all operators does not exceed five. The cap is lower in other arms of the fiord. All trips in Doubtful Sound have been fully allocated.⁵² There is no cap on activity in Dusky Sound, but applications for resource consents will be considered in accordance with Environment Southland's policy that the wilderness values of Dusky Sound should be retained.

Cruise ships are also permitted to enter Milford Sound and Thompson Sound (exiting via Doubtful Sound) provided that they are party to the *Environmental Partnership, Deed of Agreement* between the New Zealand Cruise Ship Industry and Environment Southland. Under the agreement, cruise ship operators are required to comply with environmental standards and pay a levy of 35 cents per gross registered tonne plus GST per visit to Fiordland, up to a cap of \$31,500 per visit. This money is used by Environment Southland to fund management of the coastal area. It is particularly valuable because much coastal land in Southland is public land, and therefore not subject to rates which would otherwise need to be used to fund such activity. During the 2011/2012 cruise season there were 87 visits, generating \$1.68 million dollars in marine fees. This figure is projected to rise to about 100 visits and \$2.2 million in 2012/13.⁵³

As indicated, the primary management goal for the council is to maintain the wilderness experience for visitors who seek this environment. This approach has indirect benefits for the ecosystem of Fiordland, including dolphin welfare, as it has the effect of limiting commercial vessel activity in some areas, and prohibiting

cruise ship activity in several of the fiords. However, the regional coastal plan makes no reference to the need to consider the dolphin population in decision-making under the plan. In fact, there is no mention of the issues facing the Fiordland's dolphins in any of the Council's planning documents.

Figure 18.4 Policies in the Southland Regional Coastal Plan to manage vessel traffic in Fiordland

- *Policy 16.2.2* limits the extent and number of commercial activities that can be undertaken in Fiordland, in order to preserve the natural character, landscape and amenity values, specifically remoteness and tranquillity.
- Under *Policy 16.2.3* commercial day trips are excluded from parts of Doubtful Sound – these are Gaer Arm, Bradshaw Sound, First Arm and Crooked Arm west of Turn Point. The reason for this policy is to provide areas where people who are actively experiencing the environment or seeking a backcountry experience can do so without interruption from people who are mainly there for scenic reasons. The policy emphasises that day trip activities principally affect the values that people place on the areas, rather than causing other environmental damage.
- *Policy 16.2.4* states that the amount of surface water activity in Milford Sound is not to be restricted – the reason for this is that Milford Sound is well established as a scenic attraction 'attracting up to 3,000 visitors per day', and the current level of use has diminished the Sound's remoteness and tranquillity values, so that 'any extension of this type of use will not have significant additional adverse effects on these values, although the council will continue to monitor this situation.'
- *Policy 16.2.9* provides for commercial surface water activity to use Doubtful Sound and Thompson Sound where it is necessary to pick up or offload passengers to or from shore, access services, wharves or launching areas, travel from one arm of Doubtful Sound to another, offload cargo and uplift stores, and carry out activities associated with the construction and maintenance of Manapouri power scheme and tailrace.

A stronger national policy framework has recently been put in place in order to better protect threatened species in the coastal environment, through the 2010 New Zealand Coastal Policy Statement. Policy 11 requires councils to protect indigenous biological diversity in the coastal environment, including avoiding adverse effects of activities on indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists. Bottlenose dolphins are listed as 'nationally threatened' and therefore fall within this provision.

Councils are required to give effect to this policy 'as soon as practicable' (it came into force on 4 November 2010). Under section 30(d) of the Resource Management Act, they are to do this by amending the regional policy statement and regional coastal plan if required, to give effect to the policy. Environment Southland is in the process of reviewing its regional policy statement, with a new proposed document

publicly notified on 19 May 2012. The proposed regional policy statement does not include detail to individual species level, and the Southland regional coastal plan makes no reference to particular management measures required to address the dolphin population decline. This reflects Environment Southland's view that whilst the Resource Management Act is generalist legislation, there is special legislation for marine mammals more appropriately used to manage marine mammals, and thus the council should not cut across the responsibilities of the Minister of Conservation.⁵⁴

Conclusions

The first research designed to identify the impacts of tourism vessels on the Fiordland bottlenose dolphins commenced in 1999. In 2002, the scientists reported to the Department of Conservation that the impacts were significant, and that vessel traffic should be better managed. The same year, the new tailrace at the Manapouri power station opened, increasing the flow of freshwater into Doubtful Sound. Contemporaneously, the calf survival rate for the Doubtful Sound dolphins dropped to the lowest level on record for any bottlenose population worldwide.

Although the regional council did have restraints on vessel traffic in its regional coastal plan, these were designed to protect the wilderness experiences of tourists, and the council had not considered potential impacts on the dolphins. The plan had permitted a doubling of vessel traffic in Doubtful Sound before the cap was finally reached. It was only after the scientists took the matter to the International Whaling Commission in 2006, that the Department of Conservation took action, and prepared a threat management discussion paper the following year.

The discussion paper resulted in the development of a voluntary marine mammal code of management for vessels, as this was the most well-known threat, and perceived to be the easiest to address. The code identified several dolphin protection zones where vessels were mainly excluded. In addition, vessels agreed not to initiate interactions with the dolphins. Compliance with the code has been mixed, but it has probably reduced the number of vessel-dolphin interactions. However, it is not known if this reduction is sufficient to improve the calf survival rate of the dolphins. In addition, there is currently a downturn in the tourism industry and it is not clear that this reduction will be maintained if the industry resumes its growth pattern, as seems likely when the international economy improves.

Environment Southland has not addressed the dolphin issue for some years, leaving it to the Department of Conservation to resolve. The Council recently notified a proposed regional policy statement, that does not mention the matter or provide any proposed policies to address it. Some scientists identified the freshwater discharge as a likely contributor to the dolphin's decline, but a resource consent was granted to Meridian Energy to increase the discharge in 2009.

Although the regional council is leaving management of the issue entirely to the Department of Conservation, the Department itself is not proposing any additional management measures to address the situation. Its current approach is to commission more research and hope that this will provide clearer direction. However, there has already been 18 years of concerted scientific effort to study the Doubtful Sound dolphin population, and it remains to be seen whether further research will provide sufficient evidence of the causes of population decline for the Department to act.

Although there has been recent breeding success in the Doubtful Sound dolphin population, it is possible that this will not be maintained, as the cycle of breeding females will soon return to what have been identified as 'bad mothers' or those unable to successfully rear their calves. However, it is not yet clear why these particular females are having rearing difficulties.

The causes are likely complex and cumulative,⁵⁵ and this is a situation that both the current scientific approaches and current management system seem poorly placed to address. Science-based management requires clear scientific answers, and when these are not forthcoming, the system can become paralysed. The danger is that the most that will be achieved is charting ongoing population decline, until the sub-population of dolphins either move out of Doubtful Sound to a more favourable habitat, or become extinct.

Figure 18.5: Timeline of actions to conserve Fiordland bottlenose dolphins

1954	Vessel-based tourism begins in Doubtful Sound
1969	Manapouri hydroelectric power station opens and triples freshwater discharge into Doubtful Sound
1994	Doubtful Sound bottlenose dolphin population estimated to be 69 individuals
1999	First research undertaken on the impacts of the tourism industry on the Fiordland bottlenose dolphins
2001	Vessel traffic on Doubtful Sound starts to increase significantly. New overnight cruise ship starts operating in Doubtful Sound catering for 70 passengers
2002	New tailrace opens at the Manapouri power station increasing freshwater discharge by 9.6 per cent Doubtful Sound dolphin calf survival rate drops to 0.375, thought to be the lowest ever reported for the species world-wide Scientists report to the Department of Conservation on their findings from the tourism-impact study which reveals significant changes to dolphin behaviour as a result of vessel interactions
2004	Tourism operators develop voluntary code of practice for marine mammal viewing
2006	Scientists present their concerns about the threats to the Fiordland bottlenose dolphins to the scientific committee of the International Whaling Commission Doubtful Sound bottlenose dolphin population estimated to be 56 individuals
2007	Doubtful Sound bottlenose dolphin Threat Management Discussion Paper released by the Department of Conservation
2008	Marine Mammal Code of Management put in place for tourism operators in Doubtful Sound
2009	Resource consent granted to Meridian Energy to increase the discharge of freshwater into Doubtful Sound by 2.6 per cent
2011	IUCN Red list classifies the Fiordland sub-population of bottlenose dolphins as 'critically endangered'

Endnotes

1. Henderson S, 2010
2. Currey R *et al*, 2007, 265
3. Lusseau D *et al*, 2003, 402
4. *B & D Appleby v Southland Regional Council*, Decision of the Environment Court, 29 November 2006, C157/2006, para 49
5. Henderson S, 2010
6. Baker C *et al*, 2010

7. Currey R *et al*, 2011a
8. Currey R and L Rowe, 2008
9. Henderson S, 2010
10. Currey R, 2008
11. Hasse P and K Schneider, 2001, 676
12. Currey R, 2008, 37 and 59
13. Currey R *et al*, 2011b
14. Currey R *et al*, 2007; Currey R, 2008
15. Henderson S, 2010
16. Real Journeys, <http://www.realjourneys.co.nz/Corporate/Companybackground/> (accessed 31 July 2012)
17. Lusseau D *et al*, 2006
18. Environment Southland, 2005, Southland Tourism Strategy
19. Williams C, 2007
20. Ministry of Economic Development, 2010
21. See e.g. Constantine R, 1999; Constantine *et al*, 2003; Lundquist D, 2011
22. Lusseau D *et al*, 2006
23. Lusseau D, 2005, 270
24. Anon, 2002, 'Dolphins hit by eco-tour boats', *The Dominion Post*, 29 August
25. Lusseau D *et al*, 2002
26. Parsons S *et al*, 2008
27. Anon, 2008, 'Power hungry smelter drains lakes', *Sunday Star Times*, 24 February
28. Kath Blakemore, Department of Conservation, *pers comm*.
29. Meridian Energy, undated, *Manapouri facts and figures*, Meridian Energy Limited, Christchurch
30. Environment Southland, Coastal permit 206158
31. See e.g. Rutger S and S Wing, 2006
32. Beenjtes M and G Carbines, 2005
33. Currey R, 2008
34. Currey R and L Rowe, 2008
35. Currey R, 2008
36. Cornelison C and E Goodwin, 2008
37. Lusseau D and J Higham, 2004, 664
38. Lusseau D and J Higham, 2004, 664
39. Funnell G, Department of Conservation, *pers comm*.
40. See Australian Government, 2005, *Australian national guidelines for whale and dolphin watching* and Allen S *et al*, 2007.
41. Williams C, 2007, 29
42. Lusseau D *et al*, 2006, 177
43. Lusseau D *et al*, 2006, 177
44. International Whaling Commission, 2006, Report of the Scientific Committee, 17 June
45. Department of Conservation, 2007
46. Williams C, 2007, 6-7
47. Department of Conservation, 2007
48. Department of Conservation, 2007
49. Department of Conservation, 2008a
50. Funnell G, 2009
51. Southland Regional Coastal Plan, <http://www.es.govt.nz/plans/coast/coastal-plan.aspx>
52. Williams C, 2007, 24
53. Swinney K, Environment Southland, *pers comm*.
54. Swinney K, Environment Southland, *pers comm*.
55. Currey R, *et al*, 2011 b

chapter nineteen



Dusky Dolphin

Dusky dolphins are one of the most numerous marine mammal species in New Zealand waters, but their core habitat is threatened by a number of activities. Many dusky dolphins spend considerable time in Kaikoura, where their behaviour is disrupted by the presence of dolphin watching tour boats, and part of their time in Admiralty Bay in the Marlborough Sounds, where demand for marine farming has the potential to exclude them from their preferred habitat.

