Annex F

Report of the Sub-Committee on Bowhead, Right and Gray Whales

Members: Kitakado (Convenor), Acquarone, Baba, Bachmann, Bannister, Best, Bickham, Borodin, Brandão, Brandon, Breiwick, Brownell, Butterworth, Campbell, Cañadas, Castellote, Cerchio, Childerhouse, Clapham, Cooke, Darling, Deimer-Schütte, Donovan, Ensor, Ferguson, Flores, Frasier, Fujise, Funahashi, Galletti, Gedamke, Givens, Goodman, Groch, Heide-Jorgensen, Hoelzel, Iñiguez, Ivashenko, Jaramillo-Legorreta, Kanda, Kato, Koch, Koski, Lang, Larsen, Lyrholm, Mate, Matsuoka, Miyashita, Moore, Muir, Murase, Øien, Okada, Okamura, Palka, Pampoulie, Pastene, Punt, Reeves, Roel, Rojas-Bracho, Rosa, Rose, Rosenbaum, Rowles, Scordino, Sekiguchi, Simmonds, Sironi, Suydam, Taylor, Tyurneva, Uoya, Urbán, Vladimirov, Wade, Walløe, Waples, Weller, Werner, Wiig, Witting, Yamakage, Yasokawa, Yoshida, Young, Zerbini.

1. OPENING REMARKS, ELECTION OF CHAIR AND APPOINTMENT OF RAPPORTEURS

Kitakado welcomed the participants and was elected Chair. Best, Brandon and Suydam were appointed to act as rapporteurs with assistance of Kanda.

2. ADOPTION OF THE AGENDA

The adopted Agenda is given as Appendix 1.

3. REVIEW OF AVAILABLE DOCUMENTS

The documents available for discussion by the sub-committee included SC/62/BRG2–6, 9–11, 13–20, 23–31, 33–34, SC/62/O7, SC/62/NPM22, SC/62/E13, SC/62/Rep3, Higdon (2010), Pettis (2009a) and Wade *et al*. (2010).

4. BOWHEAD WHALES

4.1 Bering-Chukchi-Beaufort (B-C-B) Seas stock of bowhead whales

4.1.1 New scientific information

SC/62/BRG13 presented preliminary analyses of broad-scale aerial surveys for large whales in the northeastern Chukchi Sea that were conducted in 2008 and 2009, in comparison with results from similar surveys conducted in that region from 1982–91. The existing study area extends from 68° to 72°N and from 157° to 169°W, encompassing the Chukchi Sea Planning Area (CSPA), which is an area of renewed interest for the exploration, development, and extraction of offshore petroleum resources. There were 77 on-effort sightings of 107 bowhead whales in the Chukchi Sea from 1982–91 and 2008–09. Bowhead whales were seen in all survey months, with the greatest number of sightings in October. Most whales were seen west and southwest of Pt Barrow, with a few sightings in the northwestern region. Bowhead sightings were within the CSPA and close to active leases. The largest bowhead sighting rates (all years combined, uncorrected for detection bias) with respect to depth were in the outer shelf, in waters ranging from 50–200m depth. The distribution of bowhead sightings during the light ice years of the early period (1982, 1986, 1989, and 1990) was similar to the distribution of bowhead sightings during 2008–09. Aggregations of feeding bowhead whales were observed relatively close to shore between Point Franklin and Point Barrow on three occasions: (1) 17–18 October 1983 (in 70–80% ice cover); (2) 30 June to 11 July 2009 (5–80% ice cover); and (3) 19 September 2009 (no ice cover).

The other large whale species sighted during the COMIDA surveys were gray (254 on-effort sightings of 533 gray whales), fin (one sighting on 2 July 2008) and humpback (one sighting on 25 July 2009) whales. Most gray whale sightings were recorded as 'feeding' and were seen nearshore (0 to 35m depth) between Pt Barrow and Pt Lay, with an additional area of concentration in offshore shoal areas in autumn of 1989–91. Gray whale cow/calf pairs were seen mainly in nearshore areas during the month of July, and all were sighted in 0–10% ice cover. Gray whale calves were often undetected during initial on-effort sighting events, and many would likely have remained undetected if brief diversions off-effort were not initiated.

The sub-committee thanked the authors for this update, especially in light of the oceanographic and climactic changes that have occurred in the Chukchi Sea in recent decades. In discussion, it was noted that there did not appear to be any major shifts in cetacean distribution between the earlier surveys and those during 2008–09. But, there were no gray whale sightings in the offshore shoal areas during 2008–09, which was unexpected. It was also noted that the observations of feeding bowhead whales to the west of Pt Barrow may better delineate the range of that feeding aggregation. In general, it was noted that analysing cetacean distribution in relation to environmental factors like sea-ice was complicated with this dataset because the timing of the surveys was not consistent between years. The authors plan on addressing the challenges of analysing cetacean distribution and habitat relationships in future analyses.

SC/62/BRG14 presents preliminary results from broad-scale aerial surveys for bowhead whales in the Alaskan Beaufort Sea conducted by the Bowhead Whale Aerial Survey Project (BWASP) in 2000–09, with comparisons to historical data. The BWASP study area ranges from 140°–157°W and from the Alaskan coast to 72°N. The surveys have been conducted every autumn since 1979. During 2000–09, nearly 190,000 total km were flown in September and October, with over 93,000km on transect. A total of 1,429 bowhead whales were seen, distributed across the study area on the inner shelf (in waters less than 50m deep). Bowhead distribution was similar in 2000–09 compared with the observed distribution from earlier years with light ice cover. Feeding and milling bowhead whales were recorded across the study area, but with highest frequency in the westernmost region (154°–157°W longitude). Incidences of feeding behaviour by bowheads in the Alaskan Beaufort Sea is likely underrepresented in the BWASP database because the goal of conducting line-transect surveys impedes focal observations of individual sightings, resulting in very little time to observe and identify definitive characteristics of feeding behaviour. Bowhead cow/calf pairs were observed across the Alaskan Beaufort Sea. Bowhead calves were often undetected during the initial on-effort sighting event, and would likely have remained undetected if brief diversions off-effort (in search or circling mode) were not initiated.

The sub-committee thanked the authors for presenting these data and **recommended** that these surveys continue on an annual basis in the future in light of their capacity to monitor the effects of climate change and other factors (including anthropogenic activities) on cetacean distributions in the Beaufort Sea. In discussion, the author noted that it is not advisable to make detailed conclusions from the BWASP data without accounting for the spatiotemporal variability in the distribution of survey effort. The possibility of extracting trend data on a sightings-per-unit-effort basis was discussed, but the authors noted that this was not recommended until detection functions had been developed which could take into account sightability as a function of environmental variables and especially sea-ice cover (given that the latter is known to have changed through time). Likewise, no conclusions could be drawn with respect to bowhead calf sightings at present, because those had not been corrected for effort and any such analyses would also need to take into account the fact that cows and calves migrate farther offshore than the rest of the population.

SC/62/BRG17 provided information about acoustic monitoring during attempts to count migrating bowhead whales near Point Barrow, Alaska. In early April 2009, four marine autonomous seafloor recorders were deployed off Pt Barrow Alaska during the bowhead spring migration (see George and Suydam, 2009). The primary objective of this effort was to demonstrate that this equipment could effectively replace the previous mechanism that relied on an array of hydrophones deployed from the ice edge for recording calling and singing bowheads. Three of the four recorders were recovered in early August 2009. Preliminary analyses based on one hour of data/day detected singing or calling bowheads on 36 of the 40 days for the 10 April–18 May 2009 period. Preliminary analysis further indicates that the multi-channel data collected with this type of autonomous seafloor array can be used to reliably locate and acoustically track actively vocalising bowheads as they migrate past Barrow. Results from this 2009 acoustic effort demonstrate the efficacy of this new seafloor array procedure and indicate that it can be used in the future as the method for obtaining acoustic data for the bowhead census and population estimation process. In early April 2010 an array of five recorders were deployed along the ice edge, and their recovery is scheduled for sometime in early August 2010.

The sub-committee welcomed this report and **encouraged** the continued use of autonomous seafloor acoustic recorders when monitoring migrating bowhead whales.

SC/62/BRG29 summarised preliminary analyses on identifying yearling bowhead whales in aerial photographs collected during spring near Barrow, Alaska. Small whales were noticed near the end of the spring migration during photographic studies conducted 1985–92 and talks with whalers identified these late-season small whales as potential yearlings. Measurements of body length, snout-to-blowhole distance, fluke width, and width at the axilla, umbilicus, anus and peduncle from whales photographed during the spring of 2004 were investigated as a means of separating yearlings from older whales. The ratios of each of the latter six measurements to body length appeared to be most suitable for this purpose and non-overlapping values for yearlings and older animals were determined by assuming that animals seen after 5 May were yearlings and animals seen before 24 April were older than one year. Based on the date, body length, and ratio data, 85% of whales 6–10m long were classified as yearlings or older. Future studies will refine the criteria for separation and investigate models to more robustly separate yearlings from older animals but the preliminary analysis confirms it is possible to do so with a high degree of confidence. Using the methods in the calf index paper by Koski *et al*. (2008), the proportion of the population that are yearlings can be estimated and compared to the proportion of yearlings the previous year to estimate calf to yearling survival. Seven additional years of photographic data are available for analyses.

In discussion, the possibility was raised that the gaps between clustered groups of individuals might have been due to inconsistent survey effort during the course of the migration. That is, gaps in body measurements between groups of animals might have been an artefact of missing a component of the migration which consisted of intermediate sized whales. The authors noted that survey coverage was excellent in 2004, and that such patterns appear to be real differences in body shape between yearlings and older juvenile whales. The sub-committee **encouraged** the authors to continue this research and looks forward to seeing results from more years of data. Suydam summarised recent efforts to estimate the population size of B-C-B bowheads. In both 2009 and 2010, there were attempts to count migrating whales from observation perches on pressure ridges on the sea ice near Point Barrow, Alaska. In 2009, the lead in the sea ice was closed during most of April and May making a population estimate impossible. In 2010, the lead was opened in late March and early April. Of note, there was a sizable passage of whales at that time, which is unprecedentedly early compared to the past ~35 years. Typically bowheads are not seen until mid-April. The lead was then closed during most of the last two weeks of April. Based on previous years' counts, a large percentage of whales migrate past Point Barrow during that time. In 2010, a large number of calls and songs of bowheads were recorded on dipping hydrophones during late April. Because observations were not possible during the last two weeks of April when a very substantial proportion of bowheads pass the perches, the population size in 2010 will not be estimated. In addition to visual counts, acoustic monitoring occurred in both 2009 and 2010 (see SC/62/BRG17 for a summary). In addition to attempting to estimate the population size, there was also an effort to estimate detection probabilities using two independent perches. Approximately 1,200 'new' whales were seen from each of the perches, and these data will be used (after identifying matches) to estimate detection probabilities. A full survey effort is being planned again in 2011.

