

Agenda Item 3.4.2

Review of New Information on Threats to Small
Cetaceans

Pollution and its Effects

Report and Recommendations of the
Marine Debris Working Group

Document 3.4.2

**Report of the Marine Debris Working
Group**

Action Requested

- Take note
- Comment

Submitted by

Marine Debris Working Group



**NOTE:
DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS
TO THE MEETING**

Report to ASCOBANS AC20 from working group marine debris

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During the Advisory Committee meeting in 2012, the establishment of a working group on marine debris was agreed. The coordinator of the WG is Marchien de Ruiter (North Sea Foundation). A number of tasks were identified:

1. To establish recommendations for research methodologies to assess debris as seen during cetacean surveys conducted at sea, aiming for a standardised approach to recording types of debris;
2. To collate standardized information from beach surveys of debris;
3. To review the relevant literature and report back;
4. To facilitate investigations into micro-debris;
5. To liaise with working groups on marine debris established by the IWC Scientific Committee, OSPAR, HELCOM and relating to the EU Marine Strategy Framework Directive;
6. To advise on a standardized protocol for necropsies; and
7. To examine and collate data available from stranding networks.

Group members:

Alison Wood (Whale and Dolphin Conservation) / Marie-Francoise van Bresse (Cetacean Conservation Medicine Group – CMED) / Wouter Jan Strietman (Wing) / Mark Simmonds (Humane Society International) / Ursula Siebert (Institute for Terrestrial and Aquatic Wildlife Research (ITAW) / Meike Scheidat (IMARES) / Kelly Macleod (Joint Nature Conservation Committee)/ Russel Leaper (University of Aberdeen)/ Helena Feindt-Herr (Institute of Terrestrial and Aquatic Wildlife Research, University of Veterinary Medicine) / Peter Evans (European Cetacean Society/Sea Watch Foundation) / Kim Detloff (NABU) / Genevieve Desportes (GDnatur) / Rob Deaville (UK Cetacean Strandings Investigation Programme) / Harriet Bolt (KIMO International) / Marchien de Ruiter (North Sea Foundation) / Heidrun Frisch (UNEP/ASCOBANS Secretariat)

Introduction

This report has been prepared for presentation at the 20th ASCOBANS meeting. The main source for this report is the IWC preparatory workshop on assessing the impacts of marine debris (13th – 17th of May 2013, Woods Hole, USA. See: [Report of the IWC Scientific Committee workshop on Marine Debris - May 2013](#)). The most important outcomes and recommendations relevant for ASCOBANS are summarized in this report. For each of the tasks of the ASCOBANS Working group Marine Debris, further recommendations are given.

General conclusions from keynote presentations during the IWC workshop, relevant for ASCOBANS are:

- IWC: facilitates global capacity for responding to entangled whales, 15 countries have already been trained. The IWC recently introduced **Conservation Management Plans** (CMPs) as a practical tool to co-ordinate the diverse work being undertaken. (Simon Brockington)
- NOAA Marine Debris Program has [Marine Debris Monitoring protocols](#) and is doing research into microplastics. In 2011 NOAA, the UNEP and stakeholders from all over the world came together to draft the Honolulu Strategy1, for reducing marine debris. (Nancy Wallace)
- In general there is little attention for **animal welfare**, the welfare status of all cetaceans should be

independent of their conservation status. (Michael Moore)

- For most whales **actively fishing gear** is the primary macro debris entanglement problem. (Michael Moore)

- An extrapolated figure of **308,000 entanglements** of cetaceans worldwide per year was estimated (Read et al, 2006). Whale species have been recorded entangled in a wide range of fishing gear; however numbers of entanglements are underreported. (David Mattila)

- Microplastics, plastic fragments smaller than 5 mm, is an emerging issue for cetaceans. The impacts are largely unknown. The University of Sienna found the first evidence of the potential toxicological impact of microplastics in a baleen whale and suggests the use of phthalates as a tracer of the intake of microplastics through the ingestion of microdebris and plankton. These preliminary investigations underscore the importance of future research on the detection of the toxicological impact of microplastics in filter-feeding species.

