Report of the Scientific Committee

Bled, Slovenia, 24 April-6 May 2018

Annex G

Report of the Sub-Committee on Northern Hemisphere Whale Stocks

**This report is presented as it was at SC/67b.
There may be further editorial changes (e.g. updated references, tables, figures)
made before publication.**

International Whaling Commission

Bled, Slovenia, 2018

Annex G

Report of the Sub-Committee on Northern Hemisphere Whale Stocks

Members: Brownell (Convenor), Al Harthi, Aoki, Archer, Atkinson, Baba, Baker, Bickham, Bjørge, Branch, Brandon, Brierley, Burkhardt, Buss, Cerchio, Cholewiak, Clapham, Collins, Cooke, Cubaynes, DeMaster, Diallo, Doniol-Valcroze, Double, Fortuna, Goto, Gunnlaugsson, Haug, Irvine, Ivashchenko, Johnson, Kato, Kim, H.W., Lang, Lundquist, Mallette, Matsuoka, Miyashita, Mizroch, Moronuki, Murase, Mwabili, Nakamura, Øien, Olson, Palka, Reeves, R., Robbins, Rodriguez-Fonseca, Scordino, Scott, Simmonds, Širović, Skaug, Slugina, Stachowitsch, Stack, Stimmelmayr, Taguchi, Tamura, Taylor, Thomas, Urban, Vikingsson, Weinrich, Weller, Yasokawa, Yasunaga, Yoshida, Zerbini, Zharikov.

1. CONVENOR'S OPENING REMARKS

Brownell welcomed the participants to the Sub-Committee on Northern Hemisphere Whale Stocks.

2. ELECTION OF CHAIR

Brownell was elected as Chair.

3. APPOINTMENT OF RAPPORTEURS

Cholewiak, Mallette and Weller were appointed as rapporteurs.

4. ADOPTION OF AGENDA

The adopted agenda is given as Appendix 1.

5. REVIEW OF AVAILABLE DOCUMENTS

The documents available to the sub-committee were identified as: SC/67b/NH/02-03, SC/67b/NH/05, SC/67b/NH/06Rev1, SC/67b/NH/07-09, SC/67b/ASI/01, SC/67b/ASI/03, SC/67b/ASI/10, SC/67b/ASI/12, SC/67b/IA/02, SC/67b/HIM/09rev1, SC/66a/HIM/15, SC/67b/SCSP/06-07 and Hansen *et al*. (in press).

6. EVALUATION FOR POTENTIAL NEW IN-DEPTH ASSESSMENTS

6.1 North Pacific blue whales

The intersessional email group on North Pacific Blue whale assessment, convened by Branch, reported back on the data available to conduct an assessment of North Pacific blue whales. Blue whales in the North Pacific consist of at least two distinct populations, the eastern North Pacific and the central and western North Pacific (CWNP), based on widespread call types. In addition, a third call type off Hokkaido may be evidence of a population off Japan. The status of the eastern NP (ENP) population is well known, with catches, abundance estimates, biological parameters, and a stock assessment reviewed and accepted by the IWC in 2016 (Monnahan *et al*., 2015), and there is a catch time series separate for ENP and CWNP (Monnahan *et al*., 2014), but no abundance estimates are currently available for the CWNP. A limited number of catches were recorded during 19th century whaling; and there are also sightings from the Whaling History database that could be used to characterise their distribution. Shore-based whaling off Japan was presented to the SC in 2016. The remaining catches come from modern whaling. The CWNP whales are 0.8-1.0m longer than ENP blue whales. Ear plugs collected for 18 blue whales off California, resulting in an estimated age of maturity of 9-11yr, a range of ages from 6 to 48 years, and 0.46-0.50 corpora added per year after maturity. Photo-id data include an extensive catalog by Calambokidis and Gendron, and photos from JARPN and POWER cruises. In addition, Discovery marks include an extensive array of marks, and 15 recaptures with locations showing links between the Gulf of Alaska and Sea of Okhotsk, while marks off Japan were recaptured off Japan. Satellite tag data show links between Costa Rica Dome, Mexico to Gulf of Alaska. Genetic data show that ENP are different to Chilean, although more similar than differences among SH blue whale subspecies. No genetic analyses have been done on a limited number of CWNP samples. Sighting surveys include the SWFSC surveys in the eastern Tropical Pacific, with a gap of 1°N and 6°N which corresponds to genetic and song types suggesting this divides ENP and Chilean blue whales. Other key sightings data are the JSV data from 1965-87 with substantial effort but no sightings off Japan, which has been used to suggest that the Japanese population was extirpated. The more recent JARPN and JARPNII data (1994-2014) shows 72 blue whales sighted off Hokkaido west of 155°E. The POWER surveys cover most of the rest of the CWNP with sightings predominantly in the region north of 40°N. Other sighting surveys include those in Alaska waters. Priorities outlined in this paper are covered later in this report.

The sub-committee welcomed this new information and thanked the intersessional group for their efforts.

The review of data availability for an assessment of North Pacific blue whales (SC/67b/NH03) began with discussion of Northeast Pacific (NEP), Northwest Pacific (NWP) and Japanese (JPN) call types. Širović noted that while a number of calls have been identified in the NWP over the years, they represent only a single song. There is apparent fine-scale structure with the NEP, however. For example, calls from the Gulf of Alaska differ from calls off California. Recordings from the central and western Pacific have been difficult to use to define song type, and a recent analysis of recordings from the Philippine Sea has yet to result in any blue whale detections.

Off Japan, the NWP song and a seasonal JPN song type have been recorded. Detections of the JPN type are louder/clearer than the NWP type and peak in the period of January-September. Detections of the NWP type are more frequent than the JPN type, peaking in about August, but are fainter. While the JPN call is assumed to be attributable to blue whales, it is unusual that it is being detected in only a single location given the high mobility of the species. The sub-committee asked about the detection range of the recorder(s) off Japan and wondered if they were capable of recording blue whales from more distant areas (e.g. the blue whale "hot spot" south of Kamchatka along the Emperor Seamount Chain). Širović noted that the recorders off Japan were in deep water (i.e. not in the sound channel) and that detections of whales in the aforementioned "hot spot" were unlikely. Recognizing that blue whales off Japan were thought to have been extirpated by whaling, the sub-committee noted that these recent acoustic detections of the JPN song type could represent an extant (albeit small in number) remnant population, a new population or re-colonisation of a historically important habitat by whales from the NWP. Finally, the sub-committee encouraged research teams from Japan (e.g. JARPN/JARPNII) and elsewhere to incorporate acoustic recording into their at-sea-programs in hopes of providing a better understanding of North Pacific blue whale stock structure.

