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BIOLOGICAL BACKGROUND ON BOTTLENOSE DOLPHINS (TURSIOPS SPP.) IN THE 'LIVE-CAPTURE' TRADE AND SPECIFICALLY ON THE INDO-PACIFIC BOTTLENOSE DOLPHIN, *T. ADUNCUS*

1. The Annex to this document has been provided by IUCN.

Biological Background on Bottlenose Dolphins (*Tursiops* spp.) in the 'Live-capture' Trade and Specifically on the Indo-Pacific bottlenose dolphin, *T. aduncus*

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Introduction

The most significant cetacean trade items until commercial whaling all but ceased in the 1990s (aside from scientific exchanges of tissues etc.) were meat and blubber from baleen whales for human consumption. Since then, live dolphins and 'small' whales for display (and to some extent for research, military use, and 'therapy') have become the most significant cetacean 'products' in international trade. Trade in live cetaceans is presently dominated by bottlenose dolphins (*Tursiops* spp.), beluga whales (*Delphinapterus leucas*) and to a lesser extent killer whales (*Orcinus orca*) (Fisher and Reeves 2005). In the past, most of the dolphins in trade were common bottlenose dolphins (*Tursiops truncatus*) originating in the United States, Mexico and the Black Sea, but since the 1980s the United States has essentially stopped its capture-for-export activities and in 2001Mexico implemented a moratorium on live-captures. The source countries for dolphins in trade are now geographically diverse, but Cuba and Japan are currently major source nations for common bottlenose dolphins. Russia is the only current source for belugas. Russia and Japan have become the main potential sources for killer whales since Iceland ceased exporting them in the 1980s or early 1990s.

The present document was prepared in response to document AC23 Doc. 8.5.1 submitted by the Government of Israel requesting that the Animals Committee select the Solomon Islands population of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) for inclusion in the review of significant trade. Trade data and the published literature are not always clear about the distinction between the two currently recognized species of *Tursiops*. In addition, the distribution of the two species overlaps to some degree in the Indo-Pacific region. Therefore, we have reviewed information on both species but with an emphasis on *T. aduncus*.

We were specifically prompted to become involved because of the controversial capture of about 100 and export of several tens of Indo-Pacific bottlenose dolphins from the Solomon Islands in 2003 (Ross *et al.* 2003) and again in 2007. The 2003 export was to Mexico (28 dolphins) and the 2007 export to the United Arab Emirates (UAE) (28 dolphins). A further shipment of up to 18 dolphins from the Solomon Islands to Singapore is anticipated (Travers and Lieberman 2008). We recognize that the context is much broader than only these exports from the Solomon Islands. It includes recent live-capture initiatives involving common bottlenose dolphins in West Africa (Guinea-Bissau; Van Waerebeek *et al.* 2008), the Caribbean Sea (Dominican Republic, Haiti, Cuba; Fisher and Reeves 2005, Van Waerebeek et al. 2006), Japan, Panama (yet to be implemented), Guyana (Fisher and Reeves 2005), Russia (Birkun 2007) and Turkey (Bearzi *et al.* in review). New areas of capture (of either species) are frequently being proposed and these tend to be in regions like the Solomon Islands with no previous population assessment.

Taxonomy and Systematics of Genus *Tursiops*

Bottlenose dolphins (genus *Tursiops*) occur worldwide in tropical and warm-temperate waters in both coastal and pelagic populations (Mead and Brownell 1993, Rice 1998). Because of their cosmopolitan distribution and variable external morphology and osteological characters, many species and subspecies were described over 100 years ago (True, 1889). In the absence of large samples, except for *T. truncatus* (Montagu, 1821), originally described from the eastern North Atlantic Ocean, nearly a century of taxonomic confusion ensued, and until recently just the single species *T. truncatus* was generally recognized in the scientific literature (Mead and Brownell 1993). Ross (1977) presented evidence for the existence of two species, *T. truncatus* and *T. aduncus* (Ehrenberg, 1832) in South Africa. However, Ross and Cockroft (1990), after examining specimens from Australia, backed away from Ross's earlier diagnosis and concluded that the differences were clinal and only the single species *T. truncatus* was represented in those two regions. It was not until the 1990s that Gao *et al.* (1995) and Wang and colleagues (Wang *et al.* 1999, Wang *et al.* 2000a,b) showed that the Indo-Pacific bottlenose dolphin (*T. aduncus*) could be distinguished from the common bottlenose dolphin (*T. truncatus*) using data on genetics, osteology and external morphology of specimens in the western North Pacific. Additional work in Australia supported the conclusion that two species occur there (Hale *et al.* 2000, Möller and Beheregaray 2001, Kemper 2004).