- If countries classified the most harmful plastics as **hazardous**, their environmental agencies would have the power to restore affected habitats and prevent more dangerous debris from accumulating. (Mark Browne)

- **Entanglement** (97% caused by lost fishing gear) and **ingestion** (54% plastics and 20,7% fishing gear) interactions have been recorded in 46 cetacean species worldwide, equivalent to **53% of all cetacean species**. There is a need to identify methods to determine whether there are population-level effects of marine debris ingestion and entanglement for cetaceans. (Sarah Baulch)

1. To establish recommendations for research methodologies to assess debris as seen during cetacean surveys conducted at sea, aiming for a standardised approach to recording types of debris

The IWC Scientific Committee recommends:

- Encouraging debris sampling when conducting cetacean research at sea and the reporting of these results to relevant groups such as the IWC.

- Submitting data collected on debris interactions to a global database, for which a standardized data form should first be designed.

- Using existing database frameworks and protocols with the aim of establishing a centralised database for a comprehensive picture of global marine debris impacts on cetaceans.

→ There is an IWC paper by Williams & Ash, about how to combine debris sightings and cetacean surveys

The ASCOBANS Marine Debris working group recommends:

1.1 An investigation in: who is monitoring litter at sea in Europe (during cetacean research), what protocols exist and is there international coordination? (Such as litter monitoring during fisheries surveys, fishing for litter programs, cetacean monitoring programs on fixed routes)

1.2 To design a standardized data form for collecting data on debris interaction in Europe (and preferably worldwide) during cetacean research. Together with a protocol on how to integrate the data collection with the aims of the cetacean research (based on the findings of Williams & Ash, and other researchers that have carried out such surveys, such as Meike Scheidat and Anita Gilles).

1.3 To examine the relationship between the results of ongoing marine litter surveys and the results of necropsies/strandings data

2. To collate standardized information from beach surveys of debris

The IWC Scientific Committee recommends:

- Using a two-part classification system:

a. Include characteristics adequate to understand the use, configuration, and other aspects of the debris while it is still in active use. E.g. the industrial function of the item: holding liquids, catching fish, providing buoyancy.

b. Focus on characteristics of the item after it has left human possession and contribute to the harm the item might cause to cetaceans. This might include colour (i.e. visibility), flexibility, sharp edges, size, strength, density, site in water, flexibility, shape/aspect ratio, and a host of other aspects that affect its ability to harm cetaceans.

→ Ocean Conservancy has a global database: <http://www.oceanconservancy.org/> (Chis Wilcox)

The ASCOBANS Marine Debris working group recommends:

2.1 An investigation in: who is monitoring litter on the beach in Europe, what protocols exist and is there international coordination? (such as OSPAR beach litter monitoring)

2.2 Encourage ongoing beach surveys in Europe to make use of the two-part classification system (see above) and to make use of existing database frameworks and protocols

2.3 To examine the relationship between the results of ongoing and beach litter surveys and the results of necropsies / strandings data

3.1 Review of current knowledge

A limited number of publications exist that have reviewed what is known on interactions between cetaceans and marine debris. The following table provides an overview of the species affected, type of interactions that have been described and references. The species are limited to small cetaceans that occur in the ASCOBANS area, however the instances are not limited to the ASCOBANS area.

Reference information in the table: S. Baulch et al, A sea of plastic on cetaceans: Evaluating the impacts of marine debris.

