2025

NEW ZEALAND THREAT CLASSIFICATION SERIES 47

Conservation status of chondrichthyans (chimaeras, sharks and rays) in Aotearoa New Zealand, 2024

Clinton Duffy, Mark Erdmann, Brittany Finucci, Marc Griffiths, Robert Lewis, Karen Middlemiss, Andrew Stewart, Rod Hitchmough and Pascale Michel

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Cover: Adult smooth hammerhead shark (*Sphyrna zygaena*), Not Threatened, in the outer Hauraki Gulf / Tīkapa Moana, January 2025.
Photo: Mark Erdmann, Conservation International

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 the NZTCS status of members of a group (e.g. algae, birds, spiders, fungi). There are currently 23 groups, each assessed once approximately 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.

The views published in this report reflect the views of an independent panel and are not necessarily the views of the Department of Conservation. This publication is not a living document and the assessments were not made by the Department of Conservation.

This publication is available for download from the Department of Conservation website. Refer doc.govt.nz under *Publications*. The NZTCS database can be accessed at nztcs.org.nz. For all enquiries, email threatstatus@doc.govt.nz.

ISSN 2324-1713 (web PDF)
ISBN 978-1-0671131-4-8 (web PDF)

This report was prepared for publication by Te Rōpū Ratonga Auaha, Te Papa Atawhai / Creative Services, Department of Conservation. Publication was approved by Henley McKegg, Manager Reporting & Insights, Department of Conservation, Wellington, New Zealand.

Published by Department of Conservation Te Papa Atawhai, PO Box 10420, Wellington 6140, New Zealand.

In the interest of forest conservation, we support paperless electronic publishing.

CONTENTS

Conservation status of chondrichthyans (chimaeras, sharks and rays) in Aotearoa New Zealand, 2024

Clinton Duffy[1,*], Mark Erdmann[2], Brittany Finucci[3], Marc Griffiths[4], Robert Lewis[5], Karen Middlemiss[6], Andrew Stewart[7], Rod Hitchmough[8] and Pascale Michel[9]

[1] Auckland War Memorial Museum, The Domain, Private Bag 92018, Auckland 1142, New Zealand

[2] Conservation International Aotearoa Ltd, 23 Symonds Street, Auckland 1010, New Zealand

[3] National Institute of Water & Atmospheric Research, Private Bag 14901, Wellington 6241, New Zealand

[4] Ministry for Primary Industries, PO Box 2526, Wellington 6140, New Zealand

[5] University of Otago, PO Box 56, Dunedin 9054, New Zealand

[6] Department of Conservation, Private Bag 5, Nelson 7042, New Zealand

[7] Museum of New Zealand Te Papa Tongarewa, PO Box 467, Wellington 6140, New Zealand

[8] Takapu Valley, Wellington 5028, New Zealand

[9] Department of Conservation, PO Box 10420, Wellington 6140, New Zealand

* Corresponding author; email: cduffy@aucklandmuseum.com

Abstract

The conservation status of all known taxa of indigenous chondrichthyans (chimaeras, sharks and rays) in Aotearoa New Zealand was reassessed using the New Zealand Threat Classification System (NZTCS). A list of these taxa is presented, along with a statistical summary and brief notes on the most important changes since the previous assessment was made in 2016. This list replaces all previous NZTCS lists for chondrichthyans. In total, 4 taxa (4%) were assessed as being Threatened, 1 taxon (1%) as At Risk, 52 taxa (46%) as Not Threatened and 5 taxa (4%) as Non-resident Native. A further 51 taxa (45%) were assessed as Data Deficient (i.e. insufficient information was available to assess their conservation status). Of the 113 taxa assessed in this report, 14 (12%) are taxonomically unresolved, 5 of which have not been formally described and named.

Keywords: Carcharhinidae, Chimaeridae, Etmopteridae, Mobulidae, New Zealand Threat Classification System, NZTCS, Pentanchidae, Rajidae, Somniosidae, Squalidae

Duffy C et al. 2025. Conservation status of chondrichthyans (chimaeras, sharks and rays) in Aotearoa New Zealand, 2024. Wellington: Department of Conservation. New Zealand Threat Classification Series 47.

1. Background

The conservation status of chondrichthyans (chimaeras, sharks and rays) in Aotearoa New Zealand was first assessed using the New Zealand Threat Classification System (NZTCS) in 2002 (Hitchmough 2002). The NZTCS was established to complement the International Union for Conservation of Nature (IUCN) Red List system. Categories and criteria were defined to reflect Aotearoa New Zealand's unique environments and to consider the country's relatively small size and diversity of ecosystems, as well as the large number of taxa with naturally restricted ranges and/or small population sizes (de Lange and Norton 1998; Molloy et al. 2002; Townsend et al. 2008; Rolfe et al. 2022).

The NZTCS methodology was refined in 2007 and again in 2019 following rigorous reviews by teams of experts to ensure that all possible combinations of status and population trend were covered within the different categories. The resulting manuals (Townsend et al. 2008; Rolfe et al. 2022) were used to reassess the conservation status of chondrichthyans in 2016 (Duffy et al. 2018) and 2024 (this report).

Minor changes to the categories, criteria and qualifiers since the previous assessment are as follows:

- The qualifier Climate Impact (CI) has been added to reflect new pressures from changing environments and to acknowledge taxa that are or will be adversely affected by long-term climate trends and/or extreme events. Adverse effects of climate change may be direct (e.g. extreme weather) or indirect (e.g. changes in predator pressure following masting events).
- The qualifier Conservation Research Needed (CR) has been added to indicate the need for research to better understand the cause of decline and/or a solution for recovery.
- The qualifier Data Poor (DP) has been replaced by the qualifiers Data Poor Recognition (DPR), Data Poor Size (DPS) and Data Poor Trend (DPT) to indicate whether the low confidence in the assessment is due to difficulty in determining the identity of the taxon in the field and/or laboratory, a lack of data on population size, or a lack of data on population trend.

NZTCS assessments are reviewed approximately every 5 years by a panel facilitated by the New Zealand Department of Conservation Te Papa Atawhai (DOC). The assessment panel brings together experts in the fields of taxonomy, conservation biology and ecology in Aotearoa New Zealand, as well as people with a good technical knowledge of the NZTCS process to ensure consistent approaches across the various assessment panels.

A call for information was advertised through DOC's 'Have your say' process, the NZTCS website and expert networks. One submission covering one taxon was received through this process.

When making their assessment, experts consider the previously published assessment as the starting point for the new assessment and evaluate any new information available, both published and unpublished. Taxa are assessed according to the reported population size and trend since the last assessment (usually the past 5 years) and predicted future changes over the next 10 years or three generations, whichever is longer.

Taxa are assigned to the category Data Deficient when insufficient data are available to assess their conservation status or are given the qualifier Data Poor Size or Data Poor Trend when assessments are made but with low confidence due to limited data being available.

Assessment criteria and categories are interpreted in the context of scientific evidence (e.g. population monitoring) and expert understanding of the ecology of each taxon/order (e.g. natural population fluctuations), and the manual requires that a precautionary approach is applied where a taxon is on the border of two possible threat categories, resulting in the higher threat category being chosen. Notes from the expert panel meeting and the rationales for the reclassification of taxa have been summarised in the present report. Full details can be found on the assessment page for each taxon on the NZTCS website (nztcs.org.nz/reports/1173).

2. Summary

This report presents the conservation status of all known taxa of indigenous chondrichthyans in Aotearoa New Zealand, including Non-resident Native – Migrant and Non-resident Native – Vagrant species. It is the latest update in a regular series of re-assessments (Hitchmough 2002; Hitchmough et al. 2007; Duffy et al. 2018). In 2016, Duffy et al. (2018) assessed the conservation status of 113 native taxa of chondrichthyans in Aotearoa New Zealand using the criteria specified in the NZTCS manual of Townsend et al. (2008). Here, we report on a new assessment of these taxa using the NZTCS manual of Rolfe et al. (2022).

2.1 Changes to the list of taxa

Fourteen taxa have had name changes since the 2016 assessment (Table 1).

The name of the thorny skate has changed from *Amblyraja hyperborea* (Collett, 1879) to *Amblyraja* cf. *hyperborea*, reflecting a shift from taxonomically determinate to taxonomically unresolved. This taxon is widely distributed around central and southern Aotearoa New Zealand at depths of 130–2,613 m (McMillan et al. 2011; Last and Stewart 2015b). It belongs to a group of large, morphologically similar deep-water skates that includes *A. georgiana* (South Atlantic, Southern Ocean), *A. hyperborea* (antitropical) and *A. jenseni* (North Atlantic) (Naylor et al. 2012; Last et al. 2016; Kulka et al. 2024). The type locality of *A. hyperborea* is the Arctic Ocean west of Spitsbergen (Collett 1879). Last and Stevens (2009) considered the identification of *A. hyperborea* from Australia as provisional, noting the occurrence of variable colour forms across the species' distribution. Genetic research by Naylor et al. (2012) and Park et al. (2020) appears to confirm the presence of *A. hyperborea* in the Southern Hemisphere (i.e. Tasman and Ross Seas). However, Naylor et al. (2012) preferred to refer to the *A. hyperborea* cluster as a complex because it contained specimens of skates identified as *A. hyperborea*, *A. badia*, *A. jenseni* and *Amblyraja* sp. Although *A. badia* and *A. jenseni* were subsequently synonymised with *A. hyperborea*, further morphological and genetic research has confirmed the validity of *A. jenseni* and demonstrated temperature-related niche separation between it and *A. hyperborea* (Last, Weigmann, et al. 2016; Kulka et al. 2024). As no direct genetic comparisons have been made between Aotearoa New Zealand specimens of thorny skate and *A. hyperborea* from the type locality, the re-classification of this species as *Amblyraja* cf. *hyperborea* reflects the ongoing uncertainty around the classification and distribution of Southern Hemisphere *Amblyraja* species (e.g. Kulka et al. 2024).

Both the shorttail and longtail stingrays, which were formerly considered species of *Dasyatis* Rafinesque, 1810, have been placed in the genus *Bathytoshia* Whitley, 1933 (Last, Naylor, et al. 2016).

The blackbelly lanternshark (*Etmopterus abernethyi* Garrick, 1957) was previously reported from Aotearoa New Zealand as *E. lucifer* Jordan & Snyder, 1902. Recent phylogenetic and taxonomic research has shown that the *E. lucifer* clade includes several cryptic species and that *E. lucifer* is restricted to the Northwest Pacific (Straube et al. 2010; Straube, Duhamel, et al. 2011; Straube, Kriwet, et al. 2011; Ebert et al. 2021; Ng et al. 2025). The blackbelly lanternshark is widespread in Aotearoa New Zealand waters and also occurs in New Caledonia and eastern and southern Australia (Last and Stevens 2009; Last and Stewart 2015a).