In discussion, it was noted that the timing of this year's migration highlights the importance of monitoring the tails of the distribution of migrating whales. While this issue has been considered in previous analyses of the migration data, the observations from 2010 suggest that this concern may be magnified for future surveys.

Members of the sub-committee discussed the possibility of developing a mark-recapture estimate from genetic data. But, it was concluded that the current sample sizes are far too limited for such an approach.

4.1.2 Catch information

SC/62/BRG18 summarised the data from the 2009 Alaskan hunt. A total of 38 bowhead whales were struck resulting in 31 animals landed, a bit less than the previous 10-year average of 40.1 (SD = 7.2). The efficiency (no. landed/no. struck) of the hunt was 82%, which is about the average during 1999–2008 (mean = 78%, SD = 8%). Challenging sea ice conditions and weather contributed to a poor hunt during the spring. Of the landed whales, 12 were males, 18 were females, and sex was not determined for one animal. Of the 18 females, 6 were presumably mature (based on length >13.4m). Only two were closely examined. One was pregnant with a 1.63m foetus. Biologists were not able to examine the others because they were landed in remote villages or were butchered in the water. Hunters mistakenly harvested two female calves (lengths of 6.2 and 6.6m) thinking they were small independent whales. Autumn calves are close in body length to yearlings and it is difficult to determine their status when swimming alone.

It was noted in discussion that there were no catches of bowhead whales by Russia this year.

4.1.3 Management advice

The sub-committee **reaffirmed** its advice from last year that the *Bowhead SLA* remains the most appropriate tool for providing management advice for this harvest. The results from the *SLA* show that the present strike and catch limits are acceptable.

The next *Implementation Review* for B-C-B bowheads is scheduled in 2012. The purpose of the *Implementation Review* is to evaluate new information which has become available since the last *Implementation Review* and assess whether the current state is outside the realm of plausibility covered by the *Implementation* trials. If so, it may be necessary to conduct further trials incorporating such information. Therefore, the sub-committee **encouraged** researchers to present relevant papers and new information for consideration during next year's meeting, so that preparations for the next *Implementation Review* can proceed efficiently.

The sub-committee reviewed the catch limits in table 4 of 'Proposed consensus decision to improve the conservation of whales from the Chair and Vice-Chair of the Commission' (IWC/62/7rev). For B-C-B bowheads, the maximum strike limit is 67 per year (plus a carryover provision of 15 unused strikes from the previous year) for total landed of 560 (580 written in footnote 8 should be a typographical error). The sub-committee **endorsed** the strike limits for B-C-B bowheads that are listed in table 4. These values are within the management advice provided by the *Bowhead SLA*.

4.2 Eastern Arctic bowhead whales

4.2.1 Stock structure

SC/62/BRG23 reported on the sexual segregation of bowhead whales sampled in Eastern Canada and West Greenland. This analysis of genetic markers was done in relation to the question of one or two stocks in the area (Baffin Bay-Davis Strait and Hudson Bay-Foxe Basin). One location was sampled in West Greenland: Disko Bay (April-June 2000–09) and four locations were sampled in Eastern Canada: Pelly Bay (September 2000–02), Cumberland Sound (June August 1997–2006), Foxe Basin (July–August 1994–2007) and Repulse Bay (September 1995–2005). Table 1 and fig. 1 of SC/62/BRG23 provide information about the samples. The same data were also used in the analyses presented in SC/62/BRG25 and BRG26.

The results showed that in Disko Bay 76% of the whales were females. The frequency was significantly different from 1:1, whereas in the other areas the sex ratio was not different from 1:1. In Disko Bay only adult whales and no calves have been observed. Few calves have been reported from other areas of Baffin Bay. However, females with calves and sub-adults are observed in Foxe Basin and in Gulf of Boothia/Prince Regent in late autumn. Historical whaling records clearly indicate that cows, calves, and sub-adult whales were taken in northwestern Hudson Bay. Based on these lines of evidence, the authors suggested that bowhead whales summering in the eastern Canadian Arctic and wintering off the west coast of Greenland must belong to one population; Baffin Bay is mainly used by adult males and resting/pregnant females whereas the Prince Regent, Gulf of Boothia, Foxe Basin and northwestern Hudson Bay animals are nursing females, calves and sub-adults.

The sub-committee thanked the authors for presenting these results and **encouraged** them to present an updated analysis next year, including data from 2010. It was noted in discussion that the available information is consistent with some form of structured movement, but this movement is still not well understood.

SC/62/BRG25 reported on the re-identification patterns of bowhead whales sampled in Eastern Canada and West Greenland, based on the samples and genetic markers described in SC/62/BRG23. This work was motivated by the question of stock structure (i.e. whether there is one or two stocks) of bowhead whales in the area. Samples were obtained from one location in West Greenland: Disko Bay (April–June 2000–09), and four locations in Eastern Canada: Pelly Bay (September 2000–02), Cumberland Sound (June–August 1997–2006), Foxe Basin (August 1994–2007) and Repulse Bay (September 1995–2005). The largest samples sizes were from Disko Bay (n = 359) and Foxe Basin (n = 192).

From the total of 647 identified individuals, 91 were identified within the same location and year. Of the remaining 556 individuals (208 males and 348 females), the authors found 16 re-identifications between years. Three of these were between sampling areas and all three had moved from the Hudson Bay-Foxe Basin area to the Baffin Bay-Davis Strait area. In addition, of the 20 new satellite tags put out in 2009 in Disko Bay, four animals had crossed assumed boundaries between putative stocks.

The authors concluded that: (i) the low number of re-identifications between years indicate that the population is relatively large; and (ii) the high proportion of re-identifications between areas indicate high rate of movement between the two putative stocks. Additionally, new and old satellite tag data confirms such movement between putative stocks. The results, therefore, indicate that tagged animals crossed the assumed stock boundaries in Hudson Strait and Heckla and Fury Strait. In the authors' view these results further indicate that there is only one stock of bowhead whales in the area.

The sub-committee thanked the authors for presenting their analyses and recognised the importance of the successful satellite tracking study. It was noted in discussion that it would be helpful if future presentations of the data provided the dates when re-identified whales were taken. In discussion, Givens noted that the specific stock boundaries assumed by the authors had not been based on specific data or past Scientic Committee consensus. There was considerable discussion about the resighting patterns within and between Disko Bay and Foxe Basin. But, at present there are still uncertainties in the interpretation of these patterns. The sub-committee **encouraged** the continuation of this work and looks forward to a presentation of a more in-depth analysis next year.

SC/62/BRG26 presented work on genetic differentiation of the Baffin Bay-Davis Strait and the Hudson Bay-Foxe Basin stocks of bowhead whales, using a ~450 bp fragment of the mitochondrial control region. The study included sequence data for 346 individuals from the Baffin Bay-Davis Strait and 197 individuals from the Hudson Bay-Foxe Basin stock. There was a slight but significant genetic differentiation of the two stocks in terms of F_{ST} based on haplotype frequencies. However, there was no differentiation between the Hudson Bay-Foxe Basin stock and the bowhead whales collected from Cumberland Sound, an area presumed to be within the range of the Baffin Bay-Davis Strait stock. In the context of other biological information available (SC/62/BRG23 and SC/62/BRG25) the authors consider the observed F_{ST} in line with the one stock hypothesis for the Baffin Bay-Davis Strait and the Hudson Bay-Foxe Basin stocks.

It was noted in discussion that in relation to significant F_{ST} values for mitochondrial haplotypes, that it appears that the level of genetic differentiation between years for samples taken at Disko Bay during 2007–09 is the same order of magnitude observed between samples taken from different areas (Baffin Bay, Foxe Bay and Hudson area). It was noted that there is not currently enough microsatellite data from Disko Bay to test for genetic differentiation at nuclear loci.

Rosenbaum summarised a paper submitted on genetic diversity and differentiation across all five IWC putative stocks of bowhead whales, including Baffin Bay-Davis Strait and Hudson Bay-Foxe Basin totalling more than 750 samples. In addition, the study utilised ancient specimens of bowhead whales from the central Canadian Arctic located in the modern BBDS stock range (500–800 years old Thule Inuit house ruins) and compared them with sequences from all five stocks. No difference was observed between modern samples from the two putative/hypothesised Canada-Greenland populations (HBFB and BBDS). These results differ from those observed in SC/62/BRG26; the latter study used more samples and a longer fragment of mtDNA, which may have improved the power of the analysis to detect potentially subtle differences between populations.

There was considerable discussion about the evidence for one or two stocks in Canada and Greenland. Some members of the sub-committee interpreted the fact that bowhead whales (detected via satellite tracking) moved seasonally between the two putative stocks areas to mean that there is a single stock. Other members of the sub-committee indicated that these movements are still consistent with shallow population structure between the two stocks and therefore the possibility of two stocks remain open (SC/62/BRG26). Furthermore, the satellite telemetry results need to be evaluated in the context of the most rigorous and complete population-level analyses and movement of whales of different ages and sexes.

Given the differences in sampling, the sub-committee **agreed** that the degree of population structure still needs to be tested with additional molecular markers (nuclear loci) before any conclusion is finalised about the number of stocks in this region. The sub-committee expressed considerable interest in receiving new information of this nature at SC/63.

4.2.2 Other new scientific information

SC/62/BRG28 reported that an aerial survey of the late-summer concentration of bowhead whales in Isabella Bay, Nunavut, Canada, was conducted on 19 September 2009. A total of 28 sightings were obtained during 155km survey effort. The resulting abundance of 1,105 (95% CI: 532–2,294) was corrected for whales that were submerged during the passage of the survey plane but not for whales missed by the observers because >90% of the sightings were detected by both platforms.

SC/62/BRG34 summarised a preliminary evaluation of the potential to use photographs and capture-recapture analyses to estimate the size of the Eastern Canada–West Greenland stock or stocks of bowhead whales. The large and often remote summer range of this stock or stocks make it difficult to obtain an aerial survey estimate of abundance in a short period of time. Estimates obtained from surveys that are temporally separated may lead to double counting of some animals or could lead to missing animals because of movements among summering areas between survey periods. Photographic surveys on the other hand benefit from mixing among the separate sampling areas and have been successfully used to estimate the size of several stocks of cetaceans including the B-C-B stock of bowhead whales. Results were summarised showing aggregation areas during spring, before bowheads can access summer feeding areas, and during summer. The authors proposed that photographic surveys conducted in two years be directed at these areas.

