



ADVANCED INSTITUTE FOR WILDLIFE CONSERVATION
(RESEARCH, TRAINING & EDUCATION)
VANDALUR, TAMIL NADU



A GUIDE TO THE MARINE MAMMALS OF TAMIL NADU



TAMIL NADU FOREST DEPARTMENT
ADVANCED INSTITUTE FOR WILDLIFE CONSERVATION

**A GUIDE TO THE MARINE MAMMALS
OF TAMIL NADU**

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EXECUTIVE SUMMARY

Tamil Nadu's coastal and marine waters are home to a diverse array of marine mammals, consisting of 24 species including baleen whales, toothed whales, oceanic dolphins, porpoises, and sirenians. Marine mammals occupy the highest trophic levels in their ecosystem and play a very crucial ecological role in both coastal and marine habitats, such as regulating prey populations, enhancing primary productivity, recycling nutrients, and serving as indicators of marine ecosystem health. As sentinel organisms, their status reflects broader environmental changes, including those driven by climate change, pollution, and habitat degradation. However, these marine mammals face mounting threats, primarily from human activities. Illegal hunting and poaching, bycatch and entanglement in fishing gear, ship strikes, habitat destruction, oceanic noise pollution, and plastic and chemical contamination are significant stressors that impact their populations and survival, further exacerbating conservation challenges.

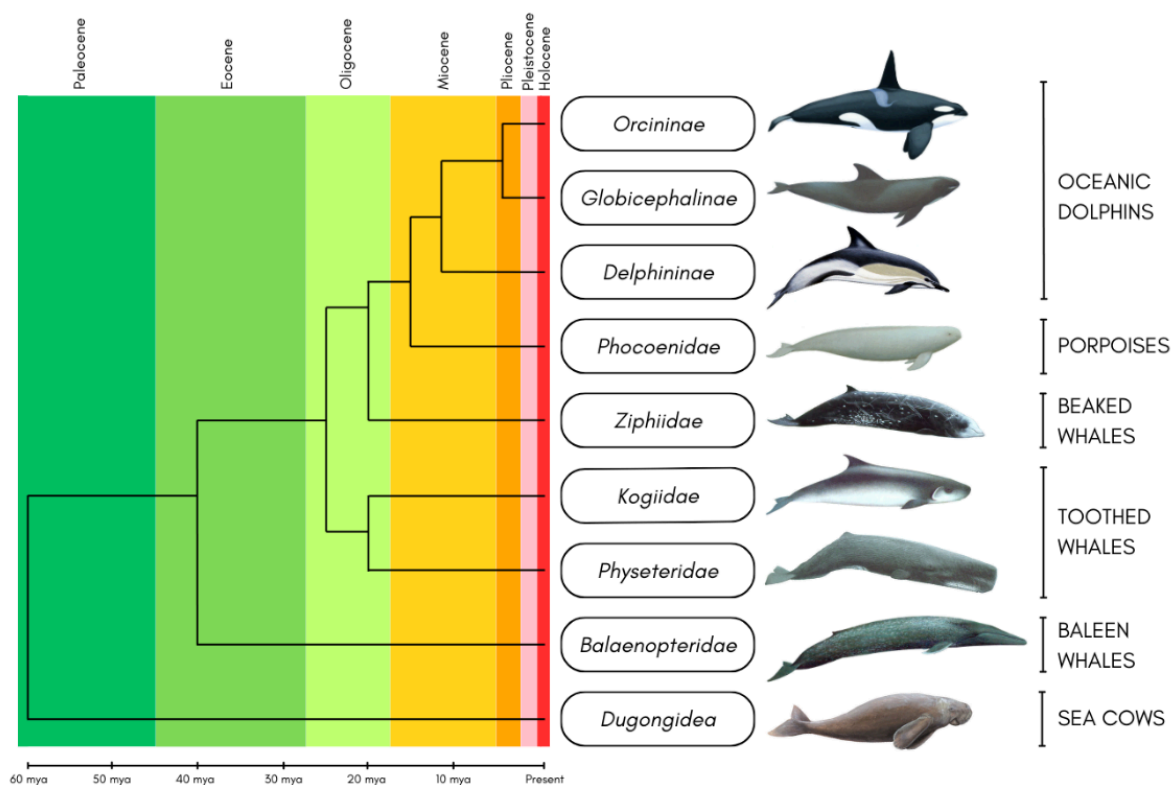
Despite Tamil Nadu's rich marine biodiversity and strategic coastal location, research on its marine mammal populations remains limited, often relying on incidental strandings and opportunistic sightings. There is a need for systematic surveys and dedicated long-term monitoring programmes on marine biodiversity in Tamil Nadu. Bridging these gaps is essential for effective conservation planning, enhancements in species management, and legislative implementation. This document may serve as a comprehensive guide to the identification of marine mammals and its distribution in Tamil Nadu, their ecology, threats and conservation challenges. It aims to enhance species identification, and recognition of their habitat among forest and other relevant department officials, conservationists, researchers, students, and the general public. Additionally, the report outlines marine mammal stranding response protocols, to ensure better preparedness for live rescues and post-mortem examinations.

Understanding the ecological role of marine mammals is key for conservation measures. Strengthening policies for conservation, improving research activities, initiating various schemes, and increasing public awareness are essential to safeguard these marine species. Conservation efforts must extend beyond short-term goals and targets by integrating sustainable marine management practices and multifaceted, cross-sector collaborations. Moreover, by fostering scientific research with international cooperation and effective community participation, Tamil Nadu can become a pioneering state in marine mammal conservation within India.

I. INTRODUCTION

depend on the aquatic ecosystem for their sustenance. Though varied in shapes and sizes, all marine mammals rely on and sustain the marine environments in various ways. They are often wide-ranging from polar ice caps to tropical seas, and are found in diverse habitats, from shallow coastal waters to deep abysses (Marine Mammals: NOAA, 2018; Society for Marine Mammalogy, 2021; Parsons *et al.*, 2012).

Cetaceans, the group of fully aquatic marine mammals includes whales, dolphins, and porpoises, . Their closest living relative is the hippopotamus. The earliest known ancestor of whales, Pakicetus, appeared around 50 million years ago during the Eocene epoch. It was a terrestrial, wolf-sized mammal that likely waded in water.



A simplified, visual approximation of divergence patterns and broad evolutionary trends of Cetaceans and Sirenians (not a detailed phylogenetic reconstruction).

This lineage progressed through several key stages, such as Ambulocetus and Rodhocetus, eventually evolving into Basilosaurus, a fully aquatic whale with vestigial hind limbs. Approximately 35 to 40 million years ago, cetaceans diverged into two main groups: Mysticeti (baleen whales) and Odontoceti (toothed whales). Mysticeti, which includes species like blue and humpback whales, developed filter-feeding structures known as baleen, while Odontoceti retained teeth and developed echolocation (Thewissen *et al.*, 2009; Gatesy *et al.*, 2013; Lambert *et al.*, 2018).

Odonocetes experienced further divergences along the way. Beaked whales (family Ziphiidae) split from Odontoceti around 20–25 million years ago, known for their deep-diving capabilities and elusive nature, having evolved specialised adaptations for prolonged underwater excursions. Oceanic dolphins (family Delphinidae) emerged around 11-15 million years ago and are now the most diverse cetaceans. Porpoises (family Phocoenidae) diverged from other odontocetes around 15–17 million years ago. They evolved separately from dolphins but share many similarities; they tend to be smaller and have distinct tooth structures (Barnes, 1985; Thewissen et al., 2009; Gatesy et al., 2013; McGowen et al., 2020).

Meanwhile, sirenians, or sea cows, are large, herbivorous marine mammals that include dugongs and manatees. They evolved separately from cetaceans and are the only herbivorous marine mammals, sharing a common ancestor with elephants around 60 million years ago. The earliest sirenian, *Prorastomus*, appeared approximately 50 million years ago as a semi-aquatic wading mammal, with dugongs and manatees diverging around 30 million years ago. Both sirenians and early cetaceans trace their origins to a common ancestor with terrestrial herbivores and carnivores, with sirenians evolving into fully aquatic forms before cetaceans (Domning, 2001).

Marine mammals health and integrity of marine ecosystems ecological such as nutrient recycling, affecting prey population sizes, facilitating bioturbation, and maintaining functional biodiversity (Watson & Estes, 2011; Bowen, 1997; Roman *et al.*, 2014; Kiszka *et al.*, 2015; Albouy *et al.*, 2017; Sergio *et al.*, 2008; Katona & Whitehead, 1988). Research has also indicated that marine mammals serve as 'sentinels' of the marine ecosystem. climate change moving at an unprecedented rate, temperatures are increasing globally, causing glaciers to retreat and sea levels to rise. Plant and animal species that depend on the marine ecosystem would be the first to face adverse effects (Boyd *et al.*, 2009). As megafauna that are high in the trophic level, marine mammals serve as prime sentinel species for assessing environmental stressors caused by climate change (Bossart, 2011; Moore, 2008).

Apart from their vitality to the ocean's biodiversity, they also hold special cultural and economic significance (Mowat, 2006). Notably cetaceans dolphins and whales as "charismatic species" because they captivate the public, attract media attention, and engage political interest (Bossart, 2011; Hoyt, 2012). Tourism based on marine mammals, such as whale watching, is a million-dollar industry raking in money while providing the chance for people to be educated about these animals (Hoyt, 2001; O'Connor *et al.*, 2009).

However, marine mammals encounter a variety of threats that endanger their survival the health of the ecosystems. Because of their distribution, many marine mammals are known to be impacted by various anthropogenic activities such as incidental bycatch in fishing, hunting, poaching, collision with aquatic transport, oil and mineral extraction, exposure to pollutants and pathogens, and underwater noise (Avila *et al.*, 2018; Gales *et al.*, 2003; Helm *et al.*, 2014; Parsons *et al.*, 2012). Such stressors harm the animals, impacting their conservation status and placing the species or the population at risk of potential extinction (IUCN, 2024). These threats could operate at both the population level and the individual level. Anthropogenic threats such as direct hunting, incidental bycatch and entanglement in fishing gear or marine debris, vehicle collision and pathogenic infection are prevalent individual stressors (Clapham & Baker, 2018; Read *et al.*, 2006; Baulch & Perry, 2014; Van Waerebeek *et al.*, 2007; Van Bresseem *et al.*, 2015). Other stressors such

as tourism, acoustic pollution, coastal erosion and depletion of feeding grounds, bioaccumulation of pollutants, and oceanographic changes due to climate change affect entire populations (Kaschner *et al.*, 2011; Desforges *et al.*, 2016; *et al.*, 2002; Weilgart, 2007; Avila *et al.*, 2015).

Tamil Nadu has the second longest coastline of 1076 km after Gujarat with 14 districts sharing the coastline namely Thiruvallur, Chennai, Chengalpattu, Villupuram, Cuddalore, Mayildathurai, Nagapattinam, Tiruvarur, Thanjavur, Pudukottai, Ramanathapuram, Thoothukudi, Tirunelveli, and Kanyakumari (Climate Change Information Portal, Anna University). The state boasts a rich variety of marine ecosystems along its coastlines, which include gulfs, bays, beaches, straits, headlands, estuaries, inlets, marshlands, and offshore islands (Theenadhayalan *et al.*, 2012; Rajan *et al.*, 2019). Nearly 47% of Tamil Nadu's human population resides among the coastal districts, agriculture and fishing as their primary income sources (Nambi & Bahinipati, 2012). As with any coastal and marine ecosystem, the ones along Tamil Nadu's coast also face several issues threatening the survival and well-being of the resident marine species.

Marine mammals inhabit all coastal regions lining Tamil Nadu, namely along the southern Bay of Bengal and the northern Indian Ocean regions (Kannan & Rajagopalan, 2013). However, strandings of many species – such as Bryde's whales, blue whales, sperm whales, dwarf sperm whales, humpback dolphins, bottlenose dolphins, spinner dolphins, finless porpoises, and dugongs – have become increasingly frequent and concerning (Sudhan *et al.*, 2017; Ramachandran, 2001; Nammalwar *et al.*, 1994; Sadhukhan *et al.*, 2022; Balaji & Sekar, 2021). This rise in strandings is primarily attributed to factors such as overfishing, habitat destruction, entanglement in fishing gear, boat strikes, and incidental bycatch. Additionally, the disposal of sewage and industrial effluents, along with hunting, poaching, and illegal trade, also play significant roles in endangering these marine species (Balaji & Sekar, 2021; Thomas *et al.*, 2022).

publications in India have increased over the past decades. However, documentations are based on opportunistic sightings or occasional stranding, typically limited to morphometric measurements and photographs (Nelms *et al.*, 2021). The establishment of the Indian Ocean Cetacean Sanctuary in 1979 by the International Whaling Commission provided impetus for cetacean research in the region (Leatherwood & Donovan, 1991). However, compared to neighbouring Sri Lanka, extensive marine monitoring and survey (Leatherwood & Reeves, 1989). Given Tamil Nadu's strategic location and substantial coastline that houses biodiversity hotspots like the Gulf of Mannar giving more importance to systematic oceanic surveys in this region would help fill critical knowledge gaps in marine mammal research and conservation (Kumaran, 2002).

The complex challenges threatening marine mammals demand a comprehensive range of conservation strategies, with local awareness and knowledge being fundamental prerequisites. reports present and discuss the. will serve as for formulating forsser-report.

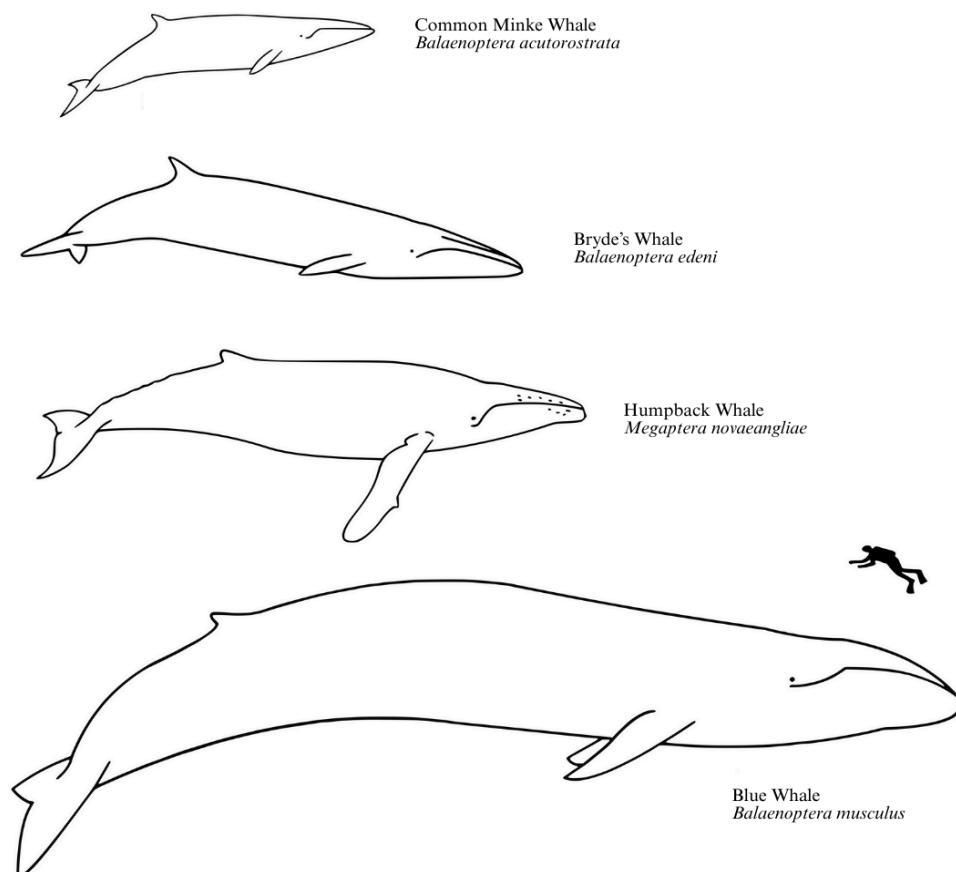
II. DETAILS OF THE MARINE MAMMALS OF TAMIL NADU

The list of species their below:

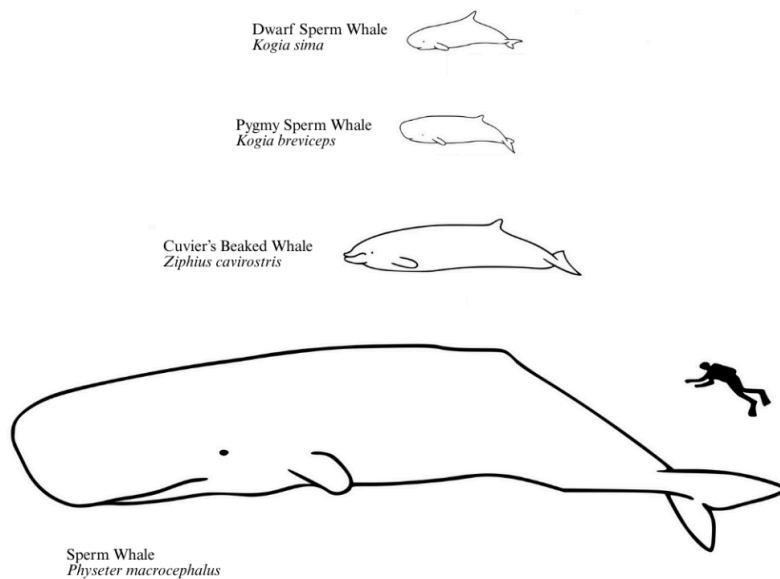
S.NO.	SCIENTIFIC NAME	COMMON NAME	IUCN Red List*	CITES Appendix	WPA, 1972 Schedule
A) BALEEN WHALE					
1.	<i>Balaenoptera acutorostrata</i>	Common Minke Whale	LC	I	I
2.	<i>Balaenoptera edeni</i>	Bryde's Whale	LC	I	I
3.	<i>Balaenoptera musculus</i>	Blue Whale	EN	I	I
4.	<i>Megaptera novaeangliae</i>	Humpback Whale	LC	I	I
B) BEAKED WHALE					
5.	<i>Ziphius cavirostris</i>	Cuvier's Beaked Whale	LC	II	II
C) TOOTHED WHALES					
6.	<i>Kogia breviceps</i>	Pygmy Sperm Whale	LC	II	I
7.	<i>Kogia sima</i>	Dwarf Sperm Whale	LC	II	I
8.	<i>Physeter macrocephalus</i>	Sperm Whale	VU	I	I
D) OCEANIC DOLPHINS					
9.	<i>Delphinus delphis</i>	Common Dolphin	LC	II	II
10.	<i>Feresa attenuata</i>	Pygmy Killer Whale	LC	II	I
11.	<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale	LC	II	I
12.	<i>Grampus griseus</i>	Risso's Dolphin	LC	II	I
13.	<i>Orcinus orca</i>	Killer Whale	DD	II	I
14.	<i>Peponocephala electra</i>	Melon-headed Whale	LC	II	I
15.	<i>Pseudorca crassidens</i>	False Killer Whale	NT	II	I
16.	<i>Sousa chinensis</i>	Indo-Pacific Humpback Dolphin	VU	I	I
17.	<i>Stenella attenuata</i>	Pantropical Spotted Dolphin	LC	II	I

18.	<i>Stenella coeruleoalba</i>	Striped Dolphin	LC	II	I
19.	<i>Stenella longirostris</i>	Spinner Dolphin	LC	II	I
20.	<i>Steno bredanensis</i>	Rough-toothed Dolphin	LC	II	I
21.	<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin	NT	II	I
22.	<i>Tursiops truncatus</i>	Common Bottlenose Dolphin	LC	II	I
E) PORPOISES					
23.	<i>Neophocaena phocaenoides</i>	Indo-Pacific Finless Porpoise	VU	I	I
F) SIRENIANS					
24.	<i>Dugong dugon</i>	Dugong	VU	I	I

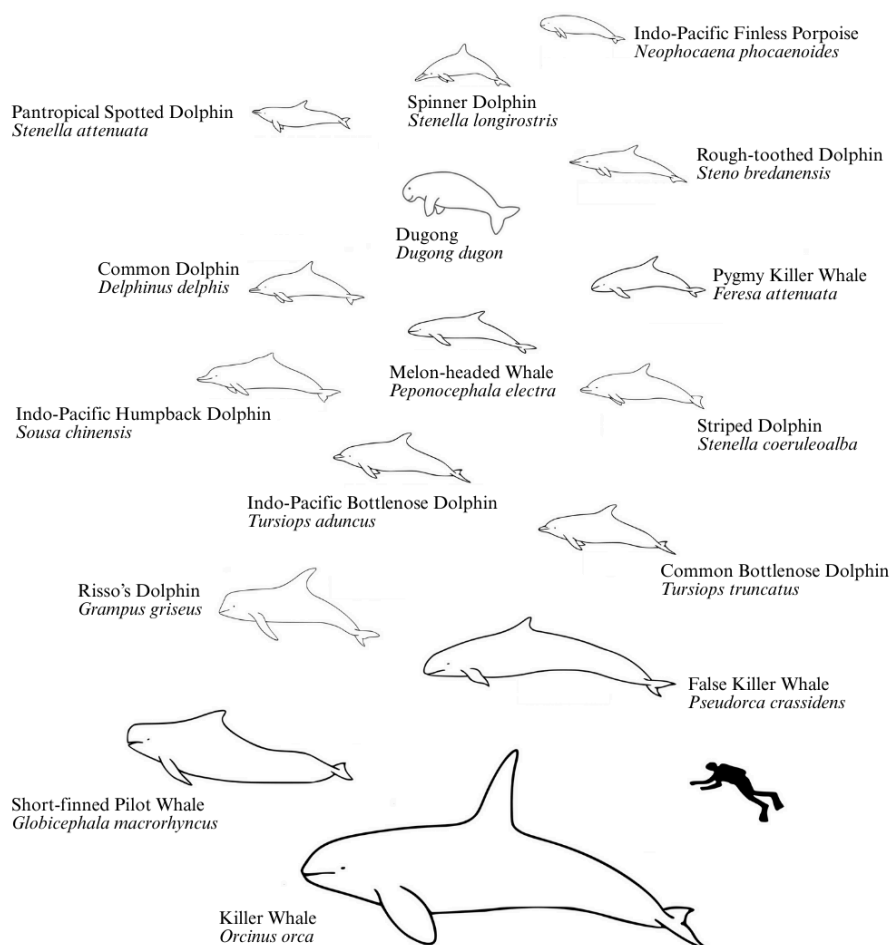
* LC – Least Concern; NT – Near Threatened; VU – Vulnerable; EN – Endangered; DD – Data Deficient



Scaled silhouettes of baleen whales of Tamil Nadu, illustrating comparative body lengths (Original vectors by Chris Huh, some rights reserved [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)).



Scaled silhouettes of toothed and beaked whales of Tamil Nadu, illustrating comparative body lengths (Original vectors by Chris Huh, some rights reserved [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)).



Scaled silhouettes of oceanic dolphins, porpoises and sirenians of Tamil Nadu, illustrating comparative body lengths
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III. DESCRIPTION OF THE MARINE MAMMALS OF TAMIL NADU

A) BALEEN WHALES

1. COMMON MINKE WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Balaenopteridae
Genus	: <i>Balaenoptera</i>
Species	: <i>B. acutorostrata</i> Lacépède, 1804

Common Tamil Name: மின்கே
திமிங்கலம்

Key Identification Features:

- The head is flattened with a narrow, pointed, triangular snout.
- The upper side is black, dark grey, or grey.
- The flippers are slender with a distinct white band.
- There are 30 to 70 throat grooves extending to the navel.
- The underside is white or pale grey.
- The dorsal fin is curved and pointed.
- The tail flukes are black on top and pale underneath with a definite median notch.

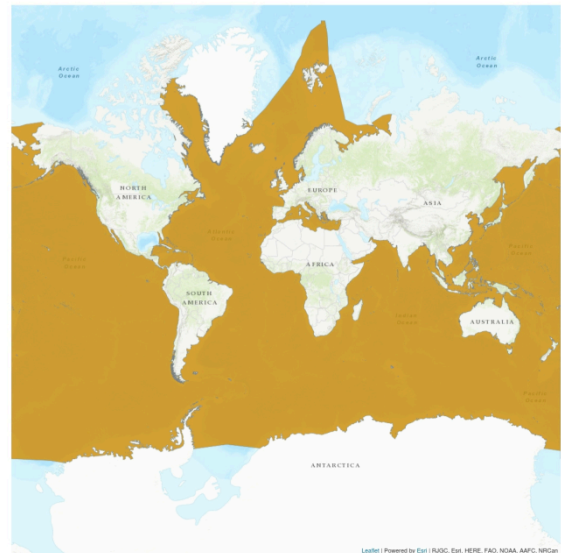
General Ecology:

Common minke whales, or northern minke whales (*Balaenoptera*

acutorostrata Lacépède, 1804), are rorqual whales, a family of baleen whales characterised by pleated throat grooves that expand during feeding.



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Global distribution range of Common Minke Whale (*Balaenoptera acutorostrata*). Source: IUCN Red List Assessment (2012).

It is the smallest of the rorquals and the second smallest baleen whale species. A distinct "dwarf" population also exists in the southern hemisphere. The average

common minke whale grows around 7-9 m. The dwarf minke whale is on average about 2 m shorter than the common minke whale. Common minke whales have a fragmented distribution, inhabiting both coastal and offshore waters, and they exploit a variety of prey species depending on availability in different areas. They are known to feed on anchovy, krill, squid, sand eels, and capelin, among others (Perrin *et al.*, 2018). All minke whales are preyed upon by killer whales and tend to flee at high speeds to evade them (Ford *et al.*, 2005). The seemingly dispersed distribution of minke whales outside the summer feeding season may be an adaptation to the predation pressure from killer whales (Ford & Reeves, 2008). Initially overlooked by whalers due to their small size and low oil yield, minke whales began to be hunted by various countries in the early 20th century. As other species declined, larger numbers of common minke whales were caught, primarily for their meat (Ole Øen, 2021). Today, they are one of the main targets of the whaling industry.

Distribution:

The common minke whale is a cosmopolitan species found in all oceans and nearly all latitudes, ranging from approximately 70°S to 80°N. It is present in the North Atlantic, the North Pacific, throughout the Southern Hemisphere, and in the northern Indian Ocean. At least some populations migrate to lower latitudes during winter, although there are no known areas of regular winter aggregation (Cooke, 2018), except at the northern Great Barrier Reef in Australia, where dwarf minke whales gather in winter (Mangott *et al.*, 2011). There has been considerable confusion in identifying

and confirming stranded minke whales, with many being misidentified as the similar-looking Bryde's whale (Brownell *et al.*, 2017). The species can be difficult to spot at sea unless conditions are fairly calm, but it is possible to detect its presence acoustically due to the confirmed identification of certain underwater sounds made by this species (Martin *et al.*, 2013). Nevertheless, there have been few records of minke whales in the northern Indian Ocean (Rao, 1991; MMRCNI) and Tamil Nadu (Kasinathan, 2000).

