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NEW ZEALAND THREAT CLASSIFICATION SERIES 29

Conservation status of New Zealand marine mammals, 2019

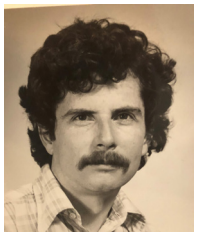
C.S. Baker, L. Boren, S. Childerhouse, R. Constantine, A. van Helden, D. Lundquist, W. Rayment and J.R. Rolfe

Department of Conservation
Te Papa Atawhai

New Zealand Government

Dedication

This report is dedicated to the memory of Dr Rob Mattlin, a founding member of this Committee, who passed away in May 2019. Rob's knowledge, insight and personality will be greatly missed by the Committee and by the marine mammals for which he was so passionate. Rob made New Zealand his home after leaving his native USA to undertake a PhD on New Zealand fur seals at Canterbury University. He proceeded to dedicate his life to marine science with a particular focus on marine mammals and spent most of his time based in New Zealand, apart from a role at the US Marine Mammal Commission. His contribution to our understanding of marine mammal biology and ecology and, in particular, his expertise in interactions with fisheries, was a key factor in achieving many positive outcomes for marine mammals in New Zealand. He made significant contributions to the conservation and management of both New Zealand sea lions and Hector's dolphins. The Committee would like to recognise the unique balance of wisdom, humour, and tenacity that Rob brought to his work and hope that we can continue to match his enthusiasm and passion.



Cover: The southern right whale (*Eubalaena australis*) population is recovering from perilously low numbers and is now assessed as At Risk – Recovering, an improvement on its previous Threatened status. *Photo: Will Rayment.*

New Zealand Threat Classification Series is a scientific monograph series presenting publications related to the New Zealand Threat Classification System (NZTCS). Most will be lists providing NZTCS status of members of a plant or animal group (e.g. algae, birds, spiders), each assessed once every 5 years. From time to time the manual that defines the categories, criteria and process for the NZTCS will be reviewed. Publications in this series are considered part of the formal international scientific literature.

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Conservation status of New Zealand marine mammals, 2019

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Abstract

The conservation status of all known New Zealand marine mammal taxa was assessed using the New Zealand Threat Classification System (NZTCS). A full list is presented, along with a statistical summary and brief notes on the most important changes. The assessment resulted in 7 species being classified as Threatened (4 Nationally Critical, 1 Nationally Endangered, 2 Nationally Vulnerable), 2 At Risk (1 Recovering, 1 Naturally Uncommon), 30 as Data Deficient, 5 as Not Threatened, and 12 as Non-resident Native (1 Migrant, 11 Vagrant). This list replaces all previous NZTCS lists for marine mammals.

Keywords: New Zealand Threat Classification System, NZTCS, conservation status, whale, dolphin, seal, sea lion, Delphinidae, Phocoenidae, Ziphiidae, Physeteridae, Kogiidae, Cetotheriidae, Balaenopteridae, Balaenidae, Otariidae, Phocidae.

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1. Summary

In 2013, Baker et al. (2016) assessed the conservation status of 57 marine mammal taxa using the criteria specified in the New Zealand Threat Classification System (NZTCS) manual (Townsend et al. 2008). Here we report on a new assessment of the taxa included in Baker et al. (2016). Table 1 compares the number of taxa in each conservation status in the 2013 assessment (Baker et al. 2016) with the numbers in this report. The assessment data for all taxa are available at https://nztcs.org.nz/reports/1067.

Table 1. Statistical comparison of the status of New Zealand marine mammal taxa assessed in 2013 (Baker et al. 2016) and 2019 (this document).

CONSERVATION STATUS	2013	2019
Data Deficient	12	30
Threatened – Nationally Critical	5	4
Threatened – Nationally Endangered	2	1
Threatened – Nationally Vulnerable	1	2
At Risk – Recovering	0	1
At Risk – Naturally Uncommon	0	2
Not Threatened	11	5
Migrant	7	1
Vagrant	19	11
Total	**57**	**57**

The panel notes with concern that 30 of the 57 species listed in this report are Data Deficient, because lack of data prevents them from being assessed. A lack of knowledge does not, however, denote uncertainty about their presence in New Zealand waters. In many instances they are species we are very familiar with but for which key life history information is unknown. The abundance of a species may be naturally low and sightings of them rare, or they may be cryptic in behaviour, making it difficult for scientists to estimate their numbers or determine population trends. It is likely that many of these species are, in fact, threatened due to low numbers, fragmented populations or restricted habitat. In many instances their presence is inferred through information from individual and mass stranding events, but also from at sea (often opportunistic) sightings. Species may range widely, or specific areas may be critical to them in different parts of their lives. While presence of a species in New Zealand waters may be certain, obtaining sufficient data to assign conservation status can be difficult. The conservation status of species is often used for prioritising conservation actions for these species. A presumption of threat for these taxa should be a major incentive for developers seeking resource consents and policy makers to commit resources to their evaluation.

The name of one species has changed since the 2013 assessment (Baker et al. 2016). The taxonomically indeterminate species previously assessed as *Balaenoptera acutorostrata* (un-named subsp.) is assessed here as *Balaenoptera acutorostrata* "dwarf" with the common name of 'dwarf minke whale'. Names assigned to different *Orcinus orca* 'Types' have also been changed. The taxonomic variation within *Orcinus orca sens. lat.* remains unresolved so here we recognise four forms of orca, all of them listed as variants of *Orcinus orca*.

