TUESDAY 9 FEBRUARY 2016

ZSL SCIENCE AND CONSERVATION EVENT

The Meeting Rooms, Zoological Society of London,
Regent's Park, London NW1 4RY

AGENDA

What's killing the killer whales?

Chair: Rob Deaville
Zoological Society of London

Receive the following communications:

Robin Law, Emeritus Research Fellow, Centre for Environment, Fisheries and Aquaculture Science, Lowestoft
Temporal trend monitoring for persistent organic pollutants in UK marine mammals

Paul Jepson, Institute of Zoology, Zoological Society of London
Toxic Legacy? PCB pollution still poses extinction risk in orcas and other European dolphins

Richard Moxon, Defra EU Marine and International Directorate
Contaminants in the marine environment - a Defra perspective

Closing comments Professor Ian Boyd, Chief Scientific Advisor, Defra

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ABSTRACTS

What's killing the killer whales?

Tuesday 9 February 2016
The Meeting Rooms, The Zoological Society of London, Regent's Park, London NW1 4RY

Temporal trend monitoring for persistent organic pollutants in UK marine mammals
Robin Law, Emeritus Research Fellow, Centre for Environment, Fisheries and Aquaculture Science, Lowestoft, and Visiting Research Associate, Institute of Zoology, Zoological Society of London

Marine mammals are top predators in marine food chains and accumulate fat-soluble, persistent organic pollutants (POPs). The harbour porpoise *(Phocoena phocoena)* is a bottom feeder that eats small schooling fish and makes a good sentinel organism for toxicological assessment. Time trend assessments of POPs in porpoise blubber or liver used nonparametric statistics to assess significance and to investigate potential confounding factors such as age, sex, region, cause of death (trauma or infectious disease) and nutritional status. Many POPs have been banned in Europe and show subsequent and marked declines. Butyltins used in antifouling paints were banned by the IMO in 2003-2008. By 2009 butylins were only detected in 4.3% of porpoise livers analysed. A number of organochlorine pesticides have also declined markedly in UK-stranded porpoise blubber in recent years including DDT, lindane, dieldrin and the fungicide hexachlorobenzene. Increasing blubber concentrations of brominated diphenyl ethers (BDEs) in UK harbour porpoises in the late 1990s led directly to an EU ban on both penta- and octa-mix BDE products, after which BDE concentrations declined. Hexabromocyclododecane (HBCD) also increased upwards during 2000–2003 but then continued downwards after 2003 due to HBCD being prohibited under Stockholm Convention as a "POP". A number of "alternative" flame retardants were subsequently introduced, including a number organophosphorus compounds. It is the polychlorinated biphenyls (PCBs) that still pose the greatest threat to European cetaceans due to their greater toxicity and persistence. PCBs remain at toxicologically significant levels in 40% of UK-stranded porpoises and stopped declining in 1998. PCBs in porpoises and the wider marine environment are maintained by diffuse inputs including joint sealants used in system-built buildings in 1950s-1980s. In Sweden, Norway and Switzerland PCBs in joint sealants have been "inventoried" so that when buildings are remodelled or demolished, they are taken to secure landfill or for high temperature incineration.

Toxic Legacy? PCB pollution still poses extinction risk in orcas and other European dolphins
Paul D Jepson, Institute of Zoology, Zoological Society of London

To investigate the potential impact of polychlorinated biphenyls (PCBs) on European cetaceans, we conducted a meta-analysis (n=1,081) of PCB concentrations (mg/kg lipid) in cetacean blubber from stranded (n=929) or free-living/biopsied (n=152) animals. Harbour porpoises (*Phocoena phocoena,* HPs)(n=706), striped dolphins (*Stenella coeruleoalba*, SDs)(n=220), bottlenose dolphins (*Tursiops truncatus*, BNDs)(n=131) and killer whale (*Orcinus orca*, KWs)(n=24) were included. The SDs, BNDs and KWs had mean and median PCB levels that markedly exceeded all known marine mammal PCB toxicity thresholds. The Iberian Peninsula was a global marine mammal "PCB hotspot". Blubber PCB concentrations initially declined following a mid-1980s EU ban, but have since stabilised in most European biota (including cetaceans). Despite regulations and mitigation measures to reduce PCB pollution, their bio-magnification in marine food webs continues to cause severe population-level impacts among cetacean top predators in European seas. The few remaining coastal killer whale populations appear close to extinction in industrialised regions of Europe. Small or declining populations of BNDs and KWs in the NE Atlantic were associated with low calf recruitment, consistent with PCB-induced reproductive toxicity. Several dolphin species (including KWs) are unlikely to achieve Favourable Conservation Status now under EC Habitats Directive (Council Directive 92/43/EEC). Nearly 97% of the historical PCB use occurred in the northern hemisphere, with the marine environment (including Arctic) acting as the ultimate "sink". Europe produced around 300,000 tonnes of PCBs from 1954–1984 (~15% of the world's total). As of 2005, 1.1 million tons of PCB contaminated material still required disposal by EU Member States, most notably France and Spain. Mitigation of PCBs should involve aspects of historic/current industrial uses, PCBs leaking out of old landfill sites into rivers, dredging of PCBs in marine sediments, and regulation of PCBs in joint sealants in tower-blocks built in 1950s–1980s.

Contaminants in the marine environment - a Defra perspective
Richard Moxon, Defra EU Marine and International Directorate

This presentation will outline the support that Defra has provided to the Cetacean Strandings Investigation Programme over the years and highlight the value that it places on the findings. Richard will describe Defra's policy approach to addressing hazardous substances in the marine environment and the protection of cetaceans, and show how the various components of the policy link together and interface with European initiatives. This involves setting a vision of what good status looks like, articulating the problems and pressures that need to be addressed to reach good status, setting appropriate targets that need to be met and developing monitoring programmes to check that the targets are working. This is followed by putting in place programmes of measures to ensure that the pressures are minimised and that the targets are achieved. Examples of the status of PCBs in biota and PCB loads to the sea are provided from ongoing monitoring programmes, and the measures to protect cetaceans from contaminants and other pressures are set out.