Global Threats:

- 1. Whaling and Hunting** - Commercial whaling remains a significant threat to common minke whales. In the northeastern Atlantic, intensive whaling from 1940 to 1983 reduced their population by about half. Although phased out in the late 1980s, whaling resumed at reduced levels in Norwegian waters in 1992 and Icelandic waters in 2002, initially under scientific permits (IWC, 2018a). In the North Pacific, whaling by vessels peaked in the mid-1970s and was phased out during the 1980s with the International Convention's moratorium on commercial whaling. However, it resumed in 1994 under a scientific permit issued by Japan. Since 2014, active whaling has been limited to coastal operations off Japan's Pacific coast. Catches have continued off the coasts of Japan and Korea, and possibly China (IWC, 2018b).
- 2. Fishing Gear Entanglement** - Outside of the western North Pacific region, reported entanglements of minke whales in fishing gear of various types (set nets, gillnets, trap

nets, trawls, and longlines) are few in relation to the apparent overall abundance of the species (Hayes *et al.*, 2019). Nonetheless entanglement in fishing gears have been reported in Canada (Perkins & Beamish, 1979), United States (Heyning & Lewis, 1990), Scotland (Northridge 2010), Italy, Portugal, France, Senegal, Canary Islands, Tunisia, and Brazil (Van Waerebeek *et al.*, 1999).

3. **Ship Strikes** - Ship strikes are another source of mortality for minke whales, although reports are few, as most incidents likely go undetected or unreported (Hayes *et al.*, 2019). Ship strikes have been documented off the east coast of the United States, in the Gulf of St. Lawrence, and off Italy (Laist *et al.*, 2001). In New South Wales, a dwarf minke whale calf stranded with one of its flukes cut by a propeller, which was likely the cause of its stranding and subsequent death (Van Waerebeek *et al.*, 2007).

2. BRYDE'S WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Balaenopteridae
Genus	: <i>Balaenoptera</i>
Species	: <i>B. edeni</i> Anderson, 1879

Key Identification Features:

- The body is a smoky grey colour.
- It has a slender, deeply curved dorsal fin.
- Three parallel ridges run from the paired blowhole to the tip of the snout.
- The whale has 40 to 70 throat grooves that extend all the way to the umbilicus.
- Its flippers are small, slender, and pointed.
- The underside of the whale is pale.
- The tail flukes are black on top and pale underneath.

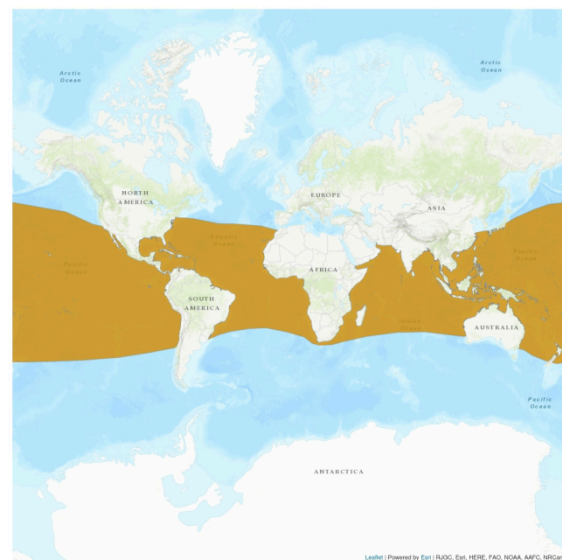
General Ecology:

Bryde's whales (*Balaenoptera edeni* Anderson, 1879) are a group of rorqual whales. They are also called the Bryde's whale complex due to the taxonomy of Bryde's whales remaining complex and debated. While historically considered a single species, current official classifications by the Society of Marine Mammalogy and International Whaling Commission recognise the scientific name *B. edeni*, with two subspecies: the larger, oceanic *B. e. brydei* and the smaller, coastal

B. e. edeni. Bryde's whales' ecology differs among the population.



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Global distribution range of Bryde's Whale (*Balaenoptera edeni*). Source: IUCN Red List Assessment (2017).

Bryde's whales are medium-sized, with the females generally larger than males throughout life, and are believed to reach a maximum of 15 m (Kato & Perrin, 2018). South African residents fed mainly on anchovy, pilchard, mackerel, krill, and lanternfish (Best, 1977) while the South Pacific and Indian Oceans fed solely on krill and anchovy (Kawamura, 1977; Ohsumi, 1977; Watanabe *et al.*, 2012). Bryde's whales caught in the Arabian Sea fed mainly on mackerel, and sardines (Mikhalev, 2000). The social structure of Bryde's whales is relatively straightforward,

Distribution:

In the Indian Ocean, they are found north of 35°S, including the Maldives (Anderson, 2005) and north-western regions, as evidenced by Soviet whaling records (Mikhalev, 2000). They are also found in colder waters off western South Africa and northward off Cameroon (Best, 2001). The smaller, coastal *B. e. edeni* is confirmed to be present in Oman and Bangladesh (Kershaw *et al.*, 2013). The holotype specimen originates from Myanmar's Gulf of Martaban (Anderson, 1879), with additional specimens from Bangladesh (Andrews, 1918) and Indonesia (Junge, 1950). There have been periodic sightings in the general vicinity of the Gulf of Mannar and Bay of Bengal (de Silva, 1987) and also been recorded instances of Bryde's whales stranding along the coasts of Tamil Nadu, specifically in Dhanushkodi (Lal Mohan, 1992), Palk Strait (Ramachandran, 2001), Point Calimere (Sathasivam, 2002), and Thoothukudi (Sudhan *et al.*, 2017).

Global Threats:

1. **Whaling** - Bryde's whales were not a primary target for commercial whalers until the 1970s, when other whale populations declined (NOAA Fisheries: Bryde's Whale). Whaling for Bryde's whales began in Japan in 1906, with over 20,000 caught in the western North Pacific between 1911 and 1987. They were hunted by Japanese, Soviet, and Taiwanese fleets, and in the Philippines from the 1940s to the 1980s. A mid-1990s assessment indicated a 49% population decline in the western North Pacific from 1911 to 1996. Norwegian factory ships caught 34 Bryde's whales off Baja California between 1924 and 1929 (Tønnessen & Johnson, 1982). Thousands were also hunted off Peru, Chile, South Africa, and Brazil, with

many incidentally caught during sei whale whaling (Cooke & Brownell, 2018). Between 1911 and 1987, more than 30,000 Bryde's whales were caught, including over 1,400 taken by Soviet whalers in the Southern Hemisphere between 1948 and 1973 - though only 19 of these were officially reported (Berzin, 2008). Bryde's whales inhabit the northern Indian Ocean (Arabian Sea and Bay of Bengal), but no population estimates exist. Over 1,000 were taken illegally by Soviet operations in the Arabian Sea during the 1960s (Mikhalev, 2000). Pelagic whaling in the North Pacific was suspended in 1980 following the International Whaling Commission ban but resumed under special permits from 2000 to 2016 (Allison, 2017).

2. **Ship Strikes** - Bryde's whales are vulnerable to vessel strikes, particularly in coastal areas with heavy traffic. They are the third most reported species struck by vessels in the southern hemisphere, but records of such incidents are generally rare and underreported across their range (NOAA Fisheries: Bryde's Whale). In the Hauraki Gulf off New Zealand, vessel strikes were frequently reported, averaging 0.9 whales per year between 1994 and 2014, posing a concern for the small local subpopulation (Constantine *et al.*, 2015). However, no collisions were reported in 2016-17, possibly due to successful voluntary measures to avoid such incidents. The small, isolated subpopulation in the northeastern Gulf of Mexico may be threatened by vessel traffic, commercial fishing, and oil and gas activities (Soldevilla *et al.*, 2017, Corkeron *et al.*, 2017).

3. BLUE WHALE

Taxonomy:

Domain : Eukaryota
Kingdom : Animalia
Phylum : Chordata
Class : Mammalia
Order : Artiodactyla
Infraorder : Cetacea
Family : Balaenopteridae
Genus : *Balaenoptera*
Species : *B. musculus*
Linnaeus, 1758

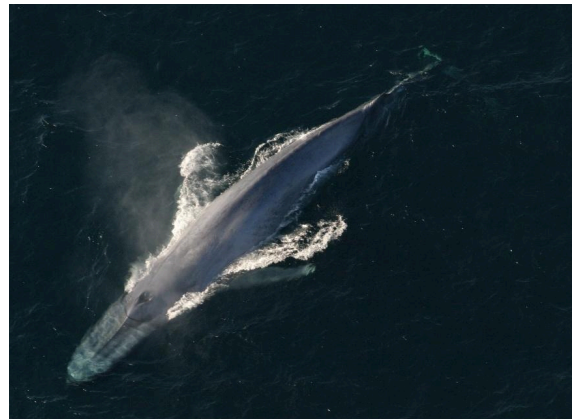
Common Tamil Name: நீலத்
திமிங்கலம்

Key Identification Features:

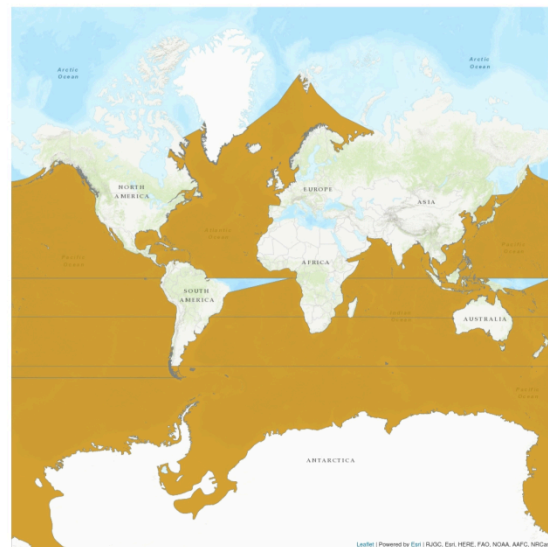
- They have mottled skin with a greyish-blue colouration.
- They possess a broad, flattened U-shaped head.
- A raised splash guard is present in front of their blowholes.
- Their throat grooves are dark-coloured and range from 60 to 88 in number.
- They have long, slender flippers with pointed tips.
- The dorsal fin of a blue whale is relatively small.
- Their tail stock is thick, with massive and slender tail flukes.

General Ecology:

Blue whales (*Balaenoptera musculus* Linnaeus, 1758) are rorqual whales, measuring 20-30 metres and weighing over 150 tonnes, making them the largest known animals in Earth's history. subspecies: *B. m. musculus*, *B. m. intermedia*, *B. m. breviceuda* (pygmy blue whale), and *B. m.*



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Global distribution range of Blue Whale (*Balaenoptera musculus*). Source: IUCN Red List Assessment (2012).

Typically solitary, occasionally form pairs or small groups. They undergo long migrations between summer polar feeding grounds and equatorial breeding waters in winter (NOAA Fisheries: Blue Whale). Whilst most blue whales feed exclusively on krill (Sears & Perrin, 2009), the northern Indian Ocean subspecies (*B. m. indica*) has a more varied diet, including sergestid shrimp, fish, cephalopods, and jellyfish (de Vos *et al.*, 2018). Killer whales *Orcinus orca* are their sole natural predators, though the frequency of successful attacks remains unknown (Sears, 1990). Blue whales are renowned for

producing some of the loudest and lowest-frequency vocalisations (Oliver, 2020), exhibiting distinct variations among different populations (McDonald *et al.*, 2006).

Distribution:

Blue whales have a cosmopolitan distribution across all major oceans (Branch *et al.*, 2007). The northern Indian Ocean subspecies (*B. m. indica*) is distinctive, remaining in tropical waters year-round, unlike other populations that undertake polar migrations (Andersen *et al.*, 2012).



Blue Whale (*Balaenoptera musculus*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

The Arabian Sea hosts a resident population, reproductively isolated due to unique monsoon-driven productivity patterns (Ballance & Pitman, 1998; Reeves *et al.*, 2013). Recent acoustic monitoring has documented blue whale vocalizations off the Lakshadweep islands (Panicker &

Stafford, 2021). Regular sightings occur off the southern coast, particularly around Dondra Head and Trincomalee (de Vos *et al.*, 2014), with significant populations inhabiting Maldivian waters during the northeast monsoon (Andersen *et al.*, 2012) and the coast of Oman (Cerchio *et al.*, 2020). In the Gulf of Mannar and Palk Bay regions (Vivekanandan & Jeyabaskaran, 2012; Afsal *et al.*, 2008), blue whale presence correlates with the seasonal upwelling during the northeast monsoon (Sutaria *et al.*, 2016). Most records comprise stranding and occasional sightings (Sathasivam, 2000). Systematic comprehensive studies on blue whales limited compared to Sri Lanka.

Global Threats:

- 1. Whaling** - Initially, blue whales were difficult to hunt due to their size and speed (Oliver, 2020). Regular hunting became feasible with deck-mounted harpoon cannons in the modern era (Darby, 2009). Modern hunting began in the North Atlantic in 1868, spreading to other areas after the local population was depleted (Tønnessen and Johnsen 1982). Peak catching occurred from the early 1900s to the late 1930s (Sears & Perrin, 2009). Whaling largely ceased in the 1960s-1970s, and blue whales have been legally protected since 1966 by the IWC (Allison, 2017); however, the Soviet Union continued illegal hunting into the 1970s (Ivashchenko *et al.*, 2011).
- 2. Ship Strikes** - The southern coast of Sri Lanka is one of the world's busiest shipping lanes (Priyadarshana *et al.*, 2016), and it also happens to be a blue whale calving ground. This area off southern Sri Lanka is particularly vulnerable to ship strikes, as evidenced

by direct observations and strandings showing blunt trauma (Ilangakoon, 2012; de Vos *et al.*, 2016). Injured whales have been observed to have impaired swimming abilities (IWC, 2018b). Between 2010-2012, at least 11 whales were struck by ships (Priyadarshana *et al.*, 2015), with two more in 2014 (Randage *et al.*, 2014). On the west coast of North America, nine whale deaths from 2007-2013 and eight out of 21 blue whale carcasses found off California from 1988-2007 were linked to ship strikes (Carretta *et al.*, 2017; Berman-Kowalewski *et al.*, 2010). These incidents indicate that ship strikes significantly contribute to blue whale mortality (Rockwood *et al.*, 2017).

3. **Incidental Bycatches** - Incidental bycatches of blue whales in fisheries are rare (Sears & Perrin, 2018). Very few cases have been reported, such as those in the northeastern Pacific in 2015 and another in the Gulf of Saint Lawrence in 2002 (NOAA, 2018). In cold waters, blue whales often bear marks or scars from ice contact, complicating the identification of scars from fishing gear (Cooke, 2018). In Sri Lanka, a blue whale was observed with a net entangled through its mouth, along its body, and wrapped around its tail (de Vos, 2015).
4. **Anthropogenic Noise** - Increasing anthropogenic noise from marine exploration (shipping/mining) affects blue whale behaviour. Studies show that blue whales alter their vocalizations during seismic surveys, calling more on exploration days (Di Iorio & Clark, 2010). Mid-frequency active sonar impacts their diving behaviour. In the Southern California Bight, whales reduced calling in the presence of sonar

(Melcón *et al.*, 2012). Deep or non-feeding whales were the most affected, while surface feeders were the least impacted. Sonar exposure led to disruptions like termination of feeding, changes in diving behaviour, and horizontal avoidance of the sound source (Southall *et al.*, 2019; Goldbogen *et al.*, 2013).

4. HUMPBACK WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Balaenopteridae
Genus	: <i>Megaptera</i>
Species	: <i>M. novaeangliae</i> Borowski, 1781

Common Tamil Name: கூன்முதுகு
திமிங்கலம்

Key Identification Features:

- Body is primarily black with varying white patches on flippers, belly, and tail flukes.
- Paired blowholes with a splashguard and tubercles on its snout and lower jaw.
- Has 14-24 throat grooves that extend slightly beyond the navel.
- Flippers are long, reaching up to 1/3rd of body length, with knobs on leading edges.
- The dorsal fin can be a small triangle or sharply hooked, creating the whale's signature humped shape.
- Broad, serrated tail flukes, with a median notch and unique black and white patterns specific to each individual.

General Ecology:

Humpback whales (*Megaptera novaeangliae* Borowski, 1781) are the sole species in the genus *Megaptera*, distinguished by their long pectoral fins and tubercles on its head. Records indicate that adults range about 16-17 metres although 14

to 15 metres is more typical, with females typically 1-1.5 metres longer than males (Clapham, 2018).



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Global distribution range of Humpback Whale (*Megaptera novaeangliae*). Source: IUCN Red List Assessment (2012).

These whales undertake extensive migrations up to 16,000 km annually, feeding in polar waters and breeding in tropical or subtropical regions (Mann, 2000). They are generalist feeders, primarily consuming krill and small fish (like herring, capelin and mackerel) using bubble-net feeding techniques (Clapham, 2018). Killer whales are their main natural predators, with the calves most targeted (Jefferson *et al.*, 1991; Mehta *et al.*, 2007). Their bodies commonly host barnacles and whale lice

Pacific (Humpback Whale Recovery Team, 1991) and over 200,000 in the Southern Hemisphere (Clapham & Baker, 2002) were recorded. The North Atlantic population plummeted to approximately 700 individuals, with the global population dropping to just 5,000 by 1966 (Baker *et al.*, 1994). The Soviet Union killed over 48,000 (Yablokov, 1997), with 25,000 taken in just two seasons (1959-61) (Mikhalev, 2000). The IWC banned commercial hunting in 1966, though limited indigenous hunting is allowed in Bequia (Humpback Whale Recovery Team, 1991) and Greenland (Huntington *et al.*, 2021).

- 2. Fishing Gear Entanglement** - Humpback whales face a critical threat from entanglement in fishing gear worldwide. Studies reveal significant mortality rates across different regions: the US West Coast experiences 16.7 deaths annually from entanglement, while the East Coast reports 7.2 such incidents (Carretta *et al.*, 2018; Hayes *et al.*, 2017). IWC reports from 2018 documented 78 entanglement cases in the USA, 46 in Australia, and numerous others globally (Hughes, 2018). In the Arabian Sea, 30-40% of photographed whales show entanglement scars, with their distribution overlapping fisheries (Minton *et al.*, 2011). Research in the Eastern North Atlantic indicates that at least 24.8% of humpback whales in Icelandic waters bear evidence of prior entanglement (Basran *et al.*, 2019). Most entanglements are likely to go undetected, making the true impact challenging to assess.
- 3. Ship Strikes** - Ship strikes represent another significant threat to humpback whales across multiple marine regions. Annual mortality data from US waters

show 2.1 deaths on the West Coast, 1.8 on the East Coast, and 4.4 in Alaska/Hawaii from vessel collisions (Muto *et al.*, 2017). International reports in 2018 documented 13 ship strike incidents in the USA, 5 in Australia, and 1 in Brazil (Hughes, 2018). While ship strikes are a known hazard for large whales, their impact varies by region, for instance in European waters the threat appears relatively minor, although documentation is limited.

- 4. Noise Pollution** - Underwater noise pollution presents a complex threat to humpback whales. Various human activities, including seismic surveys, pile driving, dredging, drilling, underwater explosions, and military sonar, can cause significant acoustic disturbance (Nowacek *et al.*, 2007; Weilgart 2007). Historical evidence suggests severe impacts: in the 19th century, two humpback whales were found dead near sub-bottom blasting sites, displaying traumatic ear injuries (Ketten *et al.*, 1993). Additionally, whale-watching activities, while providing economic and educational benefits, have the potential to cause short-term and potentially long-term disturbances to whale populations, though the specific impacts remain context-dependent (Scheidat *et al.*, 2004; Senigaglia *et al.*, 2016).
- 5. Marine Debris and Microplastics** - As filter feeders, humpback whales are particularly vulnerable to marine debris, especially microplastics. Research suggests that a humpback whale consuming 1.5% of its body weight in krill and zooplankton daily could ingest over 300,000 microplastic particles (Desforges *et al.*, 2015). Examination of a humpback whale stranded in the

Netherlands revealed the presence of microplastics in its intestines tracts (Besseling *et al.*, 2015).

B) BEAKED WHALE

5. CUVIER'S BEAKED WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Ziphiidae
Genus	: <i>Ziphius</i>
Species	: <i>Z. cavirostris</i> G. Cuvier, 1823

Key Identification Features:

- Body colouration ranges from dark grey to reddish brown, with a lighter underside.
- Most individuals display visible scarring, likely from intraspecific interactions.
- The head is predominantly white, particularly in older males, with a blunt, stubby beak.
- Adult males possess a distinctive pair of large, forward-pointing tusk-like teeth.
- A slightly upturned jawline creates a characteristic 'smiling' appearance.
- Flippers are small and rounded, with edges curving to meet the body.
- A small, curved triangular dorsal fin is positioned approximately 2/3rd down the back.
- Large, well-defined tail flukes are rounded at the tips, with or without a median notch.

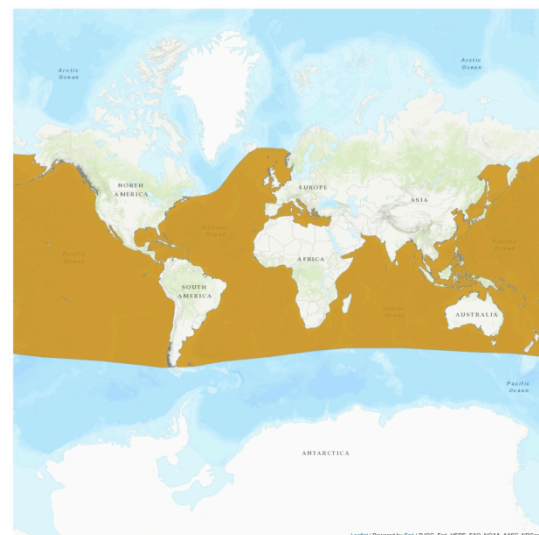
General Ecology:

Cuvier's beaked whales (*Ziphius cavirostris* G. Cuvier, 1823), also called the

goose-beaked whale, are the most widely distributed beaked whale.



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Global distribution range of Cuvier's Beaked Whale (*Ziphius cavirostris*). Source: IUCN Red List Assessment (2012).

They are a pelagic species inhabiting deep offshore waters beyond 300 meters. There is no significant difference in total length between sexes, with an average adult size of 6-6.5 m (Heyning & Mead, 2009). Resembling a stocky bottlenose dolphin, these cetaceans are renowned for executing extraordinary deep dives, with recorded depths of 2,992 m and durations of up to 222 minutes (Schorr *et al.*, 2014; Quick *et*

1. Underwater Noise Threats - Military sonars and high-energy anthropogenic sounds significantly threaten Cuvier's beaked whales worldwide. Numerous atypical mass strandings have been directly linked to naval sonar and seismic exploration activities (Frantzis, 1998; Jepson *et al.*, 2003; Fernández *et al.*, 2005; Podestà *et al.*, 2006). These acoustic disturbances can cause chronic and acute tissue damage, potentially resulting from decompression sickness due to gas bubble formation (Jepson *et al.*, 2003). Particularly vulnerable regions include the Mediterranean,

Canary Islands, and the Bahamas, where naval exercises have precipitated multiple stranding events. Geophysical surveys using airguns for oil and gas exploration further compound this acoustic threat, especially in deep-water habitats (Podestà *et al.*, 2016, Cañadas & Notarbartolo, 2018).

2. Bycatch and Fisheries Interactions -

Although not a primary target of commercial whaling, Cuvier's beaked whales have experienced incidental captures in various fisheries. Documented bycatch includes the California/Oregon drift gillnet fishery, which reported 22-44 mortalities annually between 1992-1995 (Julian & Beeson, 1998). Mediterranean fisheries, particularly swordfish and driftnet operations, have also reported occasional entanglements (Notarbartolo di Sciara, 1990). While the introduction of pingers in some fisheries has reduced bycatch (Carretta *et al.*, 2008), the species remains vulnerable to accidental entanglement, particularly in regions with intensive maritime activities.

3. Marine Debris and Contaminants -

Cuvier's beaked whales are increasingly susceptible to marine debris ingestion, particularly plastic pollution. Their suction-feeding technique makes them prone to accidentally consuming marine litter (Simmonds, 2012), which can obstruct their digestive tracts. Stranded individuals in Croatia, Italy, and the French Atlantic coast have had significant quantities of plastic in their stomachs (Holcer *et al.*, 2007; Podestà & Meotti, 1991; Poncelet *et al.*, 2000). In addition to that, chemical contaminants pose potential risks, with studies detecting elevated levels of mercury, selenium, and cadmium in the Mediterranean populations (Capelli *et al.*, 2008). Climate change can also exacerbate these threats by altering marine ecosystems and potentially expanding the species' range into areas with increased anthropogenic pressures (Van der Kooij *et al.*, 2016).

C) TOOTHED WHALES

6. PYGMY SPERM WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Kogiidae
Genus	: <i>Kogia</i>
Species	: <i>K. breviceps</i> Blainville, 1838

Key Identification Features:

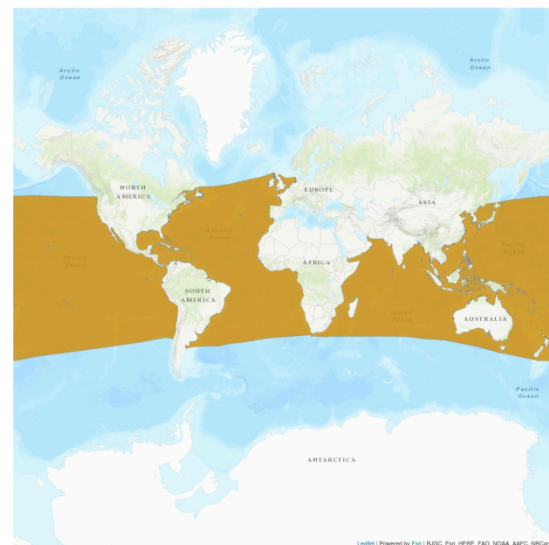
- Steely bluish-grey dorsal coloration gently fading to pale grey on the ventral surface.
- Distinctive white to pale grey patch between eye and flipper, like a fish's gill cover.
- Conical head with a small, characteristically underslung lower jaw.
- Single blowhole slightly offset to the left.
- Short, broad flippers positioned unusually far forward on the body.
- Tiny, hook-shaped dorsal fin located towards the posterior of the mid-back region.
- Large flukes with slightly rounded tips and a pronounced median notch.

General Ecology:

Pygmy sperm whales (*Kogia breviceps* Blainville, 1838) are distinctive cetaceans belonging to the family Kogiidae, characterised by a porpoise-like body and a shark-like appearance with an underslung lower jaw.



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Global distribution range of Pygmy Sperm Whale (*Kogia breviceps*). Source: IUCN Red List Assessment (2012).