The deep-water catshark formerly known as *Parmaturus* sp. 1 has been formally described as *Dichichthys satoi* and placed in a new family, Dichichthyidae, by White et al. (2024). A combination of morphological and genetic characters distinguishes this family from the other catshark families Pentanchidae, Atelomycteridae and Scyliorhinidae (White et al. 2024). *Dichichthys satoi* occurs from the West Norfolk Ridge to the southeast North Island at depths of 666–1,175 m (White et al. 2024).

Taxonomic research has also revealed that the globally distributed rhinochimaerid *Harriotta raleighana* is in fact a species complex, with the species that occurs in Aotearoa New Zealand and southeast Australia recently being described as *H. avia* (Finucci et al. 2024).

The electric ray, which was formerly considered to be an endemic species (*Torpedo fairchildi* Hutton, 1872), has been synonymised with *Tetronarce nobiliana,* which is now considered to occur in most temperate regions of the world except the North and East Pacific and Northwest Atlantic Oceans (Last et al. 2016).

The tag names *Cephaloscyllium* sp. 1 cf. *variegatum, Cephaloscyllium* sp. 2 cf. *variegatum, Hydrolagus* sp. 1 cf. *affinis* and *Tetronarce* sp. 1 cf. *tokionis* have been simplified.

The Norfolk Island smoothhound (*Mustelus* sp. 2) has been added to the list following collection of specimens from Wanganella Bank, and the oval electric ray (*Typhlonarke tarakea*) has been removed from the list following its synonymy with *Typhlonarke aysoni* (Last et al. 2016).

Table 1. Name changes affecting native taxa of chondrichthyans in Aotearoa New Zealand between the publication of Duffy et al. (2018) and this report.

NAME AND AUTHORITY IN DUFFY ET AL. (2018)	NAME AND AUTHORITY IN THIS REPORT	FAMILY
Amblyraja hyperborea (Collett, 1879)	*Amblyraja* cf. *hyperborea* (Collett, 1879) (NMNZ P.039879)	Rajidae
Dasyatis brevicaudata (Hutton, 1875)	*Bathytoshia brevicaudata* (Hutton, 1875)	Dasyatidae
Dasyatis thetidis Ogilby, 1899	*Bathytoshia lata* (Garman, 1880)	Dasyatidae
Cephaloscyllium sp. 1 cf. *variegatum* Last & White, 2008	*Cephaloscyllium* sp. 1 (NMNZ P.038080)	Scyliorhinidae
Cephaloscyllium sp. 2 cf. *variegatum* Last & White, 2008	*Cephaloscyllium* sp. 2 (AIM MA46200)	Scyliorhinidae
Parmaturus sp. 1	*Dichichthys satoi* White, Stewart, O'Neill & Naylor, 2024	Dichichthyidae
Etmopterus lucifer Jordan & Snyder, 1902	*Etmopterus abernethyi* Garrick, 1957	Etmopteridae
Harriotta raleighana Goode & Bean, 1895	*Harriotta avia* Finucci, Didier, Ebert, Green & Kemper, 2024	Rhinochimaeridae
Hydrolagus sp. 1 cf. *affinis* (de Brito Capello, 1868)	*Hydrolagus* cf. *affinis* (de Brito Capello, 1868) (NMNZ P.045758)	Chimaeridae
Centroscymnus macracanthus Regan, 1906	*Scymnodon macracanthus* (Regan, 1906)	Somniosidae
Scymnodon sp. 1 cf. *ringens* Barbosa du Bocage & de Brito Capello, 1864	*Scymnodon ringens* Barbosa du Bocage & de Brito Capello, 1864	Somniosidae
Squalus sp. 5	*Squalus* sp. (NMNZ P.042689)	Squalidae
Tetronarce fairchildi (Hutton, 1872)	*Tetronarce nobiliana* (Bonarparte, 1835)	Torpedinidae
Tetronarce sp. 1 cf. *tokionis* (Tanaka, 1908)	*Tetronarce* cf. *tokionis* (Tanaka, 1908) (NMNZ P.042400)	Torpedinidae

Institutional abbreviations: NMNZ = Museum of New Zealand Te Papa Tongarewa, AIM = Auckland War Memorial Museum Tāmaki Paenga Hira.

2.2 Taxonomically unresolved species

Fourteen species are taxonomically unresolved, and five of these require formal scientific description.

Cephaloscyllium sp. 1 occurs in deep water on West Norfolk Ridge and in the Bay of Plenty, and *Cephaloscyllium* sp. 2 occurs in deep water around the Kermadec Islands and on Star of Bengal Bank. The Kermadec smoothhound (*Mustelus* sp. 1) appears to be endemic to the Kermadec Islands, whereas *Mustelus* sp. 2 occurs on Wanganella Bank and the Norfolk Island shelf, and both these species are genetically distinct from *M. lenticulatus* (CD, unpubl. data). The shortspine spiny dogfish (*Squalus* sp.) is morphologically and genetically similar to *S. montalbani* from Queensland, Indonesia and the Philippines, and may prove to be conspecific with it (CD, unpubl. data). This species occurs below about 400 m depth off the northeast North Island and along the west coasts of the North and South Islands as far south as Cook Canyon in Westland (Roberts et al. 2015).

Uncertainty regarding the identity of the thorny skate (*Amblyraja* cf. *hyperborea*) is discussed in section 2.1 above. Other species of uncertain taxonomic status are the freckled catshark (*Apristurus* cf. *sinensis*), shortspine lanternshark (*Etmopterus unicolor*), rough shovelnose dogfish (*Deania hystricosa*), bramble shark (*Echinorhinus brucus*), slender electric ray (*Tetronarce* cf. *tokionis*), velcro skate (*Notoraja alisae*) and giant black ghostshark (*Hydrolagus* cf. *affinis*).

The genus *Apristurus* (Pentanchidae) is a diverse group of deep-water catsharks that have historically been difficult to identify due to poor knowledge of individual, ontogenetic, sexual and geographical variation in their morphology (Nakaya et al. 2008). Seven deep-water catsharks are currently recognised from Aotearoa New Zealand waters. Although their taxonomy has been largely resolved, the freckled catshark is known to be part of the *A. sinensis* species complex. It is distinguishable from *A. sinensis* from the South China Sea based on spiral valve counts (Nakaya et al. 2015). Research to determine its taxonomic status and relationships to other members of the *A. sinensis* complex is ongoing.

The shortspine lanternshark (*Etmopterus unicolor*) has a widespread but patchy distribution in Aotearoa New Zealand waters and is also reported from Japan, South Africa and southern Australia (Last and Stevens 2009; Last and Stewart 2015a). It belongs to a group of large-bodied lanternsharks referred to as the *Etmopterus spinax* clade. Other species in this clade include *E. spinax*, *E. princeps*, *E. dianthus* and *E. granulosus* (Straube et al. 2010; Straube, Kriwet, et al. 2011). Several species in this clade are difficult to distinguish morphologically, and genetic research indicates that it contains a large number of cryptic species, especially in the Southern Hemisphere (Straube et al. 2010; Straube, Duhamel, et al. 2011; Straube, Kriwet, et al. 2011). This research also demonstrated species-level genetic divergence between *E. unicolor* specimens from Japan and *E.* cf. *unicolor* specimens from the eastern Indian Ocean, suggesting that *E. unicolor* is probably confined to the Northwest Pacific (Straube, Kriwet, et al. 2011; Last and Stewart 2015a). Since no genetic comparisons have been made between specimens identified as *E. unicolor* from Aotearoa New Zealand and *E. unicolor* from Japan, the taxonomic status of the Aotearoa New Zealand specimens is uncertain (Last and Stewart 2015a).

Shovelnose spiny dogfishes (*Deania* spp.) are a common bycatch in deep-water fisheries and are the most abundant bycatch species by weight taken by Aotearoa New Zealand vessels fishing in areas adjoining the Exclusive Economic Zone (EEZ) (Duffy et al. 2017; Ford et al. 2018). Although three species (*D. calceus*, *D. hystricosa*, *D. quadrispinosa*) are currently recognised from Aotearoa New Zealand waters, considerable uncertainty surrounds the validity of *D. hystricosa* and it is unclear if the specimens identified as that species from Aotearoa New Zealand are distinct from *D. calceus*, conspecific with *D. hystricosa* or an undescribed species (Duffy et al. 2015; Matsumoto et al. 2017; Stefanni et al. 2021). Regional revisions of *Deania* (e.g. Marrero et al. 2023) have failed to resolve the larger taxonomic picture, and a global review is needed.

The bramble shark is a large, deep-water shark with apparent centres of abundance in the Southwest Atlantic Ocean and northern Indian Ocean (Battiata et al. 2024). Although there is genetic evidence indicating that the Atlantic and northern Indian Ocean populations of *Echinorhinus brucus* are distinct species, the specific identity of bramble sharks occurring in Aotearoa New Zealand waters is unresolved because of a lack of genetic material and the small number of intact museum voucher specimens from Australasia (Naylor et al. 2012; Fariña et al. 2015; Henderson et al. 2016; Morales-Ávila et al. 2023; Battiata et al. 2024). Battiata et al. (2024) concluded that the bramble shark is absent from the Pacific, discounting two records of the species from Aotearoa New Zealand reported by Francis (2015) as 'dubious'. In doing so, they overlooked the existence of two specimens in Aotearoa New Zealand museums and other authoritative reports of the species from Aotearoa New Zealand waters (Garrick 1960; Paulin et al. 1989; Stewart 2015). A summary of Aotearoa New Zealand records of *E. brucus* is provided in Appendix 1.

Two species of electric ray, *Tetronarce nobiliana* and *Tetronarce* cf. *tokionis*, are currently recognised from Aotearoa New Zealand (Last and Stewart 2015c). These are distinguished from each other by proportional differences in the height of the caudal fin relative to the pelvic-caudal space. However, further research is required, preferably using both morphological and genetic traits, to determine if *Tetronarce* cf. *tokionis* is distinct from *T. nobiliana* and to characterise its relationship to *T. tokionis* (Tanaka, 1908) from Japan (Last and Stewart 2015b).

The velcro skate (*Notoraja alisae*) was described from deep water off New Caledonia and is considered to be distributed from Vanuatu and New Caledonia along the Norfolk Ridge and east coast of the North Island to the Chatham Rise (Séret and Last 2012; Stewart and Last 2015). Morphological variation observed in specimens identified as *N. alisae* from Aotearoa New Zealand waters suggests that these may represent two distinct species. The distribution of these forms in Aotearoa New Zealand waters is currently undocumented and their relationship to *N. alisae* requires confirmation. Most specimens have been collected below 1,100 m north of the subtropical convergence (Stewart and Last 2015).

The giant black ghostshark, *Hydrolagus* cf. *affinis* (previously reported from Aotearoa New Zealand as *Hydrolagus* sp. D), is widely distributed around Aotearoa New Zealand, having been collected from Lord Howe Rise and north Chatham Rise southward to the southern edge of the Campbell Plateau (Roberts et al. 2015). It has also been collected south of Tasmania and elsewhere in the South Pacific (D Didier, Millersville University, Pennsylvania, pers. comm.; BF, unpubl. data). This species is distinguished from the little black ghostshark (*H. homonycteris*) by its much larger size (over 100 cm body length), non-deciduous skin and bluntly angular pelvic fin margin (McMillan et al. 2011; Kemper et al. 2015). It is most similar to *H. affinis* from the North and Southwest Atlantic and Southwest Indian Oceans, and *H. erithacus* from the Southeast Atlantic and Southwest Indian Oceans (Kemper et al. 2015; Walovich et al. 2017; Séret and Quod 2023). Little is known of its biology in Aotearoa New Zealand waters (Francis and Lyon 2012).

2.3 Trends

Among the 113 chondrichthyan taxa assessed, the conservation status of 88 (78%) did not change between 2016 and 2024, while the status of 2 (2%) worsened and 4 (4%) improved (Tables 2–4). Additionally, one taxon moved from Data Deficient to Threatened – Nationally Vulnerable, which is considered a neutral change under the NZTCS system but represents a more concerning conservation status based on new data. The remaining taxa were listed in other categories, such as Data Deficient (Table 4).

Species with worse conservation statuses were the basking shark (*Cetorhinus maximus*) and Plunket's shark (*Scymnodon macracanthus*) (see section 3). The worsening status of these species is due to review and reinterpretation of the available data, which indicates that both have undergone large historical population declines. This does not reflect a decline in status since the last threat assessment.

The conservation status of the basking shark was changed from Threatened – Nationally Vulnerable to Threatened – Nationally Critical, reflecting uncertainty around population size and trend, the ongoing absence of observations of large surface schools at former coastal hotspots, and very low levels of reported and observed bycatch in deep-water trawl fisheries. The almost complete cessation of sightings in coastal waters and sharp drop in reported and observed bycatch indicate that there has been a real decline in basking shark abundance in Aotearoa New Zealand waters, although the cause of this remains unknown (Francis 2017). Genetic and tagging studies indicate the movement of basking sharks within and potentially between ocean basins, suggesting that fishing both inside and outside the EEZ could affect the Aotearoa New Zealand population and there is the potential for regional shifts in abundance (Francis 2017; Sun et al. 2024). The basking shark has been fished to near extinction across much of its Northern Hemisphere range, and while there are indications of increased abundance at some locations, population recovery times appear to be very

long (Sims 2008; Witt et al. 2012; Westgate et al. 2014; McInturf et al. 2022). There has been no indication of increased abundance in Aotearoa New Zealand waters since the disappearance of large surface schools in the late 1990s (Francis 2017; Finucci et al. 2021, 2022).

Plunket's shark, which was formerly reported from Aotearoa New Zealand as *Centroscymnus plunketi*, is a relatively large deep-water species that is considered to have low resilience to fishing and is estimated to be exposed to commercial fishing across more than 60% of its Aotearoa New Zealand range (Ford et al. 2018). It is a long-lived species, with a maximum estimated age of at least 53 years. Females reproduce late, with an estimated age at maturity of around 48 years old, and produce 23 to 36 pups per litter (Francis et al. 2018). Although Ford et al. (2018) concluded that trawl survey relative biomass indicators showed no trends in Fisheries Management Areas (FMAs) 3–6, they acknowledged that these surveys monitor the species poorly. By contrast, Clark et al. (2000) reported a 94% decline in the relative biomass of this species between 1984 and 1994 in orange roughy (*Hoplostethus atlanticus*) trawl surveys of the Chatham Rise spawning box, suggesting that the lack of trend in recent biomass indicators is a reflection of the population being rapidly fished down to very low levels (Finucci et al. 2019). The movement of Plunket's shark from Not Threatened to Threatened – Nationally Critical reflects the species' low biological productivity and the large, rapid decline in biomass documented on the Chatham Rise.

The status of the oceanic manta ray (*Mobula birostris*) was changed from Data Deficient to Threatened – Nationally Vulnerable in response to an increase in information available on the species in Aotearoa New Zealand waters (Andrzejaczek et al. 2022; Cooper 2024; Ozaki et al. 2024; Manta Watch Aotearoa New Zealand [mantawatchnz.org]). Since 2019, 28 oceanic manta rays have been satellite tagged and more than 200 individuals have been photographically identified in Aotearoa New Zealand waters. Although oceanic manta rays are protected in Aotearoa New Zealand waters, they are occasionally killed in commercial fisheries and are subject to other forms of human-induced mortality, such as boat strike, entanglement in debris, plastic ingestion and pollution (Couturier et al. 2012). Almost one-third of the photographically identified individuals exhibited anthropogenic injuries, and three of the satellite-tagged rays appeared to have died in fisheries in the tropical Southwest Pacific (ME, unpubl. data; Manta Watch Aotearoa New Zealand submission). The largest known oceanic manta ray population is in Ecuador and Peru and is estimated to contain 22,316 individuals (based on 2,803 photographically identified individuals), but populations elsewhere in the Indo-Pacific region are likely to be much smaller (Stewart et al. 2016; Harty et al. 2022). Based on the number of re-sightings of photographically identified individuals, the Aotearoa New Zealand population size is likely to be less than 5,000 mature individuals (L Green, Manta Watch Aotearoa New Zealand, pers. comm.).

Species with an improved conservation status were the frill shark (*Chlamydoselachus anguineus*), southern Mandarin dogfish (*Cirrhigaleus australis*), goblin shark (*Mitsukurina owstoni*) and smalltooth sand tiger (*Odontaspis ferox*). Collection records and baited remote underwater video (BRUV) footage indicate that these deep-water species are widespread north of the subtropical convergence. Their move from At Risk – Naturally Uncommon to Not Threatened reflects the large area of habitat that is potentially available to them and the closure of the Kermadec Ridge and parts of the Lord Howe Rise and Norfolk Ridge to trawling.

Table 2. Comparison of the status of chondrichthyan taxa in Aotearoa New Zealand assessed in 2005 (Hitchmough et al. 2007), 2016 (Duffy et al. 2018) and 2024 (this report).

CONSERVATION STATUS	2005	2016	2024
Data Deficient	25	42	51
Threatened – Nationally Critical	0	0	2
Threatened – Nationally Endangered	0	1	1
Threatened – Nationally Vulnerable	0	1	1
At Risk – Declining	2[a]	0	0
At Risk – Uncommon	15[b]	8[c]	1
Not Threatened	60	55	52
Non-resident Native – Migrant	6	4	3
Non-resident Native – Vagrant	2	2	2
Total	**110**	**113**	**113**

[a] The conservation status At Risk – Gradual Decline used in 2005 is reported under the nearest equivalent status, At Risk – Declining, following Rolfe et al. (2002).

[b] The conservation statuses At Risk – Range Restricted and At Risk – Sparse used in 2005 have been reported under the nearest status, At Risk – Uncommon, following Rolfe et al. (2022).

[c] The conservation status At Risk – Naturally Uncommon used in 2016 is reported under its equivalent status, At Risk – Uncommon, following Rolfe et al. (2022).

Table 3. Summary of changes to the number of chondrichthyan taxa assigned to each conservation status between 2016 (Duffy et al. 2018) and 2024 (this report).

TYPE OF CHANGE, REASON, CONSERVATION STATUS	NUMBER OF TAXA
BETTER	**4**
Reinterpretation of data	**4**
Not Threatened	4
WORSE	**2**
Reinterpretation of data	**2**
Threatened – Nationally Critical	2
NEUTRAL[a]	**18**
Greater uncertainty	**12**
Data Deficient	12
More knowledge	**4**
Data Deficient	1
Threatened – Nationally Vulnerable	1
At Risk – Uncommon	1
Not Threatened	1
Reinterpretation of data	**2**
Not Threatened	2
NO CHANGE	**88**
Data Deficient	37
Threatened – Nationally Endangered	1
Not Threatened	45
Non-resident Native – Migrant	3
Non-resident Native – Vagrant	2
NEW LISTING	**1**
Data Deficient	1
TOTAL	**113**

[a] 'Neutral' is used to describe a taxon moving into or out of the Data Deficient category. Movement of taxa from uncertainty (Data Deficient) to confirmed vulnerability (e.g. Threatened – Nationally Vulnerable) is considered a neutral change in conservation status rather than a worsening of it. However, the change represents a more concerning conservation status based on new data.

Table 4. Summary of status changes of chondrichthyan taxa between 2016 (rows; Duffy et al. 2018) and 2024 (columns; this report). Numbers on the diagonal (shaded black) represent those taxa that have not changed status between 2016 and 2024, numbers to the right of the diagonal (shaded green) represent taxa with an improved status (e.g. four taxa were moved from At Risk – Naturally Uncommon in 2016 to Not Threatened in 2024), numbers to the left of the diagonal (shaded pink) represent taxa with a worse status, and numbers without shading represent taxa that either have moved into or out of Data Deficient, are Non-resident Native, have been newly added to this assessment, or have not been assessed in this report because they are now considered taxonomically indistinct (TI) from other taxa listed here.

		CONSERVATION STATUS 2024									
		Total	**DD**	**NC**	**NE**	**NV**	**Unc**	**NT**	**Mig**	**Vag**	**TI**
		114[a]	**51**	**2**	**1**	**1**	**1**	**52**	**3**	**2**	**1**
CONSERVATION STATUS 2016	Data Deficient	**42**	37			1	1	3			
	Threatened – Nationally Critical (NC)	**0**									
	Threatened – Nationally Endangered (NE)	**1**			1						
	Threatened – Nationally Vulnerable (NV)	**1**		1							
	At Risk – Uncommon (Unc)[b]	**8**	4					4			
	Not Threatened (NT)	**55**	8	1				45			1
	Non-resident Native – Migrant (Mig)	**4**	1						3		
	Non-resident Native – Vagrant (Vag)	**2**								2	
New listing		**1**	1								

[a] The total in this table includes one taxon that was deemed taxonomically indistinct in 2024.

[b] The status At Risk – Naturally Uncommon defined in Townsend et al. (2008) and used in 2016 is now referred to as At Risk – Uncommon following Rolfe et al. (2022).

3. Conservation status of all known indigenous chondrichthyan taxa in Aotearoa New Zealand

Taxa were assessed according to the criteria of Rolfe et al. (2022) and have been grouped in Table 5 by conservation status and then alphabetically by scientific name. For non-endemic species that are threatened internationally, the current IUCN Red List category is also provided alongside the NZTCS listing. The Data Deficient list is inserted first and categories are then ordered by degree of loss, with Threatened – Nationally Critical at the top of the list and Not Threatened at the bottom, above Non-resident Native. All chondrichthyan taxa listed as Data Deficient here are so lacking in information that an assessment of their conservation status is not possible (Rolfe et al. 2022). While some are included because they are very seldom seen, most are listed as Data Deficient because fisheries-independent surveys, which are the main source of information on these species, are not designed to monitor the distribution and abundance of non-target species. Similarly, commercial and observer-reported catch per unit effort data are also unlikely to accurately reflect population trends in non-target species (Maunder et al. 2006). It is therefore possible that the Data Deficient list may include some of the most threatened chondrichthyans in Aotearoa New Zealand.

Brief descriptions of the NZTCS categories and criteria are provided in Appendix 2. See Rolfe et al. (2022) for full definitions of categories, criteria and qualifiers, as well as an explanation of the assessment process. The Climate Impact (CI) qualifier could not be applied to any species because the available data are insufficient to understand or predict climate change impacts on chondrichythan fishes in Aotearoa New Zealand waters. The full data for the assessments listed in Table 5 can be viewed and downloaded at nztcs.org.nz/reports/1173.

Table 5. Conservation status of all known indigenous chondrichthyan taxa in Aotearoa New Zealand.

Qualifiers are abbreviated as follows: CD = Conservation Dependent, CI = Climate Impact, CR = Conservation Research Needed, De = Designated, DPR = Data Poor Recognition, DPS = Data Poor Size, DPT = Data Poor Trend, NS = Natural State, RR = Range Restricted, SO = Secure Overseas, SO? = Secure Overseas?, S?O = Secure? Overseas, Sp = Biologically Sparse, TO = Threatened Overseas, T?O = Threatened? Overseas.

IUCN Red List categories are abbreviated as follows: CR = Critically Endangered, DD = Data Deficient, EN = Endangered, LC = Least Concern, NT = Near Threatened, VU = Vulnerable.

ASSESSMENT NAME AND AUTHORITY	FAMILY	COMMON NAME	CRITERIA	QUALIFIERS	STATUS CHANGE	IUCN RED LIST
DATA DEFICIENT (51)						
Taxonomically determinate (41)						
Alopias vulpinus (Bonnaterre, 1788)	Alopiidae	thresher shark		CR, DPR, DPS, DPT, TO	Neutral	VU
Apristurus albisoma Nakaya & Séret, 1999	Pentanchidae	grey roundfin catshark		SO	No change	LC
Apristurus ampliceps Sasahara, Sato & Nakaya, 2008	Pentanchidae	roughskin catshark		DPR, SO	No change	LC
Apristurus exsanguis Sato, Nakaya & Stewart, 1999	Pentanchidae	pale / New Zealand catshark		DPR	No change	LC
Apristurus garricki Sato, Stewart & Nakaya, 2013	Pentanchidae	Pinocchio catshark		DPR	No change	LC
Apristurus melanoasper Iglésias, Nakaya & Stehmann, 2004	Pentanchidae	fleshynose catshark		DPR, SO	No change	LC
Apristurus pinguis Deng, Xiong & Zhan, 1983	Pentanchidae	deepwater catshark		DPR, SO	No change	LC
Arhynchobatis asperrimus Waite, 1909	Arhynchobatidae	longtail skate		CR, DPR	No change	DD
Brochiraja albilabiata Last & McEachran, 2006	Arhynchobatidae	whitemouth skate			No change	DD
Brochiraja asperula (Garrick & Paul, 1974)	Arhynchobatidae	smooth deepsea skate		DPR, DPT	No change	DD
Brochiraja heuresa Last & Séret, 2012	Arhynchobatidae	eureka skate			No change	DD
Brochiraja leviveneta Last & McEachran, 2006	Arhynchobatidae	blue skate		DPT	No change	DD
Brochiraja microspinifera Last & McEachran, 2006	Arhynchobatidae	deepsea skate			No change	DD
Brochiraja spinifera (Garrick & Paul, 1974)	Arhynchobatidae	prickly deepsea skate		DPT	No change	DD
Brochiraja vittacauda Last & Séret, 2012	Arhynchobatidae	ribbontail skate		DPT	No change	DD
Bythaelurus dawsoni (Springer, 1971)	Pentanchidae	Dawson's catshark			Neutral	LC
Carcharhinus obscurus (Lesueur, 1818)	Carcharhinidae	dusky shark		DPR, TO	Neutral	EN
Carcharhinus plumbeus (Nardo, 1827)	Carcharhinidae	sandbar shark		TO	No change	EN
Centrophorus harrissoni McCulloch, 1915	Centrophoridae	Harrison's dogfish		TO	No change	EN
Centroscyllium kamoharai Abe, 1966	Etmopteridae	fragile dogfish		DPR, SO	No change	LC
Chimaera lignaria Didier, 2002	Chimaeridae	giant purple chimaera		DPR, SO	Neutral	LC
Deania quadrispinosa (McCulloch, 1915)	Centrophoridae	longsnout dogfish		DPR, DPS, DPT, TO	No change	VU
Dichichthys satoi White, Stewart, O'Neill & Naylor, 2024	Dichichthyidae	roughback bristle shark		DPS, DPT	No change	DD
Echinorhinus cookei Pietschmann, 1928	Echinorhinidae	prickly shark		S?O	Neutral	DD
Etmopterus molleri (Whitley, 1939)	Etmopteridae	Moller's lanternshark		S?O	No change	DD

Continued on next page

Table 5 continued

ASSESSMENT NAME AND AUTHORITY	FAMILY	COMMON NAME	CRITERIA	QUALIFIERS	STATUS CHANGE	IUCN RED LIST
Etmopterus pusillus (Lowe, 1839)	Etmopteridae	smooth lanternshark		SO	Neutral	LC
Gollum attenuatus (Garrick, 1954)	Pseudotriakidae	slender smoothhound		CR, DPR, SO	Neutral	LC
Heptranchias perlo (Bonnaterre, 1788)	Hexanchidae	sharpnose sevengill shark		CR, DPR, DPS, DPT, S?O	Neutral	NT
Mobula mobular (Bonnaterre, 1788)	Mobulidae	spinetail devil ray		CD, CR, DPS, DPT, TO	No change	EN
Parmaturus macmillani Hardy, 1985	Pentanchidae	McMillan's catshark		DPR, DPS, DPT, Sp	No change	DD
Pseudocarcharias kamoharai (Matsubara, 1936)	Pseudocarchariidae	crocodile shark		SO	No change	LC
Pseudotriakis microdon de Brito Capello, 1868	Pseudotriakidae	false catshark		SO	No change	LC
Pteroplatytrygon violacea (Bonaparte, 1832)	Dasyatidae	pelagic stingray		SO	Neutral	LC
Scymnodalatias albicauda Taniuchi & Garrick, 1986	Somniosidae	whitetail dogfish		SO?	No change	DD
Scymnodalatias sherwoodi (Archey, 1921)	Somniosidae	Sherwood's dogfish		SO?	No change	DD
Scymnodon ringens Barbosa du Bocage & de Brito Capello, 1864	Somniosidae	knifetooth dogfish		DPR, TO	No change	VU
Somniosus antarcticus Whitley, 1939	Somniosidae	Pacific sleeper shark		DPS, SO	Neutral	LC
Somniosus longus (Tanaka, 1912)	Somniosidae	little sleeper shark		DPR, S?O	No change	DD
Tetronarce nobiliana (Bonarparte, 1835)	Torpedinidae	electric ray		SO	No change	LC
Typhlonarke aysoni (Hamilton, 1902)	Narkidae	blind electric ray		DPS, DPT	Neutral	LC
Zameus squamulosus (Günther, 1877)	Somniosidae	velvet dogfish		DPR, SO	No change	LC
Taxonomically unresolved (10)						
Apristurus cf. *sinensis* Chu & Hu, 1981 (NMNZ P.038928)	Pentanchidae	freckled catshark		DPR, SO?	No change	
Cephaloscyllium sp. 2 (AIM MA46200)	Scyliorhinidae	banded carpetshark		CR, DPR	No change	
Deania hystricosa (Garman, 1906)	Centrophoridae	rough shovelnose dogfish		DPR, S?O	No change	
Echinorhinus brucus (Bonnaterre, 1788)	Echinorhinidae	bramble shark		TO	Neutral	EN
Etmopterus unicolor (Engelhardt, 1912)	Etmopteridae	shortspine lanternshark		DPR, S?O	Neutral	DD
Hydrolagus cf. *affinis* (de Brito Capello, 1868) (NMNZ P.045758)	Chimaeridae	giant black ghostshark		DPR, DPS, DPT, SO	No change	
Mustelus sp. 2 (AIM MA46203)	Triakidae	Norfolk Island smoothhound		CR, DPR, DPS, DPT, S?O	New listing	
Notoraja alisae Séret & Last, 2012	Arhynchobatidae	velcro skate		SO?	No change	LC
Squalus sp. (NMNZ P.042689)	Squalidae	shortspine spiny dogfish		DPR, TO?	No change	
Tetronarce cf. *tokionis* (Tanaka, 1908) (NMNZ P.042400)	Torpedinidae	slender electric ray		DPR, DPS, DPT	No change	

Continued on next page

Table 5 continued

ASSESSMENT NAME AND AUTHORITY	FAMILY	COMMON NAME	CRITERIA	QUALIFIERS	STATUS CHANGE	IUCN RED LIST
THREATENED (4)						
NATIONALLY CRITICAL (2)						
Taxonomically determinate (2)						
Cetorhinus maximus (Gunnerus, 1765)	Cetorhinidae	basking shark	NCu6m	CD, CR, DPS, DPT, TO	Worse	EN
Scymnodon macracanthus (Regan, 1906)	Somniosidae	Plunket's shark	NCu6	CR, DPS, TO	Worse	DD
NATIONALLY ENDANGERED (1)						
Taxonomically determinate (1)						
Carcharodon carcharias (Linnaeus, 1758)	Lamnidae	great white shark	NEu2b	CD, DPT, TO	No change	VU
NATIONALLY VULNERABLE (1)						
Taxonomically determinate (1)						
Mobula birostris (Walbaum, 1792)	Mobulidae	oceanic manta ray	NVu3c	CD, CR, DPS, DPT, TO	Neutral	EN
AT RISK (1)						
UNCOMMON (1)						
Taxonomically determinate (1)						
Squalus raoulensis Duffy & Last, 2007	Squalidae	Kermadec spiny dogfish	UNCn2j	CD, DPR, NS, RR	Neutral	LC
NOT THREATENED (52)						
Taxonomically determinate (49)						
Alopias superciliosus (Lowe, 1841)	Alopiidae	bigeye thresher	NTn2m	CR, DPR, DPT, TO	No change	VU
Bathyraja pacifica Last, Stewart & Séret, 2016	Arhynchobatidae	Pacific blonde skate	NTn2f	DPR, DPS, DPT	No change	LC
Bathyraja richardsoni (Garrick, 1961)	Arhynchobatidae	Richardson's skate	NTn2e	DPS, DPT	No change	LC
Bathyraja shuntovi Dolganov, 1985	Arhynchobatidae	longnose deepsea skate	NTn2f		No change	DD
Bathytoshia brevicaudata (Hutton, 1875)	Dasyatidae	shorttail stingray	NTu2m	CR, DPR, DPT, SO	No change	LC
Bathytoshia lata (Garman, 1880)	Dasyatidae	longtail stingray	NTu2m	DPR, DPT, TO	No change	VU
Callorhinchus milii Bory de St Vincent, 1823	Callorhinchidae	elephantfish	NTu1f	CD, SO?	No change	LC
Carcharhinus brachyurus (Günther, 1870)	Carcharhinidae	bronze whaler shark	NTu1m	CR, DPS, DPT, TO	No change	VU
Carcharhinus galapagensis (Snodgrass & Heller, 1905)	Carcharhinidae	Galapagos shark	NTn2m	CD, SO	No change	LC
Centrophorus squamosus (Bonnaterre, 1788)	Centrophoridae	leafscale gulper shark	NTu2m	TO	No change	EN
Centroscymnus coelolepis Barbosa du Bocage & de Brito Capello, 1864	Somniosidae	Portuguese dogfish	NTu2m	DPT, S?O	No change	NT

Continued on next page

Table 5 continued

ASSESSMENT NAME AND AUTHORITY	FAMILY	COMMON NAME	CRITERIA	QUALIFIERS	STATUS CHANGE	IUCN RED LIST
Centroscymnus owstonii Garman, 1906	Somniosidae	Owston's dogfish	NTu2m	DPT, TO	No change	VU
Centroselachus crepidater (Barbosa du Bocage & de Brito Capello, 1864)	Somniosidae	longnose velvet dogfish	NTu2m	DPT, S?O	No change	NT
Cephaloscyllium isabella (Bonnaterre, 1788)	Scyliorhinidae	carpet shark	NTu2f		No change	LC
Chimaera carophila Kemper, Ebert, Naylor & Dider, 2014	Chimaeridae	brown chimaera	NTu2m	DPR	No change	LC
Chimaera panthera Didier, 1998	Chimaeridae	leopard chimaera	NTn2m	DPS, DPT	No change	LC
Chlamydoselachus anguineus Garman, 1884	Chlamydoselachidae	frill shark	NTu2m	DPS, DPT, SO	Better	LC
Cirrhigaleus australis White, Last & Stevens, 2007	Squalidae	southern Mandarin dogfish	NTn2m	DPS, DPT, S?O, Sp	Better	DD
Dalatias licha (Bonnaterre, 1788)	Dalatiidae	seal/black shark	NTu2m	TO	No change	VU
Deania calceus (Lowe, 1839)	Centrophoridae	shovelnose dogfish	NTu2f	S?O	No change	NT
Dipturus innominatus (Garrick & Paul, 1974)	Rajidae	smooth skate	NTu2f	CD	No change	LC
Etmopterus abernethyi Garrick, 1957	Etmopteridae	blackbelly lanternshark	NTu2m	SO	No change	
Etmopterus granulosus (Günther, 1880)	Etmopteridae	Baxter's dogfish	NTu2m	SO	No change	LC
Etmopterus viator Straube, 2011	Etmopteridae	slate lanternshark	NTn2m	DPT, SO	Neutral	LC
Euprotomicrus bispinatus (Quoy & Gaimard, 1824)	Dalatiidae	pygmy shark	NTn2m	CR, DPS, SO	No change	LC
Galeorhinus galeus (Linnaeus, 1758)	Triakidae	school shark	NTu2f	CD, TO	No change	CR
Harriotta avia Finucci, Didier, Ebert, Green & Kemper, 2024	Rhinochimaeridae	longnose spookfish	NTu2m	SO	No change	
Harriotta haeckeli Karrer, 1972	Rhinochimaeridae	smallspine spookfish	NTn2m	SO	No change	LC
Hexanchus griseus (Bonnaterre, 1788)	Hexanchidae	sixgill shark	NTu2m	DPS, DPT, S?O	No change	NT
Hydrolagus bemisi Didier, 2002	Chimaeridae	pale ghostshark	NTu2m	CD, DPR	No change	LC
Hydrolagus homonycteris Didier, 2008	Chimaeridae	little black ghostshark	NTu2m	DPR, DPS, DPT, SO	No change	LC
Hydrolagus novaezealandiae (Fowler, 1911)	Chimaeridae	dark ghostshark	NTu2f	CD, DPR	No change	LC
Hydrolagus trolli Didier & Séret, 2002	Chimaeridae	pointynose blue ghostshark	NTu2m	DPR, SO	No change	LC
Isistius brasiliensis (Quoy & Gaimard, 1824)	Dalatiidae	cookiecutter shark	NTn2m	SO	No change	LC
Isurus oxyrinchus Rafinesque, 1810	Lamnidae	mako	NTu2m	CD, TO	No change	EN
Lamna nasus (Bonnaterre, 1788)	Lamnidae	porbeagle	NTu2m	CD, TO	No change	VU
Mitsukurina owstoni Jordan, 1898	Mitsukurinidae	goblin shark	NTn2m	CR, DPS, DPT, SO	Better	LC
Mustelus lenticulatus Phillipps, 1932	Triakidae	rig	NTu1f	CD	No change	LC
Myliobatis tenuicaudatus Hector, 1877	Myliobatidae	eagle ray	NTu2m	CR, DPT, SO	No change	LC
Notoraja sapphira Séret & Last, 2009	Arhynchobatidae	sapphire skate	NTn2m	NS, SO	Neutral	DD
Notorynchus cepedianus (Péron, 1807)	Hexanchidae	broadnose sevengill shark	NTu2m	DPS, DPT, TO	No change	VU

Continued on next page

Table 5 continued

ASSESSMENT NAME AND AUTHORITY	FAMILY	COMMON NAME	CRITERIA	QUALIFIERS	STATUS CHANGE	IUCN RED LIST
Odontaspis ferox (Risso, 1810)	Odontaspididae	smalltooth sand tiger	NTn2m	CD, DPR, DPS, DPT, TO	Better	EN
Oxynotus bruniensis (Ogilby, 1893)	Oxynotidae	prickly dogfish	NTu2m	CR, DPT, Sp, T?O	No change	NT
Prionace glauca (Linnaeus, 1758)	Carcharhinidae	blue shark	NTu2m	CD, S?O	No change	NT
Rhinochimaera pacifica (Mitsukuri, 1895)	Rhinochimaeridae	longnose chimaera	NTu2m	SO	No change	LC
Sphyrna zygaena (Linnaeus, 1758)	Sphyrnidae	hammerhead shark		CD, CR, DPS, DPT, TO	No change	VU
Squalus acanthias Linnaeus, 1758	Squalidae	spiny dogfish	NTu2f	CD, TO	No change	VU
Squalus griffini Phillipps, 1931	Squalidae	northern/grey spiny dogfish		CR, De, DPR, SO	No change	LC
Zearaja nasuta (Banks in Müller & Henle, 1841)	Rajidae	rough skate	NTu2f	CD	No change	LC
Taxonomically unresolved (3)						
Amblyraja cf. *hyperborea* (Collett, 1879) (NMNZ P.039879)	Rajidae	thorny skate	NTn2f	CI, SO	No change	
Cephaloscyllium sp. 1 (NMNZ P.038080)	Scyliorhinidae	swell shark	NTn2m	CR, DPR	Neutral	
Mustelus sp. 1 (NMNZ P.052010)	Triakidae	Kermadec smoothhound	NTn2m	CD	No change	
NON-RESIDENT NATIVE (5)						
MIGRANT (3)						
Taxonomically determinate (3)						
Carcharhinus longimanus (Poey, 1861)	Carcharhinidae	oceanic whitetip shark		CD, TO	No change	CR
Galeocerdo cuvier (Péron & Lesueur, 1822)	Galeocerdonidae	tiger shark		S?O	No change	NT
Rhincodon typus Smith, 1828	Rhincodontidae	whale shark		CD, TO	No change	EN
VAGRANT (2)						
Taxonomically determinate (2)						
Heterodontus portusjacksoni (Meyer, 1793)	Heterodontidae	Port Jackson shark		SO	No change	LC
Triaenodon obesus (Rüppell, 1837)	Carcharhinidae	whitetip reef shark		TO	No change	VU

4. Acknowledgements

The authors would like to thank Dan MacGibbon and Richard O'Driscoll, National Institute of Water & Atmospheric Research Ltd (NIWA), for providing information on biomass distribution and trends for carpet shark (*Cephaloscyllium isabellum*) obtained from East Coast South Island inshore trawl surveys. We also thank Jeremy Barker (Museum of New Zealand Te Papa Tongarewa) for providing provenance data and photographs of bramble shark (*Echinorhinus brucus*) specimens held in the National Fish Collection. The authors also acknowledge the Ministry for Primary Industries' Observer Services for providing the bramble shark image used in Appendix 1, which was approved for use by their Fisheries Data Management Team, and those who provided submissions to help inform this review.

5. References

Andrzejaczek S et al. 2022. Diving into the vertical dimension of elasmobranch movement ecology. Science Advances. 8(33):eabo1754. doi.org/10.1126/sciadv.abo1754

Battiata M, Serena F, Lo Brutto S. 2024. Genetic and distribution data of the bramble shark *Echinorhinus brucus* (Bonnaterre, 1788) and the prickly shark *Echinorhinus cookei* Pietschmann, 1928 to better reconstruct their conservation status. Animals. 14:993. doi.org/10.3390/ani14070993

Clark MR, Anderson OF, Francis RICC, Tracey DM. 2000. The effects of commercial exploitation on orange roughy (*Hoplostethus atlanticus*) from the continental slope of the Chatham Rise, New Zealand, from 1979 to 1997. Fisheries Research. 45:217–238. doi.org/10.1016/S0165-7836(99)00121-6

Collett R. 1879. Fiske fra Nordhavsexpeditionens sidste Togt, Sommeren 1878. Forhandlinger i Videnskabs-selskabet i Christiania, Aar 1878. 14:1–106.

Cooper TM. 2024. Spatial ecology and foraging behaviour of the oceanic manta ray (*Mobula birostris*) in Aotearoa New Zealand [master's thesis]. Auckland: University of Auckland.

Couturier LIE et al. 2012. Biology, ecology and conservation of the Mobulidae. Journal of Fish Biology. 80:1075–1119. doi.org/10.1111/j.1095-8649.2012.03264.x

de Lange PJ, Norton DA. 1998. Revisiting rarity: a botanical perspective on the meanings of rarity and the classification of New Zealand's uncommon plants. Royal Society of New Zealand Miscellaneous Series. 48:145–160.

Duffy C et al. 2018. Conservation status of New Zealand chondrichthyans (chimaeras, sharks and rays), 2016. Wellington: Department of Conservation. New Zealand Threat Classification Series 23. doc.govt.nz/globalassets/documents/science-and-technical/nztcs23entire.pdf

Duffy C, Geange S, Bock T. 2017. Ecosystem approach considerations: deepwater chondrichthyans (sharks, rays and chimaeras) in the Western SPRFMO Area. SC5-DW09 rev1. 5th Meeting of the Scientific Committee, Shanghai, China, 23–28 September 2017. sprfmo.int/assets/Meetings/02-SC/5th-SC-2017/Deepwater/SC5-DW09_rev1-Deepwater-sharks.pdf

Duffy CAJ, Stewart AL, Last PR, Kawauchi J. 2015. Family Centrophoridae. Gulper sharks. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 132–138.

Ebert DA, Dando M, Fowler S. 2021. Sharks of the world: a complete guide. Princeton: Princeton University Press.

Fariña A, Quinteiro J, Rey-Méndez M. 2015. ¿Problemas taxonómicos en el género Echinorhinus? apuntes a partir de un nuevo hallazgo para el Caribe en aguas venezolanas. Foro Iberoamericano de los Recursos Marinos y la Acuicultura. VII:531–536.

Finucci B, Didier D, Ebert DA, Green ME, Kemper JM. 2024. *Harriotta avia* sp. nov. – a new rhinochimaerid (Chimaeriformes: Rhinochimaeridae) described from the Southwest Pacific. Environmental Biology of Fishes. 107:841–865. doi.org/10.1007/s10641-024-01577-4

Finucci B et al. 2021. Drivers of spatial distributions of basking shark (*Cetorhinus maximus*) in the Southwest Pacific. Frontiers in Marine Science. 8:665337. doi.org/10.3389/fmars.2021.665337

Finucci B, Duffy CAJ, Francis MP, Gibson C, Kyne PM. 2019. The extinction risk of New Zealand chondrichthyans. Aquatic Conservation: Marine and Freshwater Ecosystems. 2019:1–15. onlinelibrary.wiley.com/doi/10.1002/aqc.3053

Finucci B, Dunn MR, Pinkerton MH, Sutton P. 2022. Characterisation of New Zealand protected shark captures, to 2021. Wellington: Fisheries New Zealand. New Zealand Aquatic Environment and Biodiversity Report No. 289.

Ford RB et al. 2018. Qualitative (Level 1) risk assessment of the impact of commercial fishing on New Zealand chondrichthyans: an update for 2017. Wellington: Ministry for Primary Industries. New Zealand Aquatic Environment and Biodiversity Report No. 201.

Francis MP. 2015. Geographic distribution of commercial catches of cartilaginous fishes in New Zealand waters, 2008–2013. Wellington: Ministry for Primary Industries. New Zealand Aquatic Environment and Biodiversity Report No. 156.

Francis MP. 2017. Review of commercial fishery interactions and population information for New Zealand basking shark. Report for the Department of Conservation. Wellington: National Institute of Water & Atmospheric Research Ltd. NIWA Client Report No: 2017083WN.

Francis MP, Jones EG, Ó Maolagáin C, Lyon WS. 2018. Growth and reproduction of four deepwater sharks in New Zealand waters. Wellington: Ministry for Primary Industries. New Zealand Aquatic Environment and Biodiversity Report No. 196.

Francis MP, Lyon WS. 2012. Review of research and monitoring studies on New Zealand sharks, skates, rays and chimaeras, 2008–2012. Wellington: Ministry for Primary Industries. New Zealand Aquatic Environment and Biodiversity Report No. 102.

Garrick JAF. 1960. Studies on New Zealand Elasmobranchii. – Part X. The genus *Echinorhinus*, with an account of a second species, *E. cookei* Pietschmann, 1928, from New Zealand waters. Transactions of the Royal Society of New Zealand. 88(1):105–117.

Harty K et al. 2022. Demographics and dynamics of the world's largest known population of oceanic manta rays *Mobula birostris* in coastal Ecuador. Marine Ecology Progress Series. 700:145–159. doi.org/10.3354/meps14189

Henderson AC, Reeve AJ, Jabado RW, Naylor GJP. 2016. Taxonomic assessment of sharks, rays and guitarfishes (Chondrichthyes: Elasmobranchii) from south-eastern Arabia, using the NADH dehydrogenase subunit 2 (NADH2) gene. Zoological Journal of the Linnean Society. 176(2):399–442. doi.org/10.1111/zoj.12309

Hitchmough R (compiler). 2002. New Zealand Threat Classification System lists – 2002. Wellington: Department of Conservation. Threatened Species Occasional Publication 23. doc.govt.nz/documents/science-and-technical/tsop23.pdf

Hitchmough R, Bull L, Cromarty P (compilers). 2007. New Zealand Threat Classification System lists – 2005. Wellington: Department of Conservation. doc.govt.nz/nz-threat-classification-system-lists-2005

Kemper JM, Ebert DA, Didier DA. 2015. Family Chimaeridae. Shortnose chimaeras. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 40–49.

Kulka DW, Miri CM, Atchison S, Simpson MR. 2024. Sibling species *Amblyraja hyperborea* and *A. jenseni* in slope waters of Eastern Canada: an ecomorphological description. Diversity. 16(8):479. doi.org/10.3390/d16080479

Last PR et al. 2016. Rays of the world. Clayton: CSIRO Publishing.

Last PR, Naylor GJP, Manjaji-Matsumoto BM. 2016. A revised classification of the family Dasyatidae (Chondrichthyes: Myliobatiformes) based on new morphological and molecular insights. Zootaxa. 4139(3):345–368. doi.org/10.11646/zootaxa.4139.3.2

Last PR, Stevens JD. 2009. Sharks and rays of Australia. Collingwood: CSIRO Publishing.

Last PR, Stewart AL. 2015a. Family Etmopteridae. Lanternsharks. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 139–147.

Last PR, Stewart AL. 2015b. Family Rajidae. Hardnose skates. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 176–179.

Last PR, Stewart AL. 2015c. Family Torpedinidae. Electric rays. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 169–171.

Last PR, Weigmann S, Yang L. 2016. Changes to the nomenclature of the skates (Chondrichthyes: Rajiformes). In: Last PR et al., editors. Rays of the world. Clayton: CSIRO Publishing; supplementary information ; p. 11–34. researchgate.net/publication/311043869_Changes_to_the_nomenclature_of_the_skates_Chondrichthyes_Rajiformes

Marrero M et al. 2023. Taxonomic status of deep-sea sharks *Deania calceus* and *D. hystricosa* (Centrolophidae). Regional Studies in Marine Science. 67:10322. doi.org/10.1016/j.rsma.2023.103220

Matsumoto A, Nohara K, Horie T, Tanaka S. 2017. Taxonomic review of the longnose dogfish genus *Deania* (Centrophoridae) from Japan. Indo-Pacific Fish Conference 10. Tahiti – 2–6 October 2017. Poster and book of abstracts.

Maunder MN et al. 2006. Interpreting catch per unit effort data to assess the status of individual stocks and communities. ICES Journal of Marine Science. 63(8):1373–1385. doi.org/10.1016/j.icesjms.2006.05.008

McInturf AG et al. 2022. Spatial distribution, temporal changes, and knowledge gaps in basking shark (*Cetorhinus maximus*) sightings in the California Current Ecosystem. Frontiers in Marine Science. 9:818670. doi.org/10.3389/fmars.2022.818670

McMillan PJ et al. 2011. New Zealand fishes. Volume 1: a field guide to common species caught by bottom and midwater fishing New Zealand. Wellington: Fisheries New Zealand. Aquatic Environment and Biodiversity Report No. 68.

Molloy J et al. 2002. Classifying species according to threat of extinction. A system for New Zealand. Wellington: Department of Conservation. Threatened Species Occasional Publication 22. doc.govt.nz/globalassets/documents/science-and-technical/tsop22.pdf

Morales-Ávila JR, Al-Jufaili S, Álvarez-Pliego N, Saldierna-Martínez RJ. 2023. Encountering the morphological and molecular complexity in the bramble shark *Echinorhinus* cf. *E. brucus* (Bonnaterre 1788) from the Oman Sea. Journal of the Marine Biological Association of the United Kingdom. 103:e52. doi.org/10.1017/S0025315423000413

Nakaya K, Sato K, Iglésias SP, White WT. 2008. Methodology for the taxonomic description of members of the genus *Apristurus* (Chondrichthyes: Carcharhiniformes: Scyliorhinidae). In: Last PR, White WT, Pogonoski JJ, editors. Descriptions of new Australian chondrichthyans. Hobart: CSIRO Marine and Atmospheric Research. CSIRO Marine and Atmospheric Research Paper No. 22; p. 49–60.

Nakaya K, Sato K, Kawauchi J, Stewart AL. 2015. Family Scyliorhinidae. Catsharks. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p. 75–89.

Naylor GJP et al. 2012. A DNA sequence-based approach to the identification of shark and ray species and its implications for global elasmobranch diversity and parasitology. Bulletin of the American Museum of Natural History. 2012(367):1–262. doi.org/10.1206/754.1

Ng S, Straube N, Liu K-M, Joung S-J. 2025. Confusions across the hemispheres: taxonomic re-evaluation of two lanternshark species, *Etmopterus lucifer* and *E. molleri* (Squaliformes: Etmopteridae). Vertebrate Zoology. 75:59–86. doi.org/10.3897/vz.75.e126067

Ozaki R et al. 2024. Evidence of environmental niche separation between threatened mobulid rays in Aotearoa New Zealand: insights from species distribution modelling. Journal of Biogeography. 51:2117–2135. doi.org/10.1111/jbi.14976

Park HK, Yoon M, Kim K-Y, Jung Y-H. 2020. Characterization and phylogenetic analysis of the complete mitogenome of the Arctic skate *Amblyraja hyperborea* (Rajiformes; Rajidae). Mitochondrial DNA Part B. 5(2):1588–1589. doi.org/10.1080/23802359.2020.1742613

Paulin C, Stewart A, Roberts C, McMillan P. 1989. New Zealand fish: a complete guide. Wellington: Te Papa Press. National Museum of New Zealand Miscellaneous Series No. 19.

Roberts CD, Stewart AL, Struthers CD, editors. 2015. The fishes of New Zealand. Wellington: Te Papa Press; volumes 1–4.

Rolfe J et al. 2022. New Zealand Threat Classification System manual 2022. Part 1: assessments. Wellington: Department of Conservation. doc.govt.nz/globalassets/documents/science-and-technical/new-zealand-threat-classification-system-manual-2022-part-1-assessments.pdf

Séret B, Last PR. 2012. New deep water skates of the genus *Notoraja* Ishiyama, 1958 (Rajoidei, Arhynchobatidae) from the southwest Pacific. Zoosystema. 34(2):319–341. doi.org/10.5252/z2012n2a9

Séret B, Quod J-P. 2023. First records of a *Hydrolagus* species (Holocephali: Chimaeridae) from Reunion Island and Mayotte (Southwestern Indian Ocean). Fishes. 8:522. doi.org/10.3390/fishes8100522

Sims DW. 2008. Sieving a living: a review of the biology, ecology and conservation status of the plankton-feeding basking shark *Cetorhinus maximus*. Advances in Marine Biology. 54:171–220. doi.org/10.1016/S0065-2881(08)00003-5

Stefanni S et al. 2021. Molecular systematics of the long-snouted deep water dogfish (Centrophoridae, *Deania*) with implications for identification, taxonomy, and conservation. Frontiers in Marine Science. 7:588192. doi.org/10.3389/fmars.2020.588192

Stewart AL. 2015. Family Echinorhinidae. Bramble sharks. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p.120–122.

Stewart AL, Last PR. 2015. Family Arhynchobatidae. Softnose rays. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p.180–195.

Stewart JD et al. 2016. Spatial ecology and conservation of *Manta birostris* in the Indo-Pacific. Biological Conservation. 200:178–183. doi.org/10.1016/j.biocon.2016.05.016

Straube N, Duhamel G, Gasco N, Kriwet J, Schliewen UK. 2011. Description of a new deep-sea Lantern Shark *Etmopterus viator* sp. nov. (Squaliformes: Etmopteridae) from the Southern Hemisphere. In: Duhamel G, Welsford D, editors. The Kerguelen Plateau: marine ecosystem and fisheries. Paris: Société Française d'Ichtyologie; p.137–150.

Straube N, Iglésias SP, Sellos DY, Kriwet J, Schliewen UK. 2010. Molecular phylogeny and node time estimation of bioluminescent Lantern Sharks (Elasmobranchii: Etmopteridae). Molecular Phylogenetics and Evolution. 56:905–917. doi.org/10.1016/j.ympev.2010.04.042

Straube N, Kriwet J, Schliewen UK. 2011. Cryptic diversity and species assignment of large lantern sharks of the *Etmopterus spinax* clade from the Southern Hemisphere (Squaliformes, Etmopteridae). Zoologica Scripta. 40(1):61–75. doi.org/10.1111/j.1463-6409.2010.00455.xdoi.org/10.1111/j.1463-6409.2010.00455.x

Sun R et al. 2024. Global distribution prediction and ecological conservation of basking shark (*Cetorhinus maximus*) under integrated impacts. Global Ecology and Conservation. 56:e03310. doi.org/10.1016/j.gecco.2024.e03310

Townsend AJ et al. 2008. New Zealand Threat Classification System manual. Wellington: Department of Conservation. doc.govt.nz/globalassets/documents/science-and-technical/sap244.pdf

Walovich KA, Ebert DA, Kemper JM. 2017. *Hydrolagus erithacus* sp. nov. (Chimaeriformes: Chimaeridae), a new species of chimaerid from the southeastern Atlantic and southwestern Indian oceans. Zootaxa. 4226(4):509–520. doi.org/10.11646/zootaxa.4226.4.4

Westgate AJ, Koopman HN, Siders ZA, Wong SNP, Ronconi RA. 2014. Population density and abundance of basking sharks *Cetorhinus maximus* in the lower Bay of Fundy, Canada. Endangered Species Research. 23:177–185. doi.org/10.3354/esr00567

White WT, Stewart AL, O'Neill HL, Naylor GJP. 2024. Dichichthyidae, a new family of deepwater sharks (Carcharhiniformes) from the Indo–West Pacific, with description of a new species. Fishes. 9(4):121. doi.org/10.3390/fishes9040121

Witt MJ et al. 2012. Basking sharks in the northeast Atlantic: spatio-temporal trends from sightings in UK waters. Marine Ecology Progress Series. 459:121–134. doi.org/10.3354/meps09737

Appendix 1

Records of bramble sharks from Aotearoa New Zealand waters

The bramble shark (*Echinorhinus brucus*) is a large, heavy-bodied, deep-water shark that is usually found close to the sea floor over the outer shelf and upper slope, generally between 100 and 900 m depth, although it has been caught as shallow as 18 m depth. The maximum reported size is 3.26 m total length (TL) and more than 250 kg weight. It is a distinctive species with two small dorsal fins located above the anal fin close to the origin of the upper caudal lobe and large, widely spaced, shield-like denticles that are sometimes fused together (Garrick 1960; Stewart 2015). The reported global distribution of *E. brucus* is the North and South Atlantic Oceans, Mediterranean Sea, and Indo-West Pacific, including Aotearoa New Zealand (Ebert et al. 2021). Battiata et al. (2024) found mitochondrial DNA sequences of *E. brucus* from the Indian Ocean clustered with *E. cookei* sequences and concluded that the distribution of *E. brucus* excludes the Pacific Ocean, describing two records of commercial catches of the species in Aotearoa New Zealand as dubious. Garrick (1960) reviewed *Echinorhinus* from Aotearoa New Zealand waters and could find only one verifiable record of *E. brucus*. That specimen was a mounted skin of a shark caught off the coast of Dunedin in 1887 and held at Tūhura Otago Museum. A photograph of this specimen is included in Garrick's (1960) paper. A specimen collected in Cook Strait in 1925 (NMNZ P.000430) could not be located by Garrick or us, although Phillipps' (1928) description of the shark suggests it was *E. brucus*. A third specimen, represented by a set of dried jaws and teeth (NMNZ P.012038), was reported from Hawke Bay by Phillipps (1946) as *E. mccoyi*. Although *E. mccoyi* is considered a junior synonym of *E. brucus*, the identity of the Hawke Bay specimen could not be confirmed because of the similarity of the teeth of *E. brucus* and *E. cookei* (Garrick 1960). Unfortunately, genetic testing of the jaw was beyond the scope of this project. Since Garrick's (1960) review, we are aware of only two other verifiable records of the species from Aotearoa New Zealand (Table A1.1). Stewart (2015) reported a 1,170 mm TL mature male (NMNZ P.005688) caught in Te Houhou / George Sound, Fiordland, in 1972. We have re-examined this specimen and can confirm that it is *E. brucus* based on the morphology and spacing of the denticles, colour, and morphometrics of the head. The second specimen was caught south of the Snares Islands / Tini Heke in July 2012 and was initially misidentified as *E. cookei* (Fig. A1.1).

The prickly shark (*E. cookei*) is the most frequently reported bramble shark from Aotearoa New Zealand waters (Fisheries New Zealand Data Management team, unpubl. data). However, it appears likely that misidentification of *Echinorhinus* by fishers and fishery observers is an ongoing problem and that fisheries data do not provide accurate information on their distribution or abundance in Aotearoa New Zealand. Of the 13 *E. brucus* captures reported by fishery observers between 1988 and 2024, four had reported weights between 1,100 and 7,979 kg, implying that these are likely miscoded captures of another species, possibly bluenose (*Hyperoglyphe antarctica*) given the similarity between the species codes (BRS cf. BNS). One observed capture from Lord Howe Rise was reported as 550 kg, suggesting that either more than one specimen was caught or the catch was misidentified or miscoded. Of note in this regard is the initial misidentification of the bramble shark in Fig. A1.1 as *E. cookei*, as it highlights the value of photographing and/or collecting rare or unusual specimens to confirm catch data. Only two captures of *E. brucus* were reported by commercial fishers over the same period, neither of which can be confirmed.

Two records of *E. brucus* taken in research trawls could not be verified. One was caught in September 1979 at 440–722 m depth in the Hokitika Canyon. The other was caught in April 1996 on the flanks of the Great South Basin southeast of Stewart Island / Rakiura at 654–659 m depth (NIWA/MPI Trawl Database).

Table A1.1. Verifiable records of bramble shark (*Echinorhinus brucus*) from Aotearoa New Zealand waters.

VOUCHER NO.	TL (mm)	DATE	LOCATION	LAT	LONG	SPECIMEN TYPE	IMAGE	SOURCE
	1,420	April 1887	Dunedin	–45.82	170.76	Mounted skin	Yes	Garrick (1960)
NMNZ P.005688	1,170	May 1972	Te Houhou / George Sound, Fiordland	–44.83	167.17	Whole wet	Yes	Te Papa Tongarewa
		18 July 2012	Southland shelf, 61 km south of Snares Islands / Tini Heke	–48.60	166.30	Not retained	Yes	MPI

Abbreviations: TL = total length, MPI = Ministry for Primary Industries.

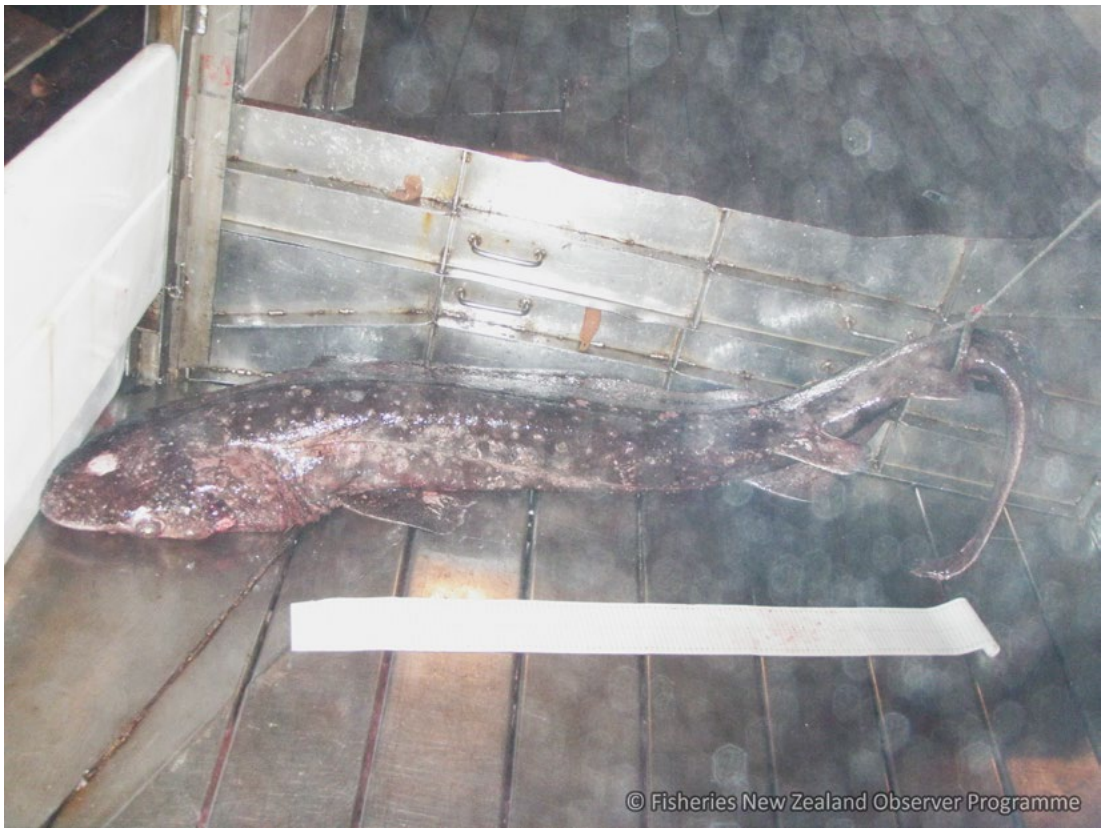

Figure A1.1. Bramble shark (*Echinorhinus brucus*) caught on the Snares Shelf in July 2012.
Photo: Fisheries New Zealand

References

Battiata M, Serena F, Lo Brutto S. 2024. Genetic and distribution data of the bramble shark *Echinorhinus brucus* (Bonnaterre, 1788) and the prickly shark *Echinorhinus cookei* Pietschmann, 1928 to better reconstruct their conservation status. Animals. 14:993. doi.org/10.3390/ani14070993

Ebert DA, Dando M, Fowler S. 2021. Sharks of the world: a complete guide. Princeton: Princeton University Press.

Garrick JAF. 1960. Studies on New Zealand Elasmobranchii. – Part X. The genus *Echinorhinus*, with an account of a second species, *E. cookei* Pietschmann, 1928, from New Zealand waters. Transactions of the Royal Society of New Zealand. 88(1):105–117.

Phillipps WJ. 1928. Sharks of New Zealand: No. 2. New Zealand Journal of Science and Technology. 10(4):221–226.

Phillipps WJ. 1946. Sharks of New Zealand. Dominion Museum Records in Zoology. 1(2):5–20.

Stewart AL. 2015. Family Echinorhinidae. Bramble sharks. In: Roberts CD, Stewart AL, Struthers CD, editors. The fishes of New Zealand. Wellington: Te Papa Press; p.120–122.

Appendix 2

New Zealand Threat Classification System: categories, criteria and qualifiers

Full details of the criteria and qualifiers included in Table 5 can be found in Rolfe et al. (2022). Summary definitions for the categories are presented below.

Data Deficient

Taxa that cannot be assessed 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 Rolfe et al. (2022).

Threatened

Taxa that meet the criteria specified by Rolfe et al. (2022) for the conservation statuses Nationally Critical, Nationally Endangered, Nationally Vulnerable and Nationally Increasing.

NATIONALLY CRITICAL

Criteria for Nationally Critical:

- **Very small population (natural or unnatural) regardless of the trend**
  - The total population size is fewer than 250 mature individuals; or
  - The total area of occupancy is less than 1 ha (0.01 km^2); or
  - There are 2 sub-populations *and* fewer than 200 mature individuals in the largest sub-population
- **Small population that is forecast to decline 50–70% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–1,000 mature individuals; or
  - The total area of occupancy is 1–10 ha (0.01–0.1 km^2); or
  - There are 3–5 sub-populations *and* ≤ 300 mature individuals in the largest sub-population
- **Population that is forecast to decline >70% over the longer of 10 years or three generations (maximum 100 years), irrespective of the size or number of sub-populations**

NATIONALLY ENDANGERED

Criteria for Nationally Endangered:

- **Small population that is forecast to remain stable ±10% (unnatural or unknown)**
  - The total population size is 250–1,000 mature individuals; or
  - The total area of occupancy is 1–10 ha (0.01–0.1 km^2); or
  - There are 3–5 sub-populations *and* ≤ 300 mature individuals in the largest sub-population
- **Small population that is forecast to decline 10–50% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–1,000 mature individuals; or
  - The total area of occupancy is 1–10 ha (0.01–0.1 km^2); or
  - There are 3–5 sub-populations *and* ≤ 300 mature individuals in the largest sub-population
- **Moderate population that is forecast to decline 50–70% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 1,000–5,000 mature individuals; or
  - The total area of occupancy is 10–100 ha (0.1–1 km^2); or
  - There are 6–15 sub-populations *and* ≤ 500 mature individuals in the largest sub-population

NATIONALLY VULNERABLE

Criteria for Nationally Vulnerable:

- **Small population (unnatural) that is forecast to increase by 10% or more over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–1,000 mature individuals; or
  - The total area of occupancy is 1–10 ha (0.01–0.1 km^2); or
  - There are 3–5 sub-populations *and* ≤ 300 mature individuals in the largest sub-population
- **Moderate population (unnatural) that is forecast to remain stable ± 10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 1,000–5,000 mature individuals; or
  - The total area of occupancy is 10–100 ha (0.1–1 km^2); or
  - There are ≤ 15 sub-populations *and* ≤ 500 mature individuals in the largest sub-population
- **Moderate population that is forecast to decline 10–50% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 1,000–5,000 mature individuals; or
  - The total area of occupancy is 10–100 ha (0.1–1 km^2); or
  - There are 6–15 sub-populations *and* ≤ 500 mature individuals in the largest sub-population
- **Moderate to large population that is forecast to decline 30–70% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 5,000–20,000 mature individuals; or
  - The total area of occupancy is 100–1,000 ha (1–10 km^2); or
  - There are 6–15 sub-populations *and* ≤ 1,000 mature individuals in the largest sub-population
- **Large population that is forecast to decline 50–70% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 20,000–100,000 mature individuals; or
  - The total area of occupancy is 1,000–10,000 ha (10–100 km^2)

At Risk

Taxa that meet the criteria specified by Rolfe et al. (2022) for Declining, Recovering and Uncommon.

UNCOMMON

This conservation status combines the conservations statuses At Risk – Naturally Uncommon and At Risk – Relict of Townsend et al. (2008) and replaces the conservation statuses At Risk – Range Restricted and At Risk – Sparse of Molloy et al. (2022).

Any taxon with a distribution that is confined to a specific substrate (e.g. ultramafic rock), habitat (e.g. high alpine fellfields, hydrothermal vents) or geographic area (e.g. subantarctic islands, seamounts) or that occurs within small and widely scattered populations is classified as Uncommon. The distribution may be natural or unnatural (i.e. the result of human-induced change) and populations may be stable or increasing.

- **Naturally small population that is forecast to increase >10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–20,000 mature individuals; or
  - The total area of occupancy is 1–100,000 ha (0.01–1,000 km^2)
- **Unnaturally small area of occupancy that is forecast to increase >10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total area of occupancy is 1,000–100,000 ha (10–1,000 km^2)

- **Naturally small population that is forecast to remain stable ±10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–20,000 mature individuals; or
  - The total area of occupancy is 1–100,000 ha (0.01–1,000 km^2)
- **Unnaturally small population that is forecast to remain stable ±10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 250–20,000 mature individuals; or
  - The total area of occupancy is 100–100,000 ha (1–1,000 km^2)
- **Naturally or unnaturally moderate to large population that has a small to moderate area of occupancy that is forecast to increase >10% or remain stable over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is 20,000–100,000 mature individuals *and* the area of occupancy is <100,000 ha (1,000 km^2); or
  - The total population size is >100,000 mature individuals *and* the area of occupancy is <100,000 ha (1,000 km^2)

  Minimum area of occupancy limits apply, which vary according to the state and trend of the population. If the area of occupancy is lower than the minimum limits listed below, the taxon should be classified as Threatened or At Risk – Recovering:
  - Natural, stable or increasing: minimum 1 ha (0.01 km^2); or
  - Unnatural, stable: minimum 100 ha (1 km^2); or
  - Unnatural, increasing: minimum 1,000 ha (10 km^2)
- **Naturally or unnaturally small to moderate population that has a large area of occupancy that is forecast to remain stable over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is < 20,000 mature individuals *and* the area of occupancy is >100,000 ha (1,000 km^2)

  Minimum population size limits apply, which vary according to the state of the population. If the population size is lower than the minimum limits listed below, the taxon will be assessed as Threatened:
  - Natural: minimum 250 mature individuals; or
  - Unnatural: minimum 5,000 mature individuals

Not Threatened

- **Naturally or unnaturally large population that is forecast to increase >10% or remain stable ±10% over the longer of 10 years or three generations (maximum 100 years)**
  - The total population size is greater than 20,000 mature individuals; *and*
  - The total area of occupancy is greater than 100,000 ha (1,000 km^2)

Non-resident Native

Taxa whose natural presence in Aotearoa 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).

MIGRANT

Taxa that predictably and cyclically visit Aotearoa 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.

VAGRANT

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

References

Molloy J et al. 2002: Classifying species according to threat of extinction. A system for New Zealand. Wellington: Department of Conservation. Threatened Species Occasional Publication 22. doc.govt.nz/documents/science-and-technical/TSOP22.pdf

Rolfe J et al. 2022. New Zealand Threat Classification System manual 2022. Part 1: assessments. Wellington: Department of Conservation. doc.govt.nz/globalassets/documents/science-and-technical/new-zealand-threat-classification-system-manual-2022-part-1-assessments.pdf

Townsend AJ et al. 2008. New Zealand Threat Classification System manual. Wellington: Department of Conservation. doc.govt.nz/documents/science-and-technical/sap244.pdf