# Annex F

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

**Members:** Walløe (Convenor), Allison, Baba, Baird, Baker, Bannister, Baulch, Bell, Bickham, Brandão, Brockington, Butterworth, Chilvers, Cipriano, Cooke, Crespo, Donovan, Double, Findlay, Gaggiotti, George, Givens, Goodman, Gunnlaugsson, Haug, Heide-Jørgensen, Hoelzel, Holm, Ilyashenko, Iñíguez, Kato, Kelly, Kitakado, Kock, Lang, Lundquist, Marcondes, Mate, Matsuoka, Mattila, Miller, Moronuki, Murase, Naoko, Øien, Okazoe, Palsbøll, Prewitt, Punt, Rendell, Reyes Reyes, Robbins, Roel, Rojas-Bracho, Rosa, Rose, Rosenbaum, Rowles, Scordino, Shpak, Simmonds, Sironi, Skaug, Stachowitsch, Stimmelmayr, Suydam, Thomas, Tiedemann, Tyurneva, Urbán, Vernazzani, Vladimirov, Wade, Waples, Weinrich, Weller, Witting, Yasokawa, Ylitalo, Yoshida, Zerbini.

## 1. INTRODUCTORY ITEMS

### 1.1 Opening remarks, election of Chair and appointment of rapporteurs

Walløe welcomed the participants and was elected Chair. Double, Scordino and Suydam were appointed to act as rapporteurs.

### 1.2 Adoption of Agenda

The adopted agenda is given as Appendix 1.

### 1.3 Review of available documents

The documents available for discussion by the sub-committee included SC/65b/BRG01-21, SC/65b/IA10, Citta *et al.* (2013) and SC/65b/Rep08.

## 2. BOWHEAD WHALES

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

#### *2.1.1 New biological information*

SC/65b/BRG05 described new laboratory methods for measuring D/L ratios of aspartic acid in bowhead whale lens nuclei, and age estimates derived from these data for 64 Bering-Chukchi-Beaufort (B-C-B) Seas bowhead whales. These age estimates used precise, triplicated D/L measurements, a previously published estimate of $K_{asp}$ (Rosa *et al.*, 2012), and an estimate of $(D/L)_0$ derived from a weighted average of D/L values for foetuses and very young bowheads from several sources. The 64 whales aged in SC/65b/BRG05 included 10 whales previously analysed using baleen carbon cycling and/or corpora counting methods. Variance estimation used bootstrap methods. The results strengthened previous evidence suggesting that the lifetimes of some B-C-B bowheads may extend nearly 200 years or beyond: the oldest estimated age found in this research was 187 years (95% CI [142, 258]) for a 19.1m male. The results for the ten whales previously aged suggested that the aspartic acid racemisation technique provided estimated ages that were generally lower than those from the corpora counting approach. Fitted von Bertalanffy growth curves for the 64 whales analysed in SC/65b/BRG05 plus 172 previously analysed animals indicated that female whales continue growing for a longer time than males and eventually attain a larger size.

In discussion the sub-committee noted that past studies have shown that yearlings and young age classes of gray and bowhead whales have slow growth rates post-weaning. Based on this observation, it was questioned why graphing of the growth curves by age in this study did not show a period of slow growth immediately following weaning. It was clarified that this paper used a simple model to fit the data since the focus of SC/65b/BRG05 was aging, not growth modelling like that of Lubetkin *et al.* (2008). That more sophisticated model has shown periods of slow growth about 2-4 years post-weaning in bowhead whales.

The sub-committee noted that the racemisation rate is temperature dependent and asked if the authors evaluated the lens temperature of whales. An unpublished study by Sformo has found that lens temperature of recently harvested whales ranged from 5.6 to 19.2°C with a mean of about 11.3°C (Sformo, unpublished data). It is difficult to make reliable inferences from these data since the temperatures were measured from dead whales. Rosa *et al.* (2012) has found correlation between deep body temperature and racemisation rate in three whale species and humans. SC/65b/BRG05 briefly described an artificial aging experiment that heated lenses to mimic the slower process of aging. Although the method may have potential for simulating D/L ratios in old whales, several significant analysis issues were identified with these data, which were therefore not used in the aging analysis.

A whale in the study aged at 88 years (95% CI 66-120 years) had a Yankee whaling projectile point patented in 1879 embedded in it. Thus, the age estimate of the whale was plausible given the time when the projectile was likely used. The sub-committee concluded that continued work is encouraged on biochemistry to verify this promising aging method.

SC/65b/BRG20 reports on the occasional inadvertent harvest of bowhead whale calves in autumn by Alaskan Eskimos. This report updates George and Suydam (2006) reported on biological characteristics of bowhead calves which was request by the Commission. George and Suydam (2006) found an overlap in length between yearlings and autumn calves and concluded that it was therefore likely that autumn calves would be occasionally harvested by mistake. The inadvertent harvest of calves has occurred periodically since then including three calves accidently harvested in 2013. Autumn 2013 was a year of record high calf production which may have been a contributing factor to the high calf harvest. The updated study confirmed that whales are born between April and June at about 4-5m in length and by autumn (September-October) bowhead calves can reach 7.5m in length and that the length distribution of calves in fall overlaps with the distribution of lengths of yearlings. Based on reports from hunters and scientific observations, calves are often separated for extended periods of time from their mother in autumn. These factors make it very difficult for hunters to assess whether a whale is a calf. Once harvested, the whale's status can be determined based on baleen length. The baleen length of calves is less than 55cm while baleen length for yearlings is generally over 70cm. Therefore, we recommend that a harvested bowhead be considered a calf based solely on a baleen length rather than standard body length. It was also found that the presence of milk in the stomach is an unreliable indication of calf status as two yearlings have been found with milk in their stomachs. The paper further recommends that after 1 December, animals born that year be considered independent animals. Alaskan hunters take the matter of calf harvest very seriously and strive to avoid them. As a result calves have constituted only about 1% of the Alaskan bowhead harvest since 1972. The inadvertent harvest of calves is not a conservation issue since they are counted against the quota and typically have a higher natural mortality rate.

In discussion the authors reported that the two yearlings observed with milk in their stomach were 7.5m and 9.2m in length which is within the normal range of yearling length. The observed range in yearling lengths who were observed with milk may be explained by the positive correlation in the length of calves and cows (Pack *et al.*, 2009).

Paper SC/65b/BRG10 summarises the results of onshore observations of bowhead whales in coastal waters of Chukotka in 2010-13, and compares them with earlier surveys dating to 1992. These observations provide spatial, temporal and relative abundance information for bowheads in coastal waters. Observations of the spring migration of bowhead whales were made in the northwest Bering Strait region. Whales were first seen towards the end of May and continued into the first half of June, however annual variation was observed. During summer (July-August) low numbers of bowhead whales frequented the northern coast Chukotka. Observations in autumn (September-November) indicated large numbers of bowheads aggregated along the Chukotka coast just before sea ice formation. Whales appeared first along the northwestern coast, and then moved eastward towards the Bering Strait as the ice density increased. Generally the fall migration began 2 to 3 weeks earlier along the northwestern coast than the Bering Strait entrance. The authors suggest that sea ice conditions account for the high variability in the timing of the fall bowhead migration. These observations are quite consistent with the results of ADFG/NSB satellite telemetry studies which indicated that essentially all tagged whales migrated from Canadian waters to the N. Chukotka coast in autumn in the area of Neshkan village. Whales may linger there for a month or more, then slowing drift SE and eventually migrating south through the Bering Strait. Finally the authors provide data suggesting that sighting rates (whales seen/day) of bowheads in autumn along the N. Chukotka coast have increased since 1992 but effort is low in recent surveys.

In discussion it was noted that ice conditions were similar for Barrow and Chukotka during migration suggesting that ice alone is not the cause in difference in migration timing. It was also noted that a satellite tagged whale that was observed migrating north up the Chukotkan coast also migrated later in the year relative to migration of other B-C-B whales past Barrow.

The authors of SC/65b/BRG04, SC/65b/BRG09, and SC/65b/BRG13 provided a brief update on their research of the bowhead genome and an update on the mtDNA and SNP database for bowhead whales. These papers were discussed in the Working Group on DNA and summaries of the papers are provided in Annex N.

SC/65b/BRG02 was also briefly presented to the sub-committee and was discussed in detail in the Stock Definition sub-committee. A summary and detailed discussions of the paper are provided in Annex I.

*2.1.2 Non-hunting human-induced mortality*

George presented the findings of Citta *et al.* (2013) on the analysis of spatial/temporal overlap of satellite tagged bowhead whales and Bering Sea pot fisheries to evaluate which fisheries had the greatest risk of interaction with bowhead whales. This paper was also presented to the sub-committee on Human-induced Mortality and the author's summary can be found in Annex J.

Following the author's presentation, the sub-committee discussed the finding that larger whales have greater rates of entanglement scars in bowhead whales than small whales. It was pointed out that for gray whales it is typically young whales that get entangled. It was suggested that maybe the large bowhead whales are the whales that survive an entanglement. George suggested an alternative point of view that the risk of entanglement is low and that older, larger whales have just had more years to be exposed to the risk. Very few bowhead whales are seen beachcast or floating dead with entanglements and it was hypothesised that that sea ice may help whales shed the gear.

*2.1.3 New catch information*

Harvest data from the aboriginal hunt for bowhead whales in Alaska were presented in SC/65b/BRG08. In 2013, 57 bowhead whales were struck resulting in 46 animals landed. Total landed of the hunt for 2013 was higher than the past 10 years (2003-12: mean of landed=40.5; SD=8.7). Efficiency (no. landed/no. struck) in 2013 was 81%, which was slightly higher than the past 10 years (mean of efficiency=77%; SD=7.4%). Of the landed whales, 25 were females and 21 were males. Based on total length, seven of the 25 females were presumed sexually mature (>13.4m in length). Four of the mature females were pregnant.

SC/65b/BRG03 reports that in 2013, one bowhead whales was taken in Chukotka, Russia. It was a male, 13m in length and weighted 41 tons. No whales were struck and lost.

The sub-committee thanked the authors for the update bowhead catch in Alaska and Russia Federation. George reported that the calving rate was greater than normal in recent years and it was not unexpected that a larger percent of harvested whales would be pregnant females as compared to years with low calving rates. Suydam further pointed out that the timing and location of the hunt is variable by year due to environmental conditions which may result in the hunt having yearly variability in the age and sex of whales harvested. The sub-committee noted that the population is continuing to grow and referred to SC/65a/BRG01 which estimated total abundance of B-C-B bowheads to be 16,892 (95% confidence interval [15,704, 18,928]) and an annual increase rate of 3.7% (2.8%, 4.7%).

*2.1.4 Management advice*

The sub-committee **agreed** with their past advice that the *Bowhead Whale SLA* continues to be the most appropriate way for the Committee to provide management advice for this population of bowhead whales. The Commission adopted catch limits for a six-year block in 2012, i.e. 2013-18. The total number of strikes shall not exceed 336 with a maximum of 67 in any one year (with a carryover provision). The sub-committee **agrees** that these limits will not harm the stock.

**2.2 Other bowhead stocks**

*2.2.1 New information*

Shpak presented SC/65b/BRG17 on new information collected in the Shantar region of the western Okhotsk Sea in 2013. Bowhead whales were encountered in Udskaya Bay in July and October; interviews with locals suggest whale presence in the bay throughout the summer. In Ulbansky Bay, in August, as many as 56 bowhead whales were counted during a single 360-scan from the water with a limited to 2km visibility, suggesting that the size of the stock observed is much larger. The majority of whales summer in Academii Bay (mostly in its western arm, Ulbansky Bay) and some feeding in Udskaya. It is not known if whales from these two regions mix or if they have fidelity to the separate bays during the feeding season.

SC/65b/BRG17 assessed two methods for estimating the abundance of bowhead whales in the Shantar region of the Okhotsk Sea. The first method was a genetic mark-recapture population estimate using a Huggins closed population estimator that incorporates whale sex, in which the samples collected in Ulbansky Bay during three years [2011 (36), 2012 (28) and 2013(25)] were used. The analysis resulted in an estimate of 328 (SE=125) whales in the Academii Bay summer aggregation. The second method utilised genetic data and methods used by Meschersky *et al.* (2014) to update their estimate of 554 (SD=183) whales using the 25 genetic samples collected in Ulbansky Bay in 2013. Of the 132 whales sampled in 1995-2012 there were 5 recaptured in the 25 genetic samples collected n 2013 resulting in a population estimate of 493 (SD=145) whales using the Chapman formula. The second method may be biased because it utilises genetic samples analysed at two different laboratories and until genotyping methodologies are compared between laboratories it is suggested that samples collected in 1995-2000 and 2011-13 are treated separately for analysis.

