Annex J

Report of the Sub-Committee on Whalewatching

Members: Kato (Chair), Best, Bannister, Berggren, Bjørge, Brown, Carlson, Clark, Clarke, da Silva, Dawson, Deimer, Donoghue, Fabbri, Findlay, Fujise, Fulford, Gambell, Gordon, Hakamada, Haug, Hedley, Ichii, Issac, Joseph, Kawachi, Kingsley, Kim, Kock, Komatsu, Lauriano, Leaper, Lens, Matsuoka, Morishita, Moronuki, Nishiwaki, Northridge, Okamura, Ohsumi, Parsons, Peddemors, Pérez-Cortés, Perrin, Perry, Rambally, Reijnders, Robineau, Rogan, Rojas-Bracho, Rose, Ryan, Simmonds, Stachowitsch, Swartz, Tanaka, E., Tanakura, Thiele, Tomita, Urbán-Ramirez, Van Waerebeek, Walters, Yamamura.

1. ELECTION OF CHAIR AND APPOINTMENT OF RAPPORTEURS

Kato was elected Chairman and Swartz was appointed rapporteur.

2. ADOPTION OF AGENDA

The adopted agenda is given as Appendix 1.

3. REVIEW OF AVAILABLE DOCUMENTS

Documents relevant to items on the agenda included SC/51/WW1-4, 7-11, SC/51/AS11 and SC/51/CAWS25-28.

4. COMMISSION'S COMMENTS FROM IWC50

Kato noted that the Chairman's report of the 49th Annual Meeting (IWC, 1998a) adopted the recommendations of the Scientific Committee (IWC, 1998b) to apply the general principals for whalewatching to all whalewatching activities, and that no new resolution had been made by the Commission in 1998. The Scientific Committee had recommended the formation of an intersessional Correspondence Group to review (especially in the context of focusing its work) the four priority areas agreed in 1996 as follows.

(1) Scientific protocols for research on the effects of whalewatching.
(2) The scientific basis for management.
(3) Research on the effectiveness of management.
(4) Criteria for selection of suitable areas for long-term studies on the effects of whalewatching on cetaceans.

The Scientific Committee reaffirmed these four priority areas as the basis for its future discussions, and agreed that an additional item, on the assessment of long-term effects, be included as a further priority.

Kato noted that the Scientific Committee had identified a number of priority areas for further work which formed the basis of the agenda and included:

(1) a more detailed review of the approach distances, effort and activity limitations in place in existing operations for a range of species, and information on the basis for such controls;
(2) an assessment of current studies of the effects of different approach distances and platforms;
(3) a review of the quantitative methods used to assess the short-term reactions of cetaceans and the basis for judgements of any adverse effects;
(4) comparative studies on different approaches/distances and other controls which may be required on areas important for feeding, resting and reproduction.

To encourage progress in its discussion of whalewatching the Scientific Committee recommended that the Commission:

(1) encourage member governments to conduct relevant scientific studies and send scientists to future meetings to present them; and
(2) encourage member governments and scientists to submit relevant scientific work, including scientific protocols, at the next meeting.

The Scientific Committee believed that the concept of dolphin feeding did not concur with the principal that cetaceans should 'be allowed to control the nature and duration of interactions', and agreed to keep this item on its agenda. Finally, the Scientific Committee noted that the 1996 document, 'A review of whalewatching guidelines and regulations around the world' (Carlson, 1996), was an ongoing matter that would be revised to include new developments and implementation of new guidelines, and would be made available to the Committee for review.

Bannister commented that given the Commission's acceptance of the application of general principles for whalewatching to all whalewatching activities (IWC, 1999, p.6) it was now an appropriate time for the sub-committee to review the focus of its discussions to include any additional items, or new approaches.

Speaking on behalf of the Government of Japan, Moronuki stated that it was the view of his government that issues dealing with whalewatching were outside the competence of the IWC. However, the Japanese government

supports the Resolution adopted by the IWC establishing the standing sub-committee on whalewatching and will provide such scientific advice as may be warranted to Contracting Governments.

5. REVIEW OF WHALEWATCHING GUIDELINES

5.1 Report of the intersessional correspondence group

Carlson reviewed SC/51/WW9 and summarised the discussions and findings of the intersessional Correspondence Group on whalewatching. The Group was convened to examine the four original priority areas previously listed in Item 4.

