Annex L

Report of the Sub-Committee on Small Cetaceans

Members: Fortuna (Convenor), Scheidat (co-Convenor), Almeida, Alps, Amerson, Archer, Ashe, Baird, Baker, Ballance, Baulch, Bell, Bickham, Bjørge, Brockington, Brownell, Cerchio, Chen, Cipriano, Crespo, Currey, Diallo, Dolar, Donovan, Eisert, Findlay, Friedlaender, Funahashi, Genov, Gerber, Gerrodette, Gilles, Griffiths, Hoelzel, Holm, Iñíguez, Jackson, Jaramillo-Legoretta, Jedensjö, Kemper, Ketele, Kim, Krützen, Kucklick, Lang, Lauriano, Leslie, Luna, Lundquist, Marcondes, Mate, Melcón, Mesnick, Mizroch, Moore, Morin, Natoli, Nda, Oosthuizen, Oremus, Paniego, Panigada, Park, Parsons, Pease, Perrin, Pitman, Porter, Prewitt, Reeves, R., Reeves, S., Rendell, Reyes, Ridoux, Ritter, Robertson, Rodriguez-Fonseca, Rojas-Bracho, Rose, Rosel, Rosenbaum, Rowles, Santos, Scordino, Simeone, Simmonds, Sitar, Skaug, Slooten, Smith, Solvang, Stachowitsch, Suydam, Taylor, Thomas, Thuok, Tiedemann, Tomohiko, Wang, D., Wang, J., Williams, Willson, Zerbini.

1. CONVENOR'S OPENING REMARKS

Fortuna welcomed the participants to the meeting.

2. ELECTION OF CHAIR

Fortuna was elected Chair and Scheidat co-Chair.

3. APPOINTMENT OF RAPPORTEURS

Reeves, Cipriano, Genov, Porter and Thomas undertook the duties of rapporteurs.

4. ADOPTION OF AGENDA

The adopted agenda is given as Appendix 1.

5. REVIEW OF AVAILABLE DOCUMENTS

The following available documents contained information relevant to the work of the sub-committee: SC/66a/SM01-SC/66a/SM25; SC/66a/SH08; IWC (2016); Moura *et al.* (2013); Natoli *et al.* (2004); Oremus *et al.* (2015); Wang *et al.* (2015); and National Progress Reports.

Any abundance estimates presented or referenced in this report were not formally evaluated by the sub-committee.

6. REVIEW OF TAXONOMY AND POPULATION STRUCTURE OF BOTTLENOSE DOLPHINS (*TURSIOPS* SPP.) IN THE WIDER INDO-PACIFIC REGION

At SC/65b the sub-committee decided that its priority topic for the next three Scientific Committee meetings would be a review of the genus *Tursiops*. Much new information from both genetic and morphological studies has become available in recent years, although information is still limited or completely lacking for many regions and populations. As bottlenose dolphins are among the most widely distributed cetaceans, with complex taxonomy and population structure, it was agreed that the review would be completed in stages, the first steps being to develop an assessment framework and to conduct general reviews of the available information in relatively well-studied regions. Factors contributing to taxonomic uncertainty in this genus include the wide distribution across highly variable environments, variability within locally adapted populations, sympatry of various forms in some regions, a lack of specimens from many regions and differences in research methods and designs (Wang and Yang, 2009).

At SC/66a the sub-committee reviewed taxonomy and population structure of bottlenose dolphins (*Tursiops* spp.) in the Indo-western Pacific region including China-Japan-Taiwan, Australian waters, New Zealand and Oceania, the eastern Bay of Bengal, Bangladesh and the east coast of Africa from the Red Sea to South Africa. Specific objectives for this first phase of the review were to clarify:

- taxonomic status of *Tursiops* spp. (*T. truncatus*, *T. aduncus*, [*T. catalania*] and *T. australis*) around Australia; and
- taxonomic status of *T. aduncus* in the core Indo-Pacific region as compared to Bangladesh, the Red Sea (type location) and eastern Africa.

The sub-committee also reviewed additional information on:

- distribution and conservation status of Indo-Pacific *Tursiops* populations, including Australia, Japan and Taiwan; and
- occurrence and distribution of island-associated *Tursiops* populations in the western Pacific (Oceania) and New Zealand.

6.1 Overview of published taxonomy and population studies in the greater Indo-Pacific, from 1999-2011

Natoli presented a summary of studies of taxonomy and population divergence as a way to orient the sub-committee to the state of knowledge from the earliest genetic studies through to about 2011, in relation to morphological studies. More than 20 different *Tursiops* species have been described historically but only two (*T. truncatus* Montagu 1821 and *T. aduncus* Ehrenberg 1832) are widely recognised.

Relationships among members of the entire family Delphinidae and, in particular, the subfamily Delphininae (including *Tursiops*, *Sousa*, *Stenella* and *Delphinus*) are also taxonomically complex and the taxonomy of these species and genera is still unclear (Perrin *et al.*, 2013). *T. truncatus* has a world-wide distribution from temperate to tropical waters in both hemispheres, whereas *T. aduncus* is confined to the Indo-Pacific region and is principally found in near-shore waters with a few notable exceptions (SC/66a/SM18). In addition, *T. truncatus* does not appear to occupy inshore areas in the range of *T. aduncus,* although there are areas where they can be considered to be generally sympatric. Among the *T. truncatus* forms in the Atlantic and Pacific, two morphotypes have been described – 'coastal' and 'oceanic' (some authors use the terms 'inshore' and 'offshore' for the same distinction, respectively) – that differ morphologically and genetically, however, the morphotype distinction is not consistent across regions, e.g. in the eastern North Pacific the coastal form is larger than the offshore form, whereas in the Atlantic the coastal form animals are smaller than oceanic animals. Strong population structure among coastal *T. truncatus* has been observed in areas where intensive analyses have been conducted (e.g. Florida, Gulf of Mexico, western North Atlantic, Mediterranean).

In the first molecular analysis of relationships within the Delphinidae (using cytochrome *b* sequences), LeDuc *et al.* (1999) found that putative *T. aduncus* specimens from Natal (South Africa) and Indonesia were not most-closely-related to *T. truncatus*, but instead clustered with *Stenella frontalis*. Wang *et al.* (1999) examined mtDNA control region sequences from *Tursiops* sampled in Taiwan (and elsewhere) and found the molecular data to be in complete agreement with the osteological and external morphological characters analysed by Wang *et al.* (2000a; 2000b). This congruence was strong evidence that the sympatric forms of bottlenose dolphins in Chinese waters are reproductively isolated and comprise two distinct species (*T. truncatus* and *T. aduncus*) that are at least partially sympatric in that region. Natoli *et al.* (2004), using mtDNA and microsatellite markers, found that coastal *T. aduncus* in South Africa differed significantly from both *T. aduncus* from Taiwan and *T. truncatus* from various locations worldwide (Atlantic, Gulf of Mexico, Mediterranean Sea and eastern North Pacific). Therefore, they concluded that the *T. aduncus* in Taiwan may represent a third species, however, Natoli and colleagues did not examine any sequences from Australian *T. aduncus*. Perrin *et al.* (2007) re-analysed the *T. aduncus* holotype (specimen from the Red Sea), using genetic and morphological data, and found that it clustered with the 'African' *T. aduncus* specimens. Sarnblad *et al.* (2011) compared published *T. aduncus* sequences from China, eastern Australia, and South Africa samples with samples from Zanzibar and found that the African sequences clustered together, confirming the differentiation from Chinese/Australian specimens.

In discussion, members of the sub-committee pointed out that some of the studies included in this review were somewhat preliminary and few markers (primarily mtDNA loci) were used. Such an approach may be adequate for identifying genetically discrete 'management units', but is not appropriate for making taxonomic distinctions. It is nevertheless clear from these studies that more than one species of *Tursiops* is present in the Indo-west Pacific. The above summary is primarily based on genetic analyses, however, morphological studies have been carried out and additional summaries of past studies and new analyses are included below.

6.2 Overview of studies of taxonomic placement of Australian bottlenose dolphins

Natoli summarised published evidence for and against a new species of bottlenose dolphin from southern Australia. Möller and Beheregaray (2001) analysed samples of coastal *Tursiops* from southeastern Australia (Jervis Bay and Port Stephens) and concluded that *T. aduncus* was present in both regions and that the southeast Australian *Tursiops* clustered with *T. aduncus* specimens from Chinese waters described by Wang *et al.* (1999), however, this study did not compare sequences with those from South Africa. Kemper (2004) examined skulls and skeletons of mature bottlenose dolphins from (mainly) southern Australia and determined that they could be assigned unambiguously to either *T. truncatus* or *T. aduncus* based on skull morphology alone. Charlton-Robb *et al.* (2011) and Möller *et al.* (2008) used cytochrome *b* and mtDNA control region sequences and microsatellites to analyse divergence of the South Australia bottlenose dolphins in comparison with other species and *T. truncatus*. Their analyses supported the presence of a third species of *Tursiops* (which they designated *T. australis*) in South Australian waters, using morphological and nuclear data in support of the previous genetic analyses. Ross and Cockcroft (1990), Hale *et al.* (2000), Kemper (2004) and Jedensjö *et al.* (2013), however, all suggest that the divergence observed is a clinal effect of the widespread distribution of *T. aduncus* along the Australian coastline.

Hoelzel presented a summary from analyses by Moura *et al.* (2013), to provide information on node dates for a *Tursiops* phylogeny based on 75 new mitogenomes. The node dating used two fossil and one biogeographic (based on the opening of the Bosphorus Strait between the Mediterranean and Black Seas) calibrations and compared various mutation rate models (using the program BEAST). The best-supported analysis suggested a separation between the lineage for the putative *T. australis* and the rest at ~1 Ma, between the *T. truncatus* and *T. aduncus* lineages at 0.79 Ma, and between the South African and Australasian *T. aduncus* lineages at 0.33 Ma, although confidence limits on these node date estimates were broad.

6.3 Overview of studies and observations of bottlenose dolphins around the islands of Oceania

Brownell and Oremus presented a summary of published studies, their own observations, and social media reports (when photographs or video were available to confirm those observations). During the 1960s, the Smithsonian Institution's Pacific Ocean Biological Survey Program conducted biological surveys on land and at sea around many of the islands in western Oceania and the results, both published and unpublished, were reviewed. Oceania is usually described as the islands of the tropical Pacific Ocean and consists of three sub-regions: Melanesia, Micronesia and Polynesia (Bier, 2009). The review by Brownell and Oremus also included Ogasawara Island just north of the northern Mariana Islands, which are part of Micronesia. Stocks of spinner dolphins are found around virtually all islands throughout the Pacific that have been studied, but bottlenose dolphins exhibit a complex and spotty distribution and are absent from many areas.

6.3.1 Micronesia: Caroline Islands (Federated States of Micronesia), Kiribati, Marshall Islands, Nauru, Palau, Guam (US), northern Mariana Islands (US), Wake Island (US) and Ogasawara (Bonin) Islands

Bottlenose dolphins are generally poorly documented in this area and in many cases, where the cetacean fauna has been studied, no bottlenose dolphins have been observed. The exception is the Ogasawara Islands, which are located 1,000km southeast of Tokyo and 1,200km north of the northern Mariana Islands, where *T. aduncus* is known to occur (Mori, 2005; Morisaka *et al.*, 2005).

6.3.2 Polynesia: Hawaii, New Zealand, Easter Island, Samoa, Tonga, the Cook Islands, Tuvulu, Tokelau, Niue, Wallis and Futuna and French Polynesia

Bottlenose dolphins are routinely observed around some island chains (e.g. Hawaii, Samoa and parts of French Polynesia) but in others where the cetacean fauna has been studied, no bottlenose dolphins have been reported or specimens collected. In almost all cases where genetic or morphometric analyses have been conducted, only *T. truncatus* has been identified. *T. aduncus* is not known to occur in the Hawaiian archipelago, however, two genetically 'aberrant' individuals from Hawaii were analysed by Martien *et al.* (2012). One of these had a *T. aduncus* control region haplotype, but its microsatellite genotype suggested a hybridisation event in the distant past. The other individual had a *T. truncatus* haplotype and its microsatellite profile suggested a more recent introgression, so it may have been an F1 or F2 hybrid (Martien *et al.*, 2012). To the south of

Hawaii, some island chains (e.g. Cook, Pitcairn and Easter Island) have no records of bottlenose dolphins. In Samoa, the Line Islands, Phoenix Island, Tonga and French Polynesia, all identified samples are *T. truncatus*. Kerr and Wragg (2006) visited Atafu and Fakaofo (coral atolls of Tokolau, a territory of New Zealand) and did not record any bottlenose dolphins present.

French Polynesia consists of five major groups of islands: (1) Iles Marquises; (2) Iles Tuamotu; (3) the Society Islands, composed of the Windward and Leeward Islands; (4) the Gambier Islands; and (5) the Austral Islands. Gannier (2002) reported sightings of *T. truncatus* from the Marquesas. Poole *et al.* (2013b) observed a group of *T. truncatus* along the coast of Tahuata (Marquises). Gannier (2000) reported sightings of *T. truncatus* around the Leeward Islands of the Society Islands, but no bottlenose dolphins were seen during extensive surveys around Moorea and Tahiti (Poole and Oremus, pers. obs.). Around the Tuamotus, Poole (1993) reported *Tursiops* at Rangiroa and Reeves *et al.* (1999) noted that in the 1990s there were 'resident' bottlenose dolphins around the Rangiroa Atoll. In the Gambier Islands, local residents in 2010 stated that 'dolphins are only very rarely observed and only offshore in ocean waters' (Poole *et al.*, 2013a). In 1990, around the Austral Islands, Leatherwood, in Reeves *et al.* (1999) noted bottlenose dolphins north of Rapa.

6.3.3 Melanesia: extends from the western end of the Pacific Ocean to the Arafura Sea, and eastward to Fiji (includes Vanuatu, Solomon Islands, Fiji, Papua New Guinea, New Caledonia, Maluku Islands and West Papua)

Both recognised species of *Tursiops* are known from New Caledonia (Oremus *et al.*, 2015). Poupon (2010) indicated that *T. aduncus* are found all around the Grande Terre, mainly in the lagoon, although sometimes just outside the barrier reef. A movie taken opportunistically shows the presence of *T. aduncus* in Ouvea (C. Garrigue, pers. comm.). Poupon (2010) also showed that *T. truncatus* are found outside the lagoon, usually in deep water (>200m). They were observed in several places around the Grande Terre, as well as in the Loyalty Islands. Oremus and Garrigue (2014) reported on the occurrence of *T. aduncus* in the waters around the Chesterfield Archipelago. Garrigue *et al.* (2004) did not include *Tursiops* spp. in their list of cetaceans found in the waters around Vanuatu and no new information is available on *Tursiops* from these waters. In 2012, cetacean surveys were conducted around Efate and Esperity Santo (Oremus and Pérard, 2015) and no sightings of bottlenose dolphins were recorded. Oremus *et al.* (2015) reported that both *T. aduncus* and *T. truncatus* are known from the Solomon Islands and these identifications have been confirmed genetically.

6.4 Philippines

Dolar summarised bottlenose dolphin distribution around the Philippines. Both *T. truncatus* and *T. aduncus* are present in Philippine waters. *T. truncatus* has been sighted in many parts of the country, e.g. Sulu Sea, South China Sea, Tañon Strait, Verde Island Passage, Balabac Strait, Panay Gulf, Philippine Sea and Bohol Sea (Dolar, 1999; 2006; 2009; Dolar *et al.*, 1997; 2006; Heaney *et al.*, 2010), whereas *T. aduncus* has been reported in fewer areas, i.e. in Balabac Strait, Tañon Strait and the South China Sea (Callanta, 2009; Heaney *et al.*, 2010; Wang, pers. comm.).

6.5 Distribution and threats affecting bottlenose dolphins in Australia

SC/66a/SM17 summarised the biology of bottlenose dolphins in South Australia and the main threats facing them in that region. Although many studies of the ecology of *T. aduncus* in Australian waters are underway, no broad-scale estimates of abundance are available. No published studies are available on threats, as determined from necropsy programmes, except in South Australia which is the only state with a reserve dedicated to the conservation of bottlenose dolphins. In South Australia, carcasses are collected for life history, diet, taxonomy, toxic contaminant and pathology studies. Total body length of adult *T. truncatus* in this region is 2.3-3.1m; *T. aduncus*, 2.1-2.5m. Maximum age of *T. aduncus* is 32 years (n=275) with sexual maturity in males attained at 12-15 years and females 6-14 years. There is genetic and dietary evidence of population sub-structure.

