Report of the Scientific Committee

Bled, Slovenia, 7-19 June 2016

Annex N: Report of the Sub-Committee on Whalewatching

**This report is presented as it was at SC/66b.
There may be further editorial changes (e.g. updated references, tables, figures) made before publication.**

International Whaling Commission
Bled, Slovenia, 2016

Annex N
Report of the Sub-Committee on Whalewatching

Members: Urbán (Chair), Rendell (co-Chair), Rose, Baldwin, Brockington, Cheeseman, Cosentino, Ferriss, Fortuna, Gallego, Garrigue, Haug, Holm, Iñíguez, Jaramillo, Jimenez-Assmus, Kaufman, Lee, Mallette, New, Panigada, Parsons, Reyes, Ritter, Rodriguez, Rojas-Bracho, Ryeng, Simmonds, Sironi, C. Smith, Stachowitsch, Vermeulen, Vlckova, Wimmer.

1. OPENING REMARKS

Urbán and Rendell welcomed members of the sub-committee. Urbán noted the health-related absence of Carole Carlson and on behalf of the sub-committee wished her a speedy recovery.

2. ELECTION OF CHAIR AND APPOINTMENT OF RAPPORTEURS

Urbán was elected Chair, Rendell co-Chair and Rose was appointed rapporteur.

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/66b/WW01-05, WW07-12, SH06, O04, CC03, SNAM02, Ritter and Bünte (2016) and Smith *et al.* (2016).

5. ASSESS THE IMPACTS OF WHALEWATCHING ON CETACEANS

SC/66b/WW01 examined the impacts of whalewatching vessels on solitary adult sperm whales (*Physeter macrocephalus*) off Andenes in northern Norway. Data were collected on the duration of surface periods and foraging dives, as well as on respiration patterns (i.e. number of blows per surfacing and inter-breath interval) and dynamics (i.e. variations of inter-breath intervals throughout the surface period). Data were also collected on 'near surface events' (i.e. a dive without fluking) or NSE. NSEs are short underwater periods that do not involve foraging (the whales do not click). This was the first time this parameter was evaluated in an impact study. While the presence of whalewatching vessels did not have a significant effect on surface periods, foraging dive durations, or respiration patterns and dynamics, whales were seven times more likely to perform a NSE (mean duration ~3 min), and when NSEs occurred, there was a 75% increase in time spent at the surface, from 8 to 14 min. The difference between the mean duration of a NSE and the additional time spent at the surface due to NSEs suggests sperm whales need time to recover from a NSE before engaging in a foraging dive. Furthermore, when whales performed NSEs, they showed more erratic breathing and changes in respiration dynamics. These associated behavioural responses could be due to NSEs, or alternatively NSEs are a consequence of affecting a whale that is already disturbed. The short-term effects observed in this study likely do not have biological consequences for individuals under the current level of whalewatching exposure in Andenes. However, a larger number of whalewatching vessels in the area could increase the occurrence of these short-term reactions and potentially lead to long-term consequences. Sperm whales that exhibit NSEs should be avoided by whalewatching vessels, minimising or preventing the adverse consequences of cumulative effects. NSEs, as indicators of likely disturbance, should be included in whalewatching regulations and guidelines for sperm whales. The collection of further data concerning NSEs and respiration dynamics is encouraged.

The sub-committee welcomed this assessment of a reaction in sperm whales that has not been studied previously. In discussion, concerns were expressed about a lack of baseline data, leading to questions as to whether a few minutes of lost foraging time would be biologically significant. In response, it was noted that NSEs do represent time spent moving away from vessels and not foraging, which is objectively a 'waste' of energy. In addition, work in Dominica has shown that sperm whales have an energy budget with little tolerance for lost energy input; it might not take much more than a few minutes of lost foraging time a day for a whale to experience a negative impact. For deep-diving species such as sperm whales, there may also be negative impacts from disrupting normal dive patterns, related to, amongst other things, dealing with nitrogen build-up in tissues. As in the past, concern was expressed about using whalewatching vessels to assess whalewatching impacts; this concern extends generally to using vessels as research platforms when conducting vessel impact studies, as the research platform itself can have an impact on the behaviour of whales. In response, it was noted that while this concern cannot be dismissed, its impact on results can be minimised through the use of experienced vessel operators and maximising distance from the animals under observation. The sub-committee encouraged additional research into the implications of NSEs.

SC/66b/WW05 examined the importance of population characteristics when assessing the effects of disturbance from whalewatching. Three factors were considered: (1) whether a population was open or closed; (2) the population's size; and (3) whether food was limited. Using simulations based on the model described in New *et al*. (2013), it was demonstrated that, in the absence of any other form of disturbance, small closed populations were more sensitive to disturbance from whalewatching than large open populations. The lack of effect of food limitation is likely a construct of the model, due to simplifying assumptions that were made. The results highlight that while individual response to whalewatching vessels may be the same across populations, the long-term consequences may depend on the population characteristics as well as the intensity of the disturbance.

The sub-committee welcomed the use of these modelling techniques to assess small cetacean examples, noting that MAWI will do similar analyses and build similar models for large whales. It was noted that large whale models may not have sufficient empirical data inputs to be predictive, but could still be useful to inform precautionary management decisions. The discussion considered whether the model(s) can account for individual 'personality' (e.g. behavioural inclinations or internal motivations; 'shy' or 'bold' behaviour) or species plasticity (e.g. some species have shifted to new habitat due to, for example, climate change impacts while others apparently cannot) and it was noted that at present this model is very simple. More complex models can account for such inclinations, but it can be difficult to tease apart individual or species inclinations from other factors. Concern was also expressed that small populations, with the lowest apparent tolerance for disturbance, are often those targeted most by whalewatching vessels; however, responding to this concern should not simply shift whalewatching to larger populations, which eventually do show a response. In addition, a major assumption of the model is that there are no impacts other than whalewatching vessels; if this assumption is violated, whalewatching could have cumulative or synergistic impacts that are greater than when whalewatching is considered alone, even on larger populations. There is concern, for example, about how climate change might exacerbate whalewatching impacts. The sub-committee **strongly recommended** the continuation of modelling work on the importance of population characteristics in assessing the effects of disturbance from whalewatching within the context of its work plan.

SC/66b/WW07 summarised the current status of southern right whales in San Matías Gulf, Argentina, from data on distribution, abundance and social structure, and described an emerging whalewatching industry. There has been an increase in the number of whales, with a peak in late August-early September, a marked seasonality and a geographic trend, with most of the whales distributed along the northwest area of San Matías Gulf. Solitary animals are the predominant group type observed in the Gulf. Since 2012, whalewatching tourism has been developing in San Antonio Bay, with the southern right whale as the target species. Whalewatching here mainly occurs on solitary animals and non-social active groups. Different group types showed different short-term reactions to whalewatching vessels.