A fifth item, research to minimise the competition with other human activities, especially fisheries, in the whalewatching area was suggested, but no specific comments were received. A sixth item, the effects of whalewatching vessels on research activities, was also discussed by the Group who believed that whalewatching activities could both hinder and assist research activities depending on the nature of the research. For example, while whalewatching vessels could provide platforms to support scientific observers, their presence and noise could confound research on acoustic behaviour. In addition, the Group was asked to collectively submit references of ongoing or completed research activities that would help to further discussions on whales and vessel impacts, and a preliminary listing of those references was initiated.

The Group agreed to focus on information necessary to assess any long-term effects of whalewatching on the status of the whale stocks affected by whalewatching activities. A list could then be developed of population parameters and related information to be monitored by researchers, working independently or in association with whalewatching operations, and used to detect and evaluate changes in the status of whale stocks that might result from exposure to whalewatching activities. Such parameters could include measures of whalewatching effort, seasonal abundance-density of whales in whalewatching areas, habitat use patterns, measures of fecundity or calving rates of individuals and evidence of physical injury such as propeller scars or other collision damage. While there was general agreement on this approach, there was no further discussion.

Carlson proposed that a workshop be convened immediately before the 2000 meeting of the Scientific Committee to expedite the collection, exchange and synthesis of information necessary to assess long-term effects of whalewatching on cetaceans. This is discussed further under Item 10.

5.2 Other

Simmonds summarised SC/51/WW4 which examined the increasing scale of whalewatching in the Caribbean. The authors noted that in 1991 an estimated 1,914 people went whalewatching in the greater Caribbean and by 1998 this number had increased to an estimated 39,000 people. Based on the numbers of whalewatchers, the average annual increase between 1994 and 1998 was 20.2%. The extent of such activities and the potential for further expansion makes monitoring of the potential effects of whalewatching of great importance. The authors produced a table listing a number of land-based locations that they believed could be used to monitor and study the potential effects of whalewatching in the region (Appendix 2).

Gordon presented SC/51/WW7 which described the current state of whalewatching in the Azores and new biological findings relevant to its future development and management. Whalewatching directed at sperm whales and dolphins started in this region as a commercial activity in 1992 and has since grown rapidly so that there are now 12 boats engaged in the activity. Most of these are fast, rigid-hulled inflatables, and all but one operates entirely or largely in a small area to the south of the central group of islands. In response to concerns about the rapid development of this industry, regulations were developed and adopted by the Regional Government to control minimum approach distance, the number of boats involved, swimming with whales (which is prohibited) and the provision of special protection for calves. Film-making and scientific research are also subject to these regulations. Licence fees may be levied to pay for monitoring and management. Research on sperm whales was conducted from a 14m long research vessel from 1987-1995. Some additional comparable data was obtained by one of the whalewatching operators. These data were analysed to provide information relevant to the management of Azorean whalewatching and are presented in more detail in SC/51/CAWS25-28.

Gordon summarised the research findings noting that, while sperm whales and dolphins were distributed throughout the Azores, the area in which most whale activity is currently focused is not the area with the highest relative whale abundance. This suggests that future expansion of the industry could occur in other locations within the Azores. Newly born calves were observed in each month between June and September and the proportion of calves increased steadily through each season, therefore confirming that calving is taking place in these waters. It is appropriate that the new regulations give calves a higher level of protection. The proportion of encounters with mature males was lowest in July, which is consistent with historical whaling data from the area. There was no evidence for the existence of discrete calving or nursing areas that might warrant particular protection. Individual identified whales were seen in the islands in different years and in different months throughout seasons, however there were no animals that were 'resident' within small areas, as is the case for some sperm whales in New Zealand. There were some differences in the depths and ranges from shore at which different components of the population were most likely to be encountered. The proportion of encounters with mature males was highest in offshore waters, $>2{,}000$m deep, while sightings of mature females and suckling calves were highest 24-30km offshore in water depths between 750-1,250m. The latter group are within easy reach of the shore-based whalewatchers. Headings and movements of tracked animals showed that most movement was parallel to the shore with a mean rate of movement of ~ 2.2km hr^{-1}, suggesting that whale groups could typically be within areas of whalewatching activities for about a day.

Gordon noted that the overall proportion of encounters with mature males was some 10% of that expected on the basis of local whaling data. Whitehead *et al.* (1997) made similar observations in the Galapagos Islands and suggested that this was due to the effects of whaling removing males from the population. In the case of the Azores, the authors suggested a more likely explanation was an increase in the distribution of females and immature males in the islands that might have been avoiding the area during the whaling era. If this is the case then the success of the current whalewatching industry would not have been possible without the cessation of whaling in 1985. Gordon pointed

out that most of this work was based on simple observations so that it should be possible for observers on whalewatching vessels to continue to make them in the future. The existing dataset could serve as a baseline for future studies involving the whalewatching industry.

