Annex M

Report of the Sub-Committee on Whalewatching

Members: Kato (Chair), Bejder (co-Chair), Amaral, Bami, Brito, Carlson, Choi, de Stephanis, Edwards, Flores, Fortuna, Funahashi, Gallego, Groch, Holm, Iñíguez, Jaramillo-Legoretta, Kasuya, Kaufman, Luna, Lusseau, Marcondes, Mattila, Nelson, Palka, Parsons, Reeves, Ridoux, Ritter, Robbins, Rose, Simmonds, Sironi, Stachowitsch, Štrbenac, Tchibozo, Urbán, Vély, Weinrich, Williams, Wright.

1. CONVENOR'S OPENING REMARKS AND TERMS OF REFERENCE

Kato welcomed the members of the sub-committee and noted the priority items identified by the Scientific Committee:

(1) proposal for a large-scale whalewatching experiment (LaWE; including reports from the intersessional steering group and the advisory group);
(2) review whalewatching off North Africa;
(3) assess the impacts of whalewatching on cetaceans.

In addition, the following items were recommended:

(1) review reports from intersessional working groups:
  (i) online database for worldwide tracking of commercial whalewatching and associated data collection; and
  (ii) swim-with-whale operations;
(2) identify platforms of opportunity and assess data of potential value to the Scientific Committee;
(3) review of whalewatching guidelines and regulations; and
(4) review of risks to cetaceans from whalewatching vessel collisions.

In closing he announced that he would be stepping down as Chair after 15 years and would consult with members of the sub-committee on its future.

2. ELECTION OF CHAIR AND APPOINTMENT OF RAPPORTEURS

Kato was elected Chair with Bejder as co-Chair. Carlson was appointed rapporteur with assistance from Rose.

3. ADOPTION OF AGENDA

The adopted Agenda is given as Appendix 1.

4. REVIEW OF AVAILABLE DOCUMENTS

The documents available to the sub-committee were identified as: SC/62/WW1-6 and SC/62/WW8; SC/62/SM8; Eisfeld *et al.* (2010); Parrott *et al*. (2010); Ritter (2010); Smit *et al*. (2010); Weir (2009) and IWC/62/CC8.

5. PROPOSAL FOR A LARGE-SCALE WHALE-WATCHING EXPERIMENT

5.1 Report from intersessional steering group on LaWE

Lusseau presented a proposal from the large-scale whalewatching experiment (LaWE) intersessional steering group (Appendix 2) which elaborated on the objectives, aims, methodology, design, management and funding considerations for this initiative.

Three options were presented for procedural mechanisms to manage the different components of the LaWE project, ranging from top-down (in which the IWC would have a steering group role) to decentralised (in which the IWC would have a coordinating role; see fig. 1 of Appendix 2). After discussion, it was agreed (see Fig. 1) that a transitional process was preferable, with a top down approach (hierarchical structure) at the initial stage of the project progressing into a mechanism where the IWC would have more of a coordinating role (network structure). It was recognised that the key constraint was budgetary needs and financial stability and that the options should be posed in terms of structure and budget.

During discussion it was noted that effects of whalewatching and other vessel traffic would be distinguished between in the nested study design of the LaWE. The sub-committee noted that it had developed a glossary of terms for whalewatching that would be useful for site categorisation (IWC, 2006, pp.249-51).

The draft email request for marine mammal listserves, such as MARMAM, regarding a call for participation in the LaWE was revised at the request of the sub-committee and sent to the Secretariat for comment. A final version was approved and scheduled for posting soon after this year's meeting.

It was suggested that IWC member nations would be able to use the results of the project as the basis for appropriate scientific management of whalewatching. The information collected during LaWE will also provide data on general biology and life history parameters of cetaceans that are relevant to the work of the IWC Scientific Committee. The sub-committee then discussed a variety of potential funding sources for the LaWE effort including:

(1) IWC membership: funding derived from fees/contributions from member nations;
(2) national/regional initiatives: funding derived from national or regional governments involved in the support/promotion of whalewatching;
(3) NGOs: funding derived from national/international NGOs involved in the conservation of cetaceans;
(4) whalewatching operators: funding derived from whale/dolphin-watching operators; and
(5) hybrid model: targets key operators in high profile whalewatching areas with additional funding sought from host countries, IWC, NGOs and other sources.

The sub-committee considered that the whalewatching industry represents an important possible funding source for LaWE. Particular emphasis was placed on the opportunity provided by large, mature companies in key ports that have the potential both to understand the importance of the effort and to provide the means of generating meaningful funds. This might aid the initial LaWE study site selection; however, it was noted that the identification of funding sources will ultimately be the responsibility of individual IWC member nations. The sub-committee noted that the feasibility of achieving successful funding could be aided by the formation of a fund similar to that of the Small Cetacean Fund where NGOs and the private sector, in addition to funds raised by

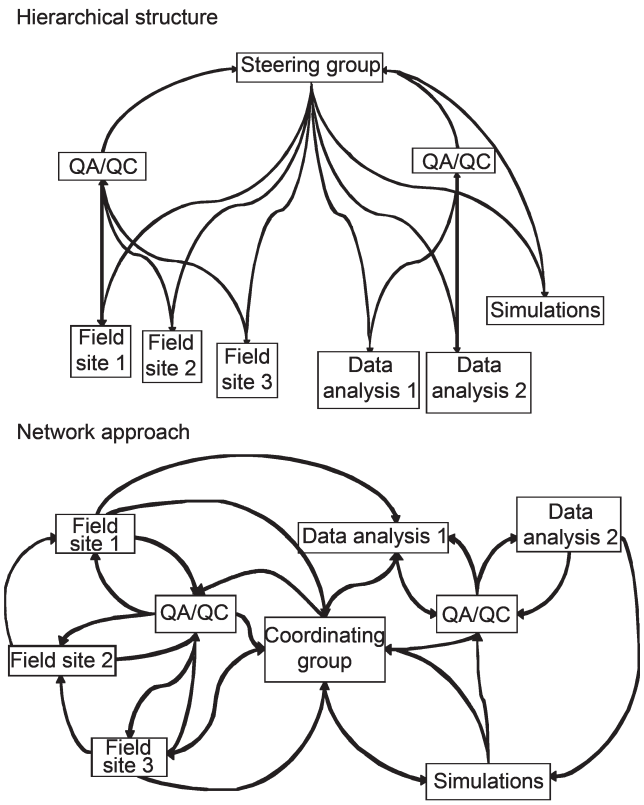

Fig. 1. Potential procedural linkages between the different components of the project (QA: quality assurance, QC: quality control). In a hierarchical structure, the LaWE group would have a steering group role, while in a network approach it would have a communication coordination role.

IWC member nations, could contribute to IWC-endorsed research efforts. The sub-committee **recommended** that an e-mail correspondence group be formed to further develop the budget for the LaWE, although it noted that until power analyses are completed and species and sites are chosen only approximate budgets can be created.

Lusseau reported that there had been no intersessional interaction between the steering and advisory groups due to time constraints. It was suggested that the site selection template developed by Carlson should be finalised and forwarded to the advisory group to commence the selection process. After discussion, it was **agreed** that the two intersessional groups would be combined into one 'steering group' to maximise collaborative discussions (see Annex Q).