Trends

The conservation status of 23 taxa has changed in this assessment (Table 2). The status of New Zealand sea lion has improved from Threatened – Nationally Critical to Threatened – Nationally Vulnerable. The overall rate of decline has slowed, and populations are stable or increasing at most breeding locations (see Appendix 1). Therefore, the trend is now assessed as a 30–50% decline over three generations, rather than >70% decline (as was assessed in 2013 (Baker et al. 2016)).

Table 2. Summary of status changes of marine mammal taxa between 2013 (data in rows, Baker et al. 2016) and 2019 (data in columns, this report). Numbers to the right of the diagonal (shaded medium grey) indicate improved status (e.g.one taxon has moved from Threatened – Nationally Critical in 2013 to Threatened – Nationally Vulnerable in 2019), numbers to the left of the diagonal (shaded light grey) indicate poorer status, numbers on the diagonal (shaded black) have not changed, and numbers without shading are either taxa that have moved into or out of Data Deficient, Migrant and Vagrant, or they are no longer considered to be distinct (TI) from other taxa in this report.

		Conservation status 2019									
		Total 57	DD 30	NC 4	NE 1	NV 2	Rec 1	NU 2	NT 5	Mig 1	Vag 11
Conservation status 2013	Data Deficient (DD)	12	12								
	Threatened – Nationally Critical (NC)	5		4		1					
	Threatened – Nationally Endangered (NE)	2			1	1					
	Threatened – Nationally Vulnerable (NV)	1				0	1				
	At Risk – Recovering (Rec)						0				
	At Risk – Naturally Uncommon (NU)							0			
	Not Threatened (NT)	11	5					1	5		
	Non-resident Native – Migrant (Mig)	7	6							1	
	Non-resident Native – Vagrant (Vag)	19	7					1			11

The status of Hector's dolphin has changed from Threatened – Nationally Endangered to Threatened – Nationally Vulnerable. This is based on population abundance estimates being greater than previously thought, rather than an actual improvement in species status. The assessment of population trends continues to be challenging, with different methods resulting in contrasting estimates of rates of decline (Slooten 2007; Slooten & Dawson 2010; Roberts et al. in press; unpubl. data). However, evidence exists that, where they are in place, protective measures benefit Hector's dolphin (e.g. Gormley et al. 2012). Nevertheless, pressures on Hector's dolphin continue, and fragmentation of the population with lost connectivity between subpopulations are ongoing concerns. The loss of connectivity adds pressure, with potential for loss of small interstitial populations severing gene flow between larger core population areas. Isolated subpopulations (Pichler et al. 1998; Pichler & Baker 2000; Hamner et al. 2012) are expected to be more susceptible to threats from human activities and other stressors in their environment, which can reduce their capability to cope with issues such as disease. The assessment of Māui dolphin is unchanged.

The status of southern right whales has improved from Threatened – Nationally Vulnerable to At Risk – Recovering. This is a genuine improvement based on continued documented growth of this population at a rate of approximately 7% per annum (Carroll et al. 2013) as it recovers after cessation of industrial whaling.

The leopard seal has been considered a Non-resident Native – Vagrant taxon in successive NZTCS assessments (Baker et al. 2010, 2016). Analysis of leopard seal records shows that this species maintains a constant presence in New Zealand, albeit in relatively low numbers, and therefore should be considered resident here. This species has been designated as Naturally Uncommon because, despite the low numbers, the population is not thought to be facing imminent extinction. There is no evidence of an established breeding population in New Zealand

and the animals here are only a small proportion of a much larger population in Antarctic waters. The low abundance of animals here is simply a reflection of the fact that New Zealand is not within the core range for the species.

A group of 18 taxa that had previously been assessed (5 Not Threatened, 6 Migrant and 7 Vagrant) are now listed as Data Deficient because the panel agreed there are insufficient data to support the previous assessments. Generally, the change of status into Data Deficient reflects greater uncertainty than was previously held. However, the pygmy blue whale, which had previously been assessed as Non-resident Native – Migrant is now recognised as being present in New Zealand waters year-round so is assessed as a Resident Native species. However, there is insufficient information to adequately assess its population size or trend, so it is listed here as Data Deficient – a move which is, paradoxically, based on more knowledge being available.

More detailed analysis of assessments of the above species and others is presented in Appendix 1. Table 3 summarises the nature of conservation status changes and reasons for them.

Table 3. Summary of changes to the number of taxa in each conservation status between 2013 (Baker et al. 2016) and 2019 (this report). A 'neutral' change is any movement into or out of Data Deficient or Non-resident native.

CONSERVATION STATUS, CHANGE AND REASON	TAXA
DATA DEFICIENT	30
No change	12
Neutral	18
Greater uncertainty	2
More knowledge	1
Reinterpretation of data	15
NATIONALLY CRITICAL	4
No change	4
NATIONALLY ENDANGERED	1
No change	1
NATIONALLY VULNERABLE	2
Better	2
Actual improvement	1
More knowledge	1
RECOVERING	1
Better	1
Actual improvement	1
NATURALLY UNCOMMON	2
Worse	1
More knowledge	1
Neutral	1
More knowledge	1
NOT THREATENED	5
No change	5
MIGRANT	1
No change	1
VAGRANT	11
No change	11

2. Conservation status of New Zealand marine mammals, 2019

Taxa are assessed according to the criteria of Townsend et al. (2008) and the results are presented in Table 4. Taxa are grouped by conservation status then alphabetically by scientific name. Data Deficient taxa are listed first, followed by other categories ordered by degree of loss, from Threatened through to Not Threatened then Non-resident Native followed by Introduced and Naturalised. Although the true status of Data Deficient taxa will span the entire range of available categories, taxa are in that list mainly because they are very seldom seen, so most are likely to end up being considered threatened. The Data Deficient list may include many of the most threatened species in New Zealand. One taxonomically unresolved species is listed at the bottom of the Data Deficient list.