A recent analysis of mitochondrial DNA sequences and microsatellites from 269 specimens from seven geographic regions showed that South African and Chinese dolphins referred to as *T. aduncus* may belong to different taxa (Natoli *et al.* 2004). Perrin *et al.* (2007) noted that the holotype of *T. aduncus* from the Red Sea has close affinities with *T. aduncus* from South Africa and that if future studies were to consider western Pacific/Southeast Asian specimens to be a different species, a different name would be required for them. Thus the resolution of the taxonomy of the genus may be that there are three species. Based on genetic evidence (sequence of cytochrome *b* gene in the mitochondrial genome), LeDuc *et al.* (1999) concluded that *T. aduncus* is more closely related to the Atlantic spotted dolphin (*Stenella frontalis*) than to *T. truncatus*.

Range Limits and Global Distribution

Common Bottlenose Dolphin

T. truncatus is known from most of the cool- and warm-temperate and tropical regions of the eastern Pacific and the North and South Atlantic (Mead and Brownell 2005; Fig. 1). It is also found in warm-temperate waters of the central Pacific (Hawaii) and westward to Japan. *T. truncatus* also occurs in the Mediterranean Sea and the Black Sea. In various parts of the world's oceans, there are both coastal and offshore populations of this species, separable on the basis of morphology (Walker 1981, Ross and Cockcroft 1990, Van Waerebeek *et al.*, 1990; Mead and Potter 1995).

Indo-Pacific Bottlenose Dolphin

T. aduncus has been reported from much of the warm-temperate and tropical Indian Ocean and the western Pacific Ocean, including various islands (Fig. 2). However, unlike *T. truncatus*, *T. aduncus* is not known to occur in any offshore regions. These dolphins have been documented from Cape Agulhas in southeastern South Africa and along the rim of the Indian Ocean, including the Red Sea, Persian Gulf, and the Indo-Malay Archipelago. They also are known to occur in coastal waters around much of the northern half of Australia. The range of this species around islands in the western South Pacific is poorly known. In the western North Pacific it occurs along the coasts of mainland China, Taiwan, the Ogasawara (Bonin) Islands and Kyushu, Japan. There are confirmed records from South Africa (Ross 1977, 1984); west and east coasts of Australia (Ross and Cockroft 1990, Connor *et al.* 2000, Hale *et al.* 2000, Kemper 2004); Gulf of Tonkin, Taiwan, Hong Kong,

China (Wang *et al.* 2000a,b); and western Kyushu, Japan (Shirakihara *et al.* 2002). Other coastal areas in the Indo-Pacific region suspected or believed to have *T. aduncus* populations include: Pakistan (Pilleri and Gihr 1974), Persian Gulf (Robineau and Rose 1984), southeastern Asian waters north to the East China Sea (Hammond and Leatherwood 1984), Ogasawara Islands (Mori 2005), Solomon Islands (Ross *et al.* 2003) and New Caledonia (C. Garrigue in Hale *et al.* 2000).

In some parts of the Indo-Pacific, both species of bottlenose dolphins are found within the exclusive economic zone (EEZ) of the same country (i.e. Solomon Islands, Taiwan, Australia, Japan, South Africa) and this can confuse and confound discussions of taxonomic status and population assessment.

Relevant Aspects of Life History

Life history is best known for common bottlenose dolphins. Growth layers in the teeth show that females have a life span over 50 years and males 40-45 years (Wells and Scott 2002). The reproductive life span of females in the wild can be as long as 48 years (Wells and Scott 1999). The gestation period is about 1 year and the size at birth, depending on the size of the mother, can range from 84 cm to 140 cm (Wells and Scott 2002). The normal calving interval for *T. truncatus* is 3-6 years; it is 4-6 years in *T. aduncus* along the west coast of Australia (Connor *et al.* 1999). In common bottlenose dolphins, females reach sexual maturity at 5-13 years and males at 9-14 years (Wells and Scott 2002). In Indo-Pacific bottlenose dolphins in western Australian waters, females do not give birth until age 12 or older (Connor *et al.* 1999).