The endangered Okhotsk Sea population of bowhead whales face both natural and anthropogenic threats to recovery. Natural threats include killer whale predation which has been observed several times per season in the region. Anthropogenic threats include fishing activities such as salmon net entanglements (two reported cases within past two years) and industrial activities such as the planned construction of terminal for mining in Konstantina Bay (northwestern arm of Academii Bay) and oil and gas development in the northern Okhotsk Sea.

The sub-committee thanked the author for this update on research of the small Okhotsk Sea bowhead population. The sub-committee noted that the two methods of estimating population had very different estimates and that the method using genetic samples from both labs most likely inflate the estimate of population size due to false negatives. It was suggested that the author conduct a simulation exercise to determine the impact of false negatives in the population estimate. The sub-committee supported the author's decision to present the smaller estimate using genetic results from just one lab as their best estimate until such time that genetic methods are calibrated between the two labs to allow the use of all genetic samples for the population estimate. The sub-committee **recommends** collaboration of genetic laboratories to allow analysis of all available genetic samples for a population estimate.

The sub-committee noted that over the past 20 to 30 years the population estimates of the Okhotsk Sea bowhead population have been stable whereas the B-C-B bowhead population has increased and hypothesised predation by killer whales may be a contributing factor to the lack of recovery of the Okhotsk Sea stock of bowhead whales. The author reported that the killer whales may also hunt beluga whale and are most typically observed eating seals in the area.

The sub-committee **commends** Shpak on her research and **encourages** her to continue this important research of Okhotsk Sea bowhead whales. Furthermore, the sub-committee **encourages** funding groups to provide dedicated money to this project which is currently conducted opportunistically during beluga whale research.

Shpak reported to the sub-committee that in recent years, bowhead whales from the critically endangered Spitsbergen population have been regularly encountered in the waters of Franz-Josef Land (FJL) Archipelago during research vessel expeditions, helicopter surveys and land-based observations conducted by the National Park 'Russian Arctic' and Russian Geographic Society.

In April 2010, 20 bowhead whales were observed in the western part of FJL, in polynyas southwest of George Island (Gavrilo and Ershov, 2010). Gavrilo and Ershov (2010) also summarised other past sightings of bowhead whales in the waters of FJL:

- August 1992: one whale north to FJL;
- June 1995: 11 whales;
- August 1995: three whales 190km south-west of FJL;
- Late August 2001: two whales 50km north-west of FJL; and
- August 2006: two whales.

Since 2010, there have been continued sightings of bowhead whales in the waters of FJL. In 2013 during the two visits in the first half of April, three groups of at least nine whales in total were observed in polynya west off FJL (Gavrilo, 2013a). In August, during the Pristine Seas Franz-Josef Land Expedition-2013, *ca.* 40 whales in total were observed in FJL waters (Gavrilo, 2013b). In April 2014, three whales were encountered in polynyas (Gavrilo, 2014). Mapping of sightings from 2010-13 expeditions has allowed Gavrilo (2014) to document areas of regular bowhead encounters in the southern part of Franz Josef Land.

Based on the summarised findings, the Franz-Josef Land Archipelago should be considered an important habitat for Spitsbergen population of bowheads for late winter through summer.

*2.2.2 New catch information*

The Canadian government provided catch data for 2012 and 2013 to the IWC. The Canadian authorities set the quota of bowhead whales as three per year. The full quota was attained in both 2012 and 2013 and no struck and lost whales were reported.

The sub-committee sincerely thank and **commend** the Canadian government for providing catch data for 2012 and 2013 and **encourage** continued reporting in future years.

No bowhead whales were harvested by Greenland in 2013.

## 3. GRAY WHALES

**3.1 Stock structure and movements**

*3.1.1 Report from intersessional Workshop*

A rangewide review of the population structure and status of North Pacific gray whales was carried out at an IWC Workshop in La Jolla, California, 8-11 April 2014 (see SC/65b/Rep08). The Workshop was co-convened by Donovan and Punt and hosted by the Southwest Fisheries Science Center.

The Workshop objectives, as agreed at SC/65a, were to:

(1) review available information (especially new telemetry, genetics and photo-ID data) and reappraise the population structure and movements of North Pacific gray whales with a focus on examining status;
(2) develop a modelling framework to better assess the status of gray whales and the potential impact of human activities and possible changes in regime or climate; and
(3) provide information for updating the IUCN/IWC Conservation Management Plan for western gray whales and develop a mechanism for updating the plan.

The two operating population models applied thus far to gray whales were reviewed. The first is that used in trials to evaluate candidate *Strike Limit Algorithms* (*SLA*s) for the PCFG, with the two 'plausible' stocks (PCFG and 'north'), each represented using age- and sex-structured population dynamics models (IWC, 2011b; 2013). The second is the individual-based, stage-structured model developed by Cooke and applied to the Sakhalin photo-ID and biopsy (sex determinations only) data (SC/65a/BRG27).

The series of range-wide stock structure hypotheses put forward at SC/65a (IWC, 2014b), which focused on stock identity of the whales that feed off Sakhalin, was reviewed and refined in advance of the Workshop and considerable effort during the Workshop was devoted to further development and plausibility ranking of these hypotheses, whilst setting them in a basin-wide framework. This resulted in seven hypotheses (the earlier numbering scheme was retained), some of which include several alternative variants or sub-hypotheses.

The extensive photo-ID, genetic and satellite telemetry data that have accumulated in recent decades from all parts of the gray whale's North Pacific range were summarised. This included identification of tissue samples potentially available for genetic studies as well as photo catalogues potentially useful for efforts to match whales from different parts of the North Pacific. An important recommendation of the Workshop was that, in view of the evidence that at least some of the gray whales that summer off Sakhalin migrate to the eastern North Pacific in winter, an analysis of all available data should be carried out, preferably before SC/65b, to place bounds on the proportion of whales that move from Sakhalin to the eastern North Pacific and *vice versa*.

Initial attempts were made to collate: (1) gray whale sightings data from all areas, particularly the data from systematic aerial surveys in Alaska; (2) life history information from the literature; and (3) a more nearly complete catch history for the western Pacific than was previously available, to complement the agreed catch series for the eastern North Pacific (IWC, 2011a). It was expected that all such information would be used to the extent possible to evaluate the plausibility of various stock structure hypotheses (e.g. timing and locations of sightings and catches, timing of life history events such as conception and birth) as well as to inform and drive the model. Previous assessment work on gray whale abundance and trends was noted (Laake, 2012; Punt and Moore, 2013; Punt and Wade, 2010), and it was agreed that the initial simple modelling approach would take the results of that work into account.

Incidental catches, ship strikes and anthropogenic disturbances of various kinds that could affect status were briefly considered. The Workshop recommended that the following three hypotheses be considered the highest priorities for inclusion in the initial modelling framework.

*Hypothesis 3a*
Two breeding stocks (Asia and Mexico) may exist, although the Asian stock may have been extirpated. Whales show matrilineal fidelity to feeding grounds, and the Mexico stock includes three feeding sub-stocks: PCFG, Northern Bering Sea (NBS)/Southern Chukchi (SCH)-Northern Chukchi-Gulf of Alaska ('Northern') and Sakhalin.

*Hypothesis 3e*
Identical to hypothesis 3a except that the Asian breeding stock is extant and feeds off both coasts of Japan and Korea and in the northern Okhotsk Sea west of the Kamchatka Peninsula. All whales off Sakhalin overwinter in the eastern North Pacific.

*Hypothesis 5a*
Identical to hypothesis 3a except that the whales feeding off Sakhalin include both whales that are part of the Asian stock and remain in the western North Pacific year-round, and whales that are part of the Mexico stock and migrate to the eastern North Pacific.

It was further agreed that Hypothesis 3c should be included as a sensitivity test. This hypothesis incorporates the possibility that a Sakhalin whale occasionally moves through the NBS-SCH region and thus will have a chance of being taken in the Chukotka aboriginal hunt.

It was understood that the development of a population dynamics model for North Pacific gray whales rangewide would necessarily be an iterative process. The first step of developing an age- and sex-aggregated model which includes multiple stocks (two or three depending on the hypothesis under consideration) would be taken primarily to understand whether sufficient data are available to justify the various stock structure hypotheses and whether parameterisation of the model based on the associated hypotheses can provide reasonable fits to the data. The first step model should explore assumptions regarding the dynamics prior to the 1990s of the whales that feed off Sakhalin.

It was anticipated that the results of the initial model fits would be reviewed by the Scientific Committee and that this review could lead to refinement of the stock structure hypotheses, including rejection of some hypotheses which are found to be clearly inconsistent with the available data.

The second step in the modelling process, assuming that the Scientific Committee considers the first phase a success, would be to extend the model to include age and sex structure and to include data on mixing proportions based on photo-identification, telemetry and genetics data. Subsequent steps may be required depending on the degree to which it proves possible to mimic the available data, and to explore the potential impacts of future catches and other human activities.

The Workshop established an intersessional Working Group (Punt (Chair), Cooke, Donovan, Lang, Mate and Weller) to develop a set of model specifications for the first step in the modelling process.

The sub-committee **welcomed** the Workshop report. There was some discussion about whether the hypotheses and resulting models would allow western gray whales to be taken in the aboriginal hunts or have human induced mortality included. Donovan responded that the model would allow whales from the west to be caught in aboriginal hunts, in both the PCFG area or near Chukotka. There are currently few data, but those that exist suggest that western gray whales are not moving to the Chukotka hunting areas.

Estimates of risk of removal in hunts are needed for modelling. Currently, the model assumes that no commercial catches will occur in the future. However, historical commercial catches, from about 1890 to 1920, may be informative. Aboriginal catches may also provide important information for calculating the risk of removal. Data from bycatch and ship strikes would be helpful too.

In discussions about the three hypotheses, there were concerns that all the western grays would overwinter in the eastern Pacific and not in Asia possibly with different feeding area in the Sea of Okhotsk. It was clarified that the model would allow whales to move between Sakhalin and the western Pacific. In discussions about the three hypotheses, concerns were raised that Hypothesis 3a does not account for recent, albeit rare, records of gray whales off Japan and China. It was clarified that the model does allow for occasional movements of whales between Sakhalin and the Asian portion of the western Pacific.

*3.1.2 Population modelling*

SC/65b/BRG01 provides the mathematical specifications for a sex- and age-aggregated population dynamics model which can represent the stock hypotheses developed during the April 2014 range-wide review of population structure and status of North Pacific gray whales (SC/65b/Rep08). The model allows for multiple stocks, each of which can have sub-stocks, multiple feeding and wintering grounds, as well as migratory corridors. The values for the parameters of the model can be estimated by fitting it to data on trends in relative and absolute abundance, in addition to mixing proportions based on telemetry and mark-resight data. The specifications in SC/65b/BRG01 include choices made when an operating model was developed to evaluate alternative *SLA*s for the Pacific Coast Feeding Group (PCFG) for the eastern north Pacific gray whales. A mixing matrix which represents model 3a from SC/65b/Rep08 is presented.

Scordino noted that estimates of ship strikes and by-catch were only available for the USA and Canada and data from Mexico are limited. The model assumes gray whales aggregate in Mexico with an unknown risk. The risk matrix is a hypothesis; however, there are few data to inform the matrix. Donovan reminded the sub-committee that mixing matrices were not discussed at the Workshop. Additional information is needed to appropriately address this topic.

There was some discussion about the movement of animals between groups when the populations were at carrying capacity (*K*). The model does not allow for any net movement between populations when at *K*, not because there might not be any movement, but simply because movement would not result in any net change in the size of the respective populations.

SC/65b/BRG21 reports estimates of non-hunting human caused mortality in US and Canadian waters for 2008 to 2012. Observed mortalities were easily documented but accounted for the odds that an injured by human activity lives through the injury. For this analysis, injured whales with a compromised chance of survival were given a prorated probability of mortality based on methods in NOAA (2012). Mortality was tallied by regions (California [US border to 41°N], Pacific Coast Feeding Group [PCFG] Range [41°N to 52°N], Puget Sound, Southeast Alaska, Kodiak Island, and northern waters [>52°N]) and by season (migratory [December to May] and feeding [June to November]). Three different models were reported for apportioning the observed mortalities and injuries to the PCFG, Far North feeding group (FN), and Sakhalin Island feeding group (SI). Sighting data from the Cascadia Research Collective database of gray whale sightings was used to estimate probability of a mortality being a PCFG whales in each of the regions during the migratory and feeding seasons which was used to apportion observed mortalities and serious injuries to these two feeding groups using three different methods. The methods differed in how they interpreted and applied the IWC PCFG definition. All mortalities observed during the migratory season were multiplied by 0.002 (Moore and Weller, 2013) to account for the chance a mortality is a SI whale. From 2008 through 2012, 27.1 mortalities were estimated. Those mortalities and injures were apportioned with the three methods which resulted in a range of annual mortality estimates of 1.4-2.6 for PCFG, 5.0-6.2 for FN, and 0.01 for SI respectively.