There will be a budget request to assist the LaWE intersessional work of £3,919 to hire a research assistant to develop procedural mechanisms to centralise data received from research groups relevant to LaWE with the Secretariat and commence power analysis for key parameters depending on data received. In addition, funds are requested to organise a pre-meeting for the LaWE steering committee to review and advance intersessional progress on all aspects, including reviewing data received, advancements in power analysis, and the selection of appropriate study species and sites.

5.2 Report from LaWE advisory group

Rose reported that there was no formal report from the advisory group as the LaWE is not yet at the point of selecting research sites.

5.3 Discussion of the proposal

This Item is discussed under Item 5.1.

5.4 Other

Lusseau presented SC/62/WW5, a summary of progress from a project tasked to develop a formal mathematical structure from the US National Academy of Sciences Population Consequences of Acoustic Disturbance (PCAD) conceptual framework. This PCAD working group has been convened by the University of California Santa Barbara with support from the Office of Naval Research, meeting every six months over a three-year period. During these meetings modellers and field researchers meet to develop approaches and discuss the feasibility of fitting them to a wide range of existing data to try parameterising the agreed models. This PCAD working group has made significant progress over the first two meetings. It decided to develop three statistical models to provide the linkages from disturbance to population dynamics. Work has focussed on the first models (disturbance to physiological conditions). It developed a state space modelling approach (SSM) based on McFarland and Sibly's (1975) concepts (the hydraulic model and its subsequent extensions) that behaviour emerges from the interactions between the motivational states of individuals and the environment. Motivational states and physiological conditions (here initially body condition) are hidden processes that are linked to observed behaviour. The parameters of these processes are then inferred (exploring both maximum likelihood and Bayesian estimation methods) by fitting these SSMs to behavioural time series. First implementations with simple systems (southern elephant seals' at-sea movement) proved extremely successful and body condition time series could be estimated and validated against body weight when the seals returned to the colony. A similar, albeit more complex, model was developed for coastal dolphin population case studies and will be implemented over the next year. The working group is happy to continue reporting to the sub-committee on progress and looks forward to exploring possibilities to interact with the LaWE project.

During discussions, one member noted that the motivational state-space approach to the PCAD model was creative; however, the PCAD working group needs to acknowledge the limitations of the original US National Research Council model. For example, it has been shown that behavioural responses cannot reliably be used to infer disturbance impact in animals without extensive contextual information, which has not been fully incorporated into the model. While energetic condition and related concepts such as hunger are included in the working model, almost no consideration has been given to psychological condition. Anxiety, cognitive bias and other stress-related conditions will greatly affect motivation, behavioural responses to disturbance, and the ultimate impact on vital rates. Furthermore, overall psychological condition may be influenced by non-behavioural consequences of acoustic exposure, including masking, which are also missing from the model. Lusseau replied that the stress hormone pathway study was an exploration initiative because the technique is at an early stage. Another member noted that while faecal sampling for hormones was discussed at the Bunbury workshop, the strategy was to use the best available technique to measure stress responses in a rapidly developing field. EKG monitors to measure heart rate in tagged whales may soon be available and could present another opportunity to gather equivalent information.

A concern was expressed about the restrictions on the remit of the PCAD project. In response, Lusseau noted that the modelling approach was flexible enough to incorporate the type of alternative pathways mentioned and that the group

was currently focussing on energetic pathways because it meant that parameters could be estimated by fitting the state space models to existing behavioural and demographic data. However, this did not preclude extending models in the future when more information becomes available. Importantly, this approach will allow construction of contrasting models and cross-validation of them against observations. It was noted that this was a significant step in developing quantitative methods to address non-lethal effects of disturbances. However, it was also noted that, while this is just a model and simplicity is valuable, the current omissions may have implications for any subsequent wide-spread application of the PCAD model and these limitations should be explicitly recognised to avoid any misapplication, especially in management settings. When asked what should be the 'take home' message for LaWE from this exercise, it was noted that the progress made in this working group validated the feasibility of the approach proposed for LaWE and that the variables selected in LaWE were appropriate (Appendix 2).

6. REVIEW WHALEWATCHING OFF NORTH AFRICA

Brito presented SC/62/SM8 on cetacean sightings, local human activities and conservation off São Tomé (São Tomé and Príncipe, Gulf of Guinea, West Africa). São Tomé and Príncipe is an equatorial archipelago situated in the Gulf of Guinea composed of two main islands and several small islands and islets. This region seems to be an important area for cetaceans probably due to prey abundance and the existence of shallow and protected bays. However, the status of species or populations of cetaceans has not been assessed due, in part, to lack of information and effort. Whalewatching is a fairly recent activity now growing due to an increase in tourism in São Tomé and Príncipe. Encounters with humpback whales and other small cetaceans are frequent and could represent a significant income for the local economy. These activities are restricted to the city of São Tomé (north) and Ilhéu das Rolas (south) where main resorts are located and also occur on the Island of Príncipe, at Ilhéu Bom Bom. At the latter site, no research on cetacean distribution, interactions with human activities or whalewatching occurrence has been conducted. Whalewatching is directed mainly to humpback whales during the breeding season and during the rest of the year to small cetaceans, including bottlenose and pantropical spotted dolphins (the most sighted species in the region).

A similar situation may exist in the Cape Verde Islands where there are resorts and a significant number of tourists. Here, most whalewatching occurs in association with other maritime activities such as scuba diving and is focused primarily on humpback whales; observations of other species are opportunistic. Brito noted that several measures regarding the conservation of natural populations of cetaceans are needed for São Tomé, Príncipe and Cape Verde Islands (including international standards of operation, educational programmes and research) to reinforce a change to a more conservation-oriented perspective with direct involvement of local communities.

One member noted that an overview of whalewatching activities in the Mediterranean will be prepared under ACCOBAMS. More information is available on the ACCOBAMS official website (*http://www.accobams.org*).

The sub-committee welcomed Brito's report and noted the lack of information on whalewatching activities in western and northern Africa. Furthermore, it expressed concern at the potential for expansion of whalewatching activities in the region without sufficient scientific information on cetaceans and called for an assessment of the scope of activities to be made by relevant authorities as soon as possible.

7. ASSESS THE IMPACTS OF WHALEWATCHING ON CETACEANS

Bejder presented SC/62/WW4 on the Critically Endangered Irrawaddy dolphin (*Orcaella brevirostris*) population inhabiting the Mekong River. Here, photo-identification studies indicate dolphins exhibit high site fidelity during the dry season to particular deep water pool areas that are limited in size (1-2km^2). Preliminary genetic analyses indicate very low genetic diversity within the population and a high mortality rate with 46 carcasses recovered from 2003-05. Fifty-four percent of recovered carcasses were newborns. The cause of the high rate of newborn mortality remains unknown. Dolphin-watching tourism began in two areas along the dolphin's habitat in the early 1990s, which remains unmanaged and unregulated. The locations of these dolphin-watching areas are two of the most important habitats for the remaining population in the river, numbering less than 100 individuals. Initially, at both locations, the dolphin-watching industry was land-based, with a few row-boats occasionally taking tourists into the pool to view dolphins. This later expanded to larger motorised boats that offered dolphin tours in the pools, expanding to approximately 15 motorised boats by the early 2000s and now numbering more than 20.