According to SC/66a/SM17, threats to *T. aduncus* include disease (31% of known 'circumstances of death'), entanglement in fishing gear and aquaculture netting (26%) and intentional killing (10%, usually by shotgun). Entanglements are believed to occur frequently but are often not reported. In 2013, an Unusual Mortality Event (UME) of *T. aduncus* occurred which was linked to morbillivirus. It was noted during the discussion that although individual cases of morbillivirus infection in cetaceans are known from the Pacific, there is no record of a UME caused by morbillivirus outside of the Atlantic Ocean (T. Rowles, pers. comm.). Cumulative threats, including disease induced by toxic contaminants, may be significant for *T. aduncus*, especially in Spencer Gulf and the Gulf of St Vincent.

The sub-committee thanked Kemper for her paper and presentation. Following a brief discussion the sub-committee made two recommendations as follows.

- The sub-committee **recommended** that a workshop be held to assess the distribution and abundance of and threats to *T. aduncus* around Australia. Specialists from elsewhere should be invited to ensure the workshop benefits from a global perspective on threats.
- The sub-committee **recommended** that efforts be made throughout Australia to improve the consistency and transparency of entanglement monitoring (i.e. detection, investigation and reporting). This would require that the fishing and aquaculture industries cooperate in securing and delivering carcasses of animals taken incidentally and that funding is made available to perform necropsies.

6.6 New information and analyses from taxonomic studies in the Indo-Pacific and Melanesia

6.6.1 Australia

SC/66a/SM10 presented information on morphometric studies of divergence within and between specimens of bottlenose dolphins in Australia, placed in the context of other delphinid species. Skulls from *Tursiops* spp. were compared to six other taxa within the Delphinidae which occur in Australian waters. Although sample size was limited for some species due to the small number of specimens available in museum collections, the results from both 2D and 3D methods showed that *Tursiops* spp. cluster as one group (including type specimens), separable from the other taxa using multivariate analyses. Tooth counts also separated *Tursiops* specimens from all other taxa. When comparing the *Tursiops* spp. skulls (and including type specimens of both), this study found support for two groups, representing *T. aduncus* and *T. truncatus*. Australian *T. aduncus* and *T. truncatus* were similar in size to the corresponding taxa in Chinese and South African waters. The analysis provided no evidence that *T. australis* is a separate taxon.

In response to a question, Jedensjö mentioned that she had analysed the holotype of *T. catalania* which is from

northern Australia, using both morphometric and genetic (mtDNA) analysis, and both analyses confirmed that this specimen falls within Australian *T. aduncus*. The discussion then focussed on which measurements were used for diagnosis of morphological differences in the adult skulls, how morphological maturity was assessed, whether the study attempted to confirm the north *vs* south and warm-*vs* cold-water distinctions found in bottlenose dolphins from other areas, how the multivariate morphometric analysis distinguished between size and shape in skull comparisons and whether there was any indication of morphological differences between putative *T. australis* specimens and the other taxa included in the analyses. Jedensjö clarified that in her analysis, fusion of the premaxilla and maxilla was used for maturity assessment and that the overall skull measurements used for morphological analysis were that described in Perrin *et al.* (2007). The 3-dimensional analysis is intended to remove size from comparisons through a multivariate hierarchical cluster analysis, so that the results reveal differences in shape between skulls. Jedensjö also pointed out that the difference in results between this study and those of Charlton-Robb *et al.* (2011) and Möller *et al.* (2008) may be due to larger sample size in the more recent studies, which better encompass the variability within *T. truncatus*, and this new discriminant analysis study was unable to distinguish those specimens designated as *T. australis* from *T. truncatus*.

Jedensjö also suggested that an updated worldwide comparison of *Tursiops* spp. is needed and stressed the importance of including both morphometrics and genetics in such comparisons, given the localised and complex differences observed in many studies. She added that there are some typographical errors in the vertebral counts given in Table 2 of SC/66a/SM10; a revised version will be submitted to the IWC Secretariat for the archives.

Krützen presented unpublished results from recent genetic analyses of bottlenose dolphins in Australian waters, conducted in parallel with the morphometric analyses conducted by Jedensjö (see also SC/66a/SM17). These analyses included nuclear microsatellite loci, mitogenomes, and Y-chromosome sequences. Results from a STRUCTURE (Pritchard *et al.*, 2000) analysis of nuclear (autosomal) markers with k=2 found support for two geographically defined clusters: offshore (*T. truncatus* and putative *T. australis*) specimens and inshore (*T. aduncus*) specimens. Another STRUCTURE analysis, including only samples from the *T. truncatus* and *T. australis* clade and with the number of genetic clusters increased to k=5, grouped specimens from Queensland/New South Wales (eastern Australia) and northwest Australia. All specimens from southeast Australia (South Australia, Victoria and Tasmania) were split into three genetic clusters with no clear geographic location.

Krützen *et al.* also analysed mitogenome sequences from 37 Indo-Pacific (Australia to China) specimens in comparison with 77 mitogenome sequences available in GenBank (from the Mediterranean, Atlantic and Pacific) and included five sequences from 'outgroup' species used to root the resulting phylogenetic reconstruction. This expanded data set was used along with fossil calibration dates to reanalyse data in Moura *et al.* (2013), in order to infer divergence times of *T. truncatus*, *T. aduncus* and bottlenose dolphins from Australia and the wider Indo-Pacific. The resulting topology separates the two widely recognised species, and a third clade including all South Australian specimens, and indicates a much more recent radiation in the latter group relative to other regions. This analysis further suggests two independent radiations of *T. aduncus* southward along the east and west coast of Australia, with South African *T. aduncus* basal to both. Further, from this analysis, *T. aduncus* samples from eastern Australia show an affinity to samples from Indonesia and other parts of southeast Asia.

Krützen also presented unpublished results from analysis of Y-chromosome sequences. Y-chromosome analyses separated *T. aduncus* and *T. truncatus* from Australian waters into two separate clades, distributed on both coasts. There was a second *T. aduncus* Y-clade, restricted to southern and south-western Australia, however, the *T. australis* and *T. truncatus* Y-haplotypes were identical. Thus, results from the Y-chromosome analysis are discordant with respect to the findings from both autosomal and mitogenomic analyses.

Overall, these analyses indicate that in South and South-Western Australia, genetic patterns are more complex than previously assumed. There are three genetically identified groups of bottlenose dolphins in this area (none clearly defined geographically) differing with respect to nuclear, mtDNA and Y genetic makeup compared to the unambiguously well-resolved *T. aduncus* and *T. truncatus* clades in eastern, western and northern parts of Australia. Krützen suggested that this complex pattern of relationships revealed by Y-chromosome sequences may be related to oceanic variability along the south/southeastern Australian coast and/or may indicate that Bass Strait (between Australia and Tasmania) has been greatly affected by glacial cycles during the last Ice-Age maximum.

Discussion focused on results, methodological details including types of genetic markers used and sample sizes, 'coverage' of the mitogenome sequencing, analytical methods, alternative explanations for the results and details of the calibration methods used to infer branching order and times of divergence. The nuclear ('autosomal') markers used were microsatellites; results provided no evidence for a hybrid origin of '*T. australis*' although there were limited samples from the Great Australian Bight; mitogenomes were sequenced at 50x-100x coverage and analysis included full mtDNA sequences with the control region removed; reciprocal monophyly between African and Australian *T. aduncus* was recovered as in previous analyses; fossil dates at two depths were used for divergence date calculations; the South Australian divergence was much more recent (0.1-0.3 MYA) than the *T. truncatus*/*T. aduncus* split (2.8 MYA). Either incomplete lineage sorting or introgression may explain the two unusual haplotypes found in Shark Bay (West Australia), but because introgression is inconsistent with the behaviour of dolphins in this area (where long-lasting alliances control mating), the latter mechanism is considered less likely. Refinement of the analysis including checking for which mtDNA regions supported the partitions recovered in addition to a 'total evidence' approach was suggested.

Hoelzel then presented results from Gray (2015). New mitogenome data showed that a sample from Oman was well supported within the South African *T. aduncus* lineage and a new lineage was identified that was dominated by samples from Pakistan and India. The new lineage was more closely linked to the Australasian *T. aduncus* lineage than to the South African *T. aduncus* lineage. The incorporation of 995bp from intron 1 of the actin locus, and 665bp from intron 2 of the α-Lactalbumin locus, together with ~5,000bp mtDNA, generated a tree with essentially the same topology. These results should be considered as preliminary, however, as the analysis is still in progress.

Discussion centered on methodological and analytical details including nuclear marker identity, strength of support provided by different markers and marker types, partitioned *vs* total evidence and inclusion of mitogenome sequences from other areas. Nuclear markers included actin and α-Lactalbumin introns; a partitioned Bremer support analysis (using TreeRot) indicated results from nuclear markers were congruent or neutral with respect to the results obtained so it was inferred that the analysis was not dominated by mtDNA; bootstrap results were not shown on the tree to allow readability but support was strong; partitioned nuclear sequence analysis showed equivalent topology; one mitogenome sequence from Oman was included, and several from Pakistan/India. Sequences similar to those in Oman (using more samples of a shorter sequence) are rarely found in Pakistan and vice versa. Members commented that partitioned Bremer helped show the relative support from different markers to distinguish right whale (*Eubalaena*) species from different oceans. It was also noted that the results of this study on bottlenose dolphins were similar to the phylogeographic pattern for *Sousa plumbea* in the same areas of Indian Ocean (Mendez *et al.*, 2013); see Item 6.6.3.

6.6.2. New Caledonia

Oremus presented new results (Oremus *et al.*, 2015) from studies of bottlenose dolphins in New Caledonia (n=88) and the Solomon Islands (n=19). Two distinct morphological forms occur in these areas, one with all the characteristics of *T. aduncus* (small size, speckles on ventrum, coastal habitat) and the other more similar to *T. truncatus* (larger body size, shorter beak). This study used published mtDNA data from other studies for comparison to sequences from individuals in Melanesia. Maximum likelihood and Bayesian analyses of sequence divergence included data from Pacific *T. aduncus*, African *T. aduncus*, *T. truncatus* and putative *T. australis* specimens. Phylogenetic reconstructions indicated that *T. aduncus* from the Pacific, *T. aduncus* from east Africa, and *T. australis* from Australia all formed monophyletic groups, but *T. truncatus* sequences were not reciprocally monophyletic. Sequences from the smaller form of *Tursiops* in Melanesia cluster within the Pacific *T. aduncus* clade, while haplotypes from the larger form were found to be shared with or very similar to known *T. truncatus* haplotypes from elsewhere. Genetic diversity of *T. truncatus* and *T. aduncus* from the Solomon Islands were both high, but genetic diversity of *T. aduncus* from New Caledonia was relatively low, suggesting that dolphins in that area may be more vulnerable to threats than dolphins in areas farther west. New Caledonia appears to be the eastern limit for *T. truncatus* in Melanesia, although very few surveys have been conducted farther east. Oremus also noted that *T. aduncus* from the Solomon Islands show significant levels of mtDNA differentiation from populations in other regions of the western Pacific and eastern Indian Ocean (New Caledonia, East Australia, China/Taiwan). This could have conservation implications considering that this species in the Solomon Islands has been a target of live-capture operations over the last decade, with large numbers being removed from local populations in Guadalcanal and Malaita (Oremus *et al.*, 2013), although, since 2014, a ban on dolphin export from the Solomon Islands has been put in place.

The discussion clarified details of the methodology used and analysis results. The phylogenetic analysis resolved *T. australis*, *T. aduncus* from the Pacific and *T. aduncus* from Africa as reciprocally monophyletic groups, while *T. truncatus* was not resolved and paraphyletic. The analysis included some sequences downloaded from GenBank; figure 2 in Oremus *et al.* (2015) indicated the number of haplotypes; the total number of individuals included in the analysis was 364; only specimens from the Indo-Pacific (none from the Atlantic Ocean) were analysed; the analysis was intended only to show genetic structure in bottlenose dolphins from Melanesia and not a full phylogenetic analysis. Although the figures showed only a single outgroup sequence included in the analysis, inclusion of sequences from other outgroup species (not shown) did not result in a loss of monophyly for the three well-supported clusters.

6.6.3 Bangladesh

SC/66a/SM18 reported on the phylogeographic affinity of *T. aduncus* in the northern Bay of Bengal, Bangladesh. This study analysed mtDNA control region sequences in comparison with published sequences of *T. aduncus* from South Africa (Natoli *et al.*, 2004), Zanzibar (Sarnblad *et al.*, 2011), India and Australia (Möller and Beheregaray, 2001), Indonesia and China (Wang and Yang, 2009) and Melanesia (Oremus *et al.*, 2015). Using the nomenclature of Oremus *et al.* (2015), the 17 control region sequences from Bangladesh grouped into eight haplotypes, with five fixed differences relative to all other *T. aduncus*, yet only two fixed differences distinguished African *T. aduncus* from the rest. Genetic diversity measures were within the range described for other *T. aduncus* populations. Estimated haplotypic diversity (0.699±0.117) was relatively low in comparison with these other studies, but similar to values obtained for South Africa, Zanzibar and Australia populations (Sarnblad *et al.*, 2011). Conversely, estimated nucleotide diversity (0.009±0.005) was relatively high and similar to values obtained for China/Taiwan and the Solomon Islands (Oremus *et al.*, 2015). Net average and mean gross genetic divergence estimates between the different regions in this study showed a high level of differentiation, similar to comparisons between African and Pacific *T. aduncus.* The haplotype network, level of differentiation and number of fixed nucleotide substitutions all suggest significant reproductive isolation and different phylogenetic units, as previously suggested for African and Pacific *Tursiops* (Natoli *et al.*, 2004; Sarnblad *et al.*, 2011) and other polytypic dolphin species within the Indo-Pacific. A recent analysis of humpback dolphins from Bangladesh found that they are also distinct from other *Sousa* (SC/66a/SM24) suggesting a more general mechanism promoting reproductive isolation of mobile marine species in the northern Bay of Bengal.

Discussion centered on explanations for the relatively high divergence between *T. aduncus* in this region relative to others, additional samples and analyses needed to clarify relationships and the mechanisms involved. The small number of samples, small size (380bp) of the control region fragment sequenced, lineage sorting and disjunct sampling across an apparently continuous range were all suggested as potential causes for the patterns observed. Strong philopatry in combination with disjunct sampling could also produce apparently strong differentiation. A larger number of samples, longer control region sequences, additional marker types (including nuclear genes) and better sampling coverage across the area were suggested to improve the analysis and confidence in the results obtained. The sub-committee acknowledged that this new information provided considerable support for considering the bottlenose dolphin population in Bangladesh a discrete conservation unit.

6.7 General discussion of older data in relation to new information

The purpose of this review of bottlenose dolphins in the Indo-Pacific was to clarify understanding of *Tursiops*

taxonomy across the region in general, and in particular the relationship of '*T. australis*' to other taxa. *T. aduncus* and *T. truncatus* are clearly distinguishable and the distinction is consistent across many different areas, studies and marker types analysed. The *aduncus*-type dolphins, however, exhibit considerable regional variability, suggesting that the morphological characters used for diagnosis are subject to convergence, perhaps related to independent adaptation to particular coastal habitats. In particular, reported analyses are distinguishing new *T. aduncus* lineages off Pakistan and India, and off Bangladesh. Coordinated analyses will be required to determine the distinction between populations in these two regions, but they are each strongly differentiated from previously identified *T. aduncus* lineages off South Africa and Australasia. Also, there are some clear differences such as body size (length) of *T. aduncus* individuals in different regions in relation to the size of *T. truncatus* individuals.