Gambell and Gordon commented that, following initial concern over the implementation of regulations governing whalewatching operators, there was general support for the regulatory programme from the whalewatching operators themselves. It was Gambell and Gordon's understanding that fees collected for whalewatching licences would be used to pay for the cost of the management programme including the research necessary to monitor and evaluate the effects of whalewatching, and therefore benefit their commercial operations. Gordon noted that to avoid a conflict of interest and to remain independent, research and monitoring in the future would likely be conducted by local university scientists and not the industry itself.

6. ASSESSMENT OF SHORT-TERM REACTIONS

Kato summarised SC/51/WW2 which presented the results of surveys on the reactions of humpback whales to whalewatching boats in the Bonin (Ogasawara) Islands, Japan. He noted that whalewatching guidelines were developed and agreed by members of the Ogasawara Whalewatching Association, and that these were followed by all whalewatching operators on a voluntary basis. The survey was conducted in 1996 and 1997, and consisted of two components: a land-based sightings survey from a 150ft tall observation site; and a pilot acoustic survey designed to characterise vessel noise. Land-based observations totalling 153 hours indicated that whales hesitated in response to close approaches of less than 50m by whalewatching vessels and changed their direction of movement. Continuing analyses of these data include information on the source level and frequency characteristics of sounds produced by the whalewatching vessels. Dawson noted that an *a priori* assumption that a particular behaviour was associated with disturbance was difficult to justify. He suggested that a more powerful statistical comparison would be to compare the behaviour of individual whales in both the presence and absence of whalewatching vessels, and that this approach would control for differences among age and sex classes of whales.

Simmonds presented SC/51/WW3 which described an unusual event where two bottlenose whales (*Hyperoodon ampullatus*), which are usually observed in deep water, entered a shallow bay in Scotland in the summer of 1998 and remained in the bay for over a month. The paper described the regular cycle of quiet and energetic activities of the animals over three days from land-based observations. The presence of the two whales in the small bay provoked considerable public interest and, despite laws designed to protect wildlife from disturbance, the whales were visited continuously by commercial whalewatching and public vessels. There were no official guidelines for the regulation of the public approaching the whales and there was general concern that the overwhelming interest in this unique event could seriously disturb the animals. In response, local authorities published articles in the local newspapers requesting that the public refrain from approaching the whales. Recommendations including minimum approach distances for vessels and kayaks, as well as recommended vessel speeds within the bay for minimising disturbance to the whales were posted in public places and the public were urged to avoid unnecessary contact with the whales or actions that might cause them distress. SC/51/WW3 made recommendations for monitoring such situations, in particular that continuous acoustic recording might aid in the interpretation of whale behaviour. The sub-committee noted that unique events like this often attract public and media attention, and that mitigating the potential disturbance to these whales can be difficult even with regulations or guidelines for whalewatching in force.

Findlay introduced SC/51/WW8 which described South African right whales that are being exposed to increasing levels of vessel traffic, with unknown short- or long-term consequences. The behaviour of groups of southern right whales was monitored from shore-based platforms, before, during and following controlled approaches by vessels, some attempting to obtain biopsy samples. Swimming speeds and directions were measured by survey theodolite and behaviour events were counted for 10-minute time blocks during each of the pre-approach, approach and post-approach phases. Results were analysed by type of approach, vessel type and whale group size. Significant changes in swimming speed and direction were recorded during approaches where biopsy sampling was attempted. Whales actively approached vessels to within a body length on just over 48% of the approaches. The results suggest that southern right whales can be approached by vessels with little or no change in their short-term behaviour. The consequences of exposure to right whales of such approaches in the long term is unknown.

Carlson summarised SC/51/WW11 which addressed the increased risk to whales due to high-speed whalewatching vessels. In recent years there has been a dramatic increase in the use of high-speed vessels (capable of cruising at 25kts or greater) for whalewatching. The use of this type of vessel in areas populated by whales needs to be addressed due to the increased risk of collision associated with increased speed. For example, during 1998 two whales were struck by vessels travelling at high speed and one was known to have been killed. Local experience suggests that vessels travelling at slower speeds have improved opportunity to detect whales and reduce the risk of collision. The author of SC/51/WW11 noted that whales are likely to become accommodated to the sounds and behaviour of whalewatching vessels and that this would make them more vulnerable to collision. In addition, when travelling at high speed, the search and reaction time of vessel operators is reduced and this contributes to increasing the risk of a collision with a whale.