Reaching a maximum size of 4 m approximately and weighing around 500 kg, these marine mammals are highly specialised deep-sea predators (McAlpine, 2018). They predominantly feed on mid and deepwater cephalopods, supplemented by fish and mesopelagic crustaceans, hunting at depths up to 1,200 meters using sophisticated echolocation techniques (West *et al.*, 2009; McAlpine, 2014). Their feeding strategy involves water column and bottom-dwelling prey capture, with their unique hyoid anatomy suggesting powerful suction-feeding capabilities. They are

relatively solitary, typically forming small groups of 1-3 individuals, potentially influenced by food density, prey availability, and predator avoidance (Dunphy-Daly *et al.*, 2008; McAlpine, 2018). Known for their timid nature, they spend considerable time motionless at the water's surface and exhibit minimal aerial behaviour (Scott *et al.*, 2001; Baird, 2016). Unlike larger sperm whales, their spermaceti organ is primarily used for sound production and echolocation rather than buoyancy control (McAlpine, 2018).

Distribution:

Pygmy sperm whales inhabit deep oceanic waters across temperate and tropical regions of the Atlantic, Indian, and Pacific Oceans, ranging approximately from 50°S to 50-60°N (Jefferson *et al.*, 2011; McAlpine, 2018). Their distribution includes New Zealand, Tasmania, South Africa, Canada, the United Kingdom, and Japan, with a preference for shelf breaks and insular slope waters. While rarely recorded in shallow seas or specific regions, the species' range remains poorly understood due to their inconspicuous behaviour (Notarbartolo di Sciara *et al.*, 2017; Plön, 2004). Stranding records suggest localised abundance in areas such as South Africa and the southeastern United States (Hodge *et al.*, 2018). In the North Atlantic, their distribution extends from tropical waters to the UK and Ireland, with documented strandings in Scotland, Ireland, the Netherlands, France, Spain, Portugal, and various Atlantic archipelagos (Berrow & Rogan, 1997; Evans, 2019). Indian waters have historical records of pygmy sperm whales (Sathasivam, 2000), with occasional stranding (Nair, 2020).

Global Threats:

- 1. Fisheries Interactions** - Pygmy sperm whales face significant anthropogenic risks from maritime activities. Bycatch in pelagic driftnet and longline fisheries has been observed, with generally low but potentially underreported levels (McAlpine, 2018). In the Canary Islands, a study of 28 stranded pygmy sperm whales revealed that four deaths were attributed to fisheries interactions, while ten were caused by ship strikes (de Canarias, 2018). The species' habit of lying quietly at the surface may contribute to their vulnerability to vessel collisions, making them particularly susceptible to accidental encounters with maritime traffic. Historically, small numbers of pygmy sperm whales have been taken in coastal whaling operations in regions including Japan and Indonesia (Jefferson *et al.*, 1993). Incidental drift gillnet fisheries capture have also been documented in various locations. Notably, unusual stranding events in Taiwan in 2005 highlighted the species' vulnerability, though the precise causes remained undetermined (Wang & Yang, 2006; Yang *et al.*, 2008).
- 2. Underwater Noise** - Underwater noise pollution poses a significant threat to pygmy sperm whales, with various human activities generating potentially harmful acoustic disturbances. These sound-sensitive cetaceans rely heavily on acoustic communication and echolocation, making them particularly vulnerable to acoustic interference impacting navigation, foraging, and social interactions (Nowacek *et al.*, 2007; Williams *et al.*, 2020). Military sonar, seismic surveys, pile driving, and

other industrial, maritime operations can produce intense underwater sound sources that may disrupt these marine mammals' critical ecological behaviours (Clark *et al.*, 2009). Military sonar has been specifically identified as a potential cause of stranding events for pygmy sperm whales (Parsons *et al.*, 2008), but not all studies have found conclusive evidence of physiological damage.

3. **Chemical Contaminants and Marine Debris** - Chemical contamination and marine debris pose significant challenges for pygmy sperm whales. Limited research suggests that oxidative stress related to mercury and selenium balance may promote cardiomyopathy, potentially leading to strandings (Bryan *et al.*, 2012). Marine debris ingestion is a growing concern, with studies documenting plastic fragments in their digestive tracts (Fernandez *et al.*, 2009; Nelms *et al.*, 2019). In one notable case, a juvenile female's health dramatically improved after plastic removal, indicating a potential direct link between debris ingestion and physiological stress (Stamper *et al.*, 2006).

7. DWARF SPERM WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Kogiidae
Genus	: <i>Kogia</i>
Species	: <i>K. sima</i> Owen, 1866

Key Identification Features:

- Skin colour varies from bluish grey, dark grey, and blackish brown.
- Dark dorsal side merges into lighter flanks and ventral side.
- Dark, gill-shaped coloration present behind each eye.
- Head is square, with a conical, pointed snout and a small, under-slung jaw.
- Stocky body that is somewhat flat with a single blowhole located slightly to the left.
- Prominent and hooked dorsal fin located near the middle of their back.
- Flukes are well developed, slightly rounded at the tips, with a definite median notch.

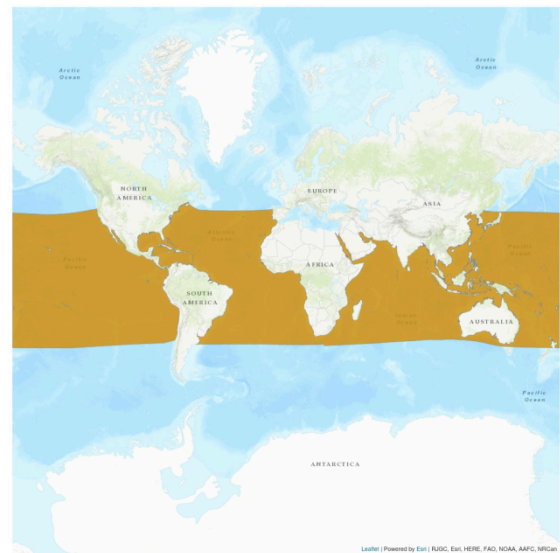
General Ecology:

Dwarf sperm whales (*Kogia sima* Owen, 1866), formerly considered synonymous with the pygmy sperm whale until 1998, are one of two extant species in the family of Kogiidae. These small cetacean measures 2 to 2.7 m in length and weighs between 136 to 272 kg, distinguished from its cousin primarily by dorsal fin

positioning (Rudolph & Smeenk, 2009, 2008; McAlpine, 2018).



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Global distribution range of Dwarf Sperm Whale (*Kogia sima*). Source: IUCN Red List Assessment (2012).

The species typically forms small pods of 1 to 4 individuals, occasionally up to ten, with group size possibly limited by food resource availability (Plön, 2004). A slow-moving species, it often floats at the surface with only its nape and dorsal fin exposed and can release a cloud of red-brown fluid when startled (Willis & Baird, 1998). As a suction feeder, it primarily preys on squid, using echolocation through narrowband high-frequency clicks rather than whistles to locate prey (Merkens *et al.*, 2018).

Distribution:

In the Atlantic, they range from Virginia to southern Brazil in the west and from the

Global Threats:

- 1. Fisheries and Hunting** - Dwarf sperm whales face threats from both accidental and deliberate capture in various fishing operations. Bycatch occurs in pelagic driftnet and longline fisheries, particularly in the northern Indian Ocean and northeastern Atlantic (Jefferson *et al.*, 1993; Arbelo *et al.*, 2013). Their habit of lying quietly at the surface may increase their vulnerability to ship strikes (McAlpine, 2018). Small-scale opportunistic hunting has been documented off the coasts of Japan, Indonesia, Taiwan, the Lesser Antilles, and Sri Lanka, although the impact is considered minimal (Jefferson *et al.*, 1993).
- 2. Acoustic Disturbance** - Underwater noise pollution significantly threatens dwarf sperm whales. Sources include seismic surveys, pile driving, dredging, drilling, underwater explosions, and military sonars (Nowacek *et al.*, 2007;

Weilgart, 2007; Clark *et al.*, 2009; Williams *et al.*, 2020). Military sonar has been specifically linked to stranding events (Parsons *et al.*, 2008). A notable incident occurred in Taiwan in 2005, where 13 dwarf sperm whales were stranded over three weeks, though the cause remains uncertain (Yang *et al.*, 2008).

3. **Environmental Factors** - Threats include exposure to harmful algal blooms, with domoic acid implicated in dwarf sperm whale mortality in the southeastern United States (Fire *et al.*, 2009). Climate change may also impact cetaceans by altering prey abundance and distribution patterns (MacLeod *et al.*, 2005; Gambaiani *et al.*, 2009; Salvadeo *et al.*, 2010; Cañadas & Vázquez, 2017). However, these effects vary among species and populations (MacLeod, 2009; Sousa *et al.*, 2019), and specific impacts on dwarf sperm whales remain unknown.

8. SPERM WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Physeteridae
Genus	: <i>Physeter</i>
Species	: <i>P. macrocephalus</i> Linnaeus, 1758

Common Tamil Name: எண்ணெய்
திமிங்கலம்

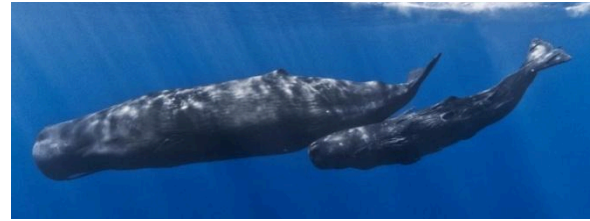
Key Identification Features:

- The body is dark grey or brownish in colour, wrinkled skin covering its entire body.
- It features an enormous, square-shaped head that accounts for 1/3rd of its body length.
- A single blowhole is located at the front of the head, slightly offset to the left.
- The lower jaw is narrow and underslung.
- The whale's flippers are small, and paddle shaped.
- Its dorsal fin is a low hump, followed by a series of visible 'knuckles' or fleshy knobs.
- The tail fluke is triangular-shaped and dark, with a ragged trailing edge.

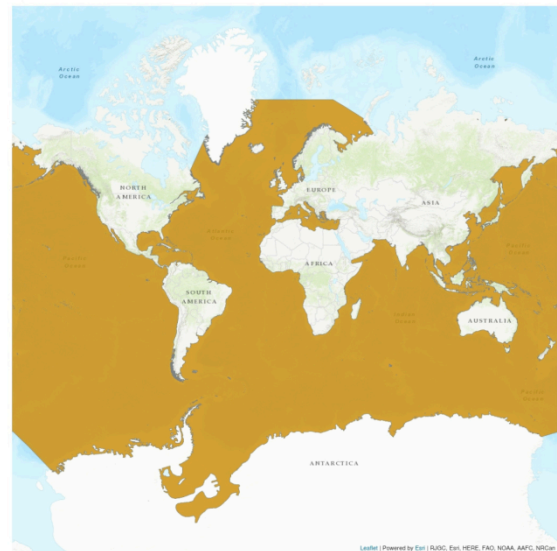
General Ecology:

Sperm whales (*Physeter macrocephalus* Linnaeus, 1758) are the largest toothed whales and predators. They are the sole living member of the genus *Physeter* and belong to the sperm whale family, which

includes the pygmy and dwarf sperm whales



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Global distribution range of Sperm Whale (*Physeter macrocephalus*). Source: IUCN Red List Assessment (2019).

of the genus *Kogia*. Mature males average 16 metres in length, with their heads comprising up-to third of their body length. These pelagic mammals have a global range and migrate seasonally for feeding and breeding. Females and young males form social groups, while mature males typically lead solitary lives outside the mating season (Whitehead, 2018). They are the third deepest diving mammals, reaching depths of 300 to 800 metres and occasionally even 1 to 2 kilometres, in search of food. Their diet primarily consists of medium-sized squid but also includes giant and colossal squid, octopus, and fish like demersal rays and sharks (Whitehead,

[illegible]

Sperm Whale (*Physeter macrocephalus*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

Global Threats:

- 1. Whaling** - Commercial whaling devastated sperm whale populations globally, reducing numbers from an estimated 1,100,000 to approximately 33% of pre-whaling levels (Whitehead & Shin, 2022). Between 1800 and 1980, roughly 1,000,000 sperm whales were killed, with particularly intense hunting periods in the 1840s and 1960s. The hunting focused intensively on specific sexes, potentially causing long-term social disruption. Removals of large males may have significantly impacted pregnancy rates while losing older females could have compromised social cohesion and ecological knowledge transmission (Best, 1979; Whitehead *et al.*, 1997). growth rates are merely 1% annually recovery

remains slow (Perrin *et al.*, 2009). Following the IWC's moratorium on commercial whaling in 1986, there has been very little whaling for sperm whales (an average of 12 whales per year) (Whitehead & Shin, 2022).

2. Fisheries and Marine Debris Interactions

- While their wide distribution buffers them from direct fisheries competition, interactions remain a considerable conservation concern. The Mediterranean Sea has been especially problematic, with persistent illegal driftnet fishing continuing despite official bans (Notarbartolo di Sciara, 2014). Marine debris, predominantly plastic, presents another critical challenge. Stranded sperm whales frequently exhibit digestive tract contamination, with plastic ingestion potentially causing fatal blockages, inflammatory changes, and pathogen transmission (Mazzariol *et al.*, 2018; IWC, 2020).

3. Anthropogenic Pressures

- Underwater noise from seismic surveys, naval operations, and industrial activities increasingly threatens sperm whale habitats. These acoustic disturbances can elicit behavioural and physiological changes, potentially affecting individual energy budgets and population dynamics (Nowacek *et al.*, 2007; Pirotta *et al.*, 2018). Chemical contamination further compounds these challenges, with sperm whale tissues showing high levels of xenobiotic compounds and trace metals. Mediterranean populations exhibit particularly elevated arsenic and aluminium concentrations (Savery *et al.*, 2014; Squadrone *et al.*, 2015). Ship strikes, especially in high-traffic areas like the Mediterranean and Canary

Islands, represent an additional anthropogenic threat, with an estimated two fatal collisions annually (Fais *et al.*, 2016).

4. Ecosystem Vulnerability

- Sperm whales play a crucial role in marine ecosystem dynamics, particularly in carbon sequestration. Their iron-rich faeces stimulate phytoplankton growth in the Southern Ocean, potentially removing approximately 2 million tonnes of atmospheric carbon annually (Whitehead & Shin, 2022). With their slow population growth rate and specialized deep-sea feeding strategies, sperm whales may be vulnerable to environmental changes affecting deep-water squid populations. Some populations show modest recovery in relatively undisturbed areas while others continue to decline under intense anthropogenic pressures (Perrin *et al.*, 2009).

D) OCEANIC DOLPHINS

9. COMMON DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Delphinus</i>
Species	: <i>D. delphis</i> Linnaeus, 1758

Common Tamil Name: ஓங்கில்

Key Identification Features:

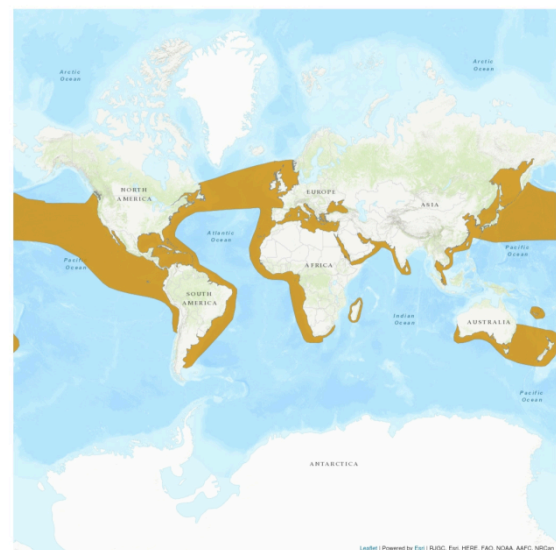
- Dark grey dorsal cape that extends over the head.
- Distinct crease between forehead and long slender beak with a dark patch around eye.
- Unique criss-cross/hourglass pattern on flank with yellow/beige patch at the front and light grey at the back separated by a dark dip in the dark grey dorsal cape.
- Tall, slightly curved dorsal fin with a pointed tip.
- Dark grey or black coloured curved flippers.
- Pale grey patch extending to tail stock.
- Flukes have pointed tips with a distinct median notch.

General Ecology:

Common dolphins (*Delphinus delphis* Linnaeus, 1758) are one of the most abundant cetaceans in the world.



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Global distribution range of Common Dolphin (*Delphinus delphis*). Source: IUCN Red List Assessment (2021).

Based on morphological differences they were earlier classified as two distinct species - short-beaked (*D. delphis*) and long-beaked (*D. capensis*) - but now common dolphins are now recognized as a more complex taxonomic group. Genetic research suggests long-beaked populations often derive from short-beaked ancestors, rendering them ecotypes rather than separate species (Heyning & Perrin, 1994; Best, 2007; Perrin, 2018). Currently, four subspecies are acknowledged: *D. d. delphis* (nominate subspecies), *D. d. bairdii* (Eastern North Pacific long-beaked

1. Incidental Bycatch - Common dolphins face significant threats from incidental capture in fishing gear worldwide. In the Eastern Tropical Pacific, annual mortality in tuna purse-seine fisheries was estimated at 24,000 in 1986, though this declined to 127 by 2016 following regulatory interventions (Scott *et al.*, 2018). In the western Atlantic, the average annual

fishery-related mortality was approximately 419 individuals between and (Hayes *et al.*, 2020). The Mediterranean and European North Atlantic regions are problematic, estimates suggesting between 5,000 and 10,000 common dolphins bycaught annually (Peltier *et al.*, 2021). Various fishing methods contribute to this mortality, including pelagic trawls, bottom trawls, purse seines, gill nets, and long-line fisheries (Marçalo *et al.*, 2018; Murphy *et al.*, 2021).

2. **Direct Hunting** - Historically, common dolphins have been extensively hunted. In the Black Sea, before the mid-1950s, they comprised 95% of cetaceans killed, with an estimated 1.5 million landed between 1931 and 1961 in the USSR and Bulgaria (Zemsky, 1996). Japan dolphin hunt in the early 1970s killed over 8,000 individuals annually, peaking at 9,032 in 1973 (Kasuya, 2017). Directed takes for human consumption and shark bait continue in some areas like Peru (Mintzer *et al.*, 2018). In the Mediterranean, culling campaigns had a significant mortality until the 1970s, likely contributing to population and fragmentation through government-supported bounty systems across several countries (Bearzi *et al.*, 2004, 2021).

3. **Chemical Pollution and Reproductive Impacts** - Chemical pollutants, particularly polychlorinated biphenyls (PCBs), threaten common dolphins substantially. In the Northeast Atlantic, many necropsied dolphins exhibited PCB concentrations exceeding toxicological thresholds (Murphy *et al.*, 2018). These high pollutant levels correlate with reproductive challenges, including reduced pregnancy rates and longer calving intervals. Studies have demonstrated that PCB and Polybrominated Diphenyl Ether (PBDE) concentrations in blubber negatively impact reproductive success, with potential long-term population implications (Pierce *et al.*, 2008; Murphy *et al.*, 2018).
4. **Marine Debris and Acoustic Disturbance** - Common dolphins face emerging threats from marine debris and noise pollution. Microplastics have been found in nearly all examined dolphins, with studies reporting up to 12 items per stomach (Hernandez-Gonzalez *et al.*, 2018; Nelms *et al.*, 2019). Acoustic disturbances from military sonar, naval exercises, and other activities can cause significant stress and potential mass strandings, as evidenced by a 2008 incident in the UK involving 26 common dolphins (Jepson *et al.*, 2013).

10. PYGMY KILLER WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Feresa</i>
Species	: <i>F. attenuata</i> Gray, 1874

Key Identification Features:

- Body exhibits a dark grey to black coloration, contrasting with the lighter grey sides.
- Sharp transition from the dark body to the lighter grey on the sides.
- Flesh around the lips and the tip of the snout is distinctly white.
- The dorsal fin is large and prominent.
- The flippers have slightly rounded tips.
- Underside is white or light grey, creating a contrast with the darker upper body.

General Ecology:

Pygmy killer whales (*Feresa attenuata* Gray, 1874) are a rarely seen oceanic dolphin species, with their resemblance to killer whales giving them their common name. They inhabit deep, warm waters, typically beyond the continental shelf, and are mainly found in tropical regions. They also occasionally stray into warm temperate areas. measures 2-2.5 m, withbetween the

sexes having not been observed (Donahue & Perryman, 2009; Baird *et al.*, 2011). These dolphins are often confused with melon-headed and false killer whales due to their small size and similar appearance (Baird, 2010).



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Global distribution range of Pygmy Killer Whale (*Feresa attenuata*). Source: IUCN Red List Assessment (2008).

Unlike melon-headed whales, pygmy killer whales do not usually lift their full face above the water when surfacing, making identification challenging (Allport *et al.*, 2017). They travel and rarely bow ride (Baird, 2010). Pygmy killer whales use echolocation, ranging from 32-100 kHz, to

Distribution:

[illegible]

They have been observed in the South American coast along the Atlantic from South Carolina to Senegal, including the Gulf of Mexico (Castro, 2004). The species is generally absent from the Mediterranean, Red Sea, and Persian Gulf (Notarbartolo di Sciara *et al.*, 2017; Jefferson *et al.*, 2011; Fisher *et al.*, 1999). With no historical presence, Sathasivam (2000) that inhabit the Indian coast. This assumption was confirmed in 2009 with the first documented sighting in Kochi, Kerala (Jeyabaskaran *et al.*, 2011), followed by the successful rescue of a live stranding in Ramanathapuram in 2024 (MMRCNI).

1. Fisheries Interactions - Pygmy killer whales have been caught in small numbers in harpoon, drive, or driftnet fisheries across the Caribbean, Sri Lanka, Taiwan, Japan, and Indonesia (Ross & Leatherwood, 1994; Perrin *et al.*, 2005; Baird, 2018). In Sri Lanka, they are sometimes harpooned as bait in longline fisheries targeting sharks and other oceanic fish. Although they comprise less than 2% of cetaceans bycaught in Sri Lankan gillnet fisheries, this could equate to 300–900 individuals annually (Ross & Leatherwood, 1994). In the U.S. Pacific, Gulf of Mexico, and U.S. Atlantic waters, fishery-related mortality and serious injury to pygmy killer whales are considered insignificant and approaching zero (Carretta *et al.*, 2017; Waring *et al.*, 2013). However, incidental catches occur in regions with poor monitoring.

such as the Philippines, Taiwan, and Ghana (Ross & Leatherwood, 1994; Dolar, 1994; Perrin *et al.*, 2005; Debrah *et al.*, 2010). Despite the relatively low number of documented kills, the lack of comprehensive monitoring in many areas poses a significant threat in regions where pygmy killer whales' distribution overlaps with extensive gillnetting operations; even small takes could have a substantial long-term impact on local populations (Ross & Leatherwood, 1994).

2. **Anthropogenic Noise** - Pygmy killer whales are particularly to loud anthropogenic sounds, such as military sonar and seismic surveys, similar to beaked and melon-headed whales (Cox *et al.*, 2005; Southall *et al.*, 2013, 2016). Mass strandings have been notably frequent in Taiwan, where 25% of such events since 1995 have occurred along a small section of the southwest coastline. Between 1995 and 2005, three additional near-mass stranding events were documented in the region. The most plausible cause for these strandings is anthropogenic sound (Brownell *et al.*, 2009; Wang & Yang, 2006).

11. SHORT-FINNED PILOT WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Globicephala</i>
Species	: <i>G. macrorhynchus</i> Gray, 1846

Common Tamil Name: குறுந்துடுப்பு
வலவம் திமிங்கிலம்

Key Identification Features:

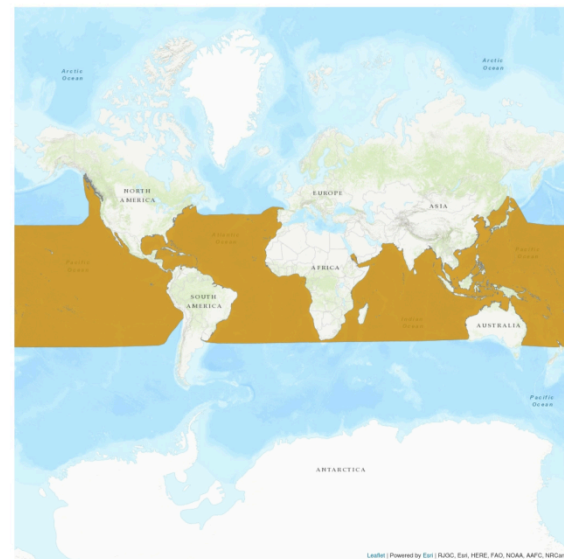
- Black to dark grey/brown body colour.
- Bulbous head that is more pronounced in males.
- Narrow underslung lower jaw with an upwards curved mouth.
- Broad based dorsal fin that is strongly curved and has a rounded tip.
- Pale grey saddle patch that extends in a tripe towards the eye.
- Flippers are short (about 1/6th of the body length) and sickle-shaped.
- W-shaped grey or whitish patch on chest between flippers.
- Thick tail stock with flukes having pointed tips and a distinct median notch.

General Ecology:

Short-finned pilot whales (*Globicephala macrorhynchus* Gray, 1846) represent one of two species in the genus *Globicephala*, alongside the Long-Finned Pilot Whale (*G. melas*). It has a worldwide distribution with distinct populations in the Pacific, Atlantic and Indian Oceans.



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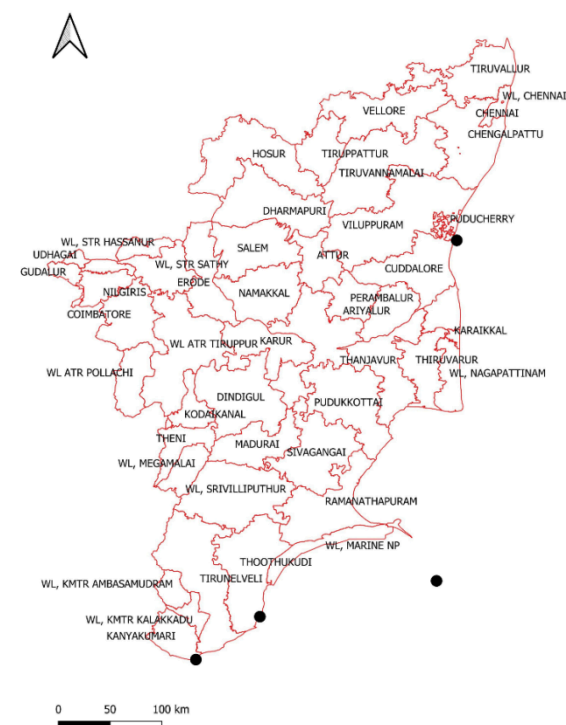
Global distribution range of Short-finned Pilot Whale (*Globicephala macrorhynchus*). Source: IUCN Red List Assessment (2012).