The definitions of qualifiers and criteria are summarised below Table 4. See Townsend et al. (2008) for details.

The full assessment data for the marine mammal taxa listed in Table 4 can be viewed and downloaded at: https://nztcs.org.nz/reports/1067.

Table 4. Conservation status of New Zealand marine mammals, 2019.

COMMON NAME	NAME AND AUTHORITY	CRIT-ERIA	QUAL-IFIERS	REASON FOR STATUS CHANGE	FAMILY
DATA DEFICIENT (30)					
Taxonomically determinate (29)					
Antarctic minke whale	*Balaenoptera bonaerensis* Burmeister, 1867		DP, SO	Reinterpretation of data	Balaenopteridae
sei whale	*Balaenoptera borealis* Lesson, 1828		TO	Reinterpretation of data	Balaenopteridae
pygmy blue whale	*Balaenoptera musculus brevicauda* Ischihara, 1966		S?O	More knowledge	Balaenopteridae
Antarctic blue whale	*Balaenoptera musculus intermedia* Burmeister, 1871		TO	Reinterpretation of data	Balaenopteridae
fin whale	*Balaenoptera physalus* (Linnaeus, 1758)		TO	Reinterpretation of data	Balaenopteridae
Arnoux's beaked whale	*Berardius arnuxii* Duvernoy, 1851		S?O	Reinterpretation of data	Ziphiidae
pygmy right whale	*Caperea marginata* (Gray, 1846)		S?O	No change	Neobalaenidae
short-finned pilot whale	*Globicephala macrorhynchus* Gray, 1846		S?O	Reinterpretation of data	Delphinidae
Risso's dolphin	*Grampus griseus* (G. Cuvier, 1812)		SO	Reinterpretation of data	Delphinidae
southern bottlenose whale	*Hyperoodon planifrons* Flower, 1882		SO	No change	Ziphiidae
pygmy sperm whale	*Kogia breviceps* (Blainville, 1838)		DP, S?O	Greater uncertainty	Kogiidae
dwarf sperm whale	*Kogia sima* (Owen, 1866)		S?O	Reinterpretation of data	Kogiidae
Fraser's dolphin	*Lagenodelphis hosei* Fraser, 1956		SO	Reinterpretation of data	Delphinidae
hourglass dolphin	*Lagenorhynchus cruciger* (Quoy & Gaimard, 1824)		SO	No change	Delphinidae
southern right whale dolphin	*Lissodelphis peronii* (Lacepede, 1804)		DP, S?O	Reinterpretation of data	Delphinidae
Andrews' beaked whale	*Mesoplodon bowdoini* Andrews, 1908		S?O	No change	Ziphiidae
dense-beaked whale	*Mesoplodon densirostris* (Blainville, 1817)		S?O	No change	Ziphiidae
ginkgo-toothed beaked whale	*Mesoplodon ginkgodens* Nishiwaki & Kamiya, 1958		S?O	Reinterpretation of data	Ziphiidae
Hector's beaked whale	*Mesoplodon hectori* (Gray, 1871)		S?O	No change	Ziphiidae
strap-toothed whale	*Mesoplodon layardii* (Gray, 1865)		S?O	No change	Ziphiidae
True's beaked whale	*Mesoplodon mirus* True, 1913		S?O	No change	Ziphiidae
pygmy beaked whale	*Mesoplodon peruvianus* Reyes, Mead & Van Waerebeek, 1991		S?O	Reinterpretation of data	Ziphiidae

