Australian Government

Department of the Environment,
Water, Heritage and the Arts

# CONSERVATION AND VALUES

## GLOBAL CETACEAN SUMMARY REPORT

This is a summary report on research commissioned by the Australian Government and undertaken by the Southern Cross University Whale Research Centre and Syneca Pty Ltd, Sydney Australia. The findings draw from a wide range of current literature, notably the reports of the International Union for Conservation of Nature (IUCN) and the International Whaling Commission (IWC). In the interests of brevity, references have not been included in this report although they can be obtained from the original reports which are available on the Department of the Environment, Water, Heritage and the Arts website at **www.environment.gov.au/coasts/species/cetaceans/index.html**



**Acknowledgments**

Research and analysis provided by: Professor Peter Harrison, Daniel Burns, Christine Fury, and Greg Luker, Southern Cross University Whale Research Centre; and, Peter Dempster and Ron Groenhout from Syneca Consulting Pty Ltd.

The GIS distribution maps were developed and funded through the Southern Cross University Whale Research Centre. We thank the IUCN for access to cetacean distribution data files, Maree Blewitt for work on the cetacean distribution maps, and Renee Carter for assisting with compiling the summary report.

The Southern Cross University Whale Research Centre researchers consulted Dr Bill Perrin and Professor Scott Baker.

**June 2009**

# Minister's introduction

I am pleased to present this summary of the global conservation status of whales, dolphins and porpoises, and the economic value associated with their conservation and non-consumptive use.

The report clearly shows that while some species and populations have started to recover from the severe overexploitation brought about by commercial whaling, many cetacean populations continue to face increased threats to their recovery. These threats include incidental mortality from fisheries, climate change and habitat degradation.

The available global data compiled in this report was also used to identify 'hot spots', areas which provide habitat for numerous threatened species and populations. The maps of these hot spots provide an indication of priority areas which could be targeted for future internationally coordinated conservation action.

However, for many species the scientific knowledge available is still so limited that there is not enough information on their biology and ecology to make informed conservation status decisions. In 2009, over half of the world's cetacean species remain listed as Data Deficient.

The report also highlights the value people place on cetaceans and their conservation – a value that can be directly translated into economic terms without compromising the conservation of these creatures. Commercial whale watching has harnessed our enjoyment of cetaceans and, in the process, has created a growing multi-billion dollar industry. This, in turn, raises awareness and motivates improved conservation.

The report clearly demonstrates the need to move to a new stage in cetacean conservation, a 21st century approach that involves the development of sound conservation management plans based on targeted peer-reviewed research. It underpins the fact that we can build sustainable and productive whale watching industries and understand all we need to know about whales without killing them.

The Australian Government has proposed such a framework to the International Whaling Commission (IWC). This is backed up by an investment of AUD$32 million over six years on non-lethal research and other initiatives. A major initiative is the collaborative Southern Ocean Research Partnership. The funding is supporting a series of innovative cetacean surveys in the Southern Ocean. We will also be working with the IWC to progress conservation management plans, and start a small cetaceans research action fund.

The Hon Peter Garrett AM MP
Minister for the Environment, Heritage and the Arts

# Contents



# Conservation and values

Based on economics, science and ethics, Australia's support for whale conservation is well known. To ensure that the global debate about the future of whales, dolphins and porpoises (cetaceans) is informed by the latest information, the Australian Government commissioned an overview of the conservation status of cetaceans and how they are valued.

The progress report *Conservation and Values Global Cetacean Snapshot* was released on 14 June 2008 before the 60th annual meeting of the International Whaling Commission.

The Global Cetacean Summary Report follows on from this report by presenting the most current information on the conservation status of the world's cetaceans and includes new information from the 2008 meetings of the International Whaling Commission (IWC) and the International Union for Conservation of Nature (IUCN). The report also highlights the main threats to their survival, and discusses the value of whale watching.

The report considers the following questions:

- What is the conservation status of the world's cetaceans?
- What threats do cetaceans face?
- If better conservation management tools were developed, how should they be targeted?
- What have been the patterns of economic development based on living cetaceans around the world?
- What are the prospects for future economic growth?
- What contributes to a successful whale watching industry?
- How can the economic values associated with the conservation of a natural asset be estimated?

Cetaceans have traditionally been classified within the Order Cetacea, hence that term is used in this report. However, the 2008 IUCN Red List of Threatened Species now classifies cetaceans within the Order Cetartiodactyla.

# Key findings

This Global Cetacean Report summarises existing scientific knowledge on the global conservation status of cetaceans and the threats to their survival, and reviews the economic value of cetaceans and their non-consumptive use through whale watching activities.

There are at least 86 cetacean species recognised by the International Whaling Commission Scientific Committee. The summary report reveals that although some species have been closely studied, relatively little is know about the biology, ecology and status of many cetacean species and populations. This demonstrates the need for the continued and increasing international research effort to address key knowledge gaps, and for developing comprehensive conservation management strategies, particularly to alleviate the growing pressures on threatened species and populations.

A few species, and populations, have started to recover from the effects of commercial whaling. However, this report highlights that some cetaceans, especially river and coastal dolphins and porpoises, face increasing human induced threats including incidental mortality from fisheries, habitat degradation and climate change.

While there is simply not enough information to determine the conservation status of over half of the 86 cetacean species, five species are listed as Near Threatened and fourteen species as Threatened (see Table 1 on pg 9):

- **2 Critically Endangered species:** the baiji (Yangtze River dolphin) and the Vaquita (Gulf of California porpoise).
- **7 Endangered species:** the North Atlantic right whale, North Pacific right whale; sei whale, fin whale, blue whale, South Asian river dolphin and Hector's dolphin.
- **5 Vulnerable species**: Sperm whale, franciscana, finless porpoise, Irrawaddy dolphin, and the Atlantic humpback dolphin.

Following on from the initial *Global Cetacean Snapshot* which was produced in June 2008 the cetacean species listed as Critically Endangered and Endangered have remained the same. Within the Vulnerable species the conservation status for four species; the humpback whale, boto (Amazon River dolphin), beluga and harbour porpoise has improved whilst the sperm whale has remained the same.

As the status of one or more species improves the status of other cetaceans can decline. Sadly, this has occurred with another four species; the franciscana, finless porpoise, Irrawady dolphin, and the Atlantic humpback dolphin now being listed as Vulnerable. This highlights the ongoing challenges associated with the conservation of cetaceans and the need for adaptive management measures.

Some subspecies and populations may have a different status to the overall species level.

The report finds that cetaceans are increasingly threatened by human activities including:

- hunting and whaling
- fisheries interactions including mortality from accidental capture or entanglement (bycatch) and deliberate culling
- habitat degradation or loss from coastal and river development and associated pollution
- noise disturbance and vessel strike
- disease outbreaks
- depletion of food resources through competition with fisheries
- climate change impacts.

These threats, if allowed to continue unabated, are likely to overwhelm some species, subspecies and populations and possibly drive some to extinction in the near future. However, the identification of these key threats highlights the areas which need to be targeted to actively manage the conservation of these animals.

By compiling and analysing all available global data, the report is able to identify 'hot spot' areas that simultaneously provide habitat for numerous threatened species, subspecies and populations. These 'hot spot' areas show that threatened cetacean species are found in the oceans around each of the world's continents. The main 'hot spot' regions, each of which has up to six threatened species, subspecies and populations, are identified in Map 1 on pg 12 of the report. They include:

- The South Pacific
- The South East Asian region
- The coastal areas of the East and South China Seas, the Northwest Pacific region and up to the Sea of Okhotsk
- The Bering Sea
- The Northeast Pacific region
- The Denmark Strait between Greenland and Iceland and in the Norwegian Sea
- Around parts of the British Isles and along Western Europe
- The east coast of North America
- The west coast of Africa
- The western South Atlantic.

This information could form the basis of future internationally coordinated conservation action.

Many people now value whales, dolphins and porpoises both in their own right and as unique living resources that play an important role in their aquatic ecosystems. For most people cetaceans also have an intrinsic value and this is reflected increasingly in economic terms through the global boom in ecotourism associated with whale and dolphin watching. This is one of the world's fastest growing tourism sectors and it is estimated that visitor expenditure on whale watching in high income countries may grow to USD$2.0 to $2.6 billion per year over the next 20 years.

There are two main approaches to estimating the economic values associated with the conservation of a natural asset, in this case cetaceans. The methods are broadly defined as revealed and stated preference approaches. The former involves collecting data on actual expenditure by visitors to view cetaceans, while the latter relies on surveys of the general population to estimate values such as the existence values associated with cetaceans.

Research has identified that people are willing to pay significant amounts reflecting the value they place on the conservation and existence of cetaceans.

The report also identifies the significant opportunities for growth in the whale watching industry. Around 100 million people from high income countries have participated in whale watching, a figure that is increasing by 10 million each year.

High income countries continue to claim a major share of this activity. This indicates the potential for growth in sustainable development opportunities in middle and low income countries, provided the right preconditions are in place. Coupled with appropriate regulation and effective management to ensure the continued health of cetaceans, whale and dolphin watching can provide substantial socio-economic benefits to regional and national economies, benefits which will only increase in the future.

The benefits of whale watching also extend beyond direct market values. Successful whale watching can raise environmental awareness, increase our scientific understanding of cetaceans and create financial incentives for conservation of the marine environment.

# CONSERVATION

# Conservation

Cetaceans – whales, dolphins and porpoises – are important and iconic mammals. One of their key ecological roles is as apex predators in marine and other aquatic ecosystems. They also have a wide range of socio-economic and cultural values.

The International Whaling Commission Scientific Committee currently recognises at least 86 cetacean species. A diverse group, cetaceans and are broadly divided into two groups:

1. Baleen whales (mysticetes) that filter feed large volumes of small prey such as krill, plankton or small fish.
2. Toothed cetaceans (odontocetes) that capture larger prey including fish and squid.

Cetaceans range in size from the vaquita porpoise (growing to 1.4 metres long) to the blue whale (more than 30 metres long). The blue whale is the largest animal that has ever existed on earth.

The number of recognised cetacean species is likely to increase as new species are identified based on emerging morphological and genetic information. For example the Australian snubfin dolphin *Orcaella heinsohni,* was formally described and recognised as a new species endemic to the Australian region in 2005. This dolphin was previously classified within the Irrawaddy dolphin species *Orcaella brevirostris.*

Due to extinctions, however, the number of cetacean species may decrease in the future. The baiji (Yangtze River dolphin) is now likely to be extinct. Other cetacean populations are seriously threatened or have been removed from significant areas of their former ranges. The Critically Endangered vaquita has a highly restricted distribution and exists only in the northern Gulf of California. Other species such as Orcas (killer whales) and humpback whales have large distributions and are found throughout the world's oceans.

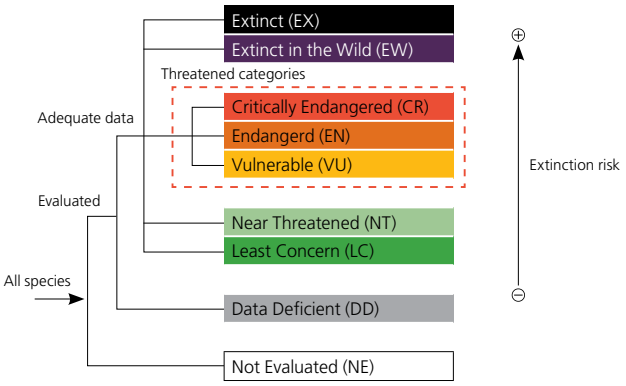
## Status and trends

Although some species have been closely studied, relatively little is known about the biology, ecology and status of many cetacean species or populations. Many species are rarely seen or recorded, resulting in limited knowledge about their distribution or abundance. This makes status assessments and conservation management decisions for these species especially difficult.

The IUCN Cetacean Specialist Group has assessed the status of cetacean species, subspecies and populations since the 1980s. During 2008 assessments for most species and populations were updated. This updated information is included in the following summaries.

### IUCN status categories

1. Extinct
2. Extinct in the Wild (only existing in captivity by cultivation)
3. Critically Endangered (Threatened category)
4. Endangered (Threatened category)
5. Vulnerable (Threatened category)
6. Near Threatened (Lower risk category)
7. Least Concern (Lower risk category)
8. Data Deficient
9. Not Evaluated




**Structure of the red list categories from**
www.iucn.org/about/work/programmes/species/red_list/review/

In summary, the most threatened species are:

- **2 Critically Endangered species**: Current data indicates that although the Baiji (Yangtze River dolphin) is listed as Critically Endangered, it is now likely to be **extinct**, which represents the first cetacean species to become extinct in recorded history. The Vaquita (Gulf of California porpoise) is also Critically Endangered with about 150 porpoises remaining in 2007.
- **7 Endangered** species: North Atlantic right whale, North Pacific right whale, blue whale, sei whale, fin whale, South Asian river dolphin, and Hector's dolphin.
- **5 Vulnerable**: sperm whale, franciscana, finless porpoise, Irrawaddy dolphin, and the Atlantic humpback dolphin.

**Table 1 – Summary of cetacean families and numbers of species listed by categories from the 2008 IUCN Red List of Threatened Species**

| **Suborder Mysticeti** (Baleen whales) | Species | Not Assessed | Data Deficient | Least Concern | Near Threatened | Vulnerable | Endangered | Critically Endangered |
|---|---|---|---|---|---|---|---|---|
| Balaenidae (Right whales) | 4 | | | 2 | | | 2 North Atlantic right whale and North Pacific right whale | |
| Neobalaenidae (Pygmy right whale) | 1 | | 1 | | | | | |
| Eschrichtiidae (Gray whale) | 1 | | | 1 | | | | |
| Balaenopteridae (Rorquals) | 8 | | 3 | 2 | | | 3 (sei, blue, fin whales) | |
| **Suborder Odontoceti** (toothed cetaceans) | | | | | | | | |
| Physeteriade (Sperm whale) | 1 | | | | | 1 (sperm whale) | | |
| Kogiidae (Diminutive sperm whales) | 2 | | 2 | | | | | |
| Platanistidae (South Asian river dolphin) | 1 | | | | | | 1 (South Asian river dolphin) | |
| Pontoporiidae (Franciscana) | 1 | | | | | 1 (franciscana) | | |
| Lipotidae (Baiji) | 1 | | | | | | | 1 (baiji) |
| Iniidae (Boto) | 1 | | 1 | | | | | |
| Monodontidae (Beluga and Narwhal) | 2 | | | | 2 | | | |
| Phocoenidae (Porpoises) | 6 | | 2 | 2 | | 1 (finless porpoise) | | 1 (vacquita) |
| Delphinidae (Dolphins excluding Iniidae, Platanistidae, Pontoporiidae, Lipotidae) | 36 | 1 | 16 | 13 | 3 | 2 (Irrawaddy dolphin, Atlantic humpback dolphin) | 1 (Hector's dolphin) | |
| Ziphiidae (Beaked whales) | 21 | | 19 | 2 | | | | |
| **Total number of species** | 86 | 1 | 44 | 22 | 5 | 5 | 7 | 2 |

## Table 2: Summary of Threatened Cetacean Species, Subspecies, Subpopulations from IUCN Red List: History, Current Status, Abundance, Trends

| Baleen whales | Family Group | Species (Population) | 1980s | 1990s | 2000s | 2008 | Estimated abundance | Trend |
|---|---|---|---|---|---|---|---|---|
| (Mysticeti) | Right whales | Southern right whale | VU | VU | NT* | LC | ~15,000? | ↑ |
| | | (Chile-Peru subpopulation) | NE | NE | NE | CR | <50 mature | ? |
| | | North Atlantic right whale | EN | EN | EN | EN | ~300-350 | ? |
| | | North Pacific right whale | NE | EN | EN | EN | ~500 | ? |
| | | (Northeast Pacific subpopulation) | NE | NE | NE | CR | <50 mature | ↓ |
| | | Bowhead whale | EN | VU | NT* | LC | >17,500 | ↑ |
| | | (Svalbard-Barents Sea subpopulation) | NE | EN | CR | CR | 10s? | ? |
| | | (Okhotsk Sea subpopulation) | NE | NE | EN | EN | A few 100s? | ? |
| | Gray whale | Gray whale | NE | NE | NT* | LC | ~20,000 | → |
| | | (NW Pacific subpopulation) | NE | EN | CR | CR | ~120 | ↑ |
| | Rorquals | Sei whale | NE | VU | EN | EN | ~30,000? | ? |
| | | Blue whale | EN | EN | EN | EN | ~10,000-25,000 | ↑ |
| | | (Antarctic Blue whale subspecies) | NE | EN | EN | CR | ~4,000? | ↑ |
| | | (North Atlantic Blue whale) | NE | NE | VU | VU | 1,400-2,400? | ↑ |
| | | Fin whale | VU | VU | EN | EN | ~85,000? | ? |
| | | Humpback whale | EN | VU | VU | LC | >60,000 | ↑ |
| | | (Arabian Sea subpopulation) | NE | NE | NE | EN | <400 | ? |
| | | (Oceania subpopulation) | NE | NE | NE | EN | ~10,000-15,000? | ? |
| Toothed cetaceans (Odontoceti) | Sperm whale | Sperm whale | NE | VU | VU | VU | ~360,000 | ? |
| | South Asian river dolphin | South Asian river dolphin | VU | VU | EN | EN | | ↓ |
| | | (Ganges river dolphin subspecies) | VU | EN | EN | EN | ~1200-1800 | ↓ |
| | | (Indus river dolphin subspecies) | EN | EN | EN | EN | ~965 | ↓ |
| | Franciscana | Franciscana | IK | IK | DD | VU | | ↓ |
| | | (Rio Grande/Uruguay subpopulation) | NE | NE | VU | VU | ~42000 | ↓ |
| | Yangtze river dolphin | Baiji | EN | CR | CR | CR | functionally extinct | ? |
| | Beluga and narwhal | Beluga or white whale | IK | IK | VU | NT | | ? |
| | | (Cook Inlet subpopulation) | NE | NE | CR | CR | ~207 adults | |
| | Porpoises | Vaquita | VU | CR | CR | CR | ~150 | ↓ |
| | | Finless porpoise | NE | IK | DD | VU | | ↓ |
| | | (Yangtze finless porpoise subspecies) | NE | EN | EN | EN | <2000 | |
| | | Harbour porpoise | IK | IK | VU | LC | | ? |
| | | (Baltic Sea subpopulation) | NE | NE | VU | CR | <200 mature | ↓ |
| | | (Black Sea subspecies) | NE | NE | VU | EN | | |
| | Dolphins | Irrawaddy dolphin | IK | IK | DD | VU | | ↓ |
| | | (Songkhla Lake subpopulation) | NE | NE | CR | CR | <50 | ↓ |
| | | (Mekong River subpopulation) | NE | NE | CR | CR | <50 | ↓ |
| | | (Malampaya Sound subpopulation) | NE | NE | CR | CR | <50 | ↓ |
| | | (Mahakam River subpopulation) | NE | NE | CR | CR | <50 | ↑ |
| | | (Ayeyarwady River subpopulation) | NE | NE | CR | CR | <50 | ↓ |
| | | Hector's dolphin | IK | VU | EN | EN | ~7270 | ↓ |
| | | (Maui's dolphin subspecies) | NE | NE | CR | CR | <100 | ↓ |
| | | Short-beaked common dolphin | NE | IK | LC | LC | | ↓ |
| | | (Black sea common dolphin subspecies) | NE | NE | NE | VU | ~100,000 | |
| | | (Mediterranean subpopulation) | NE | NE | EN | EN | | ↓ |
| | | Spinner dolphin | NE | IK | LC | DD | | ? |
| | | (Eastern spinner dolphin subspecies) | NE | NE | NE | VU | | ↑ |
| | | Common bottlenose dolphin | NE | DD | DD | LC | | ? |
| | | (Black Sea bottlenose dolphin subspecies) | NE | NE | NE | EN | | ? |
| | | Atlantic humpback dolphin | NE | IK | DD | VU | | ↓ |
| | | Indo-Pacific humpback dolphin | NE | IK | DD | NT | | ↓ |
| | | (Eastern Taiwan Strait subpopulation) | NE | NE | NE | CR | <50 | ↓ |

* IUCN List recorded these species as Lower Risk (Conservation Dependent)

| IUCN Category | Code | Pre-2008 Species | Pre-2008 Populations | 2008 Species | 2008 Subspecies-Subpop. |
|---|---|---|---|---|---|
| Critically Endangered | CR | 2 | 9 | 2 | 14 |
| Endangered | EN | 7 | 7 | 7 | 9 |
| Vulnerable | VU | 5 | 5 | 5 | 4 |
| Near Threatened | NT | 14 | | 5 | |
| Least Concern | LC | 14 | | 22 | 2 |
| Data Deficient, Insufficiently Known | DD, IK | 39 | | 44 | 1 |
| Not Evaluated | NE | 5 | | 1 | |

Of the 86 cetacean species (see Table 1 on pg 9):

- Fourteen species (16 per cent) are listed as **Threatened**
- Five species (6 per cent) are listed as **Near Threatened**
- Twenty-two species (26 per cent) are listed as **Least Concern**
- Forty-four species (51 per cent) are listed as **Data Deficient**
- One species (1 per cent) the Guiana dolphin has not been assessed.