Distribution

Dusky dolphins (*Lagenorhynchus obscurus*) are found in various locations in the southern hemisphere, primarily in waters over the continental shelf. They form discrete populations off the coasts of Africa, South America, a variety of oceanic island groups and New Zealand.¹

Dusky dolphins are the second most numerous species of dolphin in New Zealand (the Common dolphin is believed to be the most numerous). They are mainly found around the South Island and southern North Island – in particular from the East Cape down to Kaikoura, and as far east as the Chatham Islands. They are commonly found at particular ‘hotspots’ – particularly around Kaikoura, the Otago Peninsula and Marlborough Sounds. Individual dolphins typically travel long distances, over 100 kilometres, and there is no evidence of discrete populations in New Zealand waters.²

In winter the dolphins sometimes follow cool water currents as far north as Gisborne,³ but they generally do not venture further north than Wellington harbour and the Marlborough Sounds, where they are often seen. During the 1970s, dusky dolphins were reported around Taranaki, but more recent reports suggest that they are no longer to be found there. There has also been one recorded sighting in the Department of Conservation cetacean sightings database, of an individual in the Hauraki Gulf, although this is an extremely rare occurrence.⁴ In summer the dolphins move further south, as far as Southland and Stewart Island.⁵

Description

Dusky dolphins are medium-sized with individuals typically growing to between 170 and 180 centimetres long. The dusky dolphins found in New Zealand are smaller than those found off Africa and South America. They start breeding at

around seven to eight years of age. Conception occurs and calves are born in late spring and early summer. Gestation lasts just over 11 months and the calves feed on their mothers' milk for around 18 months. The dolphins live up to around 35 years of age, which is a relatively long time for a smaller dolphin species.⁶

Dusky dolphins are acrobatic, performing many leaps into the air. Research in Admiralty Bay, in the Marlborough Sounds, has attempted to identify what purpose the leaping serves. This has indicated that the dolphins may make clean leaps into the air, whilst foraging, to enable them to quickly take a breath before diving underwater again to feed. Noisy leaps appear to be more related to male display behaviours.⁷

The dolphins are found in groups ranging in size from several individuals to up to a thousand. Similar to the Hector's dolphin, dusky dolphins have a fission-fusion social structure, where individual animals will move amongst different pods. Research on the dolphin's social structure in Admiralty Bay has found a high degree of 'social mixing' with group membership frequently changing. The dolphins appeared to have numerous associates, but just a few close friends.⁸

Dusky dolphins use different feedings strategies depending on the habitat and prey being pursued. Off the Kaikoura coast, the dolphins move offshore in the late afternoon and feed individually at night in the deep water over the Kaikoura canyon. They feed on a range of fish species including lanternfish, hoki, red cod and hake as well as squid. During the day, the dolphins move back to the shallower coastal waters and congregate in large groups of up to 1,000 animals to rest. Forming these large groupings is thought to be a strategy to avoid predation by orca and sharks.⁹

During winter and early spring, groups of mainly male dolphins move up to Admiralty Bay. On a typical winters' day there are about 220 dolphins in the Bay, in an area which is only around five kilometres wide across and seven kilometres long. The Bay is relatively predator free during these colder months, with orca being rare this time of year, and sharks mainly moving into the Bay during summer. Here the dolphins feed in relative safety during the day on small fish such as pilchard, anchovy, yellow-eyed mullet and sprat.¹⁰ The Bay is located just south of French Pass which has exceedingly strong currents, and these may serve to both increase the productivity of the area, and concentrate prey fish in the Bay.¹¹

The dolphins form into groups to collectively herd the small fish into tight 'prey balls' from which they can then feed. Often these balls of small fish are herded towards the surface. The largest foraging group observed consisted of 50 dolphins, but the average size is closer to eight. The dolphins feed here in association with

a range of other species including shearwaters, Australasian gannets, terns, gulls, shags, fur seals and sharks. The dolphins play an important role in the feeding success of these other species.

The herding of the fish by the dolphins, slows down the movement of their prey, and often brings them closer to the surface. This makes the fish more accessible to other species including seabirds. Seabirds are also able to identify the location of schooling fish more easily through following the dolphins, thereby benefiting from the dolphins echolocation, which is more effective in locating prey. Australasian gannets and shearwaters are the birds most commonly observed feeding with the dolphins, indicating that this inter-species association is important to them.¹²

Conservation status

Dusky dolphins are identified as ‘not threatened’ under the New Zealand threat classification system. On a global basis, the species is identified as ‘data deficient’ under the IUCN Red List threat classification system.¹³

In 2004, the population of dusky dolphins spending time in Kaikoura was estimated at 12,000 individuals, with on average just under 2,000 found there at any one time.¹⁴ The dolphins have only been intensively studied in Kaikoura and at Admiralty Bay, Marlborough Sounds.¹⁵ As such there is no population estimate for the entire New Zealand population. This is further complicated by the fact that dusky dolphins tend to move around the coast a lot, and may migrate between different areas during different seasons. For example, although there are dusky dolphins at both Kaikoura and Admiralty Bay all year round, it is apparent that in summer some dolphins move from Kaikoura to Admiralty Bay and some move from Admiralty Bay to Kaikoura. In addition, some dolphins do not travel at all and some travel from other areas.¹⁶

Threats

Aquaculture

In 2000, out of the 520 green-lipped mussel farms in New Zealand, 455 were located in the Marlborough Sounds. During the 2000s, proposals were developed to significantly increase the amount of marine farming being undertaken in

Admiralty Bay, the very location where dusky dolphins were concentrated during winter months. The area is sparsely settled with less than 20 people living in the local town of French Pass.¹⁷

There are a number of potential impacts of marine farming on dolphins. The presence of introduced structures and equipment can restrict the dolphins' movement and effectively exclude them from the area of habitat occupied by the farm. They may also disrupt the ability of dolphins to obtain visual and acoustic sensory information. Marine farming can increase the number of vessel movements and noise levels which could potentially disturb the dolphins, and disrupt natural behaviours. Because the dusky dolphins work cooperatively to herd prey fish within Admiralty Bay, disruption to communication between animals, could affect foraging success.

The farms themselves can impact on the marine environment through deposition onto the seabed as well as into the water column. The farming activity can also result in the introduction of invasive species. These effects could collectively result in a reduction of prey fish, although little is known about such effects.¹⁸

In the Marlborough Sounds, the development of green-lipped mussel farms in Admiralty Bay has excluded dusky dolphins from part of their natural habitat. The farms fringe much of the nearshore areas of the Bay (see Figure 19.1), and when marine farms are not present, the dolphins are frequently seen close to shore.

Research into the behaviour of dusky dolphins in Admiralty Bay found that dolphins now appeared to be using the areas in the vicinity of, but not in, the mussel farms for foraging. This may be because the mussel farms are attracting prey fish which the dolphins feed on. But the dolphins do not venture into the farms themselves, probably due to the presence of numerous lines and buoys which make it difficult for the dolphins to hunt cooperatively. In addition, the dolphins use the areas near farms less for travelling.¹⁹ Previous research had indicated that proposed aquaculture developments in the Bay could impact on the dolphin's winter foraging.²⁰ The implications of these findings were described by the researcher as follows:

*Dusky dolphins exploit mobile food resources and must travel between food patches. Thus, mussel farms may act as three-dimensional obstructions which impede travelling and prey-searching capabilities at and below the surface ... Ultimately, continued expansion of mussel farms in Admiralty Bay may limit available dusky dolphin habitat.*²¹

Over the past few years, the government has identified aquaculture as being a potential growth industry in New Zealand, and has put in place a strong legal and policy framework to support it. A revised New Zealand Coastal Policy Statement, which came into force in 2010, contains more explicit support for aquaculture. Policy 8 requires councils to include in regional policies and coastal plans “*provision for aquaculture activities in appropriate places in the coastal environment*” and to take into account “*the social and economic benefits of aquaculture*”, amongst other things.

In 2011, amendments to the RMA removed the need for aquaculture management areas to be provided for in regional coastal plans before a resource consent application could be lodged for a marine farm. This was intended to facilitate the allocation of more marine space to marine farms.

In April 2012, the Government’s *Aquaculture Strategy and Five-year Action Plan to Support Aquaculture* was released. This is designed to support the industry’s goal of growing annual sales to \$1 billion in value by 2025, from the current \$350 million. One of the performance measures is that 4,000 hectares of new aquaculture space will be developed by 2016. In 2010 the government established a new Aquaculture Unit within the Ministry for Primary Industries which will amongst a range of tasks, “*work with regional councils to ensure planning to identify opportunities for aquaculture growth*”.²²

Such growth of the aquaculture industry may increase conflicts with indigenous species, such as dusky dolphins, which are reliant on coastal marine habitats.

Tourism

Tourism targeting dusky dolphins at Kaikoura began in 1989. The industry quickly grew from 1,300 customers during the summer of 1990/1991 to 5,000 the following year. In 1995, 11,000 tourists swam with the dolphins. During the 2000s between 23,000 and 27,000 tourists were being taken to view and/or swim with the dolphins each year.²³

There are currently five commercial operators which are permitted by the Department of Conservation to offer tours to view or swim with dusky dolphins. Of these, three operators use planes or helicopters. Only two operators are permitted to use boats and to swim with the dolphins; Whale Watch Kaikoura which holds four permits and Dolphin Encounter which holds three permits. Currently, only Dolphin Encounter operates swim with dolphin trips. The company’s permits authorise up to 50 trips per week which can take up to 650 passengers to swim with the dolphins.²⁴

In 2010 David Lundquist completed his research into the impacts of tourism on the dolphins. He was able to analyse data spanning the period between 1984 and 2010. This provided information on the dolphins' behaviour prior to tourism becoming established in Kaikoura, as well as during the significant growth of the industry. Lundquist found that the dolphins' responses to vessels had changed significantly over time:

*As tourism grew and matured, the net speed of dusky dolphin groups slowed down, groups changed behavioural state more often, and spent a greater proportion of time milling and travelling and less time resting. Dolphin groups were sighted in slightly different core areas over time, with a greater density of sightings in shallower water near shore and at the southern end of the study area currently compared to when tourism began.*²⁵

The research was unable to determine what the significance of these changes might be in the longer term for the dusky dolphin population. However, the researchers formed the impression that the dusky dolphin population off Kaikoura was “*doing well, with no apparent decrease in numbers*”.²⁶ The population appeared to be more able to withstand the impacts of tourism than other dolphin species in New Zealand, due to the large size of groups which the dolphins formed, typically containing more than 100 animals. In addition, the dolphins regularly moved offshore and seasonally migrated along the coast, which meant that the impact of tourism on any one individual was likely to be low.

Other

There are several other potential threats to dusky dolphins. They have been found to have elevated levels of PCBs and other organochlorines. There is also a substantial by-catch of the dolphins in fishing gear. During the mid-1980s bycatch was estimated to be 50 to 150 animals each year. Six animals were reported as being caught between 1997 and 2002, but it is likely that other incidents were not reported. The current rate of bycatch is unknown.²⁷

Management and protection

Management measures have focused on the threats posed by tourism and aquaculture, but these issues are managed by different agencies and there has

been little integration between the management responses directed towards each threat.

Aquaculture

Aquaculture in Admiralty Bay is managed under the Resource Management Act. Section 6(c) of the Act requires decision-makers to protect ‘significant habitats of indigenous fauna.’ The Environment Court has confirmed that dusky dolphins are indigenous fauna and that the Bay is likely to be a significant habitat for the dolphins.

The second finding was based on evidence presented to the court that up to several hundred dolphins are present in the Bay in any winter season; that over 1000 dolphins appear to have used the Bay over a period of several years; and that individual dolphins return there year after year. If the Bay was compromised and became sub-optimal habitat for the dolphins they “*would be forced to change a routine that is likely cultural and that may have persisted for generations.*”²⁸

The rules applying to aquaculture activity are contained in the Marlborough Sounds Resource Management Plan. The plan divides the Marlborough Sounds coastal marine area into two zones (see Figure 19.1). Coastal Marine Zone One excludes marine farms which are prohibited activities.²⁹ This means that no application can be made unless the plan provisions are changed.

Coastal Marine Zone Two provides for marine farms as a discretionary activity subject to compliance with a set of standards. These require no part of the farm to be located closer than 50 metres or further than 200 metres from mean low water mark. The Plan sets out assessment criteria for marine farm applications within this zone. These refer to the consideration of ecological factors in very broad terms, but no mention is made to considering potential impacts on dusky dolphins.³⁰ This was because the provisions of the plan were developed prior to the availability of science indicating potential effects of marine farms on the dolphins. The bulk of Admiralty Bay is zoned Coastal Marine Zone 2 and therefore provides for marine farming to locate there in inshore areas.

In 2005 the Environment Court considered an appeal against two applications for new marine farms in Admiralty Bay. The two farms were to be located in the middle of bay, covering 42.25 hectares each. This was to be in addition to the existing 44 marine farms which were situated around the perimeter of the Bay. The potential impacts of the farms included broader effects on natural character as well as on the dusky dolphin habitat. The Court sat specifically to hear evidence

from Professor Bernd Würsig on the dolphin issue while he was visiting New Zealand.