Continued on next page

Table 4 continued

COMMON NAME	NAME AND AUTHORITY	CRIT-ERIA	QUAL-IFIERS	REASON FOR STATUS CHANGE	FAMILY
spade-toothed whale	*Mesoplodon traversii* (Gray, 1874)		S?O	No change	Ziphiidae
spectacled porpoise	*Phocoena dioptrica* Lahille, 1912		S?O	No change	Phocoenidae
sperm whale	*Physeter macrocephalus* Linnaeus, 1758		DP, TO	Reinterpretation of data	Physeteridae
striped dolphin	*Stenella coeruleoalba* (Meyen, 1833)		SO	Reinterpretation of data	Delphinidae
rough-toothed dolphin	*Steno bredanensis* (G. Cuvier in Lesson, 1828)		SO	Reinterpretation of data	Delphinidae
Shepherd's beaked whale	*Tasmacetus shepherdi* Oliver, 1937		SO	No change	Ziphiidae
goose-beaked whale	*Ziphius cavirostris* G. Cuvier, 1823		SO	No change	Ziphiidae
Taxonomically unresolved (1)					
dwarf minke whale	*Balaenoptera acutorostrata* "dwarf"		DP, SO	Greater uncertainty	Balaenopteridae
THREATENED – NATIONALLY CRITICAL (4)					
Bryde's whale	*Balaenoptera edeni brydei* Olsen, 1913	A(1)	CD, DP, SO	No change	Balaenopteridae
Māui dolphin	*Cephalorhynchus hectori maui* Baker, Smith & Pichler, 2002	A(1)	CD	No change	Delphinidae
southern elephant seal	*Mirounga leonina* (Linnaeus, 1758)	A(1)	RR, SO	No change	Phocidae
orca, killer whale	*Orcinus orca* (Linnaeus, 1758)	A(1)	DP, S?O, DP, Sp	No change	Delphinidae
THREATENED – NATIONALLY ENDANGERED (1)					
bottlenose dolphin	*Tursiops truncatus* (Montagu, 1821)	A(1)	De, PF, SO, Sp	No change	Delphinidae
THREATENED – NATIONALLY VULNERABLE (2)					
Hector's dolphin	*Cephalorhynchus hectori hectori* (van Beneden, 1881)	D(1)	CD, DP, PF	More knowledge	Delphinidae
New Zealand sea lion	*Phocarctos hookeri* (Gray, 1844)	D(1)	CD, RR	Actual improvement	Otariidae
AT RISK – RECOVERING (1)					
southern right whale	*Eubalaena australis* (Desmoulins, 1822)	A	OL, RR, SO	Actual improvement	Balaenidae
AT RISK – NATURALLY UNCOMMON (2)					
false killer whale	*Pseudorca crassidens* (Owen, 1846)		DP, T?O	More knowledge	Delphinidae
leopard seal	*Hydrurga leptonyx* (Blainville, 1820)		De, SO	More knowledge	Phocidae
NOT THREATENED (5)					
New Zealand fur seal	*Arctocephalus forsteri* (Lesson, 1828)		Inc, SO	No change	Otariidae
common dolphin	*Delphinus delphis* Linnaeus, 1758		DP, SO	No change	Delphinidae
long-finned pilot whale	*Globicephala melas* (Traill, 1809)		DP, S?O	No change	Delphinidae
dusky dolphin	*Lagenorhynchus obscurus* unnamed subsp. Gray, 1828		S?O	No change	Delphinidae
Gray's beaked whale	*Mesoplodon grayi* von Haast, 1876		S?O	No change	Ziphiidae
NON-RESIDENT NATIVE – MIGRANT (1)					
humpback whale	*Megaptera novaeangliae* (Borowski, 1781)		SO	No change	Balaenopteridae
NON-RESIDENT NATIVE – VAGRANT (11)					
Antarctic fur seal	*Arctocephalus gazella* (Peters, 1876)		SO	No change	Otariidae
subantarctic fur seal	*Arctocephalus tropicalis* (Gray, 1872)		SO	No change	Otariidae
pygmy killer whale	*Feresa attenuata* Gray, 1874		DP, S?O	No change	Delphinidae
Weddell seal	*Leptonychotes weddellii* (Lesson, 1826)		SO	No change	Phocidae
crabeater seal	*Lobodon carcinophaga* (Hombron & Jacquinot, 1842)		SO	No change	Phocidae
Ross seal	*Ommatophoca rossi* Gray, 1844		SO	No change	Phocidae
orca, killer whale	*Orcinus orca* (Linnaeus, 1758) "Type B"		DP, S?O	No change	Delphinidae
orca, killer whale	*Orcinus orca* (Linnaeus, 1758) "Type C"		DP, S?O	No change	Delphinidae
orca, killer whale	*Orcinus orca* (Linnaeus, 1758) "Type D"		DP, S?O	No change	Delphinidae
melon-headed whale	*Peponocephala electra* (Gray, 1846)		SO	No change	Delphinidae
pantropical spotted dolphin	*Stenella attenuata* (Gray, 1846)		SO	No change	Delphinidae

See Townsend et al. (2008) for details of criteria and qualifiers, which are abbreviated as follows:

CD	Conservation Dependent
De	Designated
DP	Data Poor
Inc	Increasing
OL	One Location
PF	Population Fragmentation (New qualifier added to NZTCS in 2019. It is used to indicate taxa for which gene flow between subpopulations is impeded because of direct or indirect human activity and because small, isolated subpopulations are more susceptible to anthropogenic impacts.)
SO	Secure Overseas
S?O	Uncertain whether the taxon is secure overseas
TO	Threatened Overseas
T?O	Uncertain whether the taxon is threatened overseas

Extinct

Taxa for which there is no reasonable doubt – following repeated surveys in known or expected habitats at appropriate times (diurnal, seasonal and annual) and throughout the taxon's historic range – that the last individual has died.

Data Deficient

Taxa that are suspected to be threatened or, in some instances, possibly extinct but are not definitely known to belong to any particular category due to a lack of current information about their distribution and abundance. It is hoped that listing such taxa will stimulate research to find out the true category (for a fuller definition see Townsend et al. 2008).

Threatened

Taxa that meet the criteria specified by Townsend et al. (2008) for the categories Nationally Critical, Nationally Endangered and Nationally Vulnerable.

Threatened – Nationally Critical

Criteria for Nationally Critical:

A – very small population (natural or unnatural)

A(1)	<250 mature individuals
A(2)	≤2 subpopulations, ≤200 mature individuals in the larger subpopulation
A(3)	Total area of occupancy ≤1 ha (0.01 km^2)

B – small population (natural or unnatural) with a high ongoing or predicted decline

B(1/1)	250–1000 mature individuals, predicted decline 50–70%
B(2/1)	≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 50–70%
B(3/1)	Total area of occupancy ≤10 ha (0.1 km^2), predicted decline 50–70%

C – population (irrespective of size or number of subpopulations) with a very high ongoing or predicted decline (>70%)

C	Predicted decline >70%

Threatened – Nationally Endangered

Criteria for Nationally Endangered:

A – small population (natural or unnatural) that has a low to high ongoing or predicted decline

A(1/1) 250–1000 mature individuals, predicted decline 10–50%
A(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted decline 10–50%
A(3/1) Total area of occupancy ≤10 ha (0.1 km^2), predicted decline 10–50%

B – small stable population (unnatural)

B(1/1) 250–1000 mature individuals, stable population
B(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, stable population
B(3/1) Total area of occupancy ≤10 ha (0.1 km^2), stable population

C – moderate population and high ongoing or predicted decline

C(1/1) 1000–5000 mature individuals, predicted decline 50–70%
C(2/1) ≤15 subpopulations, ≤500 mature individuals in the largest subpopulation, predicted decline 50–70%
C(3/1) Total area of occupancy ≤100 ha (1 km^2), predicted decline 50–70%