The taxonomic status of '*T. australis'* has become less clear as more samples have been analysed and more markers have been used. This is exemplified by the discordance in results using different genetic markers, such as the Y-chromosome sequences and mitogenomes analysed by Krützen and colleagues. Microsatellite data distinguished *T. australis* from other local southern Australian samples, but five Y-chromosome SNPs could not distinguish *T. australis* from *T. truncatus*, though that shared lineage was distinguished from *T. aduncus* with this marker. A relatively ancient split represented by divergent mitochondrial lineages should be paralleled by concordant results in nuclear markers, but that was not strongly supported by the Krützen and colleagues data, nor by morphological analysis by Jedensjö. Both Moura and colleagues and Krützen and colleagues extending that work found *T. australis* to diverge from the basal node 1-3 Ma based on mitogenome phylogenies. Gray reported support for this same topology when mtDNA was combined with congruent nuclear intronic sequences. It is problematic that the recent, well-conceived and carefully conducted morphometric analyses by Jedensjö and Kemper did not show a difference between putative *T. australis* specimens and *T. truncatus*, however, the lack of morphological distinctiveness relative to *T. truncatus* could conceivably be related to convergence and it is well-recognised that morphology has both a genetic and environmental component, with the potential for synergisms between those influences. Morphological convergence blurring the distinctions between species and cryptic speciation are both commonly observed, given different combinations of evolutionary history and selective pressures.

Guidance from Reeves *et al.* (2004) suggests that concordance between at least two independent forms of evidence, such as genetic markers and morphology, is a useful criterion for distinguishing and delineating cetacean species. IWC taxonomy generally accords with that used by the Taxonomy Committee of the Society for Marine Mammalogy, and both seek to use objective criteria for making consistent taxonomic distinctions. An important role for the IWC is to pull together many data points and analyses in reviews, such as this one, and to promote the consistent use of genetic, morphological and behavioural characters across regions and laboratories to facilitate better and more informative comparisons.

Recognition and delineation of 'units to conserve' that require independent management may be less problematic, and sometimes easier, than resolved taxonomy in practical situations when data are unambiguous, even if all criteria for taxonomic resolution are not met. Justification for conservation decisions, e.g. assignment to an endangered species list or the IUCN Red List, provision of special protection measures, determination of the boundaries of a protected area, may be needed while the taxonomic status of the animals is still being resolved. From a conservation perspective, prioritisation of actions can be informed by, but may not depend on, taxonomic usage and 'Red List' designation. Conservation issues should not be allowed to drive, or force, taxonomic decisions. Although it is known that extreme philopatry can cause high levels of divergence, it would be inappropriate, and possibly counter-productive, to make species distinctions based on such divergence alone and therefore, more nuclear data should be a priority to further assess the taxonomy of the putative *T. australis*.

Given the remaining uncertainties and the difficulties of making progress towards understanding the relationships within and between bottlenose dolphin populations in different parts of the world, the sub-committee **urges** consistency in approaches used and in morphological, genetic and behavioural characters employed to allow direct comparisons between areas and study groups. Use of additional, independent nuclear markers (such as multi-locus genotyping using SNP analysis) and keeping open minds in the search for a better understanding of the patterns observed, will be critical. The value of morphological and morphometric analyses as part of the task should not be forgotten or overlooked.

6.8 Plans for the next stage of the review of *Tursiops* taxonomy and population structure

Considering the discussion raised during the sub-committee regarding the taxonomical issue of the genus *Tursiops*, the sub-committee acknowledged that to facilitate the progress of the revision work for the next two years on this subject, it will be beneficial to identify a diagnostic strategy that can be utilised across groups working on this genus. An inter-sessional Working Group convened by Natoli was formed to assess the value/strengths of the different genetic markers and analytical methods currently in use as evidence for/against making species/sub-species level distinction for *Tursiops* with the following Terms of Reference:

- to discuss the application of different markers and analytical tools used for species/subspecies/Unit to Conserve delineation in *Tursiops*; and
- to formulate a strategy to engage different groups to collaborate and share information to address the taxonomical/conservation issues in *Tursiops.*

7. REPORT ON THE VOLUNTARY FUND FOR SMALL CETACEAN CONSERVATION RESEARCH

Fortuna introduced the new and improved IWC website page for the Voluntary Fund for Small Cetacean Conservation Research[1]. This web page contains information on the purposes of the fund, a list of donors and descriptions of projects funded to date. Separate pages for each project contain information on the Principal Investigators, project goals and main outcomes, maps, illustrations and photographs and links to reports and publications. The sub-committee thanked the Secretariat and Collins for their assistance in updating the website and encouraged sub-committee members to disseminate information about the fund and the website to encourage greater donor participation and interest from investigators.

[1] *https://iwc.int/sm_fund.*

Fortuna also reported that the Government of the Netherlands and Whale and Dolphin Conservation (WDC) had recently contributed to the fund and expressed hope that others would come forward to further augment it. Current plans include a new call for proposals to go out in January 2016, with proposals to be evaluated at SC/66b and approved by the Commission in September 2016. The sub-committee expressed sincere gratitude to Fortuna for her dedication in developing procedures to implement the Fund and in promoting and marshalling support for it. She was encouraged to continue her involvement as Chair of the Scientific Committee.

A number of scientists who had received project support from the Voluntary Fund were present. They briefly described their research and explained how this funding had enabled them to achieve conservation-related outcomes. Wang reported on his project on *Sousa chinensis* in Taiwan, Zerbini on his and Danilewicz' franciscana (*Pontoporia blainvillei*) projects in Brazil, Smith on his work with coastal and estuarine dolphins in Bangladesh and Oremus on his studies of *T. aduncus* and dolphin drive-hunting in the Solomon Islands (Oremus *et al.*, 2013). In the absence of the investigators themselves, Rosenbaum summarised aspects of Cerchio's project focussed on dolphin hunting and bycatch in Madagascar and Collins's project focussed on *S. teuszii* in Gabon and Congo. The fund recipients noted repeatedly that in addition to meeting the specific goals of their projects, the IWC funding had helped them leverage other funds and influence broader research and conservation efforts in the countries concerned. Fortuna emphasised that involvement of local communities, local researchers and local government representatives is especially encouraged and she noted that there was evidence of this in all projects.

8. PROGRESS ON PREVIOUS RECOMMENDATIONS

8.1 Vaquita

At SC/65b Rojas-Bracho reviewed developments in vaquita (*Phocoena sinus*) conservation in Mexico since SC/65a. Participants were advised of a recent dramatic escalation of illegal fishing and trade of totoaba (*Totoaba macdonaldi*), a CITES Appendix I species, in the Upper Gulf of California. This fishing involves the use of large-mesh gillnets which have a high entanglement risk for vaquitas. The fishery is driven by the high price of swim bladders in Asian markets. Following SC/65b, in July 2014, the Comité Internacional para la Recuperación de la Vaquita (CIRVA) held its fifth meeting in Ensenada, Mexico (CIRVA, 2014). The report and recommendations from that meeting were presented to the Government of Mexico in August 2014 and reviewed by the Advisory Commission of the Presidency of Mexico for the Recovery of the Vaquita. In May 2015, following a series of regulatory notices and consultations, the President of Mexico announced a set of measures that followed, to a large degree, the CIRVA-5 recommendations. These included: (i) implementation of an emergency two-year gillnet ban throughout the vaquita's distribution; (ii) making major new commitments to enforcement by strengthening the team of agencies involved and building coordination across them, providing new high-speed patrol boats and committing to a greater overall enforcement presence in the region; (iii) establishing a comprehensive program to compensate fishermen and associated workers; and (iv) deciding to fund a new survey to estimate vaquita abundance planned for 2015.

The presence of many CIRVA members at SC/66a provided an opportunity to convene the Sixth Meeting of CIRVA (CIRVA-6) on 22 May 2015 in San Diego (Appendix 2 of this report). Rojas-Bracho and Jaramillo-Legoretta presented to the sub-committee the report of that meeting and its Annex 2 (SC/66a/SM25) which presents the analysis of rate of change in vaquita detections (and inferred abundance) between 2011-14 based on passive acoustic monitoring.

The CIRVA-6 report commends the Government of Mexico for taking the four major measures detailed above, noting that 'in an economically challenging time, the President of Mexico demonstrated unprecedented high-level commitment and support for saving Mexico's porpoise when he visited San Felipe in April 2015 to initiate these measures.'

CIRVA reviewed the results of the acoustic monitoring program, including the report of the Expert Panel, which met in April 2015 (SC/66a/SM25). The Panel found an estimated 67% decline in vaquita acoustic activity in the sampled area from 2011 to 2014. The average estimated annual rate of decline of 31% (95% Bayesian Credible Interval -51% to -10% per year) over that period is considerably greater than the previously estimated annual rate of minus 18.5% (95% Bayesian Credible Interval minus 46% to plus 19% per year) for the 2011-13 sampling period. These worsening results were caused by the very low number of detections in 2014, which resulted in an estimated rate of decline from 2013 to 2014 of 42%. The Panel concluded that acoustic activity had declined between 2011 and 2014 with very high probability (prob.=0.996) at a rate of more than 10% per year (prob.=0.976).

CIRVA concluded that the acoustic monitoring program continues to provide strong evidence of a dramatic decline in vaquita abundance. CIRVA found the rates of decline alarming, particularly the apparent 42% decline from 2013 to 2014. 'This rapid decline underscores the need for Mexico's strong recent actions to ban gillnets and increase enforcement to save the species.' CIRVA, and this sub-committee, look forward to the results of a survey to be conducted later this year that will provide a current estimate of vaquita abundance.

The CIRVA-6 report also discusses analyses of data related to fishing effort in the upper Gulf of California over the past decade, the design of the upcoming 2015 vaquita abundance survey and aspects of the implementation of the emergency ban on gillnets. In this regard the report emphasises that enforcement of the gillnet ban 'will be adequate only if gillnets are prohibited in the current exclusion zone both at sea and on land' and that 'survival of the vaquita depends on a permanent gillnet ban.' The report concludes that the gillnet ban will only be successful if fishermen are given the opportunity to develop alternative livelihoods, including continuing to fish with small trawls for shrimp, with other gear and practices that do not pose a threat to vaquitas. With respect to evaluating the effectiveness of the gillnet ban, CIRVA welcomed the two-year emergency gillnet ban as an essential and welcome step in vaquita conservation but cautioned that expectations relative to assessing the short-term efficacy of this action must be realistic. CIRVA strongly emphasised that a period of two years is completely insufficient to determine any effects of the current two-year gillnet ban on vaquita abundance.

After reviewing and revising its previous recommendations in light of new information and bearing in mind that it had repeatedly emphasised that gillnets must be removed permanently from the range of the vaquita, CIRVA made the following recommendations at its 6th meeting.

- CIRVA strongly recommends that the Government of Mexico follows up on its enactment of emergency regulations establishing a gillnet exclusion zone by immediately initiating the process of making the ban permanent.
- CIRVA recommends that the Government of Mexico maintains its strong commitment to interagency enforcement.
- CIRVA recommends that the Government of Mexico increases enforcement, including night-time surveillance, to ensure that all gillnet fishing is eliminated within the exclusion zone. Possession and transportation of gillnets should be prohibited both at sea and on land.
- CIRVA recommends that the efficacy of the enforcement efforts for the current ban be monitored and commends the Government of Mexico for having entered into a collaboration that involves third-party monitoring.
- CIRVA recommends that all available enforcement tools, both within and outside Mexico, be applied to stopping illegal fishing, especially the capture of totoaba and trade in their products.
- CIRVA recommends that increased efforts be made to develop and introduce alternatives to gillnet fishing in communities affected by enforcement of the exclusion zone.
- CIRVA recommends that, in accordance with Mexican Standard 002 published in June 2013 mandating the stepwise substitution of alternative gear for shrimp gillnets, the Government of Mexico announces that shrimp gillnets are now permanently banned.
- CIRVA recommends that issuance of permits for legal non-gillnet fishing be expedited.
- CIRVA strongly recommends that the acoustic monitoring program continue indefinitely, with adequate financial support, to determine whether mitigation efforts are working.

The sub-committee welcomed the CIRVA-6 report, endorsed and adopted the recommendations made by CIRVA, and strongly reiterated that the only measure that will save the vaquita is to make the current two-year ban on gillnets permanent throughout the species' range.

The sub-committee noted that a major driver of the vaquita decline is the illegal fishery and illegal trade of totoaba swim bladders. In light of the apparent high demand from international markets (primarily in China), the sub-committee re-iterated its recommendation that the Governments of Mexico and the USA consult on the continuing illegal international trade in CITES Appendix I totoaba and noted the opportunity afforded by the CITES Conference of Parties (CoP) in 2016 to further highlight the effect of this trade in causing additional losses of the critically endangered vaquita, with the goal of enhancing enforcement efforts and awareness. The sub-committee further requested that the IWC Executive Secretary send letters to the CITES Secretariat and to appropriate Chinese authorities expressing the Commission's strong concern about the impact of the illegal totoaba trade on the vaquita.

The sub-committee commended the Government of Mexico for the major actions taken to address the conservation of vaquitas through a two-year gillnet ban and associated enforcement, compensation and acoustic monitoring and visual surveys and respectfully requested that it provide a report on the progress of vaquita conservation efforts to SC/66b, as well as a report from the CIRVA meeting planned for early 2016, to review the estimates of abundance from this year's survey and the results of acoustic monitoring through 2015.

8.2 Yangtze finless porpoise

SC/66a/SM23 summarises progress on conservation of the Yangtze River finless porpoise (*Neophocaena asiaeorientalis*). The Institute of Hydrobiology of the Chinese Academy of Sciences and WWF have conducted awareness campaigns and promoted the Yangtze River finless porpoise as a flagship species and as an indicator of the health status of the Yangtze River ecosystem. This has been successful in garnering strong support from both the government and the general public, as demonstrated by the Ministry of Environmental Protection's (MEP) rejection of two shipping channel projects which were proposed in the Zhenjiang Provincial Cetacean Reserve and in the Anqing Municipal Cetacean Reserve. The MEP stated that such projects would be detrimental to the survival of the Yangtze River finless porpoise. Further, on 14 October 2014 the Ministry of Agriculture (MOA), the administrative department responsible for Yangtze River finless porpoise conservation, released a 'Notice on Further Strengthening the Protection and Management of Yangtze Finless Porpoise' which stipulates that this subspecies must be protected and managed according to the standards of a National First Grade Key Protected Wild Animal. In addition, the MOA is planning to transform the 'Action Plan of the Conservation of the Yangtze Finless Porpoise' from a National Strategy to a National Project, which means that permission for any activity that might have an impact on finless porpoise must be sought from Central Government rather than from a province-level agency. Sand mining, previously a widespread threat, is now better controlled in some areas, e.g. Poyang Lake which is an important habitat for the finless porpoise. In some areas where porpoise density is high, local citizen groups provide additional support for management actions. Two new reserves, one *in situ* and one *ex situ* (oxbow lake), have been established. Four porpoise caught in Poyang Lake were translocated to the new He-Wang-Miao reserve and an additional four animals were relocated from Poyang Lake to the existing Tian-E-Zhou reserve.

This sub-committee **commended** the Chinese government for elevating the Yangtze River finless porpoise to a 'National First Grade Key Protected Wild Animal'. The sub-committee also congratulated the MOA for elevating the Action Plan of the Conservation of the Yangtze Finless Porpoise (APCYFP) to a National Project which will provide stronger management support, greater financial support and national recognition of this subspecies.

In 2012, the total population size was estimated as 1,040 porpoises. Wang Ding reported that since then, it has almost certainly declined to fewer than 1,000, although the porpoise in Dongting Lake have presumably benefited from recent protective measures as suggested by the small increase which has been detected in the preliminary results of a recent survey. Wang Ding explained that although the conservation strategy is meant to stop and reverse population decline in the main river, the continued investment in *ex situ* management areas (oxbow lakes) is essential as human activities and uses of these areas can be managed effectively, whereas this is not the case in the main channel of the river. According to Wang Ding, the continued overall decline in the porpoise population is due to a combination of factors, the three most significant of which are: (i) interaction with fisheries, both competition for prey resources and entanglement in gear; (ii) the heavy vessel traffic on the river; and (iii) large-scale sand mining in much of the animals' riverine and lacustrine habitat. Wang Ding noted that some finless porpoise have shifted their distribution to busy port areas where human

fishing is hazardous and therefore, prey is comparatively abundant. The intensity of river vessel traffic, particularly in the low-water season when the river narrows and vessels are more concentrated, increases the risk of boat strikes. Sand mining contributes to habitat degradation and reduces benthic productivity and species richness. Within the *ex situ* management areas (oxbow lake), these activities are limited although some fishing is allowed with specified gear types and at specific times of the year as a way of compensating fishermen. Only large fish species are targeted, not the smaller species upon which the porpoise usually prey, and there has been no reported entanglement within the management areas. The water quality in the reserves is generally good compared to that in areas of the river close to urban settlements. Wang Ding stressed, in response to questions from the sub-committee, that water quality in the Yangtze as a whole is considered to be reasonably good and therefore, he does not believe this ranks as high on the list of threats as the three factors summarised above. He noted that while the Three Gorges Dam, which has been viewed by some as having negative impacts on finless porpoise as well as baijis (in the past), certainly has affected the overall ecology of the river, the dam is located in the northern extreme of the porpoises' range and does not fragment their habitat.