Bejder noted that there is currently no information on what effects these 20+ tourist boats operating at the pools are having on the behavioural ecology of the resident dolphins. The paper argued that an adaptive, precautionary approach is essential to managing tourism that targets small, closed, resident communities of cetaceans. It was argued that for this Critically Endangered population, a 'no vessel-based dolphin tourism' policy is desirable, given that there are high sighting rates within deep pools that facilitate sustainable land-based tourism. Specifically, it was noted that the issues associated with Cambodian cetacean-watching tourism may be generic to developing countries. The dolphin-watching industry is typically unregulated and by the time it comes to the attention of officials, it is impossible to stop or modify, both on economic grounds and because of lack of capacity and political will. For example, at Lovina in north Bali, up to 160 artisanal fishing boats, and 140 tourist boats, operate dolphin-watching focused on spinner dolphins. A single school of dolphins may be surrounded by >60 boats. At Chilika Lagoon in India, up to 250 fishing vessels participate in an industry based on a small (<150 animals), isolated and declining population of Irrawaddy dolphins, which is also subjected to gillnetting impacts.

The sub-committee noted its concern over the Critically Endangered Mekong River Irrawaddy dolphin population. In 2006, the IWC Scientific Committee noted that there was compelling evidence that the fitness of individual odontocetes repeatedly exposed to tour vessel traffic can be compromised and that this can lead to population level effects. It also stated that, in the absence of data, it should be assumed that such effects are possible until indicated otherwise – particularly for small, isolated and resident populations. Accordingly, the sub-committee **strongly recommends** that the Cambodian government and relevant agencies make every effort to reduce the exposure of dolphins to vessel-based tourism in deep-water pools in the Mekong River.

SC/62/WW1 reports on behavioural responses of southern right whales (SRW) to human approaches in Bahia San Antonio, Rio Negro, Argentina. The study

was conducted to obtain information to evaluate recent authorised whale-based tourism and the implementation of accurate regulations and conservation measures. A total of 50 SRW groups were approached with a small zodiac during the seasons of 2008 and 2009, accounting for a total of 39h of behavioural observations. The approaches occurred in a slow and controlled way up to a minimum distance of 100m. A focal animal observation (instantaneous point sample) was used to record three mutually exclusive behavioural states: rest, travel and socialising and/or aerial activity. Groups (chosen at random) consisted of solitary animals (0.52), Surface Active Groups (SAG; 0.32) and non-SAGs (0.13). Due to the paucity of data in the past, all behavioural responses were analysed regardless of group composition. Results indicated that whales continued travelling during an approach, but doubled their resting time after the approach (22% → 40%) and significantly decreased their time socialising or being aerially active (21% → 2%). Although the probability that a whale remained in a social/aerially active behaviour when exposed to anthropogenic approaches decreased notably (-22%), no significant effect was found (Z-test for 2 proportions, $p>0.05$), probably due to the relatively small dataset. Nevertheless, the authors conclude that the apparent change in SRW social behaviour urgently requires more detailed information to implement conservation strategies to adequately regulate the commercial whale-based tourism in the area. The sub-committee noted the small sample size but commended the before-during-after experimental design.

Parsons introduced SC/62/WW2, summarising recent advances in whalewatching research as follows: Noren *et al.* (2009) investigated the prevalence of 'surface active behaviours' (e.g. spy hops, breaches, tail slaps, pectoral fin slaps) in the vicinity of boats in 'southern resident' killer whales, a population that was listed as depleted under the US Marine Mammal Protection Act in 2001, and is classified as 'endangered' in the United States and Canada. Results indicate that surface active behaviours generally increased when boats were closer. The most common behaviour reported was a 'tail slap', a behaviour that the researchers suggested 'may be performed by killer whales when disturbed'. As the highest tail slap frequency was recorded when boats were within 150m of the specific whale, the authors concluded that minimum approach distance of 100m in whalewatching guidelines may be insufficient in preventing behavioural responses from whales.

Arcangeli and Crosti (2009) conducted a study on an Australian common bottlenose dolphin (*Tursiops truncatus*) population in the coastal waters of Bunbury. Dolphins were observed for a total of 64 hours and the proportion of time engaged in 'diving', 'milling' and 'travelling' behaviour increased when boats were present within 350m. The proportion of time spent 'resting' decreased from 31% of the time to 20% and the proportion of time 'foraging' decreased from 20% of the time to 7.6% (a 62% decrease). This result is one of the greatest decreases noted to date. Due to calm sea conditions, the research vessel was able to observe the dolphins with engines off; therefore, the effect of the vessel was not a confounding factor.

Christiansen *et al.* (2010) used a Markov chain analysis to investigate changes in Zanzibar Indo-Pacific bottlenose dolphin (*T. aduncus*) behavioural states in relation to boat traffic. Overall, biologically important behaviours such as 'resting', 'foraging' and 'socialising' tended to decrease in the presence of boats.

Scarpaci *et al.* (In press) reported on the impact of swim-with-cetacean tourism on bottlenose dolphins within a 'sanctuary zone' in Port Phillip Bay, Australia, a protected area implemented to provide a refuge for the dolphins from vessel activity. A land-based observer found that vessel presence resulted in larger school size regardless of school composition and a significant decrease in foraging behaviour. Feeding behaviour was observed for a high proportion of the time when vessels were absent and the authors suggested that this site may be an important feeding area, and the reduction in feeding behaviour could be biologically important.

Sousa-Lima and Clark (2009) used automated acoustic recordings to monitor and track the singing behaviour of male humpback whales in Abrolhos Marine National Park, Brazil, a major humpback whale breeding ground. The behaviour of 11 tracked whales in response to approaches by tour boats showed that, of the 11 whales approached by boats, nine moved away, and of these, five ceased singing for at least 20 minutes. Of the animals that moved away, two-thirds did so when the boat was more than 4km away, with a mean response distance of 7.5km.

This is in contrast to previous studies that showed humpback whales moving away from tour vessels at distances of less than 0.3km (e.g. Corkeron, 1995; Sousa-Lima *et al.*, 2002).

Stamation *et al.* (2010) monitored the behaviour of groups of humpback whales off Queensland Australia from both whalewatching vessels and land-based platforms. Nearly half (46%) of the groups observed from whalewatching vessels exhibited no detectable response, 23% approached whalewatching vessels and 17% moved away. There appeared to be no relationship between the behaviour of the group (e.g. 'foraging', 'travelling' or 'surface active') and their response. Certain behaviours such as 'spy hop', 'trumpet blows' and 'tail swishes' were more frequent in whales approaching vessels, and it was suggested that these latter two behaviours might be aggressive and directed to the whalewatching vessels that were being approached. Avoidance behaviour was significantly more likely to be observed when boats approached closer than 100m and for mother-calf groups was more likely at 200m.

Filla and Monteiro (2009) investigated various types of whalewatching on estuarine or 'guianensis' dolphins (*Sotalia guianensis*) in Cananéia, southeast Brazil. The study indicated that dolphins' response was influenced by interaction time, with longer periods producing less negative responses, but this is related to the longer interactions generally occurring during boat-based, undergraduate course trips where boats tended to operate at a slow speed, viewed dolphins at a distance and waited for dolphins to voluntarily approach the vessel, i.e. type of whalewatching tour may affect impacts. This study further indicates that direct approaches are inappropriate and produce negative responses.

