

A proposed research programme for satellite tagging western gray whales in 2010

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BACKGROUND

The western population of North Pacific gray whales (*Eschrichtius robustus*) is critically endangered (IUCN, 2008). The population is estimated to contain about 130 individuals age one or older, of which only about 25 are reproductive females (Cooke *et al.*, 2008), and it faces a number of anthropogenic threats throughout its range. Known threats to the population include interactions (some fatal) with coastal net fisheries (Weller *et al.*, 2008; Bradford *et al.*, 2009) along its migration route(s) and oil and gas development in and near its principal summer feeding area (IUCN, 2009). The wintering area of the population is presently unknown but, based on the limited available information, may be off the coast of southern China in the South China Sea and the Gulf of Tonkin (Weller *et al.*, 2002).

Satellite telemetry has been proposed repeatedly as an efficient way to investigate the migratory routes and wintering grounds of western gray whales. Scientists have been cautious about tagging these whales, however, because of the population's very low numbers. Additional information on migration and wintering is essential for identifying obstacles to this population's recovery and therefore the use of telemetry to obtain such information has been discussed by the IWC Scientific Committee and various panels convened under the auspices of IUCN for a number of years (e.g. IWC 2006; 2007; 2008; GWAP 2006; 2007; 2008). Summaries of these discussions are included in a recent report prepared for the U.S. Marine Mammal Commission and IUCN (Weller, 2008), which contains an addendum on western gray whales as a case study.

Here, we outline a satellite tagging research programme, couched within a specific set of safeguards and designed to address questions regarding the migration route(s) and wintering ground(s) of western gray whales of significant conservation benefit (e.g. see the recent IUCN rangewide workshop report, IUCN, 2009). A primary aim of this document is to provide background on the planned 2010 tagging study and to solicit advice and guidance from the Scientific Committee.

PROGRAMME CO-ORDINATION AND OVERSIGHT

To ensure that a telemetry programme is carried out in the safest possible manner, taking into account advice from both the IWC Scientific Committee and the IUCN Western Gray Whale Advisory Panel (GWAP), a co-ordination group was established at the 2007 Scientific Committee (IWC, 2008). This IWC co-ordination group (initially consisting of Brownell, Donovan, Gales, Reeves and Weller, with Burdin, Larsen and Tsidulko subsequently added) was tasked with providing scientific guidance with regard to development of a telemetry programme, including advice on experimental protocols, study design and measures to be taken to minimise the risk of negative impacts on individuals or the population as a whole. In addition, the group was to ensure consistency between any advice given by the IWC Scientific Committee with any given by the GWAP.

Additionally, in 2007 the IWC Scientific Committee recommended that the IWC act as co-ordinator for the tagging/telemetry project *inter alia* to ensure that it is carried out in a risk-averse manner and to enable sponsors to contribute financially without necessarily assuming responsibility for the programme's design, conduct or results (IWC, 2008).

PROGRAMME SAFEGUARDS

Discussions of tagging of western gray whales have devoted considerable time to the question of the potential for injury or compromised health of individuals due to tagging, particularly with respect to the 25 or so reproductive females. Keeping this concern in mind, both the IWC Scientific Committee, IUCN and the GWAP have recognised the value of telemetry studies provided that suitable safeguards are in place to minimise risks to whales (GWAP, 2006; 2007; 2008; IWC, 2008; In Press). These safeguards include:

- (a) the work should be carried out by experienced investigators using tested techniques;

- (b) tag design and deployment methodology should be of best-practice standard, including:
 - i. tag length being the minimum possible to achieve a pre-determined attachment duration
 - ii. use of sterile techniques to minimise infection
- (c) the work should be restricted to known males in good body condition and identified in ‘real time’ (i.e. in the field while tagging is being attempted) from previous photo-id and genetic studies);
- (d) field protocols to minimise risks and limit the time spent with individuals should be developed and presented for review by the co-ordination group in advance of fieldwork;
- (e) follow-up work on the potential effects of tagging should be a key part of any programme, and in particular every effort should be made to resight tagged whales during the period of the study;
- (f) tracking data should be available to the IWC in as near ‘real time’ as possible.

Further, it is expected that researchers undertaking the tagging of these whales will follow the guidelines used by the Society for Marine Mammalogy¹ with regard to the treatment of marine mammals in field research, particularly section 4.5 regarding attachment of equipment to free-ranging animals. These guidelines are intended to reflect internationally accepted and scientifically valid approaches to field research on marine mammals and represent the requisite ethical standards of the international marine mammal scientific community.