In discussion of the existing morphological data, it was noted that blue whales in the NWP appeared to be longer in length. The sub-committee recognised, however, that this difference may be an artefact of how the whales were measured. These measurements were made by whalers from a number of countries and there was no standardisation between them until the about the 1930s. That being said, if the measurement data from the NWP are older than data from the NEP, it is possible that larger whales still remained and contributed to the longer lengths reported.

With respect to genetic information, it was noted that NEP and southeast Pacific blue whales are not very different and that the potential for genetic exchange across hemisphere exists. Lang noted that genetic differences in the NEP are much lower than what has been reported for blue whales in the southern hemisphere.

The sub-committee also discussed a number of additional papers with respect to their data on blue whales, as summarised below.

SC/67b/IA/02 provided historical information on blue whale sightings. Blue whales were commonly seen in winter months in 1965 and 1966 and were also seen in large numbers off Baja California in 1965 during the only spring-summer marking cruise that was conducted. A total of 73 groups of blue whales were seen and at least 113 were approached for marking of which 84 were determined to be a hit or possible hit. No marks were recovered from blue whales. Blue whale marking began in 1965 and catches of blue whales were prohibited the following season.

In consideration of sighting surveys, Ivashchenko summarised progress on completion of a database on catches and sightings of whales from Soviet reports from both the whaling industry and from Soviet scientific surveys and other sources (SC/67b/NH/08). It was suggested that these data might be suitable for estimating relative abundance in portions of the NEP where data have previously been spare or unavailable. See Appendix 2.

SC/67b/SCSP/06 reported North Pacific blue whale sightings, including results of photo identifications (8 individuals) and biopsies (5 individuals) by the NEWREP-NP offshore component, conducted in the sub-areas 7, 8 and 9, from 16 June to 23 September 2017 with a total of 5,307 n. miles searching. During the survey, a total of 12 schools with 20 individuals of blue whales were sighted. Most of blue whales were distributed in the northern part of sub-area 9 (north of 47°N).

Additional information was received in SC/67b/SCSP/07, which describes sightings of two blue whales during the coastal component of the NEWREP-NP survey off Abashiri, conducted from 11 June to 6 July 2017 in the southern Okhotsk Sea. The survey covered 2,500 nautical miles, searching mainly within about 40 nautical miles from Abashiri port, northeastern Hokkaido. Blue whale sightings were made on 13 July and 18 July, along 1,000m isobath off Abashiri. The distance between the two positions was 7.5 nautical miles, and it was thought they could have been duplicate sightings. Biopsy sampling and individual identification was not conducted.

The sub-committee welcomed the new information presented in the additional papers, and thanked the authors for their contributions to the discussion.

In final discussion of stock structure, it was agreed that in the absence of additional data (e.g. acoustic, genetics) the continuous east-west distribution of blue whales in the central and WNP suggests that a single population may exist west of the eastern stock. The past catch records from the Kuril Islands and off NE Japan, in combination with the relatively recent detection of what appears to be a regionally isolated song type off southern eastern Hokkaido (Japan), suggested that the once thought to be extirpated population of blue whales in the far western Pacific may exist as a separate (remnant) population. Therefore, work is still needed to resolve the question of one or two stocks of blue whales in the WNP.

The following priority items were identified in SC/67b/NH/03 and were discussed by the sub-committee to form recommendations:

1. Obtain abundance estimates from the IWC-POWER surveys (Matsuoka and Kitakado).

Matsuoka reported that progress on the analysis to produce abundance estimates is underway.

Attention: SC
*The sub-committee **agreed** that the work on abundance estimation from IWC-POWER cruises continues to be a priority item and looked forward to reviewing results of this work at SC/68a.*

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2. Obtain abundance estimates from the JARPN and JARPNII surveys (Matsuoka *et al.*).

Matsuoka reported that this analysis is completed using the data through 2014 and that those results were reported at the JARPN II review meeting. An update incorporating data through 2017 is planned.

Attention: SC
*The sub-committee **encouraged** that the work on abundance estimation continues to be a priority item and looked forward to reviewing results of this work at SC/68a.*

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3. Analyse and compare genetic samples from ENP, IWC-POWER, and ICR biopsy samples to determine stock structure throughout the North Pacific (Lang *et al.*).

Lang reported that the IWC-POWER samples that were collected between 2010-2012 had been processed and the data are ready for analysis and interpretation.

Attention: SC
*The sub-committee **agreed** that the genetic analysis of biopsy samples continues to be a priority item and looks forward to reviewing results of this work at SC/68a. In addition, the sub-committee recognised the importance of samples collected during JARPNII and NEWREP-NP surveys, and **recommended** collection of additional biopsy samples (about 20 if possible) during the NEWREP-NP surveys in the western North Pacific to improve the power to evaluate stock structure. The sub-committee **encouraged** work to produce genetic data from the existing Japanese samples.*

Additional samples from the NEWREP-NP study area, combined with existing samples, will help determine if these western blue whales are distinct from those in the rest of the North Pacific.

4. Comparison of photo-id between POWER and other ENP catalogues and JARPN/JARPNII catalogues (no matches between POWER and ENP catalogues).

Mizroch reported that the 2010-2014 POWER blue whale catalog was compared with ENP catalogs managed by Cascadia Research Collective and Centro Interdisciplinario de Ciencias Marinas, Instituto Politécnico Nacional (CICIMAR-IPN). No matches were found. Branch recommended that photos collected during JARPN and JARPNII be compared to those collected during POWER.

Attention: SC
*The sub-committee **encouraged** that JARPN/JARPNII photographs be compared to POWER photographs and looks forward to reviewing results of this work at SC/68a.*

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5. Review new acoustic locations and information and conduct fine-scale analysis of song features for central Pacific blue whale calls, with particular focus on calls around Japan.

Širović reported that analyses of additional data collected in the Philippine Sea are currently underway, and may provide further information on distribution of blue whale song types. The sub-committee looks forward to an update on the results of analyses of the Philippine Sea and Northern Mariana Islands dataset, but agreed that detailed analysis of song features in the existing data from the central North Pacific is not feasible given the relatively faint and poor-quality recordings of the WNP/Central call type.

Attention: SC
*Given the new song type recorded off Japan, a reanalysis of recordings from the Northern Mariana Islands (Saipan and Tinian) collected by the Pacific Islands Fisheries Science Center is **recommended** to look for the presence or absence of the Japan song. In addition, the sub-committee also **encouraged** passive acoustic data collection during surveys (e.g. POWER, university/training cruises) from the region of high blue whale density southeast of the Kamchatka Peninsula to determine the song type produced by animals in that region.*

6. Obtain better life history parameters from the Cascadia Research Collective, the Mingan Island Cetacean Study Research Station and the CICIMAR-IPN photo-ID dataset.

Attention: G
*The sub-committee **agreed** that the work to obtain life history data on blue whales remained a priority item and **encouraged** the named data holders to begin progress on this initiative.*

It was discussed that the most important data that should be collated are age at sexual maturity and calving interval.