Photography methods and analyses for the proposed surveys would follow methods used for the B-C-B population estimate provided by Koski *et al*. (2010) for the B-C-B stock in 2004, which has been accepted by IWC as the current size of that stock. Closed population models would be used to estimate the number of marked whales in the population and the proportion marked would be assumed to be the same as the B-C-B stock. Justification for use of the B-C-B proportion marked is that both populations were historically depleted and appear to be recovering near their maximum possible rate based on our knowledge of bowhead whale biology. Other advantages of a photographic survey would include the compilation of a photographic catalogue which can be used to make future estimates of abundance using the model of Schweder *et al*. (2010) and estimation of other life-history parameters when additional surveys are conducted. Lengths of whales from these photographs would also provide life-history information for interpretation of genetic analyses.

In discussion it was noted that additional data will be included in an updated analysis presented during next year's meeting. The sub-committee thanked the authors for providing these analyses and looks forward to seeing future results.

4.2.3 Catch information

SC/62/BRG27 reported that five female and one male bowhead whale were taken for subsistence purposes in Disko Bay, West Greenland, in April–May 2009 and 2010 (no whales were struck in 2008 and no whales were struck and lost in 2009 and 2010). All the whales were sexually mature with body lengths exceeding 14m, one female was pregnant with a 3.87m foetus and two presumably with small foetuses that could not be detected in the field. Another female was resting with a maximum number of corpora albicantia of 7 but no mature follicles. Age determinations of three of the whales revealed that the whales were between 30 and 42 yrs old. Four of the whales had more than half full stomachs and they had been feeding intensively on calanoid copepods in particular *Calanus hyperboreus.*

In light of the uncertainties surrounding eastern Arctic bowhead stock structure and abundance, the sub-committee **strongly recommended** that data be provided on Canadian catches.

Reeves summarised the results in Higdon (2010), who compiled a comprehensive record of catches of bowhead whales in eastern Canada and West Greenland that includes both subsistence hunting by Inuit and commercial hunting by Basque, Dutch, British, German, Danish and American whalers. This includes estimates of Basque catches in the Strait of Belle Isle and Gulf of St. Lawrence between 1530 and 1713. The estimated total for commercial whaling from 1530–1915 was 55,916–67,537 (median 61,537), depending on assumptions about the intensity of the Basque harvest, and the estimated total for subsistence whaling from 1530–1915 was 8,406. A total of 65 bowhead whales are known to have been taken (either killed and secured or struck and lost) between 1918 and 2009. Thus the total estimate for all whaling from 1530–2009 is 70,008, with no allowance for struck and lost whales other than in the recent period after 1918. Higdon considered that at least parts of the catch series are incomplete or underestimated. Significantly, data quality varied considerably by nation and time period and the author used a 3-point scale of reliability to acknowledge this. More than half of the total catch estimate was derived from data regarded as 'least reliable'.

4.2.4 Management advice

In 2007, the Commission agreed to a quota for 2008–12 of two bowhead whales struck annually off West Greenland but the quota for each year shall only become operative when the Commission has received advice from the Scientific Committee that the strikes are unlikely to endanger the stock.

In 2008, the Committee was pleased to have developed an agreed approach for determining interim management advice. The sub-committee **agreed** that the current catch limit for Greenland will not harm the stock**.** It was also aware that catches from the same stock have been taken by a non-member nation, Canada. It noted that should Canadian catches continue at a similar level as in recent years, this would not change the sub-committee's advice with respect to the strike limits agreed for West Greenland.

The sub-committee reviewed the catch limits in table 4 of the 'Proposed consensus decision to improve the conservation of whales from the Chair and Vice-Chair of the Commission' (IWC/62/7rev). For Eastern Canada/West Greenland bowheads, the Greenland strike limit is two per year (plus a carryover provision of two unused strikes from the previous year). The sub-committee **endorsed** the strike limits for Eastern Canada/West Greenland bowheads that are listed in table 4. However, the sub-committee noted that Canada may allow for regular catches from this stock. Depending on the size of catches in Canada, the sub-committee's advice may change. If the Canadian catch increases, then the sub-committee wishes to draw attention to the fact that the total number taken from the stock may be greater than what is safe. The sub-committee **recommended** that the IWC should contact Canada requesting information about catches for bowheads.

4.3 Other stock of bowhead whales

SC/62/BRG3 summarised sightings of all cetaceans off western Kamchatka from existing published literature and other available sources. The waters off the western coast of Kamchatka in the Okhotsk Sea are highly productive and contribute a large fraction of Russian commercial fish and shellfish catches. This area is also the site of a sizeable oil and gas leasing area, which is in the exploratory phase of development. While fisheries-related research has been conducted off western Kamchatka for several decades, there has been essentially no directed research on cetaceans and other marine mammals in this region. In total, 351 sightings of 14 cetacean species have been recorded, reflecting a varying degree of occurrence, during the period from the 1940s until the present. Okhotsk Sea bowhead whales were recorded only a few times in the study area during the spring-autumn period, with one sighting during winter; however it is known from historical whaling data that this species was abundant in the area, particularly in the northern regions during periods of open water. The low number of bowhead, gray, and right whale sightings (see below) in recent times likely reflects their small population size and lack of appropriate surveys. Given the diversity and conservation status of species using this area, as well as the potential for this area to serve as recovery habitat for populations of bowhead, right, and gray whales, further research is required, notably in light of the potential impacts of existing fishery operations and expanding oil and gas development.

In discussion, it was inquired if there was any potential that some of the sightings presented were actually resightings of the same individual. The authors noted that there was no way of knowing if this was the case or not, given the available data.

SC/62/BRG20 reported the results of a survey for bowhead whales performed in the Fram Strait during 29 March–14 April 2010. Two observations were made. One whale was sighted, biopsied and tagged with a Spot 5 satellite transmitter on 3 April. However, the transmitter did not start to work until about three weeks after the deployment. Ten days later another sighting was made. This animal turned out to be the same individual as was encountered during the previous sighting as identified from scars on the back.

Witting reported that 12 sighting of bowhead whales were made in the Northeast Water Polynia off Northeast Greenland during an aerial survey for walrus August 2009. He also reported that a female with a calf was seen off Norske Island, Northeast Greenland on 26 July 2009.

In discussion it was noted two passive acoustic recorders were deployed in the Fram Strait from 2008–09 and that these instruments have detected numerous bowhead sounds including songs.

The sub-committee welcomed this information and **encouraged** future updates and research on these stocks.

5. RIGHT WHALES

5.1 North Atlantic right whales

Pettis (2009a) provided an update on North Atlantic right whales (*Eubalaena glacialis*) for the period May–October 2009, as an addendum to information presented in Pettis (2009b). The summary reflects the work of the North Atlantic Right Whale Consortium (NARWC), more than 100 individuals and groups that conduct coordinated research on this population across its known range. A shared photographic catalogue was used to produce a 'best' estimate of population size of 438 for 2008. This was the number of unique, catalogued individuals that had been seen alive between 2002 and 2008, not including calves observed through 2008 that could not be reliably re-identified. This total did not explicitly account for un-photographed whales in the population and may change slightly as additional data are incorporated into the catalogue. One right whale death was documented during the report period, but the cause was not determined. Additionally, there were three new entanglement cases and eight previous entanglement cases that had not yet been resolved.

The sub-committee considered that the documented growth in the catalogue plus successive years of improved calf production gave grounds for cautious optimism over the future status of this population.

5.2 North Pacific right whales

The review of cetacean sightings off western Kamchatka summarised in SC/62/BRG3 noted that the Okhotsk Sea is an important feeding ground for endangered western North Pacific right whales from spring to autumn. A number of sightings of these whales were made during Japanese-led surveys from 1989 to 2003; these were mostly restricted to the southern portion of study area. However, there were also a few sightings in earlier years by Soviet scientists, including in the northern part of the area. These sightings suggest that southwestern Kamchatka is currently an important feeding area for this population, but that northern regions may become more important as the population recovers. These sightings also highlight the need for directed research and monitoring of right whales off western Kamchatka in areas overlapping with fishery and oil and gas development activities.

SC/62/NMP22 provided results of observations of North Pacific right whales during the common minke whale sighting and biopsy survey conducted in the Okhotsk Sea in summer 2009. The research area was set north of 46°N, south of 57°N and west of 152°E in the Okhotsk Sea including the Russian 200 n.mile EEZ and 11 track lines totalling 2,219.9 n.miles were predetermined. The research vessel *Shonan-maru No. 2* conducted the survey from 18 July to 31 August. During the searching distance of 1,662.6 n.miles, 17 schools (29 animals) of North Pacific right whales were found, mainly in the offshore waters deeper than 200m. Of these, 16 schools were targeted for photo-id research and 22 animals in 15 schools were individually identified. Examination of digital images of the head (callosities and lip patches) indicated no re-sightings among them.

In response to a query whether the animals photographed on this cruise had been compared with any photographed in earlier cruises, Yoshida replied that there were plans for such a comparison once the survey planned for this year had been completed, noting that there were only a few suitable images available from previous years.

It was noted that there was a stranding of a single North Pacific right whale in Japan in 2009 (see SC/62/ProgRep Japan).

Wade *et al*. (2010) used photographic and genotype data to calculate the first mark-recapture estimates of abundance for right whales in the Bering Sea and Aleutian Islands. The estimates were very similar: photographic 31 (95% CL 23–54), genotyping 28 (95% CL 24–42). They also estimated that the population contained 8 females (95% CL 7–18) and 20 males (95% CL 17–37). Although these estimates may refer to a Bering Sea sub-population, other data suggest that the total eastern North Pacific population is unlikely to be much larger. The authors concluded that the population's precarious status is a direct consequence of uncontrolled and illegal whaling, and highlights the past failure of international management to prevent such abuses.

In a reply to a question regarding the technique used in genetic identifications of individuals, Wade responded that they used eight microsatellite loci, mtDNA haplotypes, and sex. Matching was first conducted with the microsatellite loci, and pairs with only a few alleles mismatching were compared using mtDNA haplotypes and sex. If this was inconclusive the comparison would be re-run. It was pointed out that the power of genetic matching is dependent not only on the number of markers used but also on the level of genetic diversity of these markers within the population, and that these needed to be calculated for the population.

When asked about the issue of co-variance when using model-averaging (as had been done in producing the population estimate from the genetic data) Wade replied that the program MARK was able to account for this.