Fifty-one per cent of the species listed are **Data Deficient**, indicating that there is inadequate information on their distribution and abundance or population status to assess the risk of extinction. This highlights the very significant gaps in our understanding of many cetacean species that need to be addressed for effective conservation. It would be wrong to assume that species for which there is an absence of information on abundance and population trends are not at risk. Some populations that had not been evaluated, or were Data Deficient as recently as the 1990s have since been confirmed as Critically Endangered or Endangered (see Table 2 on pg 10).

## Changes to category listing

The IUCN threat category listing of some cetacean species has changed in recent decades. Coinciding with increased pressures from human activities, the status of some species has become worse over time and their threat status increased. These include the:

- Sei whale
- Fin whale
- South Asian river dolphin
- Baiji
- Vaquita
- Hector's dolphin.

The threatened status has improved at the species level for the:

- Southern right whale
- Bowhead whale
- Gray whale
- Humpback whale
- Beluga
- Harbour porpoise.

However, the status of some populations of these species has become worse. This means some populations of these whales have had their threat status increased to a higher threat category (see Table 2).

Four species remain at the same threat status:

- North Atlantic right whale (Endangered)
- North Pacific right whale (Endangered)
- Blue whale (Endangered)
- Sperm whale (Vulnerable).

There is increasing recognition of the importance of conserving subspecies and populations within each species not just conserving the species. This is because most species exist as a number of more or less discrete and often genetically differentiated subpopulations whose survival is essential for maintaining genetic diversity.

To identify and help manage key threats, the IUCN Cetacean Specialist Group has identified threatened subspecies or subpopulations of some species. At a subspecies and subpopulation level (see Table 2), a further:

- two subspecies and 12 subpopulations of ten species are listed as Critically Endangered;
- five subspecies and four subpopulations of seven species are Endangered; and
- two subspecies and two subpopulations of four species are Vulnerable.

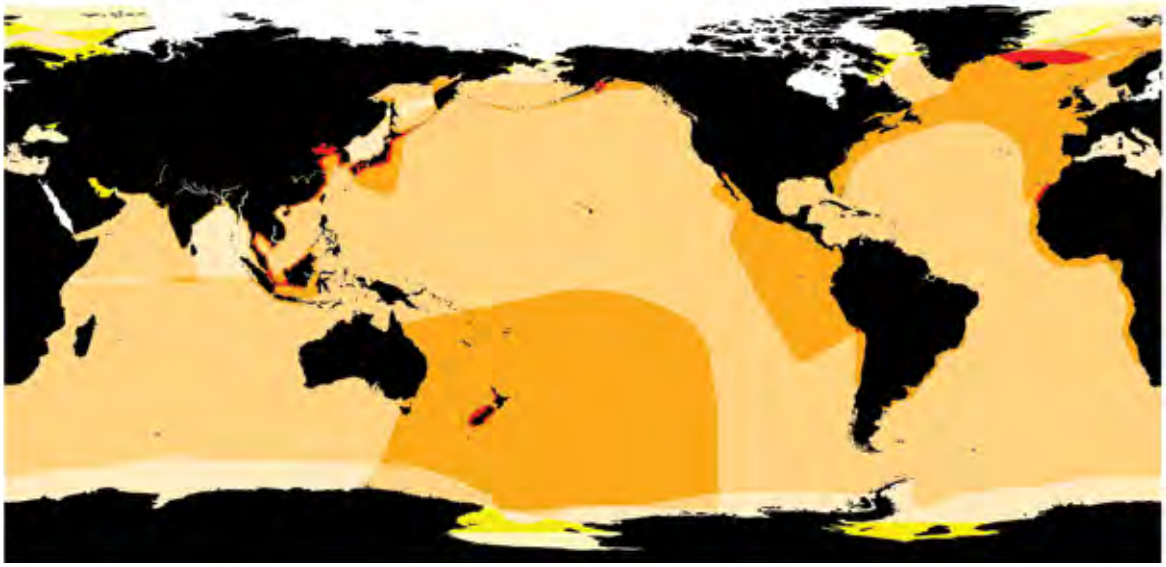
As well as highlighting the number of threatened cetacean species, this report also identifies the limited scientific information available for over half of the cetacean species. Due to the transient nature of the species and the diverse habitats in which they live, coordinated regional-scale scientific research could assist by furthering our knowledge on the status of individual species. One example is the Southern Ocean Research Partnership where countries from around the world are working to establish a collaborative whale research partnership focussing on cetaceans in the Southern Ocean.

It is clear that the number of threatened cetacean species and populations is likely to increase in future unless urgent action is taken to actively reduce or remove key threats, and substantially improve scientific knowledge, conservation planning and effective management.

# Global patterns

The IUCN and other global data was used as the basis for developing maps of biogeographic patterns of the distribution of all threatened cetacean species, subspecies and subpopulations (see Table 2 on pg 10).

This in turn has facilitated the identification of 'hot spots' containing numerous threatened species and populations. This sort of information could form the basis of future internationally coordinated conservation action.



**Total number of Threatened Species, Subspecies and Populations** 6 5 4 3 2 1

Map 1: Map showing the distribution of all IUCN listed threatened cetacean species, subspecies and populations (**Vulnerable, Endangered and Critically Endangered**).

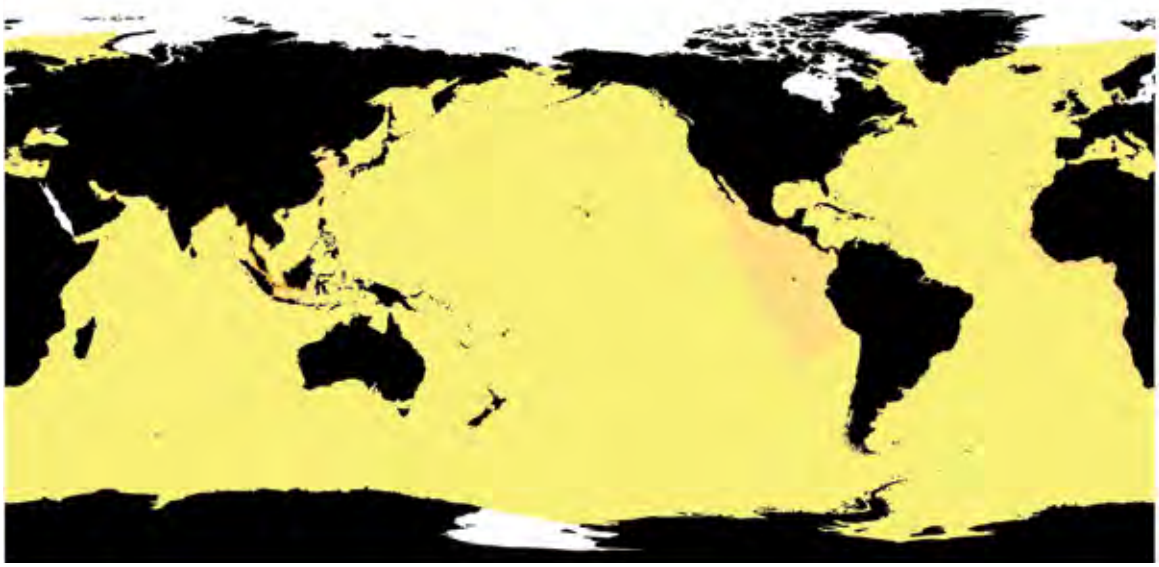
**Total number of Critically Endangered Species, Subspecies and Populations** 2 1

Map 2: Map showing the distribution of all IUCN listed **Critically Endangered** cetacean species, subspecies and populations.

Map 1 shows the distribution of all of the IUCN-listed threatened cetacean species, subspecies and populations, including Critically Endangered, Endangered and Vulnerable.

The global distributions of all Critically Endangered, Endangered and Vulnerable species, subspecies and subpopulations are shown separately in Maps 2 to 4. Refer to pg 15 (Summaries of individual threatened cetacean species) for individual distribution maps.


Map 3: Map showing the distribution of all IUCN listed **Endangered** cetacean species, subspecies and populations.




Map 4: Map showing the distribution of all IUCN listed **Vulnerable** cetacean species, subspecies and populations.

On a global scale, the distribution patterns of threatened cetacean species, subspecies and subpopulations show broad overlap in the ranges of four threatened great whale species throughout much of the Indian, Pacific and Atlantic Ocean regions. Including:

- Endangered blue whales
- Endangered fin whales
- Endangered sei whales
- Vulnerable sperm whales.

(See Map 1 on pg 12).

In the South Pacific region, additional threatened species, subspecies and subpopulations include the:

- Endangered Hectors' dolphin
- Critically Endangered Maui's dolphin (North Island subspecies endemic to New Zealand)
- Endangered Oceania subpopulation of humpback whales
- Critically Endangered Chile-Peru subpopulation of Southern right whales
- Vulnerable eastern spinner dolphin subspecies.

The ranges of up to six threatened species and populations overlap with the South East Asian region (see Map 1 on pg 12).

In addition to the four threatened great whale species, threatened entities include:

- the Vulnerable Irrawaddy dolphin
- five Critically Endangered subpopulations of Irrawaddy dolphin
- the Vulnerable finless porpoise.

A maximum of six threatened species and populations co-occur along coastal regions of the East and South China Seas, the Northwest Pacific region and up to the Sea of Okhotsk (see Map 1). These include various combinations of the four threatened great whale species:

- the Vulnerable finless porpoise
- the Critically Endangered East Taiwan Strait subpopulation of the Indo-Pacific humpback dolphin
- the Endangered North Pacific right whale
- the Endangered Okhotsk Sea subpopulation of the Bowhead whale
- the Critically Endangered Northwest Pacific subpopulation of the Gray Whale.

Up to six threatened species and populations occur across the Bering Sea, and the Northeast Pacific region including the:

- four threatened great whale species
- Critically Endangered Northeast Pacific stock of the North Pacific right whale
- Critically Endangered Cook Inlet population of the beluga.

(See Map 1 on pg 12).

In the North Atlantic region, up to six threatened species and populations occur in the Denmark Strait between Greenland and Iceland and in the Norwegian Sea, and up to five threatened entities occur along the east coast of North America, around parts of the British Isles and along Western Europe (see Map 1). These include the:

- four threatened great whale species
- Endangered North Atlantic right whale
- Critically Endangered Svaalbard-Barents Sea population of the bowhead whale.

Similarly, up to six threatened species occur along parts of the west coast of Africa including the:

- four threatened great whale species
- Endangered North Atlantic right whale
- Vulnerable Atlantic humpback dolphin.

Up to five threatened species occur in the western South Atlantic region, including the:

- four threatened great whale species
- Vulnerable franciscana dolphin (eastern coast of South America).

(See Map 1 on pg 12).

The global distributions of all Vulnerable, Endangered and Critically Endangered species and populations demonstrates the need for a globally coordinated approach to protect cetaceans, through regional conservation management plans.

# Threatened species and populations

The following summaries of threatened cetacean species and populations highlight the status, size, history, current population and the range of threats to cetaceans of varying conservation status. Individual distribution maps for each species show their distribution.

## Critically Endangered cetacean species

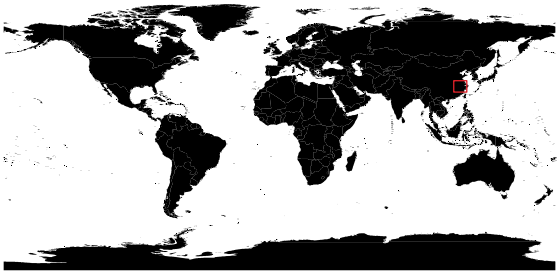
### Baiji (*Lipotes vexillifer*) or Yangtze River dolphin

**Status:** Critically Endangered **(possibly extinct) 2008**

**History:** Critically Endangered **1996**
Endangered **1986**

**Size:** Females grow to about 2.5 metres (m) and 170 kilograms (kg), and males to 2.3 m and 130 (kg).

The baiji or Yangtze River dolphin is a freshwater dolphin species endemic to China's Yangtze River. The baiji is considered the most endangered cetacean species and it is now thought to be extinct, based on the lack of confirmed sightings since 2002. The rapid population decline in recent decades was predominantly caused by unsustainable mortality levels occurring from entanglement in fishing gear, electrofishing, vessel traffic and habitat degradation and pollution.



**Baiji** (*Lipotes vexillifer*)
**Species Status** ☐ Critically Endangered

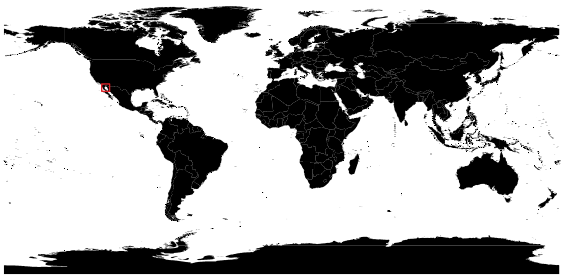
### Vaquita (*Phocoena sinus*) or Gulf of California porpoise.

**Status:** Critically Endangered **2008**

**History:** Critically Endangered **1996**
Endangered **1990**
Vulnerable **1986**

**Size:** The vaquita is the smallest cetacean species, growing to 1.4 m and 50 kg.

The vaquita is a small coastal porpoise, and has one of the smallest ranges of any cetacean species, being restricted to the northern Gulf of California. The population is decreasing, with fewer than 150 porpoises thought to be remaining in 2007. The key threat to this species is deaths from accidental bycatch in gillnets. Other potential threats include inbreeding, pesticide exposure and habitat changes as a result of reduced flow from the Colorado River. If the baiji is extinct, the vaquita porpoise would become the most critically endangered cetacean species.



**Vaquita** (*Phocoena sinus*)
**Species Status** ☐ Critically Endangered

## Endangered cetacean species

### North Atlantic right whale (*Eubalaena glacialis*)

**Status:** Endangered **2008**

**History:** Endangered **1986**

**Size:** North Atlantic right whales grow to a length of about 16 m, with females about 1 m longer than males. Mature adult right whales weigh up to about 90 tonnes (t).

The North Atlantic right whale was the first large whale to be subjected to commercial hunting as early as the 11th Century. Stocks were severely depleted by the late 1700s and close to extinction by the early 1900s. The subpopulation from the eastern North Atlantic is now extremely small or possibly extinct while the western subpopulation is estimated to number around 300–350 individuals. Most North Atlantic right whales breed, feed and migrate within 80 kilometres of the coast, making them particularly susceptible to human impacts, including shipping, fishing, mineral exploration and extraction, and agricultural and industrial runoff.

**North Atlantic right whale** (*Eubalaena glacialis*)
**Species Status** Endangered

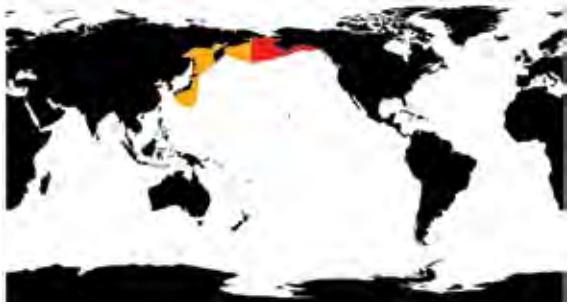
### North Pacific right whale (*Eubalaena japonica*)

**Status:** Endangered **2008**
Critically Endangered **Northeast Pacific subpopulation 2008**

**History:** Endangered **North Pacific right whale species 1996**

**Size:** North Pacific right whales are larger than right whales from the North Atlantic and the southern hemisphere, growing up to 18 m and over 100 t.

The North Pacific right whale currently numbers probably less than 1000 individuals, having been severely depleted by whaling operations during the 19th Century. The eastern subpopulation is listed separately by the IUCN as Critically Endangered. They are now found mostly in the coastal waters of Japan, Korea and Russia with small numbers also found in the Bering Sea and Gulf of Alaska. Entanglement in fishing gear may represent a significant threat to the western population. Ship strike, noise, pollution and climate change have also been identified as possible threats.



**North Pacific right whale** (*Eubalaena japonica*)
**Population Status** Critically Endangered Endangered

### Blue whale (Balaenoptera musculus)

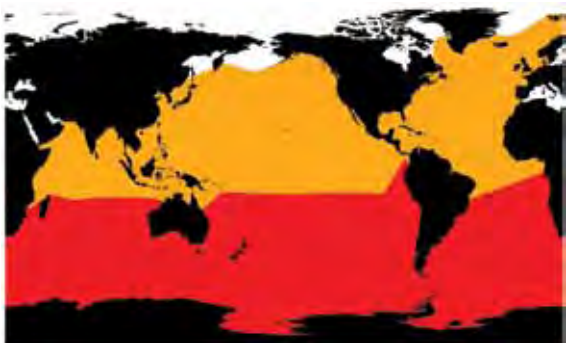
**Status:** Endangered **Blue whale (species status) 2008**
Critically Endangered **Antarctic Blue whale (subspecies) 2008**
Vulnerable **North Atlantic Blue whale (subspecies) 2008**

**History:** Endangered **Blue whale species 1986**

**Size:** The blue whale is the largest animal ever to have lived on earth, growing up to 33.6 m and 190 t.

Blue whale taxonomy is unclear, but currently three subspecies are accepted, the Northern hemisphere 'true' blue (*B. musculus musculus*), the Southern hemisphere 'true' blue (Antarctic blue) (*B. musculus intermedia*) which is listed separately by the IUCN in 2008 as Critically Endangered and the Pygmy blue (*B. musculus brevicauda).* Blue whales did not become the subject of commercial hunting on a large scale until the advent of modern whaling in the late 19th Century. The size of the global population is now likely to number about 10,000 – 25,000. The total population was reduced significantly by whaling with some populations being reduced by up to 99 per cent. Blue whales are largely cosmopolitan but are not found in the Arctic, Mediterranean, Bering and Okhotsk Seas. Some populations of blue whales appear to remain resident year–round in areas with high–productivity while others undertake annual migrations from polar feeding grounds to low latitude breeding grounds. Threats from climate change to this species may be amplified by the fact that blue

whales exhibit a nearly exclusive dependence on krill, making them vulnerable to large–scale changes in their ecosystem.



**Blue whale** (*Balaenoptera musculus*)
**Population Status** Critically Endangered Endangered

Note that *B. musculus musculus* (N. hemisphere blue whale) was not evaluated separately by the IUCN in 2008. Therefore, it is included as Endangered, as per the overall 2008 species assessment, rather than as per the 1996 assessments for this subspecies, i.e. North Atlantic (Vulnerable) and North Pacific (Lower Risk/Conservation Dependent) Cetacean Specialist Group 1996.

### Fin whale (*Balaenoptera physalus*)

**Status:** Endangered **2008**

**History:** Endangered **1996**
Vulnerable **1986**

**Size:** Fin whales grow to about 20–27 m in length, and average weights of 35–45 t, with a maximum of 70 t.

Fin whales are cosmopolitan throughout the world's oceans and are mainly found in deep offshore waters rather than in shallow coastal waters. The IUCN in 2008 determined that the global fin whale population has been reduced by more than 70 per cent since 1929, decreasing from almost 400,000 whales to less than 100,000 by 2007. Trend information for the species as a whole is uncertain however numbers appear to be increasing in some locations. The major ongoing threats to fin whales are from ship strike, noise, climate change and whaling.