The sub-committee welcomed this comprehensive review of the emerging whalewatching situation in San Matías Gulf. While once again reactions from whales were being assessed from whalewatching vessels, the periods with only one vessel watching the whales, versus periods with more than one vessel, provide a form of control and there appears to be a clear difference in reactions. It was noted that there are sites where land-based observations could be conducted – a far better control – and this may be explored in future. The aerial surveys could also be explored as a control, although to date they have been used only for abundance and distribution surveys, not to observe behaviour of whales. A caution was offered, to ensure that future control observations are not compared to past exposure observations, as the overall behaviour of the whales may change over time due to other factors, such as climate change. It was noted that whalewatching regulations in Argentina are provincial and Península Valdés and San Matías Gulf are in different provinces, Chubut and Rio Negro respectively. One example of differing regulations is that swimming with whales is prohibited in Chubut but not Rio Negro, arguing for some kind of trans-border regulatory scheme, as otherwise the whales are exposed to differing and at times additional pressures when they cross a provincial border. The sub-committee encouraged the continuation of the research into the emerging whalewatching industry in San Matías Gulf, Argentina, and **agreed** that this area might be considered as a possible focus of the MAWI initiative.

Recognising the difficulties of keeping up to date on the wealth of research on whalewatching activities, in particular the impacts of these activities on cetaceans, a paper summarising recent whalewatching research was presented to the sub-committee (Parsons *et al.*, 2004) at SC/56. This was deemed to be a useful review of recently published articles, so similar digests were requested in following years. SC/66b/WW10 is the 13th in this series of reviews, detailing a summary of whalewatching research published since SC/66a. Those studies related to impacts of whalewatching on cetaceans are summarised in Table 1. The sub-committee welcomed this paper, as always, and thanked Parsons for presenting the information in table form, which will make the information more accessible.

SC/J16/SNAM02 presented a study on the potential acoustic masking of Commerson's dolphins (*Cephalorhynchus commersonii*) from mid- and high-frequency content of ship noise in shallow waters of the Argentine Patagonian coast, where the species is targeted by dolphin-watching and is also exposed to noise from

freighters and recreational, fishing and other vessels. Several types of vessels substantially increased ambient noise levels at mid- and high frequencies (200 Hz-200 kHz), where odontocete hearing seems to be most sensitive, and thus have the potential to interfere with hearing of relevant sounds produced by Commerson's dolphins to communicate and echolocate, and potentially by other small cetaceans as well, especially in coastal shallow waters where they can be exposed to ship noise several times a day and at very close ranges. Even though acoustic masking may be a short-term effect caused by a single exposure, cumulative impacts of repeated short-term exposures may produce long-term effects, reducing fitness of the animals. In conclusion, regulations on whalewatching activities should consider the potential cumulative impacts of noise from different types of vessels in a certain area rather than as an isolated issue (e.g. approach distance of recreational boats as well as of whalewatching vessels should be regulated, to avoid potential large reductions of the dolphins' acoustic space). Furthermore, exclusion zones, where currently cetaceans can be repeatedly exposed to ship noise over a short temporal scale from all types of vessels, should be considered as one of the most effective means of protecting cetaceans and their habitats, offering animals the option of using these quieter zones. This paper was also presented at the workshop on Acoustic Masking and Whale Population Dynamics (aka SNAM) (see SC/66b/REP10).

The sub-committee welcomed this assessment of masking, often considered a low frequency issue, on high-frequency specialists. In discussion, it was noted that, while recommending approach distances for whalewatching vessels based on the data from this study was difficult, its results suggested that recreational boats, as well as commercial whalewatching vessels, may be causing a significant degree of masking for high-frequency specialists. A comparison was made to toxicology, likening noise to chemical pollutants. How much noise can be added to the environment – e.g. by various vessel types, for various species – before it causes a negative effect? The sub-committee **encouraged** further work to articulate where this potential loss of acoustic habitat imposes itself on the life functions of these small dolphin species. It was also noted that other vessels are almost always present in areas where cetaceans are targeted by whalewatchers. The impacts of tankers or other vessels may be equally or more significant than those of whalewatchers who are following established approach distances.

The sub-committee **agreed** that the workshop on Ship Noise and Acoustic Masking held before SC/66b was relevant to its work and to consider the recommendations and conclusions of SC/66b/REP10 in the context of whalewatching impacts.

6. REVIEW REPORTS FROM INTERSESSIONAL WORKING GROUPS

6.1 Modelling and Assessment of Whalewatching Impacts (MAWI)

New presented an update on the intersessional working group and reiterated the terms of reference and past work that had been achieved. She clarified that the goal of MAWI – embodied by relevant sub-committee members – is to focus on the overarching themes related to whalewatching impacts and thus potentially provide information to field researchers focused on whalewatching impacts regarding the type of research questions that can be answered and what tools are available to help them analyse their results. She suggested and requested help in the planning and execution of a workshop to define the research questions and hypotheses that will most benefit our understanding of whalewatching impacts. New also mentioned the Indian Ocean Rim Association (IORA) workshop, and identified the region as a location suitable for targeted studies of whalewatching impact, contingent upon the workshop recommendations being endorsed by IORA and the Commission.

After comprehensive discussion, the sub-committee **agreed** that a small working group would prepare a pro forma proposal for a workshop, considered to be a priority, to be submitted at this meeting to the Secretariat, to develop objectives, research questions and hypotheses to progress the implementation of MAWI. In addition, it **agreed** that the MAWI intersessional working group (see Table 3) would work to identify and contact whalewatching researchers to request their input on what they consider the most pressing research questions regarding impacts on large whales from whalewatching. These two efforts would complement each other and lead to a comprehensive suite of research questions and hypotheses. The intersessional group would also work to develop a two-year work plan for MAWI, including a timeline and budget, which would include this workshop. Eventually, sites to pursue MAWI's work plan will be identified, potentially in the IORA region, but also within other regions such as the Wider Caribbean. The San Matías Gulf in Argentina is another possible site (see SC/66b/WW07, Item 5). Requests to Committee members regarding possible research sites within their countries could also prove fruitful if additional sites need to be identified.

6.2 Swim-with-whale operations

Work in the sub-committee has indicated that swim-with-whale (SWW) operations occur globally and are increasing in number. A few studies have found that such operations appear to disturb target species. This activity is regulated or even prohibited by several countries. SC/66b/WW02 summarised the results of an initial survey undertaken by the intersessional working group since SC/66a to assess global commercial SWW operations. The survey was distributed to 75 operators in 14 countries, covering all continents except Antarctica. Of these

operators, 10.7% stated they did not offer SWW opportunities and only 14.7% completed the survey (so an overall 25.3% response rate). Nine whale species were targeted by the responding operations, such as blue, bowhead, minke, and humpback whales, the last being the most common. The majority (91%) of respondents focused on mother-calf pairs. With humpbacks, reproductive behaviours were most conducive to in-water encounters, while with sperm whales, resting and socialising groups were targeted. The number of swimmers at one time ranged between 4 and 28. The number of times per day swimmers entered the water was variable, ranging from 1 to 12. Swims could last up to 30 minutes. Swimmers sometimes came within 5 m of whales. Swimmers were prohibited from touching whales by 55% of operators; interestingly, 45% did not respond to this question. All operators reported some behavioural response from whales when swimmers were in the water. The most commonly reported whale reaction was 'curiosity'. All 11 operators reported following some code of conduct, guidelines or regulations. There were insufficient questionnaire returns to evaluate these responses statistically; however, the survey does suggest this industry is growing, largely unregulated and under-studied. A precautionary approach should be taken when making any recommendations in relation to the growth or regulation and management of the SWW industry. Further detailed studies on the industry are needed.