While the sub-committee welcomed the establishment of two new reserves in the last year, it also **reiterated** its previous recommendations that every possible effort be made to protect Yangtze River finless porpoise in their main river habitat. Further, the sub-committee **recommended** steps be taken to: (a) identify river and lake segments with the highest porpoise concentrations and enforce appropriate, year-round protection measures (including fishing bans); (b) vigorously enforce a basin-wide prohibition of electro-fishing and other fishing activities known to threaten porpoises; (c) vigorously enforce regional and seasonal closures of sand-mining; (d) strengthen pollution control measures; and (e) ensure that before any further modification of the natural flow regime (or other natural features) of the Yangtze ecosystem are allowed to take place, the implications for finless porpoise are investigated and taken into account.

The sub-committee **recommended** that the Secretariat send a follow-up letter to the Chinese Government, commending all efforts to date, highlighting the recommendations made by this sub-committee and offering assistance to the Government in refining or implementing management measures.

8.3 Hector's dolphin

8.3.1 Nomenclature

Herein there are references to Māui (or Maui's) dolphins and to Hector's dolphins, which can be confusing in view of the fact that the name Hector's dolphin is applied to the species *Cephalorhynchus hectori*, of which Māui dolphin is a subspecies, *C. h. maui*. Therefore, it is important to make clear that references in this section of the report to Hector's dolphin are meant to refer to the nominate subspecies, *C. h. hectori*.

8.3.2 Hector's dolphin surveys

At IWC SC/65b the sub-committee had a short discussion of the survey design and analysis in the paper by Mackenzie and Clement (2014) and agreed that this matter deserved closer scrutiny, without anticipating the complexity of the issues involved or determining an appropriate mechanism to achieve this closer scrutiny. In the light of this and taking into account concerns expressed in SC/66a/SM15, the Chair proposed the following approach which recognises, *inter alia,* that besides this specific issue with respect to Hector's dolphin, there is additional value in establishing this as a case study should similar instances occur in future. The sub-committee **agreed** to the following.

(1) Establish a steering group to ensure that the following work is carried out intersessionally and reported to SC/66b. The Steering Group will comprise Scheidat, Donovan, Fortuna and Palka.
(2) Recognising the complexities of obtaining abundance estimates in this area, an expert group (the Steering Group plus, *inter alia*, Currey, Lundquist, Slooten, Mackenzie, Clement and Hammond) will undertake a thorough review of the estimates produced by Mackenzie and Clement (2014) and try to reach a consensus view of the appropriate estimate or range of estimates that will be of value to the New Zealand Government in developing appropriate conservation and management actions. This review will include consideration of issues related to:
    (a) availability and perception bias (including use of circle-back, consideration of environmental conditions);
    (b) appropriate truncation; and
    (c) model fit and associated implications for the estimate.
(3) It is clear that to investigate these issues it will almost certainly be necessary to carry out additional analyses and a request to the New Zealand Government for access to the relevant data will be submitted by the IWC Secretariat.
(4) The operating procedures of the expert group will be left to the group itself, but may require a face-to-face meeting in addition to email correspondence and teleconferences.

Potential costs related to this activity will be considered under the Voluntary Fund for Small Cetaceans.

8.3.3 Māui's dolphin

8.3.3.1 UPDATE FROM THE GOVERNMENT OF NEW ZEALAND

In response to a request from SC/65b, SC/66a/SM03 provides a summary from the New Zealand Government of the current status of Māui dolphins and an update on New Zealand's research and management approach. Māui dolphins are protected under New Zealand's Marine Mammals Protection Act (1978) (MMPA) and were gazetted as a threatened species, along with Hector's dolphins, under the MMPA in 1999. SC/66a/SM03 provided a full list of previous abundance estimates for Māui dolphins, the most recent of which is 55 individuals (95% confidence interval=48-69) over one year of age in 2010-11 (Hamner *et al.*, 2012). Trend analysis using multiple methods indicates a decline rate of 2.8-3.2% per year, with 75.3-97.1% probability of decline (Wade *et al.*, 2012).

A recent risk assessment for the sub-species applied spatially explicit, semi-quantitative methods to identify, analyse and evaluate all threats to the dolphins (Currey *et al.*, 2012). The spatial analysis involved mapping dolphin distribution and overlaying this with fishing effort to assess the spatial distribution of risk. The risk assessment concluded that the subspecies is subject to a level of human impact that significantly exceeds the level of Potential Biological Removal.

In 2012, in response to new information, the New Zealand Government reviewed the Māui dolphin component of the

Hector's and Māui Dolphin Threat Management Plan (TMP) and expanded the range of protection measures for Māui dolphins. These measures included a series of regulations and prohibitions that are meant to address threats such as seismic surveys, seabed mining and setnet, trawl and drift-net fishing. The most recent changes to the measures include the extension of the set-net prohibition area in Taranaki, consistent with the findings of the risk assessment, and an increase in observer coverage for trawl vessels operating outside the existing trawl prohibition area. A programme of ongoing data collection and research is underway ahead of the next review of the TMP in 2018.

SC/66a/SM03 also provided information on 55 'public sightings' (reported by members of the public) of Māui (or Hector's) dolphins that were reported in the 12 months to the end of January 2015. A Māui (or Hector's) dolphin was reportedly caught in a recreational set net, and subsequently released alive, in the Bay of Plenty, an area not known to be inhabited by either Māui or Hector's dolphins and that is more than 200km from the nearest reported and photo-verified sighting. In the 12-month reporting period, no reports were received of captures in commercial fisheries, beach-cast dolphins or ship strikes and, as a result, no necropsies were conducted.

A Māui dolphin Research Advisory Group was established by the New Zealand Government in 2014. This group, comprising researchers, stakeholders and government officials, is focused on identifying and prioritising research for Māui dolphins that will help inform management decisions for the sub-species' recovery and continued conservation. The group has met twice and provided input on the development of a Māui dolphin five-year strategy and research plan. A list of current and proposed research and monitoring projects is included in the report. Among those projects is the project to obtain a new genetic mark-recapture abundance estimate (see Item 8.3.3.4).

8.3.3.2 MODELLING OF POPULATION DECLINE AND EFFECTIVENESS OF PROTECTION MEASURES

SC/66a/SM12 compared the effectiveness of current protection measures for Māui's dolphins that are applied in approximately 19% of their assumed total range with the projected effectiveness of protection measures, as recommended by the Scientific Committee in 2014 (IWC, 2015), that would cover approximately 86% of their total range (from Maunganui Bluff in the north to Whanganui in the south, offshore to 20 n.miles and including harbours). The spatial analysis in SC/66a/SM12 used Netlogo (Wilensky, 1999) to quantify the overlap between dolphins and fishing effort. It was assumed within the model that dolphins move through areas with and without protection, with gillnets and trawlers restricted to areas where these fishing methods are allowed. The catch rates in these fisheries were based on the estimates in Currey *et al.* (2012) and other government reports (Penny *et al.*, 2007; Thompson *et al.*, 2013).

According to SC/66a/SM12, the current management framework is expected to result in continued population decline, with none of the (1,000) model runs resulting in population growth. Protection measures at least as effective as those recommended by the Scientific Committee in 2015 would be required to prevent further population decline and ensure population recovery. The probability of a population decline to half of the starting population size within 20 years was 97% for current management and 12% for management advice provided by the Scientific Committee (IWC, 2015).

In response to Slooten's presentation, Currey noted that individual-based models can be valuable tools to guide conservation and management, and particularly for assessing small populations where individual effects can have important population-level consequences, something that is clearly relevant for Māui dolphins. He offered a few observations and suggestions that could be useful in any further work on this particular model, and could also apply more generally to the use of individual-based models for spatially explicit management strategy evaluation. He noted the sensitivity of such models to assumed habitat preference functions and population parameters, the scale-dependent nature of the capture estimation approach, and the need for model validation. Slooten provided responses to these detailed questions, confirming that the model includes an alongshore gradient and does reproduce observed patterns of dolphin distribution and fishing effort.

The sub-committee thanked Slooten for her analysis and Currey for his willingness to provide constructive comments. The sub-committee encouraged further discussion and exchanges of data and expertise between Slooten and the New Zealand Government. It stressed the importance of ensuring that data were made available for a rigorous analysis of the various management options for conserving this very small and critically endangered population of dolphins.

In the course of discussion three points were raised on issues that had been considered by the 2012 review of the Māui's dolphin threat management plan. The first concerned the need to assess the offshore distribution of Māui's dolphins. Currey reported that an advisory group had been formed to explore methods to determine the offshore distribution. It is difficult to detect dolphins at very low densities in offshore areas and the group is consulting widely for suggestions and advice.

The second concerned the need to increase trawler observer coverage in order to better assess Māui's/Hector's dolphin bycatch rates. Currey reported that observer coverage had been increased in the South Island, but that there are trade-offs in regard to the purpose of such coverage. Allocation of observer effort is complex but it is hoped that results from this South Island coverage will prove useful for developing spatially explicit risk assessments for the North Island (mainly Māui's). Discussion of the challenges, sensitivities and incentives for observer programs followed, including the merits of electronic monitoring.

The third issue was whether C-Pod type passive acoustic monitoring devices could be deployed to assess Māui dolphin habitat use. Currey noted such tools can be useful, but the Māui's dolphin case is challenging. Detection range limits the value of existing technology for assessing use of a small area that might be used by only a few individuals from a very small population. Moreover, Māui's dolphin habitat is primarily along an exposed coastline with extensive wave action, which makes deployment difficult. Scheidat pointed out that C-Pods have been used extensively over large areas of the Baltic Sea to assess harbour porpoise distribution and also that technologies, such as acoustic release devices, exist which can be helpful in recovering equipment.

8.3.3.3 NGO INITIATIVE REGARDING OPPORTUNISTIC SIGHTINGS

Leslie reported on a new mobile phone 'app' developed to receive 'public sightings' of Māui's dolphins. Reports generated from this and other channels are forwarded to an independent marine mammal scientist, the same expert used by the New Zealand Department of Conservation, for verification and assignment of validation scores. This information is collated by WWF and then shared with the New Zealand Department of Conservation, other government

agencies and scientists as part of a programme to advocate for enhanced protection of Māui's dolphins throughout their range.

Leslie reported that the programme had recently received five sightings judged to be 'reliable' of either Māui's or Hector's dolphins from regions of the west coast of the North Island and two sightings, of what were presumably Hector's dolphins, from the north side of the South Island that are not subject to fisheries controls designed to reduce dolphin bycatch. WWF requested advice on what number of sightings and with which level of confirmation in currently 'unprotected' areas would be needed, in a political context, to trigger revision of the current threat management plan.

The benefits and limitations of such public reporting schemes were discussed briefly. On the one hand, there have been some reports of what were claimed to be Māui's dolphins that were clearly unreliable, such as reports of large schools many tens of miles offshore, but on the other there have also been instances, such as those reported here, of dolphins that may have been Hector's or Māui's in locations not considered to be within the known current range, but within their typical habitat (e.g. very coastal).

8.3.3.4 NEW INFORMATION ON GENETIC MONITORING ON MĀUI DOLPHINS

Baker provided a preliminary report on the two-year genetic sampling programme begun in 2015 to obtain a new genetic mark-recapture abundance estimate. In 2010 and 2011, the New Zealand Department of Conservation had coordinated vessel-based surveys to collect biopsy samples for DNA profiling (Oremus *et al.*, 2012). Genotype capture-recapture provided an abundance estimate of only 55 individuals age 1+ (Hamner *et al.*, 2014b). The DNA profiles also identified two female Hector's dolphins associating with the Māui dolphins, providing the first evidence of dispersal between the habitats of the two subspecies (Hamner *et al.*, 2014a). Twelve surveys were conducted in February-March 2015, extending across most of the current confirmed range of Māui dolphins along the west coast of the North Island. The surveys included more than 1,600km of sighting effort, encountered 44 groups of Māui/Hector's dolphins and collected 48 samples for genetic analysis. All of the encounters were concentrated in a small part of the range, just south of the Manakau Harbour. The largest group encountered was 12 dolphins. Preliminary results of DNA profiling (mtDNA sequencing, 21 microsatellite genotypes and sex) showed that the 48 samples represented 40 individuals, with a significant female bias (13:27, p=0.038). Of the 40 individuals identified, 38 were Māui dolphins and two were Hector's dolphins, based on diagnostic differences in mtDNA. One of the two Hector's dolphins, a female, is a recapture of an individual sampled previously in 2010 and 2011 (Hamner *et al.*, 2014a). By matching genotypes to those from the previous surveys and estimating abundance over the five-year period, Baker and his collaborators hope to evaluate the effectiveness of current protection measures.

The sub-committee **welcomed** this work on genetic monitoring of Māui dolphins and looked forward to the presentation of an updated abundance estimate at next year's meeting.

Given the information presented this year, the sub-committee **concluded**, again, that existing management measures in relation to bycatch mitigation fall well short of its previous recommendations and **expressed extreme concern** over the status of the small population of Māui's dolphins. The human-caused death of even one individual would increase the extinction risk for this subspecies.

The sub-committee **reiterated** its previous recommendation that highest priority should be assigned to immediate management actions to eliminate bycatch of Māui's dolphins. This includes closures of any fisheries within the range of Māui's dolphins that are known to pose a risk of bycatch to dolphins (i.e. setnet and trawl fisheries).

The sub-committee **re-emphasised** that the critically endangered status of Māui's dolphin and the inherent and irresolvable uncertainty surrounding information on small populations point to the need for precautionary measures.

Ensuring full protection of Māui's dolphins throughout their known range, together with an ample buffer zone, would minimise the risk of bycatch and maximise the chances of population increase. The sub-committee **noted** that the confirmed current range extends from Maunganui Bluff in the north to Whanganui in the south, offshore to 20 n.miles and included harbours. Within this defined area, fishing methods other than set nets and trawling should be used.

The sub-committee again **urged** the New Zealand Government to commit to specific population increase targets and timelines, and again, respectfully **requested** that reports be provided annually on progress towards conservation goals.

8.4 Amazon River dolphin and tucuxi

SC/66a/SM02 describes the actions of the Brazilian Government to combat the use of the Amazon River dolphins (*Inia geoffrensis* and *Sotalia fluviatilis*) as bait for fishing the catfish, known as piracatinga (*Calophysus macropterus*) in the Amazon Basin. In July 2014, the Federal Government published a normative (Normative Interministerial nº 6/2014) establishing a five year moratorium on the fishing and marketing of the piracatinga in Brazilian waters starting January 2015. The Ministry of Environment (MMA) is responsible for evaluating the contribution of the moratorium to the recovery of the two dolphin species. A working group (WG) was established for the MMA (Decree n° 318/2014) to define procedures and monitor the fishing and marketing of piracatinga during the moratorium period. The WG will be effective until January 2020 when protection measures will be re-evaluated.

The sub-committee **commended** Brazilian authorities for the new restrictions placed on the piracatinga fishery as a means of reducing pressure on river dolphins and other fauna that have been heavily exploited to provide bait for the fishery. This issue has been of great concern to the sub-committee for a number of years and it was gratifying to learn that Brazil has responded forcefully to address both the science and conservation elements of this problem.

The sub-committee **noted** the progress represented by publication of the WWF South American river dolphin conservation strategy (Trujillo *et al.*, 2010), which includes information on biology and population estimates, in all boto and tucuxi range states.

The sub-committee **respectfully requested** that Brazil continue to provide progress reports to the Scientific Committee on this issue.

Brazil and the other range states, including those where there is a strong market demand for piracatinga (e.g. Colombia), are **encouraged** not only to ensure that the regulations are tightly enforced but also to monitor the dolphin populations and assess effectiveness of the control measures.