**Fin whale** (*Balaenoptera physalus*)
**Species Status** Endangered

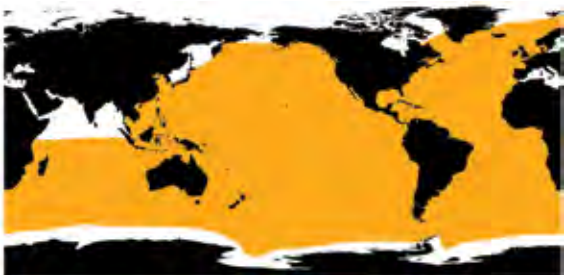
### Sei whale (*Balaenoptera borealis*)

**Status:** Endangered **2008**

**History:** Endangered **1996**
Vulnerable **1994**

**Size:** Sei whales grow to about 12–16 m, and average weights are from 12–15 t.

Sei whales are estimated to have declined in number around the world by more than 80 per cent since 1937. Whaling operations depleted stocks of this species heavily during the 1950s to 1970s in particular. Up to date, abundance and trend information is largely lacking. The species is found in all oceans of the world with a tendency to stay in temperate waters rather than polar or tropical waters and offshore rather than inshore waters. One of the main threats to this species has come from whaling, with sei whale numbers being greatly reduced. Other threats include direct disturbance from seismic operations, ship strike, entanglements and pollution. However, this species is less likely to be impacted by humans than some other whales due to its generally offshore distribution.



**Sei whale** (*Balaenoptera borealis*)
**Species Status** Endangered

### Hector's dolphin (*Cephalorhynchus hectori*) and Maui's dolphin (*Cephalorhynchus hectori ssp. maui*)

**Status:** **Endangered Hector's dolphin (species status) 2008**
**Critically Endangered Maui's dolphin (North Island subspecies) 2008**

**History:** **Hector's dolphin**
**Endangered 2000**
**Vulnerable 1990**

**Maui's dolphin subspecies was not evaluated as a separate stock until 2000**
**Critically Endangered 2000**

**Size:** Hector's dolphin is one of the world's smallest dolphins, with females growing to about 1.5 m and about 60 kg, while males are slightly smaller.

Hector's dolphin is a small delphinid species endemic to New Zealand coastal waters. It is Endangered at the species level (Cephalorhynchus hectori), while the North Island subspecies, Maui's dolphin (C. hectori maui), is Critically Endangered. The South Island Hector's dolphin populations collectively number about 7,270 individuals, while the North Island Maui's dolphin subspecies population numbers around 111. The abundance of Hector's dolphin continues to decline, predominantly because of mortality from entanglement in gillnets. Hector's and Maui's dolphins are particularly vulnerable to anthropogenic disturbances in their limited coastal habitat.

**Hector's dolphin** (*Cephalorhynchus hectori*)
**Population Status** Critically Endangered Endangered

### South Asian river dolphins (*Platanista gangetica*): Ganges and Indus river dolphins

**Status:** **Endangered South Asian river dolphins (species status) 2008**

**Endangered Ganges river dolphin (subspecies) 2008**

**Endangered Indus river dolphin (subspecies) 2008**

**History:** **South Asian river dolphin**
**Endangered 2004**
**Vulnerable 1988**

**Ganges river dolphin**
**Endangered 1996**
**Vulnerable 1988**

**Indus river dolphin**
**Endangered 1986**

**Size**: Females grow to about 2.5 m and 84 kg, and males are slightly smaller.

This endangered species is a river dolphin from the southern Asian subcontinent, occurring as two recognised subspecies: the Ganges river dolphin (*Platanista gangetica gangetica*) in India, Bangladesh, Nepal and possibly Bhutan; and the Indus river dolphin (*P. g. minor*) endemic to Pakistan. The abundance of South Asian river dolphins is largely unknown. The Ganges River dolphins are estimated to number about 1,200 to 1,800 dolphins. The most recent survey of the Indus river dolphin from 2001 provided an abundance estimate of 965 dolphins. These dolphins are functionally blind and live in very turbid river habitats, from the deltas and extending upstream. Habitat alteration through damming and other river modifications, entanglement in fishing gear, and deliberate killings have greatly decreased the range, abundance and habitat available for this species.

**South Asian river dolphin** (*Platanista gangetica*)
**Species Status** Endangered

## Vulnerable cetacean species

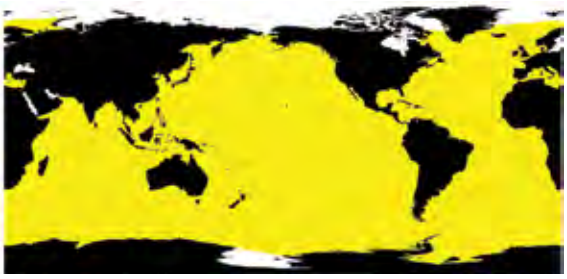
### Sperm whale (Physeter macrocephalus)

**Status:** Vulnerable **2008**

**History:** Vulnerable **1996**

**Size**: Male Sperm whales grow to around 16 m and 45 t, and females to about 11 m and 15 t.

Sperm whales are the largest toothed cetacean. They are found throughout the world's oceans, with a tendency to stay in deep waters. Pre-whaling abundance of sperm whales was about 1.1 million whales, but their abundance was reduced to around 360,000 individuals by 1999. There is insufficient data to determine whether sperm whale populations have increased or declined since the end of large-scale commercial whaling around 1980. Recovery from the large-scale depletion of sperm whales is slowed by their low reproductive rate. Threats to this species include entanglement in fishing gear, and pollution.



**Sperm whale** (*Physeter macrocephalus*)
**Species Status** Vulnerable

### Franciscana (*Pontoporia blainvillei*)

**Status:** Vulnerable **2008 (species status)**
Vulnerable **2008 (Rio Grande do Sul/ Uruguay subpopulation)**

**History:** **Data Deficient 1996**

**Size:** The franciscana is a small dolphin; females grow to about 1.7 m and 53 kg, and males are slightly smaller.

The franciscana dolphin is a small, marine and estuarine species endemic to coastal waters along the east coast of South America from Argentina, Uruguay and Brazil. The franciscana is the only species within the family Pontoporiidae, and is the only 'river' dolphin species that lives in the marine environment. There are no reliable estimates of the total abundance of the species. However, surveys of a small part of the range of the southern Brazil Rio Grande do Sul and Uruguay subpopulation in 1996 estimated a number of 42,000 dolphins. The ecology of franciscanas is poorly known but their abundance has declined in recent decades primarily due to unsustainable rates of mortality in gillnets through bycatch.

**Franciscana** (*Pontoporia blainvillei*)
**Species Status** Vulnerable

### Finless porpoise (*Neophocaena phocaenoides*) and Yangtze finless porpoise (*Neophocaena phocaenoides ssp. asiaeorientalis*)

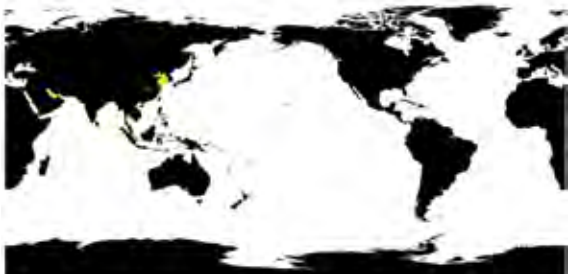
**Status:** Vulnerable **Finless porpoise (2008 species status)**
Endangered **Yangtze finless porpoise (2008 subspecies status)**

**History:** **Finless porpoise species Data Deficient 1996**

**Yangtze finless porpoise subspecies Endangered 1996 (not assessed since 1996)**

**Size:** Finless porpoises grow to about 2 m and 72 kg.

The finless porpoise is a small porpoise that inhabits shallow marine and estuarine systems in southern and eastern Asia, ranging from the Arabian Gulf to Japan. It is the most common small cetacean in coastal Chinese waters. The Yangtze finless porpoise freshwater subspecies is endemic to the middle and lower reaches of the Yangtze River and associated freshwater lakes. No total population estimate is available for the species throughout its range, as abundance estimates are only available for a few areas. Recent estimates of the endangered Yangtze finless porpoise subspecies indicate an abundance of about 1,800 porpoises from surveys conducted in 2006. Populations are declining as a result of mortality caused by fishing gear entanglements and electrofishing, habitat degradation through damming and dredging, pollution, vessel strikes, noise disturbance and coastal development.



**Finless porpoise** (*Neophocaena phocaenoides*)
**Population Status** Endangered Vulnerable

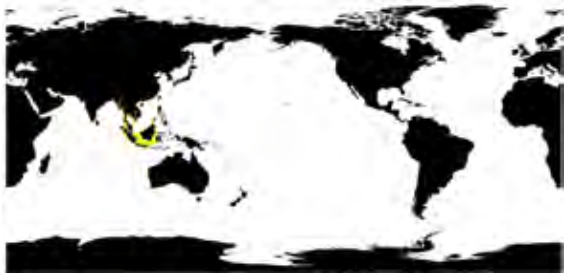
### Irrawaddy dolphin (*Orcaella brevirostris*)

**Status:** Vulnerable **Irrawaddy dolphin (species status) 2008**
Critically Endangered **5 subpopulations including; Ayeyarwady River, Mahakam River, Malampaya Sound, Mekong River and Songkhla Lake**

**History:** **Data Deficient 1996 (species)**
Critically Endangered **2004 (5 subpopulations)**

**Size:** Male Irrawaddy dolphins grow to about 2.75 m and 130 kg; females are slightly smaller.

The Irrawaddy dolphin is a small and slender dolphin species that occurs primarily in estuarine and freshwater habitats in parts of South East Asia and west to the Bay of Bengal. The Irrawaddy dolphin is classified as Vulnerable at the species level but five subpopulations have been classified as Critically Endangered including the three riverine populations and two populations in Songkhla Lake, Thailand and Malampaya Sound, Philippines. These subpopulations have decreasing population abundances. The total abundance for this species is unknown as there have been no range–wide surveys. The three Critically Endangered freshwater subpopulations in the Mekong (Laos, Vietnam and Cambodia), Mahakam (Indonesia) and Ayeyarwady (Myanmar) River systems were estimated to have fewer than 50 reproductively mature dolphins, and recent surveys indicate substantial declines in their ranges. Freshwater dolphins in Asia are among the world's most endangered mammals, with the greatest threat being mortality from incidental catches in fishing gear. Their preferred estuarine and freshwater habitats makes Irrawaddy dolphins highly vulnerable to anthropogenic threats. The greatest direct threat is from incidental capture and mortality from fisheries interactions but habitat loss and degradation are also important.



**Irrawaddy dolphin** (*Orcaella brevirostris*)
**Population Status** Critically Endangered Vulnerable

### Atlantic humpback dolphin (*Sousa teuszii*)

**Status:** Vulnerable **2008**

**History:** **Data Deficient 1996**

**Size:** About 2.5 m and 170 kg.

The Atlantic humpback dolphin is a medium sized dolphin species endemic to the western coast of Africa. These dolphins occur mainly in shallow coastal waters of the eastern Atlantic Ocean from southern Morocco to southern Angola. The total population is unknown but probably numbers a few thousand. These dolphins have become rare in some areas of their range where they used to be common. The population abundance trend is decreasing. The main threats include incidental mortality from fishing, hunting, and habitat destruction and degradation.

**Atlantic humpback dolphin** (*Sousa teuszii*)
**Species Status** Vulnerable

## Great whales showing signs of recovery but variable population status

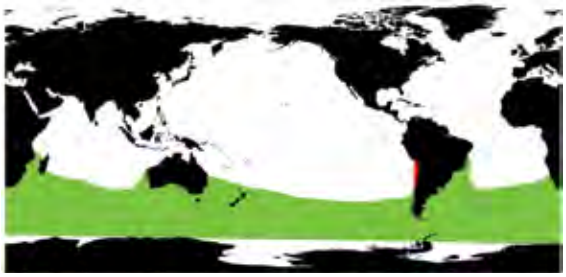
### Southern right whale (*Eubalaena australis*)

**Status:** **Least Concern 2008 (species status)**
**Critically Endangered Chile-Peru subpopulation 2008**

**History:** **Lower Risk / Conservation Dependent 1996**
**Vulnerable 1988**

**Size:** Southern right whales grow to a maximum size of 17.5 m and weigh as much as 80 t, with males being slightly smaller than females.

Southern right whales spend the summer in Antarctic feeding grounds and migrate to breeding grounds around South Africa, Argentina, Brazil, the southern coasts of Australia, and in the Auckland Islands south of New Zealand. Historical abundance of southern right whales was estimated to be 55,000-70,000. This species was subjected to intensive hunting in the South Atlantic Ocean in the early 1800s, and whaling soon expanded to the South Pacific and Indian Oceans, reducing the species to near extinction. Assuming that the Southern right whale populations have continued to grow at similar rates in recent years to previous records it is estimated that the current population is around 12,000 – 15,000. The small Chile-Peru subpopulation is listed separately by the IUCN as Critically Endangered. Southern right whales feed entirely on zooplankton (mainly copepods and krill). The major threats to southern right whales are habitat loss and degradation. Entanglements, ship strikes, climate change and pollution have also been identified as possible threats to this species.



**Southern right whale** (*Eubalaena australis*)
**Population Status** Critically Endangered Least Concern

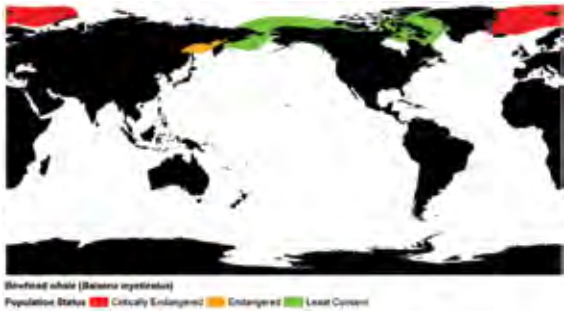
### Bowhead whale (*Balaena mysticetus*)

**Status:** **Least Concern – 2008 (species status)**
**Critically Endangered – the Svalbard-Barents Sea subpopulation 2008**
**Endangered – Okhotsk Sea subpopulation 2008**

**History:** **Lower Risk / Conservation Dependent – 1996 (species status)**
**Vulnerable 1990**
**Endangered 1986**

**Size:** Bowhead whales grow up to 18-20 m, with a maximum weight of about 110 t.

Bowhead whales are restricted to Arctic seas and are often found near the edge of the pack ice. Bowhead whales were heavily depleted by whaling operations between 1611 and 1911. They continue to be subject to indigenous hunting in some countries. Numbers overall are increasing, however, not all stocks have shown the same level of recovery. Two subpopulations were listed separately by the IUCN in 2008: the Svalbard-Barents Sea subpopulation was listed as Critically Endangered and the Okhotsk Sea subpopulation as Endangered. The major threat to bowhead whales in the past was from commercial hunting, which depleted all populations. Other potentially significant threats include oil and gas development, pollution, entanglement, ship strike and climate change. In particular, climate change influences on sea ice cover have the potential to impact bowhead whales, however this threat is not yet well understood.



**Bowhead whale** (*Balaena mysticetus*)
**Population Status**
Critically Endangered Endangered Least Concern

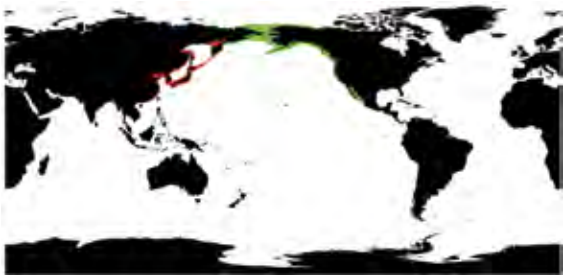
## Gray whale (*Eschrichtius robustus*)

**Status:** **Least Concern – 2008 (species status)**
**Critically Endangered – western Pacific subpopulation – 2008**

**History:** **Lower Risk / Conservation Dependent – 1996 (species status)**

**Size:** Gray whales grow on average to 11-12 m and weigh from 16-45 t.

Gray whales have been hunted for hundreds of years and had been removed from the North Atlantic Ocean by the early 18th Century. Two separate subpopulations of gray whales now exist in the North Pacific Ocean, with a large eastern population numbering around 18,000-30,000 individuals and a smaller western subpopulation of around 100–130 whales. The western subpopulation is listed separately by the IUCN as Critically Endangered. Like most baleen whales, they undertake long annual migrations from high latitude summer feeding grounds to lower latitude breeding grounds in the winter. The western population is threatened by bycatch, ship strike and directed hunting, as well as oil and gas drilling in their feeding habitat. Coastal development, climate change, entanglements, ship strike, and oil and gas exploration all pose some level of threat to the eastern population. Eastern gray whales are the focus of whale watching activities in Canada, the US and Mexico.



**Gray whale** (*Eschrictius robustus*)
**Population Status** Critically Endangered Least Concern

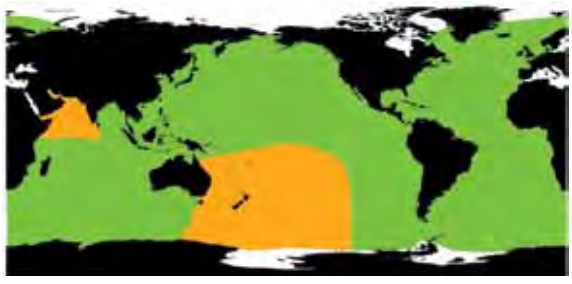
## Humpback whale (Megaptera novaeangliae)

**Status:** **Least Concern – 2008 (species status)**
**Endangered – Arabian Sea subpopulation – 2008**
**Endangered – Oceania subpopulation – 2008**

**History:** **Vulnerable 1990 (species status)**
**Endangered 1986**

**Size:** Humpback whales grow to an average length of 12–15 m, and on average weight about 25–30 t.

Humpback whales are cosmopolitan throughout the world's oceans. All but the Arabian subpopulation undertakes a long annual migration from summer feeding grounds in high latitude waters to winter breeding grounds in tropical waters. Humpback whales have increased from a global population in the low thousands in the late 1960s, to a current global population that is increasing and is now estimated to number more than 60,000 individuals. However, some subpopulations in areas such as the Arabian Sea, Oceania and the western North Pacific remain small and have not shown strong signs of increase. The Arabian Sea and Oceania subpopulations are now listed separately by the IUCN as Endangered. Humpback whales have been protected from commercial whaling in the North Atlantic since 1955, in the Southern Hemisphere since 1963 and globally since 1966. Entanglements in fishing gear, ship strike, noise and habitat loss represent threats to humpback whales. The small endangered populations remain threatened and require monitoring and mitigation of impacts, particularly in Oceania and the NW Pacific.



**Humpback whale** (*Megaptera novaeangliae*)
**Population Status** Endangered Least Concern

## Other cetacean species that have threatened populations

### Beluga (*Delphinapterus leucas*)

**Status:** **Near Threatened – 2008 (species status)**
**Critically Endangered – Cook Inlet subpopulation – 2006**

**History:** **Beluga species**
**Vulnerable 1996**

**Cook Inlet subpopulation**
**Critically Endangered 2006**

**Size:** Belugas grow to about 4.0-5.5 m long and up to 1.5 t, with males larger and more robust than females .

Belugas are medium-sized, white, toothed whales inhabiting marine and estuarine waters of the Arctic and Subarctic region. They are unusual among cetaceans in having unfused cervical vertebrae that enable them to turn and nod their heads, their ability to alter the shape of their bulging melon and are further distinguished by undergoing an annual seasonal moult. Belugas have been hunted for centuries and commercial hunting and overhunting led to depletion of some stocks and extirpation from some parts of their range. The total global population of belugas is estimated to be more than 150,000 but some stocks have not been adequately surveyed and the population trend is unknown. The Cook Inlet subpopulation declined substantially in the 1990s predominantly caused by subsistence hunting and this subpopulation has been classified as Critically Endangered. An abundance estimate for this subpopulation was 302 in 2006. The main threats to this species are from subsistence hunting, pollution, habitat modification, prey depletion from overfishing and climate change.

**White whale** (*Delphinapterus leucas*)
**Population Status** Critically Endangered Near Threatened

### Short-beaked common dolphin (*Delphinus delphis*)

**Status:** **Least Concern – 2008 (species status)**
**Endangered Mediterranean subpopulation 2008**
**Vulnerable – Black Sea common dolphin 2008**

**History:** **Short-beaked common dolphin species Lower Risk/Least Concern – 1996**

**Mediterranean subpopulation**
**Endangered – 2003 (not reassessed since 2003)**

**Black Sea common dolphin**
**Vulnerable – not evaluated until 2008**

**Size:** Short-beaked common dolphins vary regionally, but grow to about 2.4 m and up to 200 kg.

Short-beaked common dolphins (*Delphinus delphis*) are widely distributed in tropical and warm temperate pelagic and continental shelf waters in the Pacific and Atlantic Oceans. An endemic subspecies (*D. d. ponticus*) is recognised in the Black Sea . Although very abundant in parts of their range, these dolphins were heavily impacted by mortality in the eastern tropical Pacific tuna purse seine fishery in the 1960s and 1970s and from bycatch in trawl nets and driftnets. The Mediterranean subpopulation is classified as Endangered and the Black Sea subspecies is classified as Vulnerable. These populations have declined substantially due to mortality from overhunting, bycatch in fishing gear, pollution and habitat degradation.