At SC/65a, Carlson *et al.* (2013) presented guiding principles for responsible whalewatching, which were agreed by the sub-committee that year. These principles were further addressed in Carlson *et al.* (2014). These principles discouraged the further development of swim-with-cetacean programmes (Carlson *et al.*, 2013). In addition, if SWW excursions are allowed, the principles recommended the prohibition of leap-frogging to position swimmers (Carlson *et al.*, 2013; 2014). The sub-committee **agreed**, based on the results of the survey and direct observation, that the IWC guiding principles pertaining to SWW are generally being violated by swim-with-whale tourism. It would therefore be helpful for the guiding principles to be included in the whalewatching handbook (Item 7.1) and referenced by the sub-committee or the Conservation Committee's Standing Working Group on Whalewatching in all relevant forums. Future research might also evaluate the reactions of swimmers; swimming with large whales may be more frightening and stressful for swimmers than is readily apparent from the rapid expansion of the practise. The sub-committee **strongly recommended** that the Standing Working Group on Whalewatching work with the Commission and the Secretariat to collect information from Member States as to the extent of swim-with-whale programmes within their jurisdictions.

6.3 Providing input to the Standing Working Group on Whalewatching

See Items 7 and 7.1. Rendell summarised the work underway in advance of the joint Scientific Committee/Conservation Committee meeting (Joint Meeting) in June 2016 to consider the effectiveness and implementation of recommendations and emphasised the importance of ensuring recommendations from the sub-committee are clear, particularly with regard to who should carry the recommendations forward.

6.4 Guiding principles for data collection forms from platforms of opportunity

At SC/65b, the sub-committee agreed that an intersessional working group should be convened to prepare guiding principles on data collection from platforms of opportunity, with the goal to post final principles to the Commission website under the whalewatching sub-section or to include them in the whalewatching handbook. SC/66b/WW03 presents these guiding principles, with *minimum* recommended data, which can be collected by any operation with basic training, regardless of species, area or available instrumentation, and *desirable* data, which may be feasibly collected in some areas and operations, but would likely require more experience or training. As a general guideline, platforms of opportunity should record as many types of data as are feasible for their circumstances.

The intersessional working group requested feedback on this document from the sub-committee during the meeting. A revised version will be presented to the Conservation Committee meeting in October 2016. A discussion noted that there were advantages and disadvantages to providing a template data collection form along with the guiding principles. The sub-committee **recommended** that the Conservation Committee consider including template data collection forms for platforms of opportunity, or links to examples of forms in published papers, when finalising the guiding principles in the whalewatching handbook.

7. REVIEW PROGRESS ON COMMISSION'S 5-YEAR STRATEGIC PLAN AND JOINT WORK WITH CONSERVATION COMMITTEE

It was noted that the 5-Year Strategic Plan ends this year (2016). The Strategic Plan will be discussed and reviewed at the Joint Meeting in June 2016 and at IWC66 in October 2016. It was clarified that the roles of and relationship between the two Committees will be more clearly delineated during this review. Concerns were expressed about the interface between the sub-committee and the Conservation Committee. The sub-committee **agreed** that there was a need to improve involvement, coordination and definition of roles between the sub-committee and the Commission and Conservation Committee (see Item 14).

SC/66/CC03 was a report of the 'Building sustainable whale and dolphin watching tourism in the Indian Ocean region' workshop held in Colombo, Sri Lanka from 24-26 February 2016. The workshop was attended by several sub-committee members, including Simmonds, who served as chair. The workshop was developed by and delivered in partnership with the Australian Government, the IWC, the Indian Ocean Rim Association (IORA) Secretariat, the Sri Lankan Institute of Policy Studies and Murdoch University's Cetacean Research Unit. Representatives from 16 IORA member states attended. The Workshop was funded through a grant from Australia to the IWC's Voluntary Conservation Fund. The workshop agenda and recommendations are online at: http://www.iora.net/events/whale-dolphintourism/additional-materials.aspx.

In summary the workshop participants:

- recognised they face common challenges in managing whale and dolphin-watching tourism, including a lack of capacity and resources, particularly for compliance and enforcement;
- discussed the scale of the whalewatching industry in their countries and the extent of best practise guidance and regulation in place. Some countries had very low levels or no whalewatching, while others had a more developed industry. The challenges relating to compliance and enforcement were discussed, and the need for improved access to information on sustainable whalewatching, species biology and best practise approaches was highlighted;
- were unanimous in their support to establish a regional network to allow IORA Member States to work together to share best practise, knowledge, experience and expertise.

The participants also recognised the economic, social and ecological benefits of sustainably managing this fast growing industry.

The key workshop recommendation was that the workshop participants should support sharing information and expertise among IORA Member States to sustainably manage whale and dolphin-watching tourism operations, to ensure the economic, social and ecological sustainability of this industry by:

- sharing information, best practise, experience and expertise, including through online communication on the IORA website;
- sharing international expertise by collaborating with key actors, such as the IWC, which may be able to assist with mitigation of threats to cetaceans, capacity building and facilitate access to funding and development organisations;
- undertaking capacity building and training for Member States;
- acknowledging the need for baseline scientific information to inform sustainable management;
- helping develop and disseminate education materials such as brochures to tour and boat operators for tourist education; and
- establishing an IORA sustainable whale and dolphin-watching tourism network (and some details of how this might be done).

The workshop's recommendation to establish a network was noted by the IORA Committee of Senior Officials at its meeting on 22-23 May 2016 and will be considered by the IORA Council of Ministers in October 2016.

The sub-committee thanked Simmonds for presenting the report and also the government of Australia, for submitting the workshop report to the Conservation Committee and bringing it to SC/66b. The broad representation at the workshop, where most participants had some involvement in the whalewatching industry, was notable. In discussion, it was clarified that many Member States of IORA are not Members of the Commission; therefore, the sub-committee **recommended** that the Secretariat remain in contact with IORA to facilitate communication and outreach with these countries. Given that the sub-committee has not previously been presented with much information on whalewatching in the IORA region, this communication would be mutually beneficial. The sub-committee also **agreed** to make the Indian Ocean the focus of next year's regional review (see Item 8 and Table 4). It was noted that SC/66/CC03 will be further discussed at the Joint Meeting in June 2016 and at IWC66 in October 2016. The sub-committee **agreed** to set up an intersessional working group to help provide advice to IORA if appropriate and to facilitate communication between IORA and the sub-committee (see Table 3).

7.1 Online handbook

In May 2016, a small working group convened in Cambridge to further develop a beta version of the on-line whalewatching handbook (building on work previously undertaken by the sub-committee) (e.g. IWC, 2016, p.

390). An overview of this beta version was presented. The beta version has four sections, or portals, providing targeted advice and guidance to different sectors involved in whalewatching. Each portal will have a further two tiers of progressively more detailed information. The 'Planning a Trip' portal will primarily target the public. It will include what to look for in a responsible whalewatching operator and an interactive map providing basic information on in-country whalewatching activities, including where and when to see certain species. The 'Responsible Management' portal will primarily target managers/decision-makers and will include information on existing policies, guidance, and regulation. Case studies will also be included, exemplifying ideal top-down and bottom-up management practises. The 'Industry Support' portal will primarily target the industry and will provide advice and guidance on establishing a responsible whalewatching operation. The 'Training and Education' portal will primarily target groups wishing to access educational and support materials and to access the Commission's capacity-building initiatives. The beta version of the handbook will be presented to the Commission at IWC66 in October 2016. The handbook is an on-going project and will continue to be populated with information and updated at regular intervals. In order to progress its development, external funding sources need to be identified.

