Whales & Dolphins
Summary of the available knowledge on toothed whales distribution, behaviour, migration and threats compiled for CMS by Boris Culik. For details, please see "Home / Introduction". All comments and suggestions welcome.
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General summary

When the first edition of the "Review on small cetaceans" was written in 2001, there were 71 dolphin, porpoise and small whale species to consider. The number of recognized small cetacean species has not changed in this second, fully revised edition, but to complete the suborder Odontoceti, the toothed whales, we have added their largest representative, the sperm whale (*Physeter macrocephalus*) to the species reports.

Sources
This new edition became necessary due to the vast amount of literature published on cetaceans in the past 10 years. An online search on the scientific literature published between 2001 and 2010 yields 4,900 publications containing the word "whale", "dolphin" or "porpoise" in the title. For the purpose of this review, I have checked an average of approximately 50 - 60 recent articles per species using the Aquatic Science and Fisheries Abstracts (ASFA Silver Platter), the IUCN species reports (link), the scientific reports of the National Marine Fisheries Service of the USA and many other sources.

Changes in species since 2001
Among the small cetacean species, there have been three additions and several changes. Perrin's beaked whale (*Mesoplodon perrini*) was first described in 2002 on the basis of five animals stranded on the coast of California. The Australian snubfin dolphin (*Orcaella heinsohni*), formerly included in the Irrawaddy dolphin (*Orcaella brevirostris*) and the Guiana dolphin (*Sotalia guianensis*), formerly included in the Tucuxi (*Sotalia fluviatilis*) have also been recognised as new species.

As opposed to this, two species have been synonymized with others and re-assigned to subspecific status: the Arabian common dolphin (*Delphinus tropicalis*) is now included in the Long-beaked common dolphin (*Delphinus capensis*) and the account on the Indo-Pacific humpback dolphin (*Sousa plumbea*) was merged with that of the Chinese white dolphin (*Sousa chinensis*).

The name of another Mesoplodont, *Mesoplodon bahamondi* disappeared from the list, being renamed after a senior synonym for this species was idendified in 2002, it is now called *Mesoplodon traversii* . This is the least well known of all cetecan species: only 3 specimens were found to date and no description of external features is available.

Critically endangered or extinct species
But although this new edition still reports on 71 small cetacean species, there are really only 70 species today, as opposed to 2001.

The Yangtse river dolphin (*Lipotes vexillifer*) was considered extremely endangered in 2001 but attempts to save this species have failed and a survey of the Yangtse River in 2006 as well as a subsequent search in 2007 did not detect any live specimens in its former freshwater habitats in China. Several years have passed since then without any positive news and we must therefore consider this species as being extinct.

The Vaquita (*Phocoena sinus*), also called the Gulf of California porpoise, is one of the smallest toothed whale species. The latest survey in its habitat in the northern Gulf of California was conducted in 1997 and from this, a population of 177 - 1073 animals was estimated. However, since then more than a decade has elapsed and no new surveys have been conducted in the wild. A recent statistic (2009), based on these dated estimates and on inferred fisheries by-catch mortalities, assumes that only 71 - 430 animals survive today. The IWC (2008) estimated that the species may become extinct by 2013. However, there is still hope: an expedition in 2008 reported 13 sightings (T. Jefferson, 2010, pers. comm.).

Two other species were classified as endangered by the IUCN Cetacean Specialist Group in 2008 (see Poster "Odontocetes - the toothed whales"): the Hector's dolphin of New Zealand (*Cephalorhynchus hectori*), of which a subspecies, which lives on the North Island (*C. c. maui*) is actually Critically Endangered, its current population size being in the range of only 48 - 252. And the South Asian river dolphin (*Platanista gangetica*), a subspecies of which lives in the Indus and its tributaries (*P. g. minor*) in Pakistan and India with a remaining population in the high 100s. The other subspecies lives in the Ganges-Brahmaputra river system and its tributaries of India, Bangladesh and Nepal, whose population ranges in the low 1,000.