**Common dolphin** (*Delphinus delphis*)
**Population Status**
Endangered Vulnerable Least Concern

## Harbour porpoise (*Phocoena phocoena*)

**Status:** **Least Concern – 2008 (species status)**
**Critically Endangered – Baltic Sea subpopulation 2008**
**Endangered – Black Sea subspecies 2008**

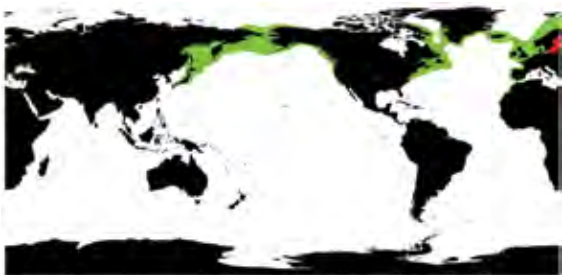
**History:** **Harbour porpoise**
**Vulnerable – 1996**

**Baltic Sea subpopulation**
**Vulnerable – 1996**

**Black Sea subspecies**
**Vulnerable – 1996**

**Size:** Harbour porpoises grow to about 1.7 m and 75 kg, with males slightly smaller than females.

The Harbour porpoise is a small, marine cetacean occurring in cold temperate and Subarctic coastal waters in the Northern Hemisphere. Three geographically and genetically isolated subspecies are recognised: *Phocoena phocoena vomerina* (North Pacific), *Phocoena phocoena phocoena* (North Atlantic and North Sea), and *Phocoena phocoena relicta* (Black Sea). The species is widespread and generally abundant; however, the Baltic Sea subpopulation is classified as Critically Endangered and the Black Sea subspecies as Endangered. The primary causes of population declines in the Baltic and Black Seas include the large historical commercial catching of porpoises; periodic catastrophic mortality events resulting from severe winter ice conditions and diseases. Various forms of habitat degradation including pollution, noise, and decreases in prey abundance or quality from overfishing also affects the population. The most significant ongoing threat to harbour porpoises is from incidental mortality in gillnets and other fishing gear. Other threats include disease outbreaks, particularly of morbilliviruses, which have occurred in the past for harbour porpoises and many porpoises in the Black Sea are carriers of the fatal disease.



**Harbour porpoise** (*Phocoena phocoena*)
**Population Status**
Critically Endangered Endangered Least Concern

## Spinner dolphin (*Stenella longirostris*)

**Status:** **Data Deficient – 2008 (species status)**
**Vulnerable – Eastern spinner dolphin 2008**

**History:** **Spinner dolphin species**
**Lower Risk / Conservation Dependent – 1996**

**Eastern spinner dolphin**
**Vulnerable – not evaluated until 2008**

**Size:** Spinner dolphins vary regionally, and grow to a maximum size of about 2.35 m and weigh up to 78 kg.

Spinner dolphins are the most common small cetacean species in tropical pelagic waters and occur worldwide throughout tropical and subtropical marine habitats. As their name indicates, these dolphins spin on their longitudinal axis as they leap above the water surface. Four subspecies are recognised. The Eastern spinner dolphin subspecies (*S. l. orientalis*) was heavily impacted from bycatch mortalities in the 1960s and 1970s caused by the purse-seine fishery for yellowfin tuna in the eastern tropical Pacific Ocean. The original abundance of Eastern spinner dolphins was estimated to be approximately 1.5 million before the tuna purse-seine fishery began in the late 1950s and fell to 0.3 million by 1979. Although the USA and international agencies have introduced management measures that have reduced fisheries bycatch by two orders of magnitude, the Eastern spinner dolphin has not shown clear signs of recovery.

**Spinner dolphin** (*Stenella longirostris*)
**Population Status** Vulnerable Data Deficient

## Common bottlenose dolphin (*Tursiops truncatus*)

**Status:** **Least Concern – 2008 (species status)**
**Endangered – Black Sea bottlenose dolphin 2008**

**History:** **Common bottlenose dolphin species Data Deficient – 1996**

**Black Sea bottlenose dolphin Endangered – not evaluated until 2008**

**Size:** Common bottlenose dolphins grow to about 3.8 m and 500 kg.

The common bottlenose dolphin is a cosmopolitan species and is one of the best studied cetaceans. Common bottlenose dolphins occur throughout tropical and warm temperate oceans and seas, in both coastal and offshore oceanic waters. Populations exhibit considerable geographic variation in morphology, genetics and physiology between oceans and within some ocean basins, hence additional subspecies or species may be recognised in future . As with the endangered Harbour porpoise and Short-beaked common dolphin subspecies that occur in the Black Sea, the Black Sea bottlenose dolphin subspecies (*T. t. ponticus*) is listed as Endangered because of the high mortality that occurred from commercial hunting in the Black Sea up to 1983 and the ongoing mortality from incidental captures in fishing gear. As for other small cetaceans, inshore populations of common bottlenose dolphins are vulnerable to hunting, bycatch mortality and problems arising from habitat degradation. Directed takes of these dolphins for human consumption, bait and other products, and to reduce potential competition with fisheries have occurred throughout their range.

**Common bottlenose dolphin** (*Tursiops truncatus*)
**Population Status** Endangered Least Concern

## Indo-Pacific humpback dolphin (*Sousa chinensis*)

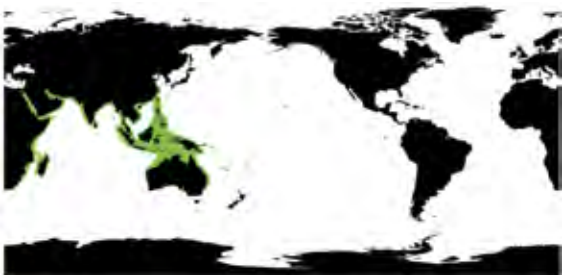
**Status:** **Near Threatened – 2008 (species status)**
**Critically Endangered – Eastern Taiwan Strait subpopulation 2008**

**History:** **Indo-Pacific humpback dolphin species Data Deficient – 1996**

**Eastern Taiwan Strait subpopulation Critically Endangered – not evaluated until 2008**

**Size:** Indo-Pacific humpback dolphins vary regionally, with a maximum size of 2.7 m and 260 kg in South African waters, and 2.6 m in Australia.

Indo-Pacific humpback dolphins occur in shallow, coastal marine and estuarine environments in the Indo-Pacific region. At present, the IUCN and IWC consider that all Indo-Pacific humpback dolphins are part of a single widespread but highly variable species, *Sousa chinensis*. However, the taxonomy of the genus *Sousa* is complex and various species, subspecies and geographic forms have been described. The two morphologically distinct geographic forms of *S. chinensis* (*plumbea*-type and *chinensis*-type) were assessed separately by the IUCN in 2008. At the species level, *Sousa chinensis* was assessed as Near Threatened in 2008 as decreased abundance was inferred in populations throughout much of its range, resulting from bycatch mortality in fishing gear and impacts from pollution and habitat degradation. The Eastern Taiwan Strait (ETS) subpopulation was assessed as Critically Endangered. The total population was estimated to be more than 10,000 mature individuals, with the ETS population estimated to be 99 individuals. For the Critically Endangered ETS subpopulation the greatest direct threat is from bycatch in fishing gear.



**Indo-Pacific humpback dolphin** (*Sousa chinensis*)
**Population Status** Critically Endangered Near Threatened

## All other cetacean species that are not listed as threatened

The 24 cetacean species that are listed as threatened by the IUCN (2008) at the species level or that have threatened subspecies or subpopulations have been described individually. The remaining 62 cetacean species currently recognised by the IWC that are not listed as threatened by the IUCN are briefly reviewed below, using family groupings.

### *Family Neobalaenidae*

**Pygmy right whale (*Caperea marginata*) Data Deficient – 2008**

The pygmy right whale is the sole member of the family Neobalaenidae, and is the smallest baleen whale, growing up to 6.5 m in length and weighing up to 3.4 t. The pygmy right whale has a circumpolar distribution in the Southern Hemisphere between about 30° and 50°S in temperate and subantarctic waters.

These very small whales have rarely been recorded at sea and are one of the least known baleen whales. Most aspects of their ecology including their total abundance and population trend are unknown, and the species has been assessed as Data Deficient. Pygmy right whales have never been commercially hunted although some have been killed in fisheries and from bycatch in nets. There are no identified direct threats to this species.

### *Family Balaenopteridae*

**Common minke whale (*Balaenoptera acutorostrata*) Least Concern – 2008**

**Antarctic minke whale (*Balaenoptera bonaerensis*) Data Deficient – 2008**

**Bryde's whale complex (*Balaenoptera edeni/brydei*) Data Deficient – 2008**

**Omura's whale (*Balaenoptera omurai*) Data Deficient – 2008**

The family Balaenopteridae contains eight of the fourteen baleen whale species, with seven species in the genus *Balaenoptera*, and one species (humpback whale) in the genus *Megaptera*. Balaenopterids, commonly known as rorquals, are characterised by the presence of a dorsal fin and ventral throat pleats. The blue, fin and sei whale species are listed as Endangered and the humpback has two Endangered Subpopulations with one species assessed as Least Concern and the remaining three rorquals listed as Data Deficient.

Minke whales were regarded as a single species (*B. acutorostrata*) until the late 1990s when the Antarctic minke whale (*B. bonaerensis*) was recognised as a separate species, based on considerable morphological and genetic differences. Northern Hemisphere minke whales along with the 'dwarf minke whale' in the Southern Hemisphere, are referred to as common minke whales. The Antarctic minke whale is found only in the Southern Hemisphere.

The common minke whale, listed by the IUCN as Least Concern, grows to approximately 10.7 m in length, and weighs about 9 t. These whales are widely distributed throughout the North Pacific and North Atlantic Oceans and in the Southern Hemisphere with an estimated population size in the North Atlantic Ocean of over 180,000 individuals. The species is believed to be abundant in much of its range and the population trend for the species is stable. But concerns have been raised about catch limits and bycatch mortality rates in some areas. This species was intensively whaled in the Northeast Atlantic last century, and Norway has continued commercial whaling with an annual catch limit of up to 1,000 minke whales. Additional catches occur off Iceland and aboriginal subsistence catches off Greenland. Japan has caught common minke whales in the North Pacific region as part of its special permit whaling since 1994.

Antarctic minke whales have a circumpolar distribution in the Southern Hemisphere, migrating from southern summer feeding grounds around Antarctica to undetermined tropical breeding grounds in winter, with some reported to remain in Antarctica over winter. These whales grow to approximately 10.7 m in length, and weigh about 9 t. Over 110,000 minke whales were killed in the Southern Hemisphere during the 20th Century, most of which were likely to have been Antarctic minke whales. There are likely to be several hundred thousand individuals of this species living in the Southern Hemisphere, however there is no currently accepted overall abundance estimate and the population trend is unknown. The species is subject to Japanese special permit whaling, with a current annual catch quota of 935 whales. Reasons behind the apparent decline in numbers of Antarctic minke whales since 1978 have not yet been resolved and for this reason the IUCN listed the species as Data Deficient in 2008.

The taxonomy and number of species present in the Bryde's whale complex remains unresolved, however there is likely to be a larger 'ordinary' form that grows to around 14 m, and one or more smaller form(s) whose taxonomy is unclear. The 'ordinary' form is found in tropical and temperate waters throughout the Atlantic, Pacific and Indian oceans, while the smaller form tends to be more coastal in its distribution. Bryde's whales generally remain in waters of 16.3°C or warmer throughout the year. Their distribution is restricted to latitudes up to 40°N and S, however, within this range they tend to migrate to higher latitudes in summer and towards the equator in winter. Bryde's whales were not subject to the same level of hunting as most other large whales during the 20th Century; this species is taken by Japanese whalers in the North Pacific under special permit. The lack of certainty about the taxonomy, abundance and population trends for Bryde's whales led to them being assessed as Data Deficient in 2008.

The species status of Omura's whale (*B. omurai*), first described by Wada *et al.* (2003), was only recently confirmed using genetic data, and it is now recognised by the IWC Scientific Committee. Having only recently been described, there is a distinct lack of information about the biology, ecology and global abundance of this species, the species is listed as Data Deficient. The only confirmed records of Omura's whale are from south-eastern Japan, the Solomon Islands, the Philippines and the Cocos (Keeling) Islands.

### *Family Kogiidae*

**Pygmy sperm whale (*Kogia breviceps*)**
**Data Deficient – 2008**

**Dwarf sperm whale (*Kogia sima*)**
**Data Deficient – 2008**

Two *Kogia* species are recognised in the family Kogiidae, the pygmy sperm whale (*K. breviceps*) and the dwarf sperm whale (*K. sima*). Much of the existing information about pygmy and dwarf sperm whales has come from strandings, with only rare sightings of these species at sea. Prior to 1966 only one species of *Kogia* was recognised, however morphological and genetic data support the recognition of two separate species. The pygmy sperm whale grows up to a length of 3.8 m and a weight of 450 kg, and the dwarf sperm whale to about 2.7 m and 272 kg. Both species are found in deep, temperate and tropical waters throughout the world's oceans with pygmy sperm whales preferring warmer waters offshore from the continental shelf while the dwarf sperm whale inhabits shelf edge and slope waters.

The lack of information on the global abundance and population trends for both *Kogia* species led to them being listed as Data Deficient by the IUCN in 2008. These whales are less likely to be impacted upon by human activities compared to most other cetaceans although ingestion of ocean debris, entanglement in fishing gear and ship strike may pose some threat to dwarf and pygmy sperm whales. Harpoon fisheries in various locations, particularly Indonesia, St Vincent and Japan have also taken both pygmy and dwarf sperm whales in small numbers in recent years. They were never hunted commercially.

### *Family Iniidae*

**Boto (*Inia geoffrensis*) Data Deficient – 2008**

The boto or Amazon River dolphin *(Inia geoffrensis)* is the sole member of the family Iniidae. The boto has a long beak, small eyes and a long keel-shaped dorsal fin, and males grow to 2.5 m in length and weigh 185 kg. The boto is a freshwater species that lives only in the Amazon and Orinoco River basins of South America. The boto is the most abundant river dolphin species. An estimated 13,000 botos occur in the *Mamirauá Sustainable Development Reserve,* a large floodplain lake system in Brazil. Other abundance estimates of botos include 345 along 120 km of the upper Amazon River and in the Pacaya-Samiria Reserve in Peru, 72 botos were sighted between 1991–2000.

The boto had previously been listed as Vulnerable since 1988 but in 2008 it was listed as Data Deficient because of the lack of current data on their ecology, known threats, population abundance and trends throughout its range. Botos have no known natural predators but anthropogenic threats include mortality from entanglement in fishing gear, deliberate killing for fish bait, increased habitat degradation, specifically damming of rivers and pollution levels could affect the abundance of the species.

### *Family Monodontidae*

**Narwhal (*Monodon monoceros*) Near Threatened – 2008**

The narwhal *(Monodon monoceros*) is one of only two species in the family Monodontidae, together with the beluga *(D. leucas*), which has a threatened subpopulation. The unique and most conspicuous feature of narwhals is their long spiralled tusk. Males grow to 4.7 m length and weigh up to 1,600 kg, while females are smaller and grow to 4.0 m length and weigh up to 1,000 kg. Narwhals occur discontinuously in arctic waters with the majority of populations found in the Canadian Arctic and western Greenland, and the eastern Russian Arctic. Their migration pattern correlates to the seasonal movements of pack ice, and narwhals exhibit site fidelity to their summer and winter grounds.

The estimated global population is more than 80,000 narwhals, with > 70,000 in the Canadian Arctic and smaller populations elsewhere. The Inuit have traditionally hunted narwhals for many centuries for food, skin and tusk ivory. Commercial hunting occurred for a few decades in the early 1900s. Narwhals continue to be hunted in Canada and Greenland and some populations may be overexploited. The need to manage hunting makes the narwhal a conservation-dependent species and it is now listed as Near Threatened by the IUCN. Other threats include global warming, specifically the effects on their arctic ice habitats, susceptibility to ice entrapment during rapid freezing, and pollution.

### *Family Phocoenidae*

**Burmeister's porpoise (*Phocoena spinipinnis*) Data Deficient – 2008**

**Spectacled porpoise (*Phocoena dioptrica*) Data Deficient – 2008**

**Dall's porpoise (*Phocoenoides dalli*) Least Concern – 2008**

The family Phocoenidae, commonly known as the porpoise, includes six species from three genera currently recognised by the IWC. The vaquita is Critically Endangered, the finless porpoise is listed as vulnerable and the harbour porpoise has a threatened subspecies and subpopulation. The remaining porpoises comprising two Data Deficient species and the Dall's porpoise listed as Least Concern.

Porpoises are among the smallest cetaceans, with none of the six species exceeding 2.5 m. They have a stocky, robust body form with no prominent rostrum, unlike most delphinids. Another feature that distinguishes porpoises from dolphins is their spatulate-shaped teeth, in contrast to dolphins that have conical teeth. The distribution of Burmeister's porpoise (*Phocoena spinipinnis*) is mainly restricted to coastal and nearshore waters around the southern half of South America, the spectacled porpoise (*Phocoena dioptrica*) is more widely distributed in coastal and offshore waters the Southern Ocean and Dall's porpoises (*Phocoenoides dalli*) are endemic to the cool temperate zones of the North Pacific Ocean.

There are no quantitative data on the abundance or population trends for Burmeister's porpoises or spectacled porpoises, and so they are listed as Data Deficient. Dall's porpoises are widespread and abundant in the North Pacific; their global abundance is estimated to be more than 1.2 million. The Dall's porpoise is primarily an oceanic species occurring in deep water.

Burmeister's porpoises and spectacled porpoises are hunted for food and crab bait and caught as bycatch in net fisheries in some areas around South America. Many thousands of Dall's porpoises were killed in driftnet fisheries in the North Pacific region from the 1950s until the United Nations ban on high-seas driftnet fishing came into effect in 1992. A large-scale Japanese hand harpoon fishery targeted Dall's porpoises in the Okhotsk Sea between 1986 and 1989. Dall's porpoises are also caught in driftnet fisheries within Exclusive Economic Zone (EEZ) waters of Japan and Russia where the United Nations ban on driftnets does not apply.

### *Family Delphinidae*

**Rough-toothed dolphin (*Steno bredanensis*) Least Concern – 2008**

**Tucuxi (*Sotalia fluviatilis*) Data Deficient – 2008**

**Guiana dolphin (*Sotalia guianensis*) (Not Evaluated)**

**White-beaked dolphin (*Lagenorhynchus albirostris*) Least Concern – 2008**

**Atlantic white-sided dolphin (*Lagenorhynchus acutus*) Least Concern – 2008**

**Dusky dolphin (*Lagenorhynchus obscurus*) Data Deficient – 2008**

**Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) Least Concern – 2008**

**Hourglass dolphin (*Lagenorhynchus cruciger*) Least Concern – 2008**

**Peale's dolphin (*Lagenorhynchus australis*) Data Deficient – 2008**

**Risso's dolphin (*Grampus griseus*) Least Concern – 2008**

**Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) Data Deficient – 2008**

**Atlantic spotted dolphin (*Stenella frontalis*) Data Deficient – 2008**

**Pantropical spotted dolphin (*Stenella attenuata*) Least Concern – 2008**

**Clymene dolphin (*Stenella clymene*) Data Deficient – 2008**

**Striped dolphin (*Stenella coeruleoalba*) Least Concern – 2008**

**Long-beaked common dolphin (*Delphinus capensis*) Data Deficient – 2008**

**Fraser's dolphin (*Lagenodelphis hosei*) Least Concern – 2008**

**Northern right whale dolphin (*Lissodelphis borealis*) Least Concern – 2008**

**Southern right whale dolphin (*Lissodelphis peronii*) Data Deficient – 2008**

**Commerson's dolphin (*Cephalorhynchus commersonii*) Data Deficient – 2008**

**Chilean dolphin (*Cephalorhynchus eutropia*) Near Threatened – 2008**

**Heaviside's dolphin (*Cephalorhynchus heavisidii*) Data Deficient – 2008**

**Melon-headed whale (*Peponocephala electra*) Least Concern – 2008**

**Pygmy killer whale (*Feresa attenuata*) Data Deficient – 2008**

**False killer whale (*Pseudorca crassidens*) Data Deficient – 2008**

**Killer whale (*Orcinus orca*) Data Deficient – 2008**

**Long-finned pilot whale (*Globicephala melas*) Data Deficient – 2008**

**Short-finned pilot whale (*Globicephala macrorhynchus*) Data Deficient – 2008**

**Australian snubfin dolphin (*Orcaella heinsohni*) Near Threatened – 2008**

The family Delphinidae is the largest and most diverse cetacean family, with 36 species from 17 genera currently recognised by the IWC. The status of all species except for the Guiana dolphin (*Sotalia guianensis*) has been assessed by the IUCN, and seven delphinid species are listed as threatened or have threatened subspecies or subpopulations. Two additional delphinid species are assessed as Near Threatened: the Chilean dolphin (*Cephalorhynchus eutropia*) and the Australian snubfin dolphin (*Orcaella heinsohni*). The remaining 27 delphinid species include 11 species assessed as being of Least Concern, and 15 species that are Data Deficient, indicating that there are insufficient data to enable their population status and threat of extinction to be reliably determined.