Adult pilot whales reach an average length of about 6 m, with males being larger than females (Olson, 2009). Short-finned pilot whales are long-lived, slow to reproduce, and highly social animals. They are usually found in pods of 10 to 30 individuals, though groups of up to several hundred have been reported (Téllez *et al.*, 2014). are deep-diving predators (Alves *et al.*, 2018) predominantly foraging along continental shelf breaks (Thorne *et al.*, 2017), with a diet primarily composed of squid, supplemented by fish and octopus and rarely other marine mammals (Mintzer *et al.*, 2008; Norris *et al.*, 1994). Their

sophisticated hunting strategy involves echolocation, using complex clicking techniques to locate and pursue prey. They generate rapid click "buzzes" during high-speed diving attacks, enabling precise underwater hunting (Pain, 2022).

Distribution:

Short-finned pilot whales inhabit warm temperate to tropical waters, predominantly in deep offshore areas, typically between 50°N and 40°S (Olson, 2009). Their distribution in the Atlantic Ocean extends from Brazil to New Jersey in the west and South Africa to France in the east (Heimlich-Boran, 1993; Ridgeway & Harrison, 1981).



Short-finned Pilot Whale (*Globicephala macrorhynchus*) along Tamil Nadu (black dots).
Data source: Sighting and Strandings Database,
Marine Mammals Research & Conservation
Network of India (2025).

They exhibit partial distributional overlap with long-finned pilot whales, particularly

in the North Atlantic and Macaronesia regions (Hayes *et al.*, 2017; Olson, 2009). The species is rare in regions like the East China Sea and Japan, with only one confirmed Mediterranean record (Kasuya, 2017; Notarbartolo di Sciara, 2016). Records suggest they are abundant in the deep water of the northern Indian Ocean (Minton *et al.*, 2018), with three notable mass strandings along the Indian coastline. In 1852, a significant stranding was recorded near Salt Lake, Kolkata (Jerdan, 1984), followed by two separate events near Manapad, Thoothukudi - first in 1973 (Alagarswami *et al.*, 1973) and subsequently in 2016 (Joseph & Kumar, 2016).

Global Threats:

1. **Direct Hunting** - short-finned pilot whales have been extensively hunted across regions. In the western North Pacific, particularly in Japan, annual catches have ranged from 100 to 500 whales between 1972 and 2009, using diverse methods, including drive hunts, harpooning, and small-type whaling (Kasuya, 2017, 2018). In the Caribbean, islands like St. Vincent and the Grenadines have an average of 141 pilot whales have been annually from 1962 to 2009 (Fielding, 2013). Similar hunting practices have been documented in other regions, including Indonesia and the Philippines, where directed hunting of marine mammals was reported until legal restrictions were implemented in 1992 (Mustika, 2006; Dolar *et al.*, 1994). Some regions have seen a decline in hunting due to legal interventions, changing cultural practices, and reduced whale availability.

2. Entanglements and Bycatches -

Short-finned pilot whales face significant threats from fisheries interactions globally. They are likely killed in moderate numbers through longline and drift gillnet fisheries across their range. In the United States, the estimated annual fishery-related serious injury and mortality on the east coast was 233 individuals (Hayes *et al.*, 2017). Around Fiji, they are known as major longline predators, and interactions have been documented in the western tropical Indian Ocean (Donoghue *et al.*, 2003; Romanov, 2002). The most common human-related cause of death in some regions includes entanglement and accidental captures, with additional threats from gunshots and spear wounds (Mignucci-Giannoni *et al.*, 1999).

3. Anthropogenic Noise -

Short-finned pilot whales are vulnerable to anthropogenic sounds from naval sonar, seismic surveys, and vessel traffic. Some mass-stranding events have been spatially and temporally associated with high levels of anthropogenic noise (Hohn *et al.*, 2006; Parsons, 2017). Studies in the Canary Islands have shown that vessel noise can significantly reduce communication ranges and induce stress, potentially impacting population fitness (Jensen *et al.*, 2009). Underwater noise from small vessels can mask communication and potentially affect animal behaviour and survival.

4. Chemical Contamination -

Moderate levels of contaminants, including mercury, polychlorinated biphenyls, and chlorinated pesticides, have been found in short-finned pilot whale blubber (Gaskin *et al.*, 1974; Simmonds *et al.*, 2002). In some regions like Japan and St. Vincent, contaminant levels in blubber and meat exceed recommended human consumption levels (Simmonds *et al.*, 2002; Fielding & Evans, 2014). Tissue element studies revealed high mercury and cadmium concentrations, with 54% of samples showing mercury levels above toxic thresholds for liver damage in marine mammals (Monteiro *et al.*, 2017).

12. RISSO'S DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Grampus</i>
Species	: <i>G. griseus</i> G. Cuvier, 1812

Common Tamil Name: கண்டா ஓங்கில்

Key Identification Features:

- Body coloration starts as grey or olive-brown and whitens with age due to scars and scratches.
- Very stocky body with a blunt head and no discernible beak.
- Light grey patches visible on ventral region.
- Flippers are long, pointed, and recurved.
- Tall, curved, sickle-shaped dorsal fin located mid-way down their back.
- Robust anterior body tapers into a narrow tailstock.
- Flukes are long and pointed with a definite median notch.

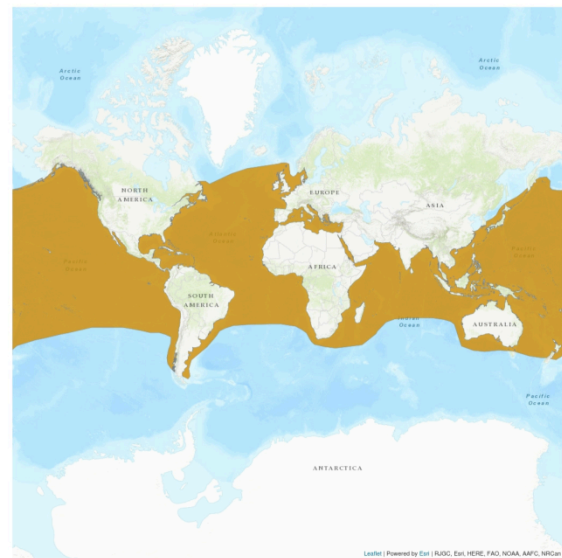
General Ecology:

Risso's dolphins (*Grampus griseus* G. Cuvier, 1812), the only species the *gGrampus*, are widely distributed in temperate and tropical waters globally, often found in oceanic and continental slope, typically at depths of 200 to 1,000 meters. They weigh around 300-500 kg and

measure around 3–4 m adults (Jefferson *et al.*, 2014; Hartman, 2018).



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Global distribution range of Risso's Dolphin (*Grampus griseus*). Source: IUCN Red List Assessment (2012).

They prefer habitats with steep continental slopes and topography, such as seamounts and escarpments, typically at depths of 400 to 1,000 metres and in waters ranging from 15–20°C, which support their primary diet of cephalopods including squid, cuttlefish, and octopus (Perrin *et al.*, 2009; Cockcroft *et al.*, 1993; Öztürk *et al.*, 2007). These dolphins are known to feed predominantly at night, taking advantage of the vertical migration of their prey (Soldevilla *et al.*, 2010; Hartman, 2018). Risso's dolphins are social animals, typically forming pods of 10-50 individuals, and are occasionally

Distribution:

Map of Tamil Nadu showing the location of the study area. The map displays the state's boundaries and major districts. A black dot indicates the location of the study area in the northern part of the state, near the border with Kerala. A scale bar at the bottom left shows distances of 0, 50, and 100 km. A north arrow is located at the top left.

Their range extends from continental shelves to oceanic regions beyond 2,000 meters depth, from Newfoundland and

Global Threats:

2. Incidental Bycatch - Bycatch represents a significant global threat to Risso's dolphins across multiple oceanic regions. Incidents have been documented in pelagic longline fisheries in the southwestern Indian

Ocean, the U.S. Atlantic coast, La Reunion, Tanzania, Ghana, the Azores, Peru, and the Solomon Islands (Garrison, 2007; Kiszka, 2015; Sabarros *et al.*, 2013; Bearzi *et al.*, 2011; Debrah *et al.*, 2010; Reeves *et al.*, 2013). While bycatch rates vary, they are particularly problematic in driftnets targeting tuna, billfish, and other large pelagic fish. In the Mediterranean, driftnets - despite being banned in some areas - appear to be associated with the highest Risso's dolphin mortalities (Bearzi *et al.*, 2011; Evans, 2013).

3. **Chemical Pollution and Contaminants** - Risso's dolphins accumulate substantial chemical contaminants, particularly in the Mediterranean region. Studies have revealed varying levels of organochlorine compounds, heavy metals, and trace elements in their tissues. High mercury concentrations have been found in dolphins stranded along the Adriatic, Ligurian, and Corsican coasts (Storelli *et al.*, 1999; Zucca *et al.*, 2005; Capelli *et al.*, 2008). Cadmium levels are notably elevated, likely due to their cephalopod-based diet, which naturally concentrates these metals (Storelli *et al.*, 1999; Law *et al.*, 2012). Additionally, halogenated flame retardants have been detected, though research remains limited (Barón *et al.*, 2015).

4. **Anthropogenic Noise** - Risso's dolphins are vulnerable to various anthropogenic disturbances, particularly underwater noise and vessel interactions. Like deep-diving beaked whales, they are susceptible to disruptions from military sonar, seismic surveys, and other loud sound sources (Cox *et al.*, 2005; Southall *et al.*, 2016). Whale-watching activities can substantially alter their behavioural patterns, potentially impacting social and resting interactions (Visser *et al.*, 2011). Underwater noise from pile driving, dredging, drilling, and underwater explosions pose additional threats (Nowacek *et al.*, 2007; Williams *et al.*, 2020). Gas embolism observations in stranded individuals further highlight the potential physiological impacts of acute noise exposure (Jepson *et al.*, 2005).

13. KILLER WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Orcinus</i>
Species	: <i>O. orca</i> Linnaeus, 1758

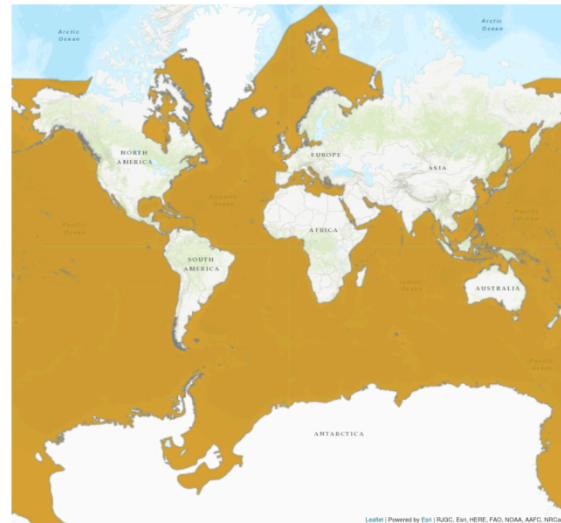
Common Tamil Name: கொலையாளி
திமிங்கலம்

Identification features:

- Body is predominantly jet black with a robust, streamlined form.
- Head is rounded, tapering to a pointed snout with distinctive white chin.
- Distinctive oval white patches (eye patches) positioned behind each eye.
- Large, paddle-shaped pectoral flippers.
- Sexual dimorphism in dorsal fins - adult males possess tall, triangular fins reaching up to 1.8 meters, while females and juveniles have shorter, more curved fins.
- Characteristic pale grey saddle patch behind dorsal fin.
- Striking white ventral patch extends along flanks, creating sharp demarcation with black colouration.
- Tail flukes show countershading: black dorsally, white to pale ventrally.



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Global distribution range of Killer Whale (*Orcinus orca*). Source: IUCN Red List Assessment (2013).

General Ecology:

Killer whales (*Orcinus orca* Linnaeus, 1758), or s, are the largest members of the oceanic dolphin family and the only extant apex predators, instantly recognisable by their distinctive black-and-white patterning, are found in diverse marine environments from the Arctic to Antarctic regions to tropical seas. They are large dolphins, attaining length of 9 m in males and 7 m in females with maximum weights of 4700-6600 kg in adults (Ford, 2009). Individual populations often specialise in particular prey types, with their diet encompassing marine mammals, seabirds, sea turtles, fish (including sharks and rays), and

cephalopods (Dahlheim & Heyning, 1999; Ford & Ellis, 1999). Their hunting strategies are remarkably diverse, from intentional beaching to capture pinnipeds to creating waves to wash seals off ice floes, often employing cooperative techniques to herd fish or attack large prey (Dahlheim & Heyning, 1999; Baird, 1998; Pitman & Durban, 2012). They are highly social animals, forming stable matrilineal family groups (pods) that transmit specific vocal behaviours and hunting techniques across generations (Heimlich & Boran, 2001). While their migration patterns remain poorly understood, long-distance movements have been documented in high-latitude populations (Matthews *et al.*, 2011; Durban & Pitman, 2012).

Distribution:

Killer whales are the most cosmopolitan of all cetaceans, potentially the second-most widely distributed mammal species after humans (Rice, 1998). Whilst found in all oceans and most seas, they prefer higher latitudes and coastal areas with high marine productivity (Carwardine, 2001; Dahlheim & Heyning, 1999). The highest densities occur in the northeast Atlantic around Norway, the north Pacific along the Aleutian Islands, and the Southern Ocean off Antarctica. Although present in tropical waters, their densities are 1-2 orders of magnitude lower than in polar regions (Forney *et al.*, 2006). They inhabit various marine environments, from surf zones to open seas, including semi-enclosed waters like the Mediterranean, Red Sea, and Persian Gulf (Reeves *et al.*, 2017). Killer whales have been documented along Indian coastlines, with historical records from Gujarat, Goa, Tamil Nadu, the Andaman and Nicobar Islands, and Lakshadweep (de Silva, 1987; Sathasivam, 2004),

complemented by recent sightings off Maharashtra (Chatterjee, 2019; 'Watch: Orcas spotted...', 2023), Karnataka ('Killer whales sighted...', 2024), and Goa (Monteiro, 2022).



Killer Whale (*Orcinus orca*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

Global Threats:

- Whaling and Hunting** - Killer whales faced significant commercial exploitation throughout the 20th century. Norwegian, Japanese, and Soviet whalers primarily hunted killer whales, with a dramatic peak of 916 whales killed in the 1979/80 Antarctic season (Dahlheim & Heyning, 1999). Historically, hunting occurred in European waters for commercial purposes and to protect fisheries' interests (Sigurjónsson & Leatherwood, 1988). Only East Greenland maintains an active hunt, with a significant

increase in takes between 2009 and 2017, recording at least 47 whales landed at Tasillaq (Lennert & Richard, 2017). For subsistence purposes, small-scale hunting continues in some regions, including Indonesia and Greenland (Reeves, 2002). Additionally, conflict with fisheries has led to intentional shootings, particularly in Alaska where depredation of longline fisheries is extensive (Jefferson *et al.*, 1993; Donoghue *et al.*, 2003).

- 2. Environmental Contamination and Pollution** - Persistent organic pollutants like Polychlorinated Biphenyls (PCBs) severely threaten Killer Whale populations globally. These mammals have some of the highest pollutant loads recorded in any animal (Jepson *et al.*, 2016; Desforges *et al.*, 2018). British Columbia and Washington's southern resident and transient Killer Whales are among the most PCB-contaminated cetaceans worldwide (Ross *et al.*, 2000). European populations show concerning contamination levels, with the highest recordings in the UK, Ireland, Canary Islands, and Gibraltar waters (Beck *et al.*, 2014). These pollutants are linked to reproductive failure, compromised immune systems, endocrine disruption, and carcinogenicity (Jepson *et al.*, 2016; Dietz *et al.*, 2019). Populations near industrial coastlines and those feeding at higher trophic levels show more significant contamination due to biomagnification. Small or declining populations in the northeastern Atlantic, particularly near Gibraltar, show low population growth is consistent with PCB-induced reproductive toxicity (Mongillo *et al.*, 2012).

- 3. Human Disturbance and Acoustic Impacts** - Whale-watching tourism and increasing maritime traffic pose significant threats to killer whale populations. Moving boats disrupt foraging and resting patterns, while underwater noise interferes with social and echolocation signals (Erbe, 2002). Studies in British Columbia have shown that close approaches by whale-watching vessels trigger avoidance responses, resulting in energetic costs for frequently disturbed whales (Williams *et al.*, 2002, 2006). The growing concern of ambient noise from shipping and vessel traffic can mask echolocation signals, potentially disrupting foraging behaviour and reducing prey acquisition (Williams *et al.*, 2014; Veirs *et al.*, 2016). Fast-moving boats also present direct risks through vessel strikes (Visser, 1999).
- 4. Climate Change and Prey Availability** - In the Arctic, declining sea ice has increased their access to marine mammal prey that traditionally relied on ice for protection (Ferguson *et al.*, 2010; Higdon *et al.*, 2012), though unpredictable freezing in newly accessible areas risks pod entrapment (Westdal *et al.*, 2017; Jourdain *et al.*, 2021). The impact on prey populations remains a significant concern (Jourdain *et al.*, 2019). Many populations face challenges from reduced prey availability, with large-scale reductions in predatory fish populations (Myers & Worm, 2003) particularly affecting fish-eating populations. In British Columbia and Washington State, Pacific Salmon stock declines correlate with reduced survival and reproductive rates in resident killer whales (Ward *et*

al., 2009; Ford *et al.*, 2010). Similarly, depleted bluefin tuna stocks in the Mediterranean Sea have significantly impacted killer whale survival near the Strait of Gibraltar (Reeves & Notarbartolo di Sciara, 2006; Esteban *et al.*, 2016).

14. MELON-HEADED WHALE

Taxonomy:

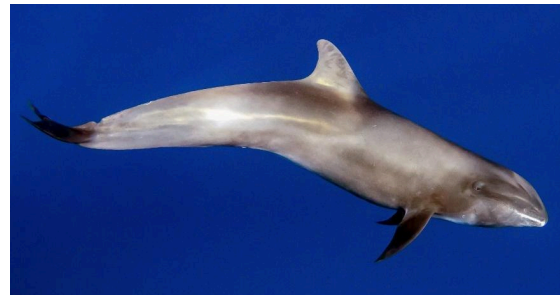
Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Peponocephala</i>
Species	: <i>P. electra</i> Gray, 1846

Key Identification Features:

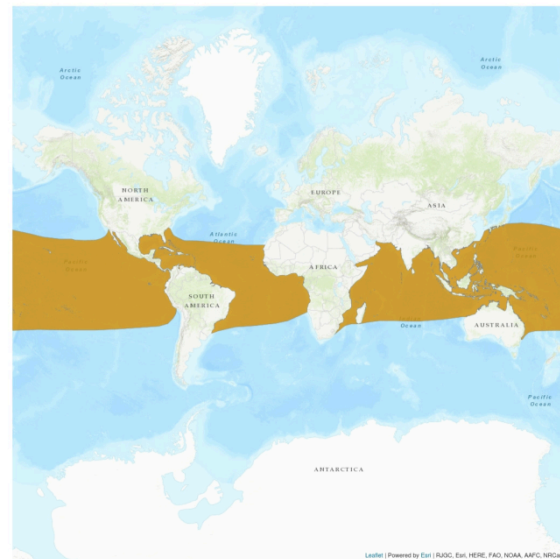
- Body is mostly dark grey, with a faint, darker grey cape that narrows at the head.
- Small conical head with a rounded melon and no discernible beak.
- White markings on their lips and dark 'masks' around the eyes.
- White or light grey areas are common in the throat region.
- Dorsal fin is relatively large and sickle-shaped.
- Flippers are relatively long, sickle-shaped, and sharply pointed at the end.
- Tail flukes are pointed or slightly rounded at the tips, with a definite median notch.

General Ecology:

Melon-headed whales (*Peponocephala electra* Gray, 1846) are toothed whale within the oceanic dolphin family. They are named for their distinctive head shape (Perryman & Danil, 2018). Often mistaken for pygmy killer whales, they can be distinguished by their head shape, flippers, and dorsal cape (Carwardine, 2017).



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Global distribution range of Melon-headed Whale (*Peponocephala electra*). Source: IUCN Red List Assessment (2012).

Males are marginally larger than females (by 6 to 10 cm), with recorded specimens measuring around 2.5-2.8 m (Perryman & Danil, 2018). These highly social cetaceans travel in groups of 100 to 500, occasionally forming herds of up to 2,000 individuals (Mullin *et al.*, 1994; Jefferson *et al.*, 2011). They are fast swimmers that create spray while porpoising and may spyhop or leap clear of the water (Carwardine, 2017). While generally wary of boats, they occasionally bow-ride (Brownell *et al.*, 2009). Their diet consists primarily of pelagic and mesopelagic squid and small fish, with some crustaceans (Jefferson & Barros, 1997; West *et al.*, 2018). They rest

1. Fisheries Bycatch - Melon-headed whales are vulnerable to bycatch in various fisheries, which can lead to injury or death. They have been incidentally caught in longline fisheries targeting tuna and swordfish off Mayotte, as well as in driftnet fisheries in the Philippines, Sri Lanka, Ghana, and India (Kiszka *et al.*, 2008; Ilangakoon, 1997; Jeyabaskaran & Vivekanandan, 2013). Although rare, bycatch has also occurred in the Eastern Tropical Pacific purse-seine tuna fisheries (Perryman *et al.*, 1994). Injuries such as body scars and dorsal fin disfigurements have been observed in individuals near Mayotte and Hawaii, likely due to interactions with fisheries. Bycaught animals are sometimes used as bait, and data on bycatch rates remain sparse in many regions (Mintzer *et al.*, 2018).

- 2. Direct Hunting** - Melon-headed whales are hunted for bait or human consumption in small-scale cetacean fisheries across several regions, including Sri Lanka, the Caribbean, the Philippines, and Indonesia (Caldwell & Caldwell, 1975; Dolar, 1994; Ilangakoon, 1997). In Ghana, they are the third most caught cetacean species for 'marine bushmeat' by artisanal fishermen (Mintzer *et al.*, 2018). Historically, Japanese drive fisheries occasionally targeted these whales, with recent increases in catch quotas, such as the 704 individuals proposed for the 2017/18 season in Taiji (IWC, 2018).
- 3. Pollution** - Melon-headed whales face threats from environmental contaminants, including plastic debris, oil spills, and industrial waste, which lead to bioaccumulation in marine ecosystems. Persistent organic pollutants (POPs) like PCBs, DDTs, and PBDEs accumulate in their blubber, potentially affecting health, hormone levels, and immune and reproductive systems (Kajiwara *et al.*, 2008; Bachman *et al.*, 2014). High contaminant levels can be transferred from mothers to calves, increases calf mortality. PBDE and chlordane levels in blubber increased in Japan between 1980 and 2000 (Kajiwara *et al.*, 2008).
- 4. Anthropogenic Noise** - Melon-headed whales are sensitive to anthropogenic noise, such as military sonar, and seismic surveys. These noises have been linked to mass stranding events, particularly in Japan and Madagascar (Southall *et al.*, 2006; Amano *et al.*, 2014). The species is notably sensitive to mid-frequency active sonar and island-associated populations, such as Hawaii) face displacement from critical habitats (Southall *et al.*, 2013).

15. FALSE KILLER WHALE

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Pseudorca</i>
Species	: <i>P. crassidens</i> Owen, 1846

Key Identification Features:

- The body is a dark grey to black colour, with the cape being a slightly darker shade and the underside a bit lighter.
- It has a long, slender head that tapers to a rounded snout, which extends over the mouth.
- A distinctive W-shaped light grey patch is present on the chest, situated between the flippers.
- The flippers are long and strongly curved, featuring a pronounced bend that is an 'S' shape.
- The dorsal fin is prominent, typically curved, and slightly rounded at the tip.
- The tail flukes are relatively smaller compared to the overall body size.

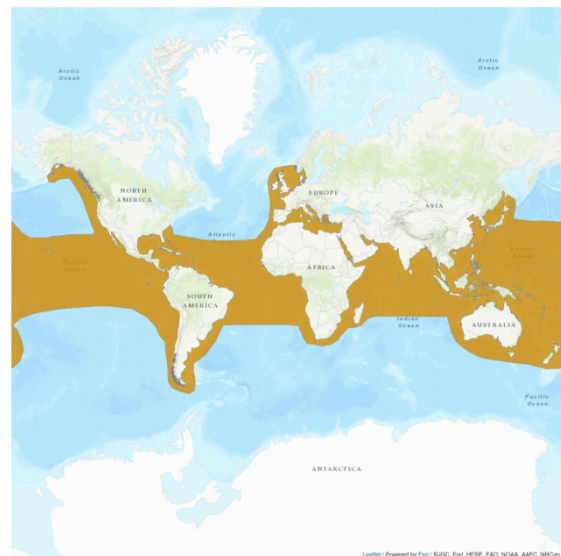
General Ecology:

False killer whales (*Pseudorca crassidens* Owen, 1846) are oceanic dolphins found primarily in tropical and subtropical waters worldwide, with the highest densities in tropical regions (Ferguson & Barlow, 2003; Baird, 2016). Adult males reach lengths of almost 6 m and females up to 5 m (Baird, 2009). As apex predators, they inhabit

deep, offshore waters and occasionally approach coastal areas near oceanic islands.



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Global distribution range of False Killer Whale (*Pseudorca crassidens*). Source: IUCN Red List Assessment (2012).

These highly social marine mammals travel in large, complex social groups ranging from 10-20 members to massive pods of over 500 individuals (Caldwell *et al.*, 1970; Riccialdelli & Goodall, 2015). Their diet is diverse, targeting large fish species like mahi-mahi, tuna, swordfish, sailfish, and cephalopods (Alonso *et al.*, 1999; Oleson *et al.*, 2010). They occasionally prey on marine mammals, including smaller dolphins, particularly those disoriented from fishing operations (Baird, 2009). They use echolocation to navigate and locate prey, with males possessing larger melons

2002) as well as recently (Ravi & Prabhu, 2017; MMRCNI).

A map of Tamil Nadu, India, showing its districts and the locations of water logging. The districts are labeled: TIRUVALLUR, VELLORE, CHENNAI, CHENGALPATTU, HOSUR, TIRUPPATTUR, TIRUVANMALAI, DHARMAPURI, VILUPPURAM, PUDUCHERRY, SALEM, ATTUR, CUDDALORE, WL STR HASSANUR, MASINAGUDI, WL STR SATHY, GUDATUR, NILGIRIS, ERODE, NAMAKKAL, COIMBATORE, ARYALUR, KARAIKAL, WL ATR TIRUPPUR, TIRUCHIRAPPALLI, THANJAVUR, THIRUVARUR, WL ATR POLLACHI, WL, NAGAPATTINAM, DINDIGUL, KODAIKANAL, PUDUKKOTTAI, THENI, MADURAI SIVAGANGAI, WL, MEGALAI, WL, SRIVILLIPUTHUR, RAMANATHAPURAM, THOOTHUKUDI, WL, MARINE NP, WL, KMTR AMBASAMUDRAM, TIRUNELVELI, WL, KMTR KALAKKADU, KANYAKUMARI. A scale bar at the bottom left indicates 0, 50, and 100 km. A north arrow is located at the top left. Three black dots indicate water logging locations: one near Thirunelveli, one near Thoothukudi, and one near Ramanathapuram.