Jensen *et al.* (2009) found that common bottlenose dolphin and pilot whale (*Globicephala macrorhynchus*) communication calls could be masked substantially by small outboard engine noise, with higher speeds resulting in more masking, as well as frequent gear changes that produce relatively high levels of broadband sound.

The sub-committee welcomed Parsons' review and encouraged him to prepare a review for the next meeting. They clarified that these reviews are not intended as critiques of methodologies or results but rather are to inform the sub-committee of new research results of interest.

Bejder presented SC/62/WW3 on the US National Oceanic and Atmospheric Administration's (NOAA) efforts on developing management plans to reduce the exposure of resting spinner dolphins (*Stenella longirostris*) to human activity in Hawaiian waters. One potential management approach under consideration by the NOAA focuses on time-area closures to reduce the number and intensity of interactions between humans and dolphins during critical rest periods in particular bays. Research will combine boat-based and land-based visual observations with passive acoustic monitoring and is an international collaboration between researchers from American, Australian and Scottish universities. The conceptual framework is a Before-After-Control-Impact (BACI) design where the local abundance, distribution and behaviour of spinner dolphins in five resting bays will be assessed before and after the implementation of time-area closures. The study will implement Pollock's robust capture-recapture sampling design (Pollock *et al.*, 1990) to reduce population parameter bias when estimating the abundance of spinner dolphins in the five resting bays. Closures will be introduced in four bays (each with varying levels of human activity) while the fifth bay (control) will remain open. Time area closures will not be implemented until a full year of pre-closure data collection has been completed. The data will be collected during field seasons lasting six months per year over three-four years, beginning in July 2010. The authors highlighted this study as a possible candidate project for inclusion in the Large-scale Whalewatching Experiment (LaWE) initiative, as it incorporates many facets that the LaWE initiative strives to achieve.

The sub-committee **commended** the NOAA funded and instigated study and deemed it relevant to the LaWE initiative.

SC/62/WW8 presented a precaution on interpreting the results of impact study data analysis. Weinrich and Corbelli (2009) published an analysis of the effects of whalewatching on female humpback whale (*Megaptera novaeangliae*) calving frequency and calf survival on their feeding grounds in the southern Gulf of Maine. One of their findings suggested the possibility of confounding variables. In a breakpoint regression analysis of cumulative whalewatching exposure to the lifetime calving rate of individual females, there was a significant positive correlation between variables. Further, in multivariate analyses of individual calving events (e.g. logistic regressions), several positive relationships were found between exposure and reproductive parameters. The 'whalewatching exposure' variable in a case such as this is therefore really a proxy for the amount of time that a whale is spending in a key and important habitat. In effect, instead of saying that there was a positive correlation between boat exposure and fitness parameters, a more correct statement would relate to the effect of the whale's habitat use patterns on its fitness parameters. If this is correct, then it is possible that a deleterious whalewatching effect is hidden in what appears to be a positive relationship between exposure and a life history parameter. In this case, the relationship between exposure and the parameters examined may be, in fact, showing a weaker positive trend then would exist in the absence of whalewatching exposure. However, because there is a positive relationship at all, the tendency would be to dismiss the effects as either absent or inconsequential.

The sub-committee welcomed this paper as an important consideration in some impact analyses. It was noted that this contribution clarifies that whalewatching is essentially another habitat variable, and should be treated as such in multivariate models. In some populations (e.g. killer whales) there might also be a confounding variable between sightability and life history parameters; for instance, the ability to detect a calf may be related to the frequency with which a whale is sighted, further confounding related variables. In relation to the study on which the original analysis was based, it was noted that both the specific (Gulf of Maine) and the oceanic (North Atlantic) population overall is not growing at the rate reported for many southern hemisphere populations, but the rate of known entanglement mortality reported to the Scientific Committee last year (3.7%, see Robbins *et al.*, 2009) may play a notable role in this lower growth rate.

Lusseau presented work carried out by a team of Canadian researchers (Parrott *et al.*, 2010), which developed an agent-based simulation platform to assess the characteristics of interactions between whales and vessels under different scenarios. The simulation is composed of a spatial environment in which a whale individual-based model and a boat (including various categories of boat with different behaviour) agent-based model can evolve. It simulates the spatio-temporal movement of marine mammals and vessel traffic in the St Lawrence Estuary (Canada). It estimates movement parameters from long-term data collected using onboard GPS and vessel monitoring systems for vessels and a combination of land-based theodolite tracking and boat-based sightings of marine mammals from whalewatching boats and research vessels. The model was written in Java using the Repast platform. The whale movement model was validated using a pattern-oriented approach. This platform can be used to inform decision-making by simulating different vessel and whalewatching traffic scenarios.

This project is highly relevant to the LaWE objectives and offers an avenue to simulate boat interaction consequences for cetaceans using behavioural statistical models of disturbance effects. This effort was welcomed by the sub-committee and it was noted that it was a positive development of the preliminary work first presented to the sub-committee in 2006 (IWC, 2006).

It was noted that the work of the sub-committee has been influential with other research initiatives in the understanding of the effects of disturbances on cetacean populations.

At last year's meeting there was discussion on the impacts of aerial whalewatching. Groch reported that she was not able to analyse behavioural data collected in previous years during southern right whale photo-identification surveys from a helicopter in Brazil due to survey design. Sironi reported that a trial was conducted to record behavioural observations during the 2009 southern right whale photo-identification aerial survey in Argentina from a fixed-winged aircraft. Due to staff and space restrictions in the aircraft, it was not possible to collect reliable data. Dedicated flights should be done in order to obtain more accurate behavioural data.

8. REVIEW REPORTS OF INTERSESSIONAL WORKING GROUPS

8.1 Online database for worldwide tracking of commercial whalewatching/associated data collection

Robbins summarised the status of an on-line database for tracking whalewatching operations and associated data collection programmes. This database was originally described in Robbins and Frost (2009) and is intended to facilitate studies of whalewatching impact as well as

to allow better assessments of the scientific value of data collection programmes. Database development has made considerable progress intersessionally and will likely go online prior to next year's Annual Meeting. The sub-committee **recommended** that the intersessional working group continue and report back to the sub-committee next year (see Annex Q).

8.2 Swim-with-whale operations

Rose reported that due to time constraints no progress was made intersessionally on field-testing a questionnaire to further assess the extent of swim-with-whale operations. However, a draft questionnaire is ready to be distributed and plans are in place to do so in the Dominican Republic and possibly Australia before next year's meeting. The sub-committee welcomed the commitment of funding for this effort by the Pacific Whale Foundation. The sub-committee **recommended** that the intersessional working group continue and report back to the sub-committee next year (see Annex Q).

9. OTHER ISSUES

9.1 Consider information from platforms of opportunity of potential value to the Scientific Committee

One member stated that the progress continues in efforts to stimulate submission of opportunistic data from ecotourism cruise ships in the Southern Ocean to the Antarctic Humpback Whale Catalogue (AHWC). Opportunistic data represent a significant portion of the AHWC. For the period 1981-2010, 684 individuals have been identified from ecotourism and other opportunistic sources. In the Antarctic Peninsula region, 60% of the photographs from catalogued individuals were contributed by opportunistic sources, primarily from ecotourism. The availability of these data has broadened our understanding of the exchange between areas and in some cases provided information that was previously not available. For example, a photograph collected from a whalewatching vessel contributed to the first re-sighting between breeding group A and breeding group C (SC/62/SH27).