Ohsumi questioned if there was any information on efforts to make vessels more 'acoustically' visible to whales so that the animals may detect and therefore avoid them. Clark reported that preliminary evaluation of the use of acoustic devices to warn whales of the presence of approaching vessels indicated that, due to the poor sound transmission between a shallow sound source and a shallow receiver (the whale), by the time a whale could hear a vessel travelling at 20-30kts, the short time available for the animal to determine the direction of approach of a vessel travelling at such speeds would likely preclude the animal's ability to avoid the vessel.

Clark commented that, with regard to the potential risk of vessel strikes for species of concern, it might be valuable to model the risk of collision by integrating the distribution of cetaceans in space (x, y, z) and their frequency distribution for times at depth with vessel speed, movement and number. This approach emphasises the need for specific observation data (i.e. species and locality) on whale distribution and diving behaviour as related to social context (e.g. nursing, feeding and transiting). This would yield predictions on the

number of collisions as a function of vessel and whale behaviour, and allow a more quantitative assessment of collision risk. The same general approach could further be used to estimate noise exposure as a function of vessel noise, and whale depth and range. This analysis would probably reveal that for a high speed vessel and a whale near the surface (e.g. < 3m depth) the animal will not hear an approaching vessel and will have great difficulty determining its direction until it is quite close (e.g. < 500m), and that the whale will have little time (e.g. < 30 seconds for a 60km/hr vessel) to avoid being struck. The sub-committee concluded that vessels travelling at high speeds through areas populated with whales pose an increased risk of collisions with these animals, and **recommends** that managers discourage the operation of high speed vessels in these areas and, if possible, vessel operators should use observers when transiting through areas occupied by whales.

While the sub-committee acknowledged that the whalewatching programmes described in SC/51/WW2 and SC/51/WW7 included key components necessary to regulate commercial whalewatching and to monitor its potential effects, it took note of the statement in SC/51/WW7 that researchers must 'give precedence to commercial operators observing the same group of whales.' The sub-committee expressed the view that, in the context of conducting research aimed at evaluating the potential effects of whalewatching, scientific research should be given high priority.

The sub-committee then discussed several aspects of the interactions between whalewatching and scientific research. Best commented that whalewatching activities can in some instances prevent research from being conducted. For example, the noise produced by whalewatching vessels will confound acoustic research on whale vocalisations, or the public sensitivity to invasive research methods, such as biopsy collection, may prevent this information from being collected by researchers. Dawson responded that if researchers make the effort to inform the public about the importance of the research and its objectives, and explain the necessity and value of obtaining such samples, the public will view the scientific methods more favourably. In this regard, researchers need to be aware of the effects research activities can have on limiting whalewatching activities. This could occur, for example, if regulations stipulate a maximum number of vessels that are allowed in close proximity to a whale, the presence of one or more research vessels may preclude a whalewatching vessel from approaching legally. Swartz commented that, in some instances, whalewatching provides the only means for researchers to gain access to whales for the purpose of obtaining information that they otherwise would be unable to obtain. The sub-committee agreed that, depending upon the circumstances, whalewatching could aid or hinder scientific research.

7. ASSESSMENT OF LONG-TERM REACTIONS

SC/51/WW1 explored the question of whether whalewatching activities were capable of contributing meaningful information that could be used to assess the long-term status of whales and, if so, how best such information could be gathered and what specific information would be most useful to collect. The author noted that organised whalewatching constituted searching effort for whales similar to a dedicated scientific survey, but that whalewatching trips were scheduled according to the desires of passengers and not scheduled according to a statistically based sampling design. While whalewatching vessels can serve as observation platforms, there must be a dedicated mechanism to collect this information. Generally, this is accomplished by volunteers and/or paid naturalists and scientists who collect data (e.g. photographic identification, behaviour observations, etc.) and are able to offer information to the paying passengers. If information is obtained, this must be passed to a dedicated research organisation or scientific group that can archive, analyse and interpret the information for a particular whale species.

With regards to the data that would be most useful for assessing the long-term status of the whales, SC/51/WW1 noted that these should include:

(1) some measure of whalewatching effort;
(2) seasonal presence or absence of whales within the area where whalewatching occurs;
(3) changes in the use of specific habitats used by whales (subset of point 2);
(4) reproductive success of known individuals (e.g. number and frequency of calves produced);
(5) evidence of physical injury or illness.