False Killer Whale (*Pseudorca crassidens*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

1. Incidental Bycatch - False killer whales face significant threats from fishery interactions, with substantial mortality caused by longline, purse seine, and gillnet fisheries. In the U.S. Hawaii-based deep-set longline fishery, they are the most frequently recorded cetacean bycatch, with mortality exceeding sustainable levels for 10 of 12 years between 2003 and 2015 (Carretta *et al.*, 2014; Forney & Kobayashi, 2007). Similar interactions occur worldwide, including the Indian Ocean, the Mediterranean, and the western Pacific (Kiszka *et al.*, 2010; SPC-OFP, 2010; Dai, 2011). Incidental takes have been documented in gill nets

across multiple countries, including Australia, India, Brazil, and China (Perrin *et al.*, 2005; Reeves *et al.*, 2013; Song, 2018).

2. Direct Hunting - Drive and harpoon fisheries have historically decimated local populations, particularly in Japan and Taiwan. Between 1972 and 2008, 2,643 individuals were killed in Japan alone, with a single year's catch potentially representing 31% of the coastal population (Kasuya, 2017). False killer whales are occasionally taken at Saint Vincent for meat and oil (Caldwell & Caldwell, 1975), and deliberate shooting by fishermen in response to depredation occurs in various regions (Oleson *et al.*, 2010; Anderson, 2014).

3. Ecosystem and Prey Availability Threats - Declining prey populations due to overfishing and ecosystem changes pose significant risks to false killer whales. Large-scale reductions in predatory fish populations, including yellowfin and bigeye tuna, have been documented (Baum *et al.*, 2003, 2005; Forney & Kobayashi, 2007). Expansion of unproductive areas and ecosystem changes potentially influence fish populations at multiple trophic levels, with unknown but potentially severe consequences for false killer whale populations (Polovina *et al.*, 2008; Coll *et al.*, 2008; Koslow *et al.*, 2015).

4. Pollution Threats - Anthropogenic pollution presents multiple risks to false killer whales. Studies of the Hawaiian Islands insular population reveal PCB levels exceeding immunosuppression thresholds (Ylitalo *et al.*, 2009; Foltz *et al.*, 2014). High trace elements and mercury levels have been found worldwide, with toxic levels documented in Chile and Japan (Cáceres-Saez *et al.*, 2018; Endo *et al.*, 2010). Plastic ingestion poses another significant threat, with stranded individuals often found with discarded items in their stomachs (Scott *et al.*, 2001).

16. INDO-PACIFIC HUMPBACK DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Sousa</i>
Species	: <i>S. chinensis</i> Osbeck, 1765

Common Tamil Name: சீன ஓங்கில்

Key Identification Features:

- Robust body with a long slender beak and a slight melon on the forehead.
- Colouration is highly variable within populations. Generally, calves are born dark grey and become mottled with pink or entirely pink with age.
- Shape of the dorsal fin and hump varies with geographical distribution. Generally, the dorsal fin is short and curved situated on a wide dorsal hump that gradually slopes into the body.
- Flippers are broad, paddle-shaped, and round-tipped.
- Marked keels present above and below the thick tailstock.
- Flukes are well-developed and pointed at the tips with a distinct median notch.

General Ecology:

Indo-Pacific humpback dolphins (*Sousa chinensis* Osbeck, 1765) inhabit the coastal waters of the eastern Indian and western Pacific Oceans, with two recognised subspecies, *S. c. chinensis* (Chinese humpback dolphin) and *S. c. taiwanensis*

(Taiwanese humpback dolphin) (Parra & Jefferson, 2018; Society for Marine Mammalogy, 2021).



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Global distribution range of Indo-Pacific Humpback Dolphin (*Sousa chinensis*). Source: IUCN Red List Assessment (2017).

These humpback dolphins reach a maximum length of 2.6–2.8m and weigh around 240–280 kg (Parra & Jefferson, 2018). They typically live in small groups of fewer than ten individuals, although larger aggregations can occur near fishing vessels (Hung & Jefferson, 2004). They are opportunistic feeders, consume a variety of nearshore, estuarine, and reef fishes, as well as cephalopods, but rarely crustaceans (Jefferson & Karczmarski, 2001; Parra & Jefferson, 2018). Indo-Pacific humpback dolphins are generally found in tropical to

[illegible]

Distribution:

rarely exceeding depths of 20-30 meters or venturing more than a few kilometres from the shore (Jefferson & Karczmarski, 2001; Chen *et al.*, 2007). Their distribution extends from central China, particularly near the mouth of the Yangtze River, southward through Southeast Asia and westward along the Bay of Bengal to the Orissa coast of eastern India (Jefferson & Rosenbaum, 2014). Indo-Pacific humpback dolphins are frequently found in enclosed seas, such as the Gulf of Thailand, with their highest densities observed in and around estuaries. Their distribution is fragmented, with significant stretches of coastline between river mouths often exhibiting low or zero dolphin densities (Jefferson & Karczmarski, 2001; Parra & Jefferson, 2018).

1. Interaction with Fisheries -

Indo-Pacific humpback dolphins face significant threats primarily from incidental mortality in fishing gear, particularly gillnets and trawls (Ross *et al.*, 1994; Jefferson & Karczmarski, 2001; Parra & Jefferson, 2018; Jaaman *et al.*, 2009). In Bangladesh, a study revealed that 15% of individuals showed scars from entanglements (Smith *et al.*, 2015). In the Eastern Taiwan Strait, over 30% of the subpopulation exhibited injuries from fishing gear, highlighting the critical threat posed by fishing activities on their population (Slooten *et al.*, 2013). In Hong Kong, net entanglement and vessel collisions are the leading causes of human-induced mortality. Despite a trawling ban in 2013, illegal trawling persists, exacerbating the bycatch problem for these dolphins (Jefferson,

2000; Parsons & Jefferson, 2000; Jefferson *et al.*, 2006).

2. Environmental Contamination -

Environmental contamination is another significant threat, particularly in industrialised regions like China. High concentrations of organochlorines, such as DDTs and PCBs, have been found in cetaceans from Hong Kong, potentially affecting reproductive success (Parsons & Chan, 1998; Minh *et al.*, 1999; Gui *et al.*, 2014). Although pollutants may not cause immediate mortality, their long-term effects on health and survival are concerning (Parsons, 2004; Jefferson *et al.*, 2006).

3. Marine Development and Vessel Traffic -

Marine development activities, including construction projects and reclamation, can lead to habitat loss and behavioural disturbances for Indo-Pacific humpback dolphins (Würsig *et al.*, 2000; Jefferson *et al.*, 2009; Hung, 2014). Excessive vessel traffic, particularly high-speed ferries, alters dolphin distribution and behaviour, potentially interfering with their communication (Sims *et al.*, 2012; Piwetz *et al.*, 2012; Hung, 2014). When guided by scientific research, implementing mitigation measures can help reduce these impacts (Jefferson *et al.*, 2009).

17. PANTROPICAL SPOTTED DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Stenella</i>
Species	: <i>S. attenuata</i> Gray, 1846

Key Identification Features:

- Dark or steely grey body on top with lighter flanks and underside.
- Pale and dark spots cover the body, increasing with age.
- Sharp crease between the forehead and a long, narrow beak with a white tip and 'lips.'
- Dark band runs from the upper jaw to the eye, extending to the flippers.
- Small, strongly curved flippers with pointed tips; dark on both sides.
- Dark grey dorsal fin, strongly curved and narrow.
- Distinct keel below the tail stock.
- Flukes are small, pointed at the tips, with a small median notch.

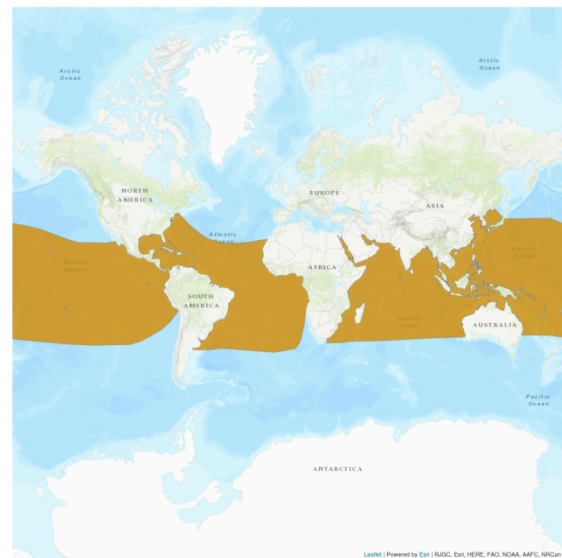
General Ecology:

Pantropical spotted dolphins (*Stenella attenuata* Gray, 1846) are one of the most abundant dolphin species in the world, found in all temperate and tropical oceans. The pantropical spotted dolphin is very active and prone to making large, splashy leaps from the sea. They are known for their playful behaviour, such as

breaching and bow-riding, and exhibit significant variation in size and colouration across their range.



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Global distribution range of Pantropical Spotted Dolphin (*Stenella attenuata*). Source: IUCN Red List Assessment (2012).

These dolphins are born about 0.8 m and grow around 2-2.5 m in length (Perrin, 2009). Two subspecies are recognised: the offshore *S. a. attenuata* and the coastal *S. a. graffmani* (Society for Marine Mammalogy 2021). Coastal dolphins are larger and more spotted, with spots being a key characteristic in adults, while juveniles are uniformly coloured (NOAA Fisheries: Pantropical Spotted Dolphin). In the eastern Pacific and southwestern Indian Ocean, they form multi-species groups with spinner dolphins and yellowfin tuna,

Distribution:

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The offshore *S. a. attenuata* is particularly abundant in lower-latitude regions, extending into enclosed seas like the Red Sea and the Persian Gulf but excluding the Mediterranean (Notarbartolo di Sciara *et al.*, 2017). These dolphins occupy diverse oceanic habitats, from coral reef outer slopes to open ocean waters, and are commonly found around oceanic islands and archipelagos, including the Hawaiian Islands, Marquesas, Caribbean Sea, and Indian Ocean islands (Ballance & Pitman, 1998; Gannier, 2002; Baird *et al.*, 2013). Population centres typically concentrate in warm waters exceeding 25°C, particularly in areas with high-temperature gradients (Courtin *et al.*, 2022, 2023). Historical documents contain numerous records of pantropical spotted dolphin sightings in India (Sathasivam, 2000). The recent Fisheries Survey of India, indicate population of marine mammals are, including pantropical spotted dolphins (Gopal, 2023).

Global threats:

1. Tuna Fishery Impacts - The northeastern offshore population of pantropical spotted dolphins in the Eastern Tropical Pacific (ETP) experienced catastrophic mortality from tuna purse seine fishing between the late 1950s and 1980s. Approximately five million dolphins were killed during 1959-1972, with three million from the northeastern offshore population alone (Wade, 1996). Although the Inter-American Tropical Tuna Commission (IATTC) implemented mortality limits, reducing annual dolphin deaths to 238 by 2016, recovery remains slow (IATTC, 2017; Gerrodette *et al.*, 2008). Potential recovery impediments include

fishery-related stress, unobserved mortality from calf separation, potential unreported deaths from small vessels, and broader ecosystem changes (Gerrodette & Forcada, 2005; Archer *et al.*, 2001).

2. Global Fishery Bycatch - Pantropical spotted dolphins face significant bycatch threats across marine regions. In the eastern tropical Atlantic and western Indian Ocean, purse seine fishery data suggest relatively low bycatch numbers (Escalle *et al.*, 2015). However, gillnet fisheries pose substantial risks, with documented in diverse locations the Arabian Sea, Zanzibar, Central American coastlines, Chinese waters, and the Philippines (Amir *et al.*, 2002; Palacios & Gerrodette, 1996; Yang *et al.*, 1999; Dolar, 1994).

3. Direct Hunting and Consumption - Pantropical spotted dolphins are systematically hunted in regions for human consumption. Japan's coastal fisheries documented extensive culling, with Kasuya (2017) reporting 27,000 dolphins killed between 1972 and 2008, peaking in 1978 with 4,184 and 1982 with 3,799 individuals. Similar hunting practices occur in the Philippines, India, Sri Lanka, and the Solomon Islands (Dolar *et al.*, 1994; Ross *et al.*, 2003; Perrin, 2009). The Solomon Islands' Fanalei villagers alone killed 15,454 dolphins from 1976 to 2013, with 1,500 pantropical spotted dolphins taken in March 2013 (Oremus *et al.*, 2015). Madagascar's southwest coast also experiences significant drive hunts, with over 6,000 dolphins taken between 1985 and 1999 in a single village (Andrianarivelo, 2001).

18. STRIPED DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Stenella</i>
Species	: <i>S. coeruleoalba</i> Meyen, 1833

Key identification features

- Dark grey cape divided by lighter streak moving up towards the dorsal fin.
- Smooth sloping forehead with a crease between the forehead and the beak.
- Dark prominent beak with crease between beak and forehead.
- One or two dark bands between eye and flippers.
- Dark, strongly curved dorsal fin that is situated midback.
- Small slender flippers, dark on both sides, and contrasting with the white or pink underside.
- Narrow, pale grey tail stock with small, thin tail flukes and a slight median notch.

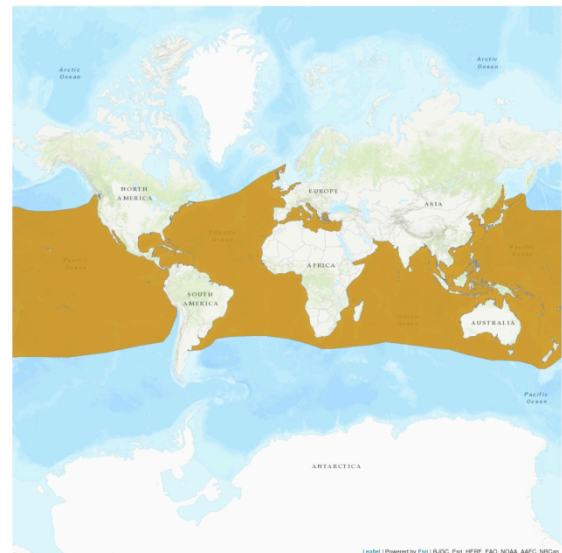
General Ecology:

Striped dolphins (*Stenella coeruleoalba* Meyen, 1833) inhabit temperate and tropical waters worldwide, mainly in oceanic regions beyond the continental shelf. They also live near the shore where deep waters are close to the coast. They are robust in size and measure around 2.2-2.5 m in length and weigh between 100-150 kg (Jefferson *et al.*, 2011; Archer, 2018). They

are similar in size and shape to other dolphins, like the pan tropical and Atlantic spotted dolphins, but their distinct colouring makes them easily noticeable at sea.



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Global distribution range of Striped Dolphin (*Stenella coeruleoalba*). Source: IUCN Red List Assessment (2012).

Known for their acrobatics, striped dolphins often travel in large groups and form mixed-species groups with common dolphins (Forcada & Hammond, 1998; Bearzi *et al.*, 2016). They prefer waters between 18°C and 22°C, associating with productive upwelling areas and oceanic currents (Archer & Perrin, 1999; Ross, 1984). Their diet includes small midwater and pelagic organisms, such as lanternfish, squid, and sardines, with varying preferences by region (Würtz & Marrale,

Distribution:

In European waters, they are primarily found in the Eastern North Atlantic, North Sea, and Macaronesian archipelagos, with significant populations along the Iberian Peninsula and south of the British Isles (Hammond *et al.*, 2017; Santos *et al.*, 2008). These dolphins predominantly inhabit waters with temperatures ranging from 18-22°C, thriving in oceanic environments across multiple regions, though population densities vary considerably (Panigada, 2021). Records of striped dolphins on Indian coasts are historical (Alling, 1986), but recent incidents have also been recorded ('Dolphin population rises...', 2023; 'Injured dolphin rescued...', 2024).

Global threats:

2. Fishery Bycatch - Striped dolphins experience substantial bycatch mortality across their global range. Documented incidents occur in purse seines, gillnets, large mesh pelagic

driftnets, and pelagic longline fisheries in the northeastern Indian Ocean, Eastern Tropical Pacific, northeastern Atlantic, Mediterranean, and north Pacific (Archer & Perrin, 1999). High seas drift gillnet fisheries in the north Pacific were particularly destructive, with approximately 3,000 individuals taken in 1990 alone (Hobbs & Jones, 1993). Mediterranean driftnet fisheries continue to pose significant risks, with estimates suggesting 1,555-2,092 Striped dolphins killed by Moroccan boats in 2003, and historical Italian fisheries reportedly killing 5,000-15,000 dolphins annually in the 1980s (Tudela *et al.*, 2005; Di Natale, 1992).

3. Environmental Contamination -

Mediterranean striped dolphins face severe environmental contamination. Tissue levels of organochlorine compounds, heavy metals, and selenium consistently exceed 'safe' threshold levels for mammals (Cardellicchio *et al.*, 2000; Storelli *et al.*, 2012). Blubber concentrations of DDT and PCB remain high, with potential reproductive and immunological impacts. Similar high concentrations have been reported in Japanese specimens (Tanabe *et al.*, 1983). PBDEs were particularly elevated in Mediterranean populations (Marsili *et al.*, 2018). These contaminants are associated with numerous physiological effects, including anaemia, immunosuppression, endocrine disruption, and reproductive impairment (Jepson *et al.*, 2016).

4. Disease and Population Vulnerability

- Striped dolphins have experienced devastating mass mortality events,

particularly in the Mediterranean Sea. Morbillivirus infections in 1990-1992 and 2006-2007 resulted in thousands of deaths, significantly impacting population dynamics (Domingo *et al.*, 1995; Keck *et al.*, 2010). These epizootics may have been exacerbated by environmental factors, including high levels of organochlorine pollutants that potentially compromised immune systems (Aguilar & Borrell, 1994). Additional population pressures include potential prey depletion from commercial fishing and climate-induced habitat changes (Aguilar & Gaspari, 2006; MacLeod *et al.*, 2005).

19. SPINNER DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Stenella</i>
Species	: <i>S. longirostris</i> Gray, 1828

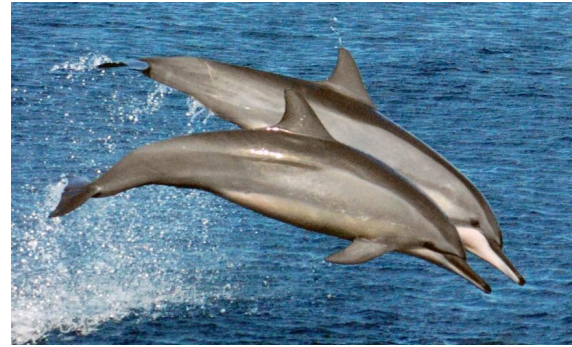
Common Tamil Name: கிண்கிணி
ஒங்கில்

Key Identification Features:

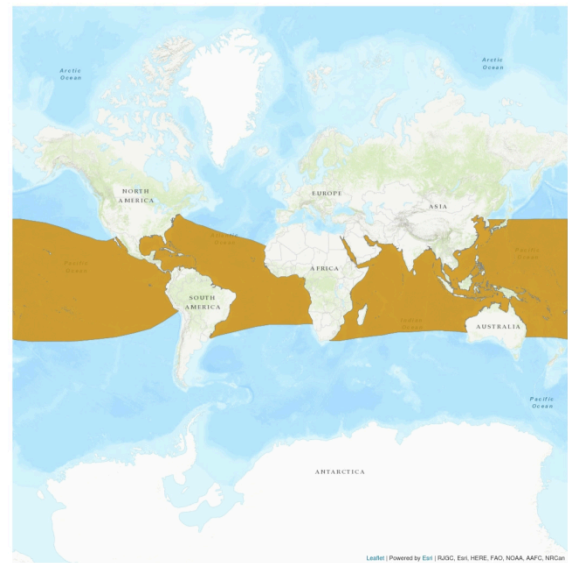
- They have a slender, torpedo-shaped body.
- They exhibit a distinct three-banded body colouring, featuring parallel bands of a dark cape, light grey flanks, and a very pale belly.
- Their slightly rounded forehead is complemented by a long, slender beak that is dark on the top and light on the bottom.
- The dolphins possess slender, curved flippers with pointed tips, which are dark on both the top and bottom.
- A dark band runs between the upper jaw and the eye, extending to the flippers.
- They have a triangular, erect, and slightly curved dorsal fin.
- Males may display a bulge or keel on the underside toward the tail.

General Ecology:

Spinner dolphins (*Stenella longirostris* Gray, 1828) are small dolphins found in offshore tropical waters worldwide, known



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Global distribution range of Striped Dolphin (*Stenella longirostris*). Source: IUCN Red List Assessment (2012).

for their acrobatic displays. Currently, four subspecies are recognized: Eastern spinner (*S. l. orientalis*), Central American or Costa Rican spinner (*S. l. centroamericana*), Hawaiian spinner (*S. l. longirostris*), and Dwarf spinner (*S. l. roseiventris*). Sexually mature adults examined ranged from 1.2-2.3 m and weighed 23–80 kg, with males on average slightly larger than females in body size (Perrin, 2009). They primarily feed on small mesopelagic fish, squids, and sergestid shrimps, diving up to 200-300 meters to catch prey (Dolar *et al.*, 2003). Hawaiian spinner dolphins are nocturnal feeders, foraging in deep

Distribution:

and minimal annual temperature variation (Perrin & Gilpatrick, 1994). School sizes range from a few individuals to over a thousand, typically larger in pelagic than inshore waters (Perrin, 2018). Spinner dolphins are well documented in Indian waters (Sathasivam, 2002), and are even considered as tourist attractions in certain parts of Tamil Nadu (Newport, 2023).



Global threats:

- 1. Incidental Bycatch** - Spinner dolphins, being one of the most common cetaceans in tropical oceanic regions, are frequently caught as bycatch in purse-seine, gillnet, and trawl fisheries (Perrin *et al.*, 1994; Donahue & Edwards, 1996). They are the most abundant dolphins in the Indian Ocean (Ballance & Pitman, 1998) and are captured in significant but largely

unknown numbers, partly due to their association with tuna (Anderson, 2014). In India, bycatch levels of hundreds of spinner dolphins were reported in the 1980s and early 1990s (Mohan, 1994), while Sri Lanka reported annual captures in the thousands during the same period (Leatherwood & Reeves, 1989).

2. **Direct Hunting** - Accidentally captured dolphins are often consumed or used as bait in shark fisheries, which has, in some cases, led to targeted hunting (Robards & Reeves, 2011; Kiszka, 2009). This bycatch has resulted in deliberate gillnetting of spinner dolphins in regions such as Sri Lanka (Leatherwood & Reeves, 1989), the Philippines (Dolar, 1994), and Indonesia (Kahn, 2004). Additionally, intentional hunting of spinner dolphins has been reported in Madagascar (Cerchio *et al.*, 2011), West Africa (Van Waerebeek *et al.*, 1999), and the Solomon Islands (Oremus *et al.*, 2015). Between 1960 and 1972, over 4 million dolphins, primarily pantropical spotted dolphins and spinner dolphins, were killed in the yellowfin tuna purse-seine fishery of Eastern Tropical Pacific. This fishery is estimated to have reduced the Eastern Spinner population by 65% (Gerrodette, 2009; Wade *et al.*, 2007; Reilly *et al.*, 2005).

3. **Tourism** - Non-consumptive threats to spinner dolphins primarily arise from dolphin-watching tourism. Due to their gregarious nature and acrobatic behaviour, spinner dolphins are targeted for boat-based and 'swim-with-the-dolphins' tourism in locations such as Hawaii, Egypt, and French Polynesia (Gannier & Petiau, 2006; Tyne *et al.*, 2017; Notarbartolo *et al.*, 2017). Harassment from dolphin-watching boats is becoming a significant disturbance in several areas of Oceania and Southeast Asia. In West Hawaii, abundance estimates from 2011 and 2012 were lower than in previous years, suggesting a potential long-term impact of dolphin-centred tourism on local populations (Tyne *et al.*, 2015, 2017).

20. ROUGH-TOOTHED DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Subfamily	: Stenoninae
Genus	: <i>Steno</i>
Species	: <i>S. bredanensis</i> G. Cuvier in Lesson, 1828

Key Identification Features:

- Small head with a long beak, lacking a noticeable crease between the beak and forehead.
- Colouration varies but is typically black to dark grey on the back and light grey to white on the belly, often with lighter spots or blotches underneath.
- A dark, narrow cape extends over the eyes and arches high on the sides of the body.
- Flippers are long, large, and rounded at the tips.
- Dorsal fin is large, tall, and hooked or sickle shaped.
- Flukes are small, rounded at the tips, with a well-defined median notch.

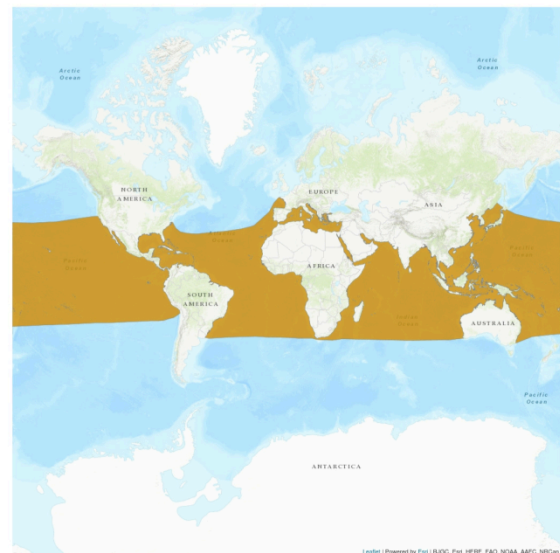
General Ecology:

Rough-toothed dolphins (*Steno bredanensis*) are marine dolphins found in warm, tropical waters worldwide. It is the sole member of its genus with no recognised subspecies, named *Steno* from the Greek for 'narrow,' referring to its distinctive beak. Found in warm temperate and tropical

waters worldwide, they inhabit deep waters over 1,000 meters typically but can also be found in shallower areas like the continental shelf.



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Global distribution range of Rough-toothed Dolphin (*Steno bredanensis*). Source: IUCN Red List Assessment (2012).