Threatened – Nationally Vulnerable

Criteria for Nationally Vulnerable:

A – small, increasing population (unnatural)

A(1/1) 250–1000 mature individuals, predicted increase >10%
A(2/1) ≤5 subpopulations, ≤300 mature individuals in the largest subpopulation, predicted increase >10%
A(3/1) Total area of occupancy ≤10 ha (0.1 km^2), predicted increase >10%

B – moderate, stable population (unnatural)

B(1/1) 1000–5000 mature individuals, stable population
B(2/1) ≤15 subpopulations, ≤500 mature individuals in the largest subpopulation, stable population
B(3/1) Total area of occupancy ≤100 ha (1 km^2), stable population

C – moderate population, with population trend that is declining

C(1/1) 1000–5000 mature individuals, predicted decline 10–50%
C(2/1) ≤15 subpopulations, ≤500 mature individuals in the largest subpopulation, predicted decline 10–50%
C(3/1) Total area of occupancy ≤100 ha (1 km^2), predicted decline 10–50%

D – moderate to large population and moderate to high ongoing or predicted decline

D(1/1) 5000–20 000 mature individuals, predicted decline 30–70%
D(2/1) ≤15 subpopulations, ≤1000 mature individuals in the largest subpopulation, predicted decline 30–70%
D(3/1) Total area of occupancy ≤1000 ha (10 km^2), predicted decline 30–70%

E – large population and high ongoing or predicted decline

E(1/1) 20 000–100 000 mature individuals, predicted decline 50–70%
E(2/1) Total area of occupancy ≤10 000 ha (100 km^2), predicted decline 50–70%

At Risk

Taxa that meet the criteria specified by Townsend et al. (2008) for Declining, Recovering, Relict and Naturally Uncommon.

At Risk – Declining

Criteria for Declining:

A – moderate to large population and low ongoing or predicted decline

A(1/1) 5000–20 000 mature individuals, predicted decline 10–30%
A(2/1) Total area of occupancy ≤1000 ha (10 km^2), predicted decline 10–30%

B – large population and low to moderate ongoing or predicted decline

B(1/1) 20 000–100 000 mature individuals, predicted decline 10–50%
B(2/1) Total area of occupancy ≤10 000 ha (100 km^2), predicted decline 10–50%

C – very large population and low to high ongoing or predicted decline

C(1/1) >100 000 mature individuals, predicted decline 10–70%
C(2/1) Total area of occupancy >10 000 ha (100 km^2), predicted decline 10–70%

At Risk – Recovering

Taxa that have undergone a documented decline within the last 1000 years and now have an ongoing or predicted increase of >10% in the total population or area of occupancy, taken over the next 10 years or three generations, whichever is longer. Note that such taxa that are increasing but have a population size of <1000 mature individuals (or total area of occupancy of <10 ha) are listed in one of the Threatened categories, depending on their population size (for more details see Townsend et al. (2008)).

Criteria for Recovering:

A 1000–5000 mature individuals or total area of occupancy ≤100 ha (1 km^2), and predicted increase >10%

B 5000–20 000 mature individuals or total area of occupancy ≤1000 ha (10 km^2), and predicted increase >10%

At Risk – Relict

Taxa that have undergone a documented decline within the last 1000 years, and now occupy <10% of their former range and meet one of the following criteria:

A 5000–20 000 mature individuals; population stable (±10%)
B >20 000 mature individuals; population stable or increasing at >10%

The range of a relictual taxon takes into account the area currently occupied as a ratio of its former extent. Relict can also include taxa that exist as reintroduced and self-sustaining populations within or outside their former known range (for more details see Townsend et al. (2008)).

At Risk – Naturally Uncommon

Taxa whose distribution is confined to a specific geographical area or which occur within naturally small and widely scattered populations, where this distribution is not the result of human disturbance.

Non-resident Native

Taxa whose natural presence in New Zealand is either discontinuous (Migrant) or sporadic or temporary (Vagrant) or which have succeeded in recently (since 1950) establishing a resident breeding population (Coloniser).

Non-resident Native – Migrant

Taxa that predictably and cyclically visit New Zealand as part of their normal life cycle (a minimum of 15 individuals known or presumed to visit per annum) but do not breed here.

Non-resident Native – Vagrant

Taxa whose occurrences, though natural, are sporadic and typically transitory, or migrants with fewer than 15 individuals visiting New Zealand per annum.

Non-resident Native – Coloniser

Taxa that otherwise trigger Threatened categories because of small population size, but have arrived in New Zealand without direct or indirect help from humans and have been successfully reproducing in the wild only since 1950.

Not Threatened

Resident native taxa that have large, stable populations.

Introduced and Naturalised

Taxa that have become naturalised in the wild after being deliberately or accidentally introduced into New Zealand by human agency.

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Appendix 1

Background notes on threatened species and others with changed status or qualifiers or with significant new information

Data Deficient taxa

Dwarf minke whale, *Balaenoptera acutorostrata* "dwarf"
Moved from Not Threatened to Data Deficient. Potentially resident in New Zealand's subantarctic waters, but no data exist on population abundance or trend, and records are conflated with Antarctic minke whales. This level of uncertainty suggests that the best classification at present is Data Deficient.

Antarctic minke whale, *Balaenoptera bonaerensis*
Moved from Not Threatened to Data Deficient. Potentially resident in New Zealand's subantarctic waters, but records are conflated with dwarf minke whales. Abundance is estimated to be in the hundreds of thousands outside New Zealand waters, but no data exist on abundance or trend in New Zealand. This level of uncertainty suggests that the best classification at present is Data Deficient.