Swartz commented that for whalewatching activities to contribute to the long-term assessment of whale status they should be matched by or linked to dedicated independent scientific investigations that can archive data and undertake and interpret appropriate analyses. As examples of such programmes, he noted the success of the US New England whalewatching fleet and its ongoing contribution of photographic identification and other information to the study of right and humpback whales along the North Atlantic coast of the United States, and the contributions of a volunteer whalewatching network to the understanding of perceived changes in the migratory behaviour and timing of eastern North Pacific gray whales along the western coast of the United States (SC/51/AS11).

Kingsley commented that SC/51/WW1 described a data gathering system that was similar to scientific sampling carried out in many commercial fishing operations, where it is mandatory that certain information on catch and fishing effort is collected and recorded in logbooks by each fisher. He also noted that the fishers are aware of the importance of these data, that they will be used in an annual assessment, and that the results of these assessments are used to manage their fishery. Thus, this data gathering requirement serves as an incentive for the fishers to see that accurate and timely information is reported. Best noted the similarity with previous reporting requirements for commercial whalers some of which produced data which were found to be unreliable and, like indices of Catch Per Unit Effort (CPUE), cannot be confidently used to assess the status of stocks. He suggested that it would be better to first define what specific information would be required to assess the status of a whale stock and then see if this information could be provided by whalewatching activities, rather than attempting to assess status from the types of information that could be obtained from a particular whalewatching operation.

Kingsley commented that while there are active concerns about short-term effects to whales from whalewatching in the St Lawrence Seaway, he was not aware of concerns being expressed about long-term changes in the utilisation by the whales of the areas where they were exposed to whalewatching activities. He also cautioned that whales exposed to whalewatching activities may represent only some unknown portion of a stock, and that drawing

inferences about long-term effects on the entire stock could be biased unless the status of the entire stock were known or it was known that the entire stock was exposed to the whalewatching activities. Brown commented that off the east coast of Australia there is an indication that the proportion of the humpback whale population visiting Hervey Bay may not be increasing as fast as the overall population, yet the whalewatching industry maintains that this is not the case and there are more whales than ever within the bay.

With regard to evaluating long-term effects, Best stated that it was important for specific research objectives to be clearly defined to identify the specific information that is required for the assessment of status. For example, the amount of whalewatching individual whales or groups of whales are exposed to would need to be measured to assess changes in individual productivity derived from photographic identification studies. He noted that in instances where annual reproduction occurred in a specific location (e.g. a particular portion of coastline, or bay), any detrimental effects from exposure to whalewatching could affect an entire years production and therefore affect the status of the stock. He also cautioned that encouraging whalewatching operators to obtain photographs would encourage them to get as close as possible to whales and this could increase disturbance and possibly cause the operators to violate regulations governing minimum approach distances. Findlay commented that even if shifts in distribution or changes in the use of a particular habitat are not noted, this does not indicate that whales are not being disturbed by whalewatching activities but that perhaps they are merely tolerating the disturbance because the habitat is important to them and they have no alternatives.

In regard to the reliability of non-scientific observers to provide information, Kingsley pointed out that the most reliable information that one could expect from a whalewatching vessel operator would include travel time to destination, weather conditions, location of whales encountered, the species seen, time spent with them and travel time back to port. For any other information to be reliably collected would require a trained researcher. Ohsumi referred to SC/51/WW2 where a well organised whalewatching organisation described which was responsible for conducting research on the effects of whalewatching, thus assuring that the information required to evaluate the effects of whalewatching would be collected. This organisation employs professional researchers who provide specific advice to the whalewatching industry. Ohsumi stated that this is essential for providing the data necessary to evaluate the long-term effects of whalewatching. While the sub-committee recognised the importance of qualified researchers conducting these kinds of programmes, Clark noted that there also exist successful 'citizen science' model programmes that involve private citizens and provide them with opportunities to make contributions to scientific investigations. Important aspects of these programmes include training on how to make and report observations, providing the contributors with a sense of the importance of the information they are gathering, and feedback informing them of the value of the information and the goals and benefits of the science programme.

The sub-committee discussed the scale of population changes that would need to be considered to assess the status of whale stocks, and the scale of the information that would be required to assess the nature of such changes. Clark commented that differences in the temporal scale and magnitude of the effects desirable for detection can limit the contributions of whalewatching. For example, the limited scope of whalewatching activities could not be expected to detect population effects attributable to global warming, but could be useful in describing reactions to vessel disturbance in the short and over the long term. Similarly, the coast wide whalewatching network described in SC/51/AS11 allowed an expansion of the analysis of gray whale migratory timing beyond the single location where primary observations of migrating whales are obtained, and subsequently a clearer understanding of the status of the population's migration.