Behavior / Social Structure

In general, bottlenose dolphins have a dynamic group composition – a fission-fusion society – with sex, age, reproductive condition, familial relationships, and affiliation histories as the main determining factors (Connor *et al.* 1999, Wells and Scott 2002). Group size in common bottlenose dolphins is typically 2-15 animals but offshore groups can contain more than 1,000 animals (Wells and Scott 2002). Indo-Pacific bottlenose dolphins are usually found in smaller groups than common bottlenose dolphins. For example, in Moreton Bay, Australia, the average group size is about 10 (Corkeron 1990); in Shark Bay, Australia, it is about five, with the largest groups consisting of up to 22 individuals (Connor *et al.* 1999).

Ecology

The diet of common bottlenose dolphins has been studied in many locations around the world. It includes a large variety of fishes and squids but tends to be dominated by sciaenids, scombrids and mugilids (Wells and Scott 2002). Diet differs between coastal and offshore forms (Mead and Potter 1990). Indo-Pacific bottlenose dolphins in South Africa take a variety of fishes and squids (Cockcroft and Ross 1990). The fishes are generally species found on sandy bottoms or around reefs.

Abundance

There are few abundance estimates for Indo-Pacific bottlenose dolphin populations. Throughout their range, they appear to occur as local, resident populations, at least some of which are relatively small. The species is known from various isolated islands in the eastern part of its range from northern Australia to Japan. There is a resident population around the Ogasawara (Bonin) Islands, Japan (Mori 2005), but numbers there are not known. Some dolphins have been live-captured for Japanese oceanariums in the Amimi Island area but little is known about numbers there. Almost nothing is known about the *T. aduncus* population reported from the Noto Peninsula region. The population in Amakusa, western Kyushu, Japan, consists of just over 200 dolphins, based on photo-

identification (Shirakihara *et al.* 2002). In an 8-yr photo-identification study around Mikura Island, a total of 169 dolphins were photo-identified (Kogi *et al.* 2004). The population along the KwZulu-Natal coast of South Africa is 1985 was estimated at 520 dolphins, based on aerial surveys (Best 2007). Off southern Zanzibar, Tanzania, the local population was estimated as 136-179 (Stensland *et al.* 2006). There are two population estimates for Australian waters: about 1,100 off Queensland (Chilvers and Corkeron 2003) and 2,000-3,000 in Shark Bay (Preen *et al.* 1997). No estimates are available for the mainland of China, Taiwan, Vietnam, Thailand, Indonesia, Malaysia, Philippines, Timor, Solomon Islands and New Caledonia. All of the island-associated populations in the Pacific appear to be geographically isolated, especially those around the more oceanic islands like the Solomon Islands.

Live-Capture Information on *T. aduncus*

Many people in the cetacean display industry consider Indo-Pacific bottlenose dolphins preferable to common bottlenose dolphins as they are considered to adapt better to captivity, have better temperaments and are less susceptible to disease and stress (Reeves *et al.* 1994). These opinions may or may not be valid (see Reeves *et al.* 1994), but the fact that they exist means that there is a relatively strong demand in the display market for *T. aduncus* specimens (especially young females). Hybridisation between the two species in captivity has occurred five times at U'Shanka Marine World in Durban, South Africa (Best 2007). Records also exist of intergeneric hybrids involving *T. truncatus* – with at least Risso's dolphin (*Grampus griseus*), short-beaked common dolphin (*Delphinus delphis*), long-beaked common dolphin (*D. capensis*), false killer whale (*Pseudorca crassidens*) (offspring viable into a second generation), rough-toothed dolphin (*Steno bredanensis*) and short-finned pilot whale (*Globicephala macrorhynchus*) (Bérubé 2002).