Ritter (2010) reported on a near-miss event involving a large vessel and humpback whales (*Megaptera novaeangliae*) off Antarctica. Observations were made from the bridge of a cruise ship, during a regular cruise along the Antarctic Peninsula. In February 2009, two humpback whales were encountered. The ship travelled at a speed of less than 10 knots closing in on the whales without purposefully approaching them. The animals only reacted at a distance of about 10m from the vessel, when they showed a startle reaction and sharply as well as vigorously turned away from the vessel. Observations from cruise ships thus can be informative on cetacean behaviour.

Smit *et al.* (2010) reports on opportunistic research off the coast of La Gomera (Canary Islands). From 1995 to 2007, the presence and distribution, as well as the combined occurrence, of different species were monitored year round from whalewatching vessels. Sightings of 5,739 cetacean groups comprising 21 species were made. Five species – bottlenose dolphins (*Tursiops truncatus*), short-finned pilot whales (*Globicephala macrorhynchus*), Atlantic spotted dolphins (*Stenella frontalis*), common dolphins (*Delphinus delphis*) and rough-toothed dolphins (*Steno bredanensis*) – accounted for 87% of all sightings. The physical characteristics of sighting locations (distance to coast, depth and sea bottom slope) of these five species were analysed using GIS. All three parameters showed significant inter-species differences. It appears that a species' habitat selection can be driven by a combination of physical characteristics as well as the presence/absence of other cetacean species. The study highlights the importance and the potential of mutual long-term cooperation between whalewatching operators and scientists.

The sub-committee welcomed the reports and reiterated the value of collaboration between researchers and whalewatching operations and other platforms of opportunity.

9.2 Review of whalewatching guidelines and regulations

Carlson noted that the compendium of whalewatching guidelines and regulations around the world is in the process of being updated and will be available on the IWC's website in August.

SC/62/WW2 described several papers relating to guidelines and compliance. Noren *et al.* (2009) noted that during the first year of their study 91% of boats observed were within 100m of the whales (dropping to 65% in the second year), demonstrating the high degree of non-compliance with local voluntary guidelines for whalewatching (a minimum approach distance of 100m). Williams *et al.* (2009) noted that changes in killer whale movement were affected by the number of vessels in the vicinity of whales. Guidelines in this region currently dictate that vessels not approach closer than 100m but do not proscribe a maximum number of vessels around a killer whale group.

Stamation *et al.* (2010) noted in their study that although 78% of the whalewatching vessels observed were 100m or further from whales (the distance required by local whalewatching guidelines), the remaining 22% approached closer than 100m or intersected the whales' route. Moreover they found that avoidance behaviour was significantly more likely to be observed when boats approached closer than 100m. Local regulations require whalewatching vessels to be no closer than 300m to whales with calves but only 14% of interactions between these groups and vessels adhered to this guideline and avoidance behaviour was more likely to be observed from these groups when vessels came within 200m.

Sousa-Lima and Clark (2009) suggested that managers of a marine protected area (MPA) for humpback whales should try to reduce noise levels within the MPA, and suggested regulations to that effect, requiring, for example, quieter engines as well as speed limits and restrictions of numbers of boats. Jensen *et al*. (2009) suggested that small outboard vessels should be restricted to speeds below 2.5 knots (as masking was negligible at 50m at this speed) and gear shifts should be minimised. The researchers' findings support whalewatching guidelines that recommend boats travel at low speeds at a distance of 50m or more.

9.3 Review of risk to cetaceans from collisions with whalewatching vessels

No new information was brought to the sub-committee this year. Some members indicated that papers on this item would be submitted to next year's meeting. The sub-committee noted that this issue will be discussed at a joint workshop with ACCOBAMS in Monaco from 21-24 September 2010.

9.4 Future of the Sub-committee on Whalewatching

The sub-committee took note of IWC/62/CC8 and discussed the possible interface between the Conservation Committee's (CC) work and its own work on whalewatching. The CC has

established a Standing Working Group on Whalewatching and intends to develop a draft strategic plan for five years (2010-15). IWC/62/CC8 made reference to the work of the sub-committee and various scientific issues and the sub-committee noted in the section on Capacity Building and Development that actions 'may include… provision of expert assistance through the Scientific Committee's sub-committee on whalewatching'.

The sub-committee is seeking clarification on the mechanism by which this expert assistance will inform the work of the Standing Working Group. It generally welcomed the opportunity to liaise with the CC and Commission, but noted its own terms of reference, and that the advice it offers should be within that framework. One possible mechanism, for example, would be to designate a representative from the sub-committee to work directly with the CC on this issue, thereby providing a formal interface.

The sub-committee is also seeking clarification on the envisioned management objectives for whalewatching, as IWC/62/CC8 states both 'growth' and 'sustainability' objectives. Clarification on this issue will guide the scientific work of the sub-committee for Objective 7 of the LaWE project ('Develop an integrated and adaptive management framework for whalewatching that accounts for uncertainties, and includes monitoring and feedback mechanisms').

The sub-committee draws the attention of the CC to the definitions of whale ecotourism developed by the sub-committee (IWC, 2006) and considered it important that the CC take a strategic view of what it might achieve in the five years. It also stressed the importance of a good scientific basis for the work that it is recommending to the Commission.

One member suggested that it would be valuable to increase communication and explore possibilities to collaborate with the UN World Tourism Organisation, as its remit complements the work of the sub-committee in a number of aspects. Lusseau volunteered to liaise for this purpose.

9.5 Other

Simmonds presented a paper by Eisfield *et al.* (2010) on the behaviour of a female solitary sociable dolphin studied on the southeast coast of England in 2007 and previously discussed by the sub-committee. This was the first time that the behaviour of such an animal was systematically recorded. By the time this study was conducted, the young female was highly interactive with people in the water. People accompanied the dolphin for 18.4% of the 100hr of observation, and their presence changed her behaviour. The study recorded 39 different behaviours; feeding and resting behaviours declined in frequency in the presence of people. In addition, the dolphin exhibited behaviour possibly hazardous to people in the water, which included preventing swimmers from leaving the water. The dolphin received several wounds, at least one of which was life-threatening, and may have eventually died as a result of her habituation to human company. The vulnerability of solitary sociable dolphins created by a high level of human interactions was again emphasised by this study.

The sub-committee **reiterated its recommendation** of 2008: habituation of solitary dolphins can make them vulnerable to harm, including being killed, and should be avoided.

10. WORK PLAN

The work plan prioritised major items as listed below.

(1) Assess the impacts of whalewatching on cetaceans (methods and results of changes in behaviour and movement patterns; methods and results of physiological changes to individuals; and methods and results of demographic and distributional changes).

In addition, the following items were **recommended** for the next meeting.

(2) Review reports from Intersessional Working Groups: (i) large-scale whalewatching experiment (LaWE) Steering Group; (ii) LaWE Budget Development Group; (iii) online database for worldwide tracking of commercial whalewatching and associated data collection; and (iv) swim-with-whale operations.
(3) Consider information from platforms of opportunity of potential value to the Scientific Committee.
(4) Review of whalewatching guidelines and regulations.
(5) Review of collision risks to cetaceans from whalewatching vessels.

The sub-committee discussed the work plan and set priorities for next year as listed. Terms of reference and members of the Intersessional Working Groups as **agreed** by the sub-committee are listed in Table 1.