Scordino noted in discussion that it is possible that this paper over apportions observed mortalities to PCFG whales during the migratory season. The apportionment method was informed by photo-identification records and it is possible there is heterogeneity in the probability that whales of each group can be photographed and identified during the migratory season. Scordino encouraged the evaluation of satellite tracking data to determine the ratio of PCFG to FN whales that are available in the PCFG range and in California during the migratory season. While agreeing that data were needed to evaluate this potential bias, Weller cautioned that the sample size of satellite tracked whales was small and individual variation was high. The sub-committee agreed that the approach outlined in this paper will help estimate removals for the models discussed in SC/65b/BRG01 on stock structure and availability for harvest.

*3.1.3 Future work*

Based on the recommendation from the gray whale workshop (SC/65b/Rep08), the sub-committee **recommends** the following work plan for the North Pacific Gray Whale Rangewide Study.

The sub-committee **endorsed** the additional recommend-ations presented in SC/65b/Rep08. They are:

- conduct a preliminary comparison of photographically and genetically identified gray whales in Mexico, off central California and in the PCFG with a focus on mothers and calves;
- develop single nucleotide polymorphisms (SNP) assays for use with gray whales;
- increase the sample numbers and sample coverage for the eastern North Pacific stock of gray whales;
- compare photographs of gray whales from areas of the Okhotsk Sea and elsewhere in Asia with the Sakhalin and Kamchatka catalogues (e.g. Weller, Bradford, Tyurneva, etc.); and
- continued telemetry studies.

It was asked what would trigger an *Implementation Review* for gray whales. Donovan responded that if there is new information that suggests we are outside tested parameter space, then an *Implementation Review* may be needed. This would occur discussions within the sub-committee. The last *Implementation Review* was completed in 2012 and the next would likely occur in 2017.

**3.2 Western North Pacific gray whales**

*3.2.1 New information*

SC/65b/BRG12 provided a summary of sightings of western gray whales near Japan. No gray whales were seen during several cetacean sighting surveys, including JARPNII, from spring to autumn 2013. There was a report of opportunistic sightings of a western gray whale in the Sea of Japan, just off the estuary of Ohkozu-Bunsuiro diversion channel, Teradomari town in Niigata prefecture from the end of

Table 1

Work plan.

| What | Who | When |
|---|---|---|
| Results of initial runs[1] of the age- and sex-aggregated model distributed to the Steering Group for hypotheses | Punt | 31/0714 |
| Comments back including the possibility of further/alternative runs and additional hypotheses from the Workshop report | Steering Group* | 15/08/14 |
| Agree any revisions | Steering Group | 01/09/14 |
| Specifications for an age- and sex-structured model distributed to the Steering group | Punt | 15/09/14 |
| Comments on specifications from Steering Group | Steering Group | 25/09/14 |
| Results of further runs of the aggregated model and initial runs of the age- and sex-aggregated model distributed to the Steering Group | Punt | 31/10/14 |
| Comments back from the Steering Group including the possibility of further/alternative runs | Steering Group | 15/11/14 |
| Improved estimates of western North Pacific catches | Brownell, Reeves | 30/11/14 |
| Final updated estimates for future ship strikes and bycatches | Scordino, Carreta, Ford, Weller, Mate, Urban | 30/11/14 |
| Improved abundance and trend estimates for the PCFG | Calambokidis, Darling, Laake | 30/11/14 |
| Putting bounds on the proportion of Sakhalin whales that migrate to the eastern North Pacific in winter | Cooke | 30/11/14 |
| Final suggestions from Steering Group on trials for Workshop | Steering Group | 06/12/14 |
| Modelling results completed | Punt | 2 weeks before Workshop |
| Technical Workshop to review modelling results and update datasets (Neah Bay or La Jolla) | Convenors: Donovan and Punt | March 2015 |
| Additional runs or work if required and possible | Punt and whoever | Prior to SC/66a |
| Review of updated Cooke model for Sakhalin and Sakhalin-Kamchatka gray whales | Cooke | SC/66a |
| Review of model results and Workshop report by SC | | SC/66a |

*Steering Group: Donovan, Punt, Weller, Reeves, Moore (J), Wade, Butterworth, Scordino, Bradford, Laake, Lang. [1]This includes conditioning as required.

March and beginning of April 2014. Nishiwaki confirmed the sighting of one gray whale on April 6 and another smaller individual on April 11. Both whales were photographed. In response to the gray whale sightings, the Fisheries Agency of Japan communicated with the prefectural government of Niigata and local fishermen about the presence of the gray whales, requesting them to avoid entangling the animals and reminding them of the regulations regarding gray whales. There is no evidence that those whales were by-caught or stranded. Additionally, Japan received no reports of strandings or entanglements from other locations from May 2013 to April 2014.

The sub-committee **welcomed** the information on the additional sightings from central Japan off the west coast. Weller noted that the photos in SC/65b/BRG12 were not sufficient to conclude that there were two whales off Japan in April 2014. If the whales were a mother/calf pair, the sightings may suggest that the western North Pacific remains an extant wintering ground for reproductive females. Kato assured the sub-committee that the gray whales were photographed many times showing that there were two individuals. The sub-committee **encouraged** further analysis of the photographs to confirm that there were two whales and that it was a mother-calf pair.

The sub-committee **strongly recommended** that photographs from Japan be compared with other photographs of gray whales from across the Pacific and the Sea of Okhotsk. Weller offered to coordinate this matching effort as part of the IWC Pacific-wide study of gray whale movements and population structure.

Kato presented information in SC/65b/BRG12 about research conducted on the skeletal morphology of gray whales. In 2012, Nakamura and Kato compared five specimens stranded or entangled off the Pacific coast of Japan between 1990 and 2005 (1 mature and 4 immature animals) with one whale from Ulsan, Korea and one from California, USA, which was reported by Andrews (1914). They found that the cranial vertex, the pelvic bones, and sternal bones were morphologically different. The specimens from Japan were more similar to the California specimen than to the Korea specimen. This article is in press at *Mammalian Science*, the journal of the Mammalogical Society of Japan.

In 2013, Nakamura and Kato examined five additional California specimens (body length, 9.3-11.7m) and focused on the vertex of skull. The results of that study were presented at the 20th biennial conference of the Society for Marine Mammalogy in December, 2014. They specifically examined: (1) the positions of posterior end of maxilla and premaxilla; (2) the form of the frontal border of the nasal; and (3) the form of the posterior end of premaxilla. The morphological features of the five specimens from the coast of Japan were more similar to the California specimens than to the Ulsan specimen. Those findings may suggest that the feeding ground of the eastern stock of gray whales has expanded to the coastal areas of Japan.

The sub-committee **welcomed** the results and **encouraged** the continuation of this study but cautioned that the results should be viewed as preliminary because of small sample sizes and other issues. SC/65b/Rep08 cautioned against over-interpretation of the results given that: (1) the sample size is small and there are the long temporal gaps in timing of collections; and (2) the sample includes specimens of immature animals and some skeletal and skull features are known to vary by age or state. Kato requested access to more samples of gray whales, especially in California. Weller and Scordino offered to assist Kato in contacting organisations that have gray whale specimens, including the Makah Museum, at Neah Bay, Washington, USA.

A collaborative Russia-US research programme on critically endangered western gray whales summering off northeastern Sakhalin Island, Russia, has been ongoing since 1995. SC/65b/BRG15 reviewed findings from the 2013 research activities and combined the results with data from previous years, in some cases ranging back to an opportunistic survey in 1994. Photo-identification research conducted off Sakhalin Island in 2013 resulted in the identification of 94 whales, including nine calves. Of the 85 non-calves identified in 2013, 83 whales (97.6%) had previous sightings in the Piltun area during 1994-2012 photographic efforts. Two previously unidentified non-calves were observed. When combined with data from 1994-2012, a catalogue of 223 photo-identified individuals has been compiled by the Russia-US research program. Not all of these 223 whales can be assumed to be alive, however. One known female first identified in 1997 was observed with a calf for the first time, resulting in a minimum of 31 reproductive females observed since 1995. A 2014 field program will begin in early July and this effort will represent the 19th year of research by the Russia-US team on western gray whales off Sakhalin Island.

Vladimirov presented information about the continuation of the annual study under the Joint Western Gray Whale Monitoring Programme off the northeast coast of Sakhalin Island funded by Exxon Neftegaz Limited and Sakhalin Energy Investment Company, Ltd. The Joint Program, implemented by scientists from leading Russian institutions, has four primary areas of research: photo-identification, distribution surveys, benthic prey surveys, and acoustic monitoring. Both Piltun and the offshore feeding areas, known to be the main feeding grounds of western gray whales in the Sea of Okhotsk, were included in the monitoring program.

The maximum numbers of western gray whales sighted within the Piltun feeding area by onshore surveys was 64 individuals which is less than in previous two years but similar to 2007-10. The distribution of whales was similar to previous years with animals concentrated in the central and north part of the Piltun feeding area. The number of gray whales in the offshore feeding area was similar to previous years. There has been a continued recent shift of whales toward the south-east, deeper portion of offshore feeding area.

Western gray whales show high fidelity to the feeding areas. Of those whales sighted in 2013, 97.5% had been identified off northeast Sakhalin at least once in previous years. During 2013, 128 identified gray whales were sighted, including six calves and three first-time non-calf gray whales. It is important to note that it is unknown whether these three first time non-calf whales were new to the region or have just not been previously photographed and identified. After 2013 the Joint Program catalogue includes a total of 228 individual animals. Also, nine biopsy samples of 20 permitted by Russian Authorities were collected from a calf, two females and six whales of unidentified sex.

The results of the Joint Programme conducted in 2013 showed that western gray whale feeding aggregation off Sakhalin is at least stable and may be slightly increasing.

The sub-committee thanked Sakhalin Energy for providing the results from the 2013 study of western gray whales. The information is very helpful. Recognising the difficulties of sharing data, the sub-committee again **recommended** that the two western gray whale study programs off Sakhalin should make every effort to collaborate, especially in sharing photographs and other data. The sub-committee also noted that oil and gas activities are increasing near Sakhalin and **recommends** that other operators should be involved in studies and monitoring of western gray whales and follow the best mitigation practices to ensure protection of these whales and their habitats off Sakhalin Island.

*3.2.2 Other issues*

In the western North Pacific there is substantial concern about interactions between critically endangered western gray whales and coastal fisheries. Between 2005 and 2007, four female gray whales in the western North Pacific were unintentionally entrapped and died in set nets (i.e. trap-nets) while migrating off the Pacific coast of Honshu, Japan (Kato *et al.*, 2013). One of these whales, entrapped off Japan in January 2007, was photographed earlier as a calf (with its mother) off Sakhalin Island, Russia, during July-August 2006 (Weller *et al.*, 2008). SC/65b/BRG16 summarises information from 2013 regarding salmon trap-nets observed operating in coastal waters on the western gray whale feeding ground off northeastern Sakhalin Island. This represents the first known deployment of such nets in this feeding area (at least since 1995 when annual research on gray whales in the region began).

The placement of these nets directly overlapped with a core portion of the feeding ground and within critical habitat for mothers with calves (Gailey *et al.*, 2011; Sychenko, 2011; Weller *et al.*, 1999). On 22 August a whale was photographed with a rope entanglement that was cutting into its caudal peduncle. This entangled whale (Russia-US catalogue no. 35) was first identified off Sakhalin in 1995 and is one of the individuals most frequently photographed by the Russia-US research team between 1995 and 2013. He is a father of multiple calves sampled off Sakhalin (Lang, 2010), and in 2004 was photo-documented in the eastern North Pacific off Vancouver Island, Canada (Weller *et al.*, 2012). In 2013, whale no. 35 was sighted on 9 and 14 July and 22 and 24 August. His entanglement was first observed from photographs taken on 22 August.