They weigh up to 155 kg, males growing larger than females (maximums records of 2.5-2.6 m) but females may have proportionately longer beaks (Ritter, 2002; Jefferson, 2009; West *et al.*, 2011). They usually form small groups of 5-15, though larger groups are sometimes observed (Gannier & West, 2005; Baird, 2016). Their diet consists of oceanic and coastal fish and cephalopods, occasionally including large pelagic fish like dolphinfish (Pitman &

Distribution:



While primarily occupying deep, offshore waters, they occasionally inhabit shallow coastal regions near Brazil, Japan, Honduras, West Africa, and the Canary Islands (Jefferson, 2009). The Mediterranean population represents a small, isolated subpopulation primarily concentrated in the eastern basin, between the Ionian Sea and the Levantine Basin (Kerem *et al.*, 2016; Kiszka *et al.*, 2019). European Atlantic waters demonstrate a gradient of presence, with regular year-round sightings in the Canary Islands, seasonal summer visits to Madeira, and rare appearances in the Azores (Carrillo *et al.*, 2010; Freitas *et al.*, 2012). Reports of rough-toothed dolphins in Indian waters are rare, notably documented near Lakshadweep ('Rough-toothed dolphins...', 2022) and Karnataka (Anoop *et al.*, 2015), with very few records along the eastern coast (MMRCNI).

Global threats:

1. Direct Hunting - Rough-toothed dolphins face significant threats from opportunistic hunting across regions. Small numbers have been taken in directed hunts in the Solomon Islands, Sri Lanka, Taiwan, West Africa, Japan, and other locations (Caldwell & Caldwell, 1975; Miyazaki & Perrin, 1994; Perrin *et al.*, 2005). In Japan, historical records reveal substantial mortality, with drive fisheries off the Izu Peninsula killing at least 80 dolphins between 1932 and 1972. Four individuals were explicitly recorded as taken by hand harpoon fishermen in Wakayama Prefecture in 1991, highlighting the persistent nature of these hunting practices across different geographical contexts (Kasuya, 2018).

2. Bycatch and Entanglement - Bycatch represents a significant mortality source for rough-toothed dolphins across diverse marine environments. In the Eastern Tropical Pacific, 21 dolphins were estimated to be killed between 1971-75, with 36 dying in a single net haul in 1982. Regional studies reveal substantial bycatch rates: Ghana reported these dolphins comprising 6.1% of cetacean gillnet catches (Van Waerebeek *et al.*, 2009; Debrah *et al.*, 2010), while northeastern Brazil recorded 13 strandings likely due to gillnet entanglement (Monteiro-Neto *et al.*, 2000). Stranding reports emerged from the eastern Mediterranean Sea (Kerem *et al.*, 2016), indicating widespread bycatch issues in tropical and warm-temperate waters globally.

3. Fishery Interactions - Fishery interactions pose a critical threat to rough-toothed dolphins worldwide. These marine mammals frequently interact with fishing gear, often removing bait and catch from longlines, which can result in injury or retaliatory actions (Oremus *et al.*, 2012; Baird, 2016). In American Samoa, six dolphins were reported injured in deep-set longline fisheries between 2008 and 2012, representing almost half of the cetacean interactions in that region (Bradford & Forney, 2014; Hayes *et al.*, 2017). Alarming, Mintzer *et al.* (2018) instances where rough-toothed dolphins are even used as bait in longline fisheries, further demonstrating the complex and harmful interactions with human maritime activities.

4. Environmental Contamination - Environmental contamination presents

another significant threat to rough-toothed dolphins. Worldwide studies have detected relatively high levels of heavy metals and persistent organic pollutants in their tissues. The eastern Mediterranean population showed measurable PCB/DDT and mercury/cadmium concentrations (Marsili & Focardi, 1997; Shoham-Frider *et al.*, 2014). Microplastic ingestion has also been documented, with rough-toothed dolphins found with plastics in their stomachs in the Canary Islands (Puig-Lozano *et al.*, 2018). Anthropogenic noise and potential impacts from seismic and naval activities further compound these environmental stressors, with mass strandings potentially linked to such disturbances (Kerem *et al.*, 2016).

21. INDO-PACIFIC BOTTLENOSE DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Tursiops</i>
Species	: <i>T. aduncus</i> Ehrenberg, 1833

Key Identification Features:

- Dorsal surface is slate blue or dark grey, with lighter extremities and underside.
- Sharp crease between the beak and gently curving forehead.
- Pronounced beak, generally slender and long, that can vary in thickness and length.
- Prominent recurved dorsal fin with a slightly hooked tip and a broad base.
- Moderately long dark slender flippers with pointed tips and broad base.
- Thick tail stock with well-developed flukes and distinct median notch.

General Ecology:

Indo-Pacific bottlenose dolphins (*Tursiops aduncus* Ehrenberg, 1833) are a distinct species, recognised separately from the common bottlenose dolphin in 1998 (Möller & Beheregaray, 2001; Wang & Yang, 2009). Typically growing to 2.6 m and weighing up to 230 kg, it features a dark grey back and a lighter grey or nearly white belly with grey spots (Shirihai *et al.*, 2006). This species is generally smaller than the common bottlenose dolphin,

possessing a longer rostrum and more teeth (Reeves *et al.*, 2002; Wang & Yang, 2009).



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Global distribution range of Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*). Source: IUCN Red List Assessment (2008).

Indo-Pacific bottlenose dolphins primarily feed on a diverse diet of schooling, demersal, reef fishes, and cephalopods, mainly squid (Amir *et al.*, 2005; Ross, 1984; Yamazaki *et al.*, 2008). They often form groups of five to 15 but can aggregate in hundreds, sometimes associating with other dolphin species, including common bottlenose and humpback dolphins (Jefferson *et al.*, 2011; Koper & Plön, 2016). Mating and calving peak in spring and summer, with a gestation period of about 12 months (Shirihai *et al.*, 2006). In

1. Incidental Bycatch - Bycatch is a significant threat to Indo-Pacific bottlenose dolphins across their range, albeit limited data on mortality rates makes it difficult to assess the full impact. In Australia, bycatch occurs at popular beaches in trawls, gillnets, and shark nets (Hale, 1997; Paterson, 1990). In Taiwan, the use of dolphins as bait in fisheries is more widespread than recorded (Mintzer *et al.*, 2018). Historical data indicate that the Taiwanese shark and tuna gillnet fishery, active until 1986, caused significant dolphin bycatch, impacting local populations (Harwood & Hembree, 1987; Young & Iudicello, 2007). In Japan, unsustainable bycatch in gillnets threatens local populations (Shirakihara & Shirakihara, 2012). Similar issues are reported in Bangladesh, Zanzibar, and other regions, where bycatch rates are unsustainable (Mansur *et al.*, 2012; Amir, 2010; Temple *et al.*, 2019).

2. Direct Exploitation - Indo-Pacific bottlenose dolphins face threats from direct exploitation, including hunting and live capture for captivity. Historically, they were targeted in drive fisheries in Taiwan and Madagascar (Kasuya, 2017; Jefferson & Curry, 2016). In Madagascar, hunting for local consumption and sale of meat has significantly impacted populations (Andrianarivelo, 2001). Live captures for oceanarium displays have occurred in several countries, with unsustainable removal levels reported in the Solomon Islands (Oremus *et al.*, 2013; Reeves & Brownell, 2009). Despite prohibitions, hunting persists in regions like Myanmar and the Seychelles (Tun, 2006; Kiszka, 2015).

3. Environmental Threats and Climate Change - The near-shore distribution of Indo-Pacific bottlenose dolphins makes them vulnerable to environmental degradation and pollution. In South Africa, high levels of persistent organochlorines have been found in dolphins, raising health concerns (Kannan *et al.*, 2000; Gui *et al.*, 2016). In Zanzibar and La Réunion, pollutants like DDTs and PCBs are present at varying levels (Mwevura *et al.*, 2010; Dirtu *et al.*, 2016). Diseases such as morbillivirus and lobomycosis-like conditions are increasing, potentially linked to habitat degradation (Kemper *et al.*, 2016). In Shark Bay, Western Australia, a marine heatwave in 2011 led to significant habitat loss and a decline in dolphin reproductive rates (Wild *et al.*, 2019).

22. COMMON BOTTLENOSE DOLPHIN

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Tursiops</i>
Species	: <i>T. truncatus</i> Montagu, 1821

Common Tamil Name: போத்தல்
மூக்கு ஓங்கில்

Key Identification Features:

- Dark grey dorsal colouration with off white/light grey ventral colouration.
- Sharp crease between the beak and forehead.
- Pronounced bottle-shaped beak, lower jaw extends beyond upper jaw.
- Tall falcate dorsal fin with a slightly hooked tip and a broad base.
- Dark medium sized slender flippers with pointed tips and broad base.
- Thick tail stock with relatively small tail flukes and distinct median notch.

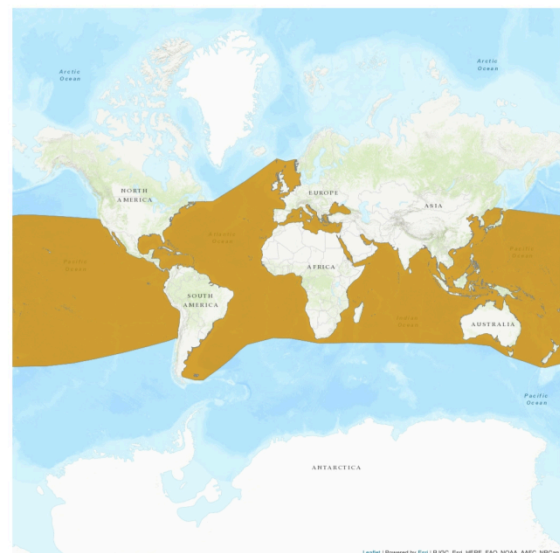
General Ecology:

Common bottlenose dolphins (*Tursiops truncatus* Montagu, 1821) are one of the three species the genus *Tursiops*. They inhabit temperate and tropical oceans worldwide, except polar waters (Wilson *et al.*, 1999; Leatherwood & Reeves, 2012). There are four recognised subspecies: *T. t. truncatus* (nominate subspecies), *T. t. gephyreus* (Lahille's bottlenose dolphin), *T.*

t. nuuanu (Eastern Tropical Pacific bottlenose dolphin), and *T. t. ponticus* (Black Sea bottlenose dolphin) (Society for Marine Mammalogy, 2021).



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Global distribution range of Common Bottlenose Dolphin (*Tursiops truncatus*). Source: IUCN Red List Assessment (2019).

Adult lengths range from about 2.5-3.8 m, varying by location (Wells & Scott, 2009). Highly social, these dolphins live in pods typically numbering about 15 individuals, though groups can range from pairs to over 1,000 for short periods (Shirihai *et al.*, 2006). Their diet mainly includes eels, squid, shrimp, and various fish species (Wells & Scott, 2009). Pods often

records predominantly reported from Orissa (Senapati, 2022, 2024).

Global threats:

- 1. Fishery-related Mortality** - Common bottlenose dolphins frequently become entangled in various fishing gears, such as gillnets, trawls, and longlines, posing significant threats to their populations (Wells & Scott, 2009; Wells *et al.*, 2008). Entanglements in set nets and driftnets are particularly problematic in the Mediterranean, with reports from countries like Algeria, Croatia, and Italy (Bearzi *et al.*, 2008; Di Natale & Notarbartolo di Sciara, 1994). These entanglements can lead to injury or

death, and the impact is often underreported. Incidental bycatch is a major concern, as dolphins are often caught unintentionally in fishing operations. In Peru, dolphins are caught in gillnets and sometimes used as bait (Mangel *et al.*, 2010). Although the scale of bycatch is poorly documented, evidence suggests it is unsustainable in some regions (Brotons *et al.*, 2008).

2. Boat Traffic and Acoustic Disturbance - Expanding boating and shipping in the Mediterranean has led to permanent or temporary avoidance of certain areas by bottlenose dolphins, raising concerns about habitat disruption and direct collisions (Dobler, 2002; Fortuna, 2007). Boat strikes pose an increasing threat to these dolphins, especially in regions with high levels of recreational and commercial boat traffic. Similar adverse effects have been observed globally, with boat strikes resulting in injury or death (Allen & Read, 2000; Lusseau, 2004, 2005). Additionally, noise from various human activities, such as seismic surveys, dredging, drilling, underwater explosions, and military or other sonars, is also a significant concern (Richardson *et al.*, 2013; Nowacek *et al.*, 2007).

3. Contamination and Outbreaks - Bottlenose dolphins are exposed to high levels of contaminants, such as PCBs and DDT, which can lead to reproductive disorders and immune system suppression (Lahvis *et al.*, 1995; Schwacke *et al.*, 2002). In the Mediterranean, contaminant levels are exceptionally high, posing significant health risks (Corsolini *et al.*, 1995;

Aguilar *et al.*, 2002). Specific epizootic outbreaks have been linked to immune system compromise from contaminants and stress (Aguilar & Borrell, 1994). Morbillivirus has caused several mass mortality events among bottlenose dolphins, notably in the western North Atlantic and Gulf of Mexico (Rowles *et al.*, 2011). During outbreaks, hundreds to thousands of dolphins have died, with actual mortality likely higher than documented (Williams *et al.*, 2011).

4. Prey Depletion - Overfishing has led to significant declines in prey availability for bottlenose dolphins, particularly in the Mediterranean, where many fish stocks are overexploited (Bearzi *et al.*, 2008; Caddy & Griffiths, 1990). This reduction in prey has contributed to lower dolphin densities in areas like the Adriatic and Ionian Seas, while densities remain higher where prey is abundant. Environmental degradation further exacerbates these challenges, impacting the dolphins' habitat and food sources. (Bearzi *et al.*, 2008).

E) PORPOISES

23. INDO-PACIFIC FINLESS PORPOISE

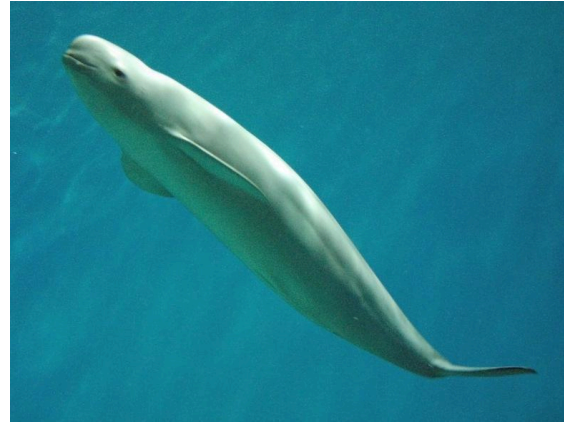
Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Artiodactyla
Infraorder	: Cetacea
Family	: Delphinidae
Genus	: <i>Neophocaena</i>
Species	: <i>N. phocaenoides</i> G. Cuvier, 1829

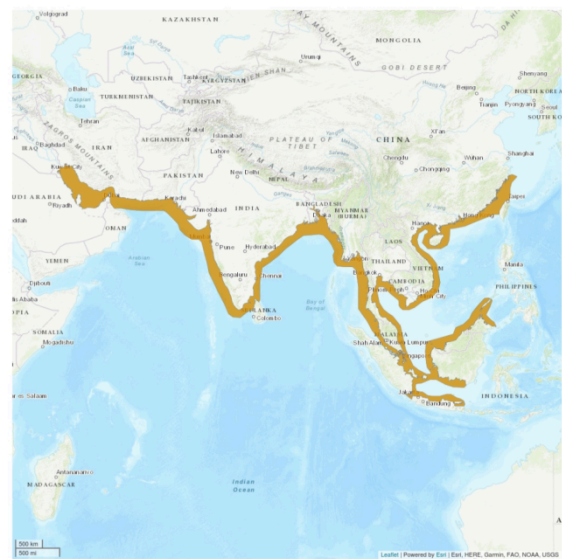
Common Tamil Name: துடுப்பில்லா
கடற்பன்றி

Key Identification Features:

- The body exhibits a uniform light grey coloration with a bluish tinge and lighter off-white ventral surface.
- The lips and chin display a lighter coloration compared to the rest of the body.
- The small, streamlined body lacks a dorsal fin but features a midline dorsal ridge.
- The area posterior to where the dorsal fin would typically be appears dark and is covered with small, rounded tubercles.
- A bulbous forehead characterizes the species, which lacks a distinct beak.
- The flippers are moderately long, broad, and terminate in pointed tips.
- Long, thin flukes with rounded tips feature a distinct median notch.



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Global distribution range of Indo-Pacific Finless Porpoise (*Neophocaena phocaenoides*). Source: IUCN Red List Assessment (2011).

General Ecology:

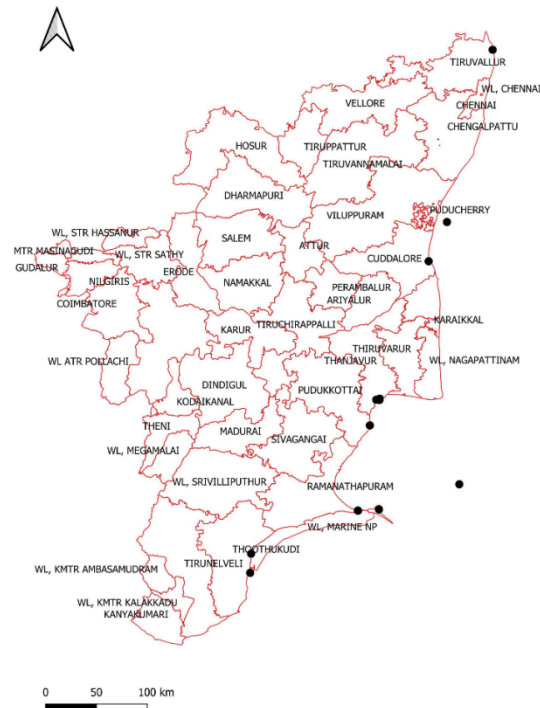
Indo-Pacific Finless Porpoises (*Neophocaena phocaenoides* G. Cuvier, 1829) are one of eight porpoise species inhabiting Asian coastal waters. They resemble miniature beluga whales and are distinguished by the complete absence of a dorsal fin, instead possessing a wide dorsal groove with small tubercles (Jefferson & Hung, 2004). Recent taxonomic revisions have split what was previously considered a single species into two: *N. phocaenoides* in the Indian Ocean and Southeast Asia and *N.*

asiaeorientalis in the eastern Pacific waters (Jefferson & Wang 2011), with the former being more tropical and wide-ranging of the two species. These shy and elusive cetaceans typically occur in small groups of 2-4 individuals, with recorded specimens measuring around 2-2.3 m and weighing around 60-70 kg. They avoid bow-wave riding and display boat-avoidance behaviour (Jefferson & Hung 2004). As opportunistic feeders, they hunt small fish, squid, and crustaceans in shallow coastal waters (Jefferson & Wang 2011; Shirakihara *et al.*, 1992). They produce both high-frequency clicks for echolocation and longer, low-frequency tones for communication, though they are generally less vocal than other cetaceans (Kasuya, 1999; Wang 1996).

Distribution:

Indo-Pacific finless porpoises inhabit shallow waters (usually <50 meters deep) along coastal regions, river mouths and estuaries around the northern rim of the Indian and western Pacific Oceans. Their range extends from the Persian/Arabian Gulf (Preen, 2004; Collins *et al.*, 2005) eastwards around the Indian Ocean to the Indo-Malay region (Ponnampalam, 2012), and northwards through Java, Indonesia to the Taiwan Strait and central Chinese waters (Gao, 1991; Gao & Zhou, 1995). Regular sightings occur in East Malaysia (Minton *et al.*, 2011) and year-round in Hong Kong (Jefferson *et al.*, 2002). They inhabit shallow waters in India along both eastern and western coasts, with documented sightings, strandings and entanglements (Sule *et al.*, 2017). Their presence has been recorded in Gujarat, Goa, Kerala, Karnataka, Tamil Nadu, Pondicherry, and Maharashtra (Jeyabaskaran *et al.*, 2016; Jog *et al.*, 2018;

Nammalwar *et al.*, 1994). Despite their common occurrence, published research on this species remains limited (Kumarran, 2012; Jog *et al.*, 2018).



Indo-Pacific Finless Porpoise (*Neophocaena phocaenoides*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

Global threats:

1. **Entanglements and Incidental Bycatches** – Like other phocoenids, finless porpoises, are highly vulnerable to gillnet entanglement (Jefferson & Curry, 1994), with significant mortality reported throughout their range (Jefferson *et al.*, 2002). Bycatch occurs in Iranian, Indian, Pakistani, and Malaysian waters, but the magnitude remains poorly documented (Collins *et al.*, 2005; Jaaman *et al.*, 2009; Braulik *et al.*, 2010). In Chinese waters, they are the most frequently captured cetaceans, with over 2,000 individuals

taken in 1994 through trawl, gill, and stow nets (Yang *et al.*, 1999). Similarly, regular captures occur in Hong Kong waters through trawl and gillnets, though bycatch levels remain unquantified (Parsons & Jefferson, 2000; Jefferson *et al.*, 2002).

2. **Environmental Disturbances** – The Indo-Pacific finless porpoise faces multiple threats beyond fishing-related mortality as a coastal species. Habitat loss and degradation result from extensive coastal modifications throughout Asia, including shrimp farming, causeways, and harbour development are a major issue (Reeves *et al.*, 2003; Braulik *et al.*, 2010). Additional threats including boat traffic and vessel collisions particularly problematic in Hong Kong waters (Parsons & Jefferson, 2000).

3. **Direct Hunting** – While no large-scale hunting targets this species, and direct killing remaining relatively rare (Reeves *et al.*, 1997), there are concerns about emerging small-scale fisheries in Southeast Asia. These may have developed from incidental captures, driven by the economic benefits of consumption and marketing, as traditional marine resources become depleted through overfishing (Perrin, 2002).

F) SIRENIANS

24. DUGONG

Taxonomy:

Domain	: Eukaryota
Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Sirenia
Family	: Dugongidae
Genus	: <i>Dugong</i>
Species	: <i>D. dugon</i> Müller 1776

Common Tamil Name: கடற்பசு

Key Identification Features:

- The body is large and cylindrical, tapering at both ends.
- Colouration varies, generally starting as a pale cream at birth and darkening to a brownish-to-dark-grey on the dorsal and lateral sides with age.
- The change in skin colour is due to the growth of algae on the skin.
- The body is sparsely covered with fine hair, mostly concentrated around the mouth.
- The snout is relatively large and rounded, ending in a muscular lip that hangs over the down-turned mouth.
- Tusks are present but are typically only visible through the skin in mature males.
- There is no dorsal fin, and the flippers are paddle-like.
- The tail flukes are flattened and have deep notches.



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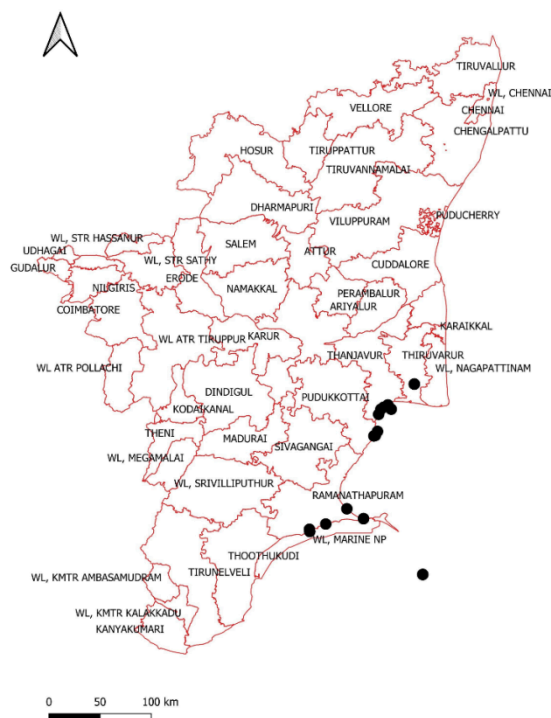
Global distribution range of Dugong (*Dugong dugon*). Source: IUCN Red List Assessment (2019).

General Ecology:

Dugongs (*Dugong dugon* Müller 1776) are one of the four extant species within the order Sirenia, including three manatee species. It is the sole surviving member of the once-diverse family Dugongidae. They measure anywhere from 2 to 4 m in length and correspondingly weigh around 200 to 500 kg with some records of even 900 kg. Dugongs rely heavily on seagrass communities for their sustenance, which confines them to coastal habitats supporting seagrass meadows. The largest populations of dugongs are typically found in expansive, shallow, and sheltered areas

(Wells *et al.*, 1998), the only remaining population in western India. Former populations centred around the Maldives and the Lakshadweep are believed to be extinct (Husar, 1975). There exists a population in the Gulf of Mannar and the Palk Strait, inbetween India and the west coast of Sri Lanka (Frazier & Mundkur, 1990), as well as in the Andaman and Nicobar Islands (Das & Dey, 1999). Herds of hundreds of dugongs were once reported in the Palk Strait (Annandale, 1905). Although large during British rule, the Andaman & Nicobar is now considered small and scattered (Marsh *et al.*, 2011). Recent recoveries of seagrass beds along former ranges of dugongs, such as Chilika Lake, have been confirmed, raising hopes for recolonisation of the species (Naik *et al.*, 2008).

1. Direct Hunting - Artisanal coastal and riverine fisheries are crucial for coastal communities' livelihoods and food security, particularly in tropical regions (Batista *et al.*, 2014), including most dugong habitats. Although dugongs are legally protected across much of their range, the enforcement of these protections is often weak or non-existent (Robards & Reeves, 2011). Artisanal fishers may be further compelled to break the law due to the lucrative opportunity to sell dugong meat and for other esoteric usages in folk medicine, amulets, charms, jewellery, carvings, religious artefacts, leather products and others (Marsh *et al.*, 2011). In the Gulf of Mannar and Palk Bay, methods such as gill nets, shore seines, trawl nets, drift nets, ray nets, and even explosives have been employed to hunt dugongs (Bensam &



Dugong (*Dugong dugon*) along Tamil Nadu (black dots). Data source: Sighting and Strandings Database, Marine Mammals Research & Conservation Network of India (2025).

Distribution:

A highly isolated population is present in the Marine National Park, Gulf of Kutch

Menon, 1996). Reports indicate that captures numbered 200 dugongs per year from 1983 to 1984, but this figure declined to 9 from 1986 to 1988 (Bensam & Menon, 1996).

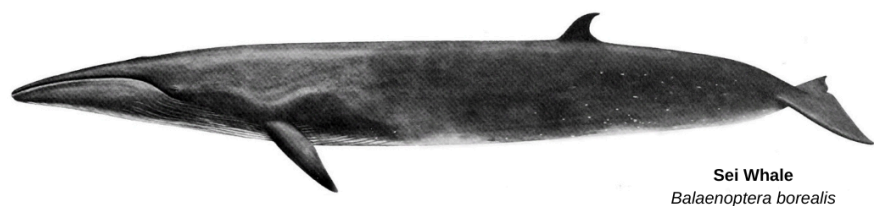
2. **Entanglement in Fishing Gears** - Gill nets pose a significant threat to many marine mammals, including dugongs (Read *et al.*, 2006; Moore *et al.*, 2010; Pilcher *et al.*, 2017; Marsh *et al.*, 2011). The decline in some dugong populations has been linked to the introduction of monofilament nylon gill nets (Muir *et al.*, 2012). In the Gulf of Mannar and Palk Bay waters, the extensive use of gill nets has been reported to cause annual dugong mortality, with an average of 40 dugong deaths yearly (Nair *et al.*, 1975). However, reports indicate that awareness and protection efforts by the Government of India and the Tamil Nadu Forest Department have significantly reduced the incidental capture of dugongs (Ilangakoon *et al.*, 2008).
3. **Boat Strikes** - The mortality risk from boat strikes is increasingly recognised as a significant management issue for marine wildlife, including dugongs. Communities reliant on marine tourism and recreational fishing are major hotspots where dugong populations suffer injuries and fatalities due to boat strikes (Maitland *et al.*, 2006). When fast-moving motorised boats travel through shallow feeding grounds, dugongs have less time to avoid collisions (Marsh *et al.*, 2011, Hodgson, 2004).