Best noted that detection and evaluation of long-term responses to whalewatching would require 'control' or baseline information on whales before they are exposed to whalewatching, or exclusion zones or other populations that were not exposed to whalewatching. Peréz-Cortés noted that such an experiment was underway along the peninsula of Baja California where one area utilised by gray whales has been closed to whalewatching activities and is being monitored to observe the responses of the whales. Brown provided an example where a monitoring programme was initiated to investigate the potential effects of whalewatching beginning at the outset of whalewatching activity in Hervey Bay, Australia. Aerial surveys were conducted in 1988, 1989 and 1990. During this period the numbers of permitted whalewatching vessels increased from two to twenty. Unfortunately, the survey design was modified in 1991 and the programme discontinued the following year. The status of humpback whales in Hervey Bay was recently discussed at the humpback whale seminars held in Brisbane in October 1998, and there was interest in resumption of the monitoring programme and comparison of new results with the previous surveys. It was hoped that the 1998-1990 surveys would provide a baseline to detect changes in the use of Hervey Bay by humpback whales.

Clark noted that in some instances control periods or areas without disturbance are not available, and programmes must evaluate responses of whales to disturbance by identifying and measuring specific parameters (e.g. movements, direction changes, surface-dive behaviour, vocal behaviour, breathing rates, etc.). These programmes do produce information that is useful for the evaluation of short- and long-term effects from exposure to disturbance (e.g. whalewatching, vessel traffic, underwater sound production, ATOC – Acoustic Thermography of Ocean Climate) in the absence of controls. Clark pointed out that pre-exposure control periods should not be made a requirement for evaluating responses to disturbance, as any conclusions regarding cause-effect relationships between whales and whalewatching or any other source of anthropogenic disturbance will be difficult to draw. The sub-committee recognised that a number of models exist for the design of such experiments, and that the appropriate design would depend upon the specific situation to be investigated and its objectives. The sub-committee agreed that this topic requires further discussion and invites members to submit examples of research and monitoring programmes that utilise various experimental designs (e.g. with and without controls) and other research approaches to the convenors of the proposed workshop discussed under Item 5.

The sub-committee concluded that whalewatching programmes have a limited capability to provide information to assess the long-term status of whales. However, to varying degrees, whalewatching programmes have the potential to contribute valuable information to dedicated scientific research programmes aimed at assessing the status of whale stocks over the long term. The sub-committee agreed that whalewatching programmes should include a scientific

monitoring programme to gather information on the potential effects of whalewatching, and that such programmes should be conducted by qualified scientists. The sub-committee further commented that these scientific monitoring programmes should be impartial and that management authorities need to utilise the information generated to review, evaluate and, as appropriate, modify their regulations governing the whalewatching operations to avoid long-term irreversible effects. In this regard, the sub-committee **recommends:**

(1) wherever practical and appropriate, the assessment of the potential effects of whalewatching operations on cetaceans should be undertaken and overseen by independent scientists;
(2) whalewatching interests (i.e. members of the industry and national licensing authorities) need to be sensitive to the need to effectively monitor cetacean populations that are the focus of whalewatching activities to ensure that whalewatching activities are sustainable and not otherwise detrimental to the cetaceans in question;
(3) national licensing authorities or other regulatory bodies should:
    (i) ensure that investigations into the effects of the industry on cetaceans and other scientific studies are accommodated along with the interests of the industry and
    (ii) encourage the industry to recognise the value of scientific research for its own benefit and for wildlife conservation in general;
(4) in instances where there are no national licensing authorities or regulatory bodies, the whalewatching industry should conduct the activities listed under (1) and (2) as part of their operations.