Table 1
Intersessional working groups and related information.

Group	Terms of Reference	Membership
LaWE Steering Group	Initiate collaboration request and report on responses; develop procedural mechanisms to centralize data received from identified collaborators relevant to LaWE with the Secretariat; utilise received data to commence power analysis for key parameters; develop matrix to categorise populations for site selection; initiate contact with field researchers to inform options for site matrix; continue to facilitate communication on LaWE progress with members of the sub-committee.	Lusseau (Convenor), Bejder, Bjørge, Carlson, Robbins, Rose, Sironi, Weinrich, Williams
LaWE Budget Development Group	Advance development of a draft budget and funding mechanisms for the LaWE.	Weinrich (Convenor), Kaufman, Lusseau
Online database for worldwide tracking of commercial whalewatching and associated data collection	Advise on the design of a database of whalewatching activities and associated data.	Robbins (Convenor) Bejder, Carlson, Kaufman, Lusseau, Simmonds, Weinrich, Williams
Swim-with-whale operations	Field-test a questionnaire intended to assess the extent and potential impact of swim-with-whale operations and refine as needed.	Rose (Convenor) Parsons, Ritter, Sironi, Weinrich

11. ADOPTION OF THE REPORT

The report was adopted at 16:53 on 6 June 2010. The sub-committee thanked Kato for his 15 years of leadership and expressed its deep appreciation for his admirable and wise guidance.

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Appendix 1

AGENDA

1. Opening remarks
2. Election of Chair and rapporteurs
3. Adoption of Agenda
4. Review of available documents and information
5. Discuss the proposal for a Large-scale Whalewatching Experiment (LaWE; including reports from the Intersessional steering group and advisory group)
   - 5.1 Report from intersessional working group
   - 5.2 Report from LaWE advisory group
   - 5.3 Discussion of the proposal
   - 5.4 Other
6. Review whalewatching off North Africa
7. Assess the impact of whalewatching on cetaceans
8. Review of intersessional working groups
   - 8.1 Online database for worldwide tracking of commercial whalewatching operations and associated data collection (Convenor: Robbins)
   - 8.2 Swim-with-whale operations (Convenor: Rose)
9. Other issues
   - 9.1 Consider information from platforms of opportunity of potential value to the Scientific Committee
   - 9.2 Review of whalewatching guidelines and regulations
   - 9.3 Review risks to cetaceans from collisions with whalewatching vessels
10. Work plan
11. Other matters
12. Adoption of the Report

Appendix 2

REPORT FROM THE INTERSESSIONAL LaWE STEERING GROUP

LaWE Steering Group[1]
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ABSTRACT

The LaWE (Large-scale Whalewatching Experiment) steering group and the LaWE advisory group were developed during SC/60 in response to IWC (2008), the Bunbury report that proposed the development of an IWC research initiative to define the principles that determine how whalewatching interacts with other pressures on cetaceans to lead to impacts on their life history parameters in some instances. The steering group is to develop proposals for methodology, design and management of this initiative, including receiving advice from the LaWE advisory group regarding candidate study sites and taxa. Following on the initial Bunbury workshop report, the steering group, including a representative of the advisory group, further developed a proposal for LaWE including the precise definition of aims and hypotheses (IWC, 2010). Here, we provide a brief overview of this proposal and proposed options to manage this project.

THE LaWE PROPOSAL

The initiative aims to understand possible effects of whalewatching on the demographic parameters of cetacean populations. The first aim is to explore causal relationships between whalewatching exposure and survival and vital rates of exposed cetacean individuals. The second aim is to understand the mechanisms involved in causal effects, if they exist, in order to define a framework for proper management. Taking heed of the precautionary principle, we chose to meet the aims concurrently; if taken sequentially, the second objective would be sufficiently time-consuming to effectively delay implementation of proper management on decadal scales.

Objectives

(1) Determine whether the vital rate effects described in recent studies can be observed in other situations (IWC/58/Rep1).
(2) Determine how exposure to whalewatching affects the ecology, behaviour and/or physiology of cetaceans.
(3) Conduct short-term studies to inform the likelihood of long-term population impacts.
(4) Assess temporal variation of individual responses to disturbance (e.g. habituation, tolerance and sensitisation).
(5) Develop a modelling framework to explore potential population consequences of changes in life history parameters given observed effects and effect sizes and use additional datasets to test model predictions.
(6) Determine the effectiveness of mitigation measures employed to reduce the effects of whalewatching.
(7) Develop a management framework for whalewatching that accounts for uncertainties, and includes monitoring and feedback mechanisms.

[1]Lars Bejder, Murdoch University; Arne Bjørge, Institute of Marine Research; David Lusseau, University of Aberdeen; Mason Weinrich, Whale Center of New England; Rob Williams, University of British Columbia. LaWE Advisory Group representative: Naomi Rose, Humane Society International.

Research design

Aim 1

Demonstrate a causal relationship between whalewatching exposure and the survival and vital rates of exposed cetacean individuals.

We propose to use **a nested block study design** to account for environmental and biological variability, with multiple control and whalewatching site replicates within species, between ecological conditions and between species with different life history strategies. A nested block design will allow accounting for inherent variability by using replicate control and exposure sites.

In principal, four categories of cetacean populations are targeted by whalewatching:

- resident populations where breeding, nursing and feeding occur in the same area;
- cetaceans on their breeding grounds;
- cetaceans on their feeding grounds; and
- cetaceans on their migratory corridors.

Aim 2

Understand the mechanisms involved in causal effects.

We will use short-term controlled exposure experiments. The interpretation of the results of these experiments will be context-specific, e.g. depending on habitat quality or physiological status. It is not feasible to measure all covariates that can influence these results. Therefore within- and between- species site replications and **nested block design** will also be essential.

Variables

Aim 1

Compare levels of exposure to whalewatching and measures of a variety of demographic parameters.

(1) Vital rate and survival information, e.g. age at maturity, reproductive and survival parameters, obtained through rigorously designed mark-recapture studies using photo-id and other non-invasive techniques.
(2) Range and spatial use information using a range of non-lethal techniques such as photo-id and passive acoustic techniques.
(3) The quantity and rate of exposure of individuals to the number and type of whalewatching boats.
(4) To the fullest extent possible, environmental covariates from each site (however those are not essential thanks to the study design).

Aim 2

Determine short-term responses.

(1) Activity budgets, movement patterns, and habitat use by sampling the movement of individuals.
(2) Data on social patterns.
(3) The physiological status of individuals using metabolic indices, body condition indices and (where possible) stress hormone levels.
(4) Characteristics of whalewatching interactions including characteristics of boats and their behaviour.

Hypotheses and work plan

Objective 1

Determine whether the vital rate effects described in existing studies can be observed in other situations.

HYPOTHESIS 1.1

There is a relationship between cumulative exposure to whalewatching interactions and the vital rates of individual cetaceans.

HYPOTHESIS 1.2

For species that segregate their life history into different geographic locations, exposure in one of the locations can be sufficient to cause an effect in vital rates.

Objective 2

Determine how exposure to whalewatching affects the ecology, behaviour and/or physiology of cetaceans.

HYPOTHESIS 2.1

Interactions with whalewatching boats elicit behavioural responses that are analogous to responses to predation risk.

HYPOTHESIS 2.2

Whalewatching boats impact cetaceans through trait-mediated indirect effects where the animals are forced to modify their behaviour because of environmental disturbance (e.g. by the boat influencing prey behaviour).