Sei whale, *Balaenoptera borealis*
Moved from Migrant to Data Deficient. Only a handful of New Zealand records, with two known deaths by ship strike. Uncertainty around residency, abundance and trends.

Pygmy blue whale, *Balaenoptera musculus brevicauda*
Moved from Migrant to Data Deficient. Now recognised as present in New Zealand waters year-round with signs of breeding activity. The population centred around New Zealand is differentiated from others around the world by genetic differences and a unique 'song' type. To date there have been no photographic matches with blue whales in Antarctica or Australia (Olson et al. 2015; Barlow et al. 2018). There are rare instances of ship strike and fisheries-related mortality and potential impacts of noise from industrial activities in parts of their distribution. Preliminary abundance estimates for New Zealand are based primarily on photos from the South Taranaki Bight region, but it is not known if this is representative of the entire New Zealand population. There are wide-ranging movements by some individuals throughout New Zealand waters as revealed by photo-identification matches and telemetry data (Olson et al. 2015; Barlow et al. 2018; Goetz et al. 2018). Abundance is presumed to be lower than pre-exploitation levels, but no trend data are available. Records may be conflated with Antarctic blue whales.

Antarctic blue whale, *Balaenoptera musculus intermedia*
Moved from Migrant to Data Deficient. Numerous acoustic detections, but it is uncertain how much time is spent in New Zealand waters. No data on abundance or trends in New Zealand are available. Records may be conflated with pygmy blue whales.

Fin whale, *Balaenoptera physalus*
Moved from Migrant to Data Deficient. It is uncertain how much time is spent in New Zealand waters. No data on abundance or trends in New Zealand are available.

Arnoux's beaked whale, *Berardius arnuxii*
Moved from Migrant to Data Deficient. It is uncertain how much time is spent in New Zealand waters. No data on abundance or trends in New Zealand are available.

Short-finned pilot whale, *Globicephala macrorhynchus*
Moved from Migrant to Data Deficient. Sporadic widespread records suggest a possibility of a resident population in New Zealand waters, but no abundance or trend information is available.

Risso's dolphin, *Grampus griseus*
Moved from Vagrant to Data Deficient. Likely to be a resident native species, but no data on abundance or trends in New Zealand waters are available.

Pygmy sperm whale, *Kogia breviceps*
Moved from Not Threatened to Data Deficient. There are 10–20 strandings per year in New Zealand waters and good genetic diversity, but the previous assessment was considered to be overly optimistic because there is no knowledge of the population size.

Dwarf sperm whale, *Kogia sima*
Moved from Vagrant to Data Deficient. Unable to interpret whether resident or non-resident. More tropical distribution in general, with uncertainty about how much of their life cycle may be spent in New Zealand waters. No data on abundance or trends in New Zealand are available.

Fraser's dolphin, *Lagenodelphis hosei*
Moved from Vagrant to Data Deficient. Possibly resident in northern subtropical waters of New Zealand. No data on abundance or trends in New Zealand waters are available.

Southern right whale dolphin, *Lissodelphis peronii*
Moved from Not Threatened to Data Deficient. Anecdotal reports of decreased sightings off Kaikoura, but no data on abundance or trends in New Zealand waters are available.

Dense-beaked whale, *Mesoplodon densirostris*
No change. The stranded animal south of Hokitika in 2017 was the southernmost record for the species.

Ginkgo-toothed beaked whale, *Mesoplodon ginkgodens*
Moved from Vagrant to Data Deficient. Records of the species in New Zealand waters suggest possible year-round presence. No data on abundance or trends in New Zealand waters are available.

Pygmy beaked whale, *Mesoplodon peruvianus*
Moved from Vagrant to Data Deficient. No data on abundance or trends in New Zealand waters are available.

Sperm whale, *Physeter macrocephalus*
Moved from Not Threatened to Data Deficient. No overall abundance estimate exists for this species in New Zealand waters. A population decline has been recorded at Kaikoura since the active development of a long-term photo-identification catalogue in 1991 (Somerford 2019). It is uncertain whether this is a decline in population abundance or whether animals have simply moved away from the area. Also, this is only a small proportion of the total New Zealand population, so it is uncertain whether this local decline is indicative of a decline throughout New Zealand waters. Stranding numbers around New Zealand seem to be consistent each year, and heterogeneity in the population indicates gene flow into the population. The demography of stranded animals suggests some rebound since whaling. This level of uncertainty suggests that the best classification at present is Data Deficient.

Striped dolphin, *Stenella coeruleoalba*
Moved from Vagrant to Data Deficient. Observed year-round in New Zealand waters, suggesting residency, but unknown abundance or trend. This level of uncertainty suggests that the best classification at present is Data Deficient.

Rough-toothed dolphin, *Steno bredanensis*
Moved from Vagrant to Data Deficient. Genetic analysis of specimens suggests diversity consistent with the broader Pacific region. Uncertainty around residency, abundance and trends in New Zealand waters suggests that the best classification at present is Data Deficient.

Shepherd's beaked whale, *Tasmacetus shepherdi*
No change. Consistent live sightings of this species have been made off the South Island east coast (Donnelly et al. 2018), but no abundance or trend information in New Zealand waters are available.

Nationally Critical taxa

Bryde's whale, *Balaenoptera edeni brydei*
No change to listed status. No new population estimate is available. Species was assessed on the basis of the Hauraki Gulf population, which is well-known, but the total New Zealand population may be larger. There are indications that the Hauraki Gulf population is not genetically isolated, and some animals off northeastern New Zealand are not included in population estimates. Mortality due to ship strike is now very rare, approaching zero due to active management measures.