As expected for such a large and diverse family, the Delphinidae includes a wide variety of species of different sizes, morphological characteristics, and diverse biology and ecology. Delphinids range from large species such as killer whales (*Orcinus orca*), where males grow to 9 m and weigh up to 5.6 t,

through to small dolphins that are less than 1.5 m in length. Delphinid species are found in almost every ocean and sea across the world, including habitats ranging from subpolar regions to the tropics, but their highest diversity occurs in tropical and warm temperate regions. Although most species are oceanic dolphins, others have adapted to live primarily in nearshore coastal habitats and two species have riverine subspecies or population.

Some species are endemic to smaller regions, such as the Commerson's dolphin (*Cephalorhynchus commersonii*) and the Chilean dolphin (*C. eutropia*) found in southern South America and Heaviside's dolphin *(C. heavisidii*) which is restricted to the south-western coast of Africa. At the other extreme, some delphinid species are very abundant and cosmopolitan, such as the striped dolphin (*Stenella coeruleoalba*) that occurs throughout tropical and warm temperate zones in the Pacific, Atlantic and Indian Oceans and adjacent seas. However, some populations of this species have declined substantially; fisheries bycatch, pollution and disease have reduced the abundance of striped dolphins in the Mediterranean Sea. Japanese harpoon and drive fisheries have overexploited some striped dolphin populations leading to local extinction from some areas of their range.

Some delphinid species are the most globally abundant cetaceans. The pantropical spotted dolphin (*Stenella attenuata*) with an estimated global abundance of more than 2.5 million individuals and the short-beaked common dolphin (*Delphinus delphis*) is estimated to number more than four million globally. However, populations of both of these species were heavily impacted by the Eastern Tropical Pacific Tuna Fishery that killed more than 5 million dolphins between 1959 to 1972, with a 76 per cent reduction in the abundance of the north-eastern population of pantropical spotted dolphins which is still not showing clear signs of recovery.

Although the social structure of delphinids varies among species, members of this family are considered to be relatively social with pods ranging from a few individuals to groups of thousands of individuals. Some species exhibit long-term associations. For example, resident killer whales in the eastern North Pacific form stable groups based on matrilineal lines of 2-9 individuals that display cooperative behaviours including calf rearing.

The two Near Threatened delphinid species (the Australian snubfin dolphin and the Chilean dolphin) both inhabit coastal areas, which make them particularly susceptible to human impacts. The endemic Chilean dolphin (*Cephalorhynchus eutropia*) prefers shallow areas 5-10 m from shore and in rivers and estuaries and is threatened from aquaculture developments and bycatch in fishing gear. The recently identified Australian snubfin dolphin (*Orcaella heinsohni*) occurs in the northern coastal zones of Australia with one record from Papua New Guinea. These dolphins occur in shallow and protected coastal waters and are most commonly recorded close to river and creek mouths. Australian snubfin dolphins have relatively small population sizes such as the one in Cleveland Bay, Queensland with population estimates of 64-76 in an area of 310 $km^2$ in 1999-2001. Populations may be declining from the impacts of bycatch in fishing gear and anti-shark nets.

## Family Ziphiidae

**Shepherd's beaked whale (*Tasmacetus shepherdi*) Data Deficient – 2008**

**Baird's beaked whale (*Berardius bairdii*) Data Deficient – 2008**

**Arnoux's beaked whale (*Berardius arnuxii*) Data Deficient – 2008**

**Tropical bottlenose whale (*Indopacetus pacificus*) Data Deficient – 2008**

**Sowerby's beaked whale (*Mesoplodon bidens*) Data Deficient – 2008**

**Blainville's beaked whale (*Mesoplodon densirostris*) Data Deficient – 2008**

**Gervais' beaked whale (*Mesoplodon europaeus*) Data Deficient – 2008**

**Strap-toothed whale (*Mesoplodon layardii*) Data Deficient – 2008**

**Hector's beaked whale (*Mesoplodon hectori*) Data Deficient – 2008**

**Gray's beaked whale (*Mesoplodon grayi*) Data Deficient – 2008**

**Stejneger's beaked whale (*Mesoplodon stejnegeri*) Data Deficient – 2008**

**Andrew's beaked whale (*Mesoplodon bowdoini*) Data Deficient – 2008**

**True's beaked whale (*Mesoplodon mirus*) Data Deficient – 2008**

**Ginkgo-toothed beaked whale (*Mesoplodon ginkgodens*) Data Deficient – 2008**

**Hubb's beaked whale (*Mesoplodon carlhubbsi*) Data Deficient – 2008**

**Perrin's beaked whale (*Mesoplodon perrini*) Data Deficient – 2008**

**Pygmy beaked whale (*Mesoplodon peruvianus*) Data Deficient – 2008**

**Spade-toothed whale (*Mesoplodon traversii*) Data Deficient – 2008**

**Cuvier's beaked whale (*Ziphius cavirostris*) Least Concern – 2008**

**Northern bottlenose whale (*Hyperoodon ampullatus*) Data Deficient – 2008**

**Southern bottlenose whale (*Hyperoodon planifrons*) Least Concern – 2008**

The family Ziphiidae contains the beaked whales and is the second largest cetacean family with 21 species from six genera currently recognised by the IWC. Beaked whales are generally pelagic and many species occur offshore in deepwater habitats and are rarely seen. While some species, such as the recently described spade-toothed whale (*Mesoplodon traversii*), have not been observed alive. Only two beaked whale species have been assessed as being of Least Concern, with the remaining 19 species assessed as Data Deficient.

Beaked whales range in size from about 3 m to 12.8 m, and are characterised by having an elongated rostrum of variable length (except for Cuvier's beaked whale, *Ziphius cavirostris*, which has a short beak). In most species functional teeth do not occur in females and immature males, and occur only as a single pair of erupted teeth in the lower jaw of males. The exception to this is Shepherd's beaked whale (*Tasmacetus shepherdi*), which has a full set of functional teeth in both upper and lower jaws. In some beaked whale species the exposed teeth serve as tusks that appear to be used in aggressive interactions with other males, leading to body scarring. In the strap-toothed whale (*Mesoplodon layardii*) these tusks can grow over the upper jaw and restrict mouth opening and feeding.

Beaked whales typically occur in deep ocean waters or over seamounts, submarine canyons or continental slopes and rarely over continental shelves. Some species are widely distributed, whereas others are known from only a few locations. Beaked whales feed mainly on deep-sea squid and fish and some species routinely dive to depths of more than 1,000 m in search of prey.

Most beaked whale species are dispersed in offshore pelagic habitats and have not been directly targeted. However, the northern bottlenose whale (*Hyperoodon ampullatus*) was hunted commercially by Norwegian and British whalers and was overexploited before it was protected by the IWC in the late 1970s. Baird's beaked whale (*Berardius bairdii*) is endemic to the North Pacific and was previously hunted in North America and Asia. It is still being hunted. Other threats to beaked whales include entanglement in fishing gear.

# Key threats to cetaceans

Cetacean mortality occurs from a wide range of natural processes including predation, disease, strandings and entrapment. Cetacean species that exist as small isolated populations with low genetic diversity, or which are naturally rare or have restricted ranges and specific habitat requirements are highly susceptible to random events that can lead to population declines, local extirpation or species extinctions.

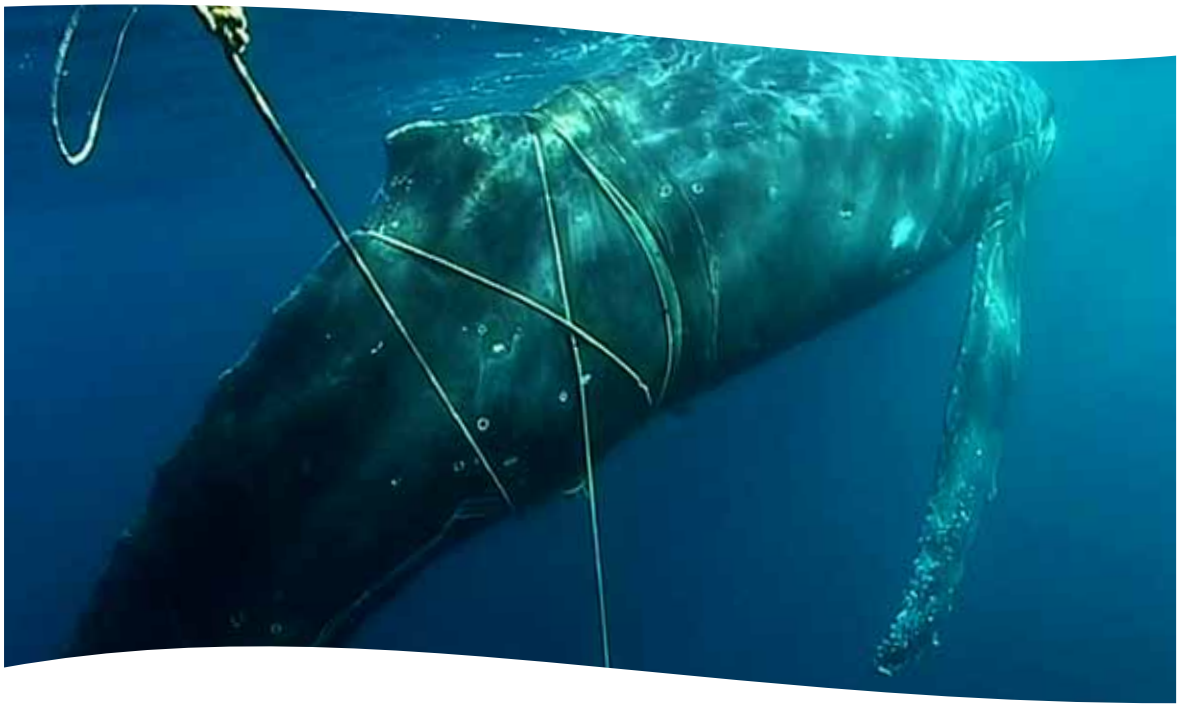
In addition to these natural threats, cetaceans are increasingly threatened by human activities.

Key anthropogenic threats to cetaceans include:

- Hunting and whaling
- Fisheries interactions including mortality from accidental capture or entanglement (bycatch) and deliberate culling
- Habitat degradation or loss from coastal and river development and associated pollution
- Noise disturbance and vessel strike
- Disease outbreaks
- Depletion of food resources through competition with fisheries
- Rapid climate change.

The impact of these threats is worse when two or more of these threats occur at the same time.

The main identified threats to each of the 41 cetacean species, subspecies and subpopulations listed as threatened by the IUCN (2008) are summarised in Table 3. These include direct and indirect impacts from human activities as well as ecological factors that effect how cetaceans withstand or recover from these impacts.



## Table 3: Summary of Recognised Threats to cetacean species, subspecies and subpopulations listed as threatened

| Species (Subspecies, Subpopulations) | Red list category | DIRECT HUMAN IMPACTS | | | | | INDIRECT HUMAN IMPACTS | | | | | | INTRINSIC FACTORS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fishing bycatch | Collision/ship strike | Boat disturbance | Harvesting for food | Harvesting for trade or direct kills (past/current) | Habitat loss & degradation | Pollution | Climate change | Acoustic disturbance | Changed prey/ food base | Disease | Restricted range & dispersal | Poor recruitment/ recovery | Inbreeding & low densities |
| Baiji dolphin | CRITICAL | Y | Y | Y | Y | Y | Y | Y | | Y | Y | | Y | | Y |
| Vaquita porpoise | CRITICAL | Y | | | | | Y | P | | | | | Y | | P |
| North Pacific right whale (NE Pacific subpopulation) | CRITICAL | Y | Y | Y | Y | Y | | Y | | | | | | | |
| Southern right whale (Chile-Peru subpopulation) | CRITICAL | Y | Y | Y | Y | Y | | | | | | | | | |
| Blue whale (Antarctic blue whale subspecies) | CRITICAL | | | | Y | Y | | | | | | | | | |
| Harbour porpoise (Baltic Sea subpopulation) | CRITICAL | Y | | | Y | Y | | Y | | | | P | | | |
| Indo-Pacific humpback dolphin (Eastern Taiwan Strait subpop.) | CRITICAL | Y | | | Y | | Y | Y | | | | | | | |
| Bowhead Whale (Svaalbard-Barents Sea subpopulation) | CRITICAL | Y | Y | | Y | Y | Y | Y | P | | | | | | |
| Gray whale (North West Pacific subpopulation) | CRITICAL | Y | Y | Y | | Y | Y | P | | P | Y | | | | |
| Beluga whale (Cook Inlet subpopulation) | CRITICAL | Y | P | Y | Y | Y | | P | P | Y | Y | | | Y | Y |
| Hector's dolphin (Maui's dolphin subspecies) | CRITICAL | Y | | P | | | Y | P | | | | P | | | |
| Irrawaddy dolphin (Songkhla Lake subpopulation) | CRITICAL | Y | | | | | Y | Y | | | P | | | | |
| Irrawaddy dolphin (Mekong River subpopulation) | CRITICAL | Y | | Y | | Y | P | Y | | Y | P | | | | |
| Irrawaddy dolphin (Malampaya Sound subpopulation) | CRITICAL | Y | | | | | | P | | | P | | | | |
| Irrawaddy dolphin (Mahakam River subpopulation) | CRITICAL | Y | Y | Y | | Y | Y | Y | Y | | Y | | | | |
| Irrawaddy dolphin (Ayeyarwady River subpopulation) | CRITICAL | Y | | | | | Y | Y | | P | | | | | |
| North Atlantic right whale | ENDANGERED | Y | Y | | | Y | | P | | | | | | Y | Y |
| North Pacific right whale | ENDANGERED | Y | Y | | | Y | | | | | | | | | |
| Sei whale | ENDANGERED | | Y | | | Y | | | | | | Y | | | |
| Blue whale | ENDANGERED | Y | Y | | | Y | | | P | | | | | | Y |
| Fin whale | ENDANGERED | Y | Y | | | Y | | | | | | | | | |
| Hector's dolphin | ENDANGERED | Y | | Y | | | Y | Y | | | | | | | |
| South Asian river dolphin | ENDANGERED | Y | | | Y | Y | Y | Y | | | | | | | |
| South Asian river dolphin (Ganges River dolphin subspecies) | ENDANGERED | Y | | | Y | Y | Y | Y | | | | | | | |
| South Asian river dolphin (Indus River dolphin subspecies) | ENDANGERED | Y | | | Y | Y | Y | Y | | | | | | | |
| Harbour porpoise (Black Sea subspecies) | ENDANGERED | Y | | | Y | Y | Y | Y | P | | | Y | | | |
| Bowhead whale (Okhotsk Sea subpopulation) | ENDANGERED | Y | | | Y | Y | | | P | | | | | | |
| Short-beaked common dolphin (Mediterranean subpopulation) | ENDANGERED | Y | | | | ? | Y | Y | Y | | Y | | | | |
| Finless porpoise (Yangtze River subspecies) | ENDANGERED | Y | Y | Y | | Y | Y | Y | | Y | Y | | | | |
| Common bottlenose dolphin (Black Sea subspecies) | ENDANGERED | Y | | | Y | Y | | Y | | | Y | Y | | | |
| Humpback whale (Arabian Sea subpopulation) | ENDANGERED | Y | | | | Y | | | | | | | | | Y |
| Humpback whale (Oceania subpopulation) | ENDANGERED | Y | Y | Y | Y | Y | | | | | | | | | |
| Irrawaddy dolphin | VULNERABLE | Y | | Y | | Y | Y | Y | | | | | | | |
| Sperm whale | VULNERABLE | Y | Y | | | Y | | Y | | Y | | | | Y | |
| Franciscana dolphin | VULNERABLE | Y | | | | | P | P | | | Y | | | | |
| Finless porpoise | VULNERABLE | Y | Y | Y | | Y | Y | Y | | Y | Y | | | | |
| Blue whale (North Atlantic subpopulation) | VULNERABLE | Y | Y | | | Y | | | | | | | | | Y |
| Short-beaked common dolphin (Black Sea subspecies) | VULNERABLE | Y | | | Y | Y | Y | | | | Y | Y | | | |
| Spinner dolphin (Eastern spinner dolphin subspecies) | VULNERABLE | Y | | Y | | | Y | | | | | | | Y | |
| Atlantic humpback dolphin | VULNERABLE | Y | P | Y | Y | Y | Y | P | | | Y | | | | |
| Franciscana dolphin (Rio Grande do Sul/Uruguay subpopulation) | VULNERABLE | Y | | | | | P | Y | | | Y | | | | |

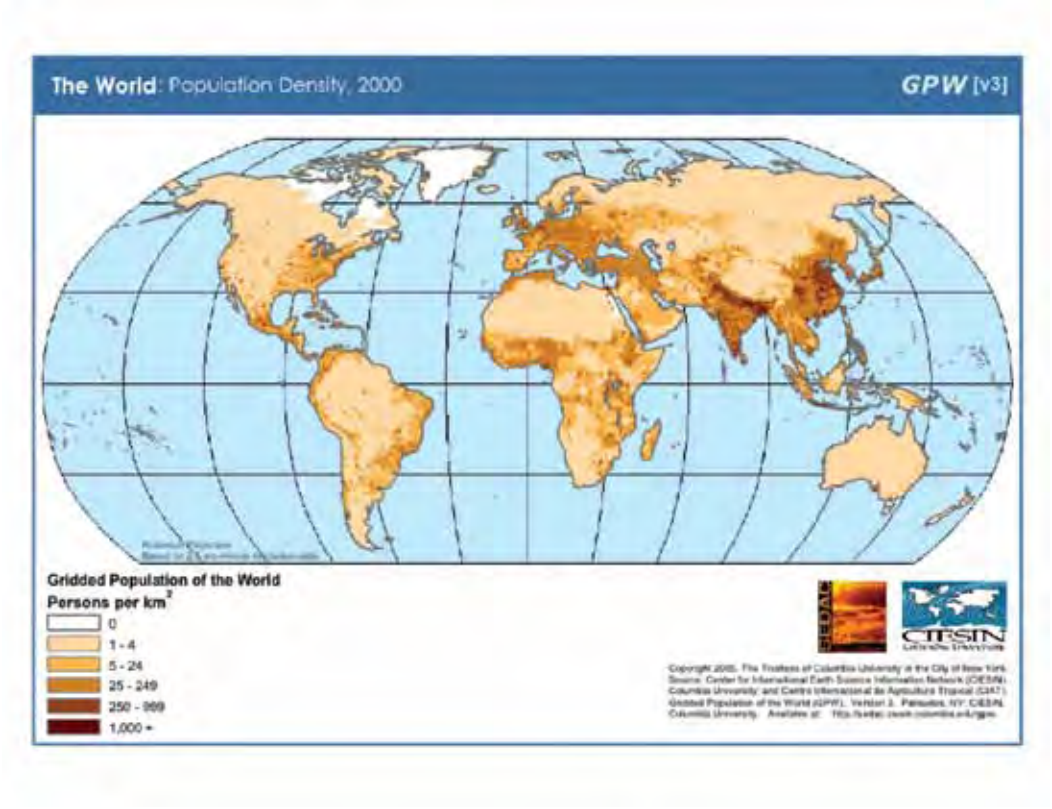
**CRITICAL** – Critically Endangered **Y** – recognised threat **P** – possible threat

## Human population growth and overexploitation

Direct and indirect threats to cetaceans are increasing as a result of continued, rapid expansion in the global human population and overexploitation of natural resources. The previous descriptions of threatened cetacean species clearly demonstrate that human activities have already resulted in substantial population declines (see summaries of threatened species starting on pg 15), local extirpation and range contractions for many cetacean species, and in the case of the baiji possible extinction.

