Cetacean strandings research

The Cetacean Strandings Investigation Programme (CSIP), led by IoZ, coordinates the investigation of all cetaceans, marine turtles and basking sharks that strand around the UK coastline.

The causes of cetacean stranding events are not always clear, and the role that human activity may play in either directly or indirectly causing strandings has often been called into question. Since 1990, data on more than 12,000 stranded cetaceans have been recorded and nearly 3,500 post-mortem examinations have been carried out by the CSIP, producing one of the world’s largest research datasets on strandings, causes of mortality, disease and many other aspects of the health of cetacean populations in UK waters. Our systematic and long-term monitoring programme of stranded animals facilitates the investigation of spatio-temporal trends in disease, causes of mortality and exposure to environmental pollutants.

It also enables both ongoing assessment of the dynamics of particular threats and their response to specific conservation measures. The national cetacean tissue archive, with more than 80,000 samples held at IoZ alone, provides an internationally important resource for collaborative scientific research.

The role of acoustic disturbance in cetacean strandings

In 2014-2015, we continued to research cetacean mass stranding events linked to exposure to high-intensity, man-made acoustic sources, such as mid-frequency active naval sonars used by warships and helicopters to detect submarines.

On 22 July 2011, a mass stranding of long-finned pilot whales (Globicephala melas) occurred in the Kyle of Durness, near Cape Wrath in north-west Scotland. Approximately 40 pilot whales live-stranded, and the efforts of volunteer rescue groups, including British Divers Marine Life Rescue, led to the refloat and rescue of a large proportion of them. However, 19 whales died or were euthanised during the course of the stranding. A CSIP team, led by staff from the Scottish Marine Animal Stranding Scheme (SMASS), conducted field necropsies on 16 whales that were available for post-mortem. An extensive investigation, undertaken by SMASS and funded by Defra and Marine Scotland, concluded that an underwater munitions disposal conducted around Garvie Island by a Royal Navy bomb disposal team the day before and during the mass stranding, was ‘the only external event with the potential to cause the mass stranding’. The report also concluded that navigational error, and/or a sick pilot whale (found with an infected pectoral joint) could not be eliminated as contributory factors to the stranding (Brownlow et al. 2015).

This builds on a previous CSIP/IoZ-led investigation into a large common dolphin (Delphinus delphis) mass stranding event in Falmouth Bay in 2008 that was caused by acoustic disturbance from an international naval exercise (Jepson et al. 2013). Earlier research by CSIP and University of Las Palmas (Gran Canaria) discovered a form of cetacean decompression sickness (‘whale bends’ in deep-diving beaked whales that mass stranded after being exposed to high-intensity mid-frequency naval sonars (Jepson et al. 2003).

The report on the long-finned pilot whale stranding (Brownlow et al. 2015) received significant press coverage, including The Guardian and The Times newspapers. The Royal Navy and Ministry of Defence ‘accepted the findings of the CSIP report in full’ and committed to modify their activities to limit the environmental risk to cetaceans in UK waters in future. Our investigation into the stranding event in Falmouth Bay led to the establishment of the Marine Underwater Sound Stakeholders Forum (later the Underwater Sound Forum), convened by the UK government with additional input from the oil and gas industry.
A central aim of the Underwater Sound Forum, of which CSIP and IoZ are integral parts, is to improve the environmental mitigation of both naval and oil/gas industry activities. The CSIP and IoZ contribute to the environmental mitigation of the Royal Navy by reporting groups of cetaceans seen close to shore to the Navy Command Headquarters in Portsmouth, Hampshire. As a direct result of our research into decompression sickness in deep-diving beaked whales, the Spanish government imposed a ban on naval exercises using high-powered sonar in the vicinity of the Canary Islands. This has been hailed as a major conservation success, as no further mass stranding events have occurred since the ban was imposed (Fernández et al. 2013).

Marine chemical pollution

The link between PCBs and reproductive failure in harbour porpoises

Until banned in many countries in the late 1970s, polychlorinated biphenyls (PCBs) were widely used in industrial processes. These chemical pollutants are extremely stable and slow to biodegrade, which causes them to bioaccumulate in humans and animals. Research published this year investigated reproductive failure in UK harbour porpoises (Phocoena phocoena) linked to PCBs. The study used samples collected over a 22-year period, and is the largest on PCB burdens in female harbour porpoises. Almost 20% of sexually mature females examined showed direct evidence of reproductive failure such as stillbirth or foetal death, while a further 16.5% had infections or tumours of the reproductive tract that could contribute to reproductive failure. The results suggest that reproductive dysfunction in porpoises may be related to PCB exposure occurring either through endocrine disrupting effects or via immunosuppression and increased disease risk (Murphy et al. 2015).

Other pollutants

Research carried out with the Centre for Environment, Fisheries and Aquaculture Science in the late 1990s found accumulating levels of new chemical pollutants (brominated flame retardants) in the blubber of UK-stranded harbour porpoises. This study contributed directly to the EU-wide ban of these chemicals in 2004. A new study, published this year (Papachlimitzou et al. 2015), analysed organophosphorus flame retardants and plasticisers in blubber and liver tissue of harbour porpoises stranded in 2012. Fourteen of the 20 compounds were below the limits of quantification in all samples, indicating a very low risk of health impacts from these new and emerging chemicals in porpoises.

Our research on new and existing chemical contaminants in UK harbour porpoises and other cetacean species continues to feed into UK and EU risk assessments, and inform policy to reduce their concentrations on a national and international basis.

References


References


