Agenda Item 5.2	Implementation of the Triennium Work Plan (2010-2012) – Other Issues Review of New Information on Pollution and its Effects
Document 5-05 rev.1	**Cetaceans and Marine Debris**
Action Requested	• Take note of the report
Submitted by	WDCS

ASCOBANS

NOTE:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

Secretariat's Note

This paper was submitted by Mark Simmonds, Whale and Dolphin Conservation Society, in response to the following Action Point agreed on by the 18th Meeting of the Advisory Committee:

WDCS would present a background document summarizing the state of knowledge of the impact on cetaceans of marine debris (including ingested plastics) to AC19.

This short report is based largely on a submission to the Scientific Committee of the International Whaling Commission (SC/63/E3REV). The original paper is currently being revised for submission for publication (i.e. Simmonds, in prep)[1].

Summary

There is evidence that marine debris can be a problem for cetaceans both in terms of entanglement and ingestion. There is little evidence from the UK stranding network of impacts on retrieved animals but concerns have been voiced in particular for beaked whales in the ASCOBANS region. The IWC Scientific Committee at its last meeting identified this issue as one that deserved further consideration.

Background

The accumulation and fragmentation of plastics has also been described as one of the 'most ubiquitous and long-lasting recent changes to the surface of our planet' (Barnes *et al*., 2009). However, the last substantive review of the effects of marine debris on cetaceans was published by Laist as long ago as 1997. At that time, entanglement was considered far more likely cause of mortality than ingestion. Fishing gear (monofilament line, nets and ropes) was found to be the most significant source of entanglements in all documented records regarding sea turtles, coastal and marine birds, marine mammals, fish and crabs. The greatest source of this material was considered to be commercial fishing operations, although recreational fishing and cargo ships were also considered potential sources. It was estimated that some 100,000 marine mammals died every year from entanglement or ingestion of fishing gear and related marine debris (Laist, 1997). Typically 40-80% of the larger categories of marine debris items are plastic. Much of this is packaging, carrier bags, footwear, cigarette lighters and other domestic items and much of this originates from land. Fisheries gear can also be important along continental shelves and remote islands. According to the United States Marine Mammal Commission, 136 marine species have been reported in entanglement incidents in the wider United States area, including 6 species of sea turtles, 51 species of seabirds and 32 species of marine mammals (Marine Mammal Commission, 1996).

The entanglement of marine mammals in fishing gear has been documented widely and may affect a significant proportion of some populations of baleen whales (see UNEP 2009).

The United Nations Environment Programme (UNEP) has taken the lead globally in addressing marine debris with a series of related initiatives and partnerships. In 2003, UNEP established a 'Global Initiative on Marine Litter' to provide an "international platform for the establishment of partnerships, co-operation and co-ordination of activities for the control and sustainable management of marine litter". It is coordinated by UNEP's Regional Seas Programme (RSP) and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA).[2] UNEP has recently called on relevant international bodies to "enhance and coordinate their efforts to work on the marine litter problem" and work in close

[1] The original IWC submission can be found here: http://www.iwcoffice.co.uk/_documents/sci_com/SC63docs/SC-63-E3.pdf

[2] http://www.unep.org/regionalseas/marinelitter/publications/default.asp

collaboration with civil society. In March 2011, UNEP and the United States' National Oceanic and Atmospheric Administration (NOAA) organized the Fifth International Marine Debris Conference in Honolulu, Hawai'i (NOAA/UNEP, 2011).

A related topic of growing concern is 'microplastics' in the marine environment. It has been suggested that these fragments could transfer harmful chemicals to living organisms. A range of chemicals are used as additives in plastics manufacture and some, such as the brominated flame retardants and phthalate plasticisers are potentially harmful (Barnes *et al*., 2009).