8.5 Beluga

SC/66a/SM14 reviewed information on the status of beluga (white whale, *Delphinapterus leucas*) populations, last

reviewed by the Scientific Committee in 1999 (IWC, 2000). More than half of the 29 stocks recognised at that time were judged by the authors to be 'depleted' or 'likely depleted'. Although some of the gaps in knowledge at that time have been filled, many, especially regarding abundance and trends, remain. The review highlighted the fact that many populations face threats from multiple types of human activity including shipping, subsistence hunting, offshore oil and natural gas development, fishery interactions, coastal industrialisation, pollution and, in one case, live capture for the international aquarium trade. Global climate change is already having a significant impact on the Arctic marine environment with changes in sea ice extent and phenology (Laidre *et al.*, 2015). Such changes have implications for belugas, potentially including alterations in prey availability, predation risk and exposure to new pathogens. Moreover, noise and pollution from shipping, construction and hydrocarbon activities, including seismic surveys, are growing threats as new areas of the Arctic are opened up to exploitation. Approximately 60% of the beluga's current annual range is within known or potential hydrocarbon regions and around 9% of their range is within existing or possible lease areas (Reeves *et al.*, 2014a). The authors highlighted the need for up-to-date status assessments of beluga populations, identification of critical habitat areas and migratory routes and programmes to monitor and mitigate anthropogenic impacts. SC/66a/SM14 also highlighted the relevance and importance of the recommendations from the 2014 IWC Workshop on Impacts of Increased Marine Activities on Cetaceans in the Arctic (Reeves *et al.*, 2014b), in particular the need for enhanced collaboration between the IWC and the International Maritime Organization (IMO) to support implementation and enhancement of the Polar Code and engagement with the Arctic Council, particularly in its development of a framework for a pan-Arctic marine protected area network.

The sub-committee welcomed this review, noting that climate change and increased industrial development are affecting, and will continue to affect, the Arctic environment and therefore, also, the living conditions for belugas.

Suydam noted that after several years of consultations, planning is finally underway for a global review of monodontids in 2016, to be led by NAMMCO with active participation by scientists from Canada and Russia (neither are members of NAMMCO) as well as various members of the IWC Scientific Committee. SC/66a/SM14 provides a potentially useful background document to inform that workshop.

The sub-committee noted the discussions in the Environmental Concerns Sub-committee (see Item 11) regarding the need to implement the recommendations from the 2014 IWC Workshop on Impacts of Increased Marine Activities on Cetaceans in the Arctic (Reeves *et al.*, 2014b) and their relevance to enhancing conservation of belugas in the changing Arctic environment.

8.6 Franciscana

SC/66a/SM06 and SC/66a/SM07 described acoustic studies undertaken since 2011 on franciscana dolphins (*Pontoporia blainvillei*) in the Rio Negro Estuary, Argentina. A female neonate that stranded alive was found to produce very distinct echolocation clicks compared to adults, the main difference being their bandwidth of about 120kHz as opposed to 20kHz in adults. This striking difference allowed the development of an acoustic detector[2] that can detect and distinguish vocalisations of both calves and adults.

[2]Pontoporia Acoustic Detector: *http://www.internationalwhalewhisperer.com/projects/*.

The sub-committee welcomed this initiative and noted that it could be very useful for other research teams working on this species and may prove to be a useful tool for studying population structure and abundance.

8.7 Sousa

8.7.1 New information on taxonomy of humpback dolphins, Sousa *spp.*

Four species of humpback dolphins are recognised: *Sousa teuszii* in the eastern Atlantic Ocean; *S. plumbea* in the western Indian Ocean; *S. chinensis* in the eastern Indian and western Pacific Oceans and *S. sahulensis* in northern Australia (Jefferson and Rosenbaum, 2014).

New information was provided in SC/66a/SM24 on the genetic identity of humpback dolphins in the area of the northern Bay of Bengal, Bangladesh, which is presumed to represent the distributional 'dividing line' between *S. plumbea* and *S. chinensis*. A fragment of 456bp of the mitochondrial DNA control region was sequenced for 15 humpback dolphins from Bangladesh and one from Malaysia. These sequences were aligned with a dataset covering most of the distribution of the dolphins in this genus (Mendez *et al.*, 2013). Samples from Bangladesh grouped into nine haplotypes and showed the highest levels of genetic diversity when compared to the other geographical regions analysed. There were no shared haplotypes between the samples from Bangladesh and those from other regions. A number of other markers analysed supported the suggestion that humpback dolphins in this region are distinct from those in all other regions studied to date. A sole exception is an animal sampled in far southern Bangladesh that was closely related to *S. chinensis* in Thailand, interpreted by the authors as implying that the range of the phylogenetically unique humpback dolphin population in Bangladesh may be limited to areas affected by freshwater input from the Ganges-Brahmaputra-Meghna River.

The sub-committee acknowledged that there is no information on the genetics of humpback dolphins along the east coast of India and in Sri Lanka and briefly discussed the initiation of new field studies, including genetic sampling, on humpback dolphins in Malaysia with plans to expand into the southern Philippines and Borneo.

The sub-committee **recommended** that further investigation of the genetic identity of humpback dolphins in Asia be made to test the hypothesis of a clinal progression from Bangladesh into the range of *S. sahulensis*. This will require more samples from previously unsampled areas and the analysis of additional genetic markers. The sub-committee noted that the Bangladesh dolphins might be the same as the earlier described *S. lentiginosa* with the type specimen obtained from Indian waters and housed at the Natural History Museum, London (Iredale and Troughton, 1934). It suggested that a sample be obtained from this skull to compare its genetic characteristics with humpback dolphins in Bangladesh. In addition, it would be valuable to examine and extract DNA from the holotype of *S. boreneensis* (Lydekker, 1901) which was collected from Sarawak, Malaysia, and is housed in the Natural History Museum, London.

Finally, the authors noted, and the sub-committee re-affirmed, the value of additional lines of evidence for differentiating populations of humpback dolphins and suggested that the use of pigmentation patterns which have been used previously to differentiate a discrete population of *Sousa* in Taiwan (Wang *et al.*, 2008) may be useful for clarifying differences between the Bangladesh population and other humpback dolphin populations in adjoining waters.

8.7.2 New information on status

SC/66a/SM24 reported new information on population demography, habitat selection and bycatch risk of humpback dolphins in the northern Bay of Bengal, Bangladesh. A robust mark-resight analysis of 468 photo-identified humpback dolphins generated winter abundance estimates of 132 (SE=10, 95% CI=115-153) in 2010-11, 131 (SE=3, 95% CI=124-137) in 2011-12 and 636 (SE=58, 95% CI=531-761) in 2012-13, with the substantial jump in the third year explained by a single group with 205 different individuals photo-identified. Similar to the situation with bottlenose dolphins summarised earlier, the sampled population is almost certainly part of a larger population that extends west across the border with India. Unlike the bottlenose dolphin population, it also extends east towards the mouth of the Meghna River. More than 15% of photo-identified humpback dolphins exhibited injuries related to entanglements in fishing gear, implying a strong potential for fatal interactions similar to the situation with bottlenose dolphins in the Swatch-of-No-Ground. During 15 trips in which large-mesh (18-20cm) gillnets were deployed between June 2013 and December 2015, one fatal entanglement of a humpback dolphin was observed.

Although the taxonomic identity of humpback dolphins in Bangladesh still needs clarification, the sub-committee recognised them as a priority for conservation. Although estimated abundance in the portion of the surveyed area was fairly high, bycatch is a known threat, the the sub-committee therefore recommended continued monitoring and further photo-identification work to refine survival estimates. The sub-committee also noted the importance of efforts to investigate and establish protective measures for humpback dolphins on the Indian side of the upper Bay of Bengal.

8.8 *Lagenorhynchus*

SC/66a/SM20 provided an overview of research on the demography of Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) in Canada and described a proposed workshop on *Lagenorhynchus* at the Biennial Conference of the Society for Marine Mammalogy. This genus generally falls low on the list of conservation and management priorities. This sub-committee last considered it as a priority topic in 1996. Since then, a number of projects and publications have presented genetic, morphological and acoustic evidence which suggest that the entire genus needs to be reviewed and probably given a taxonomic overhaul.

In 1987, Morton (2000) initiated a photo-identification study on Pacific white-sided dolphins in part of their range in British Columbia, Canada. The species had been absent from that area for decades, but there was archaeological evidence of their occurrence in the study area for thousands of years. Morton's photo-identification catalogue documented an increase in relative abundance as the dolphins re-colonised the area.

In 2007, a study was initiated in the same general area which estimated several population parameters using photo-identification data which determined that 57% of the dolphins were individually recognisable. Of these, 3.9% bore fresh or healed rake marks from killer whale teeth. Abundance in the study area was highly variable, ranging from 500 to 3,000 individuals in any given year, with no evidence of a trend. Survival estimates were also variable, depending on how emigration or transients were accounted for. A negative relationship was demonstrated between killer whale presence and apparent survival rate in years when mammal-eating killer whales were common. Field evidence supported the long inter-birth interval estimated from bycaught and stranded animals, with a best estimate of 4.2 years. Association and acoustic data indicated sociality. Some individuals visited the small study area repeatedly over periods exceeding decades. Several pairs of dolphins were photographed together over periods of 10 to 19 years and analyses of social structure suggested that this population is as socially differentiated as pilot whales (*Globicephala spp.*) or sperm whales (*Physeter macrocephalus*).

These new insights into the basic ecology of Pacific white-sided dolphins prompted a collaboration with other researchers working on aspects of *Lagenorhynchus* biology following requests for advice on how to assess the status of oceanic dolphins when data are sparse. A series of conference calls on systematics and taxonomy, conservation status, acoustic and genetic lines of evidence for taxonomic revision of the genus were organised. As a result, a workshop on *Lagenorhynchus* has been proposed for the 2015 Biennial Conference of the Society for Marine Mammalogy. Three of the six currently recognised *Lagenorhynchus* species occur in the Southern Hemisphere, making it likely that a lot of existing information particularly that found in non-English journals, has not yet been considered. Funds are being sought to enable participants from the Southern Hemisphere to join the workshop.

The sub-committee welcomed this useful information and encouraged further efforts to improve understanding of population structure, status and taxonomy of the genus *Lagenorhynchus*. The sub-committee also supported the idea of the proposed workshop and encouraged members to provide details of those people who would be appropriate to participate.

8.9 Killer whales

SC/66b/SM09 summarised results of a study on Type C killer whales (TCKWs) in McMurdo Sound, Antarctica, between December 2014 and January 2015 by dart biopsy sampling and photo-identification. Thirty-three dart biopsy samples were collected, including 27 from killer whales (26 Type C, one Type B) and six from Antarctic minke whales. With the exception of seven Type B killer whales (TBKWs; five adults, two calves), all killer whales sighted in the McMurdo Sound region were TCKWs. By combining images from the 2013/14 and 2014/15 seasons with an existing catalogue compiled by the Orca Research Trust ('AKWIC') and photos submitted by 'citizen scientists', an expanded photo-identification catalogue for Antarctic killer whales has been compiled and is expected to go online in 2015.

Preliminary analysis of the database provides evidence of long-distance migrations by TCKWs between the Ross Sea and New Zealand waters: (a) an adult female TCKW has been sighted in both New Zealand and McMurdo Sound; and (b) a large proportion of TCKWs sighted in McMurdo Sound (33-55%) exhibit marks caused by cookie-cutter sharks that are currently assumed to be limited to waters north of 50°S. TCKWs have also been re-sighted between years in New Zealand waters and in McMurdo Sound, with a minimum distance of 11km between inter-annual sightings in Antarctica, indicating that these whales may show seasonal site fidelity to areas of high ecological significance.

SC/66a/SM11 presented preliminary information on movements of TCKWs whales tagged with satellite transmitters in the Ross Sea near the Italian Antarctic Station Mario Zucchelli. The goal of the research was to assess the role of killer whales in the dynamics of the locally productive marine ecosystem of Terranova Bay by studying

their movements. The fieldwork was conducted from mid-January to mid-February 2015. Overall, ten transmitters (four SPLASH and six SPOT) were deployed on animals encountered in the area from the Campbell Ice Tongue to Cape Washington. They continued transmitting for 19 to 44 days (mean=28.6 days; SD=8.79).

The first eight transmitters were deployed on whales in a single pod. These whales spent nine days travelling back and forth in the 25km span between the two promontories of Cape Washington and the Campbell Ice Tongue. The pod then left the area as a group, taking a consistent route through the Ross Sea and then travelling constantly, with no apparent stops, north towards New Zealand. The longest-lasting tag for this group indicated an overall trip of about 4,700 n.miles. Two more individuals from a second group of killer whales were tagged at the end of January in Silverfish Bay. Like the first group, after some days of residency in Silverfish Bay, they moved northwards and eventually reached New Zealand.

This study documents abrupt changes in behaviour and activities of TCKWs, including, through the four SPLASH tags, changes from deep-diving in Silverfish Bay to shallower diving on the route northwards. The data may allow linkage of killer whale movements with the ecological characteristics of the area and help identify the role of Silverfish Bay in supporting killer whales. A second research season has been requested from the Italian Antarctic programme.

The sub-committee welcomed these presentations. The authors of both papers confirmed that they would compare photo-catalogues and expressed thanks for the broader collaboration allowed by the IWC-SORP network. Eisert noted the availability of photos from 'citizen science' which has provided thousands of pictures including some that document very interesting behaviour.

Annex 2 of SC/66a/SH08rev2 (pp.16-32), summarised the progress of the IWC-SORP project: 'Distribution, relative abundance, migration patterns and foraging ecology of three ecotypes of killer whales in the Southern Ocean', additional to that already presented documents (SC/66a/SM09 and SC/66a/SM11).

The IWC-SORP killer whale project now involves strong collaboration between Australia, Italy, New Zealand and the United States of America. In total, since SC/65b, researchers involved in the IWC-SORP killer whale project have deployed satellite tags on 46 killer whales and collected biopsy samples from 91 killer whales, and thousands of images for photo-identification have been catalogued. Fieldwork has been undertaken in McMurdo Sound, Terra Nova Bay, the Ross Sea, the western Antarctic Peninsula and Weddell Sea, and off Marion Island in the sub-Antarctic.

Pitman and Durban generated 4,204 images between December 2014 and January 2015 representing what is believed to be the entire local population of the resident TCKWs in McMurdo Sound (roughly 100-150 animals). Five individual adult male killer whales were satellite-tagged, three with location-only tags (Wildlife Computers SPOT tags) and two with depth/location tags (Wildlife Computers SPLASH tags). In addition, biopsy samples were obtained from 11 killer whales and two Antarctic minke whales (samples archived at SWFSC in La Jolla).

Pitman and Durban also undertook four expeditions around the western Antarctic Peninsula on the vessel National Geographic Explorer. A total of 2,633 images were collected representing approximately 200 individuals. Satellite tags were deployed on six killer whales (three Type A, two Type B2, one B1) and three biopsy samples were collected (three Type A). Additionally, one satellite tag was deployed on an Antarctic minke whale – a known prey species of both Type A and B1 killer whales. Images of Type A killer whales were also collected around 56°16'S, 27°32'W in February-March 2015.

In addition to the photos taken by researchers, the project received several thousand photographs from contacts on at least ten other tour vessels operating in the Peninsula area, representing an additional 25 separate killer whale encounters.

In February 2015, Dalla Rosa and colleagues (Projecto Baleias, Brazilian Antarctic Programme) surveyed the waters of the Bransfield and Gerlache Straits at the western Antarctic Peninsula, and part of the Weddell Sea. A total of 382.5 nautical miles of cetacean search effort was conducted, resulting in 302 on-effort cetacean sightings, of which three corresponded to killer whale groups (two Type A and one Type B). One Type B group with four individuals was sighted off-effort.

De Bruyn and Reisinger, conducted research from Marion Island, sub-Antarctic, employing satellite tagging, biopsy sampling and photo-identification to investigate the social organisation, population structure, movement, diving and diet of a population of killer whales. The project's image database now contains ~59,000 images and 61 individuals have been identified. Twenty-four satellite tags have been deployed and these have revealed seasonal site fidelity as well as rapid, long-distance movements and deep diving over seamounts. Forty-two biopsy samples have been collected, and stable isotope analyses indicate that killer whales are apex predators in the Marion Island marine ecosystem, with mean δ15N values higher than any seals, penguins or Patagonian toothfish, however, δ15N values in killer whales were not high enough to suggest that they prey exclusively on such high trophic level prey. Genetic analysis of these samples, in conjunction with photo-ID association data, has shown that Marion Island killer whales form small, fairly stable social units. However, membership of social units is dynamic: some long-term associations are among non-kin and kinship levels within pods is highly variable. While social units are stable, associations between them are flexible.

In discussion, Pitman noted that his work on Antarctic killer whales will continue, relying mostly on tour boats, which are now much more numerous than research vessels. These have generated a lot of pictures from the Antarctic Peninsula area. Pitman will coordinate with Eisert on matching these, with the goal of trying to better document population sizes, philopatry, etc. Currey noted that there may also be photos available from ongoing programs to assess killer whale depredation in the range of these animals.

The sub-committee noted that the IWC-SORP killer whale project is a good example of international collaboration and facilitates sharing of existing Antarctic killer whale image catalogues. The sub-committee also noted links established between IWC-SORP and CCAMLR to facilitate sharing of images of killer whales and other species between organisations; Currey was thanked for his intersessional facilitation of this effort.

8.10 Baltic harbour porpoise

Leslie provided an update on the Baltic harbour porpoise (*Phocoena phocoena*). The porpoise population in the Baltic Sea proper has been estimated at 447 animals (95% CI=90-997) based on two years of passive acoustic monitoring, as part of the SAMBAH project (Static Acoustic Monitoring

of the Baltic Sea Harbour Porpoise, *http://www.sambah.org/*). Although the estimate is rather imprecise, it tends to confirm that this population is critically endangered. Spatial modelling revealed a previously unknown and apparently important breeding area. In 2013, Hel Marine Station and WWF Poland combined efforts to deliver a conservation programme on the Baltic harbour porpoise to the Ministry of Environment in Poland. To date, the Ministry has not yet adopted the conservation programme. A reliable bycatch monitoring system is clearly lacking even though fishery bycatch is considered the most serious threat to the population.

The sub-committee commended the work of SAMBAH and stressed the importance of applying the results to stimulate both conservation action and further research and monitoring. The sub-committee encouraged the project's representatives to present their results in more detail at next year's meeting.

Also, the sub-committee **recommended** that Poland adopt the aforementioned conservation programme and that the Baltic countries maintain efforts to monitor abundance and bycatch levels.

9. TAKES OF SMALL CETACEANS

9.1 New information on takes

The sub-committee received the summary of takes of small cetaceans in 2014 extracted from this year's online National Progress Reports and prepared by Hughes of the IWC Secretariat (see Appendix 3, Tables 1-3).

9.1.1 Direct takes

In regards to direct takes, the only information received was that contained in the USA report on beluga hunts.

Funahashi summarised the content of the Japan Progress Report on Small Cetaceans, a public document that can be freely downloaded from the website of the Fishery Agency of the Government of Japan[3]. This document reports on small cetacean fisheries in 2013 as well as research programmes conducted between April 2013 and March 2014 by the National Research Institute of Far Seas Fisheries (NRIFSF) of the Fisheries Research Agency of Japan (FRA) and the Fisheries Agency of the Ministry of Agriculture, Forestry and Fisheries, the Government of Japan (FAJ) in cooperation with other organisations. The report covers information on small cetaceans which is not included in the Japanese National Progress Report.

The Committee **reiterates** its long standing recommendation that no small cetacean removals (live capture or directed harvest) should be authorised until a full and complete assessment has been made of their sustainability.

9.1.2 Accidental takes

Last year the sub-committee noted that the bycatch of finless porpoises (*Neophocaena phocaenoides*) in South Korean waters was still high, but, following up the Scientific Committee recommendations on finless porpoise bycatch from SC/65a, also heard of efforts by the Korean Government to start a monitoring and mitigation programme on the stow net fisheries[4] which are responsible for 95% of the bycatch. In this regard, the South Korean Progress Report for 2014 showed continued substantial finless porpoise bycatch, but no information on efforts to reduce bycatch was received by the sub-committee. Therefore, the sub-committee respectfully **requested** that the Government of Korea provide an update on its finless porpoise bycatch monitoring and mitigation efforts to SC/66b.

9.2 Follow up on the Workshop on 'poorly documented hunts of small cetaceans for food, bait or cash'

A discussion was held between some members of the original Marine Bushmeat Steering Group and other interested individuals. The discussion served to recap on the last four years and recent progress in better documenting takes of small cetaceans in Southeast Asia. Porter presented the work plan for the forthcoming year in southeast Asia for which funding, independent from this sub-committee, has recently been obtained. It is anticipated that the results of this work will be presented to this sub-committee at SC/66b. A useful discussion followed, incorporating advice and comments which will improve the work proposed for southeast Asia. The group welcomed the approach proposed for southeast Asia which, if successful, will achieve some of the objectives originally outlined in 2013. To plan how the larger working group will move forward, it was generally agreed that a global workshop of the scale originally proposed in 2013 should still be held and that the ultimate goal of the next two years would be to complete this workshop. It was largely believed that new data from a global level had to be obtained for such a workshop to be meaningful. There is an opportunity to apply for funding for small projects through the Small Cetacean Voluntary Fund. As before, this sub-committee will make a call for proposals which will define the scope and extent of funding available.

A small intersessional group was proposed with the purpose of further developing a more focused terms of reference for the global workshop. It was further proposed that the Society of Conservation Biology annual meeting in Singapore, mid-2016, would be an ideal venue to hold a workshop relating to marine bushmeat. Parsons has already identified funding which can be used to support this workshop. It was suggested that such a workshop focus on developing a 'toolbox' of techniques which could be used by groups throughout the areas of concern to investigate the marine bushmeat issue. Further, such a workshop would be an opportunity to engage with other entities who work on terrestrial bushmeat, e.g. CMS, CBD and CITES, and on non-cetacean marine bushmeat species.

The sub-committee **endorsed** the workplan which is: (i) to continue development of a detailed terms of reference intersessionally through a small working group; (ii) to develop a 'toolbox' of investigative techniques to assist in documenting more clearly takes of small cetaceans; and (iii) to hold a workshop comprising a multi-disciplinary group of biologists, social scientists, managers and NGO's with a global scope. It was noted that sufficient new data from more than one region would be required before such a proposed global gathering would be productive.

10. OTHER

10.1 Task team and Conservation Management Plans for small cetaceans

At SC/65b, the sub-committee agreed to trial a new intersessional approach for situations that are considered high priority from a conservation perspective at the species or population level, especially where the indications are that time is short and no effective mitigation actions are in place. The sub-committee would establish an intersessional

[3] *http://www.jfa.maff.go.jp/j/whale/w_document/pdf/h25.pdf.*
[4] *http://www.fao.org/fishery/fishtech/1024/en.*

'small cetacean task team' (SCTT) of appropriate experts from its membership. Following intersessional work to better define this task team approach, Genov introduced SC/66a/SM22 which provided a preliminary list of small cetacean populations that might require special attention and high priority in the Small Cetaceans sub-committee and might be addressed by a SCTT. This non-exhaustive list included populations listed as 'Endangered' or 'Critically Endangered' by the IUCN, as well as populations of 'Least Concern' and 'Data Deficient' species that may be suffering high and/or unregulated exploitation. The authors welcomed suggestions for additions or deletions. A working group was established during the meeting to refine the list and work further on a draft Terms of Reference for such SCTTs. The Terms of Reference developed by the working group and **agreed** by the sub-committee are in Appendix 4. This describes the objective as follows: the primary aim of the Initiative is to assist the Scientific Committee in providing timely and effective advice on situations where a population of cetaceans is or suspected to be in danger of a significant decline that may eventually lead to its extinction; the ultimate aim being to ensure that extinction does not occur. The Terms of Reference describes the role of a Task Team Steering Group and the work of SCTTs.

After discussion Simmonds was appointed as the Task Team Initiative Coordinator to serve on the SCTT Steering Committee with the Chair and Co-chair of the Small Cetacean Sub-committee, the IWC Head of Science and with Thomas, Genov, and Reeves to serve on the Steering Committee.

Iñíguez presented information on franciscana dolphins (*Pontoporia blainvillei*) as a possible candidate for an SCTT effort. These dolphins are distributed from Itaunas, (18°25'S), Brazil to Golfo San Matias (42°10'S), Argentina. The species range is divided in four 'Franciscana Management Areas' – FMAs (Secchi *et al.*, 2003), which have been proposed to improve management of the species. The IUCN listed the species as 'Vulnerable'. The Government of Argentina has included franciscana in their Red List as Endangered since 2011 and the Brazilian government has considered the species as 'Critically Endangered' since 2014. This species is considered the most threatened small cetacean species in the SW Atlantic, primarily due to high levels of accidental mortality in fisheries activities. The distribution of the franciscana is not continuous; with the northern population (FMA1) being isolated and likely fragmented (Cunha *et al.*, 2014). The IWC completed a review of the franciscana more than 10 years ago (IWC, 2004). Since this review new studies have shown evidence that populations of the franciscana are more localised, with significant genetic differentiation detected within the broader FMAs (Cunha *et al.*, 2014; Mendez *et al.*, 2010a). Furthermore, in parts of the range, levels of simultaneous bycatch of mother-offspring pairs potentially put populations at further risk (Mendez *et al.*, 2010b).

It was proposed that the franciscana would be a good initial case study to test this approach. In particular, FMA1 in Brazil, which is geographically dysjunct from all other franciscana populations, has gaps in distribution within its range, and is presumed to be subject to high rates of bycatch would be amenable to the approach of gathering and reviewing information and consultation with experts and managers in its range country, as outlined in the Terms of Reference for this initiative. The sub-committee agreed to establish a Small Cetacean Task Team on franciscana. Zerbini was appointed as fransiscana Team Initiative Coordinator. It was noted that a workshop on the franciscana is taking place in Brazil in October, where regional expertise can be identified and asked for input.

The franciscana is a potential good candidate for a Conservation Management Plan along the lines of the one already implemented for the Southern Right Whale in the west South Atlantic. It is proposed that a discussion of the creation of the CMP for this species will be started with the regional community at a meeting of the Consortium of Franciscana that will be hosted in Santa Catarina, Brazil, in October 2015. A report with a summary of these discussions will be presented next year.

10.2 IWC Resolution 2014-4

The sub-committee Chair introduced this agenda item, noting that IWC Resolution 2014-4 (IWC, 2014) establishes Terms of Reference for the Small Cetaceans sub-committee (SC/66a/SCP03). This Resolution largely consolidated the existing working methods of the sub-committee into formally adopted Terms of Reference. In addition, the new ToR calls for more integration of the work of the sub-committee with that of other sub-committees (e.g. AWMP, RMP, HIM, E). It also clarifies that this sub-committee can have access to the Research Fund, which has not normally been the case thus far.

The sub-committee welcomed this new development, which provides additional recognition of the work of the Small Cetaceans sub-committee, and notes the value of further integration of work across different sub-committees. While noting the increased opportunity for funding as part of the overall research budget, the sub-committee emphasised the continued importance of the Voluntary Fund for Small Cetaceans and hopes that Governments and NGOs will continue supporting it. It also recommended the continued use of the Voluntary Fund in supporting important research and conservation projects. In this regard, the sub-committee suggested that the funding of Invited Participants should be dealt with jointly, i.e. in coordination with the Research Fund, while the Voluntary Fund for Small Cetaceans should continue to be directed primarily at conservation-oriented activities, *inter alia*, the work of the future Small Cetacean Task Teams and new research projects.

During the discussion, it was also noted that the adopted changes to the Rules of Procedure introduced a new concept, i.e. 'maintaining cetacean populations at 'viable levels'. The sub-committee agreed that it would discuss this concept further at next year's meeting to develop a working definition.

10.3 Other scientific information

10.3.1 Bottlenose dolphins in Costa Rica

SC/66a/SM16 presented information on the occurrence of inshore and offshore common bottlenose dolphins (*Tursiops truncatus*) in Costa Rica. Two ecotypes of common bottlenose dolphins occur in Golfo Dulce (GD) and Osa Peninsula waters (OPW). Based on their distribution and external morphology, authors have distinguished between these two ecotypes. A smaller offshore form is usually found in OPW, within or close to the 200m isobath, while the larger inshore form is generally found at the sill and inner basin of GD, associated with river drainages within the Gulf. The authors hypothesised that the coastal habitat of Golfo Dulce might further drive localised genetic differentiation.

The sub-committee **thanked** the authors for providing this information.

10.3.2 Small Cetaceans in the United Arab Emirates

Natoli presented new information on surveys for small cetaceans along the coastline adjacent to Dubai. There is little information available on the status of small cetacean populations inhabiting the waters of the United Arab Emirates (UAE) or the Arabian/Persian Gulf. The only available information is based on two surveys (1989-99) suggested a 71% decline in dolphin sightings (Preen, 2004). The UAE coastline, in particular surrounding the main cities (Dubai and Abu Dhabi), faces considerable anthropogenic pressure due to the exponential increase in human population and extensive land reclamation projects. In 2014, a boat-based photo-identification survey was conducted along the Dubai coastline (58 days at sea) to gather preliminary information on coastal cetaceans. The presence of three small cetacean species was confirmed; the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), the Indo-Pacific humpback dolphin (*Sousa plumbea*) and the finless porpoise (*Neophocaena phocaenoides*). Nine bottlenose dolphins, eight humpback dolphins and three finless porpoise sightings were recorded, totalling some 212 animals. Photo-identification conducted on bottlenose and humpback dolphins identified 73 and 31 recognisable individuals, respectively. Re-sightings were frequently noted. A sighting network reporting scheme has been established and has collected 314 sightings to date. This has enabled the identification of areas of apparent high dolphin occurrence that could be the focus of future investigations. There is currently no stranding network in the UAE or in any of the Gulf range countries. From 2009, three Brydes's whales, one finless porpoise, two bottlenose dolphins, one killer whale, one dwarf sperm whale and four unidentified dolphins have stranded in UAE. In 2015, ten strandings were reported from Kuwait, including finless porpoise, humpback and bottlenose dolphins. There is no reporting of any bycatch, although extensive coastal artisanal fishing is present.

The sub-committee **welcomed** this information and encouraged further work in the area.

11. WORK PLAN

For the ongoing review focused on *Tursiops* taxonomy and population structure, the sub-committee agreed, given that the Scientific Committee meeting would be in Slovenia, that priority should be given to the North Atlantic (including the Mediterranean, Black and Caribbean seas and the Gulf of Mexico) and South Atlantic. Natoli and Rosel will carry out an overall review for these regions similar to the excellent review presented to this meeting. They asked members to help identify relevant literature and individual researchers, particularly in the South Atlantic and western North Atlantic.

12. ADOPTION OF REPORT

The report was adopted at 11:21 on 30 May 2015.

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Appendix 1

AGENDA

1. Convenor's opening remarks
2. Election of Chair
3. Appointment of rapporteurs
4. Adoption of Agenda
5. Review of available documents
6. Taxonomy of Indo-Pacific forms of *Tursiops* spp. [Taxonomic status of *Tursiops* spp. (*truncatus*, *aduncus* and *australis*) throughout their range in the Indian and Pacific Oceans (Australia, Bangladesh, eastern India, Philippines, New Zealand, Solomon Islands, Taiwan)]
7. Report on the Voluntary Fund for Small Cetacean Conservation Research
8. Progress on previous recommendations
   - 8.1 Vaquita
   - 8.2 Yangtze finless porpoise
   - 8.3 Hector's dolphin
     - 8.3.1 Maui's dolphin
   - 8.4 Amazon river dolphin and tucuxi
   - 8.5 Beluga
   - 8.6 Franciscana
   - 8.7 Sousa
   - 8.8 *Lagenorhynchus*
   - 8.9 Killer whales
   - 8.10 Harbour porpoise
9. Takes of small cetaceans
   - 9.1 New information on takes
     - 9.1.1 Direct takes
     - 9.1.2 Accidental takes
   - 9.2 Follow up on the series of Workshops on 'poorly documented hunts of small cetaceans for food, bait or cash'
10. Other
    - 10.1 Task team and Conservation Management Plans for small cetaceans
    - 10.2 Resolution 2014-4
    - 10.3 Other scientific information
11. Work plan
12. Adoption of Report

Appendix 2

REPORT OF THE SIXTH MEETING OF THE COMITÉ INTERNACIONAL PARA LA RECUPERACIÓN DE LA VAQUITA (CIRVA-6)

22 May 2015, San Diego, CA, USA

The sixth meeting of the Comité Internacional para la Recuperación de la Vaquita (CIRVA) was held in San Diego, California USA on 22 May 2014 to take advantage of many members being present at the annual meeting of the IWC Scientific Committee. Committee members present were Jay Barlow, Arne Bjørge, Robert Brownell, Greg Donovan, Tim Gerrodette, Armando Jaramillo-Legoretta, Sarah Mesnick, Jeff Moore, Andrew Read, Randall Reeves, Lorenzo Rojas-Bracho (Chairman), Barbara Taylor, Peter Thomas, and Jorge Urbán-Ramírez. Frances Gulland, Tom Jefferson, and Teri Rowles also attended portions of the meeting.