Regarding the desirability of making a genetic or photo-identification comparison between right whales from the Eastern (ENP) and Western North Pacific (WNP), Wade responded that a comparison of photographs would be very useful. Two genetic samples from the WNP had been analysed and in assignment tests individuals were found to have a low probability of assignment to the ENP: a third sample was yet to be analysed. In response to a query from the Chair he said that more samples and images should be available from another survey planned in the ENP this year, and that he hoped to provide updated information at next year's meeting.

5.3 Southern right whales

5.3.1 Australian and New Zealand areas

SC/62/BRG16 presented new information on the stock structure of southern right whales around the subantarctic Auckland Islands (NZ subantarctic) and the main islands of New Zealand (mainland). It remains uncertain whether these two regions represent two relatively isolated stocks with different histories of exploitation and recovery, or a single stock with a poorly understood pattern of migratory habitat use. A third hypothesis, that the Mainland NZ population was extirpated and is now being recolonised by a range expansion from the NZ subantarctic, is also possible. To help address these hypotheses, SC/62/BRG16 presents the results of matching between DNA profiles from southern right whales sampled around the NZ Mainland (n = 22 individuals) and NZ subantarctic (n = 613 individuals). The DNA profiles were constructed by genotyping of microsatellite loci (up to 14, average 12.7 loci), sequencing of the mtDNA control region (minimum of 500bp) and sex identification using skin samples collected with a biopsy dart. The matching resulted in a number of matches within each region and 4 matches between the two regions; 3 females and one male, first identified as a calf. This is the first time that movement between the two regions has been documented and, along with other available data, is most consistent with either the one stock or the extirpation/recolonisation hypotheses.

When asked about the availability of historical right whale specimens (e.g. in New Zealand museums) that could provide genetic information Baker replied that initial enquiries had revealed little such material, and a reasonable sample size was required to address the issue of stock identity.

The possible genetic heterogeneity of between-year samples at the Auckland Islands was raised but the distribution of mtDNA haplotypes had proven to be surprisingly stable over the sampling period.

In discussion of the paper the issue of the desirability of sampling right whale calves was raised, with several speakers mentioning that they had experienced difficulties or complications in obtaining permits for such sampling. Although there were legitimate concerns over the possible disturbance that biopsy sampling might cause to mother-calf pairs, a published study of the effects of biopsying over 100 cow-calf pairs in South African waters had shown no adverse effect on the subsequent calving interval, although the statistical power was low (Best *et al.*, 2005). Given the potential value of such sampling, particularly in establishing issues of paternity, the sub-committee **recommended** that permitting authorities should view requests for biopsy sampling of cow-calf pairs on their scientific merit and apply appropriate safeguards to limit the degree of disturbance where necessary.

SC/62/BRG19 described satellite tracking of southern right whales (*Eubalaena australis*) at the Auckland Islands, New Zealand. Satellite tags were attached to six southern right whales off the Auckland Islands in sub-Antarctic New Zealand during July and August 2009. The tags lasted for an average of 75 days (range: 1–167 days) and provided data on migratory movements of three whales that had transmitting tags when they left the Auckland Islands. All of these travelled to the south of South Australia between 38° and 48°S, although one of these whales visited the New Zealand mainland before heading west towards waters to the south of Australia. There are no future plans to tag right whales in New Zealand.

The reason(s) for the extended silent period(s) of some tags was unknown: although it had been hoped that tagged animals would be re-sighted in the Auckland Islands so that the condition of the tags and of the animals themselves could be checked; in practice there was only one such re-sighting. It was noted that the telemetry study had shown that animals from this nursery area/breeding ground frequently moved north to their feeding ground, which was the reverse of the generally accepted migratory pattern for southern right whales.

SC/62/E13 presented new data on southern right whale contact calls from the Auckland Islands. It was brought to the attention of sub-committee members but dealt with more expansively in the SWG on Environmental Concerns. See Annex K for a more detailed description.

Bannister reported the results of the 17th annual survey undertaken since 1993 along the southern Australian coast between Cape Leeuwin (Western Australia) and Ceduna (south Australia in August/September 2009. As in previous years, counts and identification photographs were obtained of right whales within *ca.* 1 n.mile of the coast. The number recorded (782 animals including 244 cow/calf pairs) was the highest yet recorded, in marked contrast to the very low count (of 287 animals including only 57 cow/calf pairs) two years earlier, in 2007, and a high count in 2008. The percentage annual increase rate, 1993–2009, for cow/calf pairs is 7.51 (95% CI = 3.18–12.02). Minimum population size is estimated at 2,530, with a total Australian population of *ca* 3,000. A study taking into account the three-year reproductive cycle and likely different cohort strengths is being undertaken to determine future survey frequency.

5.3.2 South America area

A Workshop was held to investigate the causes of the high mortality of southern right whales around Península Valdés, Argentina. It took place from 15–18 March 2010 at the Centro Nacional Patagónico (CENPAT) in Puerto Madryn, Argentina. Participants included experts on the ecology and marine environment of the Península Valdés region, scientists studying right whales in the South Atlantic and international experts on whale strandings and mortality. Brownell introduced a chair's summary of the meeting.

Since 1971, small numbers of southern right whale strandings have been recorded, but starting in 2003, when the Southern Right Whale Health Monitoring Program (SRWHMP) was established, a total of 366 right whale deaths have been recorded, with peaks in 2003 (31), 2005 (47), 2007 (83), 2008 (95) and 2009 (79). Most (333 or 91%) of the deaths have been of first-year calves. The Workshop considered specific information on the sex ratio, seasonal timing, locations and sizes of stranded animals and the results of gross pathology examinations for 366 of them and histopathology analyses for 53 of them. In addition, the Workshop evaluated information on possible diseases or toxins on the calving or feeding grounds, measures of maternal condition between years and patterns of mitochondrial genetic differentiation among stranded calves in different years. No single threat or disease process was identified as the cause of the recurrent significant mortality of young right whales at Península Valdés.

The three leading hypotheses identified to explain the spikes in mortality of first-year whales (calves) were as follows: reduced food availability for adult females, biotoxins and infectious disease. It was not possible to determine which of these was most likely, and it was acknowledged that some combination of factors may have been involved in different years. A fourth possible contributing factor, chemical contaminants, was considered less likely, and demographic factors, killer whale attacks, disturbance from whale-watching activities, vessel strikes and fishing gear entanglement were ruled out as significant factors for the high mortalities.

The parasitic behaviour of kelp gulls, which eat the skin and blubber of live whales at Península Valdés, opening large wounds and significantly affecting the behaviour of whales, particular newborn calves, was given considerable attention. The frequency of gull attacks and the proportion of whales with gull-peck lesions (77% in 2008) have increased since first being observed in this population in the 1970s.

In light of the three leading hypotheses, the Workshop recommended the following steps to build a better understanding of the cause or causes.

- Continue and expand efforts to detect and investigate strandings, conduct necropsies and analyse patterns of mortality.
- Continue and expand investigations of environmental factors that may be affecting the whales in the calving/nursery area.
- Continue and expand long-term research on the demography and behaviour of live whales in the Península Valdés region.
- Update the population assessment by Cooke *et al.* (2003).
- Establish a reporting network to alert the research community when whale behaviour is observed that could be related to die-off causation.
- Develop a biopsy programme selectively targeting adult females.
- Make greater efforts to identify the feeding grounds of the Península Valdés right whales (satellite tagging) and investigate environmental factors that could affect their survival and reproduction.

The long-term aerial photo-identification programme, along with the SRWHMP, stood out as top priorities. The 40-year datasets on the population of right whales at Península Valdés should be maintained and data collection should continue. These data and complementary aerial surveys including both the annual photo-id flights (WCI/ICB) and the broader-scale surveys to assess population distribution and trends (CENPAT) and boat-based photo-id efforts are critical for monitoring population trends, describing the significance of the recent die-offs and testing causation hypotheses.

Cooperation and collaboration among research groups is essential for addressing complex questions concerning the die-offs. Efforts to improve such cooperation and collaboration should be a high priority for local and national governments, NGOs and IGOs.

The absence of conclusive information regarding the cause(s) of exceptional right whale mortality should not preclude authorities from proceeding with some management measures, particularly in relation to kelp gulls. Regardless of whether gull lesions are a contributing factor in whale mortality, they cannot be considered as anything other than harmful to the whales, especially the calves.

The considerable efforts of the researchers in Argentina (and abroad) to investigate the die-offs in the face of fiscal and logistical constraints and in view of the sheer numbers of dead whales were acknowledged as was the importance of governmental commitment to the long-term conservation of right whales in Argentina. A western South Atlantic right whale consortium along the lines of the North Atlantic right whale consortium centred in the United States and Canada was suggested as a good way to establish and maintain links among researchers and to share information. It is also important that information be shared among researchers in different parts of the range, e.g. Argentina (including areas outside Península Valdés), Brazil, Uruguay, South Africa, Australia and New Zealand.

The sub-committee thanked Brownell for his presentation. In discussion the issue of the control of gull predation was raised. Even if it could not be identified at this stage as a definite cause of the recent die-offs, the pattern of increasing gull attacks (especially on calves) and the resultant disturbance and physical damage to the whales must be considered an undesirable phenomenon. At the same time it was one of the few identified issues for which mitigation action was possible. The sub-committee therefore welcomed the announced intention of the Argentine authorities to introduce a pilot plan for the control of nuisance gulls this year.

The sub-committee recognised the value of the long-term photo-id programme of right whales at Peninsula Valdes that had now lasted 40 years, particularly in being able to describe the significance of the recent die-off events and test certain causation hypotheses. It **strongly recommended** the continuation of the survey programme. The sub-committee also noted that emergency funding had been needed this year from the US Marine Mammal Commission to enable the necropsy programme to take place and strongly **recommended** the continuation of this programme to investigate the reason(s) for the die-off.

Paper SC/62/BRG15 reported a preliminary assessment of the genetic structure of the southern right whales from Península Valdés, Argentina. Skin biopsies from 219 whales were collected in 2003–06. Two sets of skin samples from dead animals were used. Set A contains 43 samples from 2003–06. Set B contains 155 samples, and includes the above 43 samples plus 112 samples from the period 2007–09. 37 unique haplotypes were discovered in the 374 samples analysed. The overall haplotype and nucleotide diversity were 0.95 (± 0.01) and 1.63% (± 0.82%), respectively. Clade A contains 16 haplotypes and 54% ($n = 201$) of the total sample, while Clade W has 21 haplotypes and 51% ($n = 189$) of the total sample. Significant differentiation was found between live vs. dead whales in set A for the period 2003–2006. However, when set B was compared with live whales, no genetic differentiation was found ($F_{ST} = 0.001$). Significant genetic differentiation among years was recorded when the dead whales from set B were analysed, and this contrasts sharply with the live whales, which show no differentiation among years. The alignment of 35 haplotypes with the 37 haplotypes previously published by Patenaude *et al.* (2007) revealed 45 unique haplotypes of length 275 base pairs for the Southern Hemisphere. The overall haplotype diversity (h) for southern right whales is 0.955 (±0.003) and the overall nucleotide (π) diversity is 2.8% (±1.45%). Significant differentiation was detected among the six subpopulations. Argentina shared haplotypes with all populations. Nucleotide differentiation was significant when compared to other nursery areas but not to the feeding grounds (South Georgia and SW Australia).