In addressing the requirement under section 6(c) to protect significant habitat of indigenous fauna, the Court found that Admiralty Bay fitted within this criteria and that therefore the habitat was required to be protected for its own sake. The fact that scientists could not specify what particular harm would come to the dolphins if the farms went ahead was ‘not the point.’ The Court went on to say “*What can be said is that a substantial part of the 84.5ha of habitat would be made unusable and that, of itself, is an adverse effect even if, in terms of a percentage of the area of the whole bay, it may be quite small.*”³¹

The Court turned down the applications. However, it was not impressed with the policy framework provided by the Marlborough Sounds Resource Management Plan, finding it weak:

*Arguably its Objectives and Policies are such that what are nominally non-complying activities are effectively discretionary. Attempting to deal with what will almost certainly be an expanding demand for marine farming space on such a basis promises to be a rather fraught and expensive process. We recognise that the Council has gone some way along the path with the creation of two Coastal Marine Zones. But we offer the thought that a Plan Change with, at the very least, a set of crisper Objectives and Policies might save a great deal of time and expense in the future.*³²

In 2006, the Environment Court considered appeals for additional mussel farms in Admiralty Bay. These related to a proposal to establish a 24 hectare mussel farm in the south-western corner of the inner Admiralty Bay as well as to extend existing farms in the Bay, to both infill between them, and to extend them further out into the Bay. These extensions covered an additional 187.2 hectares of water space. At the time some 206.8 hectares (or 7.4 per cent of the Bay’s total surface area) was taken up with marine farms. The effect of these new proposals would be to more than double this area to cover around 15 per cent of the inner Bay.³³

The Court held an interim hearing to consider the issue of potential impacts on dusky dolphins. In its interim decision, the Environment Court accepted that the existing marine farms had displaced the dusky dolphins from that area of habitat, at least for feeding purposes. But that this had not, as far as could be measured, yet resulted in harm to the population. However, the Court accepted that there would be a point where the expansion of farms in the Bay would adversely affect the habitat, although it was “*not possible to precisely predict what that point was.*”³⁴

The Court was not able to definitively say that there should be no further expansion of marine farming in the Bay, although it did indicate that *“the habitat provided by the waters of the inner Bay must be approaching the point where the preservation and protection required by s6 ... become increasingly dominant factors in the balancing exercise.”*³⁶

In 2009, the Court held an additional hearing, to consider the individual marine farm proposals in Admiralty Bay. All the applications were treated as non-complying activities, because although they were within Coastal Marine Zone 2 which provided for marine farming, they failed to comply with the standard which required farms to be within 200 metres of mean low water.

In light of the Court’s interim findings, in 2006, the applications had developed novel mitigation measures to reduce the impacts on the dolphins. These involved removing the surface structures and long lines from the farms, during the winter period, when the Bay was used the most intensively by the dolphins.

One applicant also suggested that there be a three year period of baseline monitoring, to establish how many dolphins were present at different times, in the various parts of the Bay. The monitoring would be undertaken by an independent scientist who would report to, and be peer reviewed by a Marine Mammal Expert Group. After three years, the Group would determine the time period during which the farm equipment would need to be removed.³⁷

The Court found that the monitoring programme and the seasonal removal of farm structures would adequately avoid or mitigate possible adverse effects on dolphin habitat *“at least to the point where it can be said that any such effect will be minor in terms of s105(2A).”*³⁸ However, because the details of the locations, dimensions and duration of seasonal removal had not been determined during the hearing, the Court decided to defer its final decision until the results of the three year study were known.

Pressure is continuing on Admiralty Bay. In May 2012 an application by Talley’s Group, to extend a mussel farm by six hectares, was considered by a council-appointed commissioner. The application was for an area which had been granted to another farmer but which was not taken up.³⁹

Tourism

During the 1990s, the Department of Conservation decided to implement a moratorium on dolphin watching permits, until comprehensive research on the effects of existing tourism activity had been undertaken. Work was undertaken by a

Masters of Science student from Otago University,⁴⁰ and the results of the research prompted operators to agree to a voluntary two hour 'time off' period, during the middle of the day between December and March. This has been in place since 1999, although compliance has been mixed. The tours which use helicopters and planes do not comply with this rest period.

The Director General of Conservation also agreed that there should be no increase in dolphin watching effort at Kaikoura, and a moratorium was placed on the issuing of new permits for a period of ten years, to 3 November 2009. Existing swim permits were also modified so that they all allowed the same number of swimmers, which was thirteen.⁴¹

The 10-year moratorium on new commercial dolphin watching permits expired in 2009. In anticipation of the expiry of the moratorium, the Department of Conservation commissioned a study to inform its decision about what to do next. The study focussed on changes to dusky dolphin behaviour in the presence of vessels and aircraft, and made 12 recommendations regarding future management of dusky dolphin tourism at Kaikoura.⁴²

The report found that the behavioural changes caused by the presence of boats were likely to be short term, and thus unlikely to affect long term health of the population. It noted that the dusky dolphin population is resilient because of the large pod sizes, the fact that they inhabit a wide area, feed at night (when not interrupted by tour boats) and undertake seasonal migrations. This means that they are, theoretically, only in the presence of tour boats for part of the year. Nevertheless, the report noted numerous warning signs, through changes to behaviour, which suggest that tourism is reaching its sustainable maximum. Therefore it was recommended that no new boat-based permits should be issued for a defined period.

The report found that aircraft-based dolphin watching causes minimal disturbance to the dolphins because the aircraft only remain with the dolphins for a few minutes at a time. Similarly, kayak-based dolphin watching was found to cause minimal disturbance because of the absence of engines. Thus, applications for permits for these types of activity could be considered. It was recommended that increasing the area in which Encounter Kaikoura could operate, to south of the Conway River, would have a no more than minor effect on dolphins.

It was recognised that the dolphins do rest during the middle of the day, an activity that is essential to their wellbeing. Although a voluntary rest period during summer months had generally been observed by commercial operators,

the report recommended that it should be made compulsory and increased to include October and November.

The report also recommended establishing a maximum number of swimmers, which would be spread across all vessels present, rather than allowing a maximum number of swimmers per vessel. This was to account for the times when a large number of vessels are in the company of the dolphins. The Department of Conservation found that this was not a practical approach, as it would be too difficult to enforce.

The researchers found that the most significant effect on dolphin behaviour was observed after the vessel had approached the dolphins four times. The report recommended that permits should enforce an individual vessel approach limit of four times. It was also found that dusky dolphin behaviour is most disrupted by swimmers when they are dropped into the water ahead of the dolphins. Therefore, it recommended that this practice should be specifically prohibited.

Following the publication of the report and a public consultation process the Director General of Conservation declared, pursuant to regulation 15 of the Marine Mammals Protection Regulations 1992, that no new permits would be granted for dusky dolphin viewing off the Kaikoura coast for a period of five years. Exceptions to this were aircraft, kayaks launched from the shore on the Kaikoura Peninsula and an extension to the area of operation for Encounter Kaikoura.

The Director General also indicated his intention to amend existing dusky dolphin watching permits at Kaikoura, as recommended in the report, to:

- Increase the number of swimmers from a maximum of 13 swimmers per vessel to 18 swimmers per vessel
- Limit the number of swim attempts per trip to a maximum of four
- Extend the 11:30-13:30 rest period (currently from December to March) to include October and November each year and make it a mandatory condition of all boat-based permits
- Prohibit boats dropping swimmers off in the front of approaching dolphin pods.⁴³

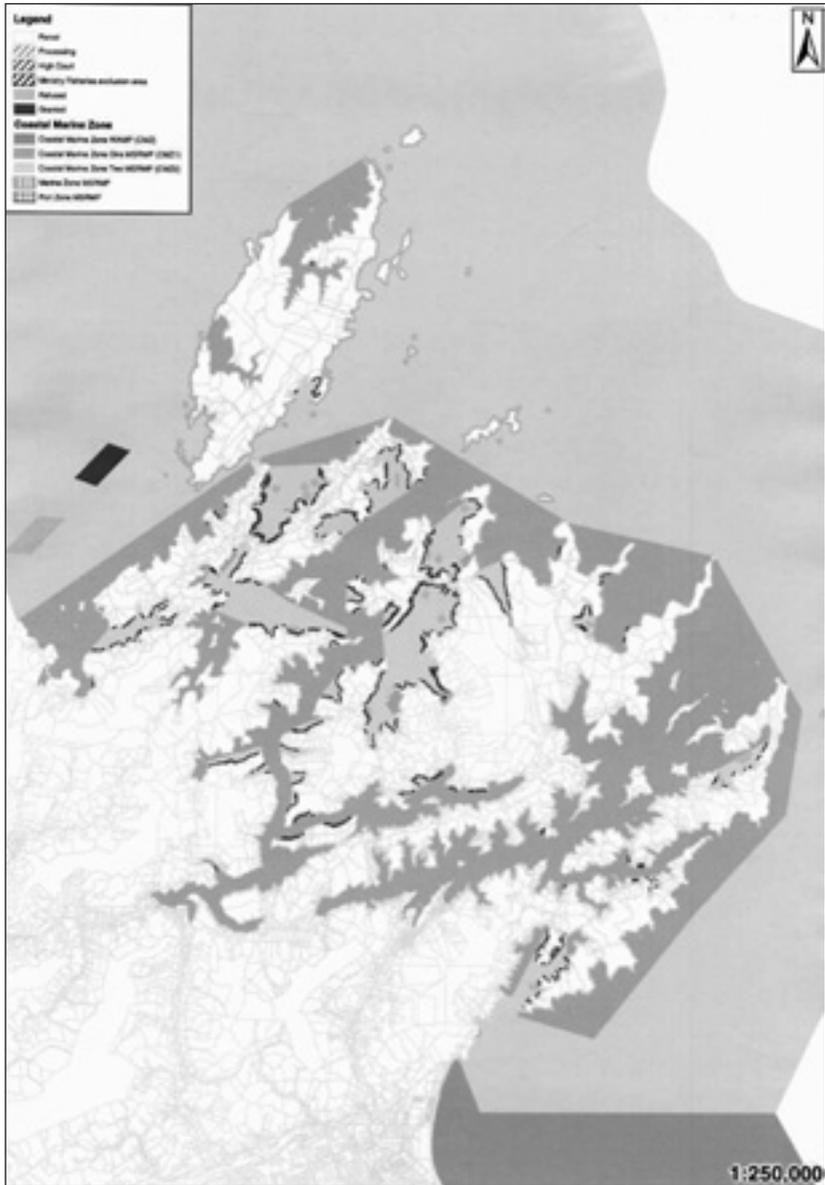
Conclusions

Unlike the other marine mammals, which are the subject of case studies in this report, dusky dolphins are not currently classified as a threatened species. The main pressures on them are tourism and aquaculture. Tourism impacts have been managed, through imposing a moratorium on new permits, until research to determine the impacts of tourism activity could be undertaken. The research indicated that the dolphin population appears healthy. However, once the research results were available, the Department of Conservation moved quickly to implement the recommendations through a further partial moratorium and strengthening of conditions attached to permits.

The provisions of the Marlborough Sounds Resource Management Plan do not address the impacts of aquaculture on the dusky dolphins, but the Environment Court has considered such impacts, through applying section 6(c) of the Resource Management Act which refers to protecting “significant habitat of indigenous fauna”. In doing so, the Court turned down applications to place marine farms in the centre of Admiralty Bay. The Court has also indicated that the provisions of the plan are weak and need to be revised. Such a revision has yet to be undertaken by the Marlborough District Council.

Pressure to expand aquaculture in Marlborough Sounds is likely to continue, and until the Marlborough Sounds Resource Management Plan is reviewed to address the impacts of such activities on the dusky dolphins, further habitat of importance to them may be lost.