Examination of all photographs of this whale from 2013 was inconclusive with respect to determining if the observed entanglement existed prior to or after 22 August. That being said, the wound observed on the peduncle appeared to be relatively fresh (i.e. the presence of apparent redness and a lack of cyamids), suggesting that the entanglement happened on the Sakhalin feeding ground in 2013 and relatively close in time to when the entanglement was first documented on 22 August. Additionally, the colour of the entangling rope (and related blue thread) appears similar to the gear used on the nearby salmon trap-nets. This observation suggests the possibility that the entanglement resulted from an interaction with the nearby salmon fishery.

In the absence of additional photographs, the fate of this whale is presently unknown and the observed entanglement is considered to be potentially life threatening. The incident reported here represents the first documented entanglement of a gray whale off Sakhalin Island since the inception of the research programme in 1995. The coincidence of this event coinciding with the introduction of salmon fishing net-traps in 2013 is cause for concern.

The sub-committee **expressed concern** about the possibility of the development of a salmon trap net fishery in the feeding areas of western gray whales off Sakhalin. There was some discussion about the origin of the rope and whether it was from the salmon fishing gear. Ilyashenko noted what appeared to be a metal segment on the right side of the rope was not used in the salmon fishery. Scordino asked if there were any crab fisheries nearby that might have caused entanglements of gray whales feeding off Sakhalin Island noting that the entanglement scarring rate observed by Bradford *et al.* (2009) of western gray whales was more than observed in an unpublished study of PCFG whales. There are no crab fisheries in the feeding areas at this time. Ilyashenko noted that his understanding is that the Russian Federation will prohibit fishing in the feeding areas of gray whales off Sakhalin Island in 2014. However, no official communications confirming this closure have been received or reviewed by the sub-committee. The sub-committee **recommended** that the Russian Federation and local Sakhalin authorities prohibit trap net fishing on the gray whale feeding grounds in the future.

Leslie provided information about Exxon Neftegaz Limited's proposed development of a temporary facility to be situated on the eastern shore of Sakhalin Island for the unloading of various modules for oil and gas activities. A total of 18 large barge loads are scheduled to be unloaded from June to November in 2016 and 2017 but possibly beginning in November 2015. There is concern that building an earthen causeway (~885m long and 40m wide) within Piltun Lagoon will have deleterious effects on the whales and their habitat and prey. The company's preferred option is to build a causeway, but other options include delivering the cargo overland through the port of Moskalvo or constructing a facility on the northern end of Sakhalin Island away from the feeding area of gray whales.

The Sakhalin Environmental Watch formed an Expert Council in the autumn of 2013. The Council consisted of 11 experts from around the world, including members of the Western Gray Whale Advisory Panel, to review the environmental risks of this project. There are a variety of concerns about possible impacts to wildlife, fish and their habitats. With regards to western gray whales, the Expert Council was especially concerned about impacts to gray whales from the increased level of anthropogenic sounds during barging and unloading. There is also concern that because the material deposited to create the causeway is not planned to be removed, it will erode and fill an important channel into Piltun Bay or cover some of the benthic feeding areas of gray whales. The Expert Council concluded that the best option for mitigating impacts to western gray whales and reducing or eliminating other environmental concerns is to move the cargo overland to Moskalvo (see Appendix 2). Transporting the modules through northern Sakhalin Island will have fewer impacts to gray whales, other wildlife and fish species.

There were discussions about what is driving the preferred option for building a causeway. It appears that financial considerations are the main issue; however, Vladimirov pointed out that trucking the modules overland would result in difficult logistical challenges. Vladimirov stated that Exxon is collecting and analysing benthic samples in the vicinity of the proposed project. Exxon believes that the material for the causeway will likely have little impact on amphipods, the gray whales' main prey. He also explained that bringing the modules through Moskalov may benefit the local community but would require lots of road building. The Environmental Impact Assessment is an independent process within Russia. Ilyashenko noted that Russian State Ecological Experts reviewed the project and made decisions based on their expertise and knowledge. The independent Expert Council was organised by a group of non-governmental organisations.

The sub-committee **expressed serious concern** about this proposed development project and its possible impacts, including cumulative ones, to western gray whales, their feeding habitat and prey. Because the proposed project may impact Piltun Lagoon, additional information is needed about the importance of the lagoon in supporting gray whale feeding habitat and prey. The sub-committee **requests** additional information from the Government of the Russian Federation on the specific locations and types of construction that comprise the development proposed by *Exxon Neftegaz Limited.* The sub-committee **urges** the Government of the Russian Federation to take steps to ensure the maintenance of Piltun Lagoon, due to its importance to support the critical feeding habitat for western gray whales mothers and calves.

Weller provided an update on the progress of the Western Gray Whale Advisory Panel (WGWAP), which is convened by the International Union for the Conservation of Nature (IUCN), since the last Scientific Committee meeting. The annual progress report from the WGWAP from June 2013 to May 2014 is included as Appendix 3.

*3.2.3 Conservation advice*

The sub-committee again **acknowledged** and **welcomed** the important work of the IUCN WGWAP as reflected in the updated report provided to this meeting (see Appendix 3) and **encouraged** its continuation. As previously, the sub-committee again **recommended** that oil and gas development activities (including seismic surveys and on- or near-shore development) in areas adjacent to or used by gray whales be undertaken only after careful planning for mitigation and monitoring. This should include a credible environmental impact assessment process prior to final decision-making. The sub-committee also **welcomed** the efforts by Japan for the conservation and research on gray whales and **encouraged** those efforts to continue.

### 3.3 Eastern North Pacific gray whales

*3.3.1 New Information*

SC/65b/BRG19 presented research on gray whales in northwest Washington with the goals to: (1) increase our understanding of gray whale use of the study area; (2) document the annual and seasonal fluctuations in the numbers of whales utilising the area; and (3) to assess the fidelity of whales to the study area within and between years. From 1984 through 2011, a total of 225 unique gray whales were observed, with 50% being observed again in a future year. There was significant variability in the number of whales photographically identified per day of survey effort by month and year. During the feeding season the number of whales observed per day of effort increased to a peak in August in the Pacific Ocean and to a peak in October in the Strait of Juan de Fuca. We observed that some whales habitually returned to northwest Washington, but on average whales were observed in only 32.1% of the possible years in which they could have been observed. On average, whales had a minimum tenure (residency time) of 24.8 days out of a possible 183 days of the feeding season. On average 10.8 new whales were seen in the study area each year with 5.6 of these seen in multiple future years. Together these findings confirm that even though northwest Washington is an important feeding area, most PCFG gray whales do not have strong fidelity to this one region within the PCFG.

Weller commented that the situation in the PCFG is unusual because there are summer 'resident' animals and migratory whales occurring in the same area. Scordino thought there were only two or three whales that have been seen each and every year of the study and that whales are most typically seen for a small number of years and then have a hiatus of one or more years until they are next seen again in the PCFG area.

Mate described the satellite-tagging of 35 PCFG gray whales off the coasts of Oregon from September to mid-October ($n$=12) and northern California near Pt. St. George, CA ($n$=23) from late October to December during 2009, 2012 and 2013. Only two of the tags (6%) did not work. Identification photographs confirmed all whales were PCFG gray whales. Biopsies were collected from 23 of the tagged whales (12 males and 11 females). A Bayesian Switching State Space Model (SSSM) was applied to the filtered Argos locations for each whale track to provide a regularised track with two estimated SSSM locations per day. Local convex hull (-LoCoH) utilisation distributions were then calculated for each whale with more than 50 feeding season locations to determine home ranges (HR, 90% isopleths) and core areas (CA, 50% isopleths). This technique was more appropriate than parametric kernel methods because it directly draws upon the spatial structure of the data allowing for hard boundaries and irregular exclusionary areas in the environment, such as those found extremely close to shore. Residence times were calculated in areas where three or more successive Area Restricted Search (ARS) locations occurred.

The 33 telemetry tracks ranged from 3-383 days ($\bar{x}$=118, SD=98.1 days) with one of the 2013 tags still transmitting at 193 days at the time of manuscript preparation. In 2009, nine tags were shorter than the other nine, with average tracking durations of 65 days and 112 days, respectively. All whale locations were on the continental shelf, close to shore, with the vast majority of good-quality locations (Argos classes 1, 2 and 3) occurring within 8km of shore.

As tagging dates ranged from September 2 to December 3, autumn and winter movements could be described for most of the tagged whales, whereas spring and summer movements could only be shown for whales whose tags lasted beyond their migration north from wintering areas. Fall/winter tracking periods (prior to southbound migration) ranged from 3-163 days ($\bar{x}$=45, SD=33.1 days, $n$=30). Twelve whales were tracked into the Pacific Northwest following their northbound migration from wintering lagoons off Baja California. Post-migration tracking periods for these whales ranged from 8-203 days ($\bar{x}$= 65, SD=60.7 days) with end dates for northbound migration ranging from February 21-April 18 between northern California to Icy Bay, Alaska.

Feeding area HRs were calculated for 23 whales whose tracks provided >50 SSSM locations in PCFG feeding areas, and ranged in size from 81-13,634km$^2$ ($\bar{x}$=3,249, SD=4,207.3km$^2$). CAs were calculated for 22 of these 23 whales and ranged in size from 11-3,976km$^2$ ($\bar{x}$=841, SD=1,158.9km$^2$). The CA for one whale could not be resolved due to the geometry of its track. Only two of the 18 2009 tags produced post-migration HRs and CAs, compared to 4 of 15 tracks from 2012 and 2013 tags. Only four tags had enough information for pre- and post-migration season to analyse larger combined HRs and CAs. HRs and CAs varied in size and location, but did not vary directly in response to track duration. Individual whale CAs ranged from 3-70% of HR values, averaging 17% and 26% of HR values for combined and individual pre- and post-migration seasons, respectively.

Feeding area HRs covered the majority of the near-shore waters from northern California to Icy Bay, Alaska and CAs showed a similar range, but with areas of high use (where CAs overlapped for multiple whales) occurring primarily off central Washington, central Oregon, and southern Oregon/northern California. More northerly areas (Alaska, British Columbia and Washington) were occupied earlier in the feeding season, primarily in spring and summer. Tagged whales shifted to the south in fall and early winter.

While recorded extended residence times were recorded for tagged PCFG whales off Cape Blanco, in southern Oregon (66 days), Icy Bay, Alaska (56 days), Grays Harbor, Washington (54 days), Newport, on the central Oregon coast (42 days), and Barkley Sound, Vancouver Island (31 days), the area near Pt. St. George, California was the most heavily used of all areas (in part as a bias of fall tagging locations) in all years with residence times ranging from 1-143 days. Tagging and re-sighting efforts in that area consistently observed relatively large numbers (15-20+) of gray whales, While gray whales have been shown to use this area in late summer (Calambokidis *et al.*, 2002), surveys have not typically taken place in November and December when the majority of tagged whales from this study were occupying the Pt. St. George area. Eighteen whales had overlapping HRs and 13 whales had overlapping CAs there. Eleven of 12 whales tagged in Oregon also spent time there. The predominance of overlapping CAs off Pt. St. George highlights the importance of this area as a late-season feeding spot, and perhaps a staging area for gray whales prior to southbound migration. Eighteen of 33 tracked whales spent time in this region just prior to migrating south, and five other tags stopped transmitting in the same area before migration. Some of the predominance in locations in the area off Pt. St. George reflects the large number of tag deployments there (23 out of 35 whales), however, whales tagged in Oregon also used the area. Seven of 12 whales tagged off central Oregon were tracked to Pt. St. George before migrating south. All but one of the remaining five whales tagged in Oregon were photographed at Pt. St. George without their tags, showing that the area was very heavily used by PCFG whales late in the season. The researchers observed foraging behavior and defecation by a relatively large number of whales in this area to support that the area may provide an important final source of food prior to migration.

One male gray whale in good body condition did not migrate south at all, remaining off the northern coast of California for the duration of the winter, with two extended periods off Pt. St. George (138 days in Sep.-Feb., and 48 days in Mar.-Apr.). The animal moved back and forth between the central and southern Oregon coast from late spring until mid-July and then off Cape Blanco for 66 days until the end of its tracking period, 383 days after tagging. This whale had one of the smaller HRs at 1,874km$^2$. This observation provides the first unequivocal evidence of a gray whale not participating in the migration to Mexico.

Seven whales had SSSM locations either inside the Makah whaling grounds or adjacent to them. Two of these whales had continuous ARS locations in the Makah Tribal area, for 1 and 2.5 days respectively. Three whales, while not having ARS locations in the Makah area, had SSSM locations there on 2, 4 and 5 days respectively. A sixth whale had one ARS location near the southern edge of the Makah area. A seventh whale travelled to areas north of the Olympic Peninsula, but we did not receive enough tag locations to confirm its occurrence in the Makah area. Locations of tagged whales in or near the Makah Tribal area occurred in six months (February, April, May, August, September and December), including those that overlap with migratory timing of eastern North Pacific gray whales (December, February, April and May).

Three of the twelve tagged whales tracked into spring spent time in Southeast Alaska, Alaska; one 2009 whale spent 56 days near Icy Bay before heading south to the east side of Haida Gwaii, British Columbia, a 2012-whale spent 9d near Icy Bay before its tag stopped transmitting, and a 2013-tagged whale travelled to just south of Yakutat Bay, Alaska by May 2014 and was still transmitting in May 2014. Despite small sample sizes during 3 separate years, we suggest that areas north of Vancouver Island to Icy Bay also represent important feeding areas for some PCFG whales.

The sub-committee **welcomed** this new paper and encouraged more telemetry effort in the PCFG.

In discussion it was noted that re-sighting data showed that most whales were seen within 60 n.miles of the first observation. Scordino cautioned that samples from this study were probably representative of animals using the southern area of PCFG and not necessarily representative of all PCFG whales. Mate acknowledged this limitation but pointed out that six of the 12 tagged animals that migrated back into the PCFG area after the reproductive season used the Makah hunting area.

*3.3.2 Catch information*

Ilyashenko presented SC/65b/BRG03. A total of 127 gray whales were struck off Chukotka, Russia in 2013 resulting in 125 landed. Of those, 39 were males and 86 were females. Two of the whales were inedible because of a strong medicinal smell (i.e. 'stinky whales'). The body length of whales ranged between 7.9 and 15.5m (average=10.1m). Body weights ranged between 5.9 and 39.1 tons (average=11.9 tons).

Mate asked why so many females were taken in 2013. Do hunters prefer larger whales that are usually females? Ilyashenko speculated that hunters may need to take larger whales because of the cultural and nutritional needs of the increasing human population of Chukotka but traditionally take smaller animals to improve safety and reduce struck and lost.

*3.3.3 Management advice*

The sub-committee **agreed** that the *Gray Whale SLA* remains the appropriate tool to provide management advice for eastern North Pacific gray whales. It was also **agreed** the proposed Makah whaling management plan remains the appropriate tool to provide management advice for hunts in Washington State, USA provided that a research program monitors the relative probability of harvesting a PCFG whale in the Makah usual and accustomed fishing grounds (IWC, 2014a).

## 4. RIGHT WHALES

### 4.1 New information on southern right whales (SC/65b/IA10, SC/65b/BRG06 and BRG07)

SC/65b/IA10 reported circumpolar spatial distribution of southern right whales using the IDCR/SOWER CPII and CPIII data. A Generalised Additive Model (GAM) was used to estimate the probability of occurrence. The sightings were restricted in Area II and IV both in CPII and CIII. Because environmental data at the time of the surveys were not available especially in early years of the IDCR/SOWER, publicly available climatological data were used in the analysis. The spatial distribution of southern right whale was estimated. Spatial distribution in Area IV expanded from CPII to CPIII although occupied area at circumpolar level was small in comparison with other baleen whales.

Bannister informed the sub-committee that the abundance estimate from CPIII data in Area IV for right whales was estimated to be approximately 900. The paper describing this analysis and SC/65b/IA10 will be submitted for publication in the IDCR/SOWER Commemorative Volume.

SC/65b/BRG06 reported that southern right whales (*Eubalaena australis*) are experiencing high mortality rates at Península Valdés, Argentina. In 2003, the Southern Right Whale Health Monitoring Program was established by a consortium of NGOs to monitor the health status of this population by post-mortem examinations. Previous reports to the IWC included information through 2011. Here the authors update information for the 2012-13 seasons. A total of 672 dead whales were recorded on the Península Valdés nursery ground and surrounding areas along the Argentine coast between 2003 and 2013. At least 116 whales died in 2012, which represents the highest number of southern right whale deaths ever recorded in one calving and nursing season (June-December). The number of dead whales was 67 in 2013. As in previous years, most of the dead whales were newborn calves (97% of strandings in 2012 and 94% in 2013). More deaths were recorded in Golfo Nuevo (86% in 2012 and 79% in 2013) than in Golfo San José (12% in 2012 and 21% in 2013), with two strandings (2%) in the outer coast of the peninsula in 2012. Most whales died in August-October (77%) in 2012 and in September-October (70%) in 2013. Only one calf was alive when it stranded in 2012, and died a few minutes after it was found. The remaining whales were dead when reported or found, and post mortem examinations were performed when and to the extent that carcass condition allowed. Biotoxins, infectious diseases and malnutrition are three hypotheses that have been proposed to explain the recurring high mortalities in this southern right whale population. Preliminary observations suggest that nutritional status and body condition could play a role in the differential mortality observed in different years. A fourth hypothesis, the physiological and behavioral effects of kelp gull attacks on newborn calves has been considered more recently. Research efforts to unravel the causes of these unexplained deaths continue. Consistent and sustained high calf mortality rates could affect/slow the Península Valdés southern right whale population's recovery (Rowntree *et al.*, 2013).

The sub-committee discussed the increased prevalence of kelp gull attacks at length. The authors confirmed that attacks are most common on calves and, with very few exceptions, the calves are dead before they strand. Not all stranded animals can be examined; search flights occur every 14 to 20 days so some carcases are too decomposed before discovery, however, it is unlikely many calves are stranding outside the search area. The high variability in calf mortality between years has not been explained and is not clearly linked to environmental variation or simply variation is the number of calves born in the region. Notably 24% of the calves that died in 2012-13 had no gull-inflicted lesions possibly because they died so quickly after birth. This suggests a portion of the calf mortality is not due to direct attacks on the calf but perhaps by an inability to suckle, rest, infection or the nutritional condition and behaviour of the mother. These factors may also be related to the gull attacks. The sub-committee discussed whether very early calf loss could explain the increase in frequency of two-year calving intervals in known females; three years being the normal calving interval. Similarly, increased five year intervals could be due to early but cryptic loss of a calf. A population assessment of the impact of both cryptic and observed calf loss will be presented to IWC/66a.

The sub-committee re-iterated it previous recommendation to record the extent of the lesions on affected animals in order to determine the size of wounds and the likely consequences to the animals' metabolism and general body condition. It also explored the value of an improved understanding of the life-history, abundance, physiology, diet and foraging movements of the gulls both within and outside the whale season. This information could lead to the development of an effective gull attack mitigation strategy. There is a notable drop in attacks once the gulls begin their incubation phase in October. The authors explained that a gull control programme by the provincial government of Chubut started three years ago but it is not clear if this will continue. Gull attacks were first recorded in late 1960s and early 1970s with the prevalence increasing steadily since that time. Gull attacks on whales have not been reported elsewhere, with the exception of isolated cases in Brazil although gulls have been recorded eating sloughed skin after a whale has breached.

The sub-committee **expressed concern** over the high calf mortality reported in this population and recommended that the stranding program continue as a high priority under this population's Conservation Management Plan (see Item 4.4). It also **recommends** that information on the gull control program is reported to the IWC Workshop to be held in Puerto Madryn, Chubut in August 2014 (see below).

SC/65b/BRG07 reported that over fifteen years ago the Marine Mammal Lab (CENPAT-CONICET) developed a method for population monitoring based on aerial surveys, which could lead to study seasonal changes within and through years. A monitoring area was defined around Península Valdés totalling a coastal strip of 350 n.miles (620km) flying the coastal zone parallel to the coastline at an altitude of 500 feet. Mother-calf pairs, solitary individuals and breeding groups were counted. A total of 55 aerial surveys were carried out in 1999, 2000, and from 2005 to 2013. The rate of increase was calculated using the number of whales and number of calves at the peak of the breeding season of those years. It was estimated from the slope of the linear regression of the log-number of whales through time. The rate of increase for the period 1999-2013 (taking out 2008 to 2010) was estimated from the slope of the linear regression of the log-number of the total number of whales ($r$=6.2, Lower CI 95%=4.2, Upper CI= 8.1; R2=0.93, $n$=7) and from the new-born calves ($r$=6.6, Lower CI 95%=4.2, Upper CI=9.0; R2=0.82, $n$=6) in the peak of the season through time. When the analysis was done considering all the years without excluding those of suboptimal surveys, the rate of increase of total number of whales was estimated in 4.2 (CI 1.1-7.3) and the increase of calves was 5.2 (CI 2.8-7.6). The rate of increase was also estimated from Generalised Linear Models using the full data set. Both Poisson and negative binomial models were applied to data of censuses of SRW. As predictor variables we included the Year and the Month, considered as continuous variables (Month 1-12; Year 1999-2013). Monthly variation in number of whales was modelled using also the Month 2, allowing the models to explore a non-linear relationship between numbers of whales and temporal variables. The selected model for the census of all of the southern right whales in Península Valdés from 1999 to 2013 indicates that population has increased in 4.57% annually (95% CI=2.84-8.82%). The selected model suggests the number of calves born in Península Valdés increased by 7.01% per year (95% CI=3.5-11.49% per year) from 1999 to 2013. The distribution of the whales with regard to distance to the coast was studied by means of a binomial non-parametric test. The proportions of whales observed between the two sides of the aircraft (coastal-offshore side) was compared with a theoretical random distribution with p=0.5. In the surveys carried out from 2005 to 2010 the proportion of whales on the offshore side of the strip became to increase, this was observed for all the groups involved. Density was also estimated inside of the monitoring zone as the total number of whales in the monitoring area. There was a remarkably high density shown in El Doradillo in 1999 where more than six whales per km$^2$ was estimated. Other areas were between one and two whales per km$^2$. Between 2005 and 2007 high density areas were between two and four whales per km$^2$. In spite of the fact that there are three areas where density of whales in the coastal zone is very high, the trend of the average density inside of the monitoring zone showed a steadily increase from 1999 to 2007 almost doubling the density in the former years. Given also that there is an unknown number of whales out of the monitoring zone in the coastal area, it was decided to estimate this figure by means of nautical surveys in deeper areas of Golfo Nuevo and Golfo San José. Random transects were carried out by a research boat from January 2001 to August 2011 on both gulfs. SRW density (D) was estimated in deeper areas using the standard distance sampling methods applied to individual animals. The selected model was Hazart Rate with series cosine (orders 2, 3). The CV% was rather high and the low encounter rate ($n/L$) was the most important component of the variance (93.1%). Density (D) obtained in offshore areas was 2.61 whales/km$^2$, and the effective strip width was about 73m. Several surveys have been carried out in the coastal zone of Golfo San Matías, to the north of Península Valdés around the peak of the breeding season. Mother-calf pairs, breeding groups and solitary individuals were counted with higher concentrations around Bahía de San Antonio and Puerto Lobos. In summary, the trend of the population is positive, irrespectively of the method used to estimate the trend. Also density is increasing, and the whole area seems to be expanding. Considering Península Valdés as the optimum habitat, once it becomes saturated, the rate of growth in the area should decrease, and that the whales should start to move to other regions, less dense and in which the rate of growth could be higher. There are clues that indicate that this could be the case, as shown by the number of whales occupying deeper waters in Península Valdés, and the increasing number of whales spotted in Golfo San Matías and other areas.

The sub-committee welcomed the collection of abundance data across a wide geographic area which will be valuable in monitoring the recovery of this population together with changes in distribution. Links between estimates of calf mortality and population growth both within and between populations should be treated with caution as the true mortality is a composite of observed and cryptic mortality and the ability to estimate these values will differ between populations. Changes in effort may change the proportion of cryptic mortality. Even with estimates of calf mortality there would be a considerable time lag between years of high calf mortality and associated changes in the rate of population growth. High rates of very early calf mortality could explain an increase in the frequency of two-year calving intervals. This would not be anticipated in a population approaching its natural carrying capacity.

Bannister outlined the results of a right whale aerial survey off the southern coast of Australia in late August 2013. Funded by the Australian Government through the Australian Marine Mammal Centre, Hobart, the survey, the 21$^{st}$ in an annual series since 1993, covered some 900 n.miles (*ca.* 1,700km) close to the coastline between Cape Leeuwin, Western Australia and Ceduna, South Australia, to which the majority of Australian right whales (the 'western' subpopulation) resort in winter/spring. The 2013 cow/calf count (246 pairs) was the highest yet in the series; the calculated population growth rate, 1993-2103 was 7.39% (95% CI 4.55-10.29), and the estimated size of that part of the Australian population to be found in the survey area, based on the number of calving females recorded over the three-year period 2011-13, is 2,756. Given the likely very much smaller number in the 'eastern' Australian subpopulation, the 'Australian' right whale population probably numbers around 3,000.