Māui dolphin, *Cephalorhynchus hectori maui*
No change to listed status. Abundance estimates are fewer than 100 (Baker et al. 2016), with an estimated average decline of c. 1.5–3%/annum since 2001. The rate of decline is expected to have slowed since 2008 as a result of management actions, such as fisheries closures, but the power to detect such change is very low and this expectation cannot be confirmed. Significant decline is still a risk over the next three generations due to uncertainty in remaining threat from overlap with fisheries and diseases such as toxoplasmosis and brucellosis.

Southern elephant seal, *Mirounga leonina*
No change to listed status. No new information is available, but a decline is inferred from trends monitored on Macquarie Island.

Orca, killer whale, *Orcinus orca*
No change to listed status. The variation in *Orcinus orca* by ecotype, subspecies or species is unresolved. Without further research we treat them all as forms of *Orcinus orca*. For the orca regularly sighted in New Zealand coastal waters, there are suggestions of a decline rate of at least 10% over three generations, but adequate abundance estimates and trend data are lacking. Nevertheless, that recommendation has been adopted following the precautionary principle.

Nationally Endangered taxa

Bottlenose dolphin, *Tursiops truncatus*
No change to listed status. There are multiple subpopulations in New Zealand waters, with varying amounts of data to assess status and trends. Overall, there is better information about abundance but little change to the population state.

Bay of Islands
The Bay of Islands subpopulation is still relatively small (c. 50 animals) and declining at a higher rate than the rest of the country (Hamilton 2013).

Hauraki Gulf / Great Barrier Island
There are c. 200 animals in the Hauraki Gulf/Great Barrier Island subpopulation, with interactions between animals along the east coast of the North Island, including the Bay of Islands (Berghan et al. 2008; Dwyer et al. 2014).

Marlborough Sounds
No new data since the 2008 assessment that reported 385 unique individuals in the catalogue spanning the broader Marlborough Sounds region (Merriman et al. 2009). Individuals from the region have been observed on the west and east coasts of the South Island, suggesting a wide home range.

Kermadec Islands
Around the Kermadecs there are c. 90 individuals in photo-identification catalogues, with several repeat records suggesting some animals are resident around Raoul Island (Clark et al. 2016). Some animals around McCauley Island are morphologically different from Raoul Island animals.

Fiordland/Stewart Island/Otago

The Doubtful Sound subpopulation has been stable at 60–70 animals in recent years and the Dusky Sound subpopulation is stable at c. 120 animals (Johnston & Bennington 2018). In the southern fiords/Stewart Island/Otago region there are c. 90 animals (Brough et al. 2015).

Nationally Vulnerable taxa

New Zealand sea lion, *Phocarctos hookeri*

Moved from Nationally Critical to Nationally Vulnerable.

Population trend

The previous classification was largely based on a decline rate of >70% over three generations. There are presently no reliable estimates of the future trend in total population size, as forward projections from the existing New Zealand sea lion population model (which is based on data from only one of the four breeding locations) have a high degree of uncertainty, including some parameters with implausibly high values (e.g. pupping probability of approx. 0.90).

Therefore, population trend was based on an assessment of the total estimate of pup production from the four main breeding locations (i.e. Auckland Islands, Campbell Island/ Motu Ihupuku, Stewart Island/Rakiura and mainland New Zealand) using past and present estimates. Estimates of pup production can be used as a reliable index of overall population size in sea lions while noting that there is some uncertainty associated with scaling-up from pup production to total population size.

Pup production is presently increasing at both Stewart Island and mainland New Zealand but appears to be approximately stable (i.e. ± 10%) at both the Auckland Islands and Campbell Island. However, it is important to note that pup production at the Auckland Islands, while approximately stable since 2008/09, is still >40% lower than the peak seen in 1997/98.

Total pup production for the four main breeding colonies is shown in Figure 1 for years when comparable estimates are available. The exception is for 1997/98 when no estimate is available for Campbell Island (identified as a green point). Given the incomplete data available, the estimate for 1997/98 is likely to be negatively biased and therefore the resulting trend estimate will also be negatively biased. Making the simplest assumption that Campbell Island had approximately the same number of pups in 1997/98 as the first year for which there is a robust estimate[1] (2002/03 – 385 pups), then the overall decline is estimated to be 38%.

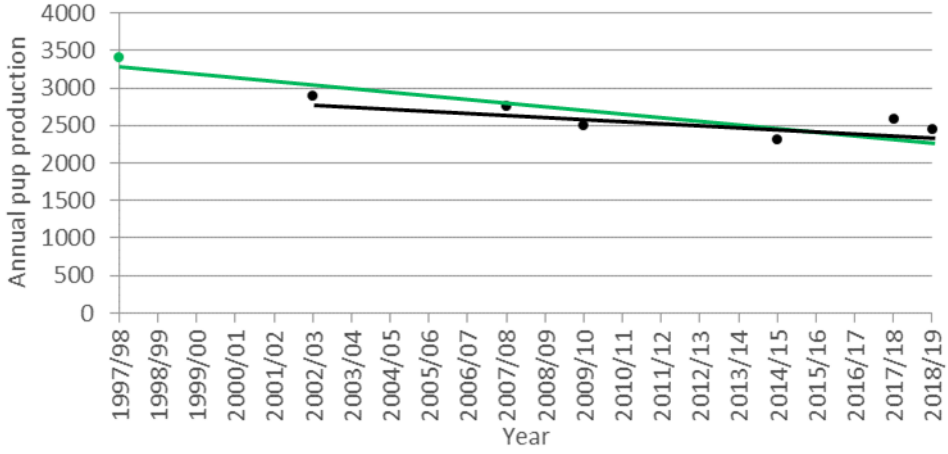

Figure 1. Estimated total annual pup production for New Zealand sea lions. Black points = combined estimates for Auckland Islands, Campbell Island/Motu Ihupuku, Stewart Island/Rakiura and mainland New Zealand; Green point = combined estimates for Auckland Islands, Stewart Island/Rakiura, mainland New Zealand and assumed pup production for Campbell Island/Motu Ihupuku of 385 pups. Fitted lines represent simple linear regressions for the data sets 1997/98 (green) and 2002/03 (black) onwards. Childerhouse 2019.