Figure 19.1 Zoning for aquaculture in the Marlborough Sounds Resource Management Plan



Endnotes

1. Lundquist D, 2011, 7
2. Würsig B *et al*, 2007, 9-10
3. <http://www.iucnredlist.org/apps/redlist/details/11146/0>
4. Annual Distribution of Dusky Dolphin nabis.govt.nz web mapping tool <http://www.nabis.govt.nz/Documents/Annual%20distribution%20of%20Dusky%20dolphin%20Lineage.pdf>
5. Te Ara summary <http://www.teara.govt.nz/en/dolphins/2>
6. Würsig B *et al*, 2007, 15; Shelton D, 2006, 7
7. Pearson H, 2008, 45
8. Pearson H, 2009, 1444
9. Würsig B *et al*, 2007, 13
10. Shelton D, 2006, 56
11. Markowitz T *et al*, 2004, 146
12. Vaughn R *et al*, 2010, 213; Pearson H, 2009, 1438; Vaughn R *et al*, 2008, 1052
13. Baker C *et al*, 2010, 105
14. Würsig B *et al*, 2007, 13
15. Würsig B *et al*, 2007
16. Annual Distribution of Dusky Dolphin, nabis.govt.nz web mapping tool <http://www.nabis.govt.nz/Documents/Annual%20distribution%20of%20Dusky%20dolphin%20Lineage.pdf>
17. Markowitz T *et al*, 2004, 135 and 146
18. Markowitz T M *et al*, 2004, 135
19. Pearson H, 2008, 29-30
20. Markowitz T *et al*, 2004, 146
21. Pearson H, 2009, 1443
22. New Zealand Government, 2012
23. Lundquist D, 2011, 75
24. Lundquist D, 2011, 10; Würsig B *et al*, 2007, 15
25. Lundquist D, 2011, 97
26. Markowitz T *et al*, 2009, 87
27. Lundquist D, 2011, 8
28. *Friends of Nelson Haven and Tasman Bay and others v Marlborough District Council* W36/2006, para 3
29. Rule 35.6, Marlborough Sounds Resource Management Plan
30. Rule 35.4.2.9, Marlborough Sounds Resource Management Plan
31. *Kuku Mara Partnership (Admiralty Bay West; Admiralty Bay East) v Marlborough District Council* W037/05, paras 57 and 58
32. *Kuku Mara Partnership (Admiralty Bay West; Admiralty Bay East) v Marlborough District Council* W037/05, paras 86
33. *Marlborough Aquaculture Limited and Friends of Nelson Haven and Tasman Bay Inc v Marlborough District Council* W027/2009, paras 1-4
34. *Friends of Nelson Haven and Tasman Bay and others v Marlborough District Council* W36/2006, para 16
35. *Friends of Nelson Haven and Tasman Bay and others v Marlborough District Council* W36/2006, para 18
36. *Marlborough Aquaculture Limited and Friends of Nelson Haven and Tasman Bay Inc v Marlborough District Council* W027/2009, paras 1-4
37. *Marlborough Aquaculture Limited and Friends of Nelson Haven and Tasman Bay Inc v Marlborough District Council* W027/2009, paras 12-16
38. *Marlborough Aquaculture Limited and Friends of Nelson Haven and Tasman Bay Inc v Marlborough District Council* W027/2009, para 17
39. Wardle P, 2012, 'Talley's Group bid to extend farm opposed', *Marlborough Express*, 20 May, 5
40. Barr K and E Slooten, 1999
41. Dusky Dolphin Watching Review Kaikoura
42. Markowitz T *et al*, 2009
43. Department of Conservation, Outcome of dusky dolphin tourism review, Kaikoura, available at <http://www.doc.govt.nz/getting-involved/consultations/results/outcome-of-dusky-dolphin-tourism-review/>

APPENDICES





Establishment

The Department of Conservation is the lead agency in New Zealand for marine mammal conservation. It was established in 1987 as a national conservation agency, primarily tasked with managing New Zealand's publicly-owned conservation land, but also with overseeing the management of marine reserves and protected species.

Under the Conservation Act 1987 the Department's responsibilities include:

1. To manage for conservation purposes, all land, and all other natural and historic resources, for the time being held under this Act, and all other land and natural and historic resources whose owner agrees with the Minister that they should be managed by the Department
2. To advocate the conservation of natural and historic resources generally
3. To promote the benefits to present and future generations of
 - a. the conservation of natural and historic resources generally and the natural and historic resources of New Zealand in particular; and
 - b. the conservation of the natural and historic resources of New Zealand's Sub-Antarctic islands and, consistently with all relevant international agreements, of the Ross Dependency and Antarctica generally; and
 - c. international co-operation on matters relating to conservation

As well as these functions, the Department took over the administration of other conservation-orientated legislation, including the Marine Mammals Protection Act and the Marine Reserves Act 1971. In 1991, the Minister of Conservation also took on the role of preparing the New Zealand Coastal Policy Statement and approving regional coastal plans under the Resource Management Act.

By the early 1990s, the Minister and Department had acquired a significant and important role in managing marine conservation issues. However, the Department's ability to address marine issues, including pressures on marine mammal populations, has been limited by the resources available to it and the frequent structural changes that it has experienced.

Early years

When it was first set up, the Department was largely staffed by people from the former agencies of the Department of Lands and Survey, the New Zealand Forest Service, the Department of Internal Affairs and the Ministry of Agriculture and Fisheries. It struggled to meld the assortment of staff and activities it inherited from the pre-existing agencies into a cohesive unit. It also lacked sufficient funding, being expected to generate a significant proportion of its income through adopting a 'user pays' policy. From its inception, the Department was riven with internal conflicts, budget deficits and constant management changes, and this made it difficult to get on with the job of conservation.

During its first three years of life, for example, the Department had three different Ministers and three Directors General. It went through a major restructuring in 1989, only two years after its establishment. As a result, 188 staff were made redundant, a management tier was removed, and regional conservators reported directly to the Director General. A minor review during 1993 and 1994 led to a further 38 staff being made redundant to save costs.¹ Funding was so tight that, by 1995, 'vehicles were put up on blocks owing to lack of funds for running them.'²

A defining point in the Department's history was the Cave Creek disaster in April 1995, when a viewing platform in the Paparoa National Park collapsed killing fourteen people. The political fallout was significant, absorbing much management and staff attention, and the Department went through another restructuring a year later. This reduced the number of conservancies from 14 to 13 and established three regional offices.

Despite all this turmoil, the early years of the Department of Conservation was a pioneering phase for marine mammals protection, with committed individuals seizing the opportunity to make real conservation gains. Only eighteen months after the Department was established, in December 1988, the first marine mammal sanctuary under the Marine Mammals Protection Act was established. This was located around the Banks Peninsula and was designed to protect the Hector's dolphin from being entangled in set nets.

When in 1989 the first marine mammal tourism business was established in Kaikoura, Departmental staff were keen to ensure that the industry was well managed, and in 1990 developed the marine mammals protection regulations. These set up a permitting system for marine mammal tourism and were considered to be ahead of their time. In 1993, the Department created a head office staff

position focused on managing the marine mammal tourism permitting process. At that stage all permits required the approval of the Director General.

In the early years, a small marine research unit was established within the Department to focus on marine issues. It included a sea lion research programme which had been transferred over from the Ministry of Agriculture and Fisheries and a seabird research programme transferred from the Wildlife Service. The scientists were generally left to follow their own individual research interests, and these did not necessarily align with management needs. There was little funding to support the establishment of new initiatives.

In October 1995, a conservation services levy system was established under the then Fisheries Act 1983. This enabled the government to levy the fishing industry for the costs of providing 'conservation services' which included research on the effects of fishing activity on protected species and on measures to mitigate these effects. This provided the Department of Conservation with a badly needed additional source of funding for marine mammal research, although it was only available where there were fisheries conflicts.

When new provisions were inserted into the Marine Mammals Protection Act and fisheries legislation in October 1996, to provide for the preparation of population management plans, the scope of the conservation services levy system was expanded to enable the fishing industry to be levied for the cost of developing the new plans. A marine conservation unit was established at the Department of Conservation's Head Office.

Establishment of national marine mammal coordinator

As marine mammal tourism activity increased, and fisheries conflicts with marine mammals gained higher profile, the Department created a dedicated role in the Wellington Central Regional Office for a national coordinator for marine mammals. The position was established during the 1996 restructuring and the role involved oversight of the more than 120 marine mammal tourism operators around New Zealand, fisheries by-catch of Hector's dolphins and the New Zealand sea lion, and the management of marine mammal strandings. This was a large role for one person to manage and a second person was eventually brought in to help. The two staff members worked with the 13 conservancies in an endeavour to address marine mammal issues. Some, but not all, conservancies had dedicated marine-focused

staff members. They did not usually have a marine mammal science background, and often relied on assistance from scientists located at the Department's head office, when issues affecting marine mammals arose in their areas.

In 1997, approval of marine mammal permits was delegated to the Department's regional office in Hamilton. Although Departmental staff recognised that the marine mammal regulations urgently needed revising, this was not given sufficient priority and was never successfully achieved. In 1998, during a further restructuring, the marine conservation unit was disbanded.

Establishment of Marine Conservation Unit

In July 2003 a new Marine Conservation Unit was established within the Department of Conservation with a dedicated manager. This was designed to provide greater focus on marine reserves and species protection. The new unit incorporated the national marine mammal coordinator as well as the conservation services levy programme. Other functions focused on marine reserves and coastal management under the Resource Management Act 1991.

This increased focus on the marine area was facilitated by an additional \$11.5 million received by the Department under the government biodiversity strategy funding package. The money was to promote the establishment of additional marine reserves to reach the national target set out in the biodiversity strategy of *“protecting 10 per cent of New Zealand's marine environment by 2010 in view of establishing a network of representative protected marine areas.”*³ Marine reserves were consequently a major focus of the new unit.

In 2005, the Department's marine science capability was incorporated into the marine conservation unit. At that stage the expertise of the Department's marine mammal scientists mainly focused on the New Zealand sea lion and fur seals. Alan Baker, who had undertaken work on the Hector's dolphin, had helped establish the Maui's dolphin as a new sub-species and who had undertaken initial survey work on the Bryde's whale, had retired in 2003. The merger appeared to have some financial motivation. The marine conservation unit was well-resourced with biodiversity strategy money and the scientists had long been starved of funding.

The merger was ultimately not successful. The scientists were used to a considerable amount of personal autonomy. The marine conservation unit was tightly managed. Differences in culture led to infighting. There were leaks of

confidential information from the unit. There were also internal conflicts over proposals to tag Maui's dolphin to provide better management information.

Despite the turmoil, the unit achieved a major success for marine mammal conservation when extensive set net bans were announced around the coast to protect the Hector's and Maui's dolphins in 2008. But at the same time, the marine reserves programme was running into trouble. This became evident with the Great Barrier Marine Reserve proposal which was ultimately turned down by the Minister for Primary Industries in May 2008. This was an expensive and embarrassing failure for the Department, which had spent five years and much resource on endeavouring to establish the reserve.

Reduction of marine capacity

In 2008 the marine conservation unit was disbanded during a Departmental restructuring aimed to address a \$8 million shortfall in funding. The functions of the unit were redistributed throughout the organisation and four marine science positions were lost.

As a result, the marine protection capability in the Department's head office was reduced to a small marine conservation section, which was situated several layers down the hierarchy, being part of the Aquatic and Threats Unit which was in turn part of the Research and Development Group. The total marine mammal science capacity had been reduced to one remaining New Zealand sea lion scientist.

In July 2009, the Director General of Conservation advised that the Department would no longer make applications for new marine reserves. He stated, *"This Government has signalled that it doesn't think the department should be both applicant and decision maker over Marine Reserves (MR) and I would expect, consistent with that policy, that marine reserves will be applied for by third parties and the department will be the processor of those."*⁴

In 2011, the marine conservation section developed a very new strategy towards marine conservation entitled *PlanBlue*. This heralded a significant shift in the Department of Conservation's approach to marine conservation, towards the development of a web-based marine information tool. This was designed to *'contribute to decision-making about marine conservation stewardship. The PlanBlue programme promotes making information on marine values (biodiversity,*

economic, social and cultural) accessible to decision-makers as they consider issues, including ecosystem integrity indicators and marine pressures.”⁵

The release of an updated population estimate for the Maui’s dolphin, in early 2012, was a wake up call for the Department. Only 55 dolphins, more than one year of age, were thought to be surviving. The dolphin appeared headed to extinction on the Department of Conservation’s watch. The loss of the dolphin would not only be a national tragedy for New Zealand, but would also be highly embarrassing for the country internationally.

Figure A1.1: Summary of key events in the Department of Conservation’s history

Date	Event
1987	Department of Conservation established
1988	Banks Peninsula marine mammal sanctuary established
1989	Major restructuring with 188 redundancies and removal of a management tier
1995	Cave creek disaster
1996	Major restructuring reducing number of conservancies and establishing regional offices
2003	Marine Conservation unit established
2005	Marine science unit merged with marine conservation unit
2008	Additional marine mammal sanctuaries and extensive set net bans to protect the Hector’s and Maui’s dolphin announced Marine Conservation Unit disbanded during major restructuring to save \$8 million
2011	Planblue announced
2012	New research indicates Maui’s dolphin in very serious trouble Interim extension of set net ban announced to further protect the Maui’s dolphin

Endnotes

1. Napp B, 2007
2. Ericksen N J *et al*, 2003, 57
3. Objective 3.6, Action (b), New Zealand Biodiversity Strategy
4. <http://www.guide2.co.nz/politics/news/doc-no-longer-to-make-marine-reserve-proposals/11/9163> (accessed 30 June 2012)
5. <http://www.doc.govt.nz/publications/about-doc/annual-report-for-year-ended-30-june-2011/5-natural-heritage-report-against-operating-intentions/intermediate-outcome-1/> (accessed 30 June 2012)



The problem

New Zealand has the highest rate of cetacean strandings in the world. Around 700 dolphins and whales strand each year. Because of our long coastline and range of marine habitats, many types of whale and dolphin have been found on the beaches of New Zealand. However, six species account for 88 per cent of strandings: the long finned pilot whale, sperm whale, false killer whale, pygmy sperm whale, Gray's beaked whale and common dolphin. Most strandings involve one animal, most commonly the common dolphin or the pygmy sperm whale. Humpback whales migrating between the Pacific Islands and the Antarctic sometimes strand in New Zealand, and occasionally, rare species such as Shepherd's beaked whales¹ and pygmy right whales² are seen.