The global human population is now estimated to be more than 6.7 billion people. Although the rate of growth has decreased in recent decades, it is still growing at a rate of more than 1 per cent per year (U.S. Census Bureau 2009). This rapid human population growth increases pressure on the environment and will intensify problems for managing cetaceans in the future.

Human population density varies by orders of magnitude around the world (see Map 5 below), and coastal regions with higher human population densities corresponding with increased numbers of threatened cetacean species, subspecies or subpopulations (see Maps 1 to 4 on pg 12 ). This is particularly evident in some coastal regions of Asia, the eastern margin of the Pacific Ocean, and eastern and western margins of the Atlantic Ocean where 'hotspots' of five or six threatened cetacean species, subspecies or subpopulations occur (see Map 1 to 4 on pg 12). Inland areas of Asia with very high human population density can also correspond with the distribution ranges of threatened river cetaceans.




Map 5: Human population density of the world map (courtesy of CIESIN Colombia University and CIAT 2005).

## Whaling and hunting

Historically, the greatest threats to cetaceans have been from overexploitation through commercial whaling and unsustainable hunting (see Table 3 pg 33). Although humans have hunted coastal cetaceans for thousands of years the most significant impact on large whales has been from commercial whaling over the past few hundred years. This has resulted in massive reductions in the abundance and distribution of some great whale species (baleen whales and sperm whales), and they have been removed from some areas of their former ranges.

Initially from the 11th Century, commercial whaling focused on coastal populations of slow moving large whales such as the North Atlantic right whale (*E. glacialis*) in the Bay of Biscay. As vessel construction and navigation skills improved, exploitation of pelagic (oceanic) whales increased and spread to all major ocean basins.

Great whales were sequentially over-exploited, starting with the more valuable and easily caught species, such as the northern right whales, bowhead, sperm, humpback and gray whales. Improved vessel and explosive harpoon technology led to industrial pelagic whaling using larger powered whaling vessels capable of catching the largest and faster-swimming rorqual whales such as blue, fin and sei whales.

The discovery of large populations of great whales in the Southern Ocean during the early 1900s led to substantial overexploitation of these stocks, and culminated in the killing of more than two million whales in the Southern Hemisphere during the 20th century. Extraordinarily large catches of great whales from the Southern Hemisphere included;

- 723,000 fin whales
- 395,000 sperm whales
- 360,000 blue whales
- 208,000 sei whales
- 197,000 humpback whales

This largely unregulated industrial whaling greatly reduced the abundance of these subpopulations, and many of the great whales were reduced to less than 10 per cent of their original abundance. Some such as the Antarctic blue whale subspecies were reduced to less than 1 per cent of their original abundance.

The impacts of the commercial overexploitation of great whales are still apparent today, as evidenced by the large number of species, subspecies and subpopulations that remain threatened, and the regional extirpation and lack of recovery of some subpopulations, including humpback whales from South Georgia, New Zealand and the Southern Caribbean.

Although most nations have stopped commercial whaling, some whaling continues under an objection to the 1986 IWC moratorium (zero catch quota) on commercial whaling. Whaling also occurs as 'special permit' whaling, often referred to as 'scientific whaling'. Under Article VIII of the 1946 International Convention for the Regulation of Whaling, special permit whaling allows member nations to grant their nationals a permit to take whales for scientific purposes. More than 10,000 whales have been taken under special permit since the 1986 moratorium on commercial whaling, mostly in the Southern Ocean and in the North Pacific.

As well as the commercial exploitation of great whales, many medium-sized and smaller cetaceans have been hunted for hundreds of years. This was initially as subsistence hunts for food, oil and other products, but also in larger-scale commercial hunts. Subsistence hunts for cetaceans still occur in some regions.

Large drive fisheries for smaller cetaceans also still occur in some regions. Previous drive fisheries have caused a substantial reduction in the abundance of smaller cetaceans.

Removing millions of whales and smaller cetaceans that are important predators in marine ecosystems is likely to have profoundly affected the trophic (the position that an organism occupies in a food chain) balance and stability of marine food webs. Removing large numbers of apex predators, such as sharks and commercially important fish species is increasingly recognised as having important but unpredictable ecological consequences on marine ecosystems. In some cases, this leads to trophic cascades significantly affecting species at lower trophic levels in food webs.

Removing top-order predators is also likely to destabilise complex ecosystems and lead to a substantial loss of biodiversity. This in turn reduces the capacity of ocean ecosystems to provide food and recover from disturbances.

The extent to which the loss of millions of whales and other cetaceans has disrupted other important functional groups in marine ecosystems is unknown. This may lead to significant ecosystem changes and altered carrying capacities for some species, and could significantly delay or impair the recovery of depleted cetacean populations.

## Fisheries

Increased demand for marine food resources from the rapidly expanding global human population has meant expansion of global fishing activities since the 1960s. This has significantly increased the scale of overexploitation and serial depletions of fish stocks in many areas of the world. This in turn has greatly increased the frequency and intensity of negative interactions between cetaceans and fisheries. A total of 74 cetacean species interact with established fisheries around the world.

Fishing activities are now recognised as having the most serious impacts of all human activities on many cetacean populations and species, and these interactions can be direct or indirect (see Table 3 on pg 33). Direct interactions between cetaceans and fisheries include incidental capture in fishing gear and culling, and indirect effects include ecological interactions that occur through overfishing and loss of prey in trophic food webs, and damage to marine habitats.

### Bycatch

Incidental mortality from fisheries, referred to as bycatch, is probably the greatest immediate threat to many cetacean populations around the world. Cetaceans become accidentally entangled and die in a wide range of fishing gear including coastal gillnets, pelagic driftnets, purse seine nets, longlines, trawl nets and trap lines. Bycatch is the primary or a recognised threat to nearly all of the 41 cetacean species, subspecies and subpopulations listed as threatened by the IUCN (Table 3 on pg 33).

The capture and death of an estimated six to seven million dolphins in the Eastern Tropical Pacific (ETP) yellowfin tuna purse seine fishery from the late 1950s to the 1970s, highlighted the seriousness of the bycatch issue, and led to unsustainable mortality and significant declines in some dolphin populations. In the 1960's hundreds of thousands of dolphins were estimated to have been killed each year, leading to a scientific and public outcry that resulted in improved fisheries operations and international fisheries management agreements to reduce bycatch and improve mitigation measures including the release of dolphins from nets.

Although these measures did reduce bycatch by two orders of magnitude and arrested the decline in dolphin populations, pelagic surveys from 1979 to 2000 indicated that populations of pantropical spotted dolphins and eastern spinner dolphins are not showing clear signs of recovery.

High seas driftnet fisheries, trawl nets and purse-seines have resulted in significant cetacean bycatch around the world. There is also the potential of bycatch from discarded or lost fishing gear, referred to as 'ghost fishing'. Bycatch mortality in high seas drift gillnet fisheries was greatly reduced following the 1993 UN ban on high seas driftnets although bycatch still occurs in areas where the UN ban does not apply. Cetacean bycatch also occurs in longline fisheries, anti-shark nets, and from entanglements in anti-predator nets around tuna mariculture (floating) cages.

In some countries, a transition from initial unintentional bycatch, to retaining cetaceans for food or bait, has led to fisheries creating a meat market for small cetaceans. These harvests are unregulated and are unlikely to be sustainable.

The present global extent of bycatch mortality is unknown due to difficulties in obtaining reliable data. Hundreds of thousands or perhaps millions of cetaceans are estimated to have died each year in gillnet and purse-seine fisheries. Read et al. (2006) estimated that the global bycatch of marine mammals including cetaceans is likely to be in the hundreds of thousands annually. Therefore, there is a clear need to greatly reduce fisheries bycatch through improved gear design, monitoring and enforcement of fishing regulations, and working directly with fisheries managers and fishers to more effectively mitigate these problems.

Hall and Mainprize (2005) concluded that fisheries bycatch could be reduced by between 25 per cent and 64 per cent if global fishing fleets adopted gear modifications shown to be effective in experimental studies.

## Other fisheries impacts on cetaceans

Other direct fisheries impacts on cetaceans include capture for bait, and culling of cetaceans that are regarded as competitors for fisheries resources or to reduce damage to fishing gear. There has been a long history of culling of cetaceans and other marine mammals based on the belief that these mammals are significant predators of commercially important fisheries stocks, and the culling debate has intensified in recent decades as fisheries stocks become depleted and aquaculture expands in cetacean habitats.

Corkeron (2009b) concluded that the best available evidence provided no justification for culling of marine mammals in managing the Barents Sea fisheries as this predation is relatively trivial. Instead, the main factors impacting on fish populations in the Barents Sea were: interactions among the three main fish populations, fisheries, and climate.

A recent analysis of ecosystem models to examine interactions between the biomass of commercially important fish stocks and whale abundance in the northwest African and Caribbean ecosystems, found that there was little overlap between fisheries and prey of whales. The analysis noted that fisheries remove a much greater biomass of fish than that consumed by whales. Gerber et al (2009) concluded that even if baleen whales were eradicated from these tropical areas, it would not lead to a significant increase in the biomass of commercially important fish stocks.

Associated with the debate over competition and culling, is increasing awareness of cetacean depredation of fish from longline fisheries or trawl nets. Depredation of catches removes or damages fish and can damage fishing gear, which reduces the value of the catch while increasing the costs of fishing. It also increases the risk of entanglement and bycatch mortality to cetaceans.

Industrial fisheries indirectly affect cetaceans by removing substantial quantities of fish and squid or other prey that some cetaceans rely on directly for food. Overfishing can also transform marine trophic food webs.

Global fisheries catch data show that intense fishing occurs in many coastal regions in Asia, along some coastal areas of North and South America, West Africa and in the North Atlantic. These areas of intense fishing tend to correspond with 'hotspots' where four, five or six threatened cetacean species, subspecies or subpopulations occur (see Maps 1 to 4 on pg 12) highlighting the importance of cetacean-fisheries interactions as a major management concern.

Small to medium sized forage fish, such as anchovies, sardines and mackerels make up about 37 per cent of the global landings from commercial fisheries. They are also important prey for various marine predators including some cetaceans.

Map 6 showing global five-year average fisheries catches per square kilometer for the 2000-04 period (Figure courtesy of the *Sea Around Us* Project). Data and methods available from the *Sea Around Us* Project (www.seaaroundus.org).

Fisheries have expanded to include harvesting of krill in the Southern Ocean. Krill is the primary food resource for many rorqual whales, including populations that remain severely depleted from commercial whaling. The potential ecological effects of krill harvesting have been managed under the Convention on the Conservation of Antarctic Living Marine Resources (CCALMR), which adopted a unique ecosystem-based approach to managing this fishery.

## Habitat degradation and loss

Expanding human populations along coastal areas of the world are increasingly modifying coastal environments resulting in habitat degradation or loss of critical habitats for many coastal species including cetaceans. Similarly, damming, water diversion and other river modifications can degrade or eliminate freshwater habitats for river dolphins, prevent migrations and fragment subpopulations into smaller isolated groups that face increased risk of local extirpation. Declining freshwater flows in major river systems also reduce freshwater inputs to dynamic estuarine environments. The habitat requirements for Ganges River dolphins and Irrawaddy dolphins makes them particularly susceptible to reduced freshwater flows and sea-level rise in coastal areas.

Severe habitat degradation has occurred in the Black Sea, where eutrophication (an increase in chemical nutrients) has led to algal blooms and anoxic events. The recovery of depleted populations of the three threatened cetacean subspecies is being impaired by prey depletion from overfishing, chemical pollution, disease outbreaks and other forms of disturbance. The Black Sea situation highlights the various human-induced forms of habitat degradation relevant to cetaceans, and these topics are briefly reviewed below.

## Pollution

Coastal development and associated industrialisation results in increased chemical and physical pollution. Pollution is a recognised threat to many of the cetacean species, subspecies and subpopulations (see Table 3 on page 33).

Persistent pollutants include a wide range of chemical compounds and various forms of trace metals that can adversely affect development, behaviour and physiology by disrupting normal endocrine functions. Organochlorines include toxic pesticides such as DDT and polychlorinated biphenyls (PCBs) bio-accumulate through increasing trophic levels.

Elevated levels of organochlorines occur in cetacean tissues in some regions and these may disrupt hormonal systems leading to reduced reproductive success, or increase susceptibility to disease through impairing immune defences. Concentrations of organochlorines are highly variable across regions but tend to be lower in marine mammals from the Southern Hemisphere compared with marine mammals from the Northern Hemisphere.

Metals occur in various chemical forms and some such as mercury, cadmium and lead can be toxic at relatively low concentrations. Elevated levels of trace metals have been recorded in some cetaceans from highly contaminated environments. Odontocete whales tend to have higher concentrations of trace metals and bioaccumulated organochlorines in their tissues than mysticetes that occupy lower trophic levels.

Other forms of pollution include oil hydrocarbons (that can be directly toxic or may coat baleen feeding structures), sewage discharges and dumping of mine tailings in deep ocean habitats that may contaminate food webs. Marine debris is another form of pollution that is a threat to cetaceans through ingestion or entanglement.

## Disease

Increased incidences of mass death events and viral and bacterial diseases are being reported in cetaceans. At least six morbillovirus epidemics have caused mass deaths in cetacean populations since 1988. Porpoise morbillivirus was first identified from harbour porpoises that stranded in coastal areas in Ireland, England, Scotland and The Netherlands. A severe outbreak of dolphin morbillivirus affected striped dolphins in the Mediterranean Sea from 1990 to 1992. Cetacean morbillivirus infections killed bottlenose dolphins along the Atlantic coast of the USA and in the Gulf of Mexico. The virus was also identified in stranded common dolphins in the North Pacific region, and bottlenose dolphins along the coasts of Israel and Mauritania. Cetacean populations in the Black Sea in 1990 and 1994, and pilot whales in the Western Atlantic also experienced mass mortality.

Morbillivirus in marine mammals has similar effects to distemper in dogs. The virus can produce destructive and inflammatory lesions in the brain, gastro-intestinal tract, lungs and lymph nodes, and immune suppression. Recent analyses of samples from 25 cetacean species showed that dolphin morbillivirus infects cetaceans worldwide. Morbilliviruses and other disease agents are likely to affect population densities through high mortality rates and reduced reproductive success.

Other diseases known to affect cetaceans include brucellosis, toxoplasmosis, lobomycosis, genital papillomaviruses and various skin diseases caused by unknown pathogens. The presence of cetacean morbillivirus strains and other pathogens in many species is an additional threat to cetaceans.

Chemical pollution and other stressors in coastal environments increase the severity of infectious diseases, therefore susceptibility to disease outbreaks needs to be assessed in management of cetacean populations. Parasites, and biotoxins from toxic dinoflagellate blooms are also a threat to cetaceans.

## Noise disturbance and vessel strike

Cetaceans are primarily acoustic animals. This means noise disturbance can significantly disrupt normal behaviour and habitat use. Underwater noise can mask their ability to communicate, navigate or capture prey, cause avoidance and reduced habitat use, and if severe can damage hearing. Vessel noise, seismic testing, dredging, construction activities and underwater explosions can significantly disturb or harm cetaceans and in some cases have been associated with whales strandings.

The global expansion of shipping and increased boating activity along coasts and in rivers has substantially increased noise disturbance from vessels, and the incidence of vessels colliding with cetaceans. Vessel strike is now recognised as a serious threat to some cetaceans, including the Endangered North Atlantic right whale. About half of the confirmed mortalities of North Atlantic right whales from 1975 to 2005 were caused by ship strike or entanglement in fishing gear, and there are concerns about high rates of vessel strikes on fin whales in the Mediterranean Sea.

Unregulated and inappropriate whale and dolphin ecotourism can also potentially disturb cetaceans through increased noise from vessels, increased risk of vessel-strike and other forms of disturbance. Given the rapidly increasing importance and economic value of this form of tourism, it is essential to carefully regulate and manage interactions with cetaceans. This can include limiting approach distances, numbers of vessels interacting with animals, and the length of time spent with individuals or groups of whales, dolphins or porpoises.

Live-capture of wild dolphins is another form of threat to small populations of cetaceans, and the demand for bottlenose dolphins for commercial public displays has not declined.

## Climate change

Rapid climate change is an increasingly important threat to cetaceans, particularly for cetaceans that require polar sea ice habitats and baleen whales that rely on krill. Climate warming is evident from increased global average air and ocean temperatures, and widespread melting of ice and snow. Average temperatures in the Arctic have increased by about twice the global average rate in the past century, and Arctic sea ice has declined by about 2.7 per cent per decade. Cetaceans such as narwhals, belugas, and bowhead whales for which sea ice forms an important part of their habitat may be particularly vulnerable to climate change.

Global warming resulting in the loss of sea ice reduces the habitat available for microalgae used by krill as a food resource. Further, the annual formation and melting of sea ice has profound effects on global ocean circulation, and the primary productivity that underpins the productivity of polar marine ecosystems. Reduced productivity leading to lower abundance of krill and other prey could significantly reduce the rate at which cetacean populations can recover from previous overexploitation. For example, a strong negative correlation has been observed between sea surface temperature anomalies at South Georgia and subsequent breeding success of southern right whales in Argentina, which indicates that increased temperatures could reduce calving rates and impair population recovery of these whales. Increased sea temperatures are also likely to alter productivity and food resources available in tropical and temperate marine ecosystems.

Increased carbon dioxide concentrations from the atmosphere are accumulating in the upper layers of the oceans, which is altering the chemistry of seawater and reducing seawater pH (a measure of the concentration of hydrogen ions). This process is often referred to as 'ocean acidification', and is highly significant because it will inhibit calcium carbonate calcification processes of ecologically important groups of phytoplankton and animals, which in turn are important food resources for fish and higher predators such as cetaceans. This process is predicted to particularly affect the growth and reproduction of some marine species in the Southern Ocean. Ocean acidification may irreversibly alter ocean ecosystems.

# A future for cetaceans

This global summary of the conservation status of cetaceans clearly shows that although a few species and some populations have started to recover from the severe overexploitation arising from commercial whaling and hunting in previous centuries, there are relatively few conservation successes and many cetacean populations and species face increased threats. The continued rapid increase in human population pressures and associated impacts from fisheries, habitat changes, pollution, climate change and other threats are likely to overwhelm the capacity for some depleted populations and threatened species to recover, and some species and subspecies may be driven to extinction in the near future. This report highlights that small cetaceans in particular are facing an increasing range of anthropological threats from their coastal habitats and closer association with humans.

In many nations and regions around the world, cetaceans are safeguarded by legislation, international agreements and in designated sanctuaries, but effective conservation and management of cetaceans can only be achieved if it is underpinned by a rigorous scientific framework. This report highlights the need for cross jurisdictional non-lethal cetacean research to obtain targeted scientific information for cetacean species and the habitats in which they live, particularly for the many species that are currently listed as data deficient. This knowledge will assist in the development and implementation of effective strategies for conservation management and mitigation of significant and emerging threats.

The information provided in this report clearly demonstrates the need for multi-lateral partnerships, regionally and globally, to protect and maintain healthy populations of whales, dolphins and porpoises for future generations.

At the 2008 annual meeting of the International Whaling Commission, Australia submitted two proposals, for collaborative whale research partnerships starting with the Southern Ocean Research Partnership and for Conservation Management Plans. The Southern Ocean Research Partnership will enhance the capacity for science within the IWC to meet the scientific needs of the Commission and to maximise the degree to which science contributes to positive conservation outcomes for all cetaceans.

Conservation Management Plans aim to protect cetacean populations from contemporary and emerging threats and to achieve improved conservation outcomes for threatened cetacean populations. They are comprehensive plans tailored to the particular circumstances of a species, population or region and are designed to complement national plans and related efforts to conserve cetacean populations.

# THE VALUE OF CETACEANS

# The value of cetaceans

## How do we value cetaceans?

Historically, cetaceans were culturally and economically important for their by-products: oil, bone, teeth and meat. However, by the late 20th Century, these products had been replaced with readily available alternatives.