The haplotype diversity currently detected at Península Valdés is relatively high and similar to levels previously reported for southern right whales. Nucleotide diversity is lower than previously reported, possibly due to the use of a longer sequence interval, much of which is well conserved. The low diversity in Clade A suggests that maternal lineages historically had a smaller population size or suffered more depletion than Clade W. A possible explanation for the equal frequency of both clades involves the influx of immigrants from areas that are rich in Clade A (South Africa and New Zealand; Patenaude *et al.*, 2007), indicating contemporary gene flow between formerly isolated populations. The among-year differentiation of the stranded animals does not result from just one year being distinct from all the others; instead, most pairwise comparisons present positive values of F_{ST}, and some of these are individually significant. This pattern suggests that at least some portion of the recent (2007–09) increase in calf mortality at Península Valdés has been caused by processes that occurred away from the Peninsula, on feeding grounds where the population shows modest levels of mitochondrial genetic differentiation.

The sub-committee welcomed this report and thanked the authors for their contribution, suggesting that it would be interesting to see the analysis of nuclear markers such as microsatellites on the same material. They were informed that this was under way and that a biopsy programme was planned for next year in an attempt to determine the identity and reproductive history of mothers of calves that had perished in the previous die-off. In reply to a question about how the yearly comparisons were conducted, given the unequal representation of clades over time, Sironi responded that the comparisons were pair-wise among the single year samples, but only where samples of live and dead whales were available. The inclusion of a further 155 previously unprocessed samples might *inter alia* help address the question of unequal sample size distribution between clades.

It was pointed out that the yearly heterogeneity found could have been a sampling artefact because the number of genetic samples, especially in some early years, was much smaller than the actual number of dead animals reported. The authors responded that this paper contained preliminary results and they will update their analyses with larger sample sizes and present the results at next year's meeting.

Three aerial surveys flown off Brazil in 2009 produced the smallest number of whales seen since 2003, 62 whales and 31 calves. Three years previously almost 200 whales had been seen.

The sub-committee agreed to the request to **recommend** the continuation of the surveys.

5.3.3 South Africa area

SC/62/BRG30 presented updated estimates of demographic parameters for southern right whales on the south coast of South Africa, incorporating a further three years data. Aerial counts of right whale cow-calf pairs recorded between 1971 and 2006 indicate an annual instantaneous population increase rate of 0.069 a year (95% CI = 0.064, 0.074). Annual photographic surveys since 1979 have resulted in 1,968 resightings of 954 individual cows with calves. Observed calving intervals ranged from 2 to 23 years, with a principal mode at 3 years and secondary modes at 6 and 9 years, but these made no allowance for missed calvings. Using the model of Payne *et al*. (1990), a maximum calving interval of 5 years produces the most appropriate fit to the data, giving a mean calving interval of 3.16 years with a 95% confidence interval of (3.13, 3.19). The same model produces an estimate for adult female survival rate of 0.990 with a 95% confidence interval of (0.985, 0.996). The Payne *et al*. (1990) model is extended to incorporate information on the observed ages of first reproduction of grey-blazed calves, which are known to be female. This allows the estimation of first parturition (median 7.74 years with 95% confidence interval (7.15, 8.33)). First year survival rate was estimated as 0.713 (0.529, 0.896) and the instantaneous population increase rate as 0.070 (0.065, 0.075). The current (2006) population is estimated as some 4,100 animals, or about 20% of initial population size: the latter parameter needs re-consideration.

A question was raised concerning the justification for the value of 75% for the proportion of females in the catch as used by Richards and Du Pasquier (1989) in estimating original population size. It was believed that this was based on assumptions regarding the composition of the 19th century catch, and it was possible that an improved estimate might be obtained from current biopsy sampling in coastal waters. It was also queried whether the issue of over-dispersion had been considered but Brandão replied that this had not yet been done.

SC/62/BRG31 examined the possibility of changes in some demographic parameters for right whales off South Africa through the analysis of re-sighting data for females with calves over the 1979–2006 period. No statistically significant change in either adult survival rate or population growth rate was detected. However the mean calving interval shows a decrease from 3.2 to 3.1 years somewhere between 1985 and 1990.

It was commented that it would be useful to show the likelihood profile for the years over which change occurs, and that it might be informative to try increasing the opportunities for change from one to two or three over the time series.

SC/62/BRG33 reported on the recent announcement of the intention to drill exploratory boreholes for natural gas in eight districts of the coastal region of the southwest coast of South Africa, three of which included nearshore waters that were home to the largest concentration of cow-calf pairs on the African coastline. About 75% of cow-calf pairs on the southern African coast occur in this region in spring, some of which are resident for up to three months, while the westward coastal movement seasonally means that an even larger proportion of the population almost certainly uses the region.

An enquiry was raised regarding the possible presence of oil with the gas reserves but there was insufficient information available to provide a definitive answer.

The sub-committee viewed this potential development with concern, noting the current lack of information available on the proposed activities. It **recommended** to the South African government that all permits issued for exploratory activities should contain mandatory mitigation measures to avoid disturbance to right whales, including confining all marine drilling activity to the season when right whales were absent (January to May). It also **recommended** that if gas production was ultimately planned for the region that the use of closed areas or the development of further mitigation measures such as directional drilling should be considered.

A proposal was put to the sub-committee for the establishment of a Southern Ocean Right Whale Photo-identification Catalogue, in which images of right whales taken in pelagic waters away from the southern continents, including the Antarctic, would be compiled and made available as in the Antarctic Humpback Whale Fluke catalogue (see Appendix 2). The intention was to provide a resource that could be consulted when researchers holding images taken in coastal waters wished to establish linkages with feeding grounds in pelagic waters. It was confirmed in discussion that this would be supplementary to such coastal catalogues. The sub-committee welcomed this proposal and **recommended** that it should be forwarded for consideration for funding. If funded, the sub-committee looked forward to receiving a progress report at its next meeting.

5.3.4 Plans to review Southern right whales

Brownell reported on progress in preparing for the Southern Right Whale Assessment Meeting. It was now planned to be held at Puerto Madryn, Argentina, in September 2011, and Bannister had agreed to act as Chair. Given that this meeting would be held very shortly after next year's IWC meeting, a budget would have to be prepared at this meeting (and reserved until 2011). A small group was set up under Brownell to draw up the budget (including provision for an appropriate selection of Invited Participants) and draft the Terms of Reference for the review meeting. Their report is included as Appendix 3.

In conclusion the chairman suggested and the sub-committee agreed that only important or urgent papers on southern right whales (such as reports on the reasons for the Argentine die-off) would be considered at next year's meeting, and all other right whale papers would be referred to the subsequent Southern Right Whale Review meeting for consideration.

6. WESTERN NORTH PACIFIC GRAY WHALES

6.1 New scientific information

Previous studies have documented genetic differentiation between eastern and western gray whale populations on the basis of mtDNA haplotype frequencies and nucleotide diversities (LeDuc *et al.*, 2002). In SC/62/BRG11, data generated using a panel of 13 microsatellite loci were combined with updated information from mtDNA control region sequences to further assess the population structure of gray whales in the North Pacific. Analyses were based on 136 samples collected from whales in the eastern Pacific and 142 samples collected from whales biopsied in the western Pacific while on the primary feeding ground off Sakhalin Island, Russia. Measures of nuclear genetic diversity were similar between the two populations (mean $H_e = 0.74$, eastern population; mean $H_e = 0.70$, western population). In contrast, mtDNA haplotype diversity was reduced in the western population ($h = 0.77$) when compared to the east ($h = 0.95$), although the western population has retained a relatively large number of mtDNA haplotypes ($n = 22$) given its small size.

Measures of genetic differentiation supported recognition of eastern and western populations as distinct, with highly significant differences observed in both mtDNA haplotype ($F_{ST} = 0.068$, $p \leq 0.001$) and microsatellite allele ($F_{ST} = 0.009$, $p \leq 0.001$) frequencies. The level of nuclear divergence between the two populations was relatively low, and results of sex-specific comparisons suggested that some limited degree of male-biased dispersal may be occurring between populations. Such dispersal could be mediated by gene flow, although the maintenance of significant genetic differences between the two populations suggests that any genetic exchange would likely be limited. Alternatively, the low level of differentiation could be generated by mixing of eastern and western animals while on feeding grounds without genetic exchange. Although the analyses utilised in this paper were not able to discriminate between these two possible explanations, increasing our understanding of the extent and nature of any dispersal between populations is important as each scenario could have different effects on the recovery of the western population.

Some concern was raised about the origin of the samples from eastern gray whales because of the genetic differences that have been found within the population. The samples from eastern gray whales were from stranded animals along the Pacific coast of the US and ~20 samples from feeding grounds. Some sub-committee members asked about possible gene flow between the east and west. Lang responded that there may be some gene flow but that observed genetic differentiation is supportive of two populations. Another question was asked about whether an admixture model, where $K = 3$, had been fit to the data. Lang replied that when an admixture model was tested with $K = 3$, most of the eastern population samples grouped together while the western population samples were separated into two groups, one of which was largely comprised of animals sampled in the west but which showed similarity to the east. However, under this model, the most likely number of clusters contained in the dataset was two.

SC/62/BRG10 presented the results of a paternity analysis conducted on the western gray whale population, utilising samples collected from 57 mother-calf pairs and 42 sampled males considered to be candidate fathers. Using data generated from 13 microsatellite loci, likelihood-based analysis of paternity identified putative fathers of 46% (n = 26) to 53% (n = 30) of calves. Eighteen males were assigned as putative fathers; the majority (56%) of those males was assigned paternity of only one calf during the 12 seasons of the study. Analysis of relatedness patterns among calves for which no putative father was identified indicated that the best estimate of the number of males needed to account for the unassigned paternities was 15.

Given that genetic samples have been collected from 83% of all gray whales photographically identified on the primary Sakhalin feeding ground, the number of calves which were assigned to putative fathers was lower than expected. These results suggest that some males which are contributing to reproduction in the western population may not utilize the primary Sakhalin feeding ground on a regular basis and highlight the need to collect genetic samples from animals recorded in other areas of the western gray whale's range. Although the relatively high proportion of calves which could not be assigned to putative fathers raises questions about the location of summer feeding areas for some males, these results provide evidence of interbreeding among animals that show fidelity to the Sakhalin feeding ground. Breeding presumably occurs while these animals are on shared migratory routes.

The Chair asked whether paternity tests had included eastern gray whales. Eastern whales had been included but no paternities were assigned to the eastern population; however, only a low proportion of eastern animals have been sampled.

SC/62/BRG5 presents the first results of genetic data obtained from the gray whales migrating along the Japanese coast to or from the breeding ground of the western population. The study examined mitochondrial DNA from gray whales from Japan (n = 6) and Russia (n = 7) to better understand the genetic characteristics of these whales at the wider geographic area. The gray whales from Japan were those either stranded or bycaught in set net from 1995 to 2007, and the Russian gray whales were those legally caught during the Chukotka aboriginal subsistence hunt in 2008. All of the mtDNA haplotypes found in the Japanese (five) and Russian (six) samples matched to some of the previously reported haplotypes. The level of genetic diversity of these samples, that is haplotype and nucleotide diversity, were surprisingly high, suggesting either gene flow between the western and eastern populations or retention of ancient polymorphisms without gene flow. No statistically significant difference in haplotype frequencies was detected between the Japanese and Russian samples possibly due to the small sample sizes. The phylogenetic analysis of the mtDNA haplotypes found in this study and the past studies detected no distinct cluster for the Japanese whales, supporting the past observation that the western and eastern gray whales were indistinguishable at the evolutionary time scale.

The sub-committee thanked the authors for providing genetic information on western gray whales during migration. These are the first samples from Japan. Other available samples are from feeding grounds, thus having samples from migratory routes will provide a valuable comparison. Some questions were asked about whether the whales sampled in Japan could have been eastern gray whales. It was unlikely because the whales were migrating south along the Japan coast. Furthermore, Brownell mentioned there was a photo match from Sakhalin with a whale from Japan.

The sub-committee **encouraged** the collection of more samples along the migration route when they are available and **recommended** a more detailed analysis of samples currently available. One suggestion was that a longer sequence was needed for the mtDNA. Another option might be to examine other markers such as microsatellites or protein coding genes. Using additional markers will be especially helpful because of the small sample size. Using additional markers will increase the possibility of detecting differences if they exist.

Larsen noted that a large proportion of the western population had been sampled and asked whether a family tree analysis had occurred. Lang responded that this approach was occurring but with the current limited number of microsatellite markers a comprehensive family tree analysis would be difficult. Additional markers will be helpful.

The review of cetacean sightings off western Kamchatka summarised in SC/62/BRG5 included six western gray whale sightings. The sightings indicated that these whales occur in the region as early as July and as late as November. This information highlights the potential for western gray whales to reoccupy parts of their former range if the currently small population expands. Given the precarious status of the western gray whale population, there is a need for directed research and monitoring of these whales relative to anthropogenic activities off western Kamchatka.

In SC/62/BRG4, data from systematic shore- and vessel-based distribution surveys conducted offshore northeast Sakhalin in the summer-to-fall seasons of 2004–09 indicated the presence of two primary gray whale feeding areas. The first, nearshore Piltun feeding area is located adjacent to Piltun Bay and extends from Ekhabi Bay in the north to Chayvo Bay in the south over a coastline stretch of about 120km length. Whales predominantly feed in this area at a distance <5 km from shore and in water depths <20m. The second, deeper offshore feeding area is located at a distance of about 35–50km from shore to the southeast of Chayvo Bay. The water depth in this area is about 35–60m.

The observations show significant variation in whale densities among years within the Piltun and offshore feeding areas. Whale densities in the Piltun area began to decrease in 2006, with lowest densities observed in 2008. This decrease reversed in 2009, when the maximum number of whales in this area seen during one survey day was 55% higher than in 2008 and comparable to 2007 levels. Increased use of the offshore feeding area was observed from 2005–2008, with the highest number of whales (since 2001) recorded in 2008. In 2009, the maximum number of whales observed on one survey day in the offshore feeding area decreased compared to 2008. This partly may be explained by the low number of offshore area surveys that were carried out in 2009 due to bad weather conditions, as well as by the fact that considerable numbers of whales were observed to the northeast of the offshore area transect lines outside the survey grid. In general, results from the 2009 distribution surveys, combined with results from 2009 photo-id surveys, indicate that the western gray whale population is stable.

Table 1 of SC/62/BRG4 presented maximum counts for each year. Some questions were raised about how those data were collected and whether time of year was accounted for. Vladimirov noted that the numbers in Table 1 were simply the highest count observed in a season, irrespective of timing. Gray whales are usually in Sakhalin in the highest numbers in September but there is some interannual variation. It was also noted that the number of whales near Piltun appeared to have decreased markedly from 2004 to 2009, with the suggestion that distribution may have shifted offshore or to another area. Vladimirov suggested that the sighting data and photo-identification data suggested that gray whales were stable in the entire Sakhalin area although there may be different dynamics occurring in the Piltun and offshore feeding areas.

SC/62/BRG9 described photo-identification studies of gray whales, which have been performed annually in the Piltun and Offshore feeding areas off northeast Sakhalin during the period 2002–09 as part of an industry sponsored monitoring programme. The intensity of use of the Piltun and Offshore feeding areas by gray whales varied from year to year. The 2002–09 catalogue of photo-identified western gray whales offshore Sakhalin Island currently includes 177 fully identified whales. The catalogue of gray whales photo-identified off southeast Kamchatka currently contains 116 fully identified whales. Sixty one of the Kamchatka whales also were seen on the Sakhalin shelf during various years, and are most likely Western gray whales. The population affiliation of the remaining 55 whales is still unclear. Out of the 117 whales identified on the northeast Sakhalin shelf in 2009, 12 gray whales were new to the Sakhalin catalogue, including four adults and eight calves.

From May 30 to June 14 of 2009, a total of eleven whales were identified off the Kamchatka Peninsula in Vestnik Bay; all of them had been registered in previous years in the Sakhalin catalogue. From 11 July to September 2009, 64 whales were observed in Olga Bay, Kamchatka of which 28 whales were registered in the Sakhalin catalogue. Since 2006, the number of identified whales in Olga Bay has grown every year. The observation season was longest and started earliest in 2009, when the largest number of whales was recorded. Since the start of the surveys in Olga Bay in 2006, researchers have identified some whales that had been registered as calves in Piltun area in the previous year. Three of the five calves identified in the Sakhalin shelf in 2008 were recorded in Olga Bay in 2009. In 2009, 138 of the 177 western gray whales from the Sakhalin catalogue were observed at both Sakhalin and/or Kamchatka combined. Eighteen whales were seen in both locations in the same season. In 2008, a mother-calf pair was registered in Olga Bay (Kamchatka) for the first time. The earlier start of the survey season in Olga Bay in 2009 compared to previous years allowed more comprehensive data to be collected about mother-calf pairs; seven pairs were identified here in 2009. Four of the mothers had been observed on the Sakhalin shelf in previous years. Two of the calves were observed later in the Piltun area. In addition, five mother-calf pairs and one calf without mother were identified only in the Piltun area. Thus, a total of ten calves with mothers in the Sakhalin catalogue were recorded in 2009. These results indicate that the Piltun area offshore Sakhalin is not the only feeding area for mother-calf pairs of the western gray whale population.

The sub-committee welcomed the new information and was especially interested in the movement of animals between Sakhalin and Kamchatka. A question was raised about whether more animals are now using the Kamchatka area because of disturbance from noise or interannual changes to prey at the Piltun feeding area. The authors did not feel that such conclusions can be drawn since the programme is not designed to compare the Kamchatka and Sakhalin feeding areas. Photo-identification surveys are again planned for 2010. Photo-identification data could provide useful information about calving interval. Some of that information has been presented to the sub-committee in the past. Movement of whales between the Sakhalin and Kamchatka areas complicates the ability to accurately determine calving rate unless studies are occurring in both areas.

Photo-identification data have been used to assess the population size of western gray whales. The most recent population assessment, using a Bayesian individually-based stage-structured model, resulted in a median 1+ (non-calf) estimate of 130 (90% Bayesian CI = 120–142; see Cooke *et al.*, 2008). The collaborative Russia-US research program on western gray whales summering off northeastern Sakhalin Island, Russia, has been ongoing since 1995 and has produced important data that has be used to determine the conservation status of this critically endangered population. SC/62/BRG6 reviews findings from 2009 research activities and combines such with data from previous years, in some cases ranging back to an opportunistic survey in 1994. Photo-identification research conducted off Sakhalin Island in 2009 resulted in the identification of 82 whales, including seven calves. This is a different effort than the photo-identification project described in SC/62/BRG9. One previously unidentified non-calf was observed. When combined with data from 1994–2008, a catalogue of 180 photo-identified individuals has been compiled. Not all of these 180 whales can be assumed to be alive, however. One new reproductive female was recorded in 2009, resulting in a minimum of 26 reproductive females being observed since 1995. In addition to a number of biological difficulties that western gray whales are facing, the large-scale offshore oil and gas development programmes near their summer feeding ground, as well as fatal net entrapments during migration, pose significant threats to the future survival of the population.

Some discussion was held about the high resighting rate of photographed whales but that the paternity tests (SC/62/BRG10) revealed only a limited number of fathers. Some of the males contributing to reproduction in the western gray whale population may not use the Sakhalin feeding ground on a regular basis, and some of the whales which demonstrate fidelity to the Sakhalin feeding ground may be migrants. Scordino asked about the high resighting rate (95%) in Sakhalin compared to a lower resighting rate of only 70% in the Pacific Northeast feeding area of eastern gray whales. This result may be due to the small size of the feeding area near Sakhalin.

Japan re-emphasised their comments from the 2009 report. The sub-committee recognised that net entrapment of western gray whales is a range-wide issue and that coastal net-fisheries outside of Japan must also be considered as potential sources of mortality, and was informed poaching was difficult to hide in Japan given the coverage of the mass media. The Government of Japan will continue to make every practicable effort to reduce anthropogenic mortality of the population of western gray whales. The sub-committee was **encouraged** by the efforts of Japan to reduce mortality, but noted that net entrapments could occur in other range states.