Cetaceans and Marine Debris

1. Ingestion

Thirty one species of marine mammals have been reported to have ingested marine debris (Allsopp *et al*., 2007) and Jacobsen *et al*. (2010) comment that even small quantities can have large effects. Whilst, the most obvious effect of ingestion is arguably interference with alimentary processes, another effect could be that the presence of plastics lodged somewhere in the alimentary tract could facilitate the transfer of pollutants associated with the plastics into the animals' bodies. The chemicals contained within plastics debris include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons, petroleum hydrocarbons, organochlorine pesticides (2,2′-bis(*p*-chlorophenyl)-1,1,1-trichloroethane, hexachlorinated hexanes), polybrominated diphenylethers, alkylphenols and bisphenol A, at concentrations from sub ng g^{-1} to µg g^{-1} (Teuten *et al*., 2009).

Walker and Coe (1990) made an extensive survey of foreign body ingestion by odontocetes and commented that the pathologic effects of foreign body ingestion on captive cetaceans are well known and provided details of materials ingested in captivity. They also investigated the situation for wild cetaceans and solicited information from relevant institutions covering the period between 1963 and 1986. Due to variations in data recording and pathology techniques, they were unable to determine frequency of occurrence of debris ingestion. They identified 43 examples of ingestion in stranded animals primarily from the east and west coasts of North America. (1990), they highlighted some records where ingestion of debris might potentially have been of health significance. Walker and Coe (1990) found that plastic bags and plastic sheeting were the most common items ingested (62.5% of ingested materials).

Simmonds (in prep) identified a number of other reports of ingestion of plastics and other debris by both odontocetes and mysticetes. These included an account of ingestion causing mortality in sperm whales from the northern California coast (Jacobsen *et al*. 2010).

Beaked whales have been suggested to be especially vulnerable to ingestion of plastics (Macleod, 2009). Their apparently high vulnerability may result from their reliance on suction-feeding for prey capture. Cuvier's beaked whales, *Ziphius cavirostris*, in the northeast Atlantic, have been suggested to have particularly high incidences of ingestion of and death from plastic bags (MacLeod, 2009). MacLeod (2009) also commented that 'currently plastic bags are known to affect beaked whales

at the individual level and may be of sufficient prevalence to affect some species at the local aggregation and population levels. As yet, it does not seem likely that plastic bag ingestion affects any beaked whales at the species level. However, this may be a possibility for some species with limited geographic ranges close to high concentrations of humans'. (Simmonds (in prep) provides a number of other published accounts of ingestion by beaked whales.)

The results of post mortem studies conducted in parts of the UK between 2009 and 2010 showed incidence of ingestion of foreign materials to be low, with debris reported in only 3 out of 149 animals[3].

This relationship between cetaceans and marine debris ingestion was considered at the 2011 meeting of the Scientific Committee of the International Whaling Commission and the Committee expressesed its concern at the increasing problems associated with marine debris and established an intersessional working group to gather more data on plastics, including microplastics and its potential effects on cetaceans

2. Entanglement

The entanglement of cetaceans in fishing gear is a well established problem and the International Whaling Commission (IWC), for example, now requires such mortalities to be included in calculations for quotas (Northridge et al. 2010). However, what may be less clear is the relationship between entanglement and whether the gears were in use or were lost or discarded at the point of entanglement. There seems to be little recently published on the issue of entanglement of cetaceans in marine debris.

Conclusions

Laist (1987) commented that 'the deceptively simple nature of the threat [posed by plastic debris], the perceived abundance of marine life, and the size of the oceans' had caused resource managers to 'overlook or dismiss the proliferation of potentially harmful plastic debris as being insignificant' but that 'developing information' justified 'recognition of persistent plastic debris as a major form of ocean pollution'. Clearly marine debris is now on the international agenda, however, at the moment, the extent of the threat posed by both ingestion and entanglement of marine debris to cetaceans is not well characterised or understood and, given that few cetaceans living in deeper waters that die at sea are subject to necropsy, its importance could be significantly overlooked. This matter deserves some careful reconsideration and assessment.

Acknowledgements

Thanks to Paul Jepson and Rob Deaville for providing sight of data from the UK Cetacean Strandings Investigation Programme (CSIP). CSIP is funded by Defra and the UK Devolved Administrations.

[3] The full annual report is available here: http://ukstrandings.org/csip-reports/

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