Today, awareness and appreciation is growing of the economic and ecological value of cetaceans. Their economic value can be seen in the global boom in whale and dolphin watching ecotourism. Whale and dolphin watching is one of the world's growing tourism sectors, and the total number of people in high income countries who have experienced whale watching may now be 100 million, and growing at a rate of 10 million per year.

When animals are valued as commodities, their value can be easily estimated. However, when they are appreciated because of their existence or contribution to healthy ecosystems or to society, estimating their value becomes more difficult and open to debate.

People enjoy and experience living cetaceans in many ways, both actively and passively. Active participation can occur by watching whales and other cetaceans from boats and aircraft or simply from a good spot on shore. More passive or vicarious enjoyment can be obtained through books, and other media, and though these people don't have a direct opportunity to watch cetaceans they similarly value their existence.

## The Development of Whale Watching

The earliest recorded whale watching operation began in California, United States in 1955. Australia began its industry in the 1960's, followed by Mexico and the Bahamas by 1970.

United States, Australia, Mexico and the Bahamas are all either high income countries or countries that provided whale watching opportunities to visitors from high income countries. Figure 1 shows the subsequent expansion of whale watching to other countries. By 2006 the industry expanded significantly and there were whale watching operations in almost 100 countries and territories.

**Figure 1 – Number of countries that host whale watching 1960 – 2006**

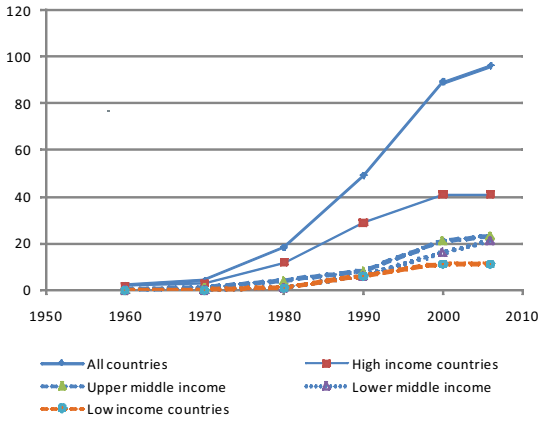



Figure 1 employs a four-part classification of countries by income, using the World Bank definitions of high, upper-middle, lower-middle and low income countries. There has been no comprehensive global update of whale watching since 2000. The figures for 2006 are based on regional surveys.

(The most comprehensive global accounts of whale watching are studies by Eric Hoyt (Hoyt 1992, 1995 and 2001), the last of which was commissioned by the International Fund for Animal Welfare (IFAW). IFAW has commissioned a further global update that is scheduled for release later in 2009.

As demonstrated in Figure 1 more can be learned about the expansion of the whale watching industry by analysing its expansion throughout the world. Whale watching started in high income countries and was taken up progressively by countries with lower incomes. **Whale watching is now established in 41 per cent of the 234 countries of the world.** This includes 54 per cent of high income countries, 51 per cent of upper-middle income countries, 35 per cent of lower-middle income countries and 21 per cent of low income countries. It shows that there is potential for many other nations to develop whale watching industries.

## Whale watching in high income countries

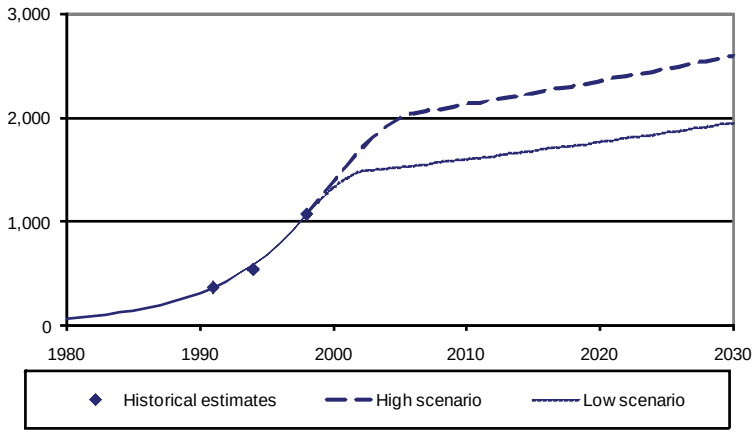
The US hosted 48 per cent of the estimated nine million whale watching trips in 1998. A second tier of three high income countries – Canada, Canary Islands and Australia – accounted for another 30 per cent. A third tier of 37 high income countries hosted another 10 per cent of global whale watching activity, bringing the total share of high income countries to 88.5 per cent in 1998. The more significant members of the third tier are New Zealand, Ireland, the United Kingdom, Japan and Puerto Rico, each of which accounted for one to two per cent of global whale watching.

Table 4 presents the available information on high income country whale watching since 1998. This is a small sample dominated by countries in the Oceania region, but all six countries returned strong growth.

**Table 4 Recent growth of whale watching in 6 high income countries**

| Location | Whale watchers | | | Percentage increases | |
|---|---|---|---|---|---|
| | 1998 | 2005 | 2007 | 1998–2005 | 1998–2007 |
| Australia (ex. land based) | 670,000 | | 1,323,000 | | 100% |
| French Polynesia | 1,000 | 6,000 | | 500% | |
| Guam | 4,000 | 84,000 | | 2,000% | |
| Iceland | 30,300 | | 104,000 | | 245% |
| New Caledonia | 1,700 | 4,900 | | 190% | |
| New Zealand (international visitors only) | 104,000 | | 223,000 | | 115% |

**Figure 2 Plausible futures for visitor expenditure on whale watching in high income countries (US$ million/year)**



Global surveys indicate that by 1988, visitors to whale watching areas in high income countries were spending USD$1.35 billion per year (at 2008 prices). As shown in Figure 2, expenditure increased rapidly through the 1990s. Rather than forecasting high rates of growth to continue indefinitely, it would be expected that whale watching will mature as a sub-sector of the tourism industry.

Figure 2 illustrates the proposition that for high income countries the industry may expand by 50 to 100 per cent of its 1998 levels and then continue to grow at 1 per cent per year as a mature industry. This suggests that visitor expenditure on whale watching may grow to USD$2.0 – USD$2.6 billion per year over the next 20 years.

Figure 2 demonstrates that whale watching in high income countries is now in its middle stage of diffusion and has some way to run at this level, before reaching maturity.

### Whale Watching Industry Case Studies

The following whale watching industry case studies focus on:

- how whale watching is organised,
- the role of private and public initiatives in the development of the industry,
- its impact on the local economy,
- understanding cetaceans and their habitat.

### Case Study: Hervey Bay whale watching industry, Australia

With a population of 50,000 Hervey Bay is located about 3.5 hours north by car from Brisbane (population of 1.7 million). Hervey Bay lies on the southern edge of a large body of sheltered water between the Queensland coast and Fraser Island, a large World Heritage listed sand island running roughly parallel with the coast.

Humpback whales migrate through this area on their way north from Antarctic to breed in the waters of the Great Barrier Reef. Pods may stay in Hervey Bay for up to a week from July to November, creating a sizeable transient whale population and reliable whale watching conditions.

Whale watching is one of a large number of recreational options in the area including beaches, swimming, boating and fishing.

#### *How whale watching is organised*

There are 10 commercial operators with larger boats (70 to 150 seat capacity) and a couple of smaller luxury vessels. Tours range from two hours to a full day and are usually single-purpose trips dedicated to whale watching. The viewing area is close enough for operators to provide several short excursions per day.

Each boat is a separate small business and relationships between operators are highly competitive. Many of the vessels have been custom-built to optimise viewing capacity. Privately owned boats also engage in whale watching with congestion a problem at peak periods.

#### *Private and public whale watching initiatives*

Whale watching was started privately in 1987 and, after rapid growth, the market matured by the mid-1990s. The number of boats has fallen over time but the reduction has been more than offset by an increase in average vessel size.

Whale watching has been regulated from an early stage. The main elements have been the declaration of a marine park, zoning arrangements for whale watching, licensing of operators, specification of approach conditions, minimum distance requirements for boats (100 metres), requirements to provide an interpretative program of a certain minimum quality, and a code of ethics for operators. Swimmers and fixed wing aircraft must maintain a distance of 300 metres from a whale and helicopters are prohibited.

The revenue from operator licence fees (per vessel) and a passenger levy goes towards management of the marine park, and operators are provided with training.

### *Economic impact*

The data suggests that whale watching in Hervey Bay may have stabilised at 60,000 to 70,000 visitors per year. Approximately 30 per cent are from overseas and another 30 per cent from other states of Australia. Visitor surveys indicate that most whale watchers would not have come to Hervey Bay in the absence of whale watching, or would have spent less time there.

In the absence of whale watching, visitor expenditure in Hervey Bay would be reduced by an estimated USD$7.1 to USD$12.6 million per annum, including expenditure on food, transport and accommodation.

### *Understanding the whales*

The recovery of the humpback whale population off the east coast of Australia is well documented. The behaviour of the whales is well understood and the impact of whale watching on the whales in Hervey Bay has been researched extensively. Behavioural changes have been documented but with uncertain biological significance. There is also evidence of increasing acceptance of vessels by humpbacks, including a growing tendency to seek out and investigate tour boats.

It is a condition of operator licences that they provide interpretative services of a certain minimum quality, educating visitors about cetaceans.


Map 7: Location of Hervey Bay, Queensland, Australia

## Case Study: Kaikoura whale watching industry, New Zealand

Kaikoura is a small town on the South Island of New Zealand with a population of about 3,600. It is located at the northern end of the Canterbury region, with a population of 520,000, including the city of Christchurch. Christchurch is about two hours by car from Kaikoura.

Kaikoura is adjacent to an area of deep undersea canyons close to the shore and nutrient-rich ocean currents, attracting sperm whales that are rarely found close to shore. Sperm whales favour deep waters where their main food sources, notably squid, are to be found. There are sub-populations of resident whales, allowing for year-round whale watching operations.

These waters also support a large population of dusky dolphins (October to March) and many other species of seabirds and marine animals that attract tourists.

### *How whale watching is organised*

One whale watch operator has been licensed for viewing sperm whales, with four boats in operation at any one time. Most are catamarans with diesel powered jet drives that generate less noise below the surface than propeller driven craft. Trips tend to take no more than 50 whale watchers at a time. Guides provide commentary and answer questions, and the trips can range from a two-hour round trip through to three and ten day packages. There is also some whale watching from aircraft.

### *Private and public whale watching initiatives*

Whale watching was jointly initiated by an American researcher and a local fisherman in 1988 and they were joined shortly after by Maori entrepreneurs and the two operations combined in 1991.

The New Zealand Government has legislated for the management of marine mammals and regulation of wildlife tourism by a permit system. The permits impose requirements for wildlife conservation, operator expertise and the provision of interpretative services. Voluntary codes of conduct are widely used by New Zealand's wildlife tourism operators.

### *Economic impact*

Kaikoura's economic base (farming, fishing and government administration) was in decline before whale watching began in 1988. Although reversing this decline, whale watching has led to some local discontentment, with residents complaining about the inadequacy of roads, infrastructure and increases to the cost of living.

There are several indicators of the significance of whale watching for the Kaikoura economy since it commenced in 1988.

- Between 1988 and 1991, 44 new businesses were added to the community and 30 new accommodation facilities. Occupancy rates increased from 55 per cent to 75 per cent.
- 68 per cent of whale watchers in a 1993 survey said they visited Kaikoura to go whale watching.
- In 1996, 25 per cent of all jobs in Kaikoura were related directly to tourism.
- By 1998 more than 100 new businesses had been started in Kaikoura.

### *Understanding the whales*

It is a condition of operator licences that they provide interpretative services of a certain minimum quality. Whale populations are monitored and seem to be well-understood. Impacts of whale watching on whale behaviour have been documented but with uncertain biological significance.

Hoyt states that New Zealand is a model country in terms of careful management of whale watching industry including funding for research, and the requirement that operators have an education program.


Map 8: Location of Kaikoura, New Zealand

## Whale watching in middle income countries

Middle income countries hosted one million whale watching trips in 1998, approximately 11 per cent of the global total. Of the 25 such countries involved, South Africa (5.6 per cent), Brazil (1.8 per cent) Mexico (1.2 per cent) and Argentina (0.9 per cent) had the largest industries. The remaining countries are geographically diverse but have a disproportionate representation from South America and the island countries of the Caribbean and the Pacific.

Whale watching had a delayed start in middle income countries but their share of global activity grew rapidly during the 1990s from 0.8 per cent in 1991 to 11 per cent in 1998. Tables 5 and 6 present the available information on South Pacific and Latin American developments in 1998.

### Pacific Island countries

Little information has become available on whale watching trends since 1998. However, trends from a sample of Pacific Island countries, such as American Samoa, Cook Islands, Federated States of Micronesia, Fiji, Niue, Northern Mariana Islands, Palau, Samoa and Tonga, reveal significant variations.

For those countries where whale watching was established before 1998, there has been considerable growth (see Table 5 for Niue and Tonga). For the remaining countries where enterprises were established after 1998, the Cook Islands and Samoa were the only ones to record more than minimal levels of activity by 2005.

### Table 5 Recent growth in whale watching for Niue and Tonga

| Location | Number of whale watchers in 2005 | Increase, 1998–2005 |
|---|---|---|
| Niue | 300 | 440% |
| Tonga | 9,000 | 290% |

## Latin America

Whale watching is now well established in Latin America with an overall increase of 112 per cent between 1998 and 2006. There have been eight newcomers since 1998 and strong growth in several countries where whale watching was established before 1998 (see table 6). Three countries – Brazil, Costa Rica and Mexico – account for 78 per cent of the activity, Columbia and Ecuador account for another 12 per cent.

### Table 6 Recent growth of whale watching in middle income countries of Latin America

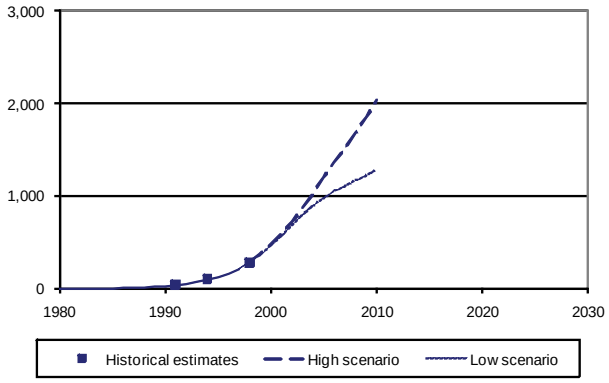
| Location | Number of whale watchers in 2006 | Percentage increase, 1998–2006 |
|---|---|---|
| Countries with whale watching established before 1998 | | |
| Belize | 368 | 9% |
| Brazil | 228,946 | 37% |
| Chile | 13,720 | 316% |
| Costa Rica | 105,617 | 8,508% |
| Ecuador | 42,900 | 270% |
| Mexico | 169,904 | 57% |
| Peru | 586 | 10% |
| New-comers to whale watching since 1998 | | |
| Bolivia | 400 | - |
| Colombia | 35,000 | - |
| Guatemala | 800 | - |
| Nicaragua | 8,832 | - |
| Panama | 17,711 | - |
| Suriname | 1,906 | - |
| Uruguay | 4,800 | - |
| Venezuela, RB | 9,757 | - |

## Economic benefit

In 1998 whale watchers spent approximately USD$285 million (2008 prices) to watch whales in middle income countries, a five-fold increase on 1991. Given the relatively underdeveloped nature of the activity in 1998, indications of further growth since then, and strong income growth prospects in many of these countries, it is anticipated that rapid growth has generally continued beyond 1998 and will continue for some time yet.

Figure 3 shows projections for growth. With the 'mature' stage of this activity not yet in sight for middle income countries, Figure 3 shows that it is plausible that the level of activity for middle income countries could reach levels of visitor expenditure levels comparable with high income countries (more than USD$2 billion per year).

### Figure 3 Plausible futures for visitor expenditure on whale watching in middle income countries (US$ million/year)



## Case Study: Mexican Baja Peninsula whale watching industry

The Baja Peninsula is on the west coast of Mexico, starting just south of the US border and extends parallel to the coast for almost 1,000 kilometres. Mexico is classified by the World Bank as an 'upper middle income' country.

The western side of the peninsula, facing the Pacific Ocean, has a series of lagoons that are breeding grounds for the North Pacific gray whale. Resident whales provide reliable whale watching opportunities for the three months from January to March.

There are a number of small townships on the western side of the peninsula, relying mainly on fishing and tourism, and whale watching is one of a number of marine and coastal recreational options in the area.

### *How whale watching is organised*

Whale watching is boat-based. There are approximately 30 operators with 130 boats seating up to six people. The whale watching season is short and most of the boats are fishing skiffs temporarily converted for the season.

Dedicated whale watching tours are from one to three hours. The viewing area is close enough for operators to provide several short excursions per day. Whale watching is also included in multi-day camping tours.

Most whale watchers are from high income countries, particularly the United States and Canada, but there is growing participation (estimated at 25 per cent) by Mexicans.

### *Private and public whale watching initiatives*

Cruise ships from the United States initiated whale watching tours into the Baja lagoons in 1970. These were high quality, self-contained tours, often with experienced naturalist guides. In the late 1980s the cruise operators began hiring Mexican boats to take visitors into the lagoons. At the same time other tourists began arriving overland and hiring boats on the spot.

Whale watch operators are required to have a permit and since 1991 the Mexican Government has required the tour boats to be locally owned and staffed. The permits are free but operators must pass an examination on whale watching guidelines.

Operators in some whale watching communities are organised as cooperatives. The cooperatives own a fixed number of permits that are variously shared between members of the cooperative. Cooperatives take a share of the revenue to fund lobbying and marketing activities and to purchase whale watching equipment.

The resource management regime includes a marine park as well as zoning arrangements for several of the lagoon complexes. This includes the exclusion of whale watching from identified parts of the lagoon complexes, and exclusion of fishing from some areas that have been turned over for whale watching.

### *Economic impact*

Local involvement has increased significantly over time as part of a general trend to increased local involvement in providing food, accommodation and other tourism related services. The seasonal nature of whale watching, and of tourism generally, means that locals use tourism to supplement their incomes from fishing and other activities. Tourism in the Baja Peninsula also relies heavily on seasonal workers from other parts of Mexico.

It was estimated in 2006 that whale watch operators collectively earned revenues of USD$2 million, and that local providers of food, accommodation and other tourism-related services earned another USD$21 million. This could be attributed to the additional tourist activity that whales attract to the region.

### *Understanding the whales*

There is considerable evidence of scientific research on cetaceans in Mexican waters, including: their abundance and causes of variation from year to year; patterns of distribution between and within the lagoons; residence times; the behaviour of nursing females and calves; the risks associated with shipping lanes and fishing gear; and with coastal and offshore developments. The North Pacific gray whales that frequent the Baja Peninsula lagoons have recovered to number in excess of 20,000.

Whales can be severely harassed by small boats of the kind used in the lagoons, but neither the incidence nor the effect of inappropriate behaviour is reported. The provision of interpretative services ranges from negligible to comprehensive, but there is no requirement to provide such services.


Map 9: Location of Baja Peninsula, Mexico

## Case Study: Tonga whale watching industry

Tonga is an archipelago in the South Pacific Ocean. It has a population of 100,000, per capita income of approximately USD$5,200 and is categorised by the World Bank as a country with 'lower middle income'. Tonga has a narrow export base of agricultural goods and tourism and is heavily dependent on external aid and remittances from the overseas Tongan community. Tourists are predominantly international with 80 per cent of visitors arriving by air and the remainder by cruise ships and private yachts.

Humpback whales visit these islands annually and remain for the period of the breeding season from July to October (about 100 days). The combination of resident whales and mostly sheltered waters provides reliable conditions for whale watching.

### *How whale watching is organised*

Whale watching is entirely boat-based. There are 14 licensed operators and each is permitted to operate two boats. However, the boats are relatively small, with an average capacity of 15 persons. The typical tour is from 10am to 4pm.

The members of the Tonga Whale Watch Operators Association have about 75 per cent of the market and may collaborate on price setting.

### *Private and public whale watching initiative*

Whale watching started in 1994 but otherwise its commercial history in Tonga is not reported.