4. **Habitat Degradation** - development is another significant factor affecting dugongs. Severe wave action, shifting sediment, and reduced light cause extensive damage to seagrass beds (Thorogood, 1990). In response to the loss of feeding, dugongs travel extensively in search of seagrass, leading to increased capture in nets (Heinsohn & Spain, 1974). Additionally, these seagrass specialists delay breeding when faced with seagrass loss (Preen & Marsh, 1995). The impact of chemical and noise pollution on dugongs remains unquantified (Marsh *et al.*, 2011).

IV. AMBIGUITIES ON THE DISTRIBUTION OF CERTAIN MARINE MAMMALS IN THE COASTAL AND MARINE AREAS OF TAMIL NADU

The consolidated list of marine mammals presented here is based on historical and recent scientific publications and reports. However, t

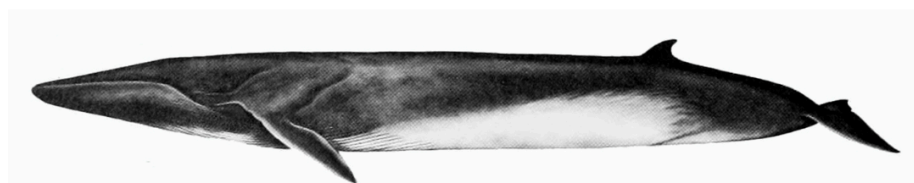
Historical records of Sei Whale (*Balaenoptera borealis*) and Fin Whale (*B. physalus*) strandings along the Tamil Nadu coast from the 1960s to 90s, particularly around the Gulf of Mannar and Palk Bay, have been documented (Sathasivam, 2000).



Sei Whale
Balaenoptera borealis



Bryde's Whale
Balaenoptera edeni



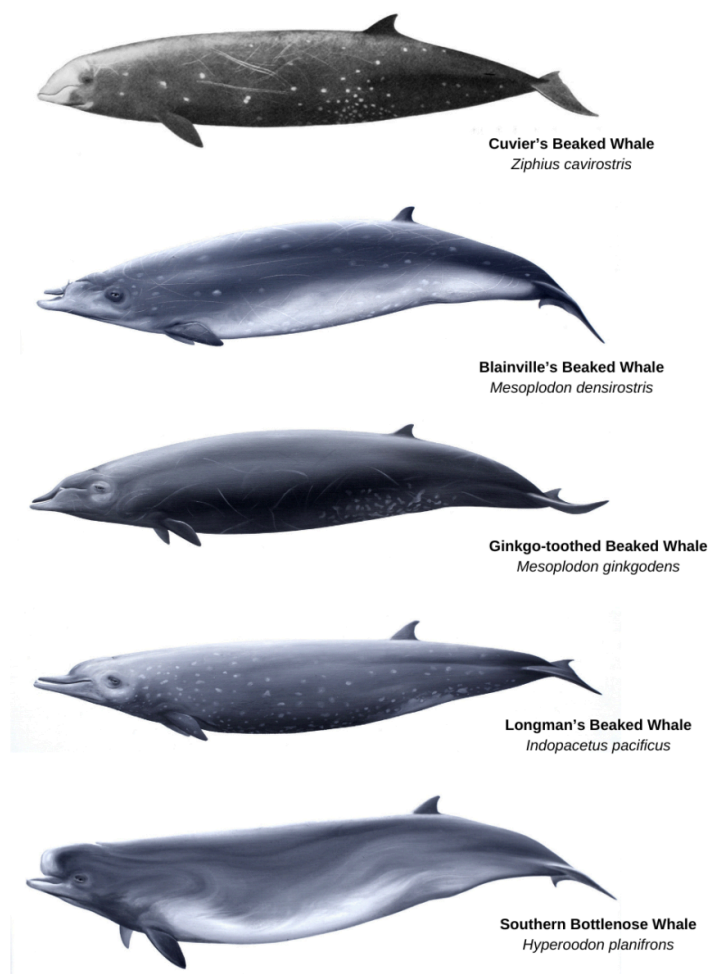
Fin Whale
Balaenoptera physalus

Morphological similarities between Bryde's, fin and sei whale

RareDegraded whale carcasses that wash ashore further complicate accurate identification. Brownell *et al.* (2017) reported that the individuals stranded in Sri Lanka and identified as fin whales prior to 2005, as noted by Ilangakoon (2002), were misidentified and were most likely blue whales, Bryde's whales, or possibly even Omura's whales (*B. omurai*). Subsequently, Ilangakoon (2012) did not list sei whales among the marine mammals in Sri Lanka, noting that some specimens previously identified as sei or fin whales were later confirmed to be Bryde's whales. Dudhat *et al.* (2022) studied marine mammal stranding hotspots along the Indian coastline and noted the lack of confirmed evidence and the retroactive misidentification of sei and fin whales. Anderson (2014) whilst the northern Indian Ocean may host sei whales and fin whales, these are likely being confused with Bryde's whales. They also commented on reports of Bryde's and sei whales in tuna fishing

areas, with conflicting accounts about which species were present, highlighting the need for expert identification and genetic testing.

The absence of recent sightings or strandings, particularly along Tamil Nadu raises further questions. The possibility of these whales having an extralimital distribution in the Bay of Bengal exists, so does the chance that these species once inhabited Indian waters but have since relocated for unknown reasons. Without further research, these ideas remain speculative. The IUCN Red List does not include in fsw (Cooke, 2018a, 2018b). Determining the distribution of marine mammals is inherently difficult without confirmed sightings or genetic evidence from strandings. Poor documentation and limited marine survey data also contribute to this lacuna. studies and proper documentation could distribution in the Indian Ocean.



Beaked Whales supposedly found in the northern Indian Ocean

Beaked whales are amongst the least-known groups of mammals due to their deep-sea habitat, reclusive behaviour and apparently low abundance (Bianuccia *et al.*, 2008). As of 2024, the Society for Marine Mammalogy Committee on Taxonomy recognises 24 extant species of beaked whales six genera. However, few species are reasonably well-known and studied. ive species of beaked whales – Blainville's beaked whale (*Mesoplodon densirostris*),

Cuvier's beaked whale (*Ziphius cavirostris*), ginkgo-toothed beaked whale (*M. ginkgodens*), Longman's beaked whale (*Indopacetus pacificus*), and southern bottlenose whale (*Hyperoodon planifrons*) – are known to inhabit Indian waters. However, only Cuvier's beaked whales have confirmed sightings and stranding the Tamil Nadu coasts as discussed previously.

Blainville's beaked whales have been recorded along the coastal areas of Karnataka ('Rare sighting of...', 2023) and the Nicobar Islands (Corbet & Hill, 1992), but there are no records of their presence along the Tamil Nadu coast. Ginkgo-toothed beaked whales have been recorded along Sri Lankan coasts (Leatherwood & Reeves, 1989) but confirmed strandings exist in Indian waters. Longman's beaked whales have no presence in India (Sathasivam, 2000) . . Southern bottlenose whales have no records from India, though the species is reported from Sri Lanka (Alling, 1986). Sightings of bottlenose whales in tropical and subtropical waters were likely misidentifications of Longman's beaked whales rather than actual southern bottlenose whales.

Four recognised humpback dolphin species, the Indo-Pacific (*Sousa chinensis*) and Indian Ocean (*S. plumbea*) humpback dolphins have considerable overlap in their distribution around the Indian coasts. The Indo-Pacific humpback dolphin predominantly occupies the northeastern Indian Ocean, while the Indian Ocean humpback dolphin is more common in the northwestern Indian Ocean (Liu *et al.*, 2021). This overlap around the Indian peninsula has led to confusion in accurately identifying these similar-looking species. Size and appearance are key differentiators. Both species are medium-sized delphinids, but on average, Indo-Pacific humpback dolphins are larger and weigh more than Indian Ocean humpback dolphins. In terms of colouration, the Indo-Pacific humpback dolphin is born dark grey and becomes mottled or entirely pink with age. In contrast, the Indian Ocean humpback dolphin remains light or dark grey throughout its life. Another distinguishing feature is the shape of the hump: Indo-Pacific humpback dolphins have a broad hump that gradually slopes into the body leaving only a slight hint of the hump. In contrast, Indian Ocean humpback dolphins have a more prominent and pronounced hump (Parra & Jefferson, 2018).



Indo-Pacific Humpback Dolphin
Sousa chinensis



Indian Ocean Humpback Dolphin
Sousa plumbea

Indo-Pacific and Indian Ocean humpback dolphin

Adding to the confusion, the Indian Ocean humpback dolphin was only recognised as a separate species in 2014 (Jefferson & Rosenbaum, 2014). Consequently, earlier publications reporting sightings or strandings of Indo-Pacific humpback dolphins in Indian waters may have inadvertently included misidentified Indian Ocean humpback dolphins. This document includes only the Indo-Pacific humpback dolphin as having a distribution in Tamil Nadu waters, as they are the predominant species in the northeastern Indian Ocean. The recently recognised Indian Ocean humpback dolphin requires further research and documentation to confirm its presence in Tamil Nadu waters.

V. MARINE CONSERVATION FRAMEWORKS: GLOBAL TO REGIONAL

international organisations have established frameworks for the conservation through treaties and conventions. At its core lies the United Nations Convention on the Law of the Sea (the Law of the Sea Convention), which came into force in 1994 with 169 signatories, including India. The international framework primarily focus on ocean governance. The Convention comprises 320 articles and nine annexes, covering critical aspects such as maritime boundary delimitation, environmental protection, marine scientific research, commercial exploitation of resources, technology transfer, and the resolution of disputes concerning ocean governance, particularly in areas beyond national jurisdiction. The recently adopted Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement), finalised in 2023, complements UNCLOS by addressing crucial issues such as ocean ecosystem degradation and biodiversity loss. The primary objective of this legally binding treaty is to ensure the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction, both for present and future generations, through the effective implementation of relevant UNCLOS provisions and enhanced international cooperation.

Established in 1992, the Convention on Biological Diversity (CBD) serves as a comprehensive international framework aimed at conserving biological diversity, promoting the sustainable use of its components, and ensuring the fair and equitable sharing of benefits arising from the utilization of genetic resources. To advance these goals, the CBD has been supplemented by agreements such as the Nagoya Protocol, which addresses access to genetic resources and benefit-sharing, and the Cartagena Protocol on Biosafety, focusing on the safe handling of living modified organisms. In 2022, the adoption of the Kunming-Montreal Global Biodiversity Framework set forth ambitious targets for 2030, including the protection of 30% of global terrestrial and marine areas. Furthermore, the Jakarta Mandate underscores the importance of conserving marine and coastal biodiversity, aligning with the CBD's overarching objectives. Several species-specific conventions further strengthen this protection, notably the Convention on International Trade in Endangered Species of Wild Fauna and Flora CITES (1973) for regulating marine species trade, the International Whaling Commission (1946) for whale conservation, and the Convention on Migratory Species of Wild Animals (1979) for protecting marine migrants. India is also a party to these conventions and has effectively implemented their objectives through various national legislations.

There are frameworks that address pollution prevention and environmental protection measures. The International Convention for the Prevention of Pollution from Ships (1973/1978) addresses ship-based pollution prevention, regulates harmful substances and designates protected areas. There are also region-specific legislatures such as the Marine Protection, Research and Sanctuaries Act (1972), authorised by the Environmental Protection Agency, that regulates ocean dumping of waste and provides for the designation and

regulation of marine sanctuaries within US waters, the Oslo-Paris (OSPAR) Convention (1998) for Northeast Atlantic protection, and the Barcelona Convention (1976) for Mediterranean Sea conservation. The Marine Mammal Protection Act (1972) was implemented particularly in response to anthropogenic threats faced by marine mammals and primarily governs all US territories and vessels.

India's marine conservation efforts are structured through a comprehensive legislative implementation framework, both at national and state levels. The Wild Life (Protection) Act 1972 serves as the cornerstone legislation for species protection on the national level, providing Schedule I and II protection for various species and establishing the legal framework for protected areas. The Biological Diversity Act was enacted in 2002 and amended in 2023 to promote the conservation of biological resources, the sustainable use of their components, and the fair and equitable sharing of benefits arising from their utilisation, including marine biological resources. It is implemented through the National Biodiversity Authority to help fulfil India's international conservation commitments. The Indian Forest Act (1927) consolidates laws relating to forests and forest produce. It applies to forest lands in coastal areas, especially mangrove forests, which are usually declared reserve forests.

India coastal management is primarily governed by the Coastal Regulation Zone Notification 2019 issued under the Environment (Protection) Act, 1986, which provides detailed guidelines for coastal development regulation and marine biodiversity protection. It also focuses on the conservation and management of Ecologically Sensitive Areas (ESAs), including mangroves, seagrasses, sand dunes, coral reefs, biologically active mudflats, turtle nesting grounds, and horseshoe crab habitats. The regulation prohibits developmental activities and waste disposal in these fragile coastal ecosystems. The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act 1976 empowers India to delineate its maritime zones and assert its sovereignty, safeguarding its interests while balancing national rights with international obligations. It also elucidates India's rights to explore, exploit, conserve, and manage natural resources within these zones, along with its jurisdiction over scientific research and marine environmental protection. The Coast Guard Act, 1978, ensures the security of India's maritime zones to safeguard marine and other national interests within these areas, as well as matters related thereto.

India has notified 130 Marine Protected Areas across its coastal states (24) and islands (106). Additionally, 106 sites have been identified and prioritised as Important Coastal and Marine Biodiversity Areas (ICMBAs) to safeguard marine species through targeted conservation efforts, focussing on marine biodiversity protection, habitat preservation and sustainable resource management. The Centre for Marine Living Resources and Ecology (CMLRE), an institute under the Ministry of Earth Sciences (MoES), is tasked with developing management strategies for marine living resources through ecosystem monitoring and modelling activities. The centrally sponsored scheme Integrated Development of Wildlife Habitat (IDWH) aims to protect and manage wildlife habitats and threatened species such as marine turtles, dolphins, and dugongs, which are prioritised for assessment and population monitoring. Project Dolphin, initiated in 2021 by the Ministry of Environment, Forest and

Climate Change (MoEFCC) under the purview of the Wildlife Institute of India, seeks to protect riverine and oceanic dolphins.

ernmentTamil Nadu has developed particularly robust marine conservation measures. The Tamil Nadu Marine Fishing Regulation Act, 1983 (Act No. 8 of 1983) provides specific provisions for territorial waters management and definitions of fishing zones. The act also imposes seasonal fishing ban for stock enhancement during breeding seasons. The Tamil Nadu State Forest Policy adopted in 2018 further strengthens measures through coastal forest protection and mangrove conservation initiatives.

stablishment of the Gulf of Mannar Marine National ParkSouth Asia's first marine biosphere reserve r, Dugong Conservation Reserve in Palk Bay,covering the coastal waters of Thanjavur and Pudukottai districts, with an area of 448 square kilometres. This reserveis also a testament to Tamil Nadu's commitment to conservation. It is India's first reserve dedicated to protecting dugongs and their habitats. The state government also launched India's first Marine Elite Force in Ramanathapuram in the same year to protect the marine resources and biodiversity in the Gulf of Mannar and Palk Bay. The following year, the state government implemented the Tamil Nadu Coastal Restoration Mission at a cost of ₹ 2000 crore over the next five years. The mission comprises projects to strengthen coastal biodiversity, improve coastal livelihood through sustainable tourism, and reduce plastic waste in marine environments.

These conservation measures are enacted by a well-structured institutional framework that includes the Tamil Nadu State Fisheries Department, Tamil Nadu Forest Department, National Coastal Zone Management Authority (NCZMA), and the Gulf of Mannar Biosphere Reserve Trust. This multi-tiered approach ensures comprehensive protection of marine ecosystems while balancing conservation needs with sustainable resource use.

regional1. Rapid Response & Rescue

To mitigate the rising trend of marine mammal strandings along the Tamil Nadu coastline, it is crucial to adopt a multifaceted approach. Strengthening community-based monitoring and enhancing postmortem investigations will provide valuable insights into the causes of strandings. Collaboration between researchers and local authorities is essential to develop effective conservation strategies. Focusing on high-risk areas like the Gulf of Mannar and Palk Bay, implementing sustainable fishing practices, and raising public awareness can significantly reduce human-induced threats. Additionally, long-term research on the impacts of climate change and proactive conservation measures are vital to safeguarding Tamil Nadu's vulnerable marine mammal populations. long-time management activity

VII. COMPREHENSIVE GUIDE TO MARINE MEGAFUNA STRANDING RESPONSE

Stranding refers to the occurrence of marine life, such as cetaceans, sea turtles, and pinnipeds, being found in situations where they are return to their natural habitat without assistance. Cetaceans are considered stranded when they are dead on the beach or floating in the water, or alive on the beach but unable to return to the sea. Live-stranded animals typically require medical attention or professional help to facilitate their return to the ocean. Marine animals are strand for numerous reasons, with the predominant causes varying by species. Common causes include, but are not limited to, ship or vessel collisions, entrapment or entanglement in fishing gear, infections and diseases, parasitism, starvation, noise pollution, and unusual weather events (Understanding Marine Wildlife Stranding and Response: NOAA)

Marine megafauna, including whales, dolphins, porpoises, and dugongs, frequently strand along coastlines due to natural and human-induced factors. Effective response requires coordinated efforts involving government agencies, marine biologists, veterinarians, NGOs, and local communities. The following cumulative guidelines have been sourced from the manuals to create a standardized response framework for handling marine mammal stranding incidents.

A) Causes of Marine Mammal Strandings

Natural Causes:

- Disease and parasitic infections
- Old age and natural mortality
- Predation and physical injuries
- Extreme weather conditions (storms, earthquakes, tidal shifts)

Human-Induced Causes:

- Fishing Gear Entanglement
- Boat Strikes
- Pollution
- Noise Disturbance
- Habitat Destruction

B) Stranding Types & Identification

- Single Stranding - Usually involves sick, injured, or disoriented individuals, more common in coastal species.

- Mass Stranding - Involves multiple individuals of the same species, typically social marine mammals like pilot whales, may be triggered by environmental factors or social cohesion.
- Beaching - Dead strandings, carcasses washed ashore due to natural death at sea or post-mortem drift.

C) Immediate Response Protocol

Step 1: Report & Secure the Area

- Notify authorities by contacting marine rescue organizations, fisheries departments, and local law enforcement.
- Keep crowds away to reduce stress and prevent interference.
- Assess safety risks, including sharp objects, waves, and dangerous marine predators.

Step 2: Assess the Animal's Condition

- Determine if the animal is alive or dead by checking breathing and responsiveness.
- Observe vital signs such as blowhole movement, body temperature, and skin condition.
- Look for signs of injury, including cuts, bleeding, or entanglement marks.
- Identify the species, which is essential for proper handling and conservation reporting.

Step 3: Provide Emergency First Aid

For Live Strandings:

- Ensure the blowhole is clear and unobstructed by sand or water.
- Provide hydration and cooling by covering the body with wet towels, but do not cover the blowhole.
- Position the animal upright or on the belly and avoid rolling it unnecessarily.
- Minimize noise and stress by avoiding sudden movements and loud sounds.

For Dead Strandings:

- Document the carcass by taking photographs and noting injuries and the decomposition state.
- If trained, collect samples of tissue, stomach contents, and blubber for necropsy.
- Prepare for disposal through burial, incineration, or leaving it for natural decomposition.

D) Handling & Transport

Small to Medium-Sized Marine Mammals:

- Use stretchers, tarpaulins, or inflatable rafts.
- Avoid dragging animals over rough terrain.
- Ensure flippers and blowhole remain free from obstruction.

Large Whales & Dugongs:

- Heavy machinery (cranes, front-end loaders) is required.
- Helicopter transport may be necessary for certain cases.
- Keep the animal moist throughout transportation.

Rehabilitation & Relocation:

- Assess suitability for release, ensuring only healthy animals are returned to the ocean.
- Gradually acclimatize the animal by supporting it in shallow water before full release.
- Monitor for re-stranding using satellite tags or visual observation.

E) Necropsy & Data Collection

Necropsy Objectives:

- Determine cause of death.
- Identify diseases, parasites, or human-related injuries.
- Collect biological samples for research.

Standard Sample Collection:

- Tissue & Blubber: For toxicology and genetic analysis.
- Stomach Contents: Check for plastic ingestion or poisoning.
- Skin & Organs: Histopathology for disease identification.

F) Carcass Disposal Methods

1. **Burying** – Preferred method; dig deep trenches to prevent health hazards.
2. **Burning** – Used only if necessary for disease control.
3. **Leaving in Place** – Allowed in remote, uninhabited areas.

G) Stranding Prevention & Conservation

Public Awareness & Training:

- Conduct workshops for fishermen, coastal communities, and first responders.
- Promote responsible fishing practices to reduce entanglements.

Use of Technology:

- Drones & Satellite Tracking – Monitor marine mammal movements.
- Mobile App & Hotlines – Report strandings in real-time.

Legislation & Policy Advocacy:

- existing laws protecting marine mammals.
- Collaborate with defence and maritime agencies for large-scale response efforts.

This highlights the necessity of a multidisciplinary approach stranding responses, rescue, rehabilitation, research, and policy implementation for. By integrating standard and best practices from various sources, it ensures effective intervention, improved data collection, and the long-term conservation of marine megafauna. Additionally, manuals provide procedures for response to stranding events.

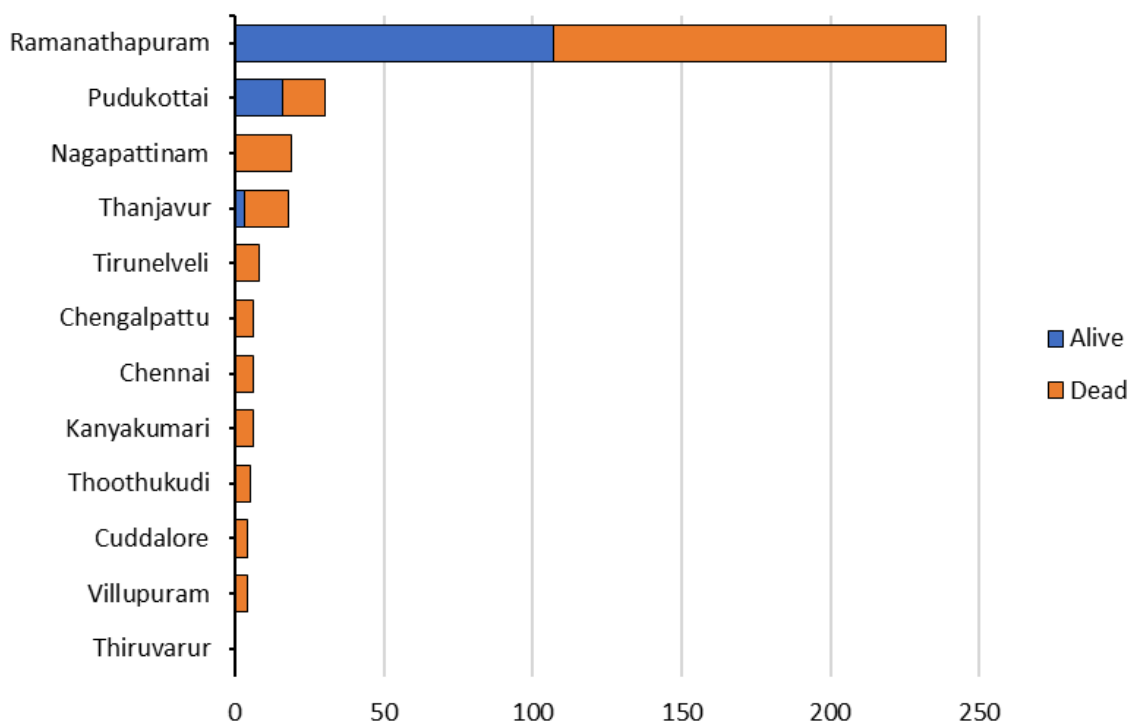
1. Title: A Manual on Marine Mammal Stranding Response (2022)
Authors: Sivakumar, K., Rajpurkar, S., Tripura, V., Dixit, D., Pande, A., Prabakaran, N., & Johnson, J.A.
Published by: Wildlife Institute of India
Available at: https://wii.gov.in/marine_manual_2022
2. Title: Marine Mega Fauna Stranding Management Guidelines (2021)
Published by: Ministry of Environment, Forest and Climate Change, Government of India
Available at: <https://moef.gov.in/uploads/2018/03/MARINE-MEGA-.pdf>
3. Title: Training Manual - GOI-UNDP-GEF Sponsored Training Programme - Dealing with Marine mammals stranding in India (2014)
Compiled and edited by: Ramkumar, S., Sakthivel, M., Mhatre, V. D., & Gopakumar, G.
Published by: Central Marine Fisheries Research Institute
Available at: <https://eprints.cmfri.org.in/10469/>

VIII. OVERVIEW OF MARINE MAMMAL STRANDINGS AND SIGHTINGS IN TAMIL NADU (2020-2024)

While historic records of marine mammal sightings and strandings exist along the coastal and marine regions of Tamil Nadu, recent observations are somewhat limited and necessitate more systematic documentation. Sighting and stranding data were acquired for the period from 2020 to 2024. Details regarding the date, location, latitude and longitude, species, number, and status of the animal (dead or alive), cause of death if determined, first observer, and subsequent actions taken for both live sightings and dead strandings were collected. Irrelevant observations such as turtles and sharks were removed from the dataset for further analysis. The incomplete, categorised into generalised groups such as 'whales' and 'dolphins', rather than specifying the exact species. Therefore, similar generalised categories – whales, dolphins, porpoises, dugongs – were used unless specified otherwise.

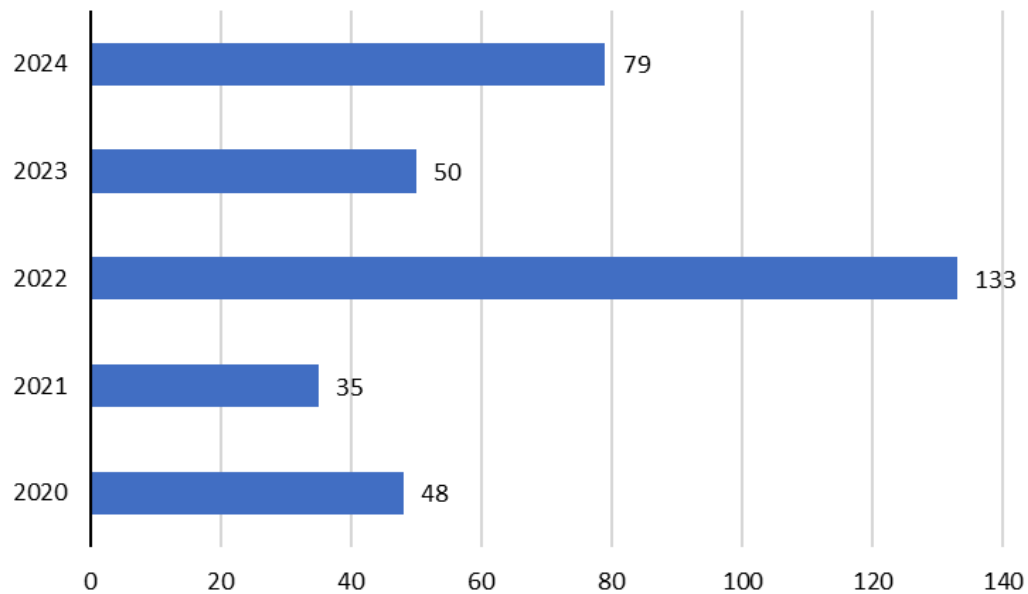
Data Collected from Coastal Divisions:

Data were from twelve coastal divisions of Tamil Nadu: Chengalpattu, Chennai, Cuddalore, Kanyakumari, Nagapattinam, Pudukottai, Ramanathapuram, Thanjavur, Thiruvavur, Thirunelveli, Tuticorin, and Villupuram. The highest number of observations, both dead and alive, was documented in Ramanathapuram, followed by Pudukottai and Nagapattinam.



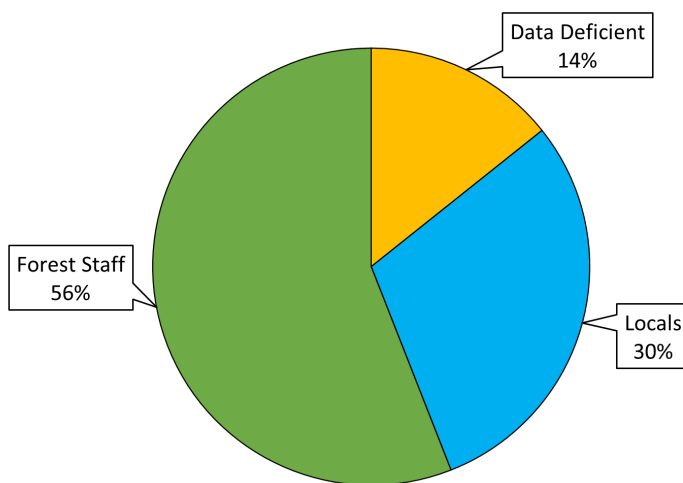
Graphical representation of all observations (live sightings and dead strandings) across Tamil Nadu's coastal divisions from 2020 to 2024 (n=345).

both , followed by Least number of .



Graphical representation of all observations (live sightings and dead strandings) across 2020 to 2024 (n=345).

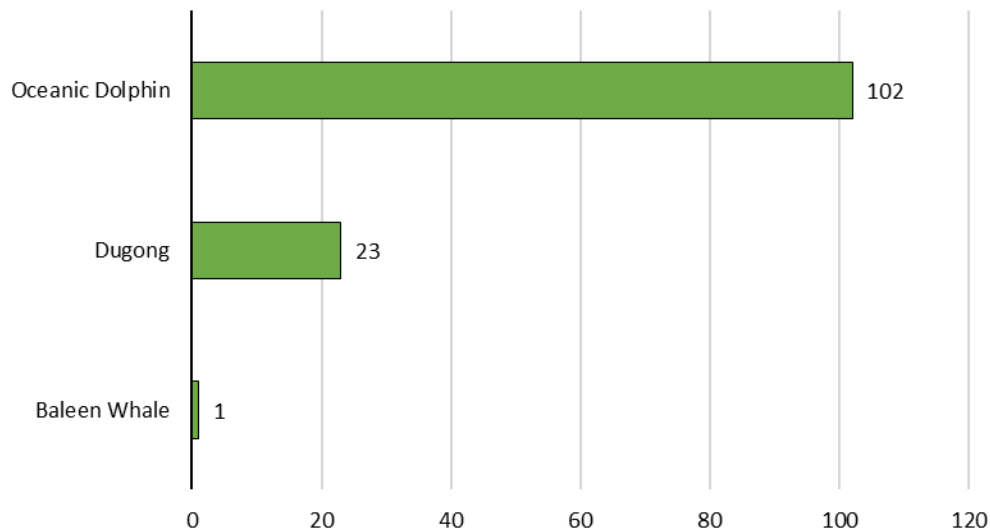
staff latter presumably includes a mixture of residents, fishermen, and visitors.



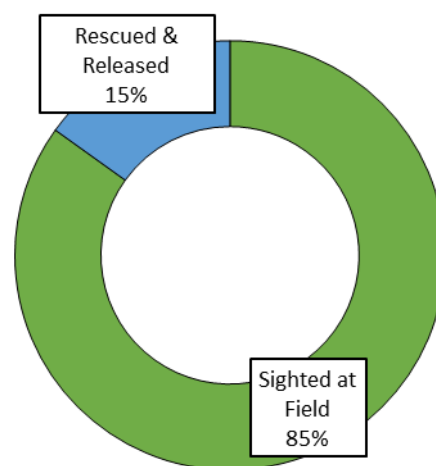
Graphical representation of first observer of marine mammals across Tamil Nadu's coastal divisions from 2020 to 2024 (n=252).

Live Sightings of Marine Mammals:

were documented only three divisions - Ramanathapuram, Pudukottai, and Thanjavur.



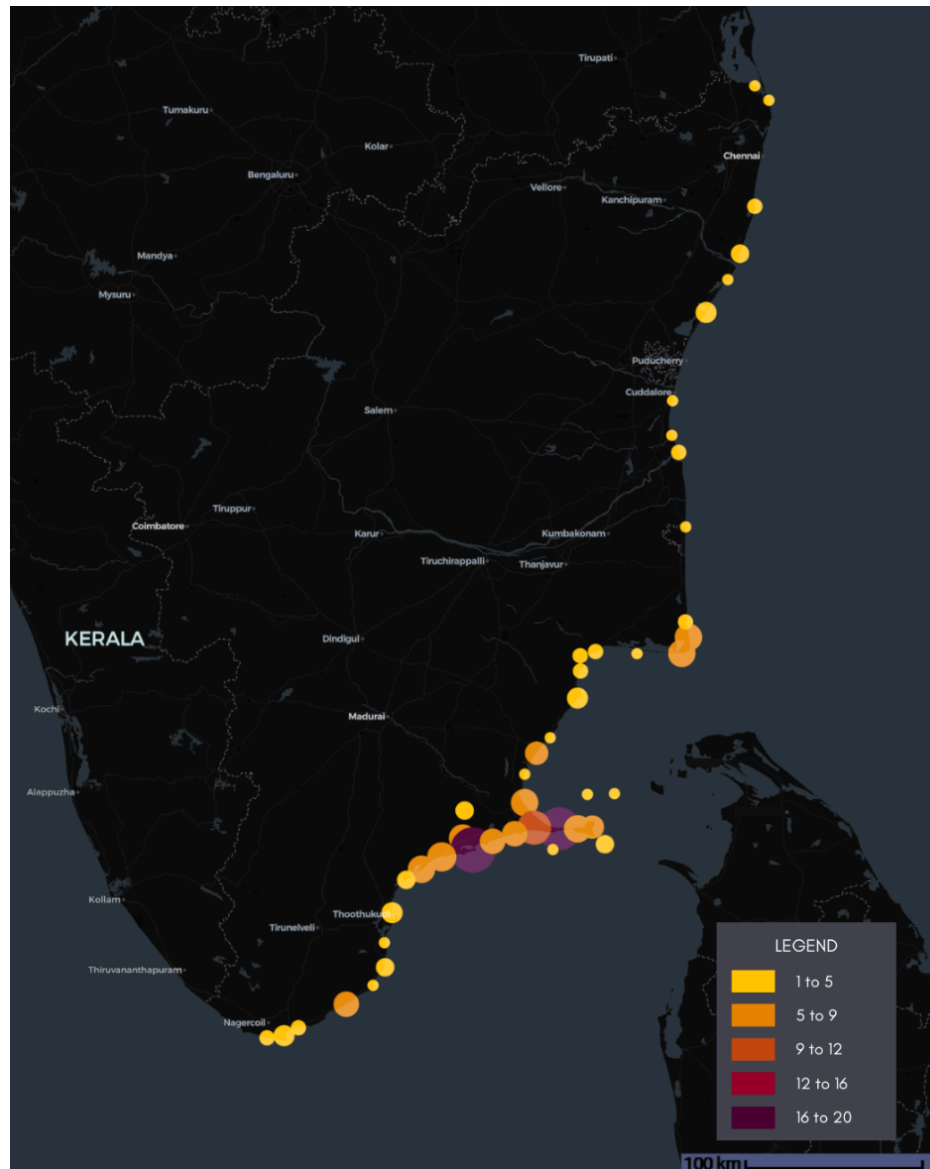
Graphical representation of live sightings of different marine mammal groups across Tamil Nadu's coastal divisions from 2020 to 2024 (n=126).



Graphical representation of course of action on sighting live marine mammals across Tamil Nadu's coastal divisions from 2020 to 2024 (n=126).

Dead Strandings of Marine Mammals:

intensityClusters were aggregated based on the number of animals stranded within an approximate radius of 1 to 30 km. The map a series of circles along the coastline, each representing the number of stranded marine mammals. increasesize and colour intensity of circle number of stranding, as indicated by the legend.



Bubble cluster heatmap of dead strandings frequency of marine mammals across Tamil Nadu's coastal divisions from 2020 to 2024 (n=219).

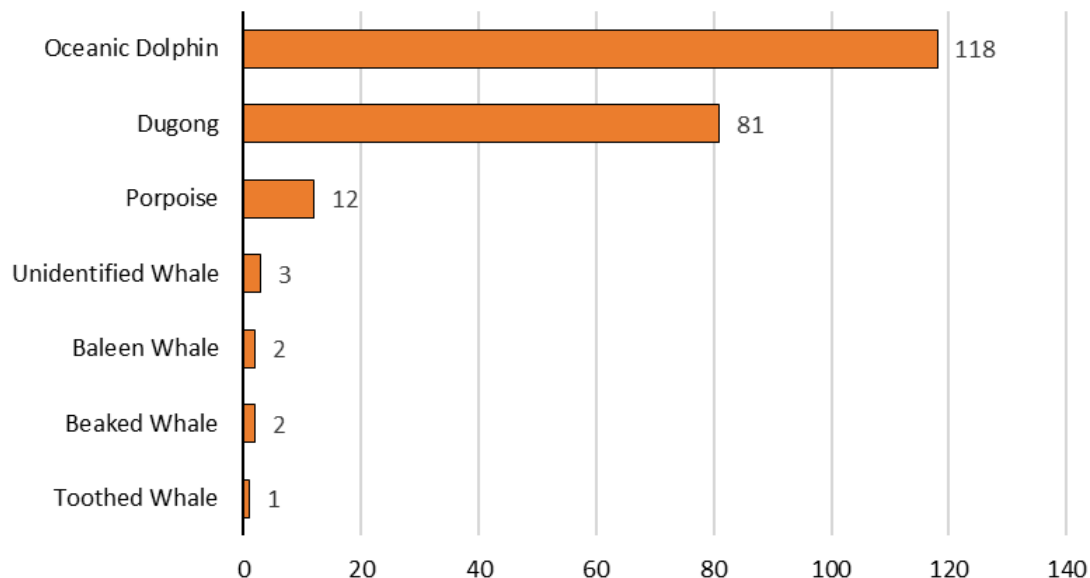
620,he southern coastline, particularly near the Gulf of Mannar and Palk Bay. The southern especially near Rameswaram and Tuticorin, exhibit moderate density clusters (12 to 16)the circles become smaller and lighter, reflecting fewer stranding (1 to 5). This pattern suggests that the factors causing strandings may be more prevalent or severe in the southand southeastern coastcompared to the northern coast.

The Gulf of Mannar and Palk Bay areas are renowned for their high biodiversity. attract a wide variety of aquatic fauna, including marine mammals (Retnamma *et al.*, 2021). However, this also thatheighten the risk of stranding, stemming from anthropogenic factors.

Dudhat *et al.* (2022) conducted a spatio-temporal analysis to identify marine mammal stranding hotspots along the Indian coastline, highlighting al areas such as Rameshwaram, Thoothukudi, and Chennai. that a combination of anthropogenic factors, fishing gear

entanglement, vessel strikes, and noise pollution, these areas becoming stranding hotspots. evidenced the cluster map, which intens fishing and shipping activities prevalent.

Dead strandings dominate the dataset. Oceanic Dolphins (53.9%) Dugongs (37.0%), Porpoises (5.5%), unidentified Whales (1.4%), Baleen Whales (0.9%), Beaked Whales (0.9%), and Toothed Whales (0.4%).

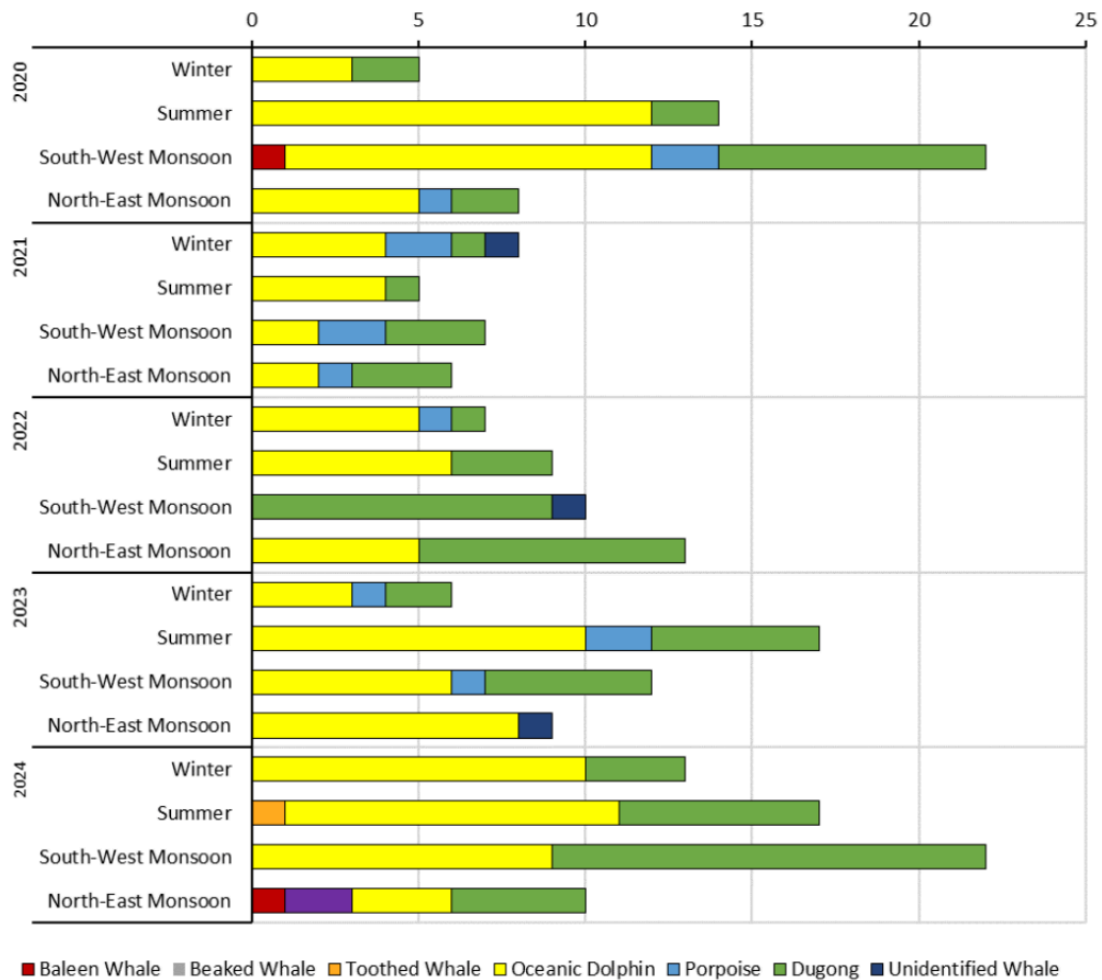


Graphical representation of dead strandings of different marine mammal groups across Tamil Nadu's coastal divisions from 2020 to 2024 (n=219).

ottlenose, humpback, rough-toothed, and spinner dolphins, as well as pygmy killer and pilot whales, are grouped under “Oceanic Dolphin”. Blue and Bryde’s whales were grouped under “Baleen Whale”. The “Toothed Whale” category had only one observation. “Porpoise” generally refers to Indo-Pacific finless porpoises. The specific species of beaked whale was not identified in the data received, but genetic studies later confirmed it as Cuvier's beaked whale, as verified by AIWC researchers who assisted with the post-mortem examinations.

Seasonal Variation in Dead Strandings:

to understand the impact stranding. our seasons were categorised based on Tamil Nadu's climat: Winter (January to February), summer (March to May), south-west monsoon (June to September), and north-east monsoon (October to December).



Graphical representation of dead strandings of different marine mammal groups over different seasons across Tamil Nadu's coastal divisions from 2020 to 2024 (n=219).

The graph illustrates the variation in marine mammal strandings across different seasons and years, with distinct peaks and troughs. The most significant peak occurs during the south-west monsoon 2020. 2022, there is a noticeable increase in strandings, particularly during the south-west and north-east monsoon seasons. Winters and summers generally have fewer strandings compared to the monsoon seasons.

Oceanic dolphins consistently have the highest number of strandings across most seasons, especially during the south-west monsoon. Porpoises show significant numbers, particularly in 2020 and 2023, while dugongs have a moderate presence, with peaks in 2020 and 2023. Beaked whales and toothed whales are rarely observed, with notable occurrences during the north-east monsoon in 2024. Baleen whales appear only once in 2020.

The high number of strandings during monsoon seasons could be, ing. Biju Kumar *et al.* (2021) that most strandings of were documented during the monsoon and post-monsoon seasons, likely linked sea conditions. Similarly, Kanji *et al.* (2019) identified extreme weather and tidal fluxes as contributing factors whale strandings. of feeding grounds may also drive

these mammals closer to shore the risk of stranding. Balaji & Sekar (2021) examined strandings along northern Palk Bay that most documented dugong strandings occurred during the summer, probably due to increased seagrass growth.

Oceanic dolphins and dugongs were the most frequently stranded, both natural and anthropogenic. This pattern is observed in many marine mammal studies (Thomas *et al.*, 2022; Biju Kumar *et al.*, 2021; Jeyabaskaran & Vivekanandan, 2013; Kiszka, 2009). Anthropogenic such as fishing and bycatch, likely contribute to this risk as well. These threats persist year-round, particularly affecting coastal species like dolphins and dugongs (Thomas *et al.*, 2022; Kiszka *et al.*, 2009; Hatkar *et al.*, 2023). Species coastal feeding habits are vulnerable due to constant fishing activity (Jeyabaskaran & Vivekanandan, 2013).

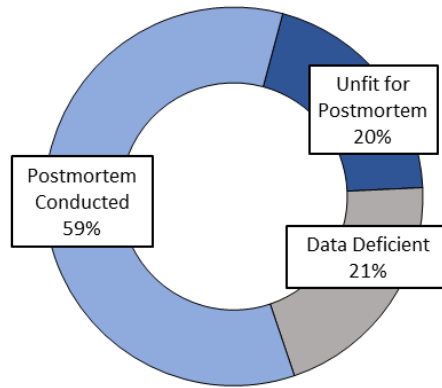
Porpoises also have a significant number of strandings, following dolphins and dugongs (Balaji & Sekar, 2021; Jeyabaskaran & Vivekanandan, 2013). They are particularly prone to entanglements and bycatches (Thomas *et al.*, 2022; George *et al.*, 2011). A study on the seasonality of harbour porpoise strandings in the Sea of Azov documented most strandings in the summer, coinciding with the calving season and associated nutritional stress (Vishnyakova & Gol'din, 2014). Similar trends were observed in the Pacific Northwest (Warlick *et al.*, 2022).

Other causes, such as ship strikes. Ship strikes pose a significant threat to larger cetaceans, particularly during their migratory patterns and in calving grounds (Plön *et al.*, 2023). Factors such as climate change (MacLeod *et al.*, 2005), which alters marine mammal behaviour (Prado *et al.*, 2016) and migration patterns (Plön *et al.*, 2023), are also known to contribute to stranding trends.

Improved reporting and monitoring efforts may have contributed to the apparent increase in strandings from 2022 onwards. The graph highlights clear seasonal patterns and species-specific trends, underscoring the significant influence of seasons on stranding events. The dominance of oceanic dolphins and dugongs in stranding data reflects their susceptibility to human activities and environmental changes.

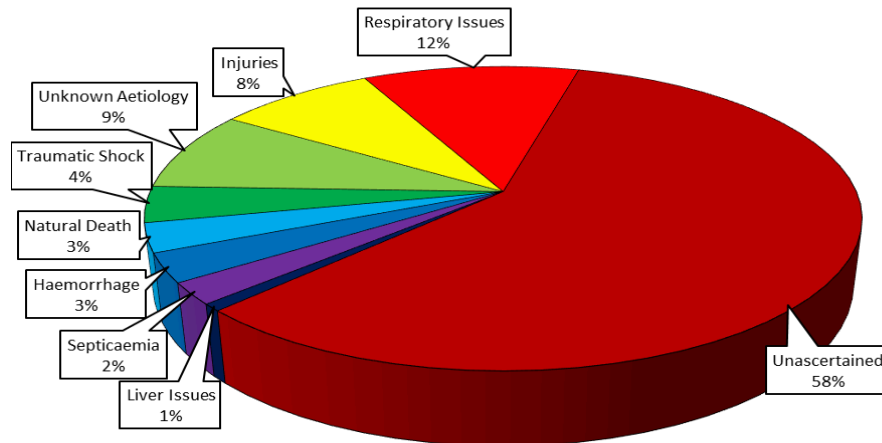
Postmortem Examination and Causes of Death:

Regarding the course of action, presumably such. 20% were declared unfit for postmortem examination due to the carcass being highly decomposed or destroyed. 59% of the dead strandings post-mortem examination.



Graphical representation of course of action on sighting dead marine mammal strandings across Tamil Nadu's coastal divisions from 2020 to 2024 (n=219).

these postmortem examinations, the cause of death was unascertainable in 58% of the individuals, primarily due to decomposition of the carcass. remain the leading wereinteractionseries.Traumatic shock, septicaemia, and liver issues (such as hepatic insufficiency) were also documented causes of death, with natural death.



Graphical representation of different causes of death determined from postmortem examination of dead marine mammal strandings across Tamil Nadu's coastal divisions from 2020 to 2024 (n=130).

VIII. DATA COLLECTION SOURCES

Various sources were to and compile data on the marine mammals of Tamil Nadu. majority of the historical records of marine mammals in India, while Kamalakannan & Nameer (2020) and Menon (2023) provided update on the mammals of India. articlesreports articles were also reviewed to better insights into the marine mammals.

Complementarily, region-specific stranding and sighting information , which was used for map. -pen-access data and information sites such as the World Register of Marine Species (WoRMS) and Ocean Biodiversity Information System (OBIS) were to confirm the presence of certain species coast he Society for Marine Mammalogy was relied upon for matters taxonomic status. The conservation status of the species was based on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the IUCN Red List. s

online resources – such as the International Whaling Commission’s (IWC) Whale Watching Handbook, National Oceanic and Atmospheric Administration (NOAA) Fisheries, Ocean Research & Conservation Association (ORCA) Ireland, and Whale and Dolphin Conservation (WDC). mages of marine mammals from Wikimedia Commons and iNaturalist with proper .

Sighting and stranding data from 2020 to 2024 were from the twelve coastal forest divisions of Tamil Nadu .

The Kepler.gl online geospatial tool was used to the distribution of stranding from the coastal divisions of Tamil Nadu. Microsoft Excel was used to graphical illustrations.

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Marine Conservation Frameworks: Global To Regional

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- Biodiversity Beyond National Jurisdiction (<https://www.un.org/bbnjagreement/en>)
- Biological Diversity Act (2002) (http://nbaindia.org/uploaded/pdf/BDAct_2023.pdf)
- Centre for Marine Living Resources and Ecology (CMLRE) (<https://www.cmlre.gov.in/>)
- Coast Guard Act (1978) (<https://www.mod.gov.in/sites/default/files/Coast%20Guard%20Act%2C%201978.pdf>)
- Coastal Regulation Zone Notification (2019) (<https://environment.tn.gov.in/assets/crz/b4ec58b933db7721e5a5f7473cf28f3a.pdf>)
- Convention on Biological Diversity (<https://www.cbd.int/>)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (<https://cites.org/eng>)
- Convention on Migratory Species of Wild Animals (<https://www.cms.int/>)
- Dugong Conservation Reserve (https://cms.tn.gov.in/cms_migrated/document/GO/envfor_e_165_ms_2022.pdf)
- Environment (Protection) Act (1986) (https://www.indiacode.nic.in/bitstream/123456789/4316/1/ep_act_1986.pdf)
- Environmental Protection Agency (<https://www.epa.gov/>)
- Gulf of Mannar Marine National Park (<https://tnswa.org/gulf-of-mannar>)
- Indian Forest Act (1927) (<http://nbaindia.org/uploaded/Biodiversityindia/Legal/3.%20Indian%20forest%20act.pdf>)
- Integrated Development of Wildlife Habitat (IDWH) (<https://moef.gov.in/wildlife>)
- International Convention for the Prevention of Pollution from Ships ([https://www.imo.org/en/about/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/about/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx))
- International Whaling Commission (<https://iwc.int/en/>)

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(https://cms.tn.gov.in/cms_migrated/document/press_release/pr080324_e_507.pdf)

Marine Mammal Protection Act
(<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act>)

Marine Protection, Research and Sanctuaries Act
(<https://www.epa.gov/enforcement/marine-protection-research-and-sanctuaries-act-mprsa-and-federal-facilities>)

Ministry of Earth Sciences (MoES) (<https://www.moes.gov.in/>)

Ministry of Environment, Forest and Climate Change (MoEFCC) (<https://moef.gov.in/>)

National Coastal Zone Management Authority (NCZMA) (<https://czmp.ncscm.res.in/>)

Oslo-Paris (OSPAR) Convention (<https://www.ospar.org/convention>)

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