The Committee commends the Government of Mexico for: (i) implementing the emergency two-year gillnet ban throughout the vaquita's distribution, as advocated by the report of CIRVA-5; (ii) making major new commitments to enforcement by strengthening the team of agencies involved and building coordination across them, providing new high-speed patrol boats, and committing to a greater overall enforcement presence in the region; (iii) establishing a comprehensive program to compensate fishermen and associated workers; and (iv) deciding to fund a new survey to estimate vaquita abundance planned to occur in 2015. In an economically challenging time, the President of Mexico demonstrated unprecedented high-level commitment and support for saving Mexico's porpoise when he visited San Felipe in April 2015 to initiate these measures.

Preventing the extinction of the vaquita necessitates collaborative efforts of many groups including both governmental and non-governmental parties. Recognition of these important collaborative efforts are given in Adjunct 1.

1. REVIEW OF TRENDS IN ABUNDANCE USING ACOUSTIC MONITORING DATA

At this meeting, CIRVA reviewed further results of the acoustic monitoring program, including the report of the Expert Panel, which met in April 2015 (for detailed results see Adjunct 1). Results indicate an estimated 67% decline in vaquita acoustic activity in the sampled area from 2011 to 2014. The average estimated annual rate of decline of 31% (95% Bayesian Credible Interval -51% to -10% per year) over that period is considerably greater than the previously estimated annual rate of -18.5% (95% Bayesian Credible Interval -46% to +19% per year) for the 2011-13 sampling period. These worsening results were caused by the very low number of detections in 2014, which resulted in an estimated rate of decline from 2013 to 2014 of 42%. The Panel concluded that acoustic activity had declined between 2011 and 2014 with very high probability (prob.=0.996) at a rate of more than 10% per year (prob.=0.976).

The Comité also concluded that the acoustic monitoring program continues to provide strong evidence of a dramatic decline in vaquita abundance. The Comité found the rates of decline alarming, particularly the apparent 42% decline from 2013 to 2014. This rapid decline underscores the need for Mexico's strong recent actions to ban gillnets and increase enforcement to save the species. The Comité looks forward to the results of a survey to be conducted later this year that will provide a current estimate of vaquita abundance.

2. ANALYSES OF DATA RELATED TO FISHING EFFORT FROM 2005-14

The Comité considered new analyses of the aerial surveys of pangas (fishing boats) and fisheries landings data performed by Jaramillo-Legoretta. A presentation at CIRVA-5 by Juan Manuel García Caudillo suggested an increase in the number of pangas fishing in the Upper Gulf of California from 2005 to 2014. The new analysis more closely examined data from two periods: 2005-07 and 2009-14. Despite considerable improvements in data quality and assurance, questions remained about survey methods used in the first period and whether these earlier data were comparable to observations from the second period. The Comité encouraged further work and concluded that this preliminary analysis demonstrated the need for a careful and critical evaluation of whether the expected decrease in fishing effort since 2008 when the Species Conservation Action Program for Vaquita (Programas de Acción para la Conservación de Especies – PACE-Vaquita) was initiated had or had not been realised.

The analysis of fisheries landings data was a new approach presented to the Committee. There was a general increase in landings of shrimp and finfish from 2005 to about 2010, followed by a slight decrease. The Comité acknowledged that landings are not necessarily a good proxy for fishing effort. For example, more fish may be landed with smaller effort in a year when fish stocks are abundant. Nevertheless, the four-fold increase in landings from 2005-10 suggests that the number of gillnets in the water also likely increased over this period. The Comité thanked Jaramillo-Legoretta for this new information and suggested that the number of landings might be a useful proxy for effort, in the absence of direct measurements of fishing effort (e.g. number of days fished). The Comité encouraged further analyses of these data as potential lines of evidence in understanding the status of the vaquita.

3. CONSIDERATION OF THE DESIGN OF THE 2015 VAQUITA ABUNDANCE ESTIMATION SURVEY

The Department of the Environment (SEMARNAT) is funding a new vaquita abundance survey in the second half of 2015. Rojas-Bracho and Taylor will jointly lead the visual component of the survey and Jaramillo-Legoretta will lead the acoustic component. Gerrodette presented the survey design, which includes both a traditional line-transect ship-based survey and use of passive acoustics (CPODs) to estimate the abundance of vaquitas in shallow waters that are inaccessible to the ship. Given the dramatic decline in vaquita numbers noted above, the visual survey will concentrate effort in areas of known higher density. At the time of the meeting, the survey design was still under review and the Comité offered several suggestions, including adding some transect lines in areas where vaquitas may persist and altering the distribution of CPODs. Generally, the Comité agreed that the approach proposed (using the same vessel employed in 1997 and 2008 and covering the shallow-water area with a grid of passive acoustic monitoring devices) would provide the most precise abundance estimate possible given the anticipated low number of encounters with vaquitas.

4. IMPLEMENTATION OF THE EMERGENCY BAN ON GILLNETS

4.1 Enforcement

Enforcement will be adequate only if gillnets are prohibited in the current exclusion zone both at sea and on land. Regarding the single exception to the gillnet prohibition (which allows gillnets to be used to encircle spawning Gulf corvina [*Cynoscion othonopterus*] from February to April) CIRVA is concerned that these nets could be used illegally as gillnets at other times of the year, so they will need to be locked up (or otherwise secured in some way) from May to January to allow for effective enforcement.

4.2 Permanency of the gillnet ban

Survival of the vaquita depends on a permanent gillnet ban. Past, ongoing, and future investments by the Government of Mexico to conserve the vaquita will only achieve their purpose if the Upper Gulf is maintained as a gillnet-free area. The publication in June 2013 of Mexican Standard 002 that mandates a stepwise transition over three years from gillnets to alternative gear for shrimp fishing was the first step towards permanent gear changes within the distribution of vaquitas. Encouraging fishermen to continue to changing gears for shrimp fishing would be facilitated by a government announcement that the use of gillnets for shrimp fishing is now permanently banned since the three-year transition period will expire before the two-year emergency gillnet ban is over.

4.3 Alternative gear development

The gillnet ban will only be successful if fishermen are given the opportunity to develop alternative livelihoods, including continuing to fish with small trawls for shrimp and with other gear and practices that do not pose a threat to vaquitas. The current compensation scheme apparently does not entail the development, testing, and implementation of alternative gear. The two-year emergency closure period provides an excellent opportunity to train and equip fishermen to use small trawls for shrimp and develop and test traps or other vaquita-safe gear to catch finfish. Fishermen should be afforded opportunities to pursue their livelihoods by continuing to fish in ways that do not threaten vaquitas.

4.4 Economic considerations

The current two-year gillnet ban represents a unique opportunity to address long-term options for alternative economic activities for affected fishing communities. There is strong interest on the part of Mexican and US agencies in a proposed 'Economic Summit' as a venue to identify alternative fisheries, additional fishing activities (e.g. aquaculture, recreational fishing) and other economic opportunities, and to identify and encourage trade streams for vaquita-safe fisheries products that are not obtained with gillnets. The possibility of a summit was discussed recently at the US-Mexico Fisheries Science Bilateral Meeting (April 2015). The next step is to schedule a planning meeting to identify concrete steps in this process. Interested chefs (on both sides of the border) and US seafood buyers have met on a number of occasions in recent months with fishermen who are using the new light trawl gear, including at a series of restaurant dinners hosted by WWF/Pronatura in Baja California featuring 'gillnet-free' products.

5. EXPECTATIONS RELATED TO EVALUATING THE EFFICACY OF THE GILLNET BAN

The two-year emergency gillnet ban is an essential and welcome step in vaquita conservation but expectations relative to assessing the short-term efficacy of this action must be realistic. The Comité strongly emphasised that a period of two years is completely insufficient to determine any effects of the current two-year gillnet ban on vaquita abundance.

The potential for vaquita population growth is limited, given that reproductively mature females can give birth to only one offspring per year, at most. Thus the extremely depleted population will be able to grow by only a very small number in two years, even in the complete absence of mortality in fishing gear. It is not possible to detect such a small increment given the available monitoring methods. This underscores the need to make the current emergency two-year ban on gillnets permanent. CIRVA intends to undertake a statistical power analysis to determine how many years of acoustic monitoring data would be required to determine with a high level of confidence whether the conservation actions taken have been effective at halting the decline of vaquitas and allowing the population to start recovering.

6. RECOMMENDATIONS

The Comité reviewed and revised its previous recommendations in the light of new information, bearing in mind that it had repeatedly emphasised that gillnets must be removed permanently from the range of the vaquita.

- CIRVA strongly recommends that the Government of Mexico follow up on its enactment of emergency regulations establishing a gillnet exclusion zone by immediately initiating the process of making the ban permanent.
- CIRVA recommends that the Government of Mexico maintain its strong commitment to interagency enforcement.
- CIRVA recommends that the Government of Mexico increase enforcement, including night-time surveillance, to ensure that all gillnet fishing is eliminated within the exclusion zone. Possession and transportation of gillnets should be prohibited both at sea and on land.
- CIRVA recommends that the efficacy of the enforcement efforts for the current ban be monitored and commends the Government of Mexico for having entered into a collaboration that involves third-party monitoring.
- CIRVA recommends that all available enforcement tools, both within and outside Mexico, be applied to stopping illegal fishing, especially the capture of totoaba and trade in their products.
- CIRVA recommends that increased efforts be made to develop and introduce alternatives to gillnet fishing in communities affected by enforcement of the exclusion zone.
- CIRVA recommends that, in accordance with Mexican Standard 002 published in June 2013 mandating the stepwise substitution of alternative gear for shrimp gillnets, the Government of Mexico announce that shrimp gillnets are now permanently banned.
- CIRVA recommends that issuance of permits for legal non-gillnet fishing be expedited.
- CIRVA strongly recommends that the acoustic monitoring program continue indefinitely, with adequate financial support, to determine whether mitigation efforts are working.

Finally, CIRVA agreed to meet again in the spring of 2016 to review the estimates of abundance from this year's survey and the results of acoustic monitoring through 2015.

Adjunct 1

Collaborative Support for Vaquita Conservation

Preventing the extinction of the vaquita necessitates collaborative efforts of many groups including both governmental and non-governmental parties. In addition to the important steps taken by the Government of Mexico acknowledged elsewhere in this Report, other groups have been, and are, contributing to efforts to conserve Mexico's porpoise. The Committee recognises the importance of those contributions not only by groups based in Mexico but also by the US Marine Mammal Commission (especially for funding the passive acoustic monitoring program), by the Expert Panel and by the steering committees for both the acoustic monitoring and vaquita abundance survey efforts (which include many scientists from US NOAA Fisheries). The continued research into alternative gear, which is key to long-term vaquita conservation, is supported not only by INAPESCA but also by WWF-Mexico, Pronatura and private funders. CIRVA welcomes new participants in vaquita conservation including in developing market solutions to compensate fishermen for using vaquita-safe gear and the Sea Shepherd Society's voluntary program to monitor fishing activities within the Vaquita Refuge.

Appendix 3

RECORDS ON TAKES OF SMALL CETACEANS

Compiled by M. Hughes

The following tables summarise the available information from the submitted National Progress Reports: direct takes (Table 1), fishery bycatch (Table 2) and other human-induced mortality (Table 3).

Table 1

Direct catch of small cetaceans: 2014 data.

Species	Area	Females	Total landed	Struck and lost	RMP *Small Area*	Type of catch	Contacts	Comments
Australia								
Indo-Pacific bottlenose dolphin	Gulf St Vincent, S Australia (Southern Ocean)	1	1	0	Unknown or N/A	N/A	C. Kemper	Illegal killing: shot by shotgun, 3 pellets found during SAM post-mortem. Date: 21 Dec 2014 (first seen dead), Virginia (PO) 10.45km WSW (=SE of Port Gawler), SA 34°42'42'S; 138°27'37'E
USA								
White whale	Arctic Ocean, Chukchi Sea	0	59	0	Unknown or N/A	A	K. Frost	Data from the Alaska Beluga Whale Committee
	Arctic Ocean, Beaufort Sea	0	24	6	Unknown or N/A	A	K. Frost	Data from the Alaska Beluga Whale Committee
	Arctic Ocean, Bering Sea	0	236	17	Unknown or N/A	A	K. Frost	Data from the Alaska Beluga Whale Committee
	Pacific Ocean, Gulf of Alaska	0	29	0	Unknown or N/A	A	K. Frost	Data from the Alaska Beluga Whale Committee

Key: A=Aboriginal; N/A=not applicable.

Table 2

Fishery bycatch of small cetaceans: 2012-14 data.

			Males				Females				Unknown											
Data year	Species	Large area	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	RMP *Small Area*	Targeted species	Gear (see key)	How observed	Contacts	References	Comments	Local area	Local taxonomy
Australia																							
2014	Common bottlenose dolphin	Pacific Ocean, Tasman Sea	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	-	[NSC]	Scientist	J. Hall	-	ARWP ID TARZ-9702_1	-	-
2014	Common dolphin	Pacific Ocean, Tasman Sea	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	-	[NSC]	Scientist	J. Hall	-	ARWP ID TARZ-10165_1	-	-
2014	Common bottlenose dolphin	Pacific Ocean, Arafura Sea	0	0	0	0	0	0	0	0	0	0	0	1	Unk. or N/A	Prawn fishery	[PTB]	Fisherman	-	Logbook	17/08/14, sex unknown, alive	-	-
2014	Unid. dolphin	Southern Ocean, Bass Strait	0	0	0	0	0	0	0	0	0	0	0	1	Unk. or N/A	Gummy shark	[GNS]	Fisherman	-	Logbook	08/12/14, animal released alive	-	-
2014	Unid. dolphin	Southern Ocean, Bass Strait	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman, observer or inspector	S. Murphy	Logbook	22/09/14, observer onboard at time of incident, reported animal as common dolphin, dead	-	-
2014	Unid. dolphin	Southern Ocean, Bass Strait	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	02/08/14	-	-
2014	Unid. dolphin	Southern Ocean, Bass Strait	0	0	0	0	0	0	0	0	3	0	0	0	Unk. or N/A	Demersal scalefish	[TBB]	Fisherman	S. Murphy	Logbook	21/05/14	-	-

Cont.

Data year	Species	Large area	Males				Females				Unknown				RMP *Small Area*	Targeted species	Gear (see key)	How observed	Contacts	Refer-ences	Comments	Local area	Local tax-onomy
			Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.									
Australia cont.																							
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	21/09/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	20/10/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	09/10/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	10/10/14, animal dead and damaged	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	19/09/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	14/10/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	21/09/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	08/03/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	0	0	0	1	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	06/12/14, animal alive, just	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	05/08/14	-	-
2014	Unid. dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	16/10/14, large animal, sex unknown	-	-
2014	Common dolphin	Southern Ocean	0	0	0	3	0	0	0	0	1	0	0	0	Unk. or N/A	-	[GNS]	Fisherman	S. Murphy	Logbook	09/12/14	-	-
2014	Common dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	07/08/14	-	-
2014	Common dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	12/11/14	-	-
2014	Common dolphin	Southern Ocean, Great Australian Bight	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Gummy shark	[GNS]	Fisherman	S. Murphy	Logbook	15/02/14	-	-
2014	Common dolphin	Southern Ocean	0	0	0	0	1	0	0	0	0	0	0	0	Unk. or N/A	Sardine	[PS1] [PS2]	Fisherman	C. Kemper	-	28/03/14, pregnant SA sardine fishery ~20km E Spilsby Island, SA 34°37'S, 136°34'E	Spencer Gulf	Short-beaked common dolphin
2014	Unid. dolphin	Southern Ocean	0	0	0	0	0	0	0	0	0	0	0	1	Unk. or N/A	Kingfish	[MIS]	Fisherman	C. Kemper	-	08/08/14 [See NOTE 1]	Boston Bay, Spencer Gulf	-

Cont.