Vulnerable and threatened species
As opposed to 2001, five odontocete species are considered as Vulnerable today (Table 1): The finless porpoise (*Neophocaena phocaenoides*), the Irrawaddy dolphin (*Orcaella brevirostris*), the sperm whale (*Physeter macrocephalus*), the Franciscana (*Pontoporia blainvillei*) and the Atlantic humpback dolphin (*Sousa teuszii*). Please also see the poster listing all 72 species according to their threat level.

Table 1: Comparison between 2001 and 2008 of toothed whales listed according to the categories of the IUCN Red List of endangered Species. DD: Data Deficient. LR: Lower Risk. LC: Least concern. NT: Near Threatened. VU: Vulnerable. EN: Endangered. CR: Critically Endangered (In 2001, 15 odontocete species were not listed by the IUCN). Source: Cetacean update of the 2008 IUCN Red List of Threatened Species

	2001	2008
DD	39	41
LR/LC	10	17
NT	0	5
VU	4	5
EN	2	2
CR	2	2
Sum	57	72

Another five species are classified as near threatened, a category which contained none in 2001: the Chilean dolphin (*Cephalorhynchus eutropia*), the beluga whale (*Delphinapterus leucas*), the narwhal (*Monodon monoceros*), the Australian snubfin dolphin (*Orcaella heinsohni*) and the Indo-Pacific humpback dolphin (*Sousa chinensis*).

The reason for this can lie in significantly reduced population sizes through massive catches in the past, with a subsequent failure of recovery to pre-whaling population sizes (e.g. in the case of the sperm whale). But in most species, ongoing and unsustainable mortalities through fishery interactions, reduced fitness through massive accumulation of biologically active pollutants, and even ongoing unsustainable catches in local whaling activities are the cause.

Threats
The major threat faced by odontocetes is by-catch in fisheries operations (Table 2). For 62 species (86 % of all toothed whale species) entanglement or capture in gillnets, driftnets, traps, weirs, purse-seine nets, long-lines, trawls and other gear and subsequent anoxia and suffocation as direct cause of death were identified as a major risk. This is a substantial increase as oppose to 2001, when by-catch was only known to affect 50 species (70.4 %).

Although hunting on a commercial scale has largely come to an end, many toothed whales still suffer losses from ongoing local hunting, deliberate killing or live-captures. A total of 50 species (69.4%) is now affected by such operations, as opposed to 47 (66.2 %) in 2001. And even if the whales are not targeted directly by the fisheries, over-fishing of their predominant prey species was identified as a threat to 13 species (18.1 %) as opposed to 11 (15.5%) in 2001.

Many human activities result in discharge of wastes and subsequent pollution of the environment. Pollution by persistent and often bio-accumulating heavy metals, including mercury and butyltins, the latter used in anti-fouling paint for ships, as well as persistent chemicals such as PCB's, DDT and others, were found to affect 48 (66.7%) of all species, as opposed to 40 (56.3) in 2001. The ingestion of plastic debris and subsequent obstruction of the digestive tract, followed by starvation, is also included in this category.

Table 2: Number of odontocete species documented as affected by a particular threat type. Comparison of 2010 edition with 2001 edition of the odontocete report. (Catch includes killing in fishery interactions as well as live-capture. Vessel interaction includes ship strikes as well as whale-watching effects. Pollution includes inorganic and organic pollutants and ingestion of plastic debris.)

	Unknown	Catch	By-catch	Vessel	Noise	Habitat degradation	Pollution	Over-fishing	Climate change
2010	12	50	62	14	24	18	48	13	3
2001	13	47	50	-	2	17	40	11	-

Anthropogenic activities may also entail habitat degradation through construction of dams, airports or harbour facilities as well as dredging, or exploitation of natural resources such as oil and gas fields and affect 18 (25%) species. Interactions with shipping, including lethal ship strikes, but also injuries by power boats or significant changes in behaviour by intensive and unregulated whale-watching pose a threat to 14 (19.4%) species.

Odontocetes rely on sound to communicate under water, to navigate and to find and capture prey. Man-made noise caused by seismic explorations, marine construction projects as well as military sonar poses an increasing threat to 24 (33.3%) species of these marine mammals (as opposed to 2 species identified in 2001).

The comparison of these numbers shows two things: Firstly, that our knowledge on the effects of anthropogenic activities has increased considerably over the past 10 years. And secondly, and this is a very alarming result, that the human footprint on the seas and oceans is becoming ever larger, its repercussions being felt by more and more species.