6.2 North Atlantic sei whales
SC/67b/NH/07 reported on two separate habitat-based density modeling efforts, utilising visual survey data to produce seasonal abundance estimates for sei whales from the purported 'Nova Scotia' stock, ranging from Nova Scotia to the southeastern U.S. One effort was undertaken by the National Marine Fisheries Service Northeast and Southeast Fisheries Science Centers (NEFSC, SEFSC), as part of a multi-agency (NMFS, BOEM, US Navy, and USFW) funded program to document the spatial-temporal distribution of cetaceans in the U.S. Atlantic waters (Palka *et al*., 2017). This study utilised systematic line-transect data collected by NMFS shipboard and aerial surveys from 2011-2015. The second study, published by Roberts *et al*. (2016a, b), utilised sightings data collected by five different institutions (including NMFS) from 1992-2014. Both methods predict high density in spring and summer months along the Georges Bank region and Scotian shelf. The NEFSC model also predicted sei whale presence south of Cape Hatteras, NC, though at lower densities than on Georges Bank.

The winter distribution and migratory behavior of sei whales in the western North Atlantic continues to be poorly understood. Passive acoustic data collected along the US eastern seaboard and presented in SC/67b/NH07 suggests persistent presence of animals along the Georges Bank region throughout fall, winter and spring, while acoustic data in southeastern US waters is also revealing the wintertime presence of at least some animals in the Blake Plateau region (off Florida), providing preliminary evidence of winter habitat. Strandings data extracted from the US National Strandings database from 2012-present have documented eight putative sei whales distributed along the US east coast and Gulf of Mexico.

In discussion, it was noted that new data were not available from regions around Iceland or Norway, where it was mentioned that abundance estimation is particularly challenging for this species in northern waters, partially due difference in timing between surveys and species' arrival in regional waters.

The sub-committee welcomed the new information on sei whale distribution and abundance, and looked forward to a further update on reanalysis of historical data, particularly related to stock structure and strandings, next year.

6.3 North Atlantic right whales
SC/67b/NH/05 summarised the status of the North Atlantic right whale (*Eubalaena glacialis*). This population has been slowly declining since 2010 and the abundance at the end of 2015 was estimated to be 458 individuals with a 95% CI of 444-471 (Pace *et al*. 2017). Of particular concern is that females showed lower annual survival than male and by 2015, 186 females (95% CI 174-195) remained. Many recent changes including shifts in distribution during summer from the northern Gulf of Maine and Bay of Fundy region to regions further north (i.e. Gulf of St. Lawrence), and during the winter from the Florida-Georgia region to regions further north along the mid-Atlantic coast (i.e. between New York and North Carolina) are being documented (Davis *et al*., 2017; Mallette *et al*., 2016, 2017). In the last two years, there has also been a lack of successful calving. In the 2016/2017 calving season, five calves were known to have been born. To date, there have been no calves observed in the

2017/2018 calving season. The stranding numbers have also been much higher in 2017 than in previous years with the greatest increase being carcasses detected from June to September in the Gulf of St Lawrence (Daoust *et al.*, 2017) and along the US east coast in April, November and December. The 2017 total number of dead whales was 17 whales, with 12 in Canada and 5 in the United States. van der Hoop *et al*. (2017) demonstrated that the energetic cost of entanglement can be a significant impediment to reproduction, and both increased number of documented entanglements and decreased calving are being observed.

Due to elevated North Atlantic right whale mortalities, on August 24, 2017, NOAA Fisheries declared a North Atlantic right whale Unusual Mortality Event (UME). For 2018, one dead whale was recovered floating offshore of Virginia entangled in pot gear involved in the snow crab fishery. The 11-year average is 3.8 whales per year. Based on preliminary findings, of the 12 cases examined (7 in Canada, 5 in U.S.) and cause of death determined, five cases were suspected or confirmed for blunt force trauma (vessel-strike) and five cases were suspected or confirmed entanglements (NOAA, 2018a). Nine of the carcasses were females, 8 were males and 1 was undetermined. In addition there were five live whale entanglements in Canada in 2017, all in the same timeframe in the Gulf of St. Lawrence and three in the U.S. (2 in 2017 and 1 in 2018). The live entanglement sighted off the coast of Massachusetts in 2018 was a chronic entanglement first observed in 2014.

Important to recognise is that these stranding reports represent the minimum number of mortalities for that season. The sub-committee showed great interest in scaling these minimum observed mortalities to an overall estimate. However, it was also realised that there are significant challenges (see HIM report), as some carcasses never make it to shore (floaters at sea), emaciated/thin animals are less likely to float, and detection effort is inconsistent. For example, from 2005 through March 2018, there were 43 confirmed strandings in U.S. waters, of which 28 were detected and reported as floaters by directed aerial survey effort, USCG survey effort, and the public.

Due to the 2017 Canadian interactions in the Gulf of St. Lawrence, on 19 April 2018 the government of Canada implemented mitigation measures to reduce future interactions (DFO 2018), including closing a large part of the Gulf of St. Lawrence snow crab fishery on June 30th; creating a dynamic 15-day fishing closure, and a 10 knot speed restriction when a single right whale sighting in any area is detected; putting in place mandatory gear marking and reporting of any lost gear; minimising the allowable amount of floating line at surface; and utilizing vessel monitoring systems that reports the boats position every 5 minutes.

A substantial increase in international collaborations and data sharing between the US and Canada has occurred as a result of these mortalities. For example, Reeves drew attention to the Independent Advisory Committee for Right Whale Recovery (IAC), which was formed in December 2017 with the goal "to reduce human impacts on right whales to levels that permit the survival and robust recovery of the species using pragmatic approaches." The impetus for creation of such a committee came from discussions at the annual meeting of the North Atlantic Right Whale Consortium in Halifax, Nova Scotia, in October where it was agreed by many participants that a bi-national, non-government group of experts could play a constructive role in assisting other bodies (e.g. NOAA's Atlantic Large Whale Take Reduction Team, Canada's Departments of Fisheries and Oceans and Marine Transport) in efforts to find ways of reducing entanglement and ship-strike risks to right whales by the summer of 2018 and beyond. The committee's composition is equally balanced in terms of US and Canadian membership, with overall co-chairs (S. Kraus and R. Reeves), co-chairs of the Entanglement working group (M. Baumgartner and S. Brillant) and the Ship Strike working group (M. Brown and A. Knowlton). Each of the working groups consists of 6-7 scientists, 6-7 conservationists associated with NGOs, and 11-13 industry representatives (fishermen and shippers, respectively). There is extensive overlap in membership between the IAC and the various other committees, teams and working groups in both countries tasked with addressing these threats to the whales. The IAC expects to produce recommendations to the relevant authorities in Canada and the US before August 2018.

