

## **Policy on Biopsy Sampling and Tagging**

The IWDG have pioneered a number of invasive research techniques on cetaceans in Ireland including biopsy sampling and telemetry. These techniques are invasive and may potentially harm the animal but the IWDG considers that the essential information this work can provide to support conservation measures justifies the low level of potential risk to the animal.

The IWDG have recently applied to the NPWS for a licence to attach satellite tags on fin whales. Since 1999 the IWDG have been recording a large increase in the number of sightings of large baleen whales (fin and humpback whales) off the south coast of Ireland (Berrow *et al.* 2002). The occurrence of these whales is of international as well as national significance as some populations of fin and humpback whale populations were severely depleted after years of commercial whaling. There is evidence of an increase in fin whales in various parts of the North Atlantic suggesting some recovery from over-exploitation.

To better understand the status of the baleen whales found in Irish waters, and identify whether (and what) additional conservation measures are required, it is essential to clarify issues related to stock structure, movements and abundance. A number of scientific tools have been used to assist in determining stock structure and movement and it is generally agreed that information from a suite of techniques is required. Without such an understanding of stocks and their movement in space and time, it is difficult, if not impossible to devise an appropriate conservation and monitoring strategy.

The most commonly used techniques are:

1. Analyses of individual identification data (photographs and/or genetic ‘fingerprinting’ data).
2. Genetic analyses of population structure
3. Analysis of satellite telemetry data.

All approaches have their strengths and weaknesses, and a number of respected international scientific bodies (e.g. the Scientific Committee of the International Whaling Commission, the IUCN Western Gray Whale Advisory Panel) recommend and use data from all three approaches to obtain as clear an understanding as possible.

The IWDG have shown that there is a strong seasonal component to the inshore distribution of fin whales and humpback whales in Irish waters, with sightings occurring from May to February and peaking in November-December. The whales are generally observed to be feeding during their time inshore. In other known feeding areas of the North Atlantic, fin whales have been found from around April to November, apart from off West Norway where they have been reported from late January to November. The whereabouts of the ‘Irish’ fin whales when they are not in coastal Irish waters is unknown.

### **Biopsy sampling**

Biopsy sampling is used to obtain a small tissue sample from live animals. A sample of skin and underlying blubber (the amount of which depends on length of the tip) can be obtained. IWDG use a standard crossbow to fire the dart.

These samples can be used for a number of analyses, including population genetics, pollutant measurements and stable isotope (dietary) studies:

1. Genetic studies will enable us to answer:
  - a. What breeding stock/population do fin whales in Ireland belong to?
  - b. How many stocks are there in the North Atlantic?
  - c. How many and where are the breeding grounds in the North Atlantic?
  - d. Where are the breeding grounds of humpbacks in Irish waters?

- e. Do Irish humpbacks belong to the healthy and expanding Caribbean population or the still severely depleted and endangered west African population?
  - f. Are there humpback breeding grounds elsewhere (e.g. off the south coast of Ireland as has been speculated)?
2. Determining the gender of biopsied animals (using genetics), especially when combined with photo-id studies is very useful. It has been speculated that humpbacks in Ireland could be young, immature males prospecting new feeding areas. If this is the case the conservation measures would be different to say adults with calves or a more local population.
  3. Biopsy samples can be used in pollution studies as many persistent pollutants, especially organochlorines (PCBs, DDT, etc), have a high affinity for lipids, and tend to build up in the blubber of apex feeders such as whales and dolphins. These studies can help managers determine the potential threat pollutants pose to cetacean populations and also enable pollutant levels in the marine environment to be monitored. Ideally a sample of the entire blubber profile is needed as organochlorines are stratified in the blubber layer.
  4. Pollutants can also be used as markers to explore migration routes and site fidelity. Exposure to specific chemicals, known to occur in specific sites, may be reflected in the lipid profile. e.g. Radiocesium 37 in the Irish Sea.
  5. Stable isotope analysis of blubber samples can help answer questions relating to the feeding behaviour of cetaceans:
    - a. What is the importance of herring/sprat in the diet of large baleen whales off the south coast?
    - b. What do they feed on when not in Irish coastal waters?
    - c. What trophic level are they feeding in?