No one fully understands why cetaceans strand themselves, but it is thought that such events may be caused by a range of factors. Some cetaceans may strand because they are ill (either due to natural causes or as a result of contact with man-made pollutants or organochlorines). They may also strand when carrying a heavy load of parasites, when sick, or when pregnant females go into the shallows to give birth.

Another potential cause of strandings is navigational error. The echolocation systems of cetaceans, which spend most of their lives in the deep open ocean, often do not work as well in shallow water. When the whales find themselves in shallow coastal areas, they may get confused, and strand themselves accidentally. Whales may also have drifted from their usual feeding grounds, which may result in them becoming weak, dehydrated and starving, and therefore more likely to strand. It is therefore difficult to identify categorically whether starvation is caused by a depletion of food sources due to human activity.

New Zealand's topography may well be a cause of cetacean strandings. Its long contorted coastlines, with fingers of land jutting out into the sea and long shallow beaches with large tidal ranges, make it easy for cetaceans to strand. The National Whale Stranding database indicates that Whangarei Harbour, Mahia Peninsula, Golden Bay and the Chatham Islands are particularly prone to strandings of pilot whales.

It is thought that the strong social bonds exhibited by some cetaceans, such as pilot whales, have a significant part to play in mass strandings. The pilot whale is extremely social, taking its name from its propensity to travel in large groups, usually of up to 200 animals, with one whale acting as the 'pilot' at the head of the group. The pilot whale's basic survival strategy is social cohesion. In the open

ocean they depend on each other; they are known to buoy each other up when sick or babysit each other's calves. However, this strategy works against them when one whale becomes ill. If a sick or distressed whale tries to come ashore, rather than drown at sea, the rest of the pod will follow.³

An average of 80 to 85 pilot whales strand on the New Zealand coastline each year, with around one mass stranding per year. However, at times many more animals have stranded together. The biggest known mass stranding in New Zealand, and in the world, was on the Chatham Islands in 1918 when 1,000 animals stranded together. The second biggest occurred in 1985, when 450 pilot whales stranded together on Great Barrier Island (of these, 324 were successfully refloated).⁴

Legislative framework

Under section 18(2) of the Marine Mammals Protection Act, managing cetacean strandings is a duty of the Department of Conservation. Marine Mammal Stranding Plans are produced for all conservancies, which must be consistent with the National Stranding Plan.⁵

The Department works cooperatively with a range of other groups including the Museum of New Zealand, Massey University, iwi and non-governmental whale conservation groups to report strandings, attempt rescues, dispose of carcasses and collect samples for research.⁶

Cetacean rescues and the disposal of carcasses are funded by the Department of Conservation. Each financial year a contingency sum is allocated which can be used for expenditure such as the hire of digging machines, helicopters, boats and cartage.⁷ New Zealand cetacean rescues have involved large mobilisations of effort and many thousands of dollars. For example, when 74 pilot whales stranded at Spirits Bay in the Far North in September 2010, the Department of Conservation's Kaitaia office became "*the centre of an incident management system, similar to that used by civil defence.*"⁸

The Department records all incidents on a standard form. This is forwarded, together with photographs, to the Museum of New Zealand which curates the New Zealand Whale Stranding Database, also funded by the Department of Conservation. The database was started in 1978 and has been backdated to 1846. It contains over 2,315 records, in relation to 13,892 animals, and is the largest such database in the world. The data is available to researchers all over the world, and

has contributed significantly to knowledge of the marine mammal species in New Zealand waters.⁹

In 1998 Ngātiwai developed a protocol with the Department of Conservation for the recovery of whale bone from stranded whales. Ngātiwai have since developed techniques for safely flensing the often decaying whale flesh from the bones; then either burying or submersing the skeletal material to enable microbial and other processes to remove residual material. The bones are later lifted, given a final cleaning, and then used for cultural purposes. The Ngātiwai protocol has since been used as a template for agreements with other iwi.

While these protocols are seen as having value by those iwi involved, there are also constraints which they do not view as appropriate. The Department of Conservation called for submissions on their management of stranded whales and the iwi recovery of whale bone, and reported the following iwi recommendations:¹⁰

- *Build on and extend to other iwi the existing good models such as the Ngātiwai model ...*
- *Amend the Department's non-statutory marine mammal contingency plans ... for these agreements ... to ensure triggers for iwi involvement [are included]*
- *Provide resources for iwi participation where appropriate*
- *Promote greater engagement between scientists and iwi ...*
- *Address the utilisation of marine mammal resources other than whale bone ...*
- *Establish wānanga to train iwi and hapū in cetacean work ...*
- *Encourage museums, universities, DOC and iwi/hapū to work together in relation to euthanasing so iwi/hapū are part of the decision making process*
- *Explore a mechanism to recognise Māori customary rights along with a commercial component because commercial harvesting of whale resources can contribute to compliance costs*

Conclusion

New Zealand has the highest rescue success rate in the world, for stranded cetaceans, and the most detailed database of whale stranding records. Baker has identified the reasons for the success of the regime as follows:¹¹

- A central agency (a government department that has a legislative mandate through the Marine Mammals Protection Act to administer strandings)
- The agency has absolute control at strandings
- The agency works cooperatively with non-governmental organisations and communities when rescue is a possibility
- The agency cooperates with iwi
- The agency cooperates with research organisations in the maintenance of records, the acquisition of data and samples from strandings and in research projects
- The agency funds rescue and disposal activities as part of its core activities.

Endnotes

1. Department of Conservation, 2009, 'Rare beaked whale strands on Kapiti Coast', press release, 29 January
2. Sparrow B, 2002, 'Stranded rare whale helped back to sea', *The Nelson Mail*, 22 September
3. Anon, 2010, 'Mystery of whale strandings deepens as experts disagree', *Northern Advocate*, 2 October
4. Anon, 2005, 'Reason for whale strandings unknown', *New Zealand Herald*, 2 December
5. Suisted R and D Neale, 2004
6. Baker A, 1997, 6
7. Baker A, 1997, 9
8. Anon, 2010, 'Rescuing of whales comes with hefty bill', *Northern Advocate*, 22 October
9. Baker A, 1997
10. Department of Conservation, 2008b
11. Baker A, 1997



Part 3 Behaviour around marine mammals

17 Application of this Part

Nothing in regulation 18 or regulation 19 or regulation 20 shall apply to persons, vessels, aircraft, or vehicles rendering assistance to stranded or injured marine mammals.

18 Conditions governing commercial operations and behaviour of all persons around any marine mammal

Every commercial operation, and every person coming into contact with any class of marine mammal, shall comply with the following conditions:

- (a) persons shall use their best endeavours to operate vessels, vehicles, and aircraft so as not to disrupt the normal movement or behaviour of any marine mammal:
- (b) contact with any marine mammal shall be abandoned at any stage if it becomes or shows signs of becoming disturbed or alarmed:
- (c) no person shall cause any marine mammal to be separated from a group of marine mammals or cause any members of such a group to be scattered:
- (d) no rubbish or food shall be thrown near or around any marine mammal:
- (e) no sudden or repeated change in the speed or direction of any vessel or aircraft shall be made except in the case of an emergency:
- (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:
- (g) no aircraft engaged in a commercial aircraft operation shall be flown below 150 metres (500 feet) above sea level, unless taking off or landing:
- (h) when operating at an altitude of less than 600 metres (2,000 feet) above sea level, no aircraft shall be closer than 150 metres (500 feet) horizontally from a point directly above any marine mammal or such lesser or greater distance as may be approved by the Director General, by notice in the Gazette, from time to time based on the best available scientific evidence:

- (i) no person shall disturb or harass any marine mammal:
- (j) vehicles must remain above the mean high water spring tide mark and shall not approach within 50 metres of a marine mammal unless in an official carpark or on a public or private slipway or on a public road:
- (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), 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:
- (n) pilots of aircraft engaged in a commercial aircraft operation shall use their best endeavours to operate the aircraft in such a manner that, without compromising safety, the aircraft’s shadow is not imposed directly on any marine mammal.

19 Special conditions applying to whales

In addition to complying with the provisions set out in regulation 18, every commercial operation and every person coming into contact with whales shall also comply with the following conditions:

- (a) no person in the water shall be less than 100 metres from a whale, unless authorised by the Director General:
- (b) no vessel shall approach within 50 metres of a whale, unless authorised by the Director General:
- (c) if a whale approaches a vessel, the master of the vessel shall, wherever practicable,—
 - (i) manoeuvre the vessel so as to keep out of the path of the whale; and
 - (ii) maintain a minimum distance of 50 metres from the whale:
- (d) no vessel or aircraft shall approach within 300 metres (1 000 feet) of any whale for the purpose of enabling passengers to watch the whale, if the number of vessels or aircraft, or both, already positioned to enable passengers to watch that whale is 3 or more:
- (e) where 2 or more vessels or aircraft approach an unaccompanied whale, the masters concerned shall co-ordinate their approach and manoeuvres, and the pilots concerned shall co-ordinate their approach and manoeuvres:
- (f) no person or vessel shall approach within 200 metres of any female baleen or sperm whale that is accompanied by a calf or calves:
- (g) a vessel shall approach a whale from a direction that is parallel to the whale and slightly to the rear of the whale:
- (h) no person shall make any loud or disturbing noise near whales:
- (i) where a sperm whale abruptly changes its orientation or starts to make short dives of between 1 and 5 minutes duration without showing its tail flukes, all persons, vessels, and aircraft shall forthwith abandon contact with the whale.

20 Special conditions applying to dolphins or seals

In addition to complying with the conditions set out in regulation 18, any commercial operation and any person coming into contact with dolphins or seals shall also comply with the following conditions:

- (a) no vessel shall proceed through a pod of dolphins:
- (b) persons may swim with dolphins and seals but not with juvenile dolphins or a pod of dolphins that includes juvenile dolphins:
- (c) commercial operators may use an airhorn to call swimmers back to the boat or to the shore:
- (d) except as provided in paragraph (c), no person shall make any loud or disturbing noise near dolphins or seals:
- (e) no vessel or aircraft shall approach within 300 metres (1 000 feet) of any pod of dolphins or herd of seals for the purpose of enabling passengers to watch the dolphins or seals, if the number of vessels or aircraft, or both, already positioned to enable passengers to watch that pod or herd is 3 or more:
- (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.



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Nicola de Wit assisted with proof reading the report and Carol Linthwaite provided the index.

List of interviewees

Name	Expertise
Amélie Augé	University of Otago; PhD student researching sea lions on Otago Peninsula
Alan Baker	Retired; longstanding marine mammal scientist; former director of National Museum and scientist at the Department of Conservation
Dr Lars Bejder	Murdoch University; undertaken research on bottlenose dolphins and marine mammal tourism in New Zealand
Paul Bingham	CEO, Black Cat Cruises, Akaroa
Fiona Black	Concessions and Consents Manager, Real Journeys, Te Anau
Kathryn Blakemore	Department of Conservation Marine Mammal Ranger, Southland Conservancy
Laura Boren	Department of Conservation National Marine Mammal Co-ordinator

Phil Brown	Department of Conservation Biodiversity Programme Manager, Auckland Area; leading Maui's dolphin conservation
Chris Carter	Former Minister of Conservation
Martin Cawthorn	Consultant marine mammal scientist; early marine mammal scientist in Ministry of Agriculture and Fisheries; focus on sealions
Dr Simon Childerhouse	Australian Marine Mammal Centre; former marine mammal scientist at Department of Conservation
Dr Louise Chilvers	Department of Conservation Marine Mammal Scientist; focus on sea lions
Dr Rochelle Constantine	University of Auckland; Marine Mammal Scientist (2 interviews – one on Bay of Islands bottlenose dolphins and the second on Bryde's whales and Maui's dolphin research)
Sean Cooper	Head of Department of Conservation's marine conservation unit
Derek Cox	Department of Conservation, Biodiversity Ranger, Mahaanui Area Office; manages permitting of marine mammal tourism
Dr Rohan Currey	Ministry for Primary Industries Senior Scientist; undertaken research on Fiordland bottlenose dolphins
Dr Steve Dawson	University of Otago, Marine Mammal Scientist
Wade Doak	Underwater diver, photographer and writer; founder of Project Interlock focused on communication with dolphins
Alex Dobbins	Early diver and trainer for dolphins at Napier Marineland
Greg Funnell	Department of Conservation Marine Technical Support Officer, Southland Conservancy
Jim Fyfe	Department of Conservation Marine Mammal Ranger, Otago Conservancy
Jo Halliday	Guide on Fullers dolphin swimming boat
Geoff Hamilton	Marine mammal tourism operator in Akaroa