Species	Number of instances of Ingestion (Number of instances where interaction likely cause of mortality)	Number of instances of Entanglement (Number of instances where interaction likely cause of mortality)	References
Bottlenose dolphin (<i>Tursiops</i>)	35 (15)	9 (1)	Barros <i>et al.</i> , 1990; Walker and Coe, 1990; Schwartz <i>et al.</i> , 1991; Mann <i>et al.</i> , 1995; Gorzelany, 1998; Ceccarelli, 2009; NEFSC,

<i>truncatus</i>)			2009; Levy <i>et al.</i> ,2009; Gomerčić <i>et al.</i> ,2009; Deaville and Jepson, 2010; FAU, 2012; Lelis, 2012; Nicolau pers. comm. 12/04/12
Common dolphin (<i>Delphinus delphis</i>)	8 (1)	0	Deaville and Jepson, 2010; Walker and Coe, 1990; Nicolau pers. comm. 12/04/12
Killer whale (<i>Orcinus orca</i>)	1 (0)	1 (0)	Cawthorn 1985; Baird and Hooker, 2000
Long-finned pilot whale (<i>Globicephala melas</i>)	1 (0)	0	Laist, 1997
Risso's dolphin (<i>Grampus griseus</i>)	4 (0)	1 (1)	Walker and Coe, 1990; Shoham-frider <i>et al.</i> ,2002; Frantzis, 2007; Bermudez- Villapol <i>et al.</i> ,2008)
Striped dolphin (<i>Stenella coeruleoalba</i>)	2 (0)	13 (13)	Walker and Coe, 1990; Frantzis, 2007; Fernandez <i>et al.</i> ,2009
White-beaked dolphin (<i>Lagenorhync hus albirostris</i>)	1 (0)	0	Baird and Hooker, 2000
Harbour porpoise (<i>Phocoena phocoena</i>)	19 (3)	4 (4)	Hare and Mead, 1987; Walker and Coe 1990; Kastelein and Lavaleije, 1992; Baird and Hooker, 2000; Tonay <i>et al.</i> ,2007; Deaville and Jepson, 2010; Bogomolni <i>et al.</i> ,2010; Northwest Straits Initiative Project, 2012
Northern bottlenose whale (<i>Hyperoodon ampullatus</i>)	2 (0)	0	Baird and Hooker, 2000; Deaville and Jepson, 2010
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	12 (2)	0	Foster and Hare, 1990; Walker and Coe, 1990; Fertl <i>et al.</i> ,1997; Poncelet <i>et al.</i> ,2000; Santos and Pierce 2001; Gomerčić <i>et al.</i> ,2006; Santos <i>et al.</i> ,2007; Kerem pers. comm. 12/04/12
Odontocete Total	85 (21)	28 (19)	

The ASCOBANS Marine Debris working group recommends:

3.1 A comprehensive review of current knowledge of marine debris and effects on small cetacean in the ASCOBANS region.

4. To facilitate investigations into micro-debris

The IWC Scientific Committee recommends:

- Examine whether ingested micro- and nano-plastic can transfer into the food chains of cetaceans

- Evaluate the use of established biomarkers of exposure to assess the toxicity of microplastics, including endocrine disruption

- Conduct laboratory and field experiments to investigate the bioavailability and toxicity of priority pollutants and additives from microplastic

- Develop and validate the use of direct (vibrational spectroscopy) and indirect (e.g. contaminants associated with plastic: phthalates, PCBs, PBDEs) measures of ingested microplastic in baleen whales)

- Baleen whales and other large filter feeders should be considered in national and international marine debris strategies (e.g. Descriptor 10 (marine SC/65a/Rep06 20 litter) in the EU Marine Strategy Framework Directive) as critical indicators of the presence and impact of microplastics in the marine environment.

- Further non-lethal research on the individual and potential population-level impacts of ingestion of debris is encouraged and further work in the field of research on biomarker development. Relevant cetacean populations should be prioritized.

