Agenda Item 5.5: **Pollutants Issues**

References concerning marine pollution relevant to ASCOBANS

Submitted by: **Secretariat/Pollution Working Group**

ASCOBANS

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

DRAFT ANNEX: SOME RECENT REFERENCES CONCERNING MARINE POLLUTION RELEVANT TO ASCOBANS

1. CHEMICAL POLLUTANTS

Das, K., Lepoint, G., Loizeau, V., Debacker, V., Dauby, P., Bouquegneau, J.M. 2000. Tuna and dolphin associations in the North-east Atlantic: evidence of different ecological niches from stable isotope and heavy metal measurements. *Marine Pollution Bulletin* 40 (2) pp 102-109

> An investigation into trophic relations using bycaught dolphins and contaminants.

Das, K., Debacker, V., Bouguegneau, J.-M. 2000 Metallothianins in Marine Mammals. Cellular and molecular biology 46 pp 283-294.

Focardi, S., Corsolini, S., Aurigi, S., Pecetti, G., Sanchez-Hernandez, J.C. 2000. Accumulation of butyltin compounds in dolphins stranded along the Mediterranean coasts. *Appl. Organometal. Chem.* 14 pp 48-56

> One of a number of papers published on organotin accumulation in cetaceans since the last advisory committee meeting. A fetal common dolphin in this study showed the highest concentrations.

Karlson, K., Ishaq, R., Becker, G., Berrgren, P., Broman, D., Colmsjö, A. 2000. PCBs, DDTs and methyl sulphone metabolites in various tissues of harbour porpoises from Swedish waters. *Environmental Pollution* 110 pp 29-46

> A study using bycaught porpoises that compared two analytical methods, finding both yielded similar results. Levels of Total PCBs and Total DDTs, on a lipid weight basis were found in approximately similar concentrations in the various tissues analysed with the exception of the brain where the levels were lower.

Nielsen, J.B., Nielsen, F., Jørgensen, P., Grandjean, P. 2000. Toxic metals and selenium in blood from pilot whales (*Globicephala melas*) and sperm whales (*Physeter catodon*). *Marine Pollution Bulletin* 40 (2) pp 348-351

> Cadmium concentrations averaged 500-1000 times higher in the stranded sperm whales than in the pilot whales. Both mercury and cadmium levels exceeded those associated with severe toxicity in several other mammal species.

Mato, Y., Isobe, T., Takada, H., Kanehiro, H., Ohtake, C., Kaminuma, T. 2001. Plastic resin pellets as a transport medium for toxic chemicals in the marine environment. *Environ. Sci. Technol.* 35 pp 318-324

> The pellets (0.1-0.5 cm) are widely distributed in oceans all over the world and provide a vechicle for enhanced exposure of wildlife to organic pollutants.

Danish report on TBT
http://www.dmu.dk/1%5Fviden/2%5Fpublikationer/3%5Farbrapporter/rapporter/
arbejdsrapport%5F135.pdf

2. NOISE POLLUTION AND DISTURBANCE

1. Whale watching/boat interference.

Au, W.W. and M. Green. (2000) Acoustic interaction of humpback whales and whale watching boats. *Marine Environmental Research* 49: 469-481.

The Whale Watching Subcommittee at the 2000 IWC Scientific Committee commented on the usefulness of simultaneously visually and acoustically monitoring whale and boat movements, reactions and noises, for example by using hydrophones and a theodolyte. This paper reports just such a study. (A second paper that will provide a fuller report on the observations made of the whales is in prep.)

Four whale watching vessels and one twin-hulled passenger ferry are considered and it was found that the loudest boats produced the strongest reactions in what was, anyway, a very noisy inshore environment.

The paper also provides a useful review of how whale reactions have previously been measured – i.e. "respiration rates [presumably by observing blows], diving, swimming speed, social exchange and aerial behaviours…" and surfacing rates and reactions (including threatening behaviour) in response to the presence of the boats. Avoidance behaviour of two main types has been identified:

- "Vertical avoidance", in which dive duration increases with a corresponding decrease in the blow interval and in swim speed and
- "horizontal avoidance", in which there is a decrease in dive duration, longer blow intervals and an increase in swimming speed.

Erbe, C. (2000) Underwater noise of whale watching boats and its effects on marine mammals. Paper submitted to the Scientific Committee of the International Whaling Commission (SC52/WW11). Unpublished.

This paper describes the use of a predictive model to evaluate the potential effects of vessel noise on orcas. The model was calibrated with data on biological thresholds for noise detection based on experimental studies on bottlenose dolphins and field observations on orcas and other whales.

The model suggested the following:
1. communications between orcas would be impacted at a 12 km range by fast moving (and therefore noisier) vessels;
2. temporary hearing damage (with a recovery time of 24 hours) was predicted to occur within 50 m of slow moving vessels and 850 m of fast moving ones; and
3. Superimposed noise levels of a number of boats circulating around of following the whales were very close to the critical level assumed to cause a permanent hearing loss over a very prolonged exposure.