The sub-committee welcomed the report and urges that such annual survey work should continue. Reflecting on the high calf mortality in South American right whales, Bannister stated that reported strandings of right whale calves in the Australian area surveyed are rare, at most one or two a year.

A brief report was provided on the 2013 southern right whale survey on the Southern Cape coast of South Africa (the 35th consecutive survey in the series). This survey was flown following standardised protocol over the period 30 September to 8 October. Totals of 29.30 hours and 682 n.miles of search effort were flown during the survey, and the weather and sighting conditions experienced were outstanding with only two days lost to inclement sighting conditions. A total of 419 groups of an estimated 882 whales were sighted during this survey including 416 sightings of an estimated 874 southern right whales. These tallies include possible duplicates as screening of images and removal of such duplicates has not yet been completed. Sightings included 337 cow-calf pairs (674 animals) in 329 sightings and 113 incidences of 200 unaccompanied animals, including 26 groups which included both cow-calf pairs and unaccompanied adults. Groups of southern right whales sighted by half degree (Figure 1) show peak numbers between Danger Point and St Sebastian Bay with both cow calf pairs and unaccompanied adult groups concentrated in two regions (019° to 019°30'E and 020° to 021°E). The field counts of 337 cow-calf pairs are similar to field counts over the last five years. However the field count of unaccompanied animals which had declined markedly in recent years (from some 250-430 on the 2006 to 2008 surveys to 75-125 on the 2010 to 2012 surveys) shows some increase to 200 individuals in 2013. The decline in sightings of unaccompanied animals noted over the last five years may reflect a distributional shift to the west and outside of the area covered by this survey. A reoccurrence of southern right whales in Namibian and Northern Cape, South Africa, waters has been noted, many of which have been matched with the South African catalogue, and it is strongly recommended that the 2014 survey attempts to cover the South African west coast between Muizenberg and the Orange River Mouth.

**4.2 New information on North Pacific right whales**

SC/65b/BRG11 reported the sighting summary of North Pacific right whale collected by JARPN and JARPN II from May to September in the period 1994-2013. A total of 189,487.4 n.miles were surveyed in the JARPN and JARPN II research area. Monthly maps of the Density Index (DI: individuals/100 n.miles) by 1°x1° square are provided. They were mainly distributed north of 42°N in the research area (55 schools and 77 individuals; observed mean school size: 1.4, including 10 mother and calf pairs. Surface temperature in the location of the sightings ranged from 2.7 to 16.6°C. A northward migration pattern of whales was observed. A total of 48 individuals photographed and a total of 26 biopsy samples were collected in the research area. This information is useful to investigate the offshore distribution and migration pattern of this species in the western North Pacific.

The sub-committee welcomed and thanked Matsuoka and his colleagues for their summary of survey data (including search effort, sighting, photo-ID and biopsies) on right whales in the western North Pacific from 1994 to 2013 in response to a sub-committee request from last year. As a next step, the sub-committee recommends that a photo-id catalogue be established as soon as possible to compare with existing photographs from the Okhotsk Sea, eastern Bering Sea and other western North Pacific photos held by Japanese and Russian researchers. In addition, the sub-committee recommends that ICR and FSFRL scientists prepare abundance estimates for the Okhotsk Sea and west of Kamchatka Peninsula. The current abundance estimate from the Okhotsk Sea is more than 20 years. Also existing data on anthropogenic injuries from photographs and stranding need to be summarised to investigate threats to this population. In the future, there needs to be additional efforts to collect total body photographs to identify scars from human interactions (fishing gear).

**4.3 New information on North Atlantic right whales**

SC/65b/BRG14 is in response to last year's Scientific Committee's request for an update on the status of the North Atlantic right whale population. A review of the photo-ID recapture database as it existed on 29 October 2012 indicated that 455 individually recognised whales in the catalogue were known to be alive during 2010. That same database suggested a positive and slowly accelerating trend in population size, with a geometric mean growth rate of 2.8%. Likely unrelated to any variance in survey effort, the annual number of calves showed greater variance than would be expected by chance. For the period 2007 through 2011, the minimum rate of annual human-caused mortality and serious injury averaged 4.05 per year. This is derived from two components: (1) incidental fishery entanglement records at 3.25 per year; and (2) ship strike records at 0.8 per year. To reduce ship strikes the 2008 US Administrative rule creating speed restriction zones was re-established in 2013 because there was evidence that the rule had been locally effective. To reduce fishery entanglements the National Marine Fisheries Service previously implemented rules requiring pot gear to use sinking ground lines in areas seasonally used by right and humpbacks. Further modification of fishing practices are in the final phases of being implemented that are designed to reduce the amount of buoy (vertical) lines in areas where whales aggregate.

The sub-committee noted that it is likely not all summer foraging areas are known and tagging in late winter could provide such information. US has deploying bottom-mounted acoustic loggers in US and Canadian waters which could better describe the movement and distribution of whales in that region. A central repository of all acoustic data would facilitate such analyses. The data suggest a low calving rate and a low rate of increase; however, the sub-committee recognised that the variability in the distribution of mothers and calves may lead to the high variance in these data and an overall underestimation of these rates.

**4.4 Conservation issues**

SC/65b/BRG18rev is the report of the IWC Conservation Management Plan for the southern right whale southwest Atlantic population for the period July 2013 to April 2014. Progress was reported against the following actions:

RES-01: It was mentioned that Argentina announced the availability of a vessel for research purposes in 2015 to carry out studies in two feeding grounds in the SW Atlantic using non-lethal techniques in an integrated way (satellite telemetry, photo-identification, passive acoustic, genetic, etc.). Results from the 'Tango' voyage to the Antarctic Peninsula area as part of the SORP/ABWP was presented as well as other research projects from Argentina and Brazil.

RES-02: The development of a GIS database on information on human activities that might have an adverse impact on whales was postponed to 2015 in order to optimise human sources and funds for this activity. Argentina received a GEF grant which is coordinated by the Secretaría de Ambiente y Desarrollo Sustentable and includes determining human activities that might threat Southern right whales. It is necessary to secure also funds to carry on this activity in Brazil, Chile and Uruguay.

MON-01: Results from two different projects on aerial surveys of southern right whales off the coast of Península Valdés developed by ICB/OA and CENPAT were summarised as well as the results from land-based observation from Punta Flecha Observatory, Golfo Nuevo, Chubut province.

MON-02: Two programs are working with the Southern right whale strandings in Península Valdés area. One is run by 'Red de fauna costera del chubut', through its necropsies team, with collaboration from CENPAT and the Veterinary College, University of Buenos Aires (UBA), among others, a second one is the Southern Right Whale Health Monitoring Program (SRWHMP). Analysis of skin lesion of southern right whales is also carried on by CENPAT and the Veterinary College, UBA. Uruguay reported two females stranded, one in 2011 and another one in 2012.

MIT-01: Following the disentanglement workshops conducted by David Mattila, international expert on disentanglement of big whales and member of IWC Secretariat, two Brazilian and two Argentine experts were trained at the Center for Coastal Research in Cape Cod, USA. The objective is to work on prevention measures. It was also reported information on entanglement for 2013, one event in Argentina 1.5 n.miles offshore of Las Grutas, Río Negro (40°49'51.0''S-65°4'35''N). Unfortunately the animal could not be released. Ten cases of confirmed different individuals (nine adults and one calf) were recorded for Brazil and three of them were later sighted free of the entanglement.

MIT-02: One of the priorities of the CMP is to develop and implement a strategy to minimise kelp gull harassment. On 28 and 29 August 2013, Dirección de Fauna y Flora Silvestre (Ministerio de Agricultura, Ganadería, Bosques y Pesca), Subsecretaría de Turismo y Áreas Protegidas, Administración de Parques Nacionales and CENPAT-CONICET hosted a workshop on mortality of southern right whale in Puerto Madryn. The main objective of the workshop was to explore the best way to properly disseminate the information on this species to be used by the public media and update results on southern right whales and mortality events. An IWC Workshop to develop and implement a strategy to minimise kelp gull harassment on southern right whales will be held in Puerto Madryn, Chubut in August 5-7, 2014. Funding for this Workshop was secured last year at SC/65a. It was organised with the province of Chubut authorities. Results will be presented to the SC/66a.

MIT-03: An expert advisory panel was established with representatives for Argentina, Brazil, Uruguay and the IWC.

MIT-04: Ship strikes events from Argentina and Brazil for 2011 and 2012 were reported.

An update on progress of CMP for eastern South Pacific southern right whales, adopted by IWC in 2012, was received and several priority actions had been advanced from June 2013 to May 2014. Four sightings have been documented and three of them were possible to be photo-identified. Additional information on sightings further strengthens the importance of coastal waters off Isla de Chiloe for southern right whales and highlights it might likely be part of a breeding area. Also a disentanglement workshop is being coordinated between Chile and IWC to be conducted on 2015. Finally, to prevent harassment of the cow-calf pair that stayed in central Chile for more than 10 days, Chilean Navy implemented a contingency plan and did not allowed vessels, divers, jetski, etc. to approach the whales.

The sub-committee noted the large number of reported entanglements off Brazil; however, with an increasing reporting effort this may not represent an increase in the overall rate of entanglement for this population. The sub-committee congratulated the teams that have contributed to the actions of the Conservation Management Plans for Southwest Atlantic and Eastern South Pacific right whales. It stressed the importance and effectiveness of coordinated international action under these Plans given the small number of whales in the right whale population off Chile and Peru and the high calf mortality recorded off Argentina.

## 5. ABUNDANCE ESTIMATES

No new abundance estimates were accepted by the sub-committee this year.

## 6. WORK PLAN AND BUDGET REQUESTS

The sub-committee reviewed four budget requests. Two of these are intimately related and are necessary to meet the work plan given in Table 1. These refer to the proposed gray whale workshop and associated modelling work by Punt. The third request was for funding for four research projects related to southern right whales off Peninsula Valdés, Argentina. They include aerial surveys, photo identification, and health assessment. The final request was for the development of a SNP panel for North Pacific gray whales (which arose out of the gray whale Workshop).

The sub-committee **endorsed** all of these projects as they had a great deal of merit and importance for the IWC and **recommended** funding them all, if possible.

After considerable discussion, the sub-committee **agreed** that the projects with the highest priority are the inter-dependent gray whale Workshop and associated work by Punt.

The southern right whale projects were ranked as the next highest priority. Even if it is not possible to fully support the southern right whale projects, the sub-committee **agreed** that it would be valuable to provide partial funding.

With respect to the project to develop a SNP panel for North Pacific gray whales, the sub-committee noted that this budget request might be important to fund next year if it could not be fully funded this year. The importance of the SNP project may be important to support the results and future work of the gray whale model development and workshop, given the high priority of those projects this year.

The sub-committee **encouraged** proposers to seek funding from national governments or NGOs, especially for the southern right whale projects and development of the SNP panel.

There was some discussion about what criteria should be used to help set priorities for funding. It was recognised that agreeing on criteria would be a challenging process that could not be accomplished at this meeting. Moreover, the sub-committee noted the wide ranging nature of the submitted proposals including included workshops and other projects arising directly from the work of the sub-committee, as well as important research projects related to the overall conservation goals of the Commission. The sub-committee **suggested** that the Scientific Committee might seek broad guidance from the Commission about overall priorities and the types of proposals that it was appropriate to be considered for funding out of the Scientific Committee's budget.

## 7. ADOPTION OF THE REPORT

The report was adopted Tuesday 20 May at 12:06.

### REFERENCES

Andrews, R.C. 1914. Monographs of the Pacific Cetacea. I. The California gray whale (*Rhachianectes glaucus* Cope). Its history, habits, external anatomy, osteology and relationships. *Mem. Am. Mus. Nat. Hist.* 1(5): 227-87.

Bradford, A.L., Weller, D.W., Ivashchenko, Y.V., Burdin, A.M. and Brownell, R.L., Jr. 2009. Anthropogenic scarring of western gray whales (*Eschrichtius robustus*). *Mar. Mammal Sci.* 25(1): 161-75.

Calambokidis, J., Darling, J.D., Deeke, V., Gearin, P., Gosho, M., Megill, W., Tombach, C.M., Goley, D., Toropova, C. and Gisborne, B. 2002. Abundance, range and movements of a feeding aggregation of gray whales from California to southeastern Alaska. *J. Cetacean Res. Manage.* 4(3): 267-76.

Citta, J., Burns, J., Quakenbush, L., Vanek, V., George, J., Small, R., Heide-Jorgensen, H. and Brower, H. 2013. Potential for bowhead whale entanglement in cod and crab pot gear in the Bering Sea *Mar. Mammal Sci.* 30(2): 445-59.

Gailey, G., Sychenko, O. and Würsig, B. 2011. Patterns of western gray whale behaviour, movement and occurrence off Sakhalin Island, 2010. In: Report to the Western Gray Whale Advisory Panel, western gray whale research and monitoring program in 2010, Sakhalin Island, Russia. Vol. II: 4/1-4/63.

Gavrilo, M.V. 2013a. Life among ice: spring expedition researches in the Franz-Josef Land nature reserve under the grants of Russian Geographical Society. *Russian Polar Res.* 13(3): 25-8. (In Russian).

Gavrilo, M.V. 2013b. Life without ice: summer expedition researches in the Franz-Josef Land nature reserve under the grants of Russian Geographical Society. *Russian Polar Res.* 14(4): 8-98. (In Russian).

Gavrilo, M.V. 2014. The review of cetaceans of the State Federal Reserve "Zemlya Frantsa-Iosifa". Proceedings of Kola Scientific Center RAS (in Russian). (In press).

Gavrilo, M.V. and Ershov, R.V. 2010. Notes on Cetaceans of the Franz-Josef Land – Victoria region. Collection of Scientific Papers after the Sixth International Conference Marine Mammals of the Holarctic, Kaliningrad, Russia. October 11–15, 2010. p. 120-124. Available at *http://2mn.org/bookself/library_mmhbooks.html.*

George, J.C. and Suydam, R. 2006. Length estimates of bowhead whale calves. Paper SC/58/BRG23 presented to the IWC Scientific Committee, May 2006, St. Kitts and Nevis, West Indies (unpublished). 4pp. [Paper available from the Office of this Journal].

International Whaling Commission. 2011a. Report of the Scientific Committee. Annex E. Report of the Standing Working Group on the Aboriginal Whaling Management Procedure (AWMP). *J. Cetacean Res. Manage. (Suppl.)* 12:143-67.

International Whaling Commission. 2011b. Report of the Scientific Committee. Annex F. Report of the Sub-Committee on Bowhead, Right and Gray Whales. *J. Cetacean Res. Manage. (Suppl.)* 12:168-84.

International Whaling Commission. 2013. Report of the Scientific Committee. Annex F. Report of the Sub-Committee on Bowhead, Right and Gray Whales. *J. Cetacean Res. Manage. (Suppl.)* 14:172-94.

International Whaling Commission. 2014a. Report of the Scientific Committee. Annex F. Report of the Sub-Committee on Bowhead, Right and Gray Whales. *J. Cetacean Res. Manage. (Suppl.)* 15:214-32.

International Whaling Commission. 2014b. Report of the Scientific Committee. Annex I. Report of the Working Group on Stock Definition. *J. Cetacean Res. Manage. (Suppl.)* 15:271-88.

Kato, H., Miyashita, T., Kishiro, T., Kanda, N., Bando, T., Mogoe, T., Nakamura, G. and Sakamoto, T. 2013. Status report of conservation and researches on the western North Pacific gray whales in Japan, May 2012-April 2013. Paper SC/65a/BRG20 presented to the IWC Scientific Committee, June 2013, Jeju Island, Republic of Korea (unpublished). 6pp. [Paper available from the Office of this Journal].

Laake, J.L. 2012. Evaluation of potential bias in abundance estimates for seasonal gray whales in the Pacific Northwest. Paper SC/64/AWMP10 presented to the IWC Scientific Committee, June 2012, Panama City (unpublished). 10pp. [Paper available from the Office of this Journal].

Lang, A.R. 2010. The population genetics of gray whales (*Eschrichtius robustus*) in the North Pacific. PhD thesis, University of San Diego. 202pp.

Lubetkin, S.C., Zeh, J., Rosa, C. and George, J.C. 2008. Age estimation for young bowhead whales (*Balaena mysticetus*) using baleen growth increments. *Can. J. Zool.* 86: 525-38.

Meschersky, I.G., Chichkina, A.N., Shpak, O.V. and Rozhnov, V.V. 2014. Molecular genetic analysis of the Shantar summer group of bowhead whales (*Balaena mysticetus* L.) in the Okhotsk Sea. *Russian Journal of Genetics* 50: 395-405.

Moore, J. and Weller, D. 2013. Probability of taking a western North Pacific gray whale during the proposed Makah hunt. *NOAA, US Dep. Commer.* Memo NMFS-SWFSC-506: 13pp. [Available from: Protected Resources Division, NOAA, 8901 La Jolla Shores Drive, La Jolla, CA 92037-1022, USA].

Pack, A.A., Herman, L.M., Spitz, S.S., Hakala, S., Deakos, M.H. and Herman, E.Y.K. 2009. Male humpback whales in the Hawaiian breeding grounds preferentially associate with larger females. *Anim. Behav.* 77: 653-62.

Punt, A.E. and Moore, J.E. 2013. Seasonal gray whales in the Pacific Northwest: An assessment of optimum sustainable population level for the Pacific Coast Feeding Group. *NOAA Tech. Mem.* SWFSC-518.

Punt, A.E. and Wade, P.R. 2010. Population status of the eastern North Pacific stock of gray whales in 2009. US Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-207. 43pp.

Rosa, C., Zeh, J., George, J.C., Botta, O., Zauscher, M., Bada, J. and O'Hara, T. 2012. Age estimates based on aspartic acid racemization for bowhead whales (*Balaena mysticetus*) harvested in 1998-2000 and the relationship between racemization rate and body temperature. *Mar. Mammal Sci.* 29(3): 424-45.

Rowntree, V., Uhart, M., Sironi, M., Chirife, A., Di Martino, M., La Sala, L., Musmeci, L., Mohamed, N., Andrejuk, J., McAloose, D., Sala, J.E., Carribero, A., Rally, H., Franco, M., Adler, F.R., Brownell, R., Jr., Seger, J. and Rowles, T. 2013. Unexplained recurring high mortality of southern right whale *Eubalaena australis* calves at Península Valdés, Argentina. *Mar. Ecol. Prog. Ser.* 493: 275-89.

Sychenko, A.O. 2011. Western gray whale (*Eschrichtius robustus*) mother and calf ecology off Sakhalin Island. MSc thesis, Texas A and M University, College Station, Texas, USA. 109pp.

Weller, D.W., Bradford, A.L., Kato, H., Bando, T., Otani, S., Burdin, A.M. and Brownell Jr, R.L. 2008. Photographic match of a western gray whale between Sakhalin Island, Russia and Honshu, Japan: first link between the feeding ground and a migratory corridor. *J. Cetacean Res. Manage.* 10(1): 89-91.

Weller, D.W., Klimek, A., Bradford, A.L., Calambokidis, J., Lang, A.R., Gisborne, B., Burdin, A.M., Szaniszlo, W., Urban, J., Unzueta, A.G., Swartz, S. and Brownell Jr., R.L. 2012. Movements of gray whales between the western and eastern North Pacific. *Endanger. Species. Res.* 18: 193-9.

Weller, D.W., Würsig, B., Bradford, A.L., Burdin, A.M., Blokhin, S.A., Minakuchi, H. and Brownell, R.L., Jr. 1999. Gray whales (*Eschrichtius robustus*) off Sakhalin Island, Russia: seasonal and annual patterns of occurrence. *Mar. Mammal Sci.* 15(4): 1208-27.

## Appendix 1

## AGENDA

1. Introductory items
   - 1.1 Convenor's opening remarks
   - 1.2 Election of Chair
   - 1.3 Appointment of rapporteurs
   - 1.4 Adoption of Agenda
   - 1.5 Review of available documents
2. Bowhead whales
   - 2.1 Bering-Chukchi-Beaufort (B-C-B) Seas stock of bowhead whales
     - 2.1.1 New biological information
     - 2.1.2 Non-hunting human-induced mortality
     - 2.1.3 New catch information
     - 2.1.4 Management advice
   - 2.2 Other bowhead stocks
     - 2.2.1 New biological information
     - 2.2.2 New catch information
3. Grey whales
   - 3.1 Stock structure and movements
     - 3.1.1 Report from intersessional Workshop
     - 3.1.2 Population modelling
     - 3.1.3 Future work
   - 3.2 Western North Pacific gray whales
     - 3.2.1 New information
     - 3.2.2 Other issues
     - 3.2.3 Conservation advice
   - 3.3 Eastern North Pacific gray whales
     - 3.3.1 New Information
     - 3.3.2 Catch information
     - 3.3.3 Management advice
4. Right whales
   - 4.1 New information on southern right whales
   - 4.2 New information on North Pacific right whales
   - 4.3 New information on North Atlantic right whales
   - 4.4 Conservation issues
5. Updated list of accepted abundance estimates
6. Work plan and budget requests
7. Adoption of Report

---

## Appendix 2

## SUMMARY OF THE REPORT ON JOINT PROGRAM FOR THE WESTERN GRAY WHALE MONITORING OFF THE NORTH-EAST COAST OF SAKHALIN IN 2013

Alexey Vladimirov
*Sakhalin Energy Investment Company, Ltd., 78, Chekhova Street, Yuzhno-Sakhalinsk, 693000, Russian Federation*

The Okhotsk-Korean gray whale, also known as the western gray whale (WGW), has been the subject of scientific studies sponsored by Exxon Neftegas Limited (ENL) and Sakhalin Energy Investment Company Ltd. (Sakhalin Energy) since 1997. The companies combined their efforts in 2002 with the establishment of the Joint Program for monitoring WGW and their habitat off northeast Sakhalin Island, Russia. The companies' objectives for conducting the Joint Program are to:

- increase scientific understanding of the WGW aggregation and ecology, and factors that affect the gray whale population and habitat; and,
- assess condition of WGW aggregation (e.g. size, growth rate, etc.) and habitat.

The information obtained from the Joint Program is used by the companies to:

- ensure that companies' activities are conducted in a manner that do not adversely affect the WGW and habitat (per Russian requirements); and
- identify and implement mitigations that minimise risks of Companies' activities to the WGW and habitat.

The Joint Program efforts have resulted in obtaining information that supports conservation of the WGW and habitat, and helps the companies mitigate potential effect of operations to the WGW population. The Joint Program, implemented by scientists from leading Russian institutions, has four primary areas of research: WGW photographic-identification, WGW distribution surveys, benthic prey surveys, and acoustic monitoring.

**WGW photo-id studies**

Photo-ID studies have been conducted each year since 2002 to identify individual gray whales. The identification of individual animals provides information on population dynamics and demography, social structure, and individual life histories. In addition, the photo-ID data provides information for long-term assessments of population status and health. Photo-ID studies are implemented by the A.V. Zhirmunsky Institute of Marine Biology of the Far Eastern Branch of the Russian Academy of Science in Vladivostok (IBM) DrYuri M.Yakovlev and Olga Y. Tyurneva, Candidate of Biological Sciences, as scientific leads.

**WGW distribution studies**

Since 2002, the Joint Program has studied WGW distribution and abundance in the Piltun and Offshore feeding areas, as well as in the Piltun-Astokh and Arkuntun-Dagi concession blocks. Each year, WGW distribution surveys have been conducted by shore-based and vessel-based teams. The distribution studies have been implemented by the Sakhalin State University with Dr V.A. Vladimirov as scientific lead.

**Benthic prey studies**

Gray whale prey studies have been conducted since 2002 to evaluate status of benthic prey in the study areas. Benthic and sediment samples are collected for analysis from within and close to the two primary WGW feeding areas (i.e. Piltun and Offshore feeding areas). The benthic studies are implemented by the A.V. Zhirmunsky Institute of Marine Biology of the Far Eastern Branch of the Russian Academy of Science in Vladivostok (IBM), with Dr V.I. Fadeev as scientific lead.

**Acoustic studies**

Acoustic studies, which document both natural (ambient) and anthropogenic sound levels in the WGW feeding areas, have been a component of the Joint Program since 2003. In addition to measuring sound levels, hydrology data are collected that allows the modelling and understanding of sound propagation in the WGW feeding areas. Acoustic studies are implemented by Pacific Oceanological Institute of the Far Eastern Branch of the Russian Academy of Science in Vladivostok (POI) with Dr Alexander N. Rutenko as scientific lead.

The implementation of the Joint Program and studies sponsored by each Company have resulted in significant increase in the understanding of the WGW and their habitat. The annual reports of the Joint Program (2002-13) include a record of the progression in the understanding the WGW and help provide the Companies and other interested parties the basis to assess the status of the WGW population and habitat. Below are key conclusions and learnings about the WGW and habitat that have been obtained through the conduct of the Joint Program and other company-sponsored studies (Anon., 2013).

The Joint Program has identified two areas off northeast Sakhalin that serve as primary summer feeding areas for WGW: the Piltun or 'near shore' feeding area and the Morskoy or 'offshore' feeding area. However, in addition to the these feeding areas, WGW have also been observed feeding in other locations near Sakhalin, such as near Chayvo Bay and Severny Bay west of Elizaveta Point (north end of Sakhalin), and in Olga and Vestnik Bays on the SE coast of Kamchatka. There are also reports of frequent sightings of gray whales around the Commander Islands located approximately 200km east of Kamchatka and along the Kuril Islands. In 2008 a gray whale previously seen in 2007 in Olga Bay off Kamchatka was photographed in Zakatny Bay of Shiashkotan Island (Kuril Islands). Later in 2008 this same whale was seen in Olga Bay again, and off Medny Island (Komandor Islands), and off Karaginsky Island (northeast Kamchatka). The winter habitat and migration route of WGW were unknown until WGW satellite tagging sponsored by the companies established the migration of three WGW to coastal North America in 2010-2012. The overlap of the geographic ranges of the Western and Eastern gray whale stocks established through satellite tracking was further verified by other scientists through comparisons of photo-ID catalogues and genetic matches.

The numbers of WGW sighted within the Piltun feeding area by the on-shore distribution survey teams fluctuates from year to year. Based on shore-based survey data, the number of WGW observed during single-day synchronise counts were highest in the years 2004-06 (128-138 WGW), then decreased in 2007-10 (47-73 WGW), and then increased again in 2011-12 (up to 103-111). In 2013, the maximum number of WGW sighted in the Piltun feeding area for a single day was 64 whales (September 16). The fluctuations of the numbers of WGW observed in Piltun feeding area within a single year and between years are believed to be due to a redistribution of WGWs among the feeding areas (i.e. Piltun, Offshore and Kamchatka).

As with the Piltun feeding area, there is substantial inter-seasonal variation in the distribution and abundance of WGW sighted in the Offshore feeding area. In 2001, when the Offshore feeding area was discovered, the maximum number of whales sighted in the OFA was relatively high (83 WGW). The lowest number of whales (9 WGW) sighted in the OFA occurred in 2004 and coincided with the highest value for the maximum number of whales observed during a single scan in the Piltun feeding area. The year 2008 is notable with its high number of WGW in the OFA. During a single survey on 3 October 2008, 82 individuals were sighted in the OFA, which again, corresponded with lower number of WGW in the Piltun feeding area. The pattern of an increase in number of WGW in the OFA observed between 2004-08 was reversed in 2009 with fewer WGW observed in the OFA. In 2013 the maximum number of WGW sighted in the Offshore feeding area was 50 individuals.

The WGW show a high fidelity to the feeding areas with the vast majority of those WGW identified off Sakhalin each year being the same individuals sighted in previous years. For example, 97.5% of WGW sighted in 2013 had been identified off NE Sakhalin at least once in previous years. Since the discovery of ~20 gray whales off NE Sakhalin in the early 1980s, WGW numbers have steadily increased. In 2002, the first year of the Joint Program, 47 WGW were identified. As of 2013, a cumulative total of 228 individual WGW have been identified by the Joint Program. Of these whales, 187 individual WGW have been observed in the last four years. During 2013, 128 identified WGW were sighted, including six calves and three first-time sighted non-calf WGW. Typically three to five non-calf WGW are sighted for the first time off NE Sakhalin each year. It is unknown whether these WGW are new to the region or have just not been previously photographed and identified.

Each year, some WGW arriving to the Sakhalin area appear to be in an emaciated ('skinny') or poor body condition. The occurrence of the skinny condition is believed to be the result of the individual WGW having depleted their body fat over the course of their winter migration. About 10 to 20% of WGW off Sakhalin each year have been observed in various levels of poor body condition (i.e. body class 2, 3 or 4). Mothers with calves are often in poor body condition upon arrival off Sakhalin (beginning of feeding season); however, the calves appear well nourished. Over the course of the feeding season, the body conditions of most WGW improves, and by the end of the feeding season ~80-91% of initially-poor body condition WGW are observed in a normal condition (i.e. body class 0 or 1).

WGW are known to feed upon benthic organisms. In the Sakhalin feeding areas, amphipods and isopods occur as the highest percentage of the benthic biomass, and therefore serve as the primary food resource for WGW off NE Sakhalin. Amphipod biomass within the Piltun feeding area is highest in the near shore zone in water depths of 5 to 15m and decreases sharply at depths greater than 20m. The amphipod biomass varies among years; with average biomass at the sampling locations ranging between 28.5-47.4 g/m$^2$.

The amphipod *Ampelisca eschrichtii* appears to be the main prey species in the Offshore feeding area. Average amphipod biomass in the Offshore feeding area are stable from year to year. WGW in the Offshore feeding area have been observed to feed at depths of 40 to 60m with amphipod biomass greater than 300g/m$^2$. The contribution of amphipods and isopods to the total biomass in the feeding areas was more than 50% and reached values of more than 100g/m$^2$. When comparing these numbers with the total amphipod biomass of the grid samples, it is clear that WGW target patches with relatively high prey biomass.

The abundance and distribution of benthic biota are affected by a variety of abiotic and biotic factors. As part of the Joint Program, measures of abiotic parameters including temperature, salinity, hydrology parameters, and sediment characterisation were conducted to help elucidate factors that influence benthos abundance and distribution in the Sakhalin feeding areas.

Since 2003, the companies have monitored ambient and anthropogenic noise through the Joint Program and with activity-specific monitoring in the feeding areas and offshore work areas to ensure that levels do not exceed prescribed thresholds. Ambient noise levels vary significantly because of weather activity (wind, surface waves and rain) which can elevate the background by more than 20dB; broadband levels can be near 100dB during storms.

As part of this ongoing study, during August and September 2013 thirteen Autonomous Underwater Acoustic Recorders (AUARs) were deployed at annual acoustic monitoring locations offshore NE Sakhalin Island to perform continuous measurements of acoustic pressure variations in the 2-15,000Hz frequency band.

Offshore construction activities by the Companies generally induced broadband sound pressure levels that did not exceed 120 dB re 1 µPa at the nearest boundary of a feeding area except for brief surges in the order of hours. This cap was largely achieved through the planning of activities with the aid of forecasting tools to avoid scenarios that could lead to unnecessary aggregation of noise sources.

Vessels are the main contributors to the acoustic footprint from Company activities with the exception of seismic surveys or pile driving. Sound levels from moving vessels are generally transient in time and are unlikely to cause sustained disturbance to whales in the area. Vessels associated with a particular operation and remain in place for extended periods could contribute significantly to sound exposure in a given area, and could cause behavioral or distribution changes in whales.

The systematic monitoring of anthropogenic sound from company activities has allowed the identification of noise, which in turn has led to revision of practices or engineering alterations to minimise acoustic output. In 2013 dedicated acoustic measurements and analyses were conducted to characterise fully the underwater noise field from the Sakhalin Energy platforms PA-A (Molikpaq) and PA-B, enabling correlation of mechanical noise from on-board equipment with radiated underwater sound and providing information suitable for an engineering review of individual sources. Gray whales are faced with both natural threats (e.g. predation, disease and starvation) and anthropogenic threats (e.g. entanglement in fishing gear, vessel strikes, pollution, and noise). ENL's and Sakhalin Energy's commitments to minimises risks of operations to WGW led each company to develop Marine Mammal Protection Plans (MMPPs) that prescribe criteria for conducting their operations in a manner protective of WGW and other marine mammals. Measures implemented by the companies have successfully mitigated potential risk of operations on WGW, and no incidents involving WGW have occurred. Levels of contaminants (petroleum hydrocarbons, heavy metals) in sediments in the monitored areas of NE Sakhalin do not exceed background levels. Additionally, noise from natural and anthropogenic sources has been monitored in the WGW feeding areas since 2003. Two primary sources of noise from the Companies' activities have been identified: vessels and offshore production facilities. This information has been used to implement mitigations to minimise noise from company operations. The acoustic monitoring has demonstrated that the mitigations resulted in noise levels believed not to affect the WGW. ENL and Sakhalin Energy maintain their commitments to conduct their Sakhalin operations in a manner that does not adversely affect the environment and the Sakhalin gray whales.

## REFERENCE

Anon. 2013. Joint Program for the Okhotsk-Korean Gray Whale Monitoring off the North-East Coast of Sakhalin, 2013. Report to Exxon Neftegas and Sakhalin Energy Investment Company. Yuzhno-Sakhalinsk, Russia. 111p.

## Appendix 3

# PROGRESS REPORT ON IUCN WESTERN GRAY WHALE ADVISORY PANEL WORK FROM JUNE 2013 TO MAY 2014

Members: Reeves, R., Weller, D., Cooke, J.G., Donovan, G. and Brownell, R.L., Jr.

This is another in an annual series of progress reports provided to the Scientific Committee concerning the work of the Western Gray Whale Advisory Panel (WGWAP), which is convened by the International Union for Conservation of Nature (IUCN) - see Reeves *et al.* (2013).

Two meetings under the aegis of the Panel have been held since SC/65a. These were the 5th and 6th meetings of the Noise Task Force (NTF-5, 11-12 October 2013; NTF-6, 3-4 April 2014), both in Amsterdam and both chaired by Donovan. The primary focus of both of these meetings was preparation of a monitoring and mitigation plan for a large seismic survey anticipated by Sakhalin Energy in summer 2015. This so-called Piltun-Astokh 4-D survey would take place in close proximity to the gray whale feeding area off north-eastern Sakhalin Island and require careful planning in order to minimise disturbance to the whales. The report of NTF-5 is on the WGWAP website (*http://www.iucn.org/wgwap/*) along with other information on the Panel's work. The report of NTF-6 was still in preparation at the time of this writing but expected to be on the website within the next few months.

The report of the 13th WGWAP meeting, held in May 2013, was posted on the WGWAP website in October 2013. It includes the latest population assessment by the Panel using data from all research teams operating in the Sakhalin and Kamchatka areas.

A significant result of the work of the NTF is Nowacek *et al.* (2013). This paper represents a unique collaboration between scientists working for the oil and gas industry off Sakhalin and scientists on the Panel whose remit is, in part, to provide independent advice on industry activities as they affect gray whales. In brief, Nowacek *et al.* (2013) propose a general approach to monitoring and mitigation that can be adapted to marine seismic surveys in any environmentally sensitive area and therefore that can serve as a set of generic guidelines. Recommendations from the paper include the need to:

- obtain baseline ecological data;
- conduct detailed advance planning, communication and critical review of survey design and mitigation approaches;
- restrict the survey area and limit noise levels to minimise a survey's 'acoustic footprint';
- employ real-time visual and acoustic monitoring of noise levels, whale locations and behaviour, before during and after the survey;
- halt the survey if the animals are too close or show strong reactions to the seismic activity; and
- conduct systematic analyses of results to inform future planning and mitigation.

In regard to the last item on that list, a series of analytical papers from the monitoring and mitigation effort associated with Sakhalin Energy's Astokh 4-D seismic survey in 2010 is being published as a Theme Section of *Endangered Species Research*, with Reeves and Donovan serving as guest co-editors[1].

Two major issues of concern presently being considered by the Panel are:

(1) planned construction activities on or near the Sakhalin near-shore feeding area; and
(2) the introduction of salmon trap-net fishing in coastal waters near the mouth of Piltun Lagoon.

During the summer of 2014, Exxon Neftegas Limited plans to begin construction of a 885m long and 40m wide (the width of a standard industrial roadbed) equipment uploading landing pier in the inner portion of Piltun Lagoon. This project will involve tug and barge traffic into and out of the lagoon mouth, introducing a new and additional source of noise and habitat modification/disturbance.

### REFERENCES

Nowacek, D.P., Bröker, K., Donovan, G., Gailey, G., Racca, R., Reeves, R.R., Vedenev, A.I., Weller, D.W. and Southall, B.L. 2013. Responsible practices for minimizing and monitoring environmental impacts of marine seismic surveys with an emphasis on marine mammals. *Aquat. Mamm.* 39(4): 356-77.

Reeves, R., Weller, D., Donovan, G., Cooke, J. and Brownell, R., Jr. 2013. Report of the Scientific Committee. Annex F. Report of the Sub-Committee on Bowhead, Right and Gray Whales. Appendix 10. Progress report on IUCN Western Gray Whale Advisory Panel work from June 2011 to June 2012. *J. Cetacean Res. Manage. (Suppl.)* 14: 194.

[1]*http://www.int-res.com/journals/esr/esr-specials/seismic-survey-and-western-gray-whales/.*