The sub-committee **agreed** that, when the beta version is ready for review, its members should review it and offer comment and input to the Chair of the Standing Working Group on Whalewatching. There is an immediate request to the sub-committee for materials such as photographs of various cetacean species to include in the handbook. The sub-committee also **agreed** that industry representatives should be approached to review and offer input on the beta version when it is ready for review; a procedure for conducting this industry outreach has yet to be determined. Initial feedback (addressing, *inter alia*, development of species fact sheets, the value of a stand-alone website address for the handbook, interactive elements, and use of case studies) was offered during discussion and will be incorporated and addressed during the continued development of the handbook. The sub-committee **recommended** that the Secretariat work to secure funding for a dedicated individual to shepherd the whalewatching handbook to completion. The sub-committee **agreed** that dissemination of the handbook will require active promotion, through, *inter alia*, social media efforts to ensure its success, an effort this dedicated individual can also undertake.

8. REVIEW WHALEWATCHING IN THE SOUTH PACIFIC

The South Pacific region was not reviewed. The sub-committee **agreed** to review whalewatching activities in the Indian Ocean at SC/67a, as the presentations at the IORA workshop (see Item 7) should form a good basis for such a review.

9. CONSIDER INFORMATION FROM PLATFORMS OF OPPORTUNITY OF POTENTIAL VALUE TO THE SCIENTIFIC COMMITTEE

SC/66b/WW04 presented an assessment of the underwater viewing platform of the semi-submersible vessel Yellow Submarine, which operates off Puerto Pirámides, Península Valdés, Argentina, as a platform of opportunity for southern right whale (*Eubalaena australis*) research. The variables considered during observations included, among others, the age class and sex of the animals observed, behavioural patterns, opportunities for individual photo-identification, distance and duration of the underwater observations and how weather conditions affected data collection. The Yellow Submarine offers a unique platform to make observations from an underwater perspective. The main limitations are the relatively short duration of the observations and reduced visibility in spring. To counter some of these limitations, the authors recommended using the lower deck for overall visual health assessments, including e.g. skin lesions, scars, and human-induced wounds; concentrating research effort during the earlier months of the whalewatching season (Jun-Aug) to take advantage of better visibility; and combining lower and upper deck photographs for individual identification.

The sub-committee welcomed this review of a unique platform of opportunity and noted that this platform facilitates observations that are otherwise difficult to make, particularly scars and injuries that would otherwise be hidden from an observer on deck. Data on these injury observations, including from the aerial surveys, will be reported in future. It was noted that having a minimum of two dedicated observers on board, one on deck, the other below, would be the ideal way to utilise this platform of opportunity, given how brief the underwater observations generally are. It was also noted that, while visibility is better and sighting probability is high enough early in the whalewatching season (June-August), the opportunity for researchers to do detailed observations of the whales below-deck is relatively low, as the tourists on board have priority at the windows. It was clarified that this vessel behaves similarly to other whalewatching vessels and that the close approaches are generally initiated by the whales. However, given the larger underwater profile of this vessel compared to a typical whalewatching vessel, comparisons of behavioural data collected from both vessel types would help to determine whether the whales behave differently around this vessel.

Along with the growth of the whalewatching and ecotourism industries, there has been significant interest in expanding data collection from these platforms of opportunity. SC/66b/WW08 presented details on a mobile web-

application, Whale and Dolphin Tracker, which was used by naturalists on Pacific Whale Foundation whalewatching vessels to collect data on cetaceans in the Maui four-island region. This app could be implemented globally at low cost on whalewatching and ecotourism vessels. Such implementation would directly contribute to enhanced collaboration among researchers and ecotourism operators, and can be used to improve the understanding of poorly-studied species.

The discussion clarified that, while the amount of area covered by whalewatching crewmembers using the app was far greater than that covered by dedicated researchers or transect surveys (Table 1 in SC/66b/WW08), detections of whales were nevertheless higher by the dedicated researcher. In response to a question, it was clarified that researchers can directly access their own datasets via a website once the data are stored by the app.

SC/66b/WW09 compared estimates of humpback whale abundance and density using data collected simultaneously during both systematic and opportunistic surveys. The authors employed a novel use of spatial density surface models that base abundance estimates on the observed relationship between animals and spatial covariates. The authors compared estimates from systematic surveys and whalewatching trips and their modelling results showed similar abundance and density estimates of humpback whales in a specific geographic area.

In discussion, concern was expressed about the application of these modelling techniques to whalewatching platform data, as such application is not currently statistically supported. The sub-committee **reiterated its previous recommendation** about the utility of platforms of opportunity generally, but noted that generating line transect-based abundance estimates from whalewatching vessels is one of the most difficult challenges the sub-committee has discussed to date and, as a result, is not yet an approach that can be used in management or conservation. As in the past, the sub-committee **agreed** that platforms of opportunity have the potential to make valuable contributions to the understanding of cetacean populations, especially in areas where data are lacking. Platforms of opportunity can provide cost-effective means of data collection, as well as data on relative abundance. Data from platforms of opportunity can also be used to help design studies using line transect surveys. However, under existing statistical methods, the behaviour of whalewatching vessels, targeting high-density areas and following cetaceans, results in violations of abundance estimate model assumptions. Significant development of statistical methodologies, including spatial density surface modelling, is needed before data collected from whalewatching vessels can be used for abundance estimates. One member suggested that any further consideration of whalewatching vessels as survey platforms for abundance estimates should be coordinated with the IWC Steering Group, established under Butterworth, which is investigating spatial modelling and quasi design-based approaches for abundance estimates (IWC, 2015b, p.111).

SC/66b/WW10 summarised Vinding *et al.* (2015), which used whalewatching vessels as platforms of opportunity. This paper noted the amount of effort that the vessels spend in certain areas may be skewed (due to reliable sightings of animals in these areas) and effort data are frequently not recorded, thus not allowing for the correction of this skewed effort. The paper also noted that there is inconsistency in how data may be collected, in particular how behavioural data are interpreted and recorded. The authors nevertheless considered data collected via whalewatching vessels as useful, as they can provide important baseline information about the biology, behaviour and distribution of cetaceans in an area and, moreover, save researchers the high expense of chartering or running research vessels.

SC/66b/SH06 described Happywhale.com, a web-based marine mammal photo-ID system creating high quality, low-cost whale sighting data while meaningfully engaging the public. The project sources images from platforms of opportunity and provides feedback on whale identities and sighting histories to contributors, a critical link encouraging further participation and generating enthusiasm and environmental education. In the eight-month pilot season, the project processed in excess of 30,000 images contributed by citizen scientists**,** using automated and semi-automated systems. The project documented 1,912 sightings and 23 cetacean species. Individual ID efforts were focused on humpback whales, documenting 616 individuals, 126 of which matched to known individuals from the Cascadia Research Collective catalogue (coastal California) and the Antarctic Humpback Whale Catalogue (Antarctic Peninsula). The data produced are open for collaborative scientific use, as Happywhale.com seeks to create a data source as an asset to whale population and behaviour studies rather than creating a new catalogue. Providing feedback to users, such as notifications of individual resights, have proven critical to success, leading contributors to share more historical images and to improve data quality (e.g. using better technique or adding a GPS unit to the camera) of future photographic efforts.