HYPOTHESIS 2.3

Whalewatching boats affect cetaceans by obstructing their behaviour (e.g. the boat acting as a physical barrier or acoustic masking).

HYPOTHESIS 2.4

The levels of stress hormones (e.g. corticosteroids) of individuals are related to their exposure to whalewatching interactions

Objective 3

Conduct short-term studies to inform the likelihood of long-term population impacts.

This objective represents a work plan that follows on the hypotheses framed under Objective 2. These studies will involve a series of controlled exposure experiments within and beyond the LaWE experimental sites using the list of pre-determined variables.

Objective 4

Assess temporal variation of individual responses to disturbance (habituation and sensitisation).

HYPOTHESIS 4.1

The magnitude of an individual's response is temporally dependent on exposure to a controlled stimulus.

HYPOTHESIS 4.2

If 4.1 is true, the rate of habituation or sensitisation will be dependent upon the exposure history in relation to the onset of the impact assessment.

Objective 5

Develop a modelling framework to explore potential population consequences of changes in life history parameters given observed effects and effect sizes and use additional datasets to test model predictions.

Individual-based models will be used to inform the mechanistic relationships between whalewatching exposure and individual vital rates and survival probability. There will be several aims to these simulations.

- Identify possible pathways that can lead exposed individuals to have significantly altered vital rates or survival probability.
- Inform study design by highlighting the minimum set of variables required to achieve project Aim 2.
- Inform study design in two ways. First, by defining the sensitivity of demographic parameters to uncertainty in parameter estimates. Second, by estimating variance of parameters and hence informing sample size.
- These models will offer a mechanism through which we will then be able to run simulations to inform on the potential outcomes of different management actions (Objective 7).

Objective 6

Determine the effectiveness of mitigation measures employed to reduce the effects of whalewatching:

(a) understand the precise stimulus that elicit responses from the animal.

HYPOTHESIS 6.1

The effect size of a response is the same regardless of the characteristics of the whalewatching interaction.

HYPOTHESIS 6.2

If hypothesis 6.1 is refuted, the effect size of the response is dependent upon one or more specific properties of the interaction:

(b) the effectiveness of mitigation measures that reduce exposure to those areas identified in (a).

HYPOTHESIS 6.3

A reduction of the exposure to significant characteristics of the whalewatching interactions will significantly reduce effect size.

Objective 7

Develop an integrated and adaptive management framework for whalewatching that accounts for uncertainties, and includes monitoring and feedback mechanisms.

- Once the models developed in Objective 5 are informed by results from the empirical studies (including those from Objective 3), we can use simulation to inform the potential outcome of different management actions in various situations.

INTERSESSIONAL TERMS OF REFERENCE

During last year's meeting, the steering group was charged with a number of intersessional tasks:

Task 1. LaWE steering group to develop procedural mechanisms for the LaWE project.

Task 2. Initiate power analyses to further develop and refine methodology.

Task 3. Receive advice from the LaWE advisory group on appropriate sites and species.

Task 4. Develop an IWC-centralised data collection and QA/QC procedure for pre-existing and new data to inform Objective 3 and power analyses.

Due to both financial and time constraints the LaWE steering group did not meet intersessionally this year. However, the following progress has been made on Tasks 1-4 and further progress is anticipated prior to the completion of this year's meeting.

Task 1. Procedural mechanisms for the LaWE project

Procedural linkages

Given the number of field sites envisioned necessary for the LaWE initiative, and therefore the number of research teams needed, there are two key procedural aspects that require special planning and forethought. Firstly, we need to define mechanisms for communication and coordination of data (both collection and storage) and analytical efforts across all teams. Secondly, we need to ensure consistency between teams and within teams over the research period, in data collection and analyses. Furthermore, not all research teams will have the required skills to carry out all components of the projects and therefore, when possible, we need to ensure the provision of a homogeneous training programme. For tasks for which this is not feasible (e.g. specialised analytical skills), we will need to develop separate teams.

We have identified four primary, *non-mutually exclusive*, groups of individuals who will interact during this project: (1) data management and QA/QC; (2) field data collection; (3) data analyses and simulations; and (4) project management. These interactions could take place in a number of ways, which are presented in Fig. 1. Data collection would be undertaken in a consistent manner at numerous field sites, data management would be completed by a team responsible for assuring and controlling data quality, data analyses would be conducted by dedicated specialised teams, and a group would coordinate and manage the project.

From the experiences drawn from other large project initiatives (e.g. the Census of Marine Life and to some extent the Revised Management Procedure), we know that neither a top-down approach (Option 1), nor a bottom-up approach (Option 2) will help us achieve the goal of this project. Instead, the procedures we put in place will need to ensure two primary goals:

(1) ensure that data is collected in the same manner at all field sites with the same quality standard; and
(2) ensure that communication between all four groups is maximised so that if problems arise (e.g. sampling hindrances, QA/QC issues, etc.) they can be quickly dealt with, given the ability to learn from past experiences in other sections of the project, and if unanticipated difficulties arise they can be discussed and resolved in an open and timely manner.

It will be important for this procedure to:

(1) not hinder innovation emerging from field sites and allow for useful emerging procedures/ideas to be propagated at other sites if need be;
(2) foster a sense of community to allow free exchange between all members; and
(3) foster feedback loops along the information exchange paths.

Under these conditions we propose that the network approach (Fig. 1, Option 3) would be most efficient for this project. Here, a coordinating group would act as a 'hub' of information exchange rather than an information sink or source.

Financial considerations

Finally, to ensure the success of this project it is essential that data collection can be maintained at all selected sites. It was recognised in the Bunbury report that external financial contributions will be necessary to sustain the project. Different countries and/or regions will have different abilities to cover, and sustain at the appropriate time scale, the cost of the workload required at their field sites. Therefore, it will be important to define a procedure to ensure that the LaWE project is not jeopardised by financial instability at selected field sites. The IWC, as an international body who has dealt with such matters in the past, has pre-existing mechanisms for nations to contribute to specific research efforts with minimal geographic restrictions, and represents a promising vehicle to achieve this important goal.

This project is essentially a Research and Development component of the global whalewatching industry. As such, it is important for the industry to realise the value of this work for its sustainability and its viability.

Many countries are already funding research on whalewatching impact from levies on whalewatching passengers. Such funding schemes should be encouraged in all locations to adequately fund components of the LaWE project.