Attention: SC

The sub-committee welcomed the updated abundance estimate based on Pace et al. 2017. This estimate will be updated in late 2018 and sub-committee looked forward to the results to be presented at the SC/68a meeting. The sub-committee ***encouraged*** *the USA to submit the comprehensive update on North Atlantic right whales to the 2019 meeting of the Scientific Committee. The sub-committee further* ***encouraged*** *updates from the Large Whale Take Reduction Team (ALWTRT), specifically on progress of the Whale Safe Rope and Gear Marking Feasibility Subgroups.*

Attention: SC
*The sub-committee **reiterated** its previous **recommendation** for the submission of a comprehensive update on the status of North Atlantic right whales (IWC, 2017:40) from the United States. It stressed the importance of this being submitted to the 2019 meeting of the SC to enable an initial review of status. This will allow time for explanations or additional analyses to be undertaken before the proposed 2019 Workshop on the Comparative Biology, Health, Status and Future of North Atlantic Right Whales: Insights from Comparative with other Balaenid Populations (including bowheads). The sub-committee **agreed** that the Steering Committee should continue its work to plan the workshop which is now scheduled for late 2019.*

Attention: S
At the SC meeting in 2000, the sub-committee expressed serious concern over the status of this stock as it is the only viable population of this species. There were two issues noted at that time: (1) reproductive failure and (2) high anthropogenic mortality mainly from ship collisions but also from bycatch. However, at this and last years' SC meeting the sub-committee noted that the main human related mortality was bycatch and not ship collisions and in high numbers. From 1970 to 2009, mortalities of right whales attributed to vessel interactions was higher (44%) than those resulting from entanglement (35%), while between 2010 and 2015, entanglements accounted for 85% of known mortalities, and 15 % were a result of vessel interactions (Krauss et al. 2016).

*Therefore, the sub-committee **agreed** that the Secretary should be asked to write to the U.S. National Marine Fisheries Service (NMFS) and the Canadian Department of Fisheries and Oceans, informing them of the Subcommittee's serious concerns over the declining population trend of this species, and as a matter of absolute urgency, that every effort be made to reduce human induced mortality in the population to zero.*

6.4 North Pacific right whales
SC/67b/ASI/10 reported a single North Pacific right whale sighting with a photo identification and biopsy sample from this animal by the dedicated sighting survey. The survey was conducted in sub-areas 7CN and 7CS from 28 April to 27 May 2017 with a total of over 2,000 n. miles searching distance. Right whale was sighted in the northern part of 7CN, approximately 60 n.miles off Kushiro port (Hokkaido) in the end of April.

SC/67b/ASI/12 reported North Pacific right whale sightings by the IWC-POWER survey conducted in the eastern part of the Bering Sea from 3 July to 25 September 2017. A total of 1,571.0 n.miles was searched on the predetermined trackline. The acoustic survey was introduced for the first time to acoustically monitor for the presence of marine mammals, with particular importance for detecting and locating North Pacific right whales. A total of 240 sonobuoys were deployed, for a total of 841 monitoring hours. During the survey, a total of 9 schools and 18 individuals (including 2 duplicate schools of 3 individuals) of right whales were sighted with photo identifications (12 individuals) and biopsies (3 individuals). The majority of North Pacific right whales were sighted at the western edge of Bristol Bay and in the middle of the critical habitat. Generally, long diving behaviours (from 12 to 18 minutes) were often observed. A total of 5 schools of 9 individuals were detected by acoustics. A school of two was detected approximately 32 n.miles from the trackline by acoustics. The sub-committee welcomed this new information and thanked the authors for their presentation.

Paper SC/67b/NH/02 presents the results of an analysis of population structure and historical demography in North Pacific right whales. This work, which represents the first genetic study comparing right whales sampled in the eastern and western North Pacific, identified statistically significant differences in mitochondrial DNA haplotype frequencies between the two groups. These genetic differences are consistent with what is known about the distribution of right whales in the North Pacific. This paper was also discussed by the SD&DNA Working Group; details on that discussion, and a summary of the paper, can be found in Annex I under agenda item 4.3.

The sub-committee welcomed this new genetic study, as it helps define a western and eastern stock of right whales in the North Pacific, looks forward to the final publication. The sub-committee also noted that SC/67b/NH02 was produced in response to a recommendation made last year (SC/67a), and thanked the authors for their contribution.

In discussion, Brownell noted that a number of the samples in SC/67b/NH/02 came from bycaught and stranded specimens, and then he briefly presented SC/67b/NH/06Rev1, reporting on a right whale taken in large-scale set net in February 2018 off Izu, Japan. It was noted that the last bycatch in a set net in Korean waters was in 2015 (SC/66a/HIM/15). Bycatches in this population was noted as a possible problem for this population in SC/67b/HIM/09Rev1.

The sub-committee looks forward to new a new population estimate in the JARPNII research area next year (western North Pacific).

7. NEW INFORMATION AND WORKPLAN FOR OTHER NORTHERN STOCKS

7.1 North Pacific fin whales

SC/67b/ASI/12 reported fin whale sightings by the IWC-POWER survey conducted in the eastern part of the Bering Sea from 3 July to 25 September 2017. Fin whales were the most frequently encountered baleen whale species in the research area and were widely distributed in the southern part of the research area south of 58N, and there were areas of high concentrations to the north and south of St. George Island, as well as north of Unimak Island. A total of 143 schools (195 individuals including 3 calves) of fin whales were observed in the research area. Approximately 50% of fin whales were sighted in shallow waters (depth between 31 and 200 meters); the rest were in deep water of depths over 1,000 meters. Biopsy samples were obtained from 28 fin whales, including both individuals in a mother calf pair. In the high density area north of St. George Island, red coloured faeces were observed on a few occasions while photographing sightings on 14 Aug. In the research area, long diving behaviours (from 10 to 18 minutes) were often observed. A total of 79 individuals from 63 schools (combined school size of 88) were photographed, of these 55 were photo-identified.

SC/67b/ASI/10 reported North Pacific fin whale sightings with biopsy (one individual) by the dedicated sighting survey, conducted at the sub-areas 7CN and 7CS from 28 April to 27 May 2017, with a total of 2,022.6 n. miles searching distance. During the survey, 2 single schools of fin whale were sighted in the research area, in the northern part of 7CN, approximately 60 n.miles off Kushiro port, and the northern part of 7CS, approximately 20 n.miles off Hachinohe port.

SC/67b/SCSP/06 reported 59 schools with 79 individuals of fin whales sightings by the NEWREP-NP offshore component, conducted in the sub-areas 7, 8 and 9 from 16 June to 23 September 2017 with a total of 5,307 n. miles searching distance.