Pere Hawes	Environmental Policy Manager, Marlborough District Council
Edward Heke	Former trainer at Mount Maunganui Marineland
Greg Horobin	Son of Alan Horobin (deceased) who established the Orewa Marineland
David Laist	USA Marine Mammal Commission, Policy and Program Analyst
Malcolm Lawson	Chair, Fiordland Marine Guardians
Dr David Lusseau	University of Aberdeen; undertaken research on bottlenose dolphins in Doubtful Sound
Aoife Martin	Ministry for Primary Industries, Deepwater Fisheries Manager
Emmanuelle Martinez	Marine Mammal Scientist; research into impacts of marine mammal tourism in Akaroa
Sean McConkey	NZ Sea Lion Trust
Kimberley Muncaster	Project Jonah
Chris Pugsley	Former head of marine research group within the Department of Conservation
Christine Rose	Former Auckland regional councillor and activist promoting the protection of the Maui's dolphin
Eugene Sage	Former Forest and Bird campaigner on Hector's dolphins
Dr Elizabeth Slooten	University of Otago, marine mammal scientist
Dr Greg Stone	Conservation International; USA marine mammal scientist; undertook research on Hector's dolphin
Rob Suisted	Former head of marine mammal work in the Department of Conservation
Ken Swinney	Policy and Planning Manager, Environment Southland
Anton van Helden	Te Papa, Marine Mammals Collection Manager
Dr Ingrid Visser	Orca Scientist
Adrian Walker	Department of Conservation Biodiversity Conservation Manager, Northland Conservancy
Richard Wells	Deepwater Group
Dr Ian West	Former Department of Conservation Science Manager

Jim Whitehorne	Former skipper, Explore NZ for dolphin watching and swimming tours
Felicity Wong	Tertiary Education Commission; former manager of Department of Conservation marine conservation unit
Bob Zuur	WWF New Zealand; former employee of Department of Conservation working on marine mammal protection

references



Abraham E, 2011, *Probability of mild traumatic brain injury for sea lions interacting with SLEDs*, Final Research Report for Ministry of Fisheries project SRP2011-03, Ministry of Fisheries, Wellington

Allen S, H Smith, K Waples and R Harcourt, 2007, 'The voluntary code of conduct for dolphin watching in Port Stephens, Australia: Is self-regulation an effective management tool?', *Journal of Cetacean Resource Management*, 9(2): 159-166

Augé A, 2010, *Foraging ecology of recolonizing female New Zealand sea lions around the Otago Peninsula*, Thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy, University of Otago

Augé A, L Chilvers, L Davis and A Moore, 2011, 'In the shallow end: Diving behaviour of recolonising female New Zealand sea lions around the Otago Peninsula', *Canadian Journal of Zoology*, 89:1195-1205

Australian Fisheries Management Authority, 2000, *Commonwealth policy on fisheries bycatch*, Australian Government, Canberra

Baird S and E Bradford, 2000, *Estimation of Hector's dolphin bycatch from inshore fisheries, 1997/98 fishing year*, Department of Conservation, Wellington

Baker A, 1997, *A history of the New Zealand whale stranding response network, and key factors in its current success*, prepared on invitation for a symposium on whale strandings, Tokyo

Baker A and B Madon, 2007, 'Brydes Whales (*Baleanoptera cf Brydei* Olsen 1913) in the Hauraki Gulf and Northeastern New Zealand waters', *Science for Conservation* 272, Department of Conservation, Wellington

Baker C, L Chilvers, R Constantine, S Du Fresne, R Mattlin, A van Helden and R Hitchmough, 2010, 'Conservation status of New Zealand marine mammals (suborders *Cetacea* and *Pinnipedia*)', *New Zealand Journal of Marine and Freshwater Research*, 44(2): 101-115

Baker A, A Smith and F Pichler, 2002, 'Geographical variation in Hector's dolphin: recognition of new subspecies of *Cephalorhynchus hectori*', *Journal of the Royal Society of New Zealand*, 32:713-727

- Barton J, 2002, 'Fisheries and fisheries management in Falkland Islands conservation zones', *Aquatic Conservation: Marine Freshwater Ecosystems*, 12:127–135
- Barr K and E Slooten, 1999, 'Effects of Tourism on Dusky Dolphins at Kaikoura', *Conservation Advisory Science Notes* 229, Department of Conservation, Wellington
- Beentjes M and G Carbines, 2005, 'Population structure and relative abundance of blue cod (*Paraperiscolias*) off Banks Peninsula and in Dusky Sound, New Zealand', *New Zealand Journal of Marine and Freshwater Research*, 39:77–90
- Behrens S and R Constantine, 2008, *Large Whale and Vessel Collisions in Northern New Zealand*, Report for Consideration by the Scientific Committee of the International Whaling Commission, Santiago Chile, doc ref SC/60/BC9
- Bejder L, A Samuels, H Whitehead, N Gales, J Mann, R Conner, M Heithaus, J Watson-Capps, C Flaherty and M Krützen, 2006, 'Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance', *Conservation Biology*, 20(6): 1791-1798
- Boren L, 2010, Department of Conservation presentation to the whale watching workshop of the International Whaling Commission, Puerto Madriya, Argentina 3-5 November
- Bowen W, 2011, *A review of the indirect effects of commercial fishing on New Zealand sea lions (Phocartos hookeri) breeding on the Auckland Islands*, Report for the Department of Conservation, Halifax, Nova Scotia
- Bremner G, J Johnstone, T Bateson and P Clarke, 2009, 'Unreported bycatch in the New Zealand west coast South Island hoki fishery', *Marine Policy*, 33:504-512
- Browne B, 2009, *Northland Moratorium Proposal*, Department of Conservation, Whangarei
- Brown N, 2000, *The dusky dolphin Lagenorhynchus obscurus of Kaikoura, New Zealand, a long term comparison of behaviour and habitat use*, Thesis submitted in fulfilment of the requirements for the degree of Master of Science, University of Auckland

Buckland SJ, D Hannah, J Taucher, E Slooten and S Dawson, 1990, 'Polychlorinated dibenzo-p-dioxins and dibenzofurans in New Zealand's Hector's dolphin', *Chemosphere*, 20:1035

Burkhardt S and E Slooten, 2003, 'Population viability analysis for Hector's dolphin (*Cephalorhynchus hectori*): A stochastic population model for local populations', *New Zealand Journal of Marine and Freshwater Research*, 37: 553-566

Cawthorn M, 1999, 'The changing face of New Zealand's whaling policy', in Institute of Cetacean Research, *Whaling and anti whaling movement*, Institute of Cetacean Research, Tokyo

Cawthorn M, M Crawley, R Mattlin and G Wilson, 1985, *Research on pinnipeds in New Zealand*, Wildlife Research Liaison Group Report No 7, Wellington

Childerhouse S, S Dawson, D Fletcher, E Slooten and L Chilvers, 2010, 'Growth and reproduction of female New Zealand sea lions', *Journal of Mammalogy*, 91:165-176

Childerhouse S and N Gales, 1998, 'The historic distribution and abundance of the New Zealand sea lion, *Phocarcotus hookeri*', *New Zealand Journal of Zoology*, 25:1-16

Chilvers L, 2011, 'Population viability analysis of New Zealand sea lions, Auckland Islands, New Zealand's sub-Antarctics: assessing relative impacts and uncertainty', *Polar biology*, 34(12)

Chilvers L and I Wilkinson, 2009, 'Diverse foraging strategies in lactating New Zealand sea lions', *Marine Ecology Progress Series*, 378:299-308

Chilvers L, I Wilkinson, and D Mackenzie, 2010, 'Predicting life-history traits for female New Zealand sea lions, *Phocarcotus hookeri*: Integrating short-term mark-recapture data and population modelling', *Journal of Agricultural, Biological, and Environmental Statistics*, 15(2): 259–278

Clement and Associates Limited, 2008, *New Zealand inshore trawl gear and operations survey: A report commissioned by Seafood Innovations Limited and Seafic*, Clement and Associates Limited, Nelson

Constantine R, 1999, 'Effects of Tourism on Marine Mammals in New Zealand', *Science for Conservation No 106*, Department of Conservation, Wellington.

- Constantine R, N Aguilar Solo and M Johnson, 2012, *Sharing the waters: Minimising ship collisions with Bryde's whales in the Hauraki Gulf*, Research Progress Report, University of Auckland, Auckland
- Constantine R and S Behrens, 2010, Bryde's Whales and Vessel Strike in the Hauraki Gulf, New Zealand, presentation to the Hauraki Gulf Forum, Auckland, 30 March
- Constantine R and L Bejder, 2008, 'Managing the whale and dolphin watching industry: Time for a paradigm shift?', in J Higham and M Luck, *Marine Wildlife and Tourism Management: Insights from the Natural and Social Sciences*, CAB International, United Kingdom
- Constantine R, D Brunton and C Baker, 2003, 'Effects of tourism on behavioural ecology of bottlenose dolphins of northeastern New Zealand,' *Conservation Science Internal Series 153*, Department of Conservation, Wellington
- Cornelison C and E Goodwin, 2008, *Tailrace discharge from the Manapouri Power Station and its effects on water temperature in Doubtful Sound*, Report for Meridian Energy Limited, Cawthron Report Number 1543
- Cox T, R Lewison, R Zydalis, L Crowder, C Safina and A Read, 2007, 'Comparing effectiveness of experimental and implemented bycatch reduction measures: The ideal and the real', *Conservation Biology*, 21(5):1155-1164
- Cumming G, 2009, 'How ship strikes are killing Auckland's whale population', *New Zealand Herald*, 14 November
- Currey R, 2008, *Conservation biology of bottlenose dolphins in Fiordland, New Zealand*, Thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy, University of Otago
- Currey R, S Dawson and E Slooten, 2007, 'New abundance estimates suggest Doubtful Sound bottlenose dolphins are declining', *Pacific Conservation Biology*, 13:265-73
- Currey R, S Dawson and K Schneider, 2011b, 'Inferring casual factors for a declining population of bottlenose dolphins via temporal symmetry capture-recapture modelling', *Marine Mammal Science*, 27(3):554-556

Currey R, S Dawson and E Slooten, 2011a, '*Tursio S truncatus* (Fiordland subpopulation)' in IUCN Red List of Threatened Species Version 2012.1, www.iucnredlist.org (accessed 30 June 2012)

Currey R and L Rowe, 2008, *Abundance and Population Structures of bottlenose dolphins in Doubtful and Dusky Sound*, Department of Conservation, Wellington

Dawson S, 2011, *Submission to the Ministry of Agriculture and Forestry on the New Zealand Sea Lion IPP*, 23 December, University of Otago, Dunedin

Dawson S and E Slooten, 1993, 'Conservation of Hector's dolphins: The case and process which led to establishment of the Banks Peninsula Marine Mammal Sanctuary,' *Aquatic Conservation*, 3(3): 207-221

Dawson S, E Slooten, S Du Fresne, P Wade and D Clement, 2004, 'Small-boat surveys for coastal dolphins: Line-transect surveys for Hector's dolphins (*Cephalorhynchus hectori*)', *Fishery Bulletin*, 201: 441- 451

Dell R, 2010, 'Hector, James – Biography', *Dictionary of New Zealand Biography, Te Ara – the Encyclopedia of New Zealand*, updated 1 September 2010, available at <http://collections.tepapa.govt.nz/exhibitions/jameshector/> (accessed 30 June 2012)

Department of Agriculture, Fisheries and Forestry, 2006, *National strategy to address interactions between humans and seals: Fisheries, aquaculture and tourism*, Australian Government, Canberra

Department of Conservation, 2006, *The value of conservation: What does conservation contribute to the economy?*, New Zealand Government, Wellington

Department of Conservation, 2007, *Summary of feedback and expert reports received from the Doubtful Sound bottlenose dolphin discussion paper*, Department of Conservation, Invercargill

Department of Conservation, 2008a, *Doubtful Sound Marine Mammal (and other wildlife) Code of Management*, Department of Conservation, Invercargill

Department of Conservation, 2008b, *Domestic trade in whale bone from whales stranded in New Zealand and a framework for the role of Māori in the management of whale strandings – Summary of submissions*, 11 April