The Happywhale.com system has been utilised by several research projects and institutions, including the Norwegian Polar Institute, the Instituto de Conservación de Ballenas in Argentina and Ocean Alliance in the USA. The sub-committee welcomed this effort and encouraged the authors to bring updates on the use of Happywhale.com to future meetings.

Ritter and Bünte (2016) analysed sightings of bottlenose dolphins (*Tursiops truncatus*) and short-finned pilot whales (*Globicephala macrorhynchus*) in mixed groups off La Gomera (Canary Islands, Spain), a multi-species

cetacean offshore habitat. Sighting data were collected opportunistically and year-round from whalewatching vessels during regular trips from 1995 through 2014. A total of 2,769 bottlenose dolphins and 2,515 pilot whale sightings were recorded, during which aggregations of the two species occurred on 569 occasions. The location, environmental parameters and group characteristics of interspecific associations were compared to single-species-sightings. Results showed that interspecific associations were not of a random nature, as group size and group structure differed significantly within the associations as compared to single-species sightings. Possible driving factors for group associations include predator avoidance, feeding success and social advantages.

This paper was also presented in the Sub-Committee on Small Cetaceans (see Annex L, Item 10.2). In discussion, it was clarified that the mixed groups are found offshore, where the pilot whales are usually found, rather than inshore where the bottlenose dolphins are usually found, leading the researchers to hypothesise that the latter actively seek the former. It was clarified that no aggression is observed during these mixed-species sightings.

10. REVIEW WHALEWATCHING GUIDELINES AND REGULATIONS

SC/66b/WW10 also included two papers on compliance with guidelines and regulations. Key results are presented in Table 2.

SC/66b/WW11 analysed whalewatching in Patagonia, Argentina, by studying fluctuations in the number of passengers, regulatory changes, biological changes and the socio-economic factors that influence the development of the activity. From the early 1970s the number of people on whalewatching tours increased in Península Valdés, reaching a plateau of approximately 100,000 in 2008. The fluctuations in the number of passengers since 1987 are more associated with socio-economic factors (international and domestic) than to biological changes in the ecosystem. Since 1984, regulations have evolved into a scheme where introducing changes can be difficult and slow. The ecosystem has changed (e.g. changes in abundance and distribution of whales), making the regulations difficult to follow for vessel captains. A survey of crewmembers found that a majority of captains do not abide by the prohibition on following mothers with neonates before 31 August every year. Most of the boat crews said that there is a need to update these regulations.

The sub-committee welcomed this evaluation of the management situation in this area and encouraged the submission of additional papers of this nature and thoroughness under this agenda item. It also encouraged continuing to monitor the management situation in this region, which is planned. It was noted that adaptive management should be considered within the context of whalewatching; some jurisdictions have adopted it, while others maintain rigid regulations despite changes in the ecosystem, such as those related to climate change. The importance of informing passengers of regulations and how they will affect the behaviour of the vessel around whales was also noted; this information should be given before leaving port, as this manages passenger expectations best and also empowers passengers to report any infractions they witness. Finally, the inconsistency of local regulations across neighbouring borders was noted again. The sub-committee **recommended** that the Conservation Committee's Standing Working Group on Whalewatching address the issue of standardising whalewatching regulatory schemes, where best practise would inform final, unified regulations, in areas where they currently differ for transboundary populations of whales.

11. REVIEW EMERGING ISSUES OF CONCERN

Smith *et al.* 2016 presented information on the emerging use of drones in marine habitat, including to view marine mammals. This paper was presented in a joint session with the Standing Working Group on Environmental Concerns and the discussion is summarised in Annex K, Item 11.5.

12. PROGRESS ON PREVIOUS RECOMMENDATIONS

SS/66b/WW12 evaluated the sub-committee's effectiveness regarding the dissemination of its recommendations and scientific information via an online survey sent to the MARMAM listserv. The survey was conducted between Sept 2015 and January 2016, with a total of 57 responses from 25 countries. Of these, 34% identified with a conservation non-profit, 4% with a government agency, 30% with a university or as an independent researcher, 28% with a whale-watching business and 4% with the tourism sector. Over half of those that participated (60%) were aware of the recommendations and activities of the sub-committee. Additionally, 64% noted that information and recommendations from the sub-committee were used to help inform local whalewatching management. Of respondents who noted the sub-committee's work had aided the development of whalewatching guidelines, 36% said that the 'IWC general principles for whalewatching' were specifically referenced (https://iwc.int/wwguidelines#manage). When asked if there was a management regime in their country, 66% of respondents replied 'yes'. Of those regions that had management regimes, 26.5% were believed to be voluntary and 73.5% were regulatory. The survey did show that that was widespread confusion as to the nature of whalewatching management in many locations: for example, in the USA, two organisations stated that whalewatching guidelines were voluntary and two others noted the same guidelines were mandatory. The extent to which the sub-committee's work was influential was likely an underestimate, as there was an obvious lack of

understanding about whalewatching regulations and the history of how whalewatching guidelines were developed in many countries. All types of respondents suggested more direct communications between the sub-committee and the whalewatching community at large. Suggestions ranged from a better electronic presence (e.g. email list, dedicated listserv, updates via MARMAM, electronic newsletter, social media) to the creation of actual liaisons/representatives for each country. In addition, respondents requested free access to online summaries of research findings (such as provided in the annual digests of whalewatching research, e.g. SC/66b/WW10). Respondents also emphasised the need for such web materials to be translated into multiple languages. Overall, the survey results speak to a need for better outreach and education from the sub-committee and the Secretariat to the whalewatching community.

The sub-committee was very pleased to receive this report of the real-world impact of its work. The survey's results clarified the sub-committee's value to the wider whalewatching community and highlighted where the Conservation Committee's Standing Working Group on Whalewatching could most productively focus its efforts on addressing management issues. It was noted that there were some gaps in responses to the survey, as the methodology could not guarantee representation from all sectors or regions; the results were likely to have underestimated the true impact of the sub-committee's work on the wider community. The sub-committee **agreed** that future surveys of the sub-committee's effectiveness would be useful and **recommended** that future surveys on the effectiveness of the sub-committee's activities make every effort to expand their scope and reach a broader sample of sectors, particularly government representatives, and regions. It was suggested that the next survey be sent directly to Commissioners, to ensure at a minimum good representation of Commission Members. It also **agreed** that, while clearly the sub-committee's work was known among some elements of the whalewatching community, greater effort to communicate the conclusions, results, and recommendations of the sub-committee to the community is needed. It was noted that the whalewatching handbook could play a central role in this effort.