Brownell summarised plans for seismic surveys off Sakhalin Island in 2010. There is concern that anthropogenic sound, especially from seismic surveys, will negatively affect western gray whales in their primary feeding area. Previously, the Commission expressed concern and passed resolutions on this topic. Two seismic surveys in or near the feeding area are planned for 2010. One will start soon (i.e. June 2010) and the other is planned for July or August and September. It was noted at the recent meeting of the IUCN Western Gray Whale Advisory Panel that the company (Rosneft) planning the later survey has not followed the same procedures in regard to monitoring and mitigation as the company planning the first survey (Sakhalin Energy). As currently planned, the Rosneft survey will occur while the highest number of feeding gray whales, including cow and calves, are present. The sub-committee is **extremely concerned** about the potential impact on western gray whales and **strongly recommended** that Rosneft postpone their survey until at least June 2011. The sub-committee also **recommended** that Rosneft use monitoring and mitigation measures similar to those used by Sakhalin Energy, which have been independently reviewed by experts, and that all energy companies operating in the feeding areas of western gray whales should use comprehensive monitoring and mitigation measures to protect western gray whales.

SC/62/BRG2 compares observations of age at first reproduction (AFR) in western North Pacific gray whales to estimates of age at sexual maturity (ASM) in eastern North Pacific gray whales. AFR is a basic component of age-structured whale assessment models, but direct estimates of this parameter do not exist for either the abundant eastern or critically endangered western population of gray whales. Instead, assessments of both populations have utilised either of two recognised estimates of eastern gray whale age at sexual maturity (ASM) that are adjusted by a year to account for foetal gestation. These ASM estimates are: (1) 9 years median, 6–12 years range, and (2) 6 years median, 5–9 years range, but there are biases and discrepancies associated with these estimates. Over a decade of individual monitoring of western gray whales on their primary feeding ground off the northeastern coast of Sakhalin Island, Russia, has identified 17 female whales first sighted as calves or yearlings that were potentially sexually mature by the 2009 field season, ranging in age from 5 to 11 years. However, only two of these whales have been observed to have produced a calf, establishing the first observed values of western gray whale AFR as seven and 11 years. While limiting, that only two AFR observations were made is also informative, suggesting that until more information is available, the first eastern gray whale ASM estimate is the more appropriate to use in western gray whale assessments. Overall, eastern and western gray whale assessments would benefit from a concerted effort to collect AFR observations from each population. The data have been used to inform the recent population assessment by Cooke *et al.* (2008) and also taken into consideration in the recent eastern gray whale assessment by Punt and Wade (SC/62/AWMP2).

SC/62/O7 reported that there was no stranding, entrapment or entanglement of gray whales in Japan during the period from May 2009 to April 2010. It also noted there had not been an entrapped or entangled animal in Japan since January 2007. One juvenile gray whale was seen opportunistically in the coastal waters of Mie Prefecture, and the information on the sighting had been shared among concerned parties including national and regional governments in a timely manner in order to be prepared for possible entrapment/entanglement. Related to skeletal measurement of two gray whales entangled in the coastal waters of Miyagi Prefecture in June 2005, Japan expressed its interest in conducting a study on phrenological comparison between western and eastern stocks of North Pacific gray whale using those skeletons in collaboration with other member countries. Japan also reported that the Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries, had created an educational leaflet in electronic format and had distributed it to governments of all coastal prefectures to draw fishermen's attention to the issue of western North Pacific gray whales. Japan expressed its intention to continue educational activities and other practicable measures on this issue in the future.

The sub-committee welcomed the information and was especially **encouraged** to learn about the educational efforts to inform fishers about the need to protect western gray whales.

Donovan reported on progress with the telemetry programme on western gray whales that has been recommended by the Committee (IWC, 2010). He reported that the programme is progressing and that all involved are grateful to Ilyashenko and his colleagues at IPEE for their work to try to ensure that this project happens, particularly at this stage with respect to the permit issue. An overall administrative and scientific structure has been agreed between the participating institutions and companies, the IWC and IUCN. The scientific steering group is continuing to work on finalising the protocols that will ensure that the IWC Scientific Committee safeguards and guidelines are met as it has been tasked by the Committee; the final protocols will be drawn up in co-operation with IPEE and OSU. [Paper SC/62/BRG7 had been withdrawn because e-mail communication problems meant that it was not possible to finish consultations with our Russian colleagues]. IWC, IUCN and the funding companies are also working hard on very difficult budgetary issues. This is a very expensive undertaking but it is hoped that it will be possible for the programme to take place this summer.

6.2 Conservation advice

As it had done last year, the sub-committee **acknowledged** the important work of the IUCN WGWAP and welcomed this year's update on the panel's activities (Appendix 4). Noting that the WGWAP's present contractual five year life span ends after December 2011, the sub-committee re-emphasised its view that the panel's work is important and should be continued if at all possible.

In 2009, the sub-committee welcomed the report of the IUCN range wide workshop. An important aspect of the results from that workshop was the object of developing a conservation plan for western gray whales. Therefore the sub-committee also enthused to receive a report on the draft Conservation Plan for Western North Pacific Gray Whales (SC/62/BRG24) and **commended** the authors for this important document.

The overall goal of the Western Gray Whale Conservation Plan is to manage human activities that affect western gray whales and maximise the population's chances for recovery, based on the best scientific knowledge.

The conservation plan includes eight sections, of which the first three provide background information including biology and status of the western gray whale population. Section 4 reviews actual and potential anthropogenic threats and ranks these as low, moderate or high priority. Section 5 describes mitigation measures for those threats that have been accorded moderate or high priority. These include:

- entrapment in set nets
- entanglement in other types of fishing gear
- vessel strikes
- noise in feeding areas
- direct effects of oil spills

Section 6, dealing with public awareness and education, concludes that providing range state individuals, groups, organisations, governments and societies with access to information and knowledge about the status of western gray whales is essential for meeting the conservation objectives detailed in the conservation plan.

Section 7 outlines the actions called for and includes sub-sections on monitoring, on implementation and coordination of the conservation plan, and on involvement of stakeholders. In order to be effective, the conservation plan must have a recognised, full-time Co-ordinator who is responsible for *inter alia* actively involving stakeholders, especially those whose livelihoods may be affected (e.g. fishermen). The Co-ordinator should report to a Steering Committee closely linked to appropriate authorities. The Conservation Plan will be useless without sufficient implementation funding. At the very least, sufficient funds must be made available to support the appointment and functioning of a Co-ordinator and Steering Group.

Section 8 describes in detail the high priority actions identified at this stage (see table below). They fall under the following five headings: Co-ordination, Capacity building and public awareness, Research essential for providing adequate management advice, Monitoring, and Mitigation measures. Descriptions of the high priority actions follow a common format, which consists of description of action (specific objective, rationale, target, timeline), actors (responsible for co-ordination of the action, stakeholders), action evaluation and priority (importance, feasibility).

CORD-01	Implementation of the Conservation Plan: Co-ordinator and Steering Committee.
CORD-02	Development of a web-based exchange of scientific information.
PACB-01	Development of a strategy to increase public awareness and build capacity in range states.
RES-01	Determine movements, migration routes and location of wintering ground(s) through satellite telemetry.
RES-02	Development of a GIS database on locations of set nets (both small-type and large-type) in the range of western gray whales.
RES-03	Development of a GIS database on locations of gill nets and pot/trap gear (e.g. for crabs) in the range of western gray whales.
RES-04	Identifying areas where western gray whales have a high risk of being exposed to oil spills.
MON-01	Ensure long-term monitoring of abundance and trends off Sakhalin Island through photo-identification and biopsy sampling.
MON-02	Ensure long-term monitoring of distribution, abundance and trends off southeastern Kamchatka.
MIT-01	Release of entrapped gray whales in set nets.
MIT-02	Prevention of entrapment of gray whales in set nets.

The most critical and urgent action is the implementation of the Western Gray Whale Conservation Plan (CORD-01). Funding must be found for this action at the earliest opportunity to appoint a Co-ordinator and set up the Steering Group to ensure that the Conservation Plan moves ahead in a timely fashion.

The sub-committee **recommended** that the conservation plan be broadly distributed, posted on the IWC and IUCN websites, and possibly published in the *JCRM*. This plan could provide a model for the development of other conservation plans for other populations.

6.3 Other information

Castellote described recent sightings of a gray whale in the Mediterranean Sea. It is not clear which population this whale originated from. It was first observed on 8 May 2010 off Israel (eastern Mediterranean Sea) near Herzliya Marina by Aviad Scheinin from IMMRAC (Israeli Marine Mammal Research and Assistance Center), and a second sighting occurred on 30 May 2010 in Spanish waters (Western Mediterranean Sea), in front of Barcelona harbour by Rodrigo Barahona from SUBMON (Conservación, Estudio y Divulgación del Medio Marino). Pictures of its tail fluke from both sightings did match confirming that this whale travelled more than 3,000km in 23 days (average speed of 5.4km/h for a straight line between sightings). This is the first time that a gray whale was sighted in the western basin of the Mediterranean Sea and just the second time that it is reported in the whole basin. Taking into account the relevance of this sighting, a coordinated effort was organised in Spain to re-sight the whale in an attempt to assess his health condition, reduce collision risks with vessels and obtain a biopsy sample to determine its population identity, but to date (as of 6 June 2010) the whale has not been re-sighted.

7. WORK PLAN

The following work plan was proposed for the coming year.

(1) Perform the annual review of catch information and new scientific information for B-C-B stock of bowhead whales and prepare for the 2012 *Implementation Review*.
(2) Review the stock structure and abundance in a more comprehensive manner for eastern Canada and West Greenland bowhead whales.
(3) Review scientific information on north Pacific and north Atlantic right whales. Only important or urgent matters

such as reports on the reasons for the Argentine die-off will be reviewed for Southern right whales (most papers will be referred to the subsequent Southern Right Whale Assessment Workshop).

(4) Review any new information on western gray and other stocks of bowhead whales.

(5) Review new information on eastern gray whale (not relevant to the *Implementation Review*)

8. ADOPTION OF REPORT

The report was adopted on 7 June 2010 at 18:40. The sub-committee thanked the Chair, noting that he had done an excellent job as a first time Chair for the sub-committee. The Chair expressed his thanks to the sub-committee members for their cooperation and to the rapporteurs for their hard work and diligence.

