Scientific Committee Document Titles Received – May 15th 2009 (*indicates paper received)

SC/61/AWMP

*1. BREIWICK, J.M., PUNT, A.E., RUGH, D.J., LAAKE, J.L. and HOBBS, R.C. Revised methods for estimating abundance of the eastern North Pacific stock of gray whales. 10pp.

Counts of migrating whales at Yankee Point and Granite Canyon, California, form the basis for estimation of trends and abundance for the eastern North Pacific stock of gray whales. Data from these surveys have been collected and analysed by methods that have become more sophisticated over time. We outline an approach and work plan which, given the available data, will lead to a set of abundance estimates that are suitable for trend analysis based on a more consistent approach.

2. BRANDON, J.R. and PUNT, A.E. Assessment of the eastern stock of North Pacific gray whales: incorporating calf production, sea-ice and strandings data.

3. BRANDON, J.R. and PUNT, A.E. Testing the Gray Whale SLA: allowing environmental variability to influence population dynamics.

*4. HEIDE-JØRGENSEN, M.P., WITTING, L., LAIDRE, K.L. and HANSEN, R.G. Revised estimates of minke whale abundance in West Greenland in 2007. 19pp.

A visual aerial line transect survey for common minke whales (*Balaenoptera acutorostrata*) was conducted off West Greenland in August-September 2007. A total of 8670 km of survey effort covered 14 strata in sea states <5 with a total stratum area of 213,996 km^2. The 27 sightings of minke whales were all within a strip width of 300m and the average time from first detection to when the sighting passed abeam was 1.7 sec. Due to the uniform and narrow distribution of the detections strip census methods were used to analyze the survey. Two methods were deployed to correct the strip census estimates for whales missed by the observers and whales that were submerged during the passage of the plane. Method 1 included all detections of minke whales (n=27) and correction for an instantaneous availability that included submergence of whales. Using only data from sea states <3 (n=22) the 'at surface' abundance of minke whales was 1,866 (cv=0.30) whales and a correction for whales missed by the observers with a simple mark-recapture estimator resulted in a corrected abundance of 1,904 (0.31) whales. Adjusting for the availability bias resulted in a fully corrected estimate of 17,307 (95% 7,628-39,270) minke whales. Method 2 used only detections of minke whales that were observed to break the surface (n=19). Applying this method to effort data at sea state<3 (n=14) results in an 'at surface' abundance of 1,208 (cv=0.36) whales and correcting for whales missed by the observers increased the abundance to 1,233 (0.37) whales. Adjusting for the availability bias resulted in a fully corrected estimate of 22,952 (95% CI 8,444-62,383) minke whales.

5. WITTING, L. and SCHWEDER, T. Lower confidence bound on population status from catch sex ratio: applied to minke whales off West Greenland.

6. KENNEDY, A.S. and CLAPHAM, P.J. Calculation of the yield of meat and other products from fin and minke whales taken in Greenland.

SC/61/BC

*1. RITTER, F. Collisions of sailing vessels with cetaceans worldwide: first insights into a seemingly growing problem. 13pp.

Vessel-whale collisions are of growing concern worldwide. Up to now, no systematic investigation has been conducted in relation to collisions involving sailing vessels. This study represents the first quantification of this kind on a global basis. An online survey was set up including questions about the most important features of a collision or near miss event. Additionally, the internet was searched for reports involving sailing vessel-cetacean collisions. A total of 81 collisions and 42 near misses were identified, spanning from 1966 until 2008. Collisions and near misses occurred on all oceans, often during ocean races and regattas, and were most frequent in the North Atlantic. A larger proportion of cases was reported in the past few years, indicating an increasing trend. Vessel type and speed as well as circumstances of the incident varied widely, but most often monohulls were involved, predominantly sailing at speeds between 5 and 10 knots. Most reports referred to "large whales" as opposed to "small whales" or "dolphins". The species could be identified in 44 cases. Most recognized animals were humpback or sperm whales. Injuries to the whales varied strongly from "not visible" to "dead after collision", but mostly could not be determined. Sailing crew members were hurt in several cases, including collisions occurring at low speeds, and collisions often damaged vessels, including major impairment and three cases of vessel loss. The findings presented here suggest that elevated vessel speed contributes to a higher risk of collisions. Conversely, the outcome of a collision (e.g. injury to whale or crew, damage to vessel) is not a direct function of vessel speed. Several measures are discussed which potentially can contribute to mitigating the problem, including placing watchposts, changes in the design of regattas and ocean races and education initiatives.

*2. PANIGADA, S. and LEAPER, R. Ship strikes in the Mediterranean Sea: assessment and identification of mitigation measures. 5pp.

Collisions between ships and whales, both odontocetes and mysticetes, are nowadays regularly reported from all the world's oceans, with evidence of ship collisions with at least 11 species of large whales (Laist *et al.* 2001, Jensen and Silber, 2003; Van Waerebeek *et al*., 2007). Of these, the fin whale (*Balaenoptera physalus*) is most commonly recorded as being hit by ships worldwide. Ship strikes in the Mediterranean Sea are rather common and most likely represent the main anthropogenic threat for fin whales and sperm whales (*Physeter macrocephalus*), with unusually high fatal rates reported every year (Panigada *et al.*, 2006).

3. ROBBINS, J., LANDRY, S. and MATTILA, D.K. Entanglement frequency and impacts among Gulf of Maine humpback whales.

4. MARCONDES, M.C.C. and ENGEL, M.H. Ship strikes with humpback whales in Brazil.

The growing worldwide navigation since the 20th Century leads to the increase of collisions and to behavior disturbances on cetaceans. The growth rate of the humpback whale population in Brazil was estimated to be 6.74% from 2001 to 2008. At the moment, the commercial traffic is also increasing due to new investments in the infrastructure of the ports at the Bahia and Espirito Santo States, where the species concentrates for breeding and calving. We report here three well-documented ship strikes with humpback whales in this breeding ground from 1999 to 2005. These registers do not represent a complete review of collisions with the species in the region but highlights the need of evaluating the significance of ship strikes impacts on the population during its recovery stage.

*5. FÉLIX, F. A new case of ship strike with a Bryde's whale in Ecuador. 5pp.

A new case of a whale Bryde's (*Balaenoptera edeni*) struck by a ship in the southwest coast of Ecuador is reported. The whale was found floating around the Guayaquil port facility on the night of 15th April 2009. Photographs taken when the animal was freshly dead show skin lesions and bruising in several parts of the body, particularly on both sides of the head and genital region. It is suspected that the whale got draped on the bow of an unidentified large ship. Environment and port authorities are encouraged to record these events to assess the potential impact of collisions on local species.

SC/61/BRG

*1. GIVENS, G.H. Spatio-temporal modeling of relative animal density using a long time series of line transect surveys with clustering and censoring. 18pp.

We introduce a probability model for data arising from aerial line transect surveys, with the goal of estimating relative animal density. This model includes consideration of animal clustering and censored observations due to effort truncation and flights with zero animal sightings. It also includes terms for spatio-temporal covariates that affect detection probabilities and animal presence. Approximate model ftting is accomplished using generalized additive modeling techniques for censored data. Estimation of uncertainty relies on bootstrapping. This model was motivated by study of a large, long-term dataset of bowhead whale surveys in the western Arctic. The fitted model is shown to map the spatio-temporal pattern of the fall bowhead migration effectively. Additional model terms may be added to test for potential localized zones of unusual scarcity or abundance such as what could be introduced by avoidance of industrial activities or hunting, or by variation in prey availability, whale behavior, or other environmental factors. Although localized scarcity phenomena are supported here by significant statistical evidence, the causes are not well understood.

*2. WIIG, Ø., BACHMANN, L., ØIEN, N., KOVACS, K.M. and LYDERSEN, C. Observations of bowhead whales (*Balaena mysticetus*) in the Svalbard area 1940-2008. 5pp.

Forty-two reported sightings of bowhead whales have taken place in the Svalbard area between 1940 and 2008. But, only three of these sightings are reported prior to 1980. Most observations involve only 1 or 2 whales, but groups of up to 7 individuals have been seen recently. Increased ship traffic in the north undoubtedly provides more opportunities for spotting this species, and the establishment of a structured cetacean sighting programme, as well as increased in effort in documenting sightings from a wider marine user-community, likely all play a role in more records being documented in recent years. A lack of control/documentation routines for sightings hampers firm conclusions about the trends in abundance of bowhead whales in the Svalbard area. Nevertheless, an apparent increase of bowhead whales in the area between East Greenland and Franz Josef Land is suggested by the sighting data in recent years. Currently, it is not known whether these sightings are animals that are stragglers from other areas or survivors of the authentic Spitsbergen stock.

3. KOSKI, W.R., FUNK, D.W., IRELAND, D.S., LYONS, C., CHRISTIE, K., MACRANDER, A.M. and BLACKWELL, S.B. An update to feeding by bowhead whales near an offshore seismic survey in the Beaufort Sea.

4. IRELAND, D.S., KOSKI, W.R., THOMAS, T.A., JANKOWSKI, M., FUNK, D.W. and MACRANDER, A.M. Updated distribution and relative abundance of cetaceans in the eastern Chukchi Sea 2006-2008.

*5. LITOVKA, D.I. and BLOKHIN, S.A. Investigations of eastern gray whales *Eschrichtius robustus* (Lilljeborg, 1861), taken in Mechigmensky Bay, 2007-2008. 16pp.

In 2007-2008, significant variations in number of Gray whales present in Mechigmen Bay as well as their irregular distribution were found. Aboriginal harvest data analysis has shown irregular distribution of whales in different physiological state: in the western part of the Bay small immature animals were feeding, in the eastern part – mature whales mostly. Information on Gray Whale biology coming annually from harvests in Mechigmen Bay can not answer all questions about population parameters such as abundance and distribution. However, nutritional state and prey analysis of examined animals evidence stable feeding conditions for Gray Whales along the Chukotka Peninsula in the recent years.

*6. SUYDAM, R., GEORGE, J.C., ROSA, C., PERSON, B., HANNS, C., SHEFFIELD, G. and BACON, J. Subsistence harvest of bowhead whales (*Balaena mysticetus*) by Alaskan Eskimos during 2008. 6pp.

In 2008, 50 bowhead whales (*Balaena mysticetus*) were struck during the Alaskan subsistence hunt resulting in 38 animals landed. Total landed for 2008 was similar to the average over the past 10 years (1998-2007: mean = 40.4; SD = 7.1). The efficiency (# landed / # struck) of the hunt was 76%, which is higher than the average during 1998-2007 (mean = 65%, SD = 8%). Spring hunts are more difficult than autumn ones because of challenging sea ice, weather conditions, and struck whales diving under the shore-fast or into the broken pack ice. The efficiency of the spring hunt was 60% compared to an autumn efficiency of 92%. Of the landed whales 18 were males, 19 were females and sex was not determined for one animal. Of the 19 females of known length, 6 were presumably mature (>13.4m in length). Only one of the mature females was examined closely and she had an active follicle. Hunters reported that one mature female was pregnant with a fetus approximately ~3m in length. Most of the mature females were not closely examined as biologists were either not stationed in the villages or the whales were butchered in the water. One landed whale was a (male) calf, 7.2 m in length, which was swimming alone. Hunters thought this animal was an independent subadult.

7. BICKHAM, J.W., HUEBINGER, R.M., PHILLIPS, C.D., PATTON, J.C., LEDUC, R., POSTMA, L.D., GEORGE, J.C. and SUYDAM, R. Assessing molecular substitution patterns in the mitochondrial control region compared to protein coding genes in two marine mammals.

This paper compares substitution patterns in three mitochondrial genes, control region, cytochrome b, and ND-1 from approximately 250 bowhead whales. Bowheads representing three populations, the BCB stock, the eastern Canadian arctic stock and the Sea of Okhotsk stock were sequenced for each gene. Substitution patterns for the hypervariable region I (HVRI) of the mitochondrial control region were compared to the more conservative protein coding genes in order to identify hypervariable sites which are sources of homoplasy and evolutionary "noise." Since HVR1 is one of the most frequently used genetic markers for population genetic and phylogeographic studies in mammals, a method to increase the resolution of this marker would increase our understanding of the population processes that drive genetic patterns. We present an evolutionary analysis of HVRI, cytochrome b and ND-1 sequences in order to quantify the occurrence of homoplasy in HVRI. The data from bowheads are compared to a larger dataset from Steller sea lions in which the estimated rate of substitution at HVRI is approximately 24 times the substitution rate at cytochrome b with an absolute rate of HVRI substitution estimated at 27.45% per million years. Incorporation of the hidden variation (homoplasies) into an evolutionary analysis in Steller sea lions showed that 8.5-12% of haplotypes defined by HVRI variants were found to have a geographic distribution modified by convergent molecular evolution. Also, information from identified homoplasies led to a 19% increase in population subdivision as estimated by the fixation index FST. .

*8. BURDIN, A.M., TSIDULKO, G.A., SIDORENKO, M., BRADFORD, A.L., WELLER, D.W. and BROWNELL, R.L. Status of gray whales off northeast Sakhalin Island, Russia in 2008. 7pp.

A collaborative Russia-U.S. research program on western gray whales (*Eschrichtius robustus*) summering off northeastern Sakhalin Island, Russia, has been ongoing since 1995 and has produced important information on the present day conservation status of this critically endangered population. This paper reviews findings from 2008 research activities and combines such with data from previous years, in some cases ranging back to an opportunistic survey in 1994. Photo-identification research conducted off Sakhalin Island in 2008 resulted in the identification of 45 whales, including three calves. No previously unidentified non-calves were observed. When combined with data from 1994-2007, a catalog of 172 photo-identified individuals has been compiled. Not all of these 172 whales can be assumed to be alive, however. One new reproductive female was recorded in 2008, resulting in a minimum of 25 reproductive females being observed since 1995. In addition to a number of biological difficulties that western gray whales are facing, the large-scale offshore oil and gas development programs near their summer feeding ground, as well as fatal net entrapments off Japan during migration, pose significant threats to the future survival of the population.

*9. WELLER, D.W., BRADFORD, A.L., BURDIN, A.M. and BROWNELL, R.L. The incidence of killer whale tooth rakes in western gray whales off Sakhalin Island, Russia. 7pp.

Killer whales (*Orcinus orca*) are known to attack nearly all species of baleen whales but observations of attacks are not common. Gray whales (*Eschrichtius robustus*) are the species most frequently observed to be attacked by killer whales. Although observations of killer whale attacks on large whales are relatively few, the presence of killer whale tooth rakes on the bodies, flippers, and flukes of most species of baleen whales demonstrate that non-lethal attacks occur. This paper provides a preliminary analysis of the incidence of killer whale tooth rakes on western gray whales photo-identified off Sakhalin Island, Russia.

10. WELLER, D.W., BRADFORD, A.L., LANG, A.R., BURDIN, A.M. and BROWNELL, R.L. Birth-intervals and sex composition of western gray whales summering off Sakhalin Island, Russia.

*11. PETTIS, H. North Atlantic right whale consortium annual report card, 01 November 2007 - 30 April 2009. 7pp.

12. ROSA, C., LITOVKA, D., SHEFFIELD, G., BLOKHIN, S. and ILYASHENKO, V. Update on 2008 collection activities related to 'stinky' gray whales in Chukotka, Russia.

13. ROSA, C., GEORGE, J.C., SUYDAM, R., THEWISSEN, H., KISHIDA, T. and NUMMELA, S. A summary of ongoing

bowhead whale sensory research in Northern Alaska.

The North Slope Borough Department of Wildlife Management, in conjunction with Dr. Hans Thewissen (Northeastern Ohio Universities College of Medicine), has instituted a research track that is geared specifically to investigating the sensory abilities of the bowhead whale. This work consists of four main projects that investigate olfaction, hearing, taste and sight. These projects are described and details are provided on preliminary results.

14. GROCH, K.R., PALAZZO, J.T., FLORES, P.A.C. and FABIAN, M.E. Right whales (*Eubalaena australis*) off southern Brazil: annual and seasonal patterns of occurrence, site fidelity and group structure.

Southern right whales (*Eubalaena australis*) in Brazil were historically distributed from northeastern to southern coast, but intensive commercial whaling held until 1973 almost extirpated them from the region. From 1986 through 2003 aerial surveys were conducted off southern Brazil primarily for photo-identification of the remnant population. A total of 481 whales (223 groups) were sighted in 16 surveys during peak whale abundance. Groups consisted mostly of two whales (67.3%, n=150) and groups of up to 8 whales were sighted. From the total, 149 sightings were of mother/calf pairs and 183 were unaccompanied whales. Whales concentrated between bins J (Garopaba) and N (Araranguá), with a peak in L (Laguna). Distribution of mother/calf pairs and unaccompanied whales differed, though not supported statistically (Mann-Whitney: U=71.5, z=0.301, p=0.763, n1=11, n2=14). Because unequal survey coverage and irregularity throughout the period, the density of whales/bin (unit area with 12 minutes latitude long) between blocks of years with similar survey coverage and approximate date of flight were compared to verify tendencies on distribution. Within-season distribution was described after monthly surveys conducted between July and November in 2002 and 2003. Whales arrived in July/August, reaching peak in September, and declining in October/November. The identification of 39 non-calf whales provided information on intra-annual resighting patterns. Thirty-one whales were resighted inter-annually at least once (sighting interval: 1-10 years). There where 71% of resightings in 2003 (none before 1994), and 93.5% (n=29) of whales were resighted at least once. From 120 females identified in Brazil, 19.2% (n=23) have shown some level of site fidelity. 82.6% (n=19) of these females were in calving years. From the 149 identified unaccompanied whales, 3.4% (n=8) have been resighted, at a one-year modal interval. The distribution of right whales along the southern Brazilian coast was not uniform, indicating specific areas as important wintering habitat for this recovering species. Survey effort varied, but patterns of distribution are identified. Distribution of mother/calf pairs and unaccompanied whales is somewhat overlapped, but a major concentration area was identified, especially for mother/calf pairs, which coincides with previously recognized aggregation area off Brazilian coast.

15. ESPÍRITO SANTO, S.M., FRANCO, D. and GROCH, K.R. Density geostatistical analysis of southern rigth whale (*Eubalaena australis*) occurrence on Santa Caterina coast - preliminary information.

Right whale groups use southern Brazilian waters as a reproductive wintering ground particularly between the coast of Santa Catarina Island (27º25'S, 48º30'W) to Cabo de Santa Marta (28º36'S, 48º48'W), in Santa Catarina State. As Santa Catarina coast is an important southern right whales breeding ground and these animals were depleted by commercial whaling in the past, the use of geostatistic tools for managing this population can be very useful. Use of geotechnologies for the understanding and mapping of right whales aggregations is important in order to support the conservation and management of this species, as well as for the adequate planning of economical development and urban expansion projects so that avoiding impact in the right whales breeding grounds. Therefore, this work aimed to analyze the distribution patterns of right whales observed in Santa Catarina coast, to confirm the hypothesis that the observed events have some systematic patterns, that are, they are not randomly distributed, and to determine the highest right whale density sites through density estimative maps. The methodology consisted of the analysis of sightings of right whales from aerial surveys conducted between 1987 to 2003, by the Brazilian Right Whale Project, over a track between the coordinates 27° to 30°S along the coastline. Geostatistical analysis of density estimative of the right whales sightings was done using the Kernel Density estimator, in software Spring version 4.3.3. This tool performs a counting of all points inside the influence region, generating a grid, in which each cell represents the intensity value, density and reason between the attributes. A digital bathymetry was constructed which was overlaid into the results of density analysis. Kernel Density analysis map pointed out two large regions of right whale aggregations, approximately in coordinates 28.10°S and 28.35°S. The first region is close to Imbituba city and the second is located in Santa Marta Cape, demonstrating that these locations have the highest density of whales groups. Other sites had lower densities or no whales occurrence. From the analysis of bathymetric features, it was observed that the largest aggregations described above are situated on places where the coastline shows higher number of bays. However, there are several closed bays that did not have high concentrations of whales. Therefore this distribution pattern must also be influenced by some environmental factors that favors whales presence on specific sites, such as circulation patterns, SST, among others, that must be investigated through more detailed studies.

*16. CLAPHAM, P., ZERBINI, A., KENNEDY, A., RONE, B. and BERCHOK, C. Update on North Pacific right whale research. 9pp.

Through an Inter-Agency agreement (IA) between the National Marine Mammal Laboratory (NMML) and the Minerals Management Service (MMS), NMML is conducting a dedicated multi-year study of the distribution, abundance and habitat use of North Pacific right whales in the North Aleutian Basin and southeastern Bering Sea. This report covers activities conducted during the period 15 January 2008 to 16 January 2009. The major activities during 2008 consisted of the final planning and preparation for, and then the execution of, the PRIEST (Pacific RIght whale Evaluation Study) survey. A 150-ft crabber, the Ocean Olympic, was chartered for this project. A total of 25 scientists (including one observer aboard the USCGC Healy and an acoustician aboard the NOAA Ship Oscar Dyson) participated in the shipboard portion of the study and two additional observers were led by Brenda Rone for the aerial component of the project. Approximately 1200nm (vessel) and 5821nm (aerial) of on-effort track lines were covered throughout the survey. In all, 11-14 individual right whales were photographed this season, and 5 of those have been matched to whales seen in previous years. One right whale and 3 humpbacks were satellite tagged during the cruise. On Leg 1, extensive oceanographic sampling was conducted throughout the area to characterize the habitat.

17. BRANDON, J.R. and PUNT, A.E. Assessment of BCB bowheads: including estimates of calf production and preliminary conisderation of environmental variability on population dynamics.

*18. UHART, M.M., ROWNTREE, V., SIRONI, M., CHIRIFE, A., MOHAMED, N., POZZI, L.M., MUSMECI, L., FRANCO, M., MCALOOSE, D., DOUCETTE, G., SASTRE, V. and ROWLES, T. Continuing southern right whale mortality events at Península Valdés, Argentina. 10pp.

Península Valdés (PV) in Argentina is the major nursery ground for the southwest Atlantic Southern Right Whale (SRW, *Eubalaena australis*) population. Probably due to the topography and currents of the Península's large bays, most of the whales that die become stranded on the beaches, allowing for reasonably accurate mortality estimates. Systematic efforts to evaluate SRW health through post-mortem examinations began in 2003. Since then, 291 SRW deaths have been recorded, with peaks in 2005, 2007 and 2008. Ninety percent of beached whales were calves, and most were female. In 2007 and 2008, 83 and 96 whales died and stranded at PV in what are considered the most extreme mortality events ever observed in any baleen whale. We discuss environmental conditions prior to and during the events and report results from analyses of whale tissues and water samples collected in the gulfs where the whales died. Necropsies provided no evidence for cause of death. Most carcasses were in advanced states of decomposition when they were examined. Investigation of marine mammal unusual mortality events (UME) is challenging and complex, and critical information is often missed as the onset of the UME is not initially recognized. The immediate cause of death, predisposing factors, and population effects of UME have been identified for only a small percentage of investigated cases. With an annual population growth rate of 6.9% for the period 1971-2000, the PV SRW may have the capacity to overcome years of such high calf mortality. However, events of this magnitude could drive their sister species in the northern hemisphere towards extinction.

*19. SIRONI, M., ROWNTREE, V., SNOWDON, C.T., VALENZUELA, L. and MARÓN, C. Kelp gulls (*Larus dominicanus*) feeding on southern right whales (*Eubalaena australis*) at Península Valdés, Argentina: updated estimates and conservation implications. 12pp.

Kelp gulls (*Larus dominicanus*) feed on the skin and blubber of southern right whales (*Eubalaena australis*) at Península Valdés, Argentina, notably affecting the whales' behavior. We have monitored the frequency of gull attacks from 1995 to 2008, and studied behavioral aspects of these interactions during the 1999 - 2001 right whale calving seasons. Gulls did not direct their attacks evenly among all whale age classes. Mother-calf pairs received 81% of the attacks and were attacked five times more often than juvenile whales. Juveniles spent over half of their time alone, and they received most of the gull attacks while they were solitary. However, the attack rate per hour was highest (5.2) when juveniles interacted with mother-calf pairs and lowest (0.7) when they were with adults. The attack frequency has continued to escalate since it was originally studied in 1984 (Thomas 1988) and 1995 (Rowntree *et al.* 1998). In 1995, 12% of 5-min intervals collected during focal follows of mother-calf pairs contained attacks at two study sites, compared to 26% in Golfo San José and 25% in Golfo

Nuevo in 2008. The proportion of whales with gull marks between 1974 and 2008 increased steadily from 1% of whales in 1974 to 37.8% in 1990, 67.6% in 2000, and 76.8% in 2008. Adult whales have learned to reduce the likelihood of being attacked by gulls by changing their resting posture at the surface, arching their backs to keep them underwater. The local gull population has grown since the 1970's possibly as a consequence of the refuse available from fishing boats operating at sea and at fishery and urban landfills. In 2005, 2007 and 2008 unusually high right whale calf mortalities were recorded at Península Valdés. It has been suggested that gull inflicted wounds could reduce calf survivorship. We provide recommendations for the management of the gull population to reduce the negative effects of gull harrassment on right whale behavior and to reduce the potential impact of gull attacks on calf health. We present a brief account of the three workshops held to analyze this conservation and management problem in Argentina.

*20. SADYKOVA, D. and SCHWEDER, T. Migration ranks for bowhead whales (*Balaena mysticetus*) at Barrow in spring. 10pp.

In a series of aerial photographic surveys of bowhead whales migrating past Barrow in Alaska in the spring, 40 individuals were captured in more than one year. To study individual-specific persistency in migratory pattern, the relative ranks of the captures of these whales among all captures that year are analysed. Controlling for body length and the presence of calves, the correlation of relative ranks in individuals captured multiple times is estimated to be 1.9e-12, and found not significantly different from zero (pvalue=0.78).

*21. SCHWEDER, T. and SADYKOVA, D. Information is gained increasingly fast in capture-recapture surveys - bowheads assessed by photographic surveys, and minke whales by genetic marking? 16pp.

The expected Fisher information gain per extra capture in a sequential capture-recapture experiment is found to grow faster than linear in number of captures when the population is closed and homogeneous. A similar pattern is found for open populations, with information gain growing faster to its maximum the shorter the longevity is. From simulating photographic capture-recapture surveys o¤ Barrow in the spring, from 2008 and with e¤ort as in previous such surveys, the abundance estimate for the BCB bowhead population based on photo-ID data is found to be about 9% in 2022. The Fisher information in an abundance estimate based on mark-recapture data is calculated for an imagined program of biopsy sampling. If each year 50 northeastern Atlantic minke whales are biopsy sampled, and 600 are taken in the catch, the cv of the abundance estimate will be some 12% after 25 years of the program.

*22. ILYASHENKO, V. How isolated is the 'western' gray whale population? 3pp.

23. GEORGE, J.C. Preliminary findings from the 2009 whale census.

24. FADEEV, V.I. Benthos studies in feeding grounds of western gray whales off the northeast coast of Sakhalin Island (Russia), 2004-2008.

Vessel and shore-based surveys of Western gray whales performed in the summer-fall period of 2007 as part of the Northeast Sakhalin Gray Whale Monitoring Program showed that the distribution of gray whales in their feeding areas in both Piltun and the Offshore area significantly changed in comparison.

SC/61/E

1. PARSONS, E.C.M. State of the Cetacean Environment Report (SOCER): 2008-2009.

*2. OVIEDO, L. Patterns of prey biomass consumption by small odontocetes in the northeastern coast of Venezuela. 9pp.

Trophic relationships are conditioned by population dynamics of interacting species in the community (species present, connections between them in the web, and interaction strengths), and on the consequences of these species interactions for ecosystem processes such as productivity and nutrient flux. Odontocete predators use a wide range of prey items; they are adapted to feeding at different depths, base on the fact that increased water depth is likely to offer more niches to be exploited by marine life. The aim of this report is to assess the patterns of prey consumption by small odontocetes in the study area, using a spatial predictive model and incorporate natural predatory patterns into a potential management scheme of strategic food sources, for both human and marine predators. Using the geo-statistical analysis tool of ArcGIS 9.2, a model of prey consumption density was predicted for species with a SPUE > 0.15. The model was constructed using the biomass consumption estimates, effort corrected APUE and geographical coordinates as input parameters, interpolated on a 1.8 × 1.8 km grid using a Gaussian Kriging Interpolation to generate thematic maps. The biomass consumption emphasized the differential in habitat use by species. The latter tendency primarily sustains the dominancy of common dolphins in the whole assessed area, with a major level of consumption within shelf waters. Th trends in predicted prey biomass removal distribution by odontocetes particularly suggest the stratification of niches primarily in shelf waters, with a prey biomass that would be constitute basically by demersal fish and small pelagic (including *Sardinella aurita*), and into transition-oceanic depths where most of the predatory pattern would rely in pelagic mesopelagic squids and myctophids. Overall the spatial tendencies in regionalization presented in this contribution will serve as a base-line to assess ecosystem health and evaluate management scenarios.

3. BOLAÑOS-JIMÉNEZ, J. An overview of skin diseases and other traumata of dophin populations off the State of Aragua, central Venezuela.

4. MOON, H.B., CHOI, H.G., AN, Y.R., CHOI, S.G., PARK, J.Y. and KIM, Z.G. Chlorinated and brominated organic compounds in cetaceans from Korean coastal waters.

5. MOON, H.B., CHOI, H.G., AN, Y.R., CHOI, S.G., PARK, J.Y. and KIM, Z.G. Perfluorinated compounds (PFCs) in cetaceans from Korean coastal waters.

*6. WRIGHT, D., BROWN, V.C. and SIMMONDS, M.P. A review of developing marine renewable technologies. 10pp.

This paper provides an overview of the latest information regarding the development of marine renewable energy generating devices, including current-driven mechanisms. It highlights the potential impacts of these devices on cetaceans and recommends that this matter deserves further attention by the IWC Scientific Committee.

*7. BROWN, V. and SIMMONDS, M.P. A further update on the distributions of marine renewable energy plants in Europe. 20pp.

European seas are being impacted by a rapid expansion of marine windfarms as governments strive to meet renewable energy commitments. Other Marine Renewable Energy Developments (MREDs), particularly wave and tidal energy devices, are also starting to be deployed. Concerns have been raised that the potential impacts on cetaceans and the marine environment are not being adequately taken into account when these MRED sites are being developed. Before 2000 there were just 13 sites (11 wind farms and 2 tidal energy plants); by 2004 there were 33 sites (26 wind farms, 5 tidal energy and 2 wave energy plants); and today, there are 95 sites (67 wind farms, 15 tidal energy and 13 wave energy plants) either operational, under construction, planned, or submitted. This paper provides an update on the locations and state of development of the European MREDs.

8. SIMMONDS, M.P., ALTER, E., SMITH, B. and BRANDON, J.R. The tertiary effects of climate change for cetaceans - the human dimension.

Primary effects of climate change for cetaceans have been defined as those that debilitate or cause death at the level of the individual. Secondary effects are those at the population level and tertiary effects are also at this level but caused by human actions generated by climate change. Examples might include increased hunting pressure on near-shore dolphins and whales off Asia, Latin America, Africa, and perhaps elsewhere, as responses to changes in availability of fish stocks caused by climate change. Potential tertiary effects have recently been highlighted in the Arctic context following ice retreat and could include increased boat strikes; increased industrial activity; increased fisheries activities (potentially causing increased bycatch and prey depletion); and increased acoustic injury and exposure to sound pollution. The tertiary effects for cetaceans may turn out to be highly significant for some cetacean populations but could not be considered by the recent IWC workshop on climate change, so we provide here a review of potential impacts intended to augment the report from the workshop. .

9. KOSKI, W.R., ABGRALL, P. and YAZVENKO, S.B. An inventory and evaluation of unmanned aerial systems for use in offshore waters.

10. CLARK, C.W., ELLISON, W.T., SOUTHALL, B.L., HATCH, L., VAN PARIJS, S., FRANKEL, A. and PONIRAKIS, D. Acoustic masking in marine ecosystems as a function of anthropogenic sound sources.

Acoustic masking from anthropogenic sound sources is recognized as a potential threat to low-frequency specialists such as the baleen whales. Masking from chronic noise sources has been difficult to quantify and measure at both the individual and population levels. There is evidence for increases in low-frequency ocean noise and sound clutter, often in habitats with whale populations. This raises concern that such sound sources could be a chronic factor in the life histories of individuals and populations. This paper presents and extends a recent analytical paradigm focused on masking from vessel noise to include sounds from seismic airgun arrays. The algorithm quantifies changes in an animal's acoustic communication space as a result of spatial, spectral, and temporal changes in background sound levels. The result is both a functional definition of communication masking for whales, and a metric to quantify the potential for acoustic masking. We apply the method to calculate time-varying measures of masking for singing fin whales, singing humpback whales, singing bowhead whales, and calling right whales. .

11. ROSA, C., SUYDAM, R. and GEORGE, J.C. Subsistence concerns surrounding offshore industrial discharge and potential impacts on bowhead whales.

12. ROSA, C., SUYDAM, R. and GEORGE, J.C. A summary of dead, stranded bowhead whales reported in the Chukchi and Beaufort Seas over the last twenty-five years.

13. MARSILI, L., CASINI, S., CARLETTI, L., MALTESE, S., PORCELLONI, S., NIÑO-TORRES, C.A., ROJAS-BRACHO, L., URBÁN, J. and FOSSI, M.C. Success in fibroblast cell cultures from long-beaked common dolphin (*Delphinus capensis*) and Bryde's whale (*Balaenoptera edeni*) skin biopsies of the Gulf of California (Mexico): potential application for ecotoxocological studies.

The aim of this study was to develop fibroblast cell cultures from skin biopsies of free-ranging cetaceans from the Gulf of California (Sea of Cortez-Mexico): long-beaked common dolphins (*Delphinus capensis*) and Bryde's whales (*Balaenoptera edeni*), as methodological tool in ecotoxicological studies. The biopsy dart, a regular aluminium crossbow bolt with a modified stainless steel collecting tip, was used in different ways depending on the species. In the case of Bryde's whales, the dart was fired into the whale with a crossbow equipped with a 150-lb test bow. In long-beaked common dolphins the biopsy was taken by mounting the dart at the end of a 2-m pole. The tissue was kept in tissue culture medium at ambient temperature and processed in 72h. The main result was the success for the first time in fibroblast cultures of two long-beaked common dolphin and two Bryde's whale specimens. The growth of first fibroblasts were observed after 10 days both in dolphins and in whales. The difference was that fibroblast cultures reached 90% confluence in 50 ml Falcon flasks in 15 days time for long-beaked common dolphins while fibroblasts from Bryde's whales grew slowly and do not reached confluence in 50 ml flasks. The dolphin fibroblasts were trypsinized, washed and placed in 250 and 550 ml flasks, after two and three trypsinizations, respectively. The cultures thus obtained can be used for many purposes, including genetic, biochemical and toxicological studies. In particular, fibroblasts can be used to test the susceptibility of these cetaceans to different environmental contaminants such as organochlorine compounds (OCs) and polybrominated diphenyl ethers (PBDEs). Fibroblast cell cultures of Mexican cetaceans, treated with different mixtures of OCs, PBDEs and PAHs, will be analysed by immunofluorescence and western blotting techniques for a qualitative and quantitative evaluation of target proteins such as CYP1A1-1A2 and CYP2B4.

14. HUBNER DE JESUS, A., REIS, A.N., JÚNIOR, E.S. and WEILER, A.F. A case of Lobomycosis in Guiana dolphin from Brazil.

*15. WRIGHT, A.J. A workshop on cumulative impacts of underwater noise with other anthropogenic stressors on marine mammals: from ideas to action. 4pp.

As part of their ongoing work on the impacts of anthropogenic noise on marine mammals, Okeanos – Stiftung für das Meer will be holding a multi-disciplinary Workshop on Cumulative Impacts of Underwater Noise with Other Anthropogenic Stressors on Marine Mammals: From Ideas to Action in Monterey, California, in August 2009. Participants at the three-and-a-half-day workshop will include biologists, acousticians, modellers, managers, an environmental economist and a network physicist, as well as other specialists in assessing cumulative and/or synergistic impacts. Early discussions will focus on a generalised process for managing cumulative impacts (particularly from noise, as this has not been included in many, if any, cumulative exposure assessments) within any marine mammal population. We will then breakout into three groups focusing on additive and synergistic impacts on an individual level; integration of cumulative impacts assessments at the demographically independent population level; and ecosystem-based management of cumulative impacts. The overarching goal of the workshop will be to develop, to the extent possible, a practical process for estimating how cumulative impacts from anthropogenic activities are impacting marine mammals and their populations. The workshop aims to do this by exploring the applicability of methods used in cumulative impacts assessments carried out in other environments, determining how best to include noise in total stressor exposure assessments, models and maps, and exploring ways to incorporate the potential synergism of different anthropogenic stressors into management decisions. Participants will also attempt to identify the appropriate level (i.e., individual, population, ecosystem) for achieving the most efficient management of cumulative impacts.

*16. WRIGHT, A.J., DEAK, T. and PARSONS, E.C.M. Concerns related to chronic stress in marine mammals. 7pp.

The management of marine mammals traditionally focuses on lethal takes, such as in bycatch, vessel collisions and strandings. However, we are beginning to realise that non-lethal impacts of human disturbance can also have serious conservation implications, indicating that mortality counts only reveal a fraction of the picture. Possibly the most important of non-lethal (at least, not immediately lethal) impacts arises from the prolonged or repeated activation of the stress response. The physiological stress response is a life-saving combination of systems and events that essentially maximises the ability of an animal to kill or avoid being killed. However, "chronic stress" is linked to numerous conditions in humans, including coronary disease, immune suppression, anxiety and depression, cognitive and learning difficulties, and infertility. How does this relate to marine mammals and their conservation? Growing human activity in the marine environment is increasing the frequency with which human disturbance triggers stress responses in cetaceans and other marine mammals and thus also the likelihood of inducing chronic stress. As noise travels further in water than air, marine mammals, like other marine fauna, will be exposed acoustically to human activity at much greater distances than terrestrial animals and may thus be particularly sensitive to chronic stress. Coastal species will be especially vulnerable due to the concentration of human activity in these areas. Whalewatching may also be a particular concern because it specifically targets marine mammals. The possibility that endangered marine mammals might express the various conditions linked with chronic stress in humans has troubling implications for conservation efforts (especially Marine Protected Areas), demands management attention, and may explain, at least in part, why some species have not recovered after protective measures have been put into place.

*17. FOSSI, M.C., URBAN, J., CASINI, S., MALTESE, S., SPINSANTI, G., PANTI, C., PORCELLONI, S., PANIGADA, S., LAURIANO, G., NIÑO, C., ROJAS-BRACHO, L., JIMENEZ, B., MUÑOZ, J. and MARSILI, L. Biomarker reponses and contaminant levels in fin whale (*Balaenoptera physalus*) skin biopsies of the Pelagos Sanctuary (Mediterranean Sea) and of the Gulf of California (Mexico). 11pp.

The main objective of this study was to apply a suite of sensitive non-lethal biomarkers in skin biopsy of fin whales (*Balaenoptera physalus*) to evaluate the toxicological status of this mysticete in the Pelagos sanctuary (Mediterranean Sea) and in the Gulf of California (Sea of Cortez-Mexico). