

Section 4

Subchapter 4E

Marine mammals

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Key points

- Major threats to marine mammals include by-catch, chemical pollution, vessel strikes and climate change.
- Anthropogenic noise, plastics and other emerging threats require investigation.
- Quantitative research on the cumulative effects of threats is limited.

1. Introduction

Marine mammals are top predators and good indicators of environmental change. They face direct, indirect and cumulative anthropogenic threats. Data on their distribution, abundance and trends are incomplete and should be considered top priorities for management and conservation.

Changes in taxonomy since 2018 are related to the definition of subspecies, although some new species have been identified (see <https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/>).

Few threats have been alleviated since the publication of the second *World Ocean Assessment* despite some advancements in threat abatement in a very small number of regional populations. Global climate change poses a significant threat, although its effects are clearest in polar regions (Gulland and others, 2022; Meredith and others, 2019). Although climate change and overfishing are serious ecosystem-level threats, species are also challenged by by-catch, pollution, emerging diseases, vessel strikes and disturbances to animal culture and communities.

2. Environmental changes since the publication of the second *World Ocean Assessment*

Changes in overall status: updates by taxon

Pinnipeds (36 species, including 2 extinct)

Pinnipeds are susceptible to climate change-induced shifts and fisheries interactions (affecting mortality and prey availability). Mid-latitude species are affected by marine heat waves (Garcia-Aguilar and others, 2018; Backe and others, 2021; Jog and others, 2022). The International Union for Conservation of Nature (IUCN) has updated its information on some pinnipeds since the publication of the second *World Ocean Assessment*: ice-dependent species assessed are in decline. Intensive conservation efforts have improved the status of Mediterranean monk seals (Karamanlidis and others, 2023) and, through national legislation and marine protection frameworks (Monk Seal Alliance, 2024), the status of Hawaiian monk seals (Baker and others, 2025) and Saimaa seals (Auttila and Alakoski, 2025) has improved.

Cetaceans

Mysticetes (15 species)

Changing oceanographic processes in the north-west Atlantic due to climate change have altered the range and foraging behaviour of critically endangered North Atlantic right whales, reducing calving rates and increasing the risks of vessel strikes and fishing gear entanglement (Meyer-Gutbrod and others, 2022). Since 2011, the population has declined to fewer than 400 individuals (Frasier and others, 2024).

Rice's whale (Rosel and Wilcox 2014; Rosel and others, 2021), which occurs in the north-eastern Gulf of Mexico and numbers approximately 33 individuals, is listed as Endangered under the United States Endangered Species Act and as Critically Endangered on the IUCN Red List of Threatened Species.

Odontocetes (79 species, 1 possibly extinct)

Coastal and estuarine dolphins and porpoises

By-catch continues to be the primary threat (Brownell and others, 2019), with habitat loss and degradation from coastal development and pollution negatively affecting feeding and breeding grounds (Bartalini and others, 2022; Lailson-Brito Jr., J and others, 2022). The Critically Endangered Atlantic humpback dolphin (Braulik and others, 2023), found along West Africa, faces threats from artisanal fisheries and rapid coastal development (Genov and others, 2024). To assist with their conservation, the Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals adopted resolution 14.10 on the single species action plan for the Atlantic humpback dolphin (*Sousa teuszii*). In 2023, gillnet blocking devices created a sanctuary for vaquitas in Baja California. Rojas-Bracho and others (2024) recommend further development of vaquita-safe fishing gear to allow artisanal fishing. In 2023, the International Whaling Commission (IWC) issued its first-ever extinction alert for the vaquita (IWC, 2023).

Pelagic toothed whales, dolphins and porpoises

Beaked whales (n=24) lack data on population structure and abundance (Feyrer and others, 2024). Threats to these deep-diving species include military sonar, climate change, entanglement, plastic pollution, vessel strikes and oil spills.

Freshwater dolphins

Due to their limited ranges, freshwater dolphins in Asia and South America are endangered by anthropogenic threats (Campbell and others, 2022). In 2023, unprecedented droughts in the Amazon Basin led to extreme water heating and increased dolphin mortality (Grossman, 2024; Fleischmann and others, in press). Irrawaddy dolphins in the Mekong River are likely extirpated due to population fragmentation as a result of dams, high fishing mortality, vessel strikes, pollutants, genetic outbreeding depression and low recruitment (Krutzen and others, 2018; Dove, 2022).

Sirenians (5 species, including 1 extinct)

Dugong populations are mostly declining outside Australia (Panyawai and Prathep, 2022; Marsh and others, 2025) and are listed as Vulnerable globally (Marsh and Sobztick, 2019). Three subpopulations have recently been listed by IUCN: New Caledonia (Endangered) (Hamel and others, 2022); Japan

(Endangered) (Brownell and others, 2019) and coastal East Africa (Critically Endangered) (Trotzok and others, 2022). Research on the three manatee species has progressed in the Amazon (Amaral and others, 2023), Caribbean (Galves and others, 2023), Africa (Keith-Diagne and others, 2021; Factheu and others, 2023) and Florida (Brady and others, 2022).

Other carnivores

Polar bears (1 species)

Trend assessments for all polar bear populations indicate that five are stable, three are increasing and two are declining (Laidre and others, 2022; Polar Bear Specialist Group (PBSG), 2023). Improved harvest management and transient improvement in habitat conditions have resulted in improved status for some populations (Dyck and others, 2020; Laidre and others, 2023), while longer ice-free seasons and reductions in ice-seal prey have reduced body condition, productivity and survivorship in others (Dyck and others, 2022; Bromaghin and others, 2015; Atkinson and others, 2022). Given the rate of climate change (Molnár, 2020; Stroeve and others, 2024), few polar bear populations are expected to exist beyond 2100.

Mustelids (3 species)

Southern sea otters in western North America have not recovered from hunting, although protection began in 1911 with the North Pacific Fur Seal Convention. The population is estimated at 3,000 (Hatfield and others, 2019). Reintroductions of otters to parts of their historical range are under consideration (Hughes and others, 2019; Rudebusch and others, 2020). There is little information on the marine otter, or chungungo, along the western coast of South America; it is considered Endangered on the IUCN Red List.

Area-based protection

Since 2018, 234 important marine mammal areas for 110 species have been identified by IUCN. Such areas can inform the implementation of area-based management measures, e.g. the north-west Mediterranean Particularly Sensitive Sea Areas of the International Maritime Organization (see <https://www.marinemammalhabitat.org/immas/immas-searchable-database/>).

Changes in overall status

Overall, 26.9% of all marine mammal species (including freshwater species) are under threat (table 1). One third of the 30 species not assessed in the second *World Ocean Assessment* are still classified as Data Deficient. Only two have changed in status (table 2 and figure I): the Mediterranean monk seal, now classified as Vulnerable, and the North Atlantic right whale, now classified as Critically Endangered.

Table 1

Marine mammal species in each category of the International Union for Conservation of Nature Red List of Threatened Species in 2024

Group	Extinct	Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient	Total
Freshwater dolphins		1	4					5
Mysticetes		2	3	1	1	7	1	15
Odontocetes		2	5	6	9	42	9	73
Pinnipeds	2		6	4	1	23		36
Polar bear				1				1
Sea otters			2					2
Sirenians				4				4
Total	2	5	20	16	11	72	10	136

Source: Prepared by the writing team.

Note: Regional, subspecies or subpopulation assessments are excluded.

Table 2

Changes in the status of marine mammals in the International Union for Conservation of Nature Red List of Threatened Species since the publication of the second *World Ocean Assessment*

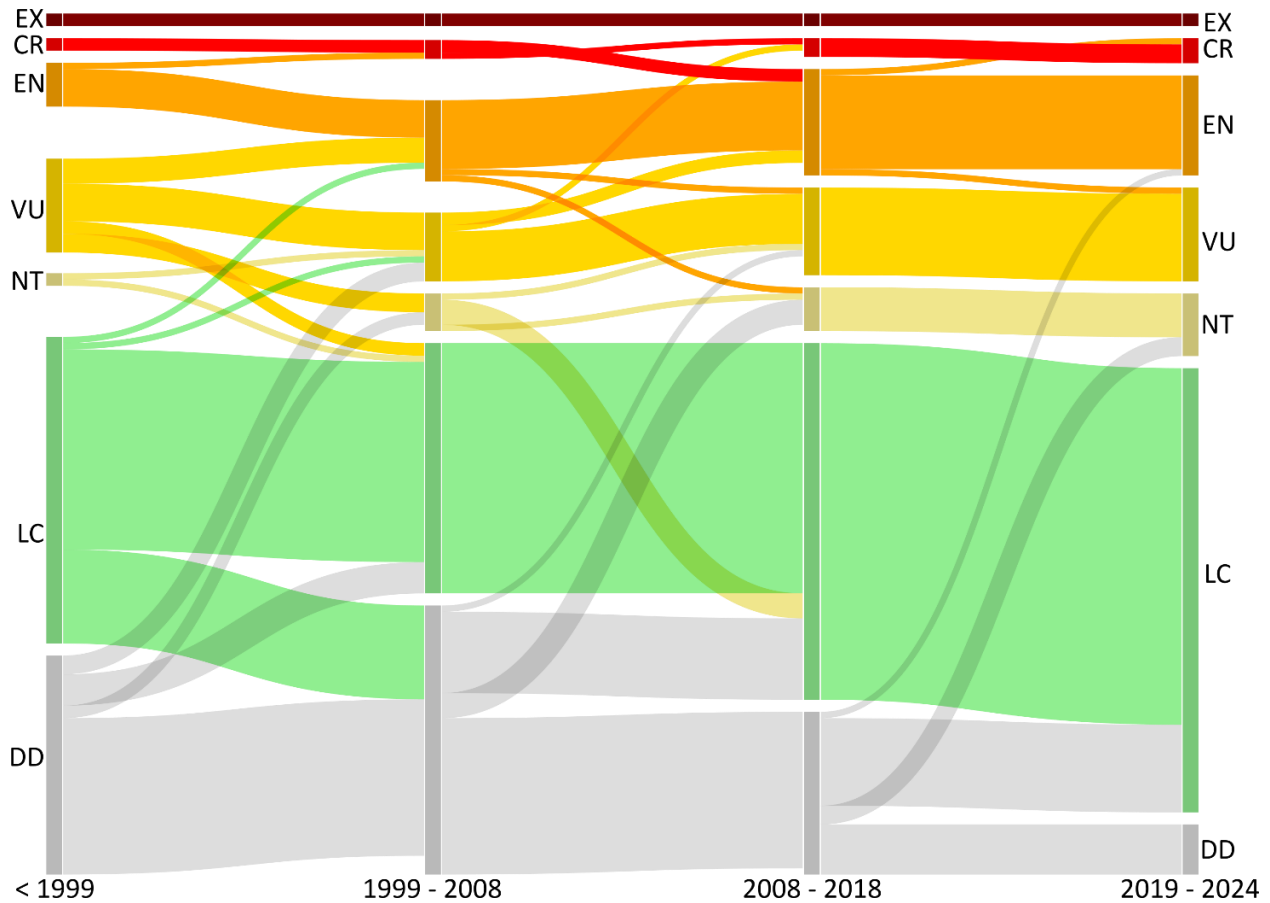
Group	New	Uplisted	Unchanged	Downlisted	Data Deficient	Total
Freshwater dolphins	1		4			5
Mysticetes		1	13		1	15
Odontocetes	20		44		9	73
Pinnipeds			35	1		36
Polar bears			1			1
Sea otters			2			2
Sirenia			4			4
Total	21	1	103	1	10	136

Source: Prepared by the writing team.

Note: “New” refers to species evaluated after the publication of the second World Ocean Assessment or previously Data Deficient; “Uplisted”: worsened conservation status; “Downlisted”: improved conservation status.

Figure I

Status changes over time



Source: Prepared by the writing team.

Abbreviations: EX, Extinct; CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.

Region-specific changes

Arctic Ocean

Since the publication of the second *World Ocean Assessment*, Arctic marine ecosystems have changed dramatically due to global warming, with temperature increases four times the global average (Meredith and others, 2019; Rantanen and others, 2022). Arctic sea ice has drastically declined in extent and thickness. An ice-free Arctic is predicted for mid-century (Kim and others, 2023), representing virtually total habitat loss for 11 endemic Arctic marine mammal species. Transformed food webs, altered predator-prey relationships, changing distribution and migration patterns, local overharvesting, increasing disease risks and human encroachment are threats (Heide-Jørgensen and others, 2020; Kovacs and others, 2021; Kuletz and others, 2024).

North Atlantic Ocean, Baltic Sea, Black Sea, Mediterranean Sea and North Sea

Regional downlisting of Mediterranean monk seals, common bottlenose dolphins and striped dolphins and the establishment of the north-western Mediterranean Particularly Sensitive Sea Areas are examples of positive developments. For example, Greece has designated two new national marine parks, one in the Ionian Sea and one in the Aegean Sea, and is endorsing concrete management actions to ensure high protection and improve species' conservation status. Türkiye has committed to designating new marine protected areas (MPAs) and management actions in the Mediterranean Sea. However, mass strandings of beaked whales and by-catch still raise serious concerns. The Critically Endangered Baltic harbour porpoise (Celemin and others, 2023) and the Endangered Black Sea endemic harbour porpoise are threatened by by-catch in gillnets (International Council for the Exploration of the Sea (ICES), 2024) and in turbot gillnets (Popov and others, 2023).

South Atlantic Ocean and wider Caribbean

Entanglement in fishing gear remains the main threat to coastal marine mammals regionally (Domit and others, 2021; Secchi and others, 2021; da Silva and others, 2023). Although legally protected in most countries, direct take and consumption occur in some countries (Ingram and others, 2022; Nuno and others, 2022).¹ Environmental degradation is considered the leading cause of some population declines (Lailson-Brito Jr and others, 2022; Oliveira-Ferreira and others, 2024). In 2023-2024 the H5N1 avian influenza severely affected South American pinnipeds (Plaza and others, 2024; Uhart and others, 2024).

Indian Ocean, Arabian Sea, Bay of Bengal, Red Sea, Gulf of Aden and Persian Gulf

Since the publication of the second *World Ocean Assessment*, freshwater and oceanic mammals in the Bay of Bengal and its tributaries have been increasingly exposed to human-induced threats, including fisheries, habitat degradation and pollution (Paudel and others, 2020a and 2020b; Campbell and others, 2022). A lack of monitoring and research in some countries limits the availability of information for 23 cetacean species and the dugong.

North Pacific Ocean

Knowledge of cetaceans in the East and South China Seas has increased since the publication of the second *World Ocean Assessment*, with at least 25 cetacean species confirmed in the South China Sea (Liu and others, 2023; Liu and others, 2024a, 2024b; Li and others, 2024). Dugongs may be functionally extinct in China (Lin and others, 2022a). Several populations of Indo-Pacific humpback dolphin have rapidly declined in recent decades, with at least one group facing extirpation (Lin and others, 2022b, 2024a, 2024b). As of 2022, the Yangtze finless porpoise is increasing in numbers after the implementation of a 10-year fishing ban (Hao and others, 2024).

South Pacific Ocean

In Chile, South American sea lions are depredating fish catches, resulting in fishermen illegally killing them (approximately three per boat per month) (Sepulveda and others, 2018). In the South-West Pacific,

¹ Recent initiatives, such as resolution 14.15 of the Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals, address the harvest of aquatic wild meat in West Africa.

data on strandings around New Caledonia could be used to determine species distributions and provide samples for genetic, ageing, diet and pollutant analysis (Garrigue and others, 2024).

Southern Ocean

In the Southern Ocean, habitats are shifting poleward, increasing habitat for sub-Antarctic species and reducing habitat for ice-dependent species (Hindell and others, 2020; Melbourne-Thomas, 2020). Antarctic krill distribution has drifted south, with declining sea ice (Kawaguchi and others, 2024) raising concerns because they are the primary prey for blue, fin, humpback, Antarctic and minke whales and crabeater seals. There is also concern about increased vessel traffic associated with ecotourism (Pallin and others, 2022).

Changes in key threatening processes since the publication of the second *World Ocean Assessment*

Fisheries by-catch

Research on by-catch has increased in some countries since the publication of the second *World Ocean Assessment* because of export regulations (e.g. National Oceanic and Atmospheric Administration (NOAA), Office of International Affairs and Commerce, 2023).

Good governance and the involvement of local communities are key to addressing artisanal gillnet fisheries threats to small cetaceans globally (Brownell and others, 2019). The Bycatch Risk Assessment toolkit is available for addressing data-poor cases (Hines and others, 2020). In some areas, animals are increasingly using fishing activities as a foraging strategy (e.g. Papageorgiou and others, 2024).

Vessel strikes

A global analysis of the risk of global shipping vessel strikes to four large whale species found that less than 10% of populations had protective measures (Nisi and others, 2024). The International Whaling Commission (IWC) leads global efforts on risk assessment and the identification of mitigation options, advising countries and intergovernmental organizations such as the International Maritime Organization. The Commission hosts a global vessel strike database (Winkler and others, 2020). Reducing the risks of vessel strikes for marine megafauna has been addressed by the Conference of the Parties to the Convention on Migratory Species in its resolution 14.5.

Climate change

Climate change impacts are recognized as a global threat to marine biodiversity, creating both direct and indirect negative effects on marine mammals (Marsh and others, 2022; D'Amen and others, 2024). Since the publication of the second *World Ocean Assessment*, this threat has escalated. Oceans have become warmer, fresher, increasingly stratified and less oxygenated (Intergovernmental Panel on Climate Change (IPCC), 2022). Sea levels have risen, storm activity has intensified and sea ice has declined. These changes affect marine mammals directly, through physical habitat changes, and indirectly, through altered ecosystems. Other climate-related concerns related to marine mammals include increased harmful algal blooms and infectious disease exposure (Kebke and others, 2022; Barratclough and others, 2023) and the impacts of warmer water on sound propagation and exposure to contaminants (Affatati and others, 2022; Borgå and others, 2022).

Contaminants

Legacy compounds identified in the second *World Ocean Assessment* have declined in many species but continue to accumulate in animal tissues in some regions despite being banned under the Stockholm Convention² on Persistent Organic Pollutants (2004). Novel contaminants, especially perfluoralkyl compounds and microplastics (Schaap and others, 2023), now add to threats.

Diseases

Harmful algal blooms

Since the publication of the second *World Ocean Assessment*, climate change has increased the spatiotemporal distribution of harmful algal blooms globally (Hallegraeef and others, 2021), which can cause marine mammal death and disease. Saxitoxin, a neurotoxin found in shellfish contaminated by harmful algal blooms, has recently been detected north of the Bering Strait for the first time (Lefebvre and others, 2022). Harmful algal blooms have been responsible for the deaths of sirenians, dolphins and baleen whales (Haussermann and others, 2017; Starr and others, 2017; Broadwater and others, 2018).

Infectious diseases

Multiple viral epizootics have caused severe die-offs of marine mammals since the publication of the second *World Ocean Assessment*. Morbilliviruses have killed thousands of cetaceans and pinnipeds (Duignan and others, 2014; Van Bresseem and others, 2014; Groch and others, 2018). Die-offs of pinnipeds in South America in 2022 and 2023 were caused by the avian influenza virus H5N1 (Ulloa and others, 2023; Uhart and others, 2024).

The spread of terrestrial pathogens to marine mammals has been facilitated by coastal development and increases in coastal run-off. Toxoplasmosis causes mortality globally, killing critically endangered Māui dolphins in New Zealand, monk seals in Hawaii and sea otters in the United States of America (Barbieri and others, 2016; Miller and others, 2018).

Offshore wind energy production

Worldwide production of offshore wind energy has expanded rapidly. Both exploration and implementation pose risks to marine mammals (Macrander and others, 2022). Passive acoustic monitoring can be used to define critical habitats and reduce the risk of vessel strikes, as studies in New England, for example, have shown (Van Parijs and others, 2023).

Tourism

Wildlife tourism is growing in scale and revenue (O'Connor and others, 2009). Recent research enables the quantification of disturbance of unmanaged tourism at population levels (Bejder and others, 2022). Possible physiological and behavioural consequences can lead to decreased health and survival (Booth, 2022). The Secretariat of the Convention on Migratory Species has developed a publication, *International Guidelines for Sustainable Marine Wildlife Interactions: Boat-Based and In-Water Activities* (CMS Technical Series Publication No. 49).

² See <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/stockholm-convention>.

3. Key remaining knowledge and capacity gaps

Knowledge and capacity-building gaps	Steps taken to address gaps since the publication of the second <i>World Ocean Assessment</i>
Global distribution, abundance and population structure	<p>Advances in satellite imagery and artificial intelligence (Cubaynes and others, 2023)</p> <p>Regional and international large-scale surveys (e.g. Gilles and others, 2023; Panigada and others, 2023)</p> <p>Marine acoustics (Ferguson and others, 2023; Cominelli and others, 2024)</p> <p>Advances in genetics (McGowen and others, 2024; Morin and others, 2024)</p>
Species-specific distribution modelling	<p>Advances in habitat use modelling</p> <p>(Bedrinana-Romano and others, 2022; Cañadas and others, 2023; Fiedler et al 2023; Frantz et al 2024)</p>
Spatiotemporal identification of climatic refugia for marine mammals	<p>Creation of climate refugia (Gulland and others, 2022; Garcia-Reyes and others, 2023; Zelli et al 2025)</p>
Plastics and microplastics	<p>Research on the effects of microplastics on marine mammals (Zantis and others, 2021)</p>

Source: Prepared by the writing team.

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