The answers to these questions have implications for fisheries management. To protect the food sources which sustain cetaceans you need to know what species they feed on and when and where the feeding occurs. Temporal and/or spatial closures of fisheries may be required to protect these areas. Such proposals need to be backed by solid scientific evidence, before they are presented to the fishing industry, with potential impacts on livelihoods in coastal communities.

6. Samples can be and are taken from stranded animals but the provenance of these animals is not known and nor can it be taken that they represent a true reflection of healthy animals occurring in Irish waters.

Biopsy sampling started in the Shannon estuary on bottlenose dolphins as part of a study on pollution levels (see Berrow, et al., 2002. *Marine Pollution Bulletin* 44, 1296-1313). Since then UCC/CMRC have been biopsy sampling bottlenose dolphins over the last four years in Irish coastal waters as part of study on genetic variability. The IWDG have been concentrating on large baleen whales with the first sample obtained from a humpback whale in 2003. This whale (Boomerang) has been seen in west cork in four of the last five years.

### **Satellite tracking**

Telemetry data are proving to be an extremely valuable scientific tool for providing information relevant to conservation and management and to supplement more traditional techniques such as genetics and photo-identification. The value of telemetry data has been recognised by many national (e.g. USA, Australia, Denmark, Greenland, Faro Islands, Italy and France) and intergovernmental bodies (including the IWC Scientific Committee). Several environmental NGOs have also recognised the value of such studies and, for example, Greenpeace have recently funded satellite telemetry work of humpback whales in the South Pacific.

The value of telemetry data varies with the nature of the equipment used – some tags are designed to provide very detailed information on (for example) diving behaviour in short time periods whereas others are designed to provide long-term positional data primarily to provide information on movement and migration, and to allow identification of areas of critical habitat (at least in terms of time spent in an area). It is this latter type of information that the IWDG hope to obtain. The importance of obtaining such information is clear from both a scientific and a conservation perspective. It will enable:

1. A better understanding of the movements of animals in Irish waters when they are not being observed.
2. A better understanding of their movements outside Irish waters.
3. Information on the migration routes and the location of breeding areas.

The ability to achieve these goals will depend on the lifespan of the tags – as with any electrical device there can be successes and failures – there are examples of tags that have remained operational for over a year and of ~~course~~ tags that fail to transmit at all!

The conservation benefit of obtaining such information is threefold:

1. It will supplement other information on stock structure (and perhaps for the first time provide information on the breeding grounds of North Atlantic fin whales allowing a targeted biopsy sampling scheme) – essential for understanding the status of the population of fin whales that spends part of its time in Irish waters and for developing an appropriate monitoring system.
2. It will provide a better understanding of the movement of whales within Irish waters allowing us to better identify potential threats they may face (e.g. entanglement in fishing gear, ship strikes, habitat damage) and to develop appropriate mitigation strategies.
3. It will provide a better understanding of the movement of whales *outside* Irish waters allowing us to better identify potential threats they may face and to develop appropriate mitigation strategies and thus contribute to the conservation work of other bodies including the IWC and the EU. All of this information is essential to support management plans for this species to ensure the population and habitat are maintained in favourable conservation status.

Of course, as for other techniques, there are limitations. Some are logistical and relate to the expense of tags, potential failure rates and the need for the work to be carried out by experienced personnel. The primary scientific limitations relate to sample size considerations and whether the behaviour of the animals is altered in the long-term by the act of tagging? The primary ethical questions relate to the possibility of animals being harmed by the tags.

All of these issues have been thoroughly examined by a number of bodies including the IUCN WGWAP, the IWC Scientific Committee and the US Marine Mammal Commission and of course, have been carefully considered and incorporated into the design of the IWDG project.

### **Licencing**

All invasive techniques are carried out under licence from the NPWS. Proposals require a Risk Assessment to be conducted as part of the application.

The IWDG considers that the questions that can be answered and the information that can be gained by studies using biopsy sampling justify the minimal disturbance and impact caused in obtaining samples. Many of these issues cannot be addressed using other methods or are significantly compromised by relying on other sampling techniques. Sufficient samples are required to provide robust results, the number depending on the study and the variability within the samples.

The IWDG believe good conservation measures and policies should be supported by best available information resulting from good science.