The earliest records of Indo-Pacific bottlenose dolphins in captivity are from South Africa. Between 1963-1981, at least 30 were removed from the wild (Best and Ross 1984). Some other early live-capture records for *T. aduncus* include the following: 26 from Java between 1974-1982 (Tas'an and Leatherwood 1984), 9 from Indonesia in 1987 (Reeves et al. 1994), 22 from Taiwan between 1975-1979 (Hammond and Leatherwood 1984) and 8 from Taiwan in 1984 (Reeves *et al.* 1994). At least 30 specimens were held captive in Australia before 1984 (Cawthorn and Gaskin 1984). Indonesia exported around 27 wild-caught specimens (as well as some captive-bred individuals) between 1997 and 2006. In July 2003 the Solomon Islands exported 33 live *T. aduncus* to Mexico and in October 2007 an additional 28 specimens were exported to the UAE. At present, the only facilities known to house this species are in Mexico and the UAE, although there are plans for more animals from the Solomon Islands to be imported by Singapore. Additional animals are reportedly being held in sea pens in the Solomon Islands, presumably pending sale and export agreements. The government of the Solomon Islands has issued a permit for the export of up to 80 dolphins (all *T. aduncus*) per year (CITES Secretariat document AC 23 Doc.8.5). The size of the population(s) from which these dolphins are being removed is unknown and possibly small.

Conservation Status

The status of *T. aduncus* is poorly known throughout most of its extensive range. Most of what is known about the species is based on a few long-term studies of isolated, resident, local populations. Although the Indo-Pacific bottlenose dolphin is not considered globally endangered, its near-shore distribution makes it vulnerable to direct exploitation (including live-capture and removal), fishery conflicts and human-caused environmental degradation (Reeves *et al.* 2003). This is especially true at the level of small, local, resident populations, which are often island-associated. Such populations can easily be affected by small direct catches or bycatch, and therefore it is important to ensure that any deliberate removals are preceded by rigorous, scientific population assessment to ensure sustainability.

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Figure 1. Approximate global range of the common bottlenose dolphin (*Tursiops truncatus*), courtesy of Global Mammal Assessment. It is important to recognise that the distribution is not continuous as implied; there are many discrete, local populations of this species.

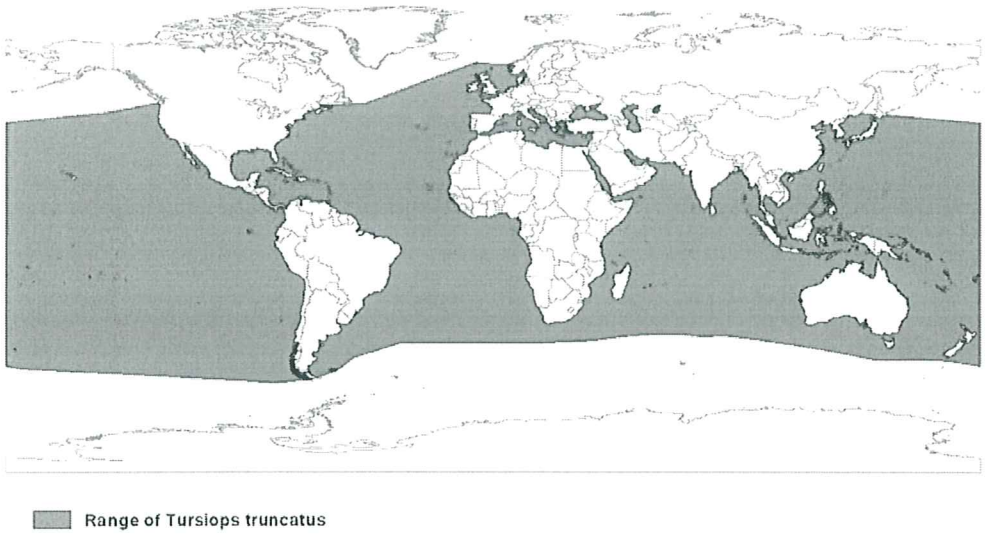

Figure 2. Approximate global range of the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), courtesy of Global Mammal Assessment. Note that this depiction is general and not meant to imply that the distribution is continuous, e.g. between Madagascar and eastern Africa and between northern Australia and Papua New Guinea. As explained in the text, there are likely multiple hiatuses between geographically and demographically isolated populations.