The ASCOBANS Marine Debris working group recommends:

4.1 To facilitate further research into:

- i) the impacts of micro-plastic ingestion on cetaceans
- ii) whether ingested micro- and nano-plastic can transfer into the food chains of cetaceans
- iii) the use of established biomarkers of exposure to assess the toxicity of microplastics, including endocrine disruption
- iv) the bioavailability and toxicity of priority pollutants and additives from microplastic through laboratory and field experiments

4.2 Examine whether accumulated micro- and nano-plastic in the foodchain can be transferred to cetaceans and what the effects are on cetaceans

5. To liaise with working groups on marine debris established by the IWC Scientific Committee, OSPAR, HELCOM and relating to the EU Marine Strategy Framework Directive

The ASCOBANS Marine Debris working group recommends:

5.1 In addition to the IWC, OSPAR, HELCOM and MSFD, the ASCOBANS working group should liaise with the following international organisations and existing frameworks: the Convention on Migratory Species (CMS) Resolution on Marine Debris, the UNEP/GPA Global Partnership on Marine Litter, UNEP Regional Seas Programme, MARPOL4, the UN Food and Agriculture Organisation (FAO) and the Convention for Biological Diversity (CBD).

6. To advise on a standardized protocol for necropsies

Conclusions from the IWC Scientific Committee

Evaluating possible impacts due to entanglement and ingestion impacts of fishing gear and debris should be done using a classical differential diagnostic approach when possible, to enable: a) detection of trauma, chemical exposure and other sequelae related to exposure; and b) analysis of their roles in contributing to morbidity and mortality in the context of other potential causes, such as infectious or non-infectious disease, nutrition, and other possible etiologies.

In situations when a full differential diagnostic approach is not possible, efforts to document the presence of marine debris, both ingested and entangled, are still very important. Efforts should focus on macrodebris and on microdebris. Efforts should include the following components in the examination of all live and dead wild cetaceans as appropriate:

a. Gross necropsy examination and report: description, sketches, images, measurements, collection and preservation of entanglement/ debris, and affected body part(s). The entire gastrointestinal tract should be opened and examined. Standard cetacean necropsy protocols should be followed (see (Pugliares et al., 2007) (Barco and Moore, In Press) and (McLellan et al., 2004).

b. Debris characterization: Material should be categorized as rope, net, floats, monofilament, braided line, hooks, packaging, cigarette butts, plastics and other anthropogenic material. Size, shape (image analysis of digital photographs), mass, volume, and polymer type if plastic (e.g. vibrational spectrometry) should all be recorded, and all evidence should be identified as to source using established techniques (Browne et al., 2010) as practical and in collaboration with the relevant industries, to maximize the integration of data into these industries, such as plastics and fishing.

c. Confirmatory diagnostics: Further analyses as practical and indicated should be undertaken, such as histopathology, imaging, analytical chemistry, blood test and organ function tests, to document presence of and type of debris as well as possible impacts to the animals. It would be useful to provide resources to develop techniques to identify particles of plastic in the tissues of animals. Criteria for the assignation of degree of confidence of findings (e.g. quality of data) of entanglement or ingestion contributing to or causing morbidity and mortality have been recently published and should be applied (Moore et al., 2013). Chain of Custody documentation should be maintained as required or possible.

d. Training designed for specific countries and regions, and database maintenance would both enhance understanding of these problems.

The ASCOBANS Marine Debris working group recommends:

6.1 Reviewing existing necropsy protocols to establish whether recording of debris is already being done

6.2 To include the above mentioned components in the examination of all live and dead wild cetaceans as appropriate.

7. To examine and collate data available from stranding networks

Conclusions from the IWC Scientific Committee

Google fusion tables (Google forms and open data kit) were presented as a potentially valuable tool for collating global data in the future. Data collection forms can be designed and sent to stranding networks and responses can then automatically populate an online table. This would greatly facilitate data collection and collation and thereby aid understanding of the threat of marine debris.

All gear removed from cetaceans should be retained, documented and detailed, archived, and analysed wherever feasible. The EU has conducted research using synthetic aperture radar (SAR) to successfully detect the presence of anchored gillnets after fishery management effort restrictions (Rosenthal and Lehner, 2011). SAR allows for remote detection of fishing effort without the need for traditional methods of recording effort, such as logbooks and vessel monitoring systems.

The IWC initiates a program to provide an effective transfer of information and methods from on-going programs to countries interested in beginning new derelict gear removal programs, it stimulates the adoption of official programs for removing fishing gear as debris.