- Department of Conservation, 2009, *New Zealand sea lion species management plan 2009-2014*, Department of Conservation, Wellington
- Department of Conservation, 2010, *Population management plan review*, New Zealand Government, Wellington
- Department of Conservation, 2012, *Interim extension of the marine mammal sanctuary and seismic survey regulations to manage the risk of Maui's dolphin mortality*, New Zealand Government, Wellington
- Department of Conservation and Ministry of Fisheries, 2007a, *Hector's dolphin threat management discussion document*, New Zealand Government, Wellington
- Department of Conservation and Ministry of Fisheries, 2007b, *Hector's and Maui's dolphin threat management plan: Draft for public consultation*, 29 August, New Zealand Government, Wellington
- Department of the Environment and Water Resources, 2007, *Guidelines for the ecologically sustainable management of fisheries*, Australian Government, Canberra
- Department of Sustainability, Environment, Water, Population and Communities, 2011, *Whalewatching in Commonwealth waters – review of management arrangements*, Australian Government, Canberra
- Du Fresne S, 2008, *Evaluation of the impacts of finfish farming on marine mammals in the Firth of Thames*, Environment Waikato, Hamilton
- Du Fresne S, A Grant, W Norden and J Pierre, 2007, 'Factors affecting cetacean bycatch in a New Zealand trawl fishery', *Conservation Research and Development Series 272*, Department of Conservation, Wellington
- Epstein C, 2008, *The power of words in international relations: The birth of an anti whaling discourse*, Massachusetts Institute of Technology, Massachusetts
- Ericksen N, P Berke, J Crawford and J Dixon, 2003, *Planning for Sustainability: New Zealand under the RMA*, International Global Change Institute, University of Waikato, Hamilton

- Ferreira S and C Roberts, 2003, 'Distribution and abundance of Maui's dolphins (*Cephalorynchus hectori maui*) along the North Island west coast, New Zealand', *Conservation Science Internal Series 93*, Department of Conservation
- Forrest B, N Keeley, P Gillespie, G Hopkins, B Knight and D Govier, 2007, *Review of the ecological effects of marine finfish aquaculture*, Cawthron Institute, Nelson
- Funnell G, 2009, *Marine Mammal Code of Management review*, Department of Conservation, Invercargill
- Gilbert D and L Chilvers, 2008, *Final report on New Zealand sea lion pupping rate, POP2006-01 objective 3 analysis from sea lion database to estimate pupping rate and associated parameters*, NIWA Report WLG2008-77
- Gillespie A, 2011, 'The distant sound of alarm bells in the wonder country', *New Zealand Journal of Environmental Law*, 15:51-87
- Gordon J, D Gillespie, J Potter, A Frantzis, M Simmonds, R Swift and D Thompson, 2004, 'A review of the effects of seismic surveys on marine mammals', *Marine Technology Society Journal*, 37(4):16-34
- Gormley A, E Slooten, S Dawson, R Barker, W Rayment, S Du Fresne and S Brager, 2012, 'First evidence that marine protected areas can work for marine mammals', *Journal of Applied Ecology*, 49(2):474-480
- Government of New Zealand, 2010, *Voluntary national cetacean conservation report*, submitted to the International Whaling Commission Conservation Committee, IWC/62/CC 9, at http://iwcoffice.org/_documents/commission/IWC62docs/CC-9.pdf (accessed 30 June 2012)
- Government of New Zealand, 2012, *Voluntary national cetacean conservation report*, submitted to the International Whaling Commission Conservation Committee, IWC/64/CC19
- Gullett W, 2006, 'The threshold test of the precautionary principle in Australian Courts and Tribunals: Lessons for judicial review', in E Fisher, J Jones and R von Schomberg (eds), *Implementing the precautionary principle: Perspectives and prospects*, Edward Elgar Publishing, Gloucester

- Haase P and K Schneider, 2001, 'Birth demographics of bottlenose dolphins, *Tursiops truncatus*, in Doubtful Sound, Fiordland, New Zealand – preliminary findings', *New Zealand Journal of Marine and Freshwater Research*, 35:675-680
- Hamner R, M Oremus, M Stanley, P Brown, R Constantine and S Baker, 2012, *Estimating the abundance and effective population size of Maui's dolphins using microsatellite genotypes in 2010-11, with retrospective matching to 2001-7*, Department of Conservation, Wellington
- Henderson S, 2010, *Abundance and population structure of bottlenose dolphins in Doubtful and Dusky Sounds: Population monitoring in 2009 and summer 2010*, University of Otago, Dunedin
- Hoyt E, 1995, *The worldwide value and extent of whale watching*, Whale and Dolphin Conservation Society, Bath
- Hoyt E, 2001, *Whale watching 2001: Worldwide tourism, numbers, expenditures and socioeconomic benefits*, International Fund for Animal Welfare, Yarmouth Port, Massachusetts
- Hoyt E, 2011, *Marine Protected Areas for whales, dolphins and porpoises: A world handbook for cetacean conservation and planning* (2nd edition), Earthscan, Oxford
- Hughey K, 2000, 'An evaluation of a management saga: The Banks Peninsula Marine Mammal Sanctuary', *New Zealand Journal of Environmental Management*, 58(3):179-197
- Hutching G and C Walrond, 2009, 'Marine conservation - Māori and the sea', *Te Ara - the Encyclopedia of New Zealand*, updated 2 March, <http://www.TeAra.govt.nz/en/marine-conservation/1> (accessed 30 June 2012)
- Ingram K, 2007, 'Ship collisions strike down whales', *Professional Skipper Magazine*, September/October
- Iowa State University, 2007, *Brucellosis in marine mammals*, Centre for Food Security and Public Health, Iowa
- Kahui V, 2012, 'A biomechanical model for Hooker's sea lion bycatch in New Zealand', *Australian Journal of Agricultural and Resource Economics*, 56(1): 22-41

Keeley N, B Forrest, G Hopkins, P Gillespie, B Knight, S Webb, D Clement and J Gardner, 2009, *Sustainable aquaculture in New Zealand: Review of the ecological effects of farming shellfish and other non finfish species*, Cawthron Report No 1476, Cawthron Institute, Nelson

Lloyd B, 2003, *Potential effects of mussel farming on New Zealand's marine mammals and seabirds: A discussion paper*, Department of Conservation, Wellington

Lundquist D, 2011, *Behaviour and movement patterns of dusky dolphins (Lagenorhynchus obscurus) off Kaikoura, New Zealand: Effects of tourism*, Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy, University of Otago

Lusseau D, 2002, *The effects of tourism activities on bottlenose dolphins in Fiordland, New Zealand*, Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy, University of Otago

Lusseau D, 2005, 'Residency pattern of bottlenose dolphins *Tursiops spp.* in Milford Sound, New Zealand, is related to boat traffic', *Marine Ecology Progress Series*, 295

Lusseau D and J Higham, 2004, 'Managing the impacts of dolphin-based tourism through the definition of critical habitats: The case of bottlenose dolphins (*Tursiops spp.*) in Doubtful Sound, New Zealand', *Tourism Management*, 25(6):657-667

Lusseau D, K Schneider, O Boisseau, P Haase, E Slooten and S M Dawson, 2003, 'The bottlenose dolphin community of Doubtful Sound features large proportion of long-lasting associations: Can geographic isolation explain this unique trait?', *Behavioural Ecological Sociobiology*, 54: 396-405

Lusseau D, E Slooten, J Higham and S Dawson, 2002, *The effects of tourism activities on bottlenose dolphins in Fiordland: Towards a sustainable solution*, Department of Conservation, Wellington

Lusseau D, E Slooten and R Currey, 2006, 'Unsustainable dolphin watching tourism in Fiordland, New Zealand', *Tourism in Marine Environments*, 3:173-178

Lusseau S and S Wing, 2006, 'Importance of local production versus pelagic subsidies in the diet of an isolated population of bottlenose dolphins *Tursiops sp.*', *Marine Ecology Progress Series*, 321,283-293

- Lyle J, 2011, *Fur seal interactions with SED excluder device*, report prepared for the Ministry of Fisheries, Wellington, Institute of Marine and Antarctic Studies, Hobart
- McElderry H, D McCullough, J Schrader and J Illingworth, 2007, *Pilot study to test the effectiveness of electronic monitoring in Canterbury fisheries*, Department of Conservation, Wellington
- Maloney A, L Chilvers, C Muller and M Haley, 2012, 'Increasing pup production of New Zealand sea lions at Campbell Island/Motu Ihupuku: Can it continue?', *New Zealand Journal of Zoology*, 39(1):19-29
- Maloney A, L Chilvers, M Haley, M Muller, C Roe and I Debski, 2008, 'Distribution, pup production and mortality of New Zealand sea lion (*Phocartos hookeri*) on Campbell Island/Motu Ihupuku', *New Zealand Journal of Ecology*, 33:97-105
- Markowitz T, S du Fresne and B Würsg, 2009 *Tourism effects on dusky dolphins at Kaikoura, Final report*, Kaikoura Dusky Dolphin Tourism Research Project, Kaikoura
- Markowitz, T, A Harlin, B Würsg and C McFadden, 2004, 'Dusky Dolphin Foraging Habitat: Overlap with Aquaculture in New Zealand', *Aquatic Conservation: Marine and Freshwater Ecosystems*, 24:133-149
- Markowitz T, C Richter and J Gordon, 2011, *Effects of Tourism on the behaviour of sperm whales inhabiting the Kaikoura Canyon*, Kaikoura Sperm Whales and Tourism Research Project, Kaikoura
- Martinez E, 2007, *Responses of South Island Hector's dolphins (Cephalorhynchus hectori hectori) to vessel activity in Akaroa Harbour, Banks Peninsula: Implications for the tourism industry?*, Progress Report for the Department of Conservation, Canterbury
- Martinez E, 2010, *Responses of South Island Hector's dolphins (Cephalorhynchus hectori hectori) to vessel activity (including tourism operations) in Akaroa Harbour, Banks Peninsula, New Zealand*, Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Marine Biology, Massey University, Auckland

- Meynier L, 2009, *Feeding ecology of the New Zealand sea lion*, Thesis presented in fulfilment of the requirements for the degree of Doctor of Philosophy, Massey University, Auckland
- Ministry of Agriculture and Fisheries, 2012, *Interim set net measures to manage the risk of Maui's dolphin mortality*, New Zealand Government, Wellington
- Ministry of Economic Development, 2010, *New Zealand regional tourism forecasts 2010-2016, Fiordland RTO*, New Zealand Government, Wellington
- Ministry of Fisheries, 2010, *Statement of Intent 2010-2015: Nature and scope of functions*, New Zealand Government, Wellington
- Ministry of Fisheries, 2011, *SQU6T operational plan: Initial position paper*, New Zealand Government, Wellington
- Ministry for the Environment, 2010, *Environmental snapshot: Fishing reporting: seabed trawling*, Ministry for the Environment, Wellington
- Ministry for Primary Industries 2012, *SQUID SQU6T Final advice paper*, New Zealand Government, Wellington
- Modeste D, 2011, 'The precautionary principle and the Fisheries Act', *New Zealand Law Journal*, 179
- Mooney T, P Nachtigall and W Au, 2004, 'Target strength of a nylon monofilament and an acoustically enhanced gillnet: Predictions of biosonar detection ranges', *Aquatic Mammals*, 30(2): 220-226
- Napp B, 2007, *A short history of the Department of Conservation, 1987-2007*, New Zealand Government, Wellington
- Nathan S and M Varnham (eds), 2008, *The amazing world of James Hector*, Awa Press, Wellington
- New Zealand Government, 2012, *The government's aquaculture strategy and five-year action plan to support aquaculture*, New Zealand Government, Wellington
- OECD, undated, *Country note on fisheries management systems – Australia*, <http://www.oecd.org/dataoecd/12/7/34427707.pdf> (accessed 30 June 2012)

Parsons S, C Radford, A Jeffs, S Baker and C Tindle, 2008, *The Fiordland underwater environment – quantifying the ambient noise levels and acoustic characteristics of tourist vessels in Doubtful and Milford Sounds*, Final Report to the Department of Conservation Southland Conservancy, University of Auckland, Auckland

Pearson H, 2008, *Fission-fusion sociality in dusky dolphins (*Lagenorhynchus obscurus*), with comparisons to other dolphins and great apes*, Thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy, Texas A&M University

Pearson H, 2009, 'Influences on dusky dolphin (*Lagenorhynchus obscurus*) fission-fusion dynamics in Admiralty Bay, New Zealand', *Behavioural Ecology and Sociobiology*, 63:1437-1446

Perrin W, B Würsig and J Thewissen (eds), 2002, *Encyclopedia of Marine Mammals*, Academic Press, San Diego

Pichler F B, 2001, *Population structure and genetic variation in Hector's dolphin (*Cephalorhynchus hectori*)*, Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Biology, University of Auckland

Pichler F and C Baker, 2000, 'Loss of genetic diversity in the endemic Hector's dolphin due to fisheries-related mortality', *Proceedings of the Royal Society of London B*, 267, 97-102

Pichler F, E Slooten and S Dawson, 2003, 'Hector's dolphins and fisheries in New Zealand: A species at risk', in Gales N, M Hindell and R Kirkwood (eds), *Marine mammals: Fisheries, tourism and management issues*, CSIRO Publishing, Collingwood, Victoria