Data year	Species	Large area	Males				Females				Unknown				RMP *Small Area*	Targeted species	Gear (see key)	How observed	Contacts	Refer-ences	Comments	Local area	Local tax-onomy
			Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.									
Australia cont.																							
2014	Common dolphin	Southern Ocean	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	Finfish	[RG] [GN]	Scientist, public	R. Alderman	-	[See NOTE 2]	Eagle-hawk Neck, Tasmania	-
2014	Common dolphin	Southern Ocean	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	Finfish	-	Scientist, fisherman	R. Alderman	-	Found dead, floating within salmanoid aquaculture lease	Hideaway Bay, Tasmania	-
2014	Indo-Pacific bottlenose dolphin	Pacific Ocean, Coral Sea	1	0	0	0	1	0	1	0	0	0	0	0	Unk. or N/A	-	[NSC]	Observer or inspector	Queensland Dept. of Agriculture, Fisheries and Forestry	-	[See NOTE 3]	-	-
2014	Unid. dolphin	Pacific Ocean, Coral Sea	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	-	[NSC]	Observer or inspector		-	Sunshine Coast	-	-
2014	Common dolphin	Pacific Ocean, Coral Sea	2	0	0	0	8	0	0	0	0	0	0	0	Unk. or N/A	-	[NSC] [GN]	Observer or inspector		-	[See NOTE 4]	-	-
2014	Indo-Pacific bottlenose dolphin	Pacific Ocean, Coral Sea	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[GN]	Observer or inspector	Queensland Dept. of National Parks, Recreation Sport and Racing	-	Far north Queensland	-	-
Korea, Republic of																							
2014	Dall's porpoise	Pacific Ocean, Sea of Japan/ East Sea	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[FPN]	Fisherman	-	-	-	-	-
2014	Pacific white-sided dolphin	Pacific Ocean, Sea of Japan/ East Sea	3	0	0	0	4	0	0	0	21	0	0	0	Unk. or N/A	-	[FPN] [GN]	Fisherman	-	-	-	-	-
2014	Killer whale	Pacific Ocean, Sea of Japan/ East Sea	1	0	0	0	0	0	0	0	0	0	0	0	Unk. or N/A	-	[GN]	Fisherman	-	-	-	-	-
2014	Harbour porpoise	Pacific Ocean, Sea of Japan/ East Sea	2	0	0	0	2	0	0	0	4	0	0	0	Unk. or N/A	-	[GN]	Fisherman	-	-	-	-	-
2014	Risso's dolphin	Pacific Ocean, Sea of Japan/ East Sea	0	0	0	0	1	0	0	0	0	0	0	0	Unk. or N/A	-	[FPO]	Fisherman	-	-	-	-	-
2014	False killer whale	Pacific Ocean, Sea of Japan/ East Sea	2	0	0	0	0	0	0	0	0	0	0	0	Unk.or N/A	-	[GN] [TM]	Fisherman	-	-	-	-	-
2014	Long-beaked common dolphin	Pacific Ocean, Sea of Japan/ East Sea	179	0	0	0	127	0	0	0	200	0	0	0	Unk. or N/A	-	[FYK] [FPO] [FPN] [GN] [TM]	Fisherman	-	-	-	-	-
2014	Finless porpoise	Pacific Ocean, Sea of Japan/ East Sea	10	0	0	0	9	0	0	0	18	0	0	0	Unk. or N/A	-	[FPO] [GN] [TM]	Fisherman	-	-	-	-	-

Cont.

Data year	Species	Large area	Males				Females				Unknown				RMP *Small Area*	Targeted species	Gear (see key)	How observed	Contacts	References	Comments	Local area	Local taxonomy
			Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.									
Korea cont.																							
2014	Finless porpoise	Pacific Ocean, Yellow Sea	149	0	0	0	254	0	0	0	793	0	0	0	Unk. or N/A	-	[FSN] [FYK] [FPO] [FPN] [GN] [TM]	Fisherman	-	-	-	-	-
Netherlands																							
2014	Harbour porpoise	Atlantic Ocean, North Sea	2	0	0	0	0	0	0	0	0	0	0	2	Unk. or N/A	-	[RG] [GTR] [GNS]	Fisherman, public	L. Ijsseldijk, M. Siemensma, M. Scheidat	-	[See NOTE 5]	Bruinvis	-
New Zealand																							
2014	Common dolphin	Pacific Ocean, New Zealand	1	0	0	0	4	0	0	0	0	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	18/03/14	W coast North Island	-
2014	Common dolphin	Pacific Ocean, New Zealand	1	0	0	0	5	0	0	0	0	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	21/03/14	As above	-
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	5	0	0	0	0	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	26/03/14	As above	-
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	0	0	0	0	2	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	04/04/14	As above	-
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	0	0	0	0	9	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	10/05/14	As above	-
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	15/06/14	As above	-
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	02/09/13	Cook Strait	
2014	Common dolphin	Pacific Ocean, New Zealand	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Jack mackerel	[TM]	Observer or inspector	K. Ramm	-	09/12/13	W coast North Island	-
Spain																							
2014	Common bottlenose dolphin	Atlantic Ocean, Mediterranean Sea	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	Fishing gear	-	J.A. Raga, J. Jimenez	-	-	Gulf of Valencia	-
2015	Common dolphin	Atlantic Ocean, Mediterranean Sea	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	Fishing gear	-	J.A Raga, J. Jimenez	-	-	Gulf of Valencia	-
USA																							
2012	Atlantic white-sided dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	9	0	0	0	Unk. or N/A	-	[TBB]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Atlantic white-sided dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[GN]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Risso's dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[TBB]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Risso's dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[GN]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Harbour porpoise	North Atlantic Ocean	0	0	0	0	0	0	0	0	36	0	0	0	Unk. or N/A	-	[GN]	Observer or inspector	-	-	[See NOTE 6]	-	-

Cont.

Data year	Species	Large area	Males				Females				Unknown				RMP *Small Area*	Targeted species	Gear (see key)	How observed	Contacts	Refer-ences	Comments	Local area	Local tax-onomy
			Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.	Dead	Seriously injured	Injured	Unk.									
USA cont.																							
2012	Long-finned pilot whale	North Atlantic Ocean	0	0	0	0	0	0	0	0	7	3	0	0	Unk. or N/A	-	[TBB]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Long-finned pilot whale	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[TM]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Common dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	42	1	1	0	Unk. or N/A	-	[TBB]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Common dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	7	0	0	0	Unk. or N/A	-	[GN]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Common dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[TM]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Common bottlenose dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	-	[TBB]	Observer or inspector	-	-	[See NOTE 6]	-	-
2012	Northern right whale dolphin	North Pacific Ocean	0	0	0	0	1	0	0	0	0	0	0	0	Unk. or N/A	Broadbill, swordfish	[GND]	Fisherman, observer or inspector	J. Carretta	-	-	-	-
2012	Common dolphin	North Pacific Ocean	3	0	0	0	2	0	0	0	0	0	0	0	Unk. or N/A	Broadbill, swordfish	[GND]	Fisherman, observer or inspector	J. Carretta	-	-	-	-
2013	Common dolphin	North Pacific Ocean	3	0	0	0	3	0	0	0	0	0	0	0	Unk. or N/A	Broadbill, swordfish	[GND]	Fisherman, observer or inspector	J. Carretta	-	-	-	-
2013	Northern right whale dolphin	North Pacific Ocean	1	0	0	0	1	0	0	0	0	0	0	0	Unk. or N/A	Broadbill, swordfish	[GND]	Fisherman, observer or inspector	J. Carretta	-	-	-	-
2012	Long- or short-finned pilot whale	North Atlantic Ocean	0	0	0	0	0	0	0	0	0	14	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	-	-	-
2012	Risso's dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	0	1	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	-	-	-
2012	Risso's dolphin	Atlantic Ocean - Gulf of Mexico	0	0	0	0	0	0	0	0	0	1	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	-	-	-
2012	Common bottlenose dolphin	North Atlantic Ocean	0	0	0	0	0	0	0	0	0	3	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	-	-	-
2012	Common bottlenose dolphin	Atlantic Ocean, Gulf of Mexico	0	0	0	0	0	0	0	0	0	1	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	-	-	-
2012	Pan-tropical spotted dolphin	Atlantic Ocean, Gulf of Mexico	0	0	0	0	0	0	0	0	1	0	0	0	Unk. or N/A	Tuna/ swordfish	[LL]	Observer or inspector	L. Garrison	-	This mortality occurred during an experimental set.	-	-

NOTES

Australia. NOTE 1: Found caught in loose bird netting, workers removed the net and dolphin sway away, SA kingfish farm 4.1km NNE Port Lincoln (PO), SA 34°41'S, 135°52'E. NOTE 2: Found dead on shore with tail cut off, marks on flukes, rostrum, etc. consistent with net entanglement. Recreational gillnets commonly set in area. NOTE 3: *Tursiops* spp. (not identified to species). One female released alive from drumline (Gold Coast). One male and one female entangled in nets (Sunshine Coast). NOTE 4: Two females entangled in nets on the Sunshine Coast. Two males and six females entangled on the Gold Coast.

Netherlands. NOTE 5: Two harbour porpoises were caught in a recreational setnet and were released alive (*http://www.nu.nl/binnenland /3745245/leden-knrm-redden-bruin vissen-visnet.html*). Between January and December 2014 an Electronic Monitoring system had been installed on Dutch set net vessels. During this time two bycaught animals have been called in by fishermen and brought ashore for further pathological research. Both animals were juvenile males. Necropsy findings suggest that asphyxiation as a result of bycatch was the cause of death. During pathological examination three stranded porpoises were considered possible or probable bycatches.

USA. NOTE 6: Serious injury determinations for small cetaceans and seals caught in commercial fisheries off the northeast US coast, 2012.

FAO fishing gear codes		
[FPN] Traps – stationary uncovered pound nets	[GNS] Gillnets and entangling gear – set gillnets (anchored)	[PS2] Surrounding nets – two-boat operated purse-seines
[FPO] Traps – pots	[GTR] Gillnets and entangling gear – trammel nets	[PTB] Trawls – otter trawls (side or stern)
[FSN] Traps – stow nets	[LL] Hooks and lines – longlines (not specified)	[RG] Recreational fishing gear
[FYK] Traps – fyke nets	[MIS] Miscellaneous gear	[TBB] Trawls – bottom trawls
[GN] Gillnets and entangling gear – gillnets (not specified)	[NSC] Shark control nets	[TBB] trawls – bottom trawls
[GND] Gillnets and entangling gear – driftnets	[PS1] Surrounding nets – one-boat operated purse-seines	[TM] Midwater trawls – midwater trawls (not specified)

Table 3

Other human-induced mortality of small cetaceans 2013 data.

Data year	Species	Large area	Females: seriously injured	Unknown: dead	RMP *Small Area*	Submitted to ship strikes database	Contacts
UK							
2014	Common dolphin	North Atlantic Ocean (Cornwall, England)	1*	0	Unknown or N/A	Unknown	R. Deaville
USA							
2013	Common bottlenose dolphin	North Atlantic Ocean	0	2	Unknown or N/A	Unknown	M. Garron
2013	Striped dolphin	North Atlantic Ocean	0	1	Unknown or N/A	Unknown	M. Garron
2013	Striped dolphin	North Atlantic Ocean	0	1	Unknown or N/A	Unknown	M. Garron
2013	Common bottlenose dolphin	North Pacific Ocean (San Diego)	0	1	Unknown or N/A	Unknown	J. Carretta
2013	Long-beaked common dolphin	North Pacific Ocean	0	10	Unknown or N/A	Unknown	J. Carretta
2013	Common dolphin	North Pacific Ocean	0	1	Unknown or N/A	Unknown	J. Carretta
2013	Harbour porpoise	North Pacific Ocean	0	7	Unknown or N/A	Unknown	J. Carretta
2013	Pacific white-sided dolphin	North Pacific Ocean	0	4	Unknown or N/A	Unknown	J. Carretta
2013	Risso's dolphin	North Pacific Ocean (Clatsop, OR)	0	1	Unknown or N/A	Unknown	J. Carretta

Note: *Adult female common dolphin found alive at sea with damage to the caudal peduncle and partially severed tail flukes. Retrieved for assessment by rescue groups and euthanised on welfare grounds. Examined by the UK strandings scheme at necropsy and assessed as possible ship strike. Source: CSIP Annual Report to UK Government for 2014.

Appendix 4

SMALL CETACEAN TASK TEAMS INITIATIVE: TERMS OF REFERENCE

Objective: the primary aim of the Initiative is to assist the Scientific Committee in providing timely and effective advice on situations where a population of cetaceans is in danger of a significant decline that may eventually lead to its extinction; the ultimate aim being to ensure that extinction does not occur.

PHASES

This initiative will go through a number of phases.

Phase One

The Task Teams Steering Group will:

(1) work with the Sub-Committee on Small Cetaceans and other experts to identify populations where action by Task Teams may be helpful (see guidelines below); and
(2) establish Task Teams for such populations.

Phase Two

The Task Team will:

(1) compile and review information about the focal population; and
(2) work with the IWC Secretariat to: (i) establish dialogue with the relevant country/countries; and (ii) provide via appropriate diplomatic channels advice and assistance as proves appropriate.

Phase Three

The Steering Group will:

(1) report annually on Task Team activities through the Small Cetacean Sub-Committee and the Conservation Committee, including helping to identify any funding needs to support its work and recommended mitigation measures.

In addition the Steering Group, working with the Task Teams, will also help secure financial support for the Initiative.

MEMBERSHIP

The Initiative's Steering Committee will comprise:

(a) the Chair and Co-chair of the Sub-Committee on Small Cetaceans;
(b) a Task Team Initiative Coordinator appointed by the Sub-Committee on Small Cetaceans;
(c) the IWC Head of Science; and
(d) other experts nominated by the sub-committee or SCTT Steering Committee, as proves appropriate.

Each Task Team will have a team leader and include members of the SC appropriate to that population and other invited experts.

GUIDELINES FOR IDENTIFYING SUITABLE POPULATIONS

Key criterion: the population is in danger of a serious decline that may eventually lead to its extinction.

See also SC/66a/SM22.

Further considerations (in no particular order).

(a) Whether the country/countries open to receiving help and/or requesting assistance.
(b) Whether the country/countries concerned is/are an IWC member nation(s) - it would probably be helpful at least in the first attempts to deploy the team in an IWC member nation.
(c) Whether the population is found within the borders of a single country or across borders.
(d) Whether or not other appropriate national or international entities are already active (in some situations the Task Teams may not be able to add anything).
(e) Whether or not there is existing local expertise.
(f) Whether the Task Team can be expected to make a positive impact on the conservation status of the particular population.
(g) Whether, even in the absence of abundance estimates, information on mortality levels and/or other lines of evidence indicate that mortality is unsustainable.

CASE STUDY

It is proposed that the franciscana is a good case study to start and test this approach, as it features clearly identified problems that can be tackled. In this regard a Workshop on the franciscana is taking place in October, where the regional expertise can be involved and asked for input. It may be wise to first focus on a single, clear franciscana population, rather than tackling an entire super population.

The Hong Kong/China finless porpoise is another potential candidate.

Notes

Intersessional work

The steering group may establish Task Teams intersessionally if this proves appropriate and will manage the teams between the meetings of the Scientific Committee.

Relationship to CMP

Having a Task Team focus on a particular population does not preclude the development of a Conservation Management Plan (CMP) for that same population(s) and may assist in the development of the Plan.

[The CMP is a formal arrangement among countries, while a Task Team can immediately start making assessments, looking for opportunities, etc. The Task Team vision is that a group of experts can start acting quickly, offer expertise, assess a given conservation situation, provide advice on potential ways to address the issue, etc. The work of the Task Teams and the CMP process can run in parallel.]

Local involvement

Key in the success of the initiative will be the involvement of local scientists/experts/policy makers and the SCTT would seek to empower them in the longer term.

Exit strategy

As part of the process and linked to the point above, the Task Team will also develop an 'exit strategy' to allow the disbandment of a Task Team when this becomes appropriate.

Measuring success

The Task Teams will need to work on case-by-case basis but this will also be an iterative process with knowledge of what proves effective building over time. Monitoring needs to be part of any case study and success would be measured by how effectively advice is turned into management action.