With respect to gear marking, the workshop recommended that every effort should be made to distinguish whether the entangling gear was active or derelict at the time of entanglement.

The ASCOBANS Marine Debris working group recommends:

7.1. Establish the extent to which stranding networks in the ASCOBANS area record data on marine debris

7.2 To encourage stranding networks to retain, document and analyse all gear removed from cetaceans wherever feasible

8. General conclusions / Future recommendations

Summary of Recommendations in relation to WG Tasks

1.1 An investigation in: who is monitoring litter at sea in Europe (during cetacean research), what protocols exist and is there international coordination? (Such as litter monitoring during fisheries surveys, fishing for litter programs, cetacean monitoring programs on fixed routes)

1.2 To design a standardized data form for collecting data on debris interaction in Europe (and preferably worldwide) during cetacean research. Together with a protocol on how to integrate the data collection with the aims of the cetacean research (based on the findings of Williams & Ash, and other researchers that have carried out such surveys, such as Meike Scheidat and Anita Gilles).

1.3 To examine the relationship between the results of ongoing marine litter surveys and the results of necropsies/strandings data

2.1 An investigation in: who is monitoring litter on the beach in Europe, what protocols exist and is there international coordination? (such as OSPAR beach litter monitoring)

2.2 Encourage ongoing beach surveys in Europe to make use of the two-part classification system (see

above) and to make use of existing database frameworks and protocols

2.3 To examine the relationship between the results of ongoing and beach litter surveys and the results of necropsies / strandings data

3.1 A comprehensive review of current knowledge of marine debris and effects on small cetacean in the ASCOBANS region.

4.1 To facilitate further research into:

- i) the impacts of micro-plastic ingestion on cetaceans
- ii) whether ingested micro- and nano-plastic can transfer into the food chains of cetaceans
- iii) the use of established biomarkers of exposure to assess the toxicity of microplastics, including endocrine disruption
- iv) the bioavailability and toxicity of priority pollutants and additives from microplastic through laboratory and field experiments

4.2 Examine whether accumulated micro- and nano-plastic in the foodchain can be transferred to cetaceans and what the effects are on cetaceans

5.1 In addition to the IWC, OSPAR, HELCOM and MSFD, the ASCOBANS working group should liaise with the following international organisations and existing frameworks: the Convention on Migratory Species (CMS) Resolution on Marine Debris, the UNEP/GPA Global Partnership on Marine Litter, UNEP Regional Seas Programme, MARPOL4, the UN Food and Agriculture Organisation (FAO) and the Convention for Biological Diversity (CBD).

6.1 Reviewing existing necropsy protocols to establish whether recording of debris is already being done

6.2 To include the above mentioned components in the examination of all live and dead wild cetaceans as appropriate.

7.1. Establish the extent to which stranding networks in the ASCOBANS area record data on marine debris

7.2 To encourage stranding networks to retain, document and analyse all gear removed from cetaceans wherever feasible

Future recommendations

- Further investigations are necessary to identify the main issues for small cetaceans in the ASCOBANS region and the current efforts on collecting data on the effects of marine debris at sea, on the beach and within stranding networks
- To establish a standardized approach for recording debris at sea during cetacean research and collating data from beach surveys, it is recommended to liaise with existing organisations and initiatives worldwide
- The impacts of microplastics are still largely unknown but they are of growing concern. Therefore, further research in Europe should be encouraged, together with identifying the scope of the issue for small cetaceans
- With the examination of all live and dead wild cetaceans, the following components should be included: gross necropsy examination and report, debris characterization, confirmatory diagnostics and a training designed for specific countries and regions
- Further actions of the ASCOBANS marine debris working group should include to provide an overview of potential mitigation measures

- A possible new task for the working group (to be discussed at AC20) Encouraging modeling approaches that examine the relationship between marine debris 'hot spots' and information on distributions, feeding strategies and mortality rate data already collected by the IWC and other organisations.