1. While there are pup production estimates for Campbell Island prior to 2002/03, these were collected opportunistically and using different methods. Therefore, we do not not consider them to be robust or comparable with later systematic estimates.

Given the considerable uncertainty around the 1997/98 estimate of pup production, an alternative approach is to only use the time periods for which comparable estimates are available. This removes the 1997/98 data point and starts the comparison at 2002/03. With this approach the overall decline is estimated to be 29%.

Given the history of adverse stochastic events (affecting, in particular, the Auckland Islands) and following the Threat Classification System guidelines, a precautionary approach is taken, and the decline is therefore estimated at >30% over three generations.

Population size
Population Size (i.e. the number of mature individuals) was based on technical advice provided to the Committee by Dr. Jim Roberts (Roberts 2018). Two data sets were used in estimating the number of mature females. The first used age-structured modelling of New Zealand sea lion data from the Auckland Islands, producing an estimate of 2500 mature females for this locality (Roberts & Doonan 2016; Roberts 2017). The second used estimates of the number of mature females – 970 at Campbell Island/ Motu Ihupuku, 55 at Stewart Island/Rakiura and 22 on mainland New Zealand – derived from estimates of pup production at those locations and an assessment of average annual breeding probability (Roberts 2018). These two estimates combined provide a total estimate of mature females of 3570. Assuming a female to male sex ratio of 1:1 (based on a known birth rate ratio of 1:1 and broadly consistent survival rates between sexes), this would lead to a total estimate of the number of mature individuals (i.e. females and males) of 7140.

The estimate is likely to be an overestimate of the actual number of breeding individuals in any one season.

Based on the precautionary approach, with an estimated rate of decline over three generations of 30–50%, and an estimated total number of mature individuals between 5000 and 20,000, the species is assessed as Nationally Vulnerable.

Hector's dolphin, *Cephalorhynchus hectori hectori*
Moved from Nationally Endangered to Nationally Vulnerable. Abundance of Hector's dolphins is now estimated to be greater than previously thought. Aerial surveys of the coastal waters of the South Island, excluding harbours and enclosed bays, provided an estimate of 14 849 animals (CV: 11%, 95% CI 11 923–18 492) (MacKenzie & Clement 2014, 2016), which necessitated a change in threat classification.

Available data on trends are conflicting, with different methods resulting in strongly contrasting estimates of rates of decline. Estimates of fisheries-related declines received in submissions ranged from just a few percent to > 70% decline over three generations (1975–2015). The decline has slowed at Banks Peninsula where protective measures are in place (Gormley et al. 2012) to reduce fisheries risks, but similar positive population-level effects of protection have not been demonstrated or investigated elsewhere. Disease and risks from fishing in dolphin habitat outside protected areas may still be sufficient to inhibit recovery (Roberts et al. in press).

None of the data available on trends over the last three generations are conclusive, particularly with respect to fisheries risks in the 1970s and 80s. Our inference is that population declines are likely to have been significant in the past but have been reduced by protections in place at present. Uncertainty about this trend has resulted in the 'Data Poor' qualifier being applied. We are still concerned about the risk of decline across most of the species' range, particularly in areas where populations range outside currently protected areas. We are particularly concerned for small, isolated subpopulations around the South Island, which are likely to be less resilient to anthropogenic impacts.

Recovering taxa

Southern right whale, *Eubalaena australis*

Moved from Nationally Vulnerable to Recovering. This is supported by multiple estimates of abundance exceeding 1000 animals (Carroll et al. 2013; Jackson et al. 2016) and strong rates of growth (7% per annum) (Carroll et al. 2013). There is little evidence yet of colonisation beyond the primary calving ground at the Auckland Islands, so a 'One Location' qualifier has been added.

Naturally Uncommon taxa

False killer whale, *Pseudorca crassidens*

Moved from Not Threatened to Naturally Uncommon. Most sightings are in northern waters during warmer months, with high levels of resighting rates of individuals. It is unknown how widely they range but records exist in Canterbury and the Chatham Islands. There is an estimate of approximately 100 animals in one subpopulation (Zaeschmar 2015). Records of mass strandings point to the likelihood of a larger population base, however. The documented social structure of the species in other parts of the world indicates that it is possible that subpopulations within the New Zealand range may be genetically isolated from each other. There is some evidence of fisheries interactions, but these are not thought to impact significantly on the total population, therefore the Naturally Uncommon classification was chosen. Data available for population size and trend are poor.

Leopard seal, *Hydrurga leptonyx*

Moved from Vagrant to Naturally Uncommon. This change reflects long-term records from the subantarctic islands and the mainland, an increasing frequency of sightings on the mainland, and new evidence that the species is continuously present in New Zealand. There are a handful of records of births, although all pups died and therefore to date there is no evidence of an established breeding population in New Zealand. Animals have typically been sighted on the mainland over short periods of time (days or weeks), which suggests regular immigration and emigration of animals to/from New Zealand, though some individuals have been repeatedly sighted over months or years. The Designated qualifier is applied because the number of mature individuals found in New Zealand is <250 at any one time, which would usually result in a status of Nationally Critical. That status was not considered appropriate in this instance, because the low abundance of animals here may simply reflect that New Zealand is not within the species' core range and animals here are likely only a small proportion of the larger Antarctic population, rather than a discrete local population at high risk of extinction.

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