In a genetic analysis aimed at identifying Omura's whales in Korean waters, Kim and colleagues reported three fin whale mitochondrial DNA control region sequences from whales bycaught in fisheries around South Korea between 2002 and 2016 that were deposited in GenBank. Two were from the East Sea and one from the Yellow Sea.

The sub-committee thanked the authors for the presentation of their work and welcomed the new data.

7.2 Omura's whale

SC/67b/NH09 reports new data on Omura's whales from the west coast of Madagascar, supporting the current understanding that the population is resident and non-migratory, and potentially isolated within its regional and global range. Field surveys off Nosy Be, Madagascar were conducted in 2015 and in 2016, involving small boat sighting surveys, passive acoustic monitoring and deployment of satellite tags. Frequent photographic re-sights of individuals were noted within and across seasons, including at least one reproductive female that was sighted in four of six years from 2012 to 2017, once with a calf, suggesting strong site fidelity. Photo-Id work is under way working towards estimation of abundance. Feeding was observed on dense patches of krill identified morphologically as *Pseudeuphasia latifrons*, which seem to appear in response to dense blooms of a cyanobacteria *Trichodesmium* sp. Passive acoustic monitoring (PAM) was conducted at four sites spread across 80km for one year. Omura's whale song was present year-round indicating residency of the Omura's whale population in this region, with evident spatial and temporal heterogeneity among sites. Four individuals were satellite tagged yielding telemetry tracks ranging from 30 to 58 days. Satellite tagged individuals remained in a restricted range of no more than 405km (mean among individuals of 283km) along the northwest coast of Madagascar, with all individuals moving multiple times throughout their individual ranges. Behavioral switching state-space models indicated highly localised movement patterns, involving short periods of transiting between specific areas where the whales would linger for several days displaying primarily localised movements, likely feeding. Habitat suitability modelling indicated favorable conditions for Omura's whale along the west coast of Madagascar, defined primarily by shallow depth and some undefined influence of primary productivity, with little other predicted suitable habitat throughout the Southwest Indian Ocean. Combination of these data sources suggests that this is a resident, non-migratory population whose distribution is likely determined by local shallow water ecological processes and patchy and ephemeral prey resources. Furthermore, this population of Omura's whale may be isolated within a fragmented oceanic/global range for the species. Likely threats to the Madagascar population include entanglement in local fisheries, impacts from oil and gas exploration, and most imminent the risk of coastal water contamination from a recently initiated mining operation for Rare Earth Elements. Future work should include a long-term latitudinal study that incorporates multiple methodologies to investigate all aspects of the species biology and conservation threats to the population. Therefore the development of sustained

or long-term funding sources is currently a critical requirement for the continued investigation of this population and success of the project

The sub-committee welcomed this substantial new information from northern Madagascar on this poorly known species.

Attention:SC
*The sub-committee **drew attention to** the significant contribution the research efforts off Madagascar have made to our growing understanding of this species and encourages this work to be continued and expanded into the future. The sub-committee also **recommended** identification of study sites that are suitable for long-term comparative study on Omura's whales in other parts of its range. Possible sites discussed included New Caledonia, Komodo Islands, Indonesia, and the Bohol Sea, Philippines.*

Kim and colleagues reported on the first confirmed documentation of Omura's whale in the waters of South Korea. Between 2002 and 2016, six large baleen whales were bycaught in fisheries along the south and east coasts of South Korea. Using the mitochondrial DNA control region, and reference samples downloaded from GenBank, two of these specimens from the south coast of South Korea at Geoje and Goheung were confirmed to be Omura's whale. The other specimens were identified as fin whale (3) and Bryde's whale (1).

This account reinforces the importance of the Southeast Asian region, including Sea of Japan, the Yellow Sea, the East China Sea, and the South China Sea, as important habitat for Omura's whales, as demonstrated by existing accounts of Omura's whale strandings in Japan, mainland People's Republic of China, Taiwan, Hong Kong and now Korea. It also highlights the vulnerability of this apparently obligate coastal species to anthropogenic impacts such as entanglement in fishing gear.

The sub-committee thanked the author for this valuable information.

7.3 Gulf of Thailand Bryde's whales
SC/67b/HIM/09rev01 presents information on the Bight of Bangkok Bryde's whale population, which has not been assessed by the IWC or on the IUCN Red List. The population was estimated to be 63±8 (S.E.) based upon photo-identification data collected between January 2010 and December 2013 (Cherdsukjai *et al.,* 2015). Thongsudee *et al.* (2014) reported mom calf pairs in this region from April to November. Detection of mother-calf pairs during mark recapture studies suggest this region could serve as an important nursing ground for this population. Mortalities attributed to interactions with fishing gear have been reported and in 1998, a 12m long Bryde's whale was taken in a trawl in Chumphon Province. In September of 2009, a 4.5m calf was severely entangled in a gill net targeting rays off the coast of Trang province (Adulyanukosol *et al.,* 2012). Records of mortality and evidence of scars on the body attributed to fishery interactions (Adulyanukosol *et al.,* 2012) highlight the threat of bycatch on this small population and in potentially important feeding and nursing grounds (Thongsudee *et al.,* 2014).

The sub-committee thanked the authors for bringing this information to their attention.

7.4 Gulf of Mexico Bryde's whales
The sub-committee received an update from Rosel on activities related to monitoring and new research plans for the Gulf of Mexico Bryde's whale. The search for an appropriate holotype specimen for this subspecies continues, as two specimens from the Gulf of Mexico have proved to be inadequate for use as a holotype. Regarding new data collection, in 2017 the Southeast Fisheries Science Center (SEFSC) undertook a shipboard line-transect cetacean assessment survey in the northern Gulf of Mexico, including known habitat of the Gulf of Mexico Bryde's whale. Passive acoustic data are being collected in historic habitat of the central and western Gulf from June 2016 to June 2017, to evaluate whether the whales' calls are detected in regions beyond their current known northeastern habitat. Data analysis is currently underway. An acoustic suction-cup deployed in 2015 remained on the whale for three days (Soldevilla *et al*., 2017), and results indicated that the individual whale exhibited diel diving behavior, with deep daytime dives and shallow nighttime dives. At night, the whale spent 88% of its time near the surface, which is of concern for potential ship strike risk.

The SEFSC received funding from the RESTORE Act to direct dedicated research effort towards the Gulf of Mexico Bryde's whale. The RESTORE Act provides funds to restore and protect ecosystems of the Gulf of Mexico following the Deepwater Horizon oil spill (2010). The SEFSC held a workshop with the following objectives: (1) Review the current state of knowledge on Gulf of Mexico Bryde's whales; (2) Provide an overview of the objectives and research plan for the RESTORE project; (3) Identify information needs related to the conservation and restoration of Gulf of Mexico Bryde's whales; (4) Outline research priorities to address critical information gaps; and (5) Discuss future coordination to facilitate research and conservation planning.