The IWC 2000 whale-watching workshop that received this paper expressed some concern about "how the models dealt with uncertainty associated with the input data but recognised the value of such modeling approaches for predicting possible effects of exposure to chronic noise."

M.C. Diazgranados (1999) Changes in the vocal activity of the bottlenose dolphin (*Tursiops truncatus*) in relation to boat traffic in the Kessock Channel, Moray Firth. MSc Thesis: University of Aberdeen. 33 pages. (unpublished).

The author reported a small change in the acoustic behaviour of bottlenose dolphins in the Moray Firth in Scotland in response to the presence of vessels.

Dolphin call rate and surfacing behaviour (tail slaps and full forward slaps) increased dramatically when motoring yachts/sailing vessels were passing through the study area (the Kessock Channel). When the local commercial dolphin-watching vessel was interacting with the dolphin group both whistle call-rate and surface behaviour decreased.

2. Reactions to military or industrial noises.

Miller, P.J.O., N. Biassoni, A. Samuels and P.L.Tyack. 2000. Whale songs lengthen in response to sonar. Nature 405:903.

> Humpback whale songs were found to be longer when the animals were exposed Low Frequency Active Sonar and this was proposed as a means of compensation for acoustic interference.

US Navy (2000) press/information release November 2000

> "A surface duct was present in the New Providence Channel at the time of the stranding [of a number of beaked whales and other cetaceans on March 15th 2000]…". The suggestion being that an unusual physical phenomen in the local marine environment at this time could have contributed to the mass stranding of beaked whales there.

Balcomb, K.C. (2001) Cetaceans and sonar – Bahamas strandings. Letter to SURTASS LFA Sonar OEIS/EIS Program Manager. Published on "Marmam" website on 2nd March 2001.

> Balcomb states "I have had the unique opportunity to witness and study a mass stranding of whales and a dolphin caused by a US Naval Sonar Exercise in the Bahamas (Pirie, ltr. June 15, 2000). That incident unequivocally demonstrated the lethality of high-powered sonars, and it provided the opportunity to understand how sonar has been inadvertently killing whales in vast expanses of ocean around the world.The killing is largely due to resonance phenomena in the whales' cranial airspaces that are tearing apart delicate tissues around the brains and ears."

3. Pingers and other fisheries deterrents.

Kastelein, R.A., W.W.L.Au and D. de Haan (2000) Detection distances of bottom-set gillnets by harbour porpoises (*Phocoena phocoena*) and bottlenose dolphins (*Tursiops truncatus*). Marine Environmental Research 49: 359-375.

> Simulated harbour porpoise and bottlenose dolphin signals were used to test gill net detection probabilities by these two species. The estimated detection range for the harbour porpoise was only 2-6m from the net and, as porpoises can reach speeds of around 25km/h when foraging, they may detect gill nets too late to avoid collision.
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> Bottlenose dolphins would be able to detect the nets from significantly further away. The authors note that "if the target strength of gillnets cannot be increased sufficiently without decreasing fish catch, harbour porpoise catch can possibly be reduced in a more expensive way by deterring the porpoises from the nets with acoustic alarms."

Stone, G.S., L. Cavagnaro, A. Hutt, S. Kraus, K. Baldwin and J. Brown (2000) Reactions of Hector's dolphins to acoustic gillnet pingers. Published Client Report on Contract 3071. Funded by the Conservation Services Levy. Published by Department of Conservation Wellington, New Zealand. 29 pages.

> The authors reported on the response of Hectors dolphins to three models of gill net pinger, concluding that this species responded most strongly to the pinger using the highest frequency.

Madsen, P.T. and B. Mohl (2000) Sperm whales (*Physeter catodon L.* 1758) do not react to sounds from detonators. J. Acoust. Soc. Am. 668-671**.**

> Sperm whale behaviour did not change when they were exposed to the discharge of 8 detonators (producing received sound levels of some 180 dB re 1 uPa peRMS). It is hypothesized that the explosions may have been interpreted by the whales as distant calls of conspecifics.

Schick, R.S. and D.L. Urban (2000) Spatial components of bowhead whale (*Balaena mysticetus*) distribution in the Alaskan Beaufort Sea. Can. J. Fish. Aquat. Sci. 57: 2193-2200.

> The authors looked at data concerning bowhead whales in the Alaskan Sea that was collected in 1993. They found that -
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> 1. "the whales were distributed further from drilling rigs than they would have been under a random scenario" and
> 2. because "the spatial pattern of bowhead distribution was highly correlated with distance from the drilling rig the presence of the drilling resulted in significant temporary loss in available habitat."

4. Legal Considerations.

Dotinga, H.M. and G.O. Elferink (2000). Acoustic pollution in the oceans: the search for legal standards. Ocean Development and International Law 31:151-182.

> As a form of energy, sound falls within the definition of pollution of the marine environment contained in the Law of the Sea Convention. The LOS is thereby interpreted to make it a duty to "protect the marine environment from acoustic pollution; to prevent it from occurring; to act with precaution and to carry out assessment procedures before starting new [noisy] activities".
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> IMO is identified as the competent organisation to address vessel-sourced pollution at the international level and ASCOBANS is considered within the context of an international body already considering noise.