8. COMPARATIVE STUDIES

Leaper presented SC/51/WW10 which described a method for tracking whales and measuring distances between whales and vessels using a combined video and compass binocular system. This system can provide accurate data on the position of whales and vessels from a moving vessel at sea similar to that obtained by land-based theodolite tracking studies. The system consists of a video camera and binoculars mounted on a frame which rests on the observer's shoulder. The observer's height above sea level was 4m. The video images were analysed on a computer to obtain range from the angle of declination below the horizon. Bearings read from the compass binoculars to the whales and vessels were recorded verbally on the video's audio track. SC/51/WW10 presents results from a study which used this tracking system to document the movements of North Atlantic right whales in the Bay of Fundy, Canada. Calibration tests were conducted under a variety of conditions, and positions of whales were obtained within a root mean square error of 40m in radial distance from the true position of a whale. Observations included small-scale movements, breathing rates, surfacing patterns and spatial structure of right whale aggregations. The accuracy of these measurements could be improved considerably by using a higher observer platform and a differential GPS system. The sub-committee welcomed the application of this technology as it provides a cost-effective means to accurately measure the distance between whales and vessels for behavioural research, and noted that such a system could potentially aid with the enforcement of whalewatching regulations.

9. DOLPHIN FEEDING PROGRAMMES

There was no new information on dolphin feeding programmes provided for review at this year's meeting. The sub-committee reiterated its view that the concept of dolphin feeding did not concur with the principal that cetaceans should 'be allowed to control the nature and duration of interactions', and agreed to keep this item on its agenda. The sub-committee requests that member governments provide new information at next year's meeting. The sub-committee recalled that it had previously reviewed information on the dolphin feeding programme at Monkey Mia, western Australia, and it believed that this agenda item should be revisited at its next meeting to review any new information for all dolphin feeding programmes.

10. WORK PLAN

The sub-committee believed that the proposed Whalewatching Workshop discussed under Items 5 and 7 would expedite the collection, exchange and synthesis of information necessary to assess long-term effects of whalewatching on cetaceans, and **recommends** that this workshop be convened immediately before the 2000 meeting of the Scientific Committee. The sub-committee noted that the convening of such a workshop separate from the Scientific Committee meeting would, among other things, allow Committee members to participate who would otherwise be unable to attend these discussions during the regular Scientific Committee meeting. It would also provide a period of time to focus on the relevant issues without the encumbrance of the Scientific Committee's regular work schedule. Carlson proposed that the workshop begin three days before the Scientific Committee meeting: two days for the presentation and discussion of the issues, and one day to produce a report of the proceedings. She indicated that approximately £8,000 will be required to ensure that invited participants with specific expertise other than members of the Scientific Committee would be able to attend. Carlson also noted that a no-cost venue for the workshop is being investigated as well as government and private sector sponsorship.

The Terms of Reference for this workshop would be:

(1) The identification and presentation of case studies of established whalewatching programmes and accompanying research programmes to monitor the potential effects of whalewatching (e.g. history of the whalewatching programme, trends in whalewatching effort, cetaceans species watched, experimental design utilised to monitor these programmes including data collection techniques, and analyses).
(2) The development of a list of population parameters that can be monitored in conjunction with whalewatching programmes and used to assess the long-term status of whale stocks. Such parameters might include: seasonal abundance and density in whalewatching areas; habitat use patterns; measures of fecundity or calving rates of individuals; and evidence of physical injury, etc.

The sub-committee **recommends** that an intersessional planning group be convened by Carlson and include Brown, Findlay, Gambell, Gordon, Hiby, Kato, Simmonds, Swartz and Thiele. The planning group should work intersessionally to develop the agenda and plan the workshop. The sub-committee also **recommends** that a statistician be included on the planning group to advise on the development of a list of suitable population parameters to be monitored.

Moronuki registered his reservation on holding the workshop since issues concerning whalewatching are outside the competence of the IWC. He believed that the limited budget available should primarily be used for the original objectives of the IWC.

The sub-committee accepted its work plan for next year's meeting. These items are listed in priority order as follows.

(1) Review the findings of the workshop on assessing the long-term effects of whalewatching on whales.
(2) Review the updated report on National Whalewatching Guidelines.
(3) Review new information on dolphin feeding programmes.
(4) Review 'swim with' programmes that involve whales and dolphins.

Other matters, including ongoing research programmes and new methods to assess the effects of whalewatching, will be considered as a matter of course.

With regards to the proposed whalewatching workshop, Carlson brought to the sub-committee's attention a report from the Saguenay-St Lawrence Marine Park, Fisheries and Oceans, Canada and Transport Canada entitled 'Proceedings of the Regional Workshop on Whale Watching Activities at Sea'. This workshop brought together representatives of the scientific community, the tourist industry, interest groups and government branches both involved and interested in whalewatching. The objective of the workshop was to ensure the protection of marine mammals as well as the sustainability of whalewatching activities. Carlson suggested that this detailed report would be a valuable background document and that she would arrange for copies to be available at next year's workshop. Brown added that the report of the 1998 meeting in Brisbane, Australia on whalewatching and humpback whales would also be relevant, and that she would obtain a copy for the workshop planning committee.