The sub-committee welcomed this report and noted that there are new ongoing research plans.

Attention: SC
*The sub-committee **recommends** that the NOAA scientists working with this subspecies present results from shipboard and acoustic data analyses to the IWC at the scientific committee meeting in 2019, and looks forward to receiving a report from the Workshop held in conjunction with the initiation of research associated with the RESTORE Act funds.*

As noted in the Working Group last year, the small population size, restricted range and low genetic diversity place these whales at significant risk of extinction. Furthermore, the northern Gulf of Mexico is a highly-industrialised body of water and energy (oil and gas) exploration and production, commercial fishing, and large port cities that support a significant shipping industry pose significant threats to the population (Rosel *et al*., 2016). The available evidence clearly demonstrates that this recently identified taxon, which ranks as at least a new subspecies and possibly a species, is critically endangered. Its precarious conservation status mimics that of the eastern North Pacific right whale population, which is estimated to be about 30 whales.

In 2017, the Gulf of Mexico Bryde's whale was listed as a critically endangered subpopulation on the IUCN Redlist.

Attention: CG-R United States, S
*The sub-committee **reiterated** its previous **recommendations** that U.S. authorities:*

- *Make full and immediate use of available legal and regulatory instruments to provide the greatest possible level of protection to these whales and their habitat.*
- *Ensure that seismic surveys and associated activities that degrade acoustic habitat are excluded from the region of the eastern Gulf of Mexico inhabited by these whales, including an appropriate geographic buffer against acoustic impacts from activities in the Central Planning Area and active leases in the Eastern Planning Area.*
- *Characterise the degree of overlap between the whales' currently known preferred habitat and ship traffic, and immediately implement appropriate measures to reduce the risk of ship strikes (e.g. re-routing, speed restrictions).*
- *Based on the known distribution of these whales and overlap with certain fisheries, improve understanding of potential for interaction with fishing gear, and expand and implement appropriate measures, such as area closures, to reduce the risk of entanglement throughout their range*
- *Develop and implement restoration projects (with funds from the Deepwater Horizon oil spill settlement) for these whales and their habitat as a priority and ensure that a robust monitoring and adaptive management plan is in place to evaluate the effectiveness of all restoration efforts*
- *Design and conduct research programs (sighting surveys, acoustic monitoring, genetic mark-recapture, photoidentification if feasible, satellite tagging if feasible, health studies if feasible) to further investigate these whales' distribution, movements, habitat use, health, survival and fecundity. This should include efforts to better document the whales' total geographic range and to document causes of mortality through necropsies when carcasses are reported.*
- *Ensure that information about core known habitat and movements in the Gulf of Mexico is transmitted to the U.S. Coast Guard, shipping industry trade organizations, and Gulf of Mexico port authorities (e.g. in Tampa, Florida) for their consideration to mitigate ship-strike risk.*

*In addition, the sub-committee **reiterated** its recommendation that the IWC Secretariat (i) communicate the above concerns and recommendations to range state authorities and (b) specifically explore in collaboration with the International Maritime Organization the feasibility of providing internationally recognised forms of protection to these whales (e.g. designation of an Area to be Avoided) that would reduce the risk of ship strike and help mitigate degradation of acoustic habitat by ship noise.*

Attention: G, SC
*The sub-committee continued to **encourage** U.S. and Mexican scientists to collaborate in efforts to determine whether any of these whales occur in Mexican waters in the western GOMx (e.g. Bay of Campeche) where a major oil spill of three million barrels occurred in 1979. This should include consideration of passive acoustics as well*

as visual surveys focusing on areas of habitat similar to that found in the core known range in the north-eastern Gulf. It was further noted that passive acoustic data or specimen records from the northern coast of Cuba would be useful to determine potential occurrence of this subspecies in that region.

7.5 North Atlantic Bryde's whales

SC/67b/ASI/01 reviewed recent coastal surveys off Guinea, Sierra Leone and Liberia during March 2018. During these surveys, two groups of five individual Bryde's whales were observed and members of the sub-committee agreed on the species ID based on photographs presented in the report.

The sub-committee welcomed this information and **encouraged** future surveys in this region.

7.6 North Atlantic blue whales

Currently, blue whales in the north Atlantic are considered to be one stock; however, there is little (if any) evidence of interchange between animals in western and eastern North Atlantic waters. Cholewiak presented an update on recent information available for blue whales in western North Atlantic, which included a summary of 31 sightings in US waters since the year 2012. Seventeen serious injuries or mortalities have been documented from 1998 to present through the US eastern seaboard and into the Gulf of St. Lawrence; three of these were due to vessel strikes or entanglement. Preliminary analyses of passive acoustic data collected along the US eastern seaboard has indicated seasonal (fall-winter) presence of blue whales off the Georges Bank region, as well as off Cape Hatteras, NC. Recently published papers have also documented the acoustic presence of blue whales off the New York bight in winter (Muirhead *et al*. 2018), and movements of two females equipped with satellite tags down through the mid-Atlantic bight and offshore waters (Lesage *et al*., 2017). A recent Canadian Science Advisory Secretariat Research Document (2016/080; Lesage *et al*., 2018) provides an extensive summary of recent data collected in Canadian waters.

In discussion, it was noted that multiple new datasets have been recently collected and may provide more information on blue whale distribution in North Atlantic waters. These include ecosystem surveys conducted by Norway, the results of which will be published following presentation at the Joint Norwegian-Russian Symposium entitled "Influence of ecosystem changes on harvestable resources at high latitudes" which will take place in Murmansk, Russia, 5-7 June 2018, as well as visual surveys off Iceland. Extensive passive acoustic data collection in the western North Atlantic is currently underway, including work by US, Canadian, and German colleagues. These datasets will provide new insights into blue whale distribution throughout the western North Atlantic coast, Labrador Sea, and Fram Strait. Finally, comparison of photo-identification catalogs between the Gulf of St. Lawrence and Iceland have so far yielded no individuals matched between these locations, but additional data from Iceland are available for comparison.

Attention: SC, G
*The sub-committee **drew attention to** the lack of data on interchange between blue whales in the eastern and western North Atlantic, and **recommended** that U.S. and Icelandic colleagues conduct a new comparison of blue whale photo-identification catalogs before the SC/68a meeting. The sub-committee also **encouraged** Canadian colleagues to generate a new population abundance estimate as soon as feasible, and looks forward to updates on new passive acoustic and visual sightings data SC/68a.*

7.7 North Atlantic humpback whales

Between January 2016 and March 2018, 68 humpback whale mortalities were documented along the western North Atlantic. Either full or partial necropsies were performed on approximately half and evidence of either vessel strikes or entanglement was attributed to 50% of these cases (NOAA 2018b). An Unusual Mortality Event (UME) was declared for humpback whales in April 2017, and is currently ongoing. In addition, an Unusual Mortality Event was also declared for minke whales in the North Atlantic Atlantic from Maine through South Carolina. Since January 1, 2017, a total of 29 stranded minke whales (10 live; 19 dead) have been documented (NOAA 2018c).