Poharama A, M Henley, A Smith, J Fairweather and D Simmons, 1998, *The impact of tourism on the Māori community in Kaikoura*, Tourism Research and Education Centre, Report Number 7

Ponte G, A van den Berg and R Anderson, 2010, *Investigation of the impact characteristics of the New Zealand fisheries sea lion exclusion device (SLED)*, Centre for Automotive Safety Research, University of Adelaide

Ponte G, A van den Berg and R Anderson, 2011, *Further analysis of the impact characteristics of the New Zealand Fisheries sea lion exclusion device stainless steel grid*, Centre for Automotive Safety Research, University of Adelaide

Ports of Auckland, 2008, *Port Development Plan*, Ports of Auckland, Auckland

Rayment W and T Webster, 2009, 'Observations of Hector's dolphins (*Cephalorhynchus hectori*) associating with inshore fishing trawlers at Banks Peninsula, New Zealand', *New Zealand Journal of Marine and Freshwater Research*, 43:911-916

Reilly S, J Bannister, P Best, M Brown, R Brownell Jr, D Butterworth, P Clapham, J Cooke, G Donovan, J Urbán and A Zerbini, 2008, '*Balaenoptera endeni*' in *IUCN Red List of Threatened Species, Version 2012.1*, available at www.iucn.org

International Whaling Commission, 1999, 'Report of the Scientific Committee of the International Whaling Commission 1999', *Journal of Cetacean Research and Management*, 1 (Supplement)

Richter S, S Dawson and E Slooten, undated, *Impacts of whale watching on sperm whales off Kaikoura*, University of Otago Marine Mammal Research Group website, <http://www.otago.ac.nz/marinescience/mammals/tourism.htm#one> (accessed 30 June 2012)

Robertson B, 2011, *Submission on the squid fishery around the Auckland Islands (SQU6T) Initial Position Paper 2011/12*, University of Otago, Dunedin

Robertson B and L Chilvers, 2011 'The Population decline of the New Zealand sea lion *Phocartos hookeri*: a review of possible causes', *Mammal Review*, 41(4):253-275

Roe W, 2010a, *External review of NZ sea lion bycatch necropsy data and methods*, meeting at Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North, 9 and 10 June

Roe W, 2010b, *External review of NZ sea lion bycatch necropsy data and methods*, Ministry of Fisheries, Wellington

Roth G and U Dicke, 2005 'Evolution of the brain and intelligence', *Trends in Cognitive Sciences*, 9(5):250-257

Rowe A, 2004, 'Review of methodologies for mitigating incidental catch of protected marine mammals,' *Conservation Research and Development Series 283*, Department of Conservation, Wellington

Rutger S and S Wing, 2006, 'Effects of freshwater input on shallow-water infaunal communities in Doubtful Sound, New Zealand,' *Marine Ecology Progress Series*, 314:35-47

Shelton D, 2007, *Dusky dolphins in New Zealand: Group structure by sex and relatedness*, Thesis submitted in fulfilment of the requirements for the degree of Master of Science, Texas A&M University

Silber G, A Vanderlaan, A Tejedor Arceredillo, L Johnson, C Taggart, M Brown, S Bettridge and R Sagarminaga, 2012, 'The role of the International Maritime Organisation in reducing vessel threat to whales: Process, options, action and effectiveness', *Marine Policy*, in press

Slooten E and S Dawson, 2008 'Sustainable levels of human impact for Hector's dolphins', *Open Conservation Biology Journal*, 2:37-43

Slooten E and S Dawson, 2010, 'Assessing the effectiveness of conservation management decisions: Likely effects of new protection measures for Hector's dolphin (*Cephalorhynchus hectori*)', *Aquatic Conservation: Marine and Freshwater Ecosystems*, 20(3):334-347

Slooten E, W Rayment and S Dawson, 2006, 'Offshore distribution of Hector's dolphin at Banks Peninsula: Is the Banks Peninsula Marine Mammal Sanctuary large enough?', *New Zealand Journal of Marine and Freshwater Research*, 40(2):333-343

Slooten E, S Dawson, W Rayment, and S Childerhouse, 2006, 'A new abundance estimate for Maui's dolphin: What does it mean for managing this critically endangered species?', *Biological Conservation*, 128: 576-581

Smith I, 1989, 'Māori impact on marine megafauna: Pre-European distributions of New Zealand sea mammals', in D G Sutton (ed), *Saying so doesn't make it so: Papers in honour of B Foss Leach*, New Zealand Archaeological Association, Dunedin

Smith I, 2002, *The New Zealand sealing industry: History, archaeology, and heritage management*, Department of Conservation, Wellington

Starr P and A Langley, 2000, *Inshore fishery observer programme for Hector's dolphins in Pegasus Bay, Canterbury Bight 1997/98*, Department of Conservation, Wellington

State Services Commission, 1995, Review of the Department of Conservation, [http://www.doc.govt.nz/upload/documents/about-doc/news/issues/Review-of-the-Department-of-Conservation-\(Post-Cave-Creek\).pdf](http://www.doc.govt.nz/upload/documents/about-doc/news/issues/Review-of-the-Department-of-Conservation-(Post-Cave-Creek).pdf) (accessed 26 August 2010)

Stockin K, R Law, P Duignan, G Jones, L Porter, L Mirimin, L Meynier and M Orams, 2007, 'Trace elements, PCBs and organochlorine pesticides in New Zealand common dolphins (*Delphinus sp.*)', *Science of the Total Environment*, 387(1-3):333-345

Stockin K, R Law, W Roe, L Meynier, E Martinez, P J Duignan, P Bridgen and B Jones, 2010, 'PCBs and organochlorine pesticides in Hector's (*Cephalorhynchus hectori hectori*) and Maui's (*Cephalorhynchus hectori mauī*) dolphins', *Marine Pollution Bulletin*, 60:834-842

Stockin K, D Lusseau, V Binedell and M Orams, 2008, 'Tourism affects the behavioural budget of the common dolphin (*Delphinus sp*) in the Hauraki Gulf', *New Zealand Marine Ecology Progress Series*, 355:287-295

Stockin K and M Orams, 2009, 'The status of common dolphins (*Delphinus delphis*) within New Zealand waters', *Journal of Cetacean Resource Management*, SC/61/SM20

Suisted R and D Neale, 2004, *Department of Conservation marine mammal action plan for 2005-2010*, Department of Conservation, Wellington

Te Korowai o te Tai o Marokura (Kaikoura Coastal Marine Guardians), 2007, *Kaikoura coastal marine values and uses: A characterisation report*, Kaikoura Coastal Marine Guardians, Kaikoura

Tezanos Pinto G, 2009, *Population structure, abundance and reproductive parameters of bottlenose dolphins (*Tursiops truncatus*) in the Bay of Islands (Northland, New Zealand)*, Thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy in Biological Sciences, University of Auckland

Thompson F and E Abraham, 2009, *Estimation of the capture of New Zealand sea lions (Phocarctos hookeri) in trawl fisheries, from 1995-96 to 2006-07*, New Zealand Aquatic Environment and Biodiversity Report No 41, Ministry of Fisheries, Wellington

Thompson F, E Abraham and K Berkenbusch, 2010, *Common dolphin (Delphinus delphis) bycatch in New Zealand mackerel trawl fisheries 1995-1996 to 2008-2009*, New Zealand Aquatic Environment and Biodiversity Report No 63, Ministry of Fisheries, Wellington

Townsend A, P de Lange, C Duffy, C Miskelly, J Molloy and D Norton, 2008, *Threat classification system manual*, Department of Conservation, Wellington

United States Government Accountability Service, 2008 *National Marine Fisheries Service: Improvements are needed in the federal process used to protect marine mammals from commercial fishing*, report to the Chairman, Committee on Natural Resources, House of Representatives, available at <http://www.gao.gov/new.items/d0978.pdf>

Van Waerebeek K, A Baker, F Félix, J Gedamke, M Iñiguez, G Sanino, E Secchi, D Sutaria, A van Helden and Y Wang, 2007, 'Vessel collisions with small cetaceans worldwide and with large whales in the Southern Hemisphere, an initial assessment', *Latin American Journal of Aquatic Mammals*, 6(1): 43-69

Van Waerebeek K, R Leaper, A Baler, V Papastavrou, D Thiele, K Findlay, G Donovan and P Ensor, 2010, 'Odontocetes of the Southern Ocean Sanctuary', *Journal of Cetacean Resource Management*, 11(3), 315-346

Vanderlaan A and C Taggart, 2007, 'Vessel collisions with whales: The probability of lethal injury based on vessel speed', *Marine Mammal Science*, 23(1):144-156

Vaughn R, B Würsg and J Packard, 2010, 'Dolphin prey herding: Prey ball mobility relative to dolphin group and prey ball sizes, multispecies associates, and feeding duration', *Marine Mammal Science*, 26(1): 213-225

Vaughn R, B Würsg, D Shelton, L Timm and L Watson, 2008, 'Dusky dolphins influence prey accessibility for seabirds in Admiralty Bay, New Zealand', *Journal of Mammalogy*, 89(4):1051-1058

Weir C and S Dolman, 2007, 'Comparative review of the regional marine mammal mitigation guidelines implemented during seismic surveys and guidance towards a worldwide standard', *Journal of International Wildlife Law and Policy*, 10:1-27

Wilkinson I, J Burgess and M Cawthorn, 2003, 'New Zealand sea lions and squid – managing fisheries impacts on a threatened marine mammal', in N Gales, M Hindell and R Kirkwood (eds), *Marine mammals: Fisheries, tourism and management issues*, CSIRO publishing, Melbourne

Wilkinson I, P Duignan, A Grinberg, L Chilvers and B Robertson, 2006, 'Klebsiella pneumonia epidemics: Possible impact on New Zealand sea lion recruitment', in A Trites, S Atkinson, D DeMaster, L Fritz, T Gelatt, L Rea and K Wynne (eds), *Sea lions of the world*, Alaska Sea Grant College Programme, University of Alaska, Fairbanks

Williams C, 2007, *Doubtful Sound Bottlenose dolphin threat management discussion paper*, Department of Conservation, Invercargill

When N, 2008, 'Hector's and Maui's dolphins' in K Bosselmann, R Engel and P Taylor (eds), *Governance for sustainability: Issues, challenges, successes*, Environmental Policy and Law Paper No 70, IUCN, Gland

When N, 2012, 'How the law lets down the down-under dolphin – fishing related mortality of marine animals and the law in New Zealand', *New Zealand Journal of Environmental Law*, forthcoming

Wiseman N, 2008, *Genetic identity and ecology of Bryde's whales in the Hauraki Gulf, New Zealand*, Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy, University of Auckland

Würsig B, N Duprey and J Weir, 2007, *Dusky dolphins (Lagenorhynchus obscurus) in New Zealand waters: Present knowledge and research goals*, Department of Conservation, Wellington

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A very diverse range of marine mammals live in New Zealand waters, representing almost half of the world's species. Maui's and Hector's dolphins and New Zealand sea lions are found nowhere else in the world. There are small resident populations of orca and bottlenose dolphins in New Zealand, and a group of Bryde's whales living in the Hauraki Gulf. In Kaikoura, sperm whales come unusually close to land. Others, such as pilot whales, frequently strand on the country's beaches.

Marine mammals strongly influenced New Zealand's early history and are the basis of a flourishing tourism industry today. Many New Zealander's have a special connection with these highly intelligent and social creatures.

The Marine Mammals Protection Act 1978 was promulgated over thirty years ago. But it has not succeeded in ensuring the health of New Zealand's marine mammal populations. Many species are suffering from significant stresses. The very survival of some, such as the Maui's dolphin, is now at stake.

This publication investigates how New Zealand's current legislative framework has been applied in practice to address conflicts between human activity and marine mammals. It canvasses approaches to marine mammal protection in other countries and identifies current weaknesses in New Zealand's management framework. It then outlines measures that could be taken to enable the legislation to better ensure the 'full protection' of New Zealand's marine mammals.

It should be read by all those who want to better understand the threats currently facing New Zealand's marine mammals and what can be done about them.

KATE MULCAHY is the Environmental Defence Society's Senior Oceans Researcher. She is a qualified lawyer and has a first class Masters degree in Public International and Environmental Law. Prior to joining EDS, Kate worked for an environmental consultancy in the United Kingdom, specialising in marine planning and waste management matters. She has also worked as a solicitor for a civil litigation firm in Auckland.

RAEWYN PEART is the Environmental Defence Society's Policy Director. She holds degrees in psychology, law and commerce and has over 20 years' professional experience in environmental law and policy. For the past ten years Raewyn's work has focused on landscape protection, coastal development and marine management in New Zealand. She has written numerous papers, research reports and guides on these issues.