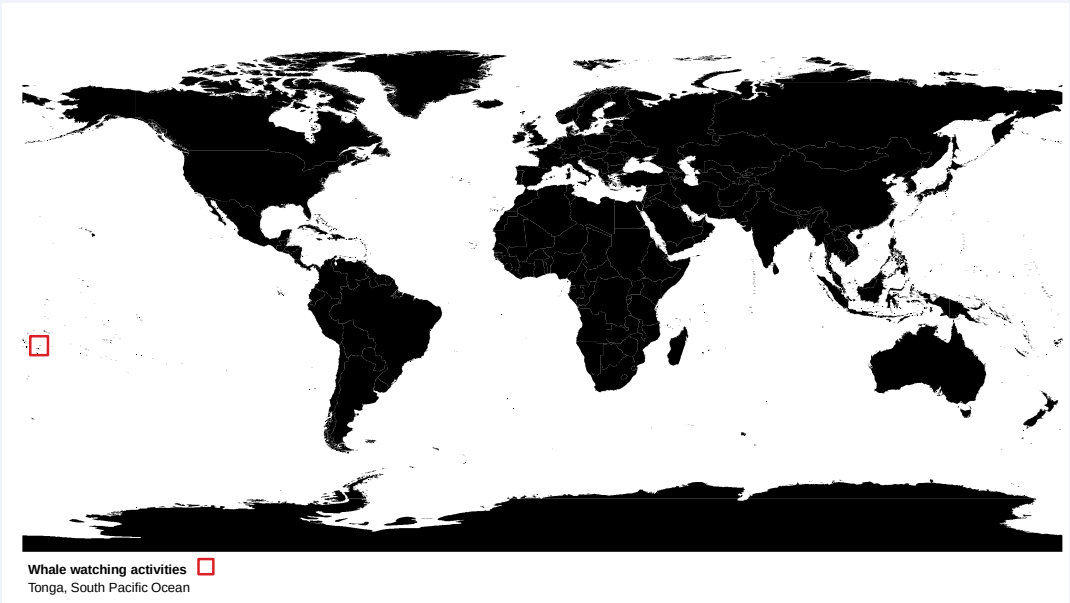
### *Economic impact*

The tourism industry employs 5 to 10 per cent of the Tongan workforce and whale watching features prominently in Tonga's tourism marketing. It is estimated that about 16 per cent of visitors whale watch.

The average trip price is about USD$100 and visitors commonly make multiple trips. The total revenue that would be lost in the absence of whale watching is estimated at USD$1.1 million per year including associated visitor expenditure on accommodation, food, local transport and souvenirs.

### *Understanding the whales*

The available material does not confidently provide a definitive scientific understanding of cetaceans in these waters. It is not possible to conclude whether whale populations are increasing or whether these populations are being harmed by intrusive whale watching practices. There is also no information about the quality of interpretative material provided to visitors.




Map 10: Location of Tonga

## Whale watching in low income countries

Low income countries hosted 45,000 whale watching trips in 1998, about 0.5 per cent of the global total. All six countries involved were from the Indian sub-continent or Africa. India was the most significant, with 0.3 per cent of global activity.

The distinct lack of information on developments in whale watching for low income countries over the last decade makes this an important topic for future research, which could identify major potential growth markets.

### Case Study: Goa dolphin watching industry, India

Goa is India's smallest state and is located on the west coast of India on the Arabian Sea. Panaji is the state's capital, and Vasco da Gama is the largest city. It is renowned for its beaches, churches and architecture and is visited by hundreds of thousands of international and domestic tourists each year.

#### *How dolphin watching is organised*

Most dolphin watching is of Indo-Pacific humpbacked dolphins. The boat operators are mainly fishermen who supplement their income by offering dolphin watching in out-board powered dugouts.

Several full-time commercial operators use larger boats and tours range from 1.5 to 3 hour offered from late October to early April with the peak period being mid-December to late January.

#### *Private and public dolphin watching initiative*

The commercial history of dolphin watching in Goa is not reported.

#### *Economic impact*

In 1998 25,000 people watched whales or dolphins throughout India. They spent US$150,000 on whale watching with and a total expenditure of USD$525,000 when associated costs are included.

At least four communities in north and south Goa are also involved in dolphin watching. Dolphin watching provides an additional attraction for visitors and makes a significant contribution to the local tourism economy. Goa's dolphin watchers are largely international tourists (mainly British, American and German).

With the success in Goa, dolphin based trips could be extended along the west coast in existing tourism areas such as Kerala province.

#### *Understanding the dolphins*

The growth in the dolphin watch industry has increased conservation awareness in the community. The commercial operators, fishermen and the community increasingly express concern for the welfare of the dolphins. Potential threats include boat traffic to and from the Vasco da Gama container port, waterborne pollutants from oil refineries and chemical plants and the possible extension of the Vasco da Gama port to the Grandi Islands with an extensive reclamation project.

There is considerable potential to improve the dolphin watch tours and make them more educational.

This case study provides a good example of the potential growth for whale and dolphin watching opportunities in low income countries. It is important to note that the Indo-Pacific humpbacked dolphins are classified as near-threatened for the species. It would be important to consider the conservation needs of this species, along with the potential for the growth of a sustainable dolphin watching industry.


Map 11: Location of Goa, India

# Successful whale watching

Whale watching is commercially beneficial for local communities, creating jobs and new businesses and adding a new dimension to community identity.

The success of a whale watching industry depends on a wide range of factors, including the presence of suitable cetacean species, a market profile, the capacities of local operators and regulation motivated by the long-term sustainability of the industry and the populations on which it depends.

There are several common factors influencing the development of whale watching:

- Environmental awareness accompanied by media interest in accessible and iconic species has grown the market for whale watching among tourists.
- Chance factors influencing the relative success of whale watching at competing locations include the environmental credentials of local celebrities and entrepreneurs.
- The locality needs a market profile and local operators need to be involved in developing that profile.
- To gain the confidence of potential customers environmental accreditations and endorsements are valuable, as are appropriate regulations on the operation and expansion of the industry.

### Whale Watching Industry case studies

It is evident from the whale watching case studies in high, middle, and low income countries that private initiative is enough to begin whale watching.

The case studies strongly indicate that a certain level of policy intervention is needed to manage the tensions and issues that rapidly emerge as whale watching starts to accelerate. These issues relate to:

- the protection and conservation of cetaceans and their marine environments through regulation as well as education and information
- the displacement of existing economic activities and the evolution of new arrangements for sharing marine resources, in this case for tourism
- limited carrying capacity of the viewing sites and competition for access rights
- the threat of reputation damage in the absence of minimum standards for whale watching operations
- equitable participation by the local community in the economic benefits
- equitable treatment of commercial and private whale watching.

### Whale Watching in the Pacific

Studies of the development of whale watching in the Pacific have offered global lessons for identifying some preconditions for growing whale watching industries. These include: abundant cetaceans; tourist accessibility; and established marine-based tourism operators. To further develop the industry countries need to:

- continue growing regional tourism markets and developing whale watching to complement existing tourism activity
- better understand the seasonal cycles and behaviours of cetaceans
- monitor the sustainability of whale watching operations, particular for evidence of excessive pressure from the number of tourism operators
- secure the environmental reputations of countries and regions
- study the economic and financial dynamics of whale watching operations, including benefits to local communities
- protect territorial waters from the adverse effects of human activity, such as pollution and fisheries bycatch.

### Whale watching – more than a commercial success

It is important for whale watching to be commercially successful but it can be much more than that. In *A Blueprint for Dolphin and Whale Watching Development, 2007,* Hoyt states that whale watching should aim to:

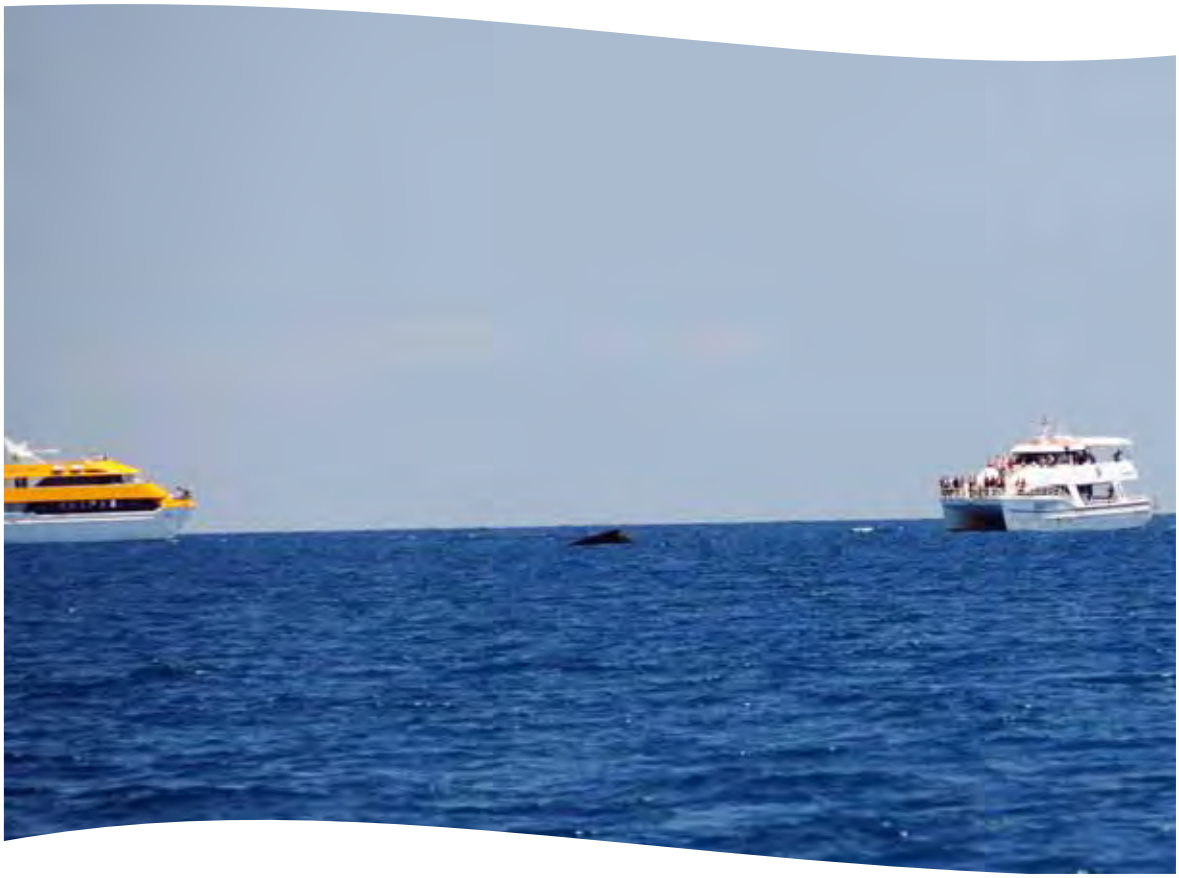
- provide a prime recreational and educational experience that motivates participants to care about whales
- add to the scientific understanding of cetaceans

- tell good, accurate stories about whales and their behaviour and encourage urban dwellers to develop their understanding of oceans
- bring business, researchers, communities and conservation groups together
- minimise the adverse impacts that watching can have on whales
- create financial incentives to conserve cetaceans and the marine systems on which they depend.

Some species that support whale watching industries are classified as threatened (for example the Blue whale, Northern right whale, and Southern right whale). Protecting these species so that they can recover means that industries that depend on them can expand.

More scientific research is needed to identify the effects of the whale and dolphin watching industry on cetaceans. This includes further research on the behaviour, migratory patterns and breeding cycles of affected cetaceans.

As new challenges and opportunities present themselves, particularly as new scientific information emerges, there will be a need for adaptive management. Policy also needs to remain flexible: for example, when dealing with emerging capacity constraints and to facilitate the improvements in service quality that may be needed for commercial activities to remain competitive.



# Approaches for estimating the economic values associated with cetaceans

There are two main approaches to estimating the range of economic values associated with the conservation of a natural asset, in this case cetaceans.

These methods are revealed and stated preference approaches. The former involves collecting data on actual expenditure by visitors to view cetaceans, while the latter relies on surveys of the general population to estimate values such as the existence values associated with cetaceans. Both approaches need to be used together to estimate the total economic value cetaceans.

## Revealed Preference Approach

The most appropriate approach to estimate revealed preference values of cetaceans is the travel-cost method. The method estimates the value placed on cetaceans by the amount of time and money that visitors are prepared to spend to see them. The willingness of people to travel long distances, and pay the associated costs, indicates the value of seeing the cetaceans.

The travel-cost method is undertaken through visitor surveys which collect detailed information about all of the costs that each visitor incurs or make conclusions about average costs based on where the visitor lives. By observing how demand declines and eventually stops as distance increases, it is possible to calculate the difference between the costs that people actually incur and the maximum cost that they would be prepared to pay, their consumer surplus.

There have only been small number of studies have been undertaken using this method in relation to whale watching trips (Table 7 on pg 56 summarises the results of these studies).

Three of the studies show that the cetaceans provide the average whale watcher with a consumer surplus of between USD$36 per trip and USD$46 per trip. This is the value above their actual costs which they would be prepared to pay to make a visit.

The Shaikh and Larson study shows that visitors attach considerable value to more frequent sightings, and are willing to pay more it whale sightings are guaranteed.

The average consumer surplus is likely to be high where cetaceans are abundant and come close to shore in sheltered waters close to large human settlements, with environmentally aware and financially secure residents.

The average consumer surplus is likely to be lower where the populations of either cetaceans or humans are more dispersed as it is more difficult and costly to bring the two together.

**Table 7 Estimates of the average consumer surplus accruing to whale watchers, using travel cost information**

| Authors | Day | Shaikh & Larson* | Loomis, Yorizane & Larson | Hoagland and Meeks |
|---|---|---|---|---|
| Year of publication | unpublished | 2003 | 2000 | 2000 |
| Year of survey | Mid-1980s | 1991–92 | 1993 | 1996 |
| Location | Gloucester, Massachusetts | Several shore-viewing and boat-viewing sites in California | Several shore-viewing and boat-viewing sites in California | Stellwagen Bank, New England |
| Estimates of consumer surplus per whale watching trip ($US, 2008 prices) | US$46/trip | | US$66/trip | US$36/trip |
| Estimates of the increase in average consumer surplus, per trip, from an increase in the chance of seeing whales ($US, 2008 prices) | | | | |
| 50% better chance of seeing whales | | US$133/trip | | |
| 100% better chance of seeing whales | | US$158/trip | | |

Notes

* Shaikh & Larson use travel cost information but in variation on the traditional travel cost method. They allow the model to determine the unit value of time, subject to a constraint on the available time.

## Stated preference approach

Studies have shown that people will pay for improved conservation outcomes for cetaceans, such as the protection of a species, or a specified increase in the species population.

This economic value is described as their willingness-to-pay. Table 8 summarises studies that have been used to estimate what people would be willing to pay to deliver an improved conservation outcome for cetaceans.

These studies show that people are willing to pay significant amounts to reflect the value they place on the conservation and existence of cetaceans.

## Measures to recover costs and redistribute benefits

Detailed demand studies can provide relevant information about the impact of measures to recover management costs, impose minimum quality standards such as interpretative services, or to restrict entry to the industry.

Whale watchers on the Pacific coast of Mexico, for example, enjoy substantial consumer surplus and, at least in theory, part of this could be transferred back to the producers, namely the tour operators. More broadly when considering the worldwide picture, there seems to be some evidence that operator licensing schemes are designed to limit competition and put a floor under prices, not just to manage visitor congestion and their impacts on cetaceans.

Whether price increases improve net returns to producers depends on the price elasticity of demand, that is, the extent to which the demand for whale watching would fall as prices rise. One study that examined this issue found that returns to tour operators were maximised at a price approximately double the existing price.

**Table 8 Estimates of willingness to pay for the non-consumptive use of cetaceans**

| Authors | Year published | Location | Year of survey | Environmental goal | WTP US$/year, 2008 prices |
|---|---|---|---|---|---|
| SUB-POPULATION OF WHALE WATCHERS | | | | | |
| Loomis & Larson* | 1994 | California, USA | 1991/92 | 50% increase in gray whales | US$34 |
| | | | | 100% increase in gray whales | US$40 |
| Larson, Shaikh & Layton* | 2004 | California, USA | 1991/92 | 50% increase in whale population | US$26-31 |
| | | | | 100% increase in whale population | US$32-39 |
| Wilson & Tisdell | 2003 | Hervey Bay, Qld, Australia | 2000 | Protect humpback whales for 10 years on an annual basis | US$101-128 |
| GENERAL POPULATION | | | | | |
| Loomis & Larson* | 1994 | California, USA | 1991/92 | 50% increase in whale population | US$22 |
| | | | | 100% increase in whale population | US$25 |
| Rudd | 2007 | Atlantic coast, Canada | 2006 | North Atlantic right whales: increase population 25%-100% | US$22-33 |
| Olar et al | 2007 | St Lawrence Estuary, Canada | 2006 | Beluga: recovery from 'threatened' to 'special concern' | US$92 |
| | | | | Beluga: recovery from 'threatened' to 'not at risk' | US$105 |
| | | | | Recovery: beluga & harbour seal to 'not at risk'; blue whale from 'endangered' to 'threatened' | US$208 |

Note

* These studies use the same dataset, a survey conducted in California in the winter of 1991 /1992

# A Sustainable Future for Cetaceans

The aim of this summary report was to provide an overview of the global conservation status of whales, dolphins and porpoises and the economic value associated with their conservation and non-consumptive use.

The individual summaries of threatened cetacean species and populations highlights details of their history, distribution, current population, range of threats and the conservation status of individual cetaceans. This information demonstrates the immense diversity in species and their habitats, and the individual species maps clearly show their varying distribution ranges.

Overall the summary report has highlighted the key threats to cetaceans, detailed the conservation status of each species, and mapped global "hot spots" containing numerous threatened species and populations. It identifies the research gaps on the biology and ecology of some species, and highlights the need for targeted conservation management actions to reduce the impacts of key threatening processes.

This summary report has identified a range of issues in relation to cetacean conservation and management, and the values that can be found not only through the economic worth of the whale and dolphin watching industries but also simply the existence value of having cetaceans around for future generations.

It has outlined not only the complexities and challenges we face in ensuring a sustainable future for cetaceans, but it has also detailed the great opportunities which are available through further research, united conservation management approaches and the international development of a sustainable whale watching industry.

The original reports including references on which this summary report is based are available on the Department of the Environment, Water, Heritage and the Arts website at **www.environment.gov.au/coasts/species/cetaceans/index.html**

## Image Credits

Front Cover: (L–R) Indo-Pacific bottlenose dolphins *Tursiops aduncus* (P. Harrison)
Southern right whales *Eubalaena australis* (Dave & Fiona Harvey)
Australian snubfin dolphin *Orcaella heinsohni* (Guido J. Parra)
Humpback whale *Megaptera novaeangliae* (Great Barrier Reef Marine Park Authority (GBRMPA))
(Bottom) Whale tail (D.Paton)

Page 2: Bottlenose dolphin *Tursiops truncates* (Daniel Burns)

Page 7: Humpback whale *Megaptera novaeangliae* (GBRMPA)

Page 18: Maui's dolphins *Cephalorhynchus hectori ssp. maui* (Gaby de Tezanos Pinto)

Page 21: Southern right whale *Eubalaena australis* (Daniel Burns)

Page 22: Humpback whale *Megaptera novaeangliae* (P. Harrison)

Page 23: Short-beaked common dolphins *Delphinus delphis* (Liz Hawkins)

Page 24: Spinner dolphin *Stenella longirostris* (P. Harrison)

Page 25: Indo-Pacific humpback dolphin *Sousa chinensis* (Daniele Cagnazzi)

Page 26: Bryde's whale *Balaenoptera edeni / brydei* (Liz Hawkins)

Page 29: Australian snubfin dolphin *Orcaella heinsohni* (Daniele Cagnazzi)

Page 31: Blainville's beaked whale *Mesoplodon densirostris* (Nan Hauser)

Page 32: Entangled Humpback whale *Megaptera novaeangliae* (Leighton De Barros Sea Dog Films)

Page 36: Entangled whale tail (South Australian Museum and Dept for Environment and Heritage – South Australia)

Page 41: Humpback whale *Megaptera novaeangliae* (GBRMPA)

Page 53: Dwarf Minke whale an undescribed subspecies of *Balaenoptera acutorostrata* (GBRMPA)

Page 55: Commercial whale watching in Australia (GBRMPA)

Page 58: Southern right whales *Eubalaena australis* (Dave & Fiona Harvey)

Page 60: Dwarf Minke whale an undescribed subspecies of *Balaenoptera acutorostrata* (GBRMPA)

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