The Convention on the Conservation of Migratory Species of Wild Animals (UNEP/CMS) has reacted to this increasing level of threats to toothed whales and has included 37 species or particular populations of these species into its Appendices I or II (CMS-Appendices; please also see article on "Cetacean Conservation under the Convention on Migratory Species" for details) as opposed to 34 species in 2001.

Data quality
Despite the vast body of new literature published since the first edition, our knowledge on many

odontocete species remains fragmentary and has only moderately improved over the course of the last 10 years. There are large "white patches" remaining with respect to our understanding of toothed whales. The whole family of the Mesoplodonts is a prime example for this, and their individual species accounts are often only 1 - 2 pages long. In many cases, we only know these cetaceans from carcasses or bones found on the beach and one, *Mesoplodon traversii*, was actually never recognised alive.

Of the 72 odontocete species, the IUCN considers 41 species (57%) as Data Deficient. At present we simply do not have enough information on the size of populations, their distribution, mortality and recovery rates and so on to be able to classify them into one of the other categories, including the one expressing "Least Concern". A lot of work remains to be done by field biologists.

Former and repeated recommendations
In the first version of the "Report on small cetaceans" I had suggested the inclusion of a variety of species into the appendices of CMS, based on the fact that these species showed documented, transnational migratory behaviour. Of these, the West African population of *Stenella clymene* was in the meantime included into Appendix II.

Among the species not considered by CMS so far is the Indus subspecies of the South Asian river dolphin *Platanista gangetica minor*: Because this subspecies occurs, and was recently observed, in riverine systems of both Pakistan and India, inclusion in Appendix II of CMS might be considered (please see individual species account for details).

Outlook
From the series of reports published here, a small statistic was drawn up to determine, which species have low population numbers and at the same time a distribution which is restricted locally or regionally (as opposed to ocean wide or global). While several of these species are already included in CMS appendix II, they are considered a Data Deficient by the IUCN. Table 3 lists these species and is intended to further discussion on the assessment of these species by the IUCN Cetacean Specialist Group.

Table 3: Species classified as "Data Deficient" (DD) by the IUCN with relatively low abundance estimates and mostly regional distribution warranting closer assessment with respect to their threat status. (SA: South American population; AS/TS: Arafura/Timor Sea populations).

Genus	Species	IUCN	CMS	Abundance	Distribution
Sotalia	fluviatilis	DD	II	low 1,000	regional
Sotalia	guianensis	DD	II	low 1,000	regional
Indopacetus	pacificus	DD		low 1,000	oceanwide
Tursiops	aduncus	DD	II (AS/TS)	low 1,000	oceanwide
Cephalorhynchus	commersonii	DD	II (SA)	low 10,000	regional
Inia	geoffrensis	DD	II	low 10,000	regional
Mesoplodon	peruvianus	DD		low 10,000	regional
Cephalorhynchus	heavisidii	DD	II	low 10,000	regional

Acknowledgements
I would like to thank all those who have helped to make this report possible:

Marco Barbieri and Heidrun Frisch at the CMS and ASCOBANS Secretariat in Bonn were very supportive of the idea to revise the cetacean account and helped to get the project off the ground.

David Waugh and Wolfgang Kiessling at Loro Parque Fundacion, Tenerife, Spain and Sue Watson and Volker Homes at WWF supported the project financially.

Every species was illustrated by Maurizio Würtz and Nadia Repeto, Artescienza and Genova University, Italy.

The maps showing the currently known distribution of each species were generated by the IUCN Cetacean Specialist Group headed by Randall Reeves. Those on the current distribution of *Sotalia fluviatilis* and *Sotalia guianensis* were kindly drawn anew by Federica Chiozza at Rome University.

Every single species account was critically reviewed either by Koen Van Waerebeek, Lima Peru, or by William Perrin, La Jolla, California. I am very grateful for their innumerable corrections, comments and suggestions.

Finally, the poster on the odontocetes was financially supported by ACCOBAMS. The drawings by Maurizio Würtz, Artescienza as well as the maps by IUCN were kindly arranged by Hendrik Völker, Kiel.

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