SC/67b/ASI03 reported the intersessional correspondence which reviewed the Icelandic humpback whale abundance estimates, specifically noted was estimates from 2015 for humpback whales around Iceland/Faroe Islands and East and West Greenland, as requested by the ASI subcommittee. The Standing Working Group on Abundance Estimates, Status of Stocks and International Cruises agreed on the abundance estimate for humpback whales around Iceland/Faroe Islands (4962-20278, CV=0.36;SC/67b/ASI/3 and ASI/9), East Greenland (1845-9666, CV=0.44) and West Greenland (434-2272, CV=0.44; Hansen *et al*., in press). In discussion, it was mentioned that large numbers of humpback whales have been moving into fjords along Norway. Whales have

been documented feeding on herring between the months of November and January in recent years, which is concurrent with an anecdotal shift in herring distribution. It was also noted that photo-identification and tagging efforts were recently conducted around northern Norway.

The sub-committee welcomed this new information on recent work on humpback whales.

7.8 North Atlantic bowhead whales not subject to aboriginal subsistence whaling
No new information was available to the sub-committee.

7.9 North Pacific bowhead whales not subject to aboriginal subsistence whaling
No new information was available to the sub-committee.

7.10 North Pacific sperm whales
SC/67b/ASI10 reported North Pacific sperm sightings by the dedicated sighting survey, conducted at the sub-areas 7CN and 7CS from 28 April to 27 May 2017, with a total of 2,022.6 n. miles searching distance. During the survey, a total of 19 schools with 41 individuals of this species were sighted in the research area.

SC/67b/ASI12 reported the sighting of sperm whales during IWC-POWER survey, conducted in the eastern part of the Bering Sea. Sperm whales were sighted in the southern part of the research area, south of 57ºN where the water depth was over 200 meters. A total of 15 schools (15 individuals) were recorded. Almost all whales were sighted in deep waters over 1,000 meters. No photographs or biopsy samples were collected from any sperm whales sighted.

SC/67b/SCSP06 reported 215 schools with 365 individuals of North Pacific sperm whales were sighted from the NEWREP-NP offshore component, conducted in the sub-areas 7, 8 and 9 from 16 June to 23 September 2017, with a total of 5,307 n. miles searching distance.

The sub-committee welcomed this new information and thanked the authors for their presentation.

7.11 Other Northern Hemisphere sperm whale stocks, including the Northern Indian Ocean
No new information was available to the sub-committee.

8. WORKPLAN AND BUDGETS REQUESTS FOR 2019-2020

The sub-committee agreed to the two-year workplan in Table 1. A workshop is proposed for North Atlantic right whales that includes a budget request for 2019-2020.

9. ADOPTION OF REPORT

The report was adopted at 17:30h on 2 May 2018.

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Table 1

Work plan for Northern Hemisphere whale stocks

Topic	Intersessional 2018/19	2019 Annual Meeting (SC/68a)	Intersessional 2019/20	2020 Annual meeting
North Pacific blue whales	Data collection and review specifically for early catches and stock structure	Review any new information needed for future assessment	Develop proposal for WNP stock structure	Agree to WNP stock structure (1 or 2 stocks)
North Atlantic sei whales	Review distribution based on sightings, strandings and available stock structure	Review any new information needed for future assessment	Develop proposal for WNA stock structure	Consider proposal for WNA stock structure
North Atlantic right whales	-	Review new population status and mortality data	-	Review new population status and mortality data
North Pacific right whale	-	Review any new information needed for future assessment	-	Review any new information needed for future assessment
North Pacific fin whales	-	Review any new information	-	Review any new information
Omura's whales	-	Review any new information	-	Review any new information
Gulf of Thailand Bryde's whales	-	Review any new information	-	Review any new information
Gulf of Mexico Bryde's whale	-	Review any new information on human-induced mortality	-	Review any new information on human-induced mortality
North Atlantic Bryde's whales	-	Review any new information	-	Review any new information
North Atlantic blue whales	-	Review any new information	-	Review any new information
North Atlantic humpback whales	-	Review any new information	-	Review any new information
North Atlantic bowhead whales (not subject to aboriginal subsistence whaling)	-	Review any new information	-	Review any new information
North Pacific bowhead whales (not subject to aboriginal subsistence whaling)	-	Review any new information	-	Review any new information
North Pacific sperm whales	-	Review any new information	-	Review any new information
Other Northern Hemisphere sperm whale stocks (including the Northern Indian Ocean)	-	Review any new information	-	Review any new information

Appendix 1

AGENDA

1. CONVENOR'S OPENING REMARKS
2. ELECTION OF CHAIR
3. APPOINTMENT OF RAPPORTEUR(S)
4. ADOPTION OF AGENDA
5. REVIEW OF AVAILABLE DOCUMENTS
6. EVALUATION FOR POTENTIAL NEW IN-DEPTH ASSESSMENTS
    - 6.1 North Pacific blue whales
    - 6.2 North Atlantic sei whales
    - 6.3 North Atlantic right whales
    - 6.4 North Pacific right whale
7. New information and workplan for other northern stocks
    - 7.1 North Pacific fin whales
    - 7.2 Omura's whale
    - 7.3 Gulf of Thailand Bryde's whales
    - 7.4 Gulf of Mexico Bryde's whales
    - 7.5 North Atlantic Bryde's whales
    - 7.6 North Atlantic blue whales
    - 7.7 North Atlantic humpback whales
    - 7.8 North Atlantic bowhead whales not subject to aboriginal subsistence whaling
    - 7.9 North Pacific bowhead whales not subject to aboriginal subsistence whaling
    - 7.10 North Pacific sperm whales
    - 7.11 Other Northern Hemisphere sperm whale stocks, including the Northern Indian Ocean
8. Workplan and budgets requests for 2019-2020

Appendix 2

FURTHER DATA ON NORTH PACIFIC BLUE WHALE DISTRIBUTION

Trevor A. Branch, Yulia Ivashchenko and Koji Matsuoka

JARPN/JARPNII data: Individual locations of blue whale sightings were plotted from the JARPN and JARPNII cruises to assess the extent to which blue whales are now present close to former catches, and close to the acoustic detections of a new song type off Hokkaido. The data include 72 sightings west of 155°E, several close to the location of the acoustic recorder (Fig. 1), in addition to 177 sightings in the hotspot at 45-50°N and 155-165°E. These data were plotted in summarised form in Matsuoka *et al*. (2015).

Soviet sightings and catches: blue whale data were extracted from the digitisation of Soviet sighting surveys and catches (Ivashchenko and Clapham, 2018). These show a much broader distribution of blue whale

sightings than was previously known, including some catches in the Bering Sea, and one north of the Bering Strait, in addition to blue whale sightings west of Hokkaido, scattered locations south of the hydrophone location, and catches and sightings around Hawaii and other low latitudes in the western and central North Pacific around 20-25°N. Catches in the Sea of Japan and Sea of Okhotsk are also of interest.

NOTE:

Exact locations from the JARPN and JARPNII cruises were supplied by Koji Matsuoka, and data from the Soviet North Pacific sighting voyages and catches from Yulia Ivashchenko.

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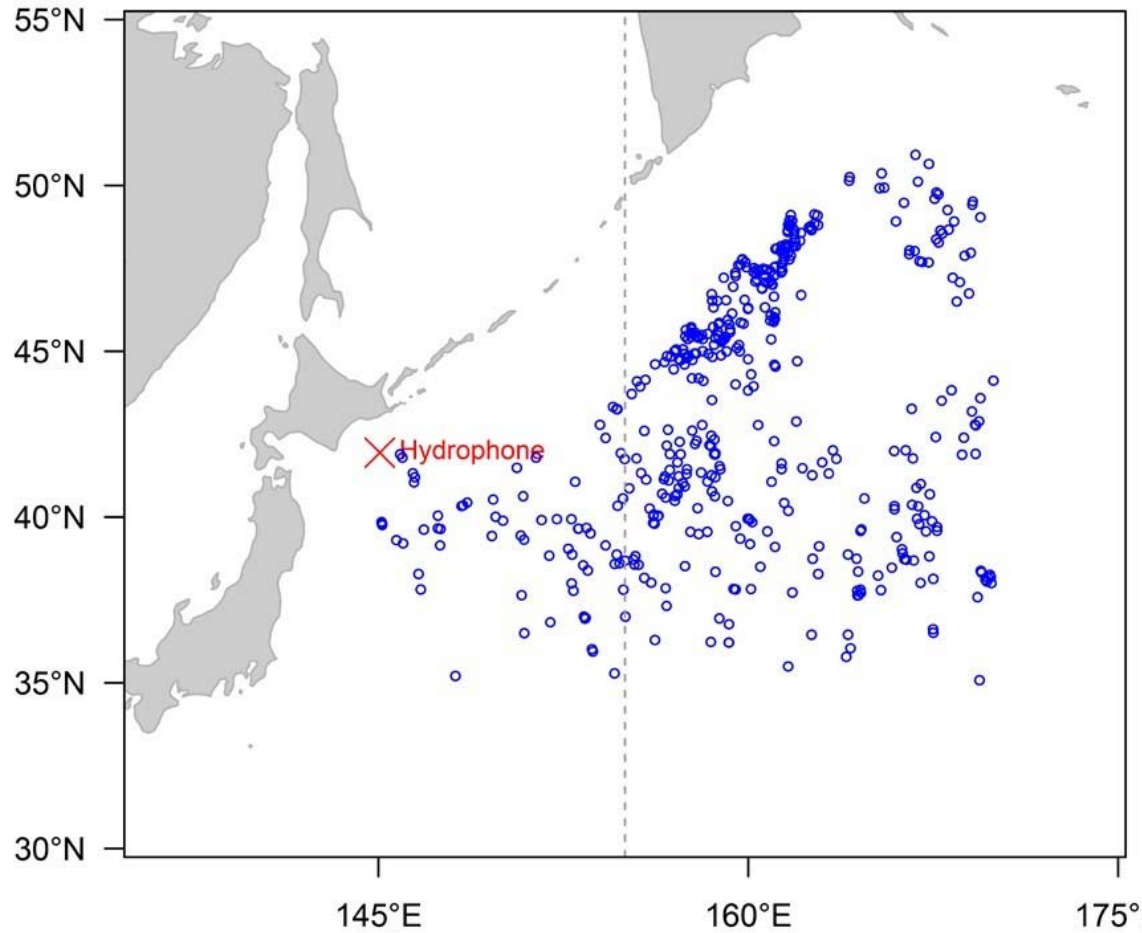

Fig. 1. Sightings of blue whales in the JARPN and JARPNII cruises with a dashed line at 155°E, from Matsuoka *et al*. (2015).

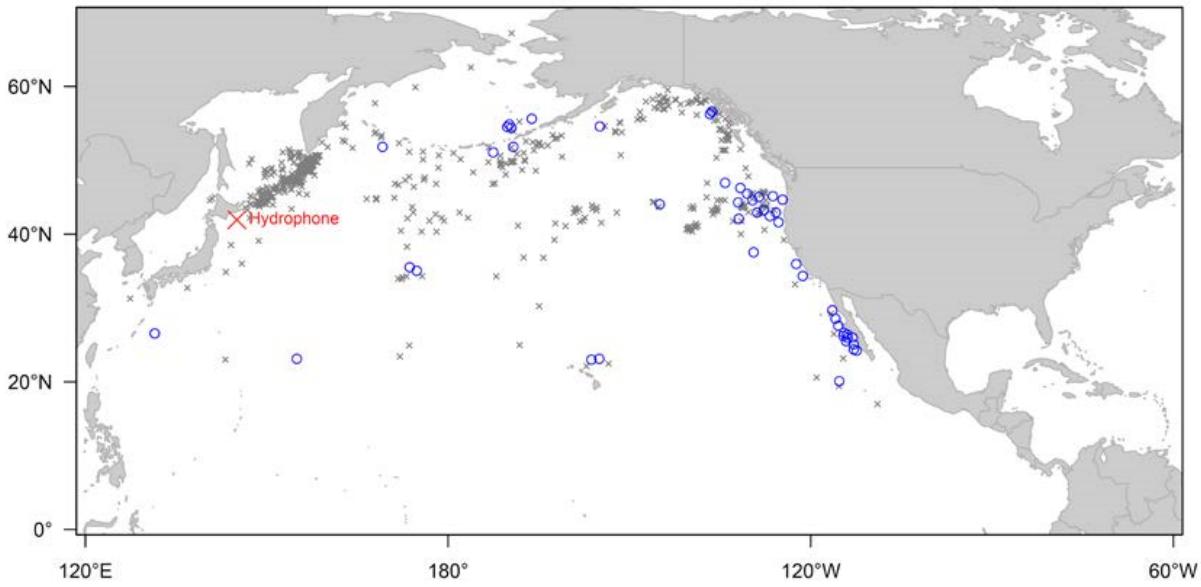

Fig. 2. Locations of sightings (blue circles) and locations recorded as either catches or catches/sightings (grey x) from Soviet surveys. Unpublished data from Ivashchenko and Clapham (2018).