Recognising that this programme of research will occur in Russian waters, it is understood that all national permits, permissions and research standards must be followed. Additionally, Russian participation in the field programme is highly encouraged. Finally, it is hoped that collaborators in all the range states will be involved in the programme in some way, whether by contributing information on the specific locations of tagged whales and how to obtain additional information on these animals or making visual observations of the animals. This will require that the range state collaborators have real time access to the location of tagged whales in their waters.

PROGRAMME DESIGN

In consideration of the aforementioned safeguards, the co-ordination group recommends that no more than 12 tags be deployed on 12 male western gray whales, all in good body condition. Real-time identification and selection of candidate whales will draw upon the genetic (sex determination) and photo-identification data sets collected by the Russia-US research team between 1994 and 2008 and rely on the unique ability of one team member (Amanda Bradford) to recognize individual whales by sight. The co-ordination group encourages Bradford to spend approximately one month in the field working as part of the Russia-US photo-identification team in advance of the tagging operations in order to re-familiarize herself with the identification characteristics of each whale.

To maximize the duration of data transmission, in hopes of identifying not only the migration route(s) but also the wintering destination(s) of the animals, it is recommended that tags provide positional information once daily and be able to transmit such information for a minimum of 120 days. Given that eastern gray whales are thought to make the southbound migration from Alaska to Baja California, Mexico in approximately 55 days (Jones and Swartz, 2009), averaging about 114-185 km/day, a minimum data return of 120 days in the present study should be sufficient for addressing the project objectives outlined here. Tags used will have been tested first on eastern gray whales to ensure that attachment techniques and tag performance are such that they will maximise the likelihood that they will meet or exceed the objective of 120+ days of data return.

The onset of the southern migration by whales on the Sakhalin feeding ground is somewhat variable, but in general the relative abundance of animals begins to diminish towards late September (Vladimirov *et al.*, 2009). However, this does not mean the whales start their southern migration at that time. Unfortunately, this late September period coincides with the onset of rapidly deteriorating weather and sea conditions. Thus, to maximize the likelihood of collecting migration route and wintering ground information, it is suggested that tags be deployed during the mid-August to mid-September period. Keeping in mind that follow up studies of tagged whales is one of the specified safeguards for this programme, deployment of tags closer to the mid-August period would maximize the opportunity to observe (i.e. resight) individuals post-tagging.

Given that the IWC will serve as the co-ordinator of this tagging programme, researchers identified to conduct the study will provide the IWC via its co-ordination group with a detailed scope of work that contains information and technical details of their methods, field protocols, analysis plans and reporting deliverables. This scope of work would undergo proper evaluation and consideration by the co-ordination group well in advance of any fieldwork to ensure that it is satisfactory with respect to safeguards and chances of success.

¹ (<http://www.marinemammalogy.org>)

SUMMARY AND CONCLUSION

The programme outlined above adheres to the previous recommendations by the IWC Scientific Committee, various IUCN panels and the recent IUCN workshop that a satellite-tagging programme be designed and undertaken, with due consideration for the need to minimise risks to the health of individual animals and to the population's recovery. The co-ordination group established at the 2007 IWC Scientific Committee should oversee development of the programme; the group may establish a logistical group to assist with day-to-day matters including permit applications. It is important that initiation of the satellite-tagging programme not be further delayed, and that every effort be made to attempt tagging during mid-August to mid-September 2010 whilst recognising the potential logistical problems (including finance, available personnel and permit requirements).

We emphasize that much of the information expected from the programme is urgently needed. For example, it is important to identify wintering areas and migration routes and assess their spatio-temporal overlap with various threat factors such as fishing gear, vessel traffic and industrial activities. Moreover, the potential for achieving a key precautionary element of the tagging effort, i.e. selecting candidate whales for tagging based on their sex, relative age, health status and other factors, is diminishing with time as it depends on the Russia-US team's availability (in practice, the presence of A. Bradford as part of the tagging team) and ability to keep current with the individual whales.

Finally, the co-ordination group is aware of and interested in a variety of emerging, potentially less invasive tag designs (e.g. Andrews *et al.*, 2008). However, these emerging technologies have yet to be sufficiently tested on eastern gray whales. Given the general concern about potential effects of satellite tagging on the health of individual whales and the need for follow-up data on tagged individuals (see Weller *et al.*, 2008), the co-ordination group encourages that studies be undertaken as soon as possible to evaluate the performance of new tag technologies and the effects of such on eastern gray whales. A candidate population would be the well-studied Pacific coast feeding aggregation off Washington, USA and British Columbia, Canada in which inter- and intra-annual resightings of the same individuals are frequent. Such techniques may then be used in follow-up studies.

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