11. OTHER MATTERS

Fulford informed the sub-committee that the UK Foreign and Commonwealth Office (FCO), through the Department of Environment, Science and Energy in London, had written to the British Overseas Territories in the Caribbean on the possibility of hosting a workshop on whalewatching in the Caribbean in one of the territories next year. Caribbean nations will be invited to participate. The cost of such a workshop is under discussion, and the Turks and Caicos Islands have submitted a bid to host the workshop. An initial relevant contribution to the issue of whalewatching in the Caribbean was the submission of SC/51/WW4 to this year's meeting of the Committee, which collated responses from some Caribbean nations. The Turks and Caicos Islands have endorsed the proposed workshop and will convene a planning team. The sub-committee welcomed this information, encouraged that the proposed workshop on whalewatching in the Caribbean go forward and will look forward to the workshop report.

12. ADOPTION OF THE REPORT

The report was adopted at 11:40 on Monday 10 May, 1999.

REFERENCES

Carlson, C.A. 1996. A review of whalewatching guidelines and regulations around the world. Paper SC/48/O25 presented to IWC Scientific Committee, June 1996, Aberdeen (unpublished). 59pp.
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International Whaling Commission. 1999. Chairman's Report of the Fiftieth Annual Meeting. *Ann. Rep. Int. Whaling Comm.* 1998:3-61.
Whitehead, H., Christal, J. and Dufault, S. 1997. Past and distant whaling and the rapid decline of sperm whales off the Galápagos Islands. *Conserv. Biol.* 11:1,387-396.

Appendix 1

AGENDA

1. Opening remarks, election of chairman and appointment of rapporteurs
2. Adoption of agenda
3. Review of available documents
4. Commission's comments from IWC50
5. Review of whalewatching guidelines
   5.1 Report of intersessional working group
   5.2 Others
6. Assessment of short-term reactions
7. Assessment of long-term reactions
8. Comparative studies
9. Dolphin feeding programmes
10. Work plan
11. Other matters
12. Adoption of report

Appendix 2

THE DEVELOPMENT, VALUE AND STUDY OF WHALEWATCHING IN THE CARIBBEAN (TABLE 2 FROM SC/51/WW4)

Erich Hoyt and Glen Hvenegaard

Potential land-based monitoring and study sites in the Greater Caribbean.

Country/dependency	Land-based monitoring and study sites	Species
Antigua & Barbuda	Shirley Heights	*Megaptera* (January-March)
	Indian Creek	*Tursiops*
	North of Spanish Point (Barbuda)	*Stenella frontalis; Tursiops*
Bahamas	Hole-in-the-Wall Lighthouse, Abacos[1]	*Stenella frontalis; Tursiops;Physeter; Megaptera; Pseudorca; Globicephala; Mesoplodon* spp.
	Lighthouse on Elbow Cay, Abacos[1]	*Tursiops* etc.
Dominica	Scotts Head	*Physeter; Delphinidae* spp.
	Pointe Michel	*Physeter; Delphinidae* spp.
	West coast (high vantage points)	*Physeter; Delphinidae* spp.
Dominican Republic	Cabo Francés Viejo[2]	*Megaptera* (January-March)
	Cueva de Agua[2]	*Megaptera* (January-March)
	Punta Balandra Light[1]	*Megaptera* (January-March)
	Cabo Samaña	*Megaptera* (January-March)
	Cabo Engano	*Megaptera* (January-March)
	Parque Nacional del Este (SE DR)	*Delphinidae* spp.
Guadeloupe (France)	West coast (high vantage points)	*Physeter; Delphinidae* spp.
Martinique (France)	West coast (high vantage points)	*Physeter; Delphinidae* spp.
Puerto Rico (USA)	Aguadilla	*Megaptera* (January-March)
	Punta Higuera lighthouse (near Rincon)[1]	*Megaptera* (January-March)
St Lucia	Anse Chastanet and vantage points over Soufriere Bay	*Physeter*; *Delphinidae* spp.
	Northwest coast (high vantage points)	*Physeter*; *Delphinidae* spp.
Turks and Caicos (UK)	Provo	*Tursiops*; *Stenella* spp.
	Salt Cay[2]	*Megaptera* (January-April)

[1] Has been used for scientific research and monitoring of cetaceans.
[2] Prime land-based sites used already for whale watch tours, etc.