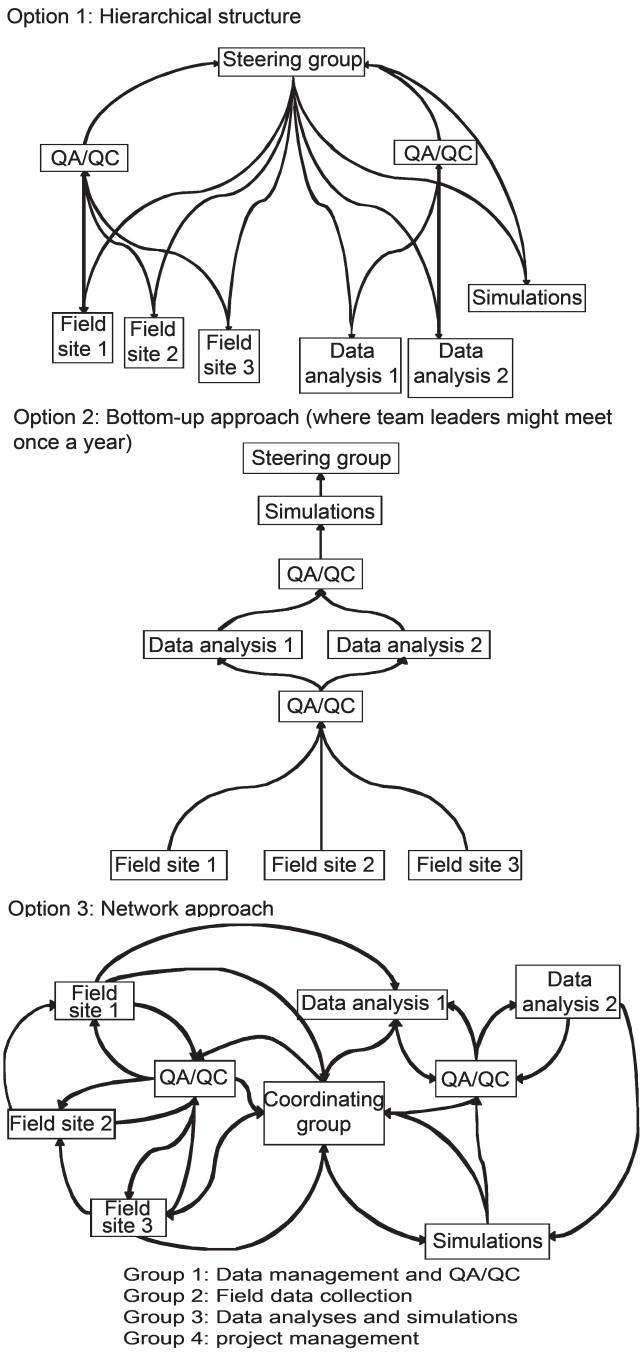

Fig. 1. Potential procedural linkages between the different components of the project (QA: quality assurance, QC: quality control).

It is necessary to recognise that data collection is only one component of the project and, at times, the easiest to fund. However, financial stability is also required for the other components (QA/QC, analysis and simulations). In time, we can envisage the procedure to be fully incorporated to the workload of the IWC in the same manner as the current whaling RMP is.

Task 2. Initiate power analyses to further develop and refine methodology

Preliminary work on this task (as reported in IWC, 2008) showed that a meta-analysis cannot be completed using currently published information, largely due to a disparity in information reported. This task will therefore require Task 4 to be completed before analyses can proceed. Development of a budget for such efforts, as well as potential funding sources, will also be required.

Task 3. Receive advice from the LaWE advisory group on appropriate sites and species

We have not engaged with the LaWE advisory group intersessionally because we have not yet reached the point where specific field sites and dialogues on other issues would have been helpful. We look forward to initiating and streamlining this process starting at this year's meeting.

Task 4. Develop an IWC-centralised data collection and QA/QC procedure for pre-existing and new data to inform Objective 3 and power analyses

(a) We plan to engage in discussion with the IWC Secretariat to assess the feasibility, and associated costs, for housing data with the Secretariat to both ensure transparency and to take advantage of data-sharing mechanisms already in place at the Secretariat.

(b) We have drafted the following email to be distributed through the MARMAM listserve subsequent to discussions at this year's meeting.

Text of e-mail for consideration by the whalewatching sub-committee

'International Whaling Commission – Large-scale Whalewatching Experiment (LaWE): scoping call for participation

We are seeking collaborations with researchers working on the behavioural ecology of cetaceans around the world. The long-term goal of the collaborations is to develop research to determine sustainable levels of whalewatching.

For the past 25 years, a large number of studies have investigated the effects of whalewatching on cetaceans and their potential impacts. From this body of work there is a consensus emerging that 'the fitness of individual odontocetes repeatedly exposed to whalewatching vessel traffic can be compromised and that this can lead to population level effects' (IWC, 2006). There is currently no consensus on mysticetes. The IWC Scientific Committee has strongly encouraged the development of research, particularly on large whales, to determine sustainable levels of whalewatching.

To this end we are developing a large-scale research programme (Large-scale Whalewatching Experiment – LaWE) with the goal of providing scientific advice to determine sustainable levels of whalewatching. This IWC initiative has been developed to assess how whalewatching exposure can interact with the life history strategies of the targeted individuals and the ecological conditions of their habitat to lead to population-level consequences. We have developed a research programme proposal with seven clear objectives. The text of the proposal is available at *http://www.iwcoffice.org/conservation/whalewatching.htm*. We are hoping to be able to initiate the project in the year to come, starting with a power analysis to define the number of sites that will be required for hypotheses-testing.

To this end, we are opening a call to researchers who have conducted behavioural studies (not necessarily whalewatch impact research) on cetaceans (odontocete and mysticete) in the past or are currently doing so. We have carried out previous attempts to meta-analyse data from pre-existing whalewatching impact assessment studies to compare effect size across different sites. However, this analysis came to an impasse due to disparities in methodology and the statistics reported. Such meta-analyses will help focus sampling strategies and work towards several of the objectives of LaWE. We are therefore interested in collating raw data on key parameters identified for the LaWE project to carry out such meta-analyses (as well as power analyses) for one of the aims of the LaWE ('Understand the mechanism involved in the causal relationship between whalewatching exposure and the survival and vital rates of exposed individuals'). We have identified interest in the following variables:

Activity budgets (based on focal follow sampling).

Movement patterns (based both from land-based sampling techniques and animal instrumentation).

Habitat use (both from photo-identification and the sampling of the movement of individuals).

This is an initial call to gauge interest in entering in such coordinated collaborative effort. If you possess such data, that could be used for the power analyses described in the research proposal, with information on quality control and quality assurance during sampling (e.g. formalised sampling protocols, consistent and regular calibration of sampling procedures), and are interested in participating to this collaborative effort, please contact us by emailing David Lusseau (*d.lusseau@abdn.ac.uk*). We will then discuss the possible mechanisms to develop this collaboration, ensuring the respect of data ownership, which will be coordinated from within the IWC.'

OTHER MATTERS

The Conservation Committee has now focused its work on whalewatching through the creation the Standing Working Group on Whalewatching (IWC/61/Rep5). This working group is developing a strategic plan to foster the development of whalewatching in a sustainable manner. We feel it is primordial that a close working relationship exists between LaWE and the Standing Working Group on Whalewatching to ensure that any development advice is based on robust scientific advice and to ensure that LaWE receives advice from the Standing Working Group on Whalewatching for Objective 7.

The IWC Scientific Committee sub-committee has recognised the relevance of the Population Consequence of Acoustic Disturbance (PCAD) model and framework to whalewatching effect studies on the scale of the LaWE (IWC/58/Rep1). LaWE steering group members have become aware of other current endeavours to implement the PCAD framework. This effort is providing a formalisation of PCAD and testing it on a wide variety of marine mammal case studies (see SC/62/WW6). This effort has made considerable progress in developing a modelling approach to PCAD which will be extremely valuable for LaWE. Indeed, this approach echoes LaWE's Objectives 2-4 and provides a statistical modelling framework to use data collected under the proposed study design to achieve Aim 2. It would be profitable for LaWE to engage more closely with this initiative.

REFERENCES

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