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Appendix 1

AGENDA

1. Opening remarks
    - 1.1 Election of Chair
    - 1.2 Appointment of rapporteurs
2. Adoption of agenda
3. Review of available documents
4. Bowhead whales
    - 4.1 Bering-Chukchi-Beaufort (B-C-B) Seas stock of bowhead whales
        - 4.1.1 New scientific information
        - 4.1.2 Catch information
        - 4.1.3 Management advice
    - 4.2. Eastern Arctic bowhead whales
        - 4.2.1 Stock structure
        - 4.2.2 Other new scientific information
        - 4.2.3 Catch information
        - 4.2.4 Management advice
    - 4.3 Other stock of bowhead whales
5. Right whales
    - 5.1 North Atlantic right whales
    - 5.2 North Pacific right whales
    - 5.3 Southern right whales
        - 5.3.1 Australian and New Zealand areas
        - 5.3.2 South America area
        - 5.3.3 South Africa area
        - 5.3.4 Plans to review Southern right whales
6. Western North Pacific gray whales
    - 6.1 New scientific information
    - 6.2 Conservation advice
    - 6.3 Other information
7. Work plan
8. Adoption of Report

Appendix 2

PROPOSAL FOR SOUTHERN OCEAN RIGHT WHALE PHOTO-IDENTIFICATION CATALOGUE

Brief description of project and why it is necessary to your sub-committee

For several decades extensive photo-id surveys have been carried out for southern right whales in the coastal waters of South America, southern Africa and Australia during winter and spring, and much valuable data on the demographics of these populations collected. Together with genetic information these data also provide the opportunity to investigate interchange and mixing between the coastal populations, but because of their geographic limitations are uninformative about the links between these populations and those found (generally at higher latitudes) in summer where extensive catches were taken in pelagic whaling, particularly in the 19th century.

This proposal seeks to address this gap by compiling images of southern right whales taken away from coastal waters of the continents, and principally south of 40°S, in a catalogue and associated database. Potential holders of images are believed to include the IWC (IDCR/SOWER), ICR (JARPA), BAS and other National Antarctic Research Programmes. Because most if not all images will be boat-based, the catalogue will be constructed so that it can be searched using any available feature (left side head, right side head, front/top of head, pigmentation/scarring, etc.) in a programme such as Big Fish. Images will all be scored for: (a) quality; and (b) distinctiveness.

Access to the images is proposed to be open to any interested researcher, but to protect intellectual property rights, access to the associated database will depend on what conditions the provider of the images has set. The holders of the Antarctic humpback whale catalogue will be consulted to implement a similar system as for their catalogue.

Compilation will be undertaken by Ingrid Peters at the MRI Whale Unit, University of Pretoria, who has experience in constructing such boat-based catalogues and databases as part of her ongoing PhD on the St. Helena Bay right whale feeding ground. Funds are sought for 6 months' work to enable her to undertake the initial sourcing, compilation and sorting of images.

Timetable

Jan.–Jun. 2011: Sourcing, compilation and sorting of available images. Production of progress report at 2011 Scientific Committee meeting.

Researchers' name

Dr Peter B. Best, MRI Whale Unit, c/o Iziko South African Museum, Box 61, Cape Town 8000, South Africa.

Estimated total cost with breakdown as needed (e.g. salary, equipment)

Salary for Ingrid Peters, MRI Whale Unit, University of Pretoria:

6 months @ R7,000 a month = R42,000 – 3,800 pounds.

Appendix 3

PROPOSAL FOR SOUTHERN RIGHT WHALE ASSESSMENT WORKSHOP

The last Scientific Committee assessment of southern right whales (SRW) was held in 1998 in Cape Town, South Africa and these results were published as an IWC Special Issue in 2001. At the 2008 Scientific Committee meeting, an intersessional correspondence group was established to develop plans on an updated assessment of southern right whales. Some members of the group met at the March 2009 SORP meeting in Sydney, Australia and again at the 2009 Scientific Committee meeting and most recently at the 2010 Scientific Committee meeting.

Objectives:

(1) the examination of current understanding of distribution and population structure in the Southern Hemisphere;
(2) the examination of current stock size and recent population trends;
(3) update and review threats to SRW populations;
(4) identification of feeding grounds and links with nursery/breeding grounds;
(5) food, feeding and links with productivity/survival;
(6) update on historical catches and estimates of original population size;
(7) future research needs and conservation plans by region; and
(8) review progress on establishment of Southern Ocean Right Whale Photo-Identification Catalogue.

Date: September 2011, 4 days.

Venue: Puerto Madryn, Argentina.

Steering committee: Brownell (convenor), Bannister*, Best*, Childerhouse, Groch*, Kitakado, and Sironi*.

IPs: Scott Baker, Anabela Brandao, Steve Burnell, Emma Carroll, Justin Cooke, Barbara Galletti, Ingrid Peters, Randy Reeves, Howard Rosenbaum, Vicky Rowntree, [Uruguay to be named], Luciano Valenzuela.

Budget: £24,000 [15 people] including steering committee marked with *.

Appendix 4

PROGRESS REPORT ON IUCN WESTERN GRAY WHALE ADVISORY PANEL WORK FROM JUNE 2009 TO JUNE 2010

R. Reeves, D. Weller, F. Larsen, G. Donovan, J. Cooke and R. Brownell, Jr.

The Western Gray Whale Advisory Panel (WGWAP), which is convened by the International Union for Conservation of Nature (IUCN), has held two formal meetings since SC/61. These were WGWAP-7 in Geneva, 11–14 December 2009, and WGWAP-8 in Geneva, 16–18 April 2010. As previously, the work of WGWAP has consisted primarily of: (a) reviewing and commenting on western gray whale field research and monitoring work sponsored by Sakhalin Energy Investment Company (also known as Sakhalin Energy); and (b) carrying out a variety of collaborative tasks with company-sponsored scientists and other outside experts within the context of task forces. Increasingly, in recognition that much oil and gas activity by other companies takes place in the region, the panel also comments on the potential additive and cumulative effects of that activity on western gray whales. Besides the two panel meetings, three task force meetings took place over the last year, all in Geneva immediately preceding the WGWAP meetings. The Photo-identification Task Force met on 8–9 December 2009 and the Seismic Survey Task Force met on 6–8 December 2009 and 13–14 April 2010.

The reports of all WGWAP and task force meetings and most of the documents considered at WGWAP meetings are available on the IUCN Western Gray Whale website (*http://www.iucn.org/wgwap/*); note that the latest WGWAP and Seismic Survey Task Force reports will be posted by the end of June 2010. Also available on this website is the cumulative list of formal recommendations made by WGWAP and its predecessors since 2004. This list includes an indication of implementation status for each recommendation. According to the WGWAP terms of reference, Sakhalin Energy is obliged to respond to relevant WGWAP recommendations by either implementing them or explaining its reasons for not doing so, and the company responses become part of the public record.

As indicated in last year's report to the Scientific Committee (IWC, 2010, p.176), the anomalous situation with regard to whale occurrence off Sakhalin in 2008 (fewer animals than in any previous year of monitoring since 2002) had prompted the WGWAP to recommend that Sakhalin Energy postpone its planned 4-D seismic survey of the Astokh oil and gas field for at least a year, and the company had agreed to do so. In the interim, the Seismic Survey Task Force continued its collaborative work with the company to develop a robust mitigation and monitoring programme for the Astokh 4-D seismic survey if and when this would take place.

According to information provided at WGWAP-7 and WGWAP-8, the numbers and distribution of gray whales off Sakhalin in the 2009 field season were similar to what had been observed in years before 2008. Given that, Sakhalin Energy has proceeded with its plans to conduct the Astokh 4-D survey, to begin as early as possible in June 2010 in the expectation that the survey will be completed before large numbers of whales arrive onto the Piltun feeding area. Although the WGWAP was generally satisfied with Sakhalin Energy's final monitoring and mitigation plan, it expressed extreme concern with another seismic survey, this one by the Russian company Rosneft Shelf – Far East, scheduled to begin soon after the Sakhalin Energy survey and expected to last on the order of two months (i.e. from late July or early August and through much of September 2010). The Rosneft survey will cover Lebedenskoie field, which underlies the northern part of the near-shore feeding area of western gray whales. The area to be surveyed directly overlaps the primary feeding area used by gray whale mothers and calves. Details of Rosneft's monitoring and mitigation plan were not available to the Panel.

The WGWAP sent letters of concern to R. Gizatulin, head of the Russian Inter-departmental Working Group on Western Gray Whale Conservation, in December 2009 and again immediately following its April 2010 meeting. Additionally, in May 2010 the Director-General of IUCN sent a letter to Prime Minister Putin urging the Russian Government to intervene and ensure that the Lebedenskoie seismic survey was postponed at least until a satisfactory monitoring and mitigation programme is in place to minimise the disturbance to whales (see *http://www.iucn.org/wgwap/wgwap/public_statements/* for full text of these and other letters).

Among other items of potential interest to this sub-committee are the following:

- One major aspect of the WGWAP's work has been to encourage and facilitate efforts by Sakhalin Energy to carry out regular beach surveys of north-eastern Sakhalin Island in order to detect and respond to stranded marine mammals. On 5 September 2009, the fresh carcase of a dead gray whale (male, 10.07m) was found near Chaivo Lagoon. From photographic evidence it was determined that this individual had been first documented as a calf off Piltun in 2005 and that it had also been photo-identified off south-eastern Kamchatka in 2008 and again in July 2009. There was no external evidence from which to infer cause of death. A biopsy was taken for genetic analyses.
- As reported previously, the Photo-id Task Force has been assessing the compatibility of the two Sakhalin photo-id catalogues with the ultimate aim of enabling a 'joint' population analysis based on the combined photo-id data sets. The population analysis using both data sets through the 2008 season was completed by Cooke and presented to the WGWAP-8 meeting. The analysis will be posted on the WGWAP website as soon as approval has been received from contributing parties. It will also be sent for external review by experts at St. Andrews University. The results indicate an estimated population size of 120–140 whales (excluding calves) in 2009 and that the population is predicted to increase if there are no additional deaths.
- The WGWAP and its convening body, the IUCN Global Marine Programme, have been working closely with the IWC Head of Science (Greg Donovan),

the donor companies (Sakhalin Energy and Exxon Neftegas Limited) and the lead scientists (Bruce Mate and Amanda Bradford) in support of the western gray whale satellite tagging initiative, for which details are reported elsewhere (see overview in SC/62/BRG7). Summaries of the satellite tagging discussions at panel meetings can be found in the reports on the WGWAP website. This is also an 'action' in the Western Gray Whale Conservation Plan discussed elsewhere (SC/62/BRG24).

The next WGWAP meeting is planned for early December 2010. It should also be noted that the 5-year contract between IUCN and Sakhalin Energy expires at the end of 2011 and it remains to be seen whether and under what terms a similar panel process will continue beyond that time.

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