The sub-committee has made multiple recommendations (e.g. IWC, 2014, p.56; IWC, 2015a, p. 57) regarding unsustainable dolphin-watching in Bocas del Toro. Parsons reported that there have been community meetings, and more are planned, towards building a 'dolphin centre' in Bocas del Toro, as discussed by the sub-committee at SC/66a (IWC, 2016, p. 395). The main purpose of this centre is to serve as a hub for regulating boat traffic, providing dolphin-related education, and facilitating research. A coordinating committee for this centre has been established, which includes representation from Panacetacea, a local research group. In addition, the United Nations Development Program (PNUD) is funding three positions related to marine mammal tourism in Panama, including a position that will review marine mammal regulations at a national level (http://procurement-notices.undp.org/view_notice.cfm?notice_id=30131), another that will entail mapping important marine mammal habitat (http://procurement-notices.undp.org/view_notice.cfm?notice_id=30133), and a third related to marketing marine mammal tourism (http://procurement-notices.undp.org/view_notice.cfm?notice_id=30132). Parsons reported that Panamanian researchers are cautiously optimistic (as action on this issue has been pledged in the past, but was not realised); however, it does appear that the numerous recommendations and expressions of concern from the sub-committee have led to some progress. The local researchers will continue monitoring the situation.

The sub-committee thanked Parsons for this update, but **recommended** additional research be carried out to confirm any progress made in Bocas del Toro, Panama, with results brought to a future meeting. Parsons responded that additional compliance surveys were planned and their results would be presented at a future meeting. It was noted that there may be marked seasonal differences in dolphin-watching activities and that this may need further investigation to ensure a full understanding of potential impacts. The discussion clarified that year-round observations of the dolphin-watching situation, a previously identified research need, were being planned in partnership with a local university.

13. OTHER ISSUES

An update on the whalewatching situation in Oman noted that funding has been provided to the Environment Society of Oman for work related to responsible dolphin- and whalewatching tourism there. Work began in 2014 with the development and publication of cetacean watching guidelines, as well as workshops on implementation of these guidelines, including both classroom and field training of cetacean watching operators. Three members of the sub-committee assisted with this work in Oman, both in the capital city of Muscat and in the southern region of Dhofar. A report and presentation of this first phase of work was presented to the sub-committee at SC/65b. Funds for the work still remain and work is on-going with a focus on the endangered Arabian Sea humpback whale as a species of priority conservation concern. Current work considers the potentially negative impacts of whalewatching on Arabian Sea humpback whales, as well as considering ways in which humpback whalewatching may successfully develop into a responsibly-managed, sustainable industry in Oman. This latter point is included in acknowledgement of the fact that whalewatching is likely to grow as an industry in the future and should therefore be appropriately guided in advance. The on-going work includes preparation for a final workshop with

relevant stakeholders to disseminate results of ongoing studies. It is intended to present these results to the sub-committee at SC/67a.

The sub-committee thanked Baldwin for this update and looked forward to a report next year.

SC/66b/O04 outlined a number of draft recommendations arising from a cetacean welfare workshop held in South Africa 3-4 May 2016. The workshop was split into two parts, intended to deliver elements of the welfare action plan adopted at IWC/65 in 2014. The first part considered the science of animal welfare and developed and applied a novel approach to assessing the severity of certain non-hunting threats to welfare. The second part considered stranding response and this has been covered in other sub-committees. The workshop was attended by approximately 35 scientists, policy makers, veterinarians and conservation practitioners from 14 different countries. The element relevant to the sub-committee's agenda is the adaptation of the Five Domains model, originally developed by Mellor and Reid (1994). The workshop adapted the model from its current application in assessing the welfare status of animals in captivity and applied it to wild cetaceans for the first time. This newly developed welfare assessment tool is intended to help capture expert judgment to provide an assessment of the severity of certain welfare threats. It was tested against a number of threat-based scenarios, including exposure to contaminants, entanglement in marine debris, ship strikes, and whalewatching. The workshop concluded that the tool had a number of potential positive applications and could enable a more robust assessment of welfare threats and aid their consideration in conservation strategies. Workshop participants intend to submit the workshop results to a scientific journal for peer review. The workshop also identified a number of other threats to cetacean welfare warranting further consideration, including swim-with-cetacean programmes, entanglement and by-catch for small cetaceans, biotoxins from harmful algal blooms and the consequences of repeated entrapment and release of dolphins in tuna fisheries.

The sub-committee welcomed this summary of the workshop and requested future information on the potential for the Five Domains approach to be used in evaluating welfare impacts related to whalewatching, including swim-with-whale programmes.

14. WORK PLAN

The sub-committee **agreed** it would seek to enhance its capacity to address scientific and technical aspects of whalewatching and closely coordinate and cooperate with the Conservation Committee and its Standing Working Group on Whalewatching, including through the joint Conservation Committee/Scientific Committee Working Group. The work of the sub-committee will include providing advice on the impacts of whalewatching through data collection, monitoring, appropriate modelling, identification of emerging areas and activities of concern, the evaluation of guidelines and their effectiveness and the implementation of previous recommendations. Work areas will be reviewed on a continuing basis in conjunction with the Conservation Committee, being mindful of relevant Terms of Reference and resource constraints. The sub-committee will develop its agenda accordingly and **agreed** to establish an intersessional working group to refine the work programme and agenda as appropriate (see Table 3). This intersessional working group will advise on key areas/threats, to focus on where invited participants would be highly beneficial; seek to integrate the agenda/work programme of the sub-committees and working groups of the Committee, e.g. ship strikes and noise; consider how best to address cross cutting issues and other issues potentially not being fully considered with regards whale watching e.g. socioeconomics and capacity-building; liaise with the Conservation Committee; seek to improve connections with other international organisations such as ACCOBAMS; and communicate intersessionally to plan the agenda as necessary.

The work plan prioritised major items as listed below (see Table 4).

(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; methods and results of demographic and distributional changes);

(2) Develop the Modelling and Assessment of Whalewatching Impacts (MAWI) project.

In addition, the following items were **agreed** for the next meeting (see Table 4).

(1) Review reports from Intersessional Working Groups: (i) Modelling and Assessment of Whalewatching Impacts (MAWI) steering group; (ii) swim-with-whale operations; (iii) communication with the Indian Ocean Rim Association (IORA); and (iv) strategic planning of the work programme and agenda.

(2) Review whalewatching in the region of the Indian Ocean.

(3) Consider information from platforms of opportunity of potential value to the Scientific Committee.

(4) Review of whalewatching guidelines and regulations (methods and results of compliance with guidelines/ regulations; methods and results of efficacy of 'top-down' versus 'bottom-up' management; update development of guidelines or regulations in existing and new jurisdictions).

(5) Consider emerging issues of concern (e.g. new areas/species, new technologies, in-water interactions).

(6) Review progress on previous recommendations.

The sub-committee discussed the work plan and set priorities for the next two years as listed. Terms of reference and members of the Intersessional Working Groups as **agreed** by the sub-committee are listed in Table 3.

14. ADOPTION OF THE REPORT

The report was adopted at 12:23hrs on 14 June 2016. The sub-committee thanked Urbán and Rendell for their careful guidance during the discussions and Rose for her efficient rapporteuring. Carlson sent her regards to the sub-committee and thanked us for our well-wishes.

Table 1

Summary of studies on the impacts of whalewatching on cetaceans (SC/66b/WW10). Note that inclusion in this table does not imply endorsement of the findings or recommendations of the various studies by the sub-committee.

Species	Location	Methodology	Key findings	Reference
Southern right whales	Peninsula Valdés, Patagonia, Argentina	Whalewatching vessel platform of opportunity; vessel-based observation	-Mother-calf pairs exhibited higher levels of avoidance when approach was 'inappropriate' -Whales were more likely to approach vessel or react neutrally if vessel approach was 'appropriate' or engines were off	Argüelles *et al*. (2016)
Humpback whale	Bahia Malaga, Colombia	Land-based observation	When exposed to whalewatching vessels the whales: - reduced blows per minute - moved faster and more erratically - increased breaching frequency - decreased resting behaviour	Avila *et al*. (2015)
Common bottlenose dolphin	Santa Monica Bay, California	Vessel-based surveys	Interactions with kayakers, surfers, stand-up paddle boarders, and swimmers recorded: - dolphins encountered surfers most often - encounters rarely lasted longer than 5 minutes - only 20% of dolphins changed direction when encountering these marine users; most reactions were neutral -if a reaction occurred it was when approaches were within 3m	Fandel *et al*. (2015)
Killer whale	Salish Sea, Washington State/British Columbia	Acoustic tag; vessel-based observation with laser range-finder	- The amount of noise produced by vessels was related to their length (with smaller vessels producing proportionately more noise), speed and number of propellers - Vessel speed was the most important factor that determined the noise received by the whales	Houghton *et al.* (2015)

			- Regulations that require whalewatching vessels to reduce their speed in the vicinity of killer whales would reduce the amount of anthropogenic noise	
Indo-Pacific bottlenose dolphins	Kisite-Mpunguti MPA, Kenya	Vessel-based observation; photo-ID; capture-recapture models, Markov chain analysis	- Likelihood of dolphins temporarily leaving the study area positively related to number of vessels present	Perez-Jorge *et al.* (2016)
Gray whale	San Ignacio Lagoon, Mexico	Acoustic surveys	- Noise from whalewatching boats is a contributor to the acoustic environment in the breeding lagoon - The amount of whalewatching activity in the lagoon is currently relatively low but development plans mean this, and therefore noise, will increase	Seger *et al.* (2015)
Various	Various	Meta-analysis	In a limited review of response of cetaceans to whale-watching vessels: - animals were more likely to travel, and were less likely to rest or forage, in the presence of vessels - animals were also less likely to take a direct route	Senigaglia *et al.* (2016)
Spinner dolphins	Kona, Hawaii	Vessel-based observation; land-based observation	- Dolphins rested in bays during the day (especially 10am-2pm) - Boats and swimmers frequently tried to interact with the resting dolphins - Human disturbance may lead to dolphins being displaced from resting habitat	Tyne *et al.* (2015)
Gray whale	Eastern Pacific coast	Bioenergetic modelling	A bioenergetics model looked at the effect of disturbance on a female gray whale in three scenarios: - an energy loss of 4% due to disturbance during the year of pregnancy would result in the female not producing a calf - during lactation, if the female experienced an energy loss of 37%, the calf would be weaned early and have a lower body mass - with a 30-35% energy loss before pregnancy, the female would be unable to become pregnant - a 40-42% energy loss could even lead to female mortality - only 10 days of foraging opportunities lost due to disturbance could lead to an unsuccessful pregnancy and/or loss of a calf	Villegas *et al.* (2015)

Table 2

Summary of studies on compliance with whalewatching guidelines or regulations (SC/66b/WW10). Note that inclusion in this table does not imply endorsement of the findings or recommendations of the various studies by the sub-committee.

Species	Location	Methodology	Key findings	Reference
Humpback whale	Bahia Malaga, Colombia	Land-based observation	- 44% of breeding groups sighted were approached by whalewatching vessels - Small and large boats are required to stay 200 m or 300 m, respectively, from whale groups, but the modal distance of boats from groups was just 50 m - Although boats are supposed to approach whales slowly - 94% approached at speeds greater than 3 knots - Although boats are supposed to avoid mother-calf pairs - 79% of vessels approached them - Vessels are supposed to stay with whale groups no more than 30 minutes -average time with groups was 43 minutes - Guidelines state that only one boat can be with a whale group at a time – whale groups were encountering more than one boat 60% of the time	Avila *et al*. (2015)
Common bottlenose dolphin	Bocas del Toro, Panama	Focal group follow; vessel-based surveys	- Regulations state boats are not supposed to approach closer than 100m - 71% of vessels were closer than 100 m from dolphin groups - Only 2 vessels are allowed to be in proximity to dolphin groups - 45% of interactions had more than two whalewatching vessels present - As many as 15 boats were observed interacting with dolphin groups at one time	Sitar *et al*. (2016)

Table 3

E-mail Intersessional Correspondence Groups, Steering Groups, Working Groups and Terms of Reference.

Group	Terms of Reference	Membership
(1) Modelling and Assessment of Whalewatching Impacts (MAWI) Steering Group	Define specific research questions and hypotheses that will benefit understanding of the impact of whalewatching, identify those whalewatching locations that would be most suitable and amenable for targeted studies addressing these questions, and summarise the current modelling tools available to analyse the data that will be collected.	New (Convenor), Carlson, Cook, Cosentino, Jimenez-Assmus, Kaufman, Leaper, Parsons, Ritter, Robbins, Rose, Simmonds, C. Smith, Weinrich
(2) Swim-with-whale operations	Assess the extent and potential impact of swim-with-whale operations.	Rose (Convenor), Gero, Jimenez-Assmus, Kaufman, Parsons, Ritter, Rodriguez-Fonseca, Sironi, C. Smith, Urban, Weinrich
(3) Communication with the Indian Ocean Rim Association (IORA)	Help provide advice to IORA when appropriate and facilitate communication between IORA and the sub-committee	Simmonds (Convenor) , Baldwin, Ferriss, Iñiguez, Kaufman, New, Parsons, C. Smith, Urban
(4) Strategic planning of the work programme and agenda	Seek to increase the emphasis on the science of whalewatching impacts within the sub-committee; advise on key areas/threats to focus on where the invitation of IPs would be highly beneficial; seek to integrate the agenda/work programme of the sub-committees and working groups of the Committee, e.g. ship strikes and noise; liaise with the Conservation Committee; seek to improve connections with other international organisations such as ACCOBAMS; and communicate intersessionally to plan the agenda as necessary.	Rendell (Convenor) , Carlson, Cosentino, Donovan, Ferriss, Fortuna, Jimenez-Assmus, Iñiguez, Kaufman, New, Panigada, Parsons, Rose, Rojas-Bracho, Simmonds, Urban, Wulff

Table 4

Summary of work plan for the Sub-committee on Whalewatching.

Item	Intersessional 2016/17	2017 Annual Meeting (SC/67a)
(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; methods and results of demographic and distributional changes) – PRIORITY.		Papers to be presented
(2) Develop the Modelling and Assessment of Whalewatching Impacts (MAWI) project – PRIORITY.		Papers to be presented
(3) Review reports from Intersessional Working Groups: (i) Modelling and Assessment of Whalewatching Impacts (MAWI) steering group; (ii) swim-with-whale operations; (iii) communication with the Indian Ocean Rim Association (IORA); and (iv) strategic planning of the work programme and agenda.	See Table 3 for terms of reference – work to be done intersessionally and reported at SC/67a	Reports/updates to be presented
(4) Review whalewatching in the region of the Indian Ocean.	Intersessional working group (iii) to contact IORA and prepare a review	Review to be presented, ideally as a table
(5) Consider information from platforms of opportunity of potential value to the Scientific Committee.		Papers to be presented
(6) Review of whalewatching guidelines and regulations (methods and results of compliance with guidelines/ regulations; methods and results of efficacy of 'top-down' versus 'bottom-up' management; update development of guidelines or regulations in existing and new jurisdictions).		Papers to be presented
(7) Consider emerging issues of concern (e.g. new areas/ species, new technologies, in-water interactions).		Papers to be presented
(8) Review progress on previous recommendations.		Papers to be presented

REFERENCES

Argüelles, M.B., Coscarella, M., Fazio, A. and Bertellotti, M. 2016. Impact of whale-watching on the short-term behaviour of Southern right whales (*Eubalaena australis*) in Patagonia, Argentina. *Tour. Manage. Persp.* 18: 118-124.

Avila, I.C., Correa, L.M. and Parsons, E.C.M. 2015. Whale-watching activity in Bahía Málaga, Colombian Pacific, and its effect on humpback whale (*Megaptera novaeangliae*) behaviour. *Tour. Mar. Environ.* 11(1): 19-32.

Carlson, C., Kaufman, G., Ritter, F., and Rose, N. 2013. Report of the intersessional working group on guiding principles development. Paper SC/65a/WW03 presented to the IWC Scientific Committee, June 2013, Jeju Island, Republic of Korea (unpublished). 4pp. [Paper available from the Office of this Journal].

Carlson, C., Kaufman, G., Ritter, F., and Rose, N. 2014. 2014. Report of the intersessional working group on guiding principles development. Paper SC/65b/WW04 presented to the IWC Scientific Committee, May 2014, Bled, Slovenia (unpublished). 6pp. [Paper available from the Office of this Journal].

Fandel, A.D., Bearzi, M. and Cook, T.C. 2015. Effects of ocean recreational users on coastal bottlenose dolphins (*Tursiops truncatus*) in the Santa Monica Bay, California. *Bull. South. Calif. Acad. Sci.* 114(2): 63-75.

Houghton, J., Holt, M.M., Giles, D.A., Hanson, M.B., Emmons, C.K., Hogan, J.T., Branch, T.A. and Van Blaricom, G.R. 2015. The relationship between vessel traffic and noise levels received by killer whales *(Orcinus orca*). *PLoS ONE* 10(12): e0140119, 1-20.
International Whaling Commission. 2014. Report of the Scientific Committee. *J. Cetacean Res. Manage. (Suppl.)* 15:1-75.
International Whaling Commission. 2015a. Report of the Scientific Committee. *J. Cetacean Res. Manage. (Suppl.)* 16:1-87.
International Whaling Commission. 2015b. Report of the Scientific Committee. Annex D. Report of the Sub-Committee on the Revised Management Procedure. *J. Cetacean Res. Manage. (Suppl.)* 16: 106-184.
International Whaling Commission. 2016. Report of the Scientific Committee. Annex M. Report of the Sub-Committee on Whalewatching. *J. Cetacean Res. Manage. (Suppl.)* 17: 385-398.
Mellor, D.J. and Reid, C.S.W. 1994. Concepts of animal well-being and predicting the impact of procedures on experimental animals. *Improving the Well-being of Animals in the Research Environment*, pp.3-18.
Parsons, E.C.M., Classen, J.M. and Bauer, A. 2004. Recent advances in whale-watching research. Paper SC/56/WW6 presented to the IWC Scientific Committee, July 2004, Sorrento, Italy (unpublished). 13pp. [Paper available from the Office of this Journal].
Pérez-Jorge, S., Inês Gomes, I., Hayes, K., Corti, G., Louzao, M., Genovart, M. and Daniel Oro, D. 2016. Effects of nature-based tourism and environmental drivers on the demography of a small dolphin population. *Biol. Conserv.* 197: 200-208.
Ritter, F. and Bünte, J.N. 2016. Who is following whom? Interspecific associations between bottlenose dolphins and pilot whales in deep waters off La Gomera. Poster presented at the Annual Conference of the European Cetacean Society, Madeira, March 2016.
Seger, K.D., Thode, A.M., Swartz, S.L. and Urbán R., J. 2015. The ambient acoustic environment in Laguna San Ignacio, Baja California Sur, Mexico. *J. Acoust. Soc. Amer.* 138(5): 3397-3410.
Senigaglia, V., Christiansen, F., Bejder, L., Gendron, D., Lundquist, D., Noren, D.P., Schaffar, A., Smith, J.C., Williams, R., Martinez, E., K. Stockin, K. and Lusseau, D. 2016. Meta-analyses of whale-watching impact studies: comparisons of cetacean responses to disturbance. *Mar. Ecol. Prog. Ser.* 542: 251-263.
Sitar, A., May-Collado, L.J., Wright, A.J., Peters-Burton, E., Rockwood, L. and Parsons, E.C.M. 2016. Boat operators in Bocas del Toro, Panama display low levels of compliance with national whale-watching regulations. *Mar. Pol.* 68: 221-228.
Smith, C.E., Sykora-Bodie, S.T., Bloodworth, B., Pack, S.M., Spradlin, T.R., and LeBoeuf, N.R. 2016. Assessment of known impacts of unmanned aerial systems (UAS) on marine mammals: data gaps and recommendations for researchers in the United States. *J. Unmanned Veh. Syst*. 4: 31-44.
Tyne, J.A., Johnston, D.W., Rankin, R., Loneragan, N.R. and Bejder, L. 2015. The importance of spinner dolphin (*Stenella longirostris*) resting habitat: Implications for management. *J. Appl. Ecol.* 52(3): 621-630.
Villegas, S., Schwartz, L.K., Sumich, J.L. and Costa, D.P. 2015. A bioenergetics model to evaluate demographic consequences of disturbance in marine mammals applied to gray whales. *Ecosphere* 6(10): art. 183, 1-19.
Vinding, K., Bester, M., Kirkman, S.P., Chivell, W. and Elwen, S.H. 2015. The use of data from a platform of opportunity (whale watching) to study coastal cetaceans on the southwest coast of South Africa. *Tour. Mar. Environ.* 11(1): 33-54.

Appendix 1

Agenda

1. Opening remarks
2. Election of chair(s) and appointment of rapporteur(s)
3. Adoption of agenda
4. Review of available documents
5. 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)
6. Review reports from Intersessional Working Groups
    - 6.1 Modelling and Assessment of Whalewatching Impacts (MAWI) steering group
    - 6.2 Swim-with-whale operations
    - 6.3 Providing input to the Standing Working Group on Whalewatching
    - 6.4 Guiding principles for data collection forms from platforms of opportunity
7. Review progress on Commission's 5-year strategic plan and joint work with Conservation Committee (CC03)
    - 7.1 Online handbook
8. Review whalewatching in the South Pacific
9. Consider information from platforms of opportunity of potential value to the Scientific Committee
10. Review of whalewatching guidelines and regulations
11. Review emerging issues of concern (e.g. new areas/species, new technologies, in-water interactions)
12. Progress on previous recommendations
13. Other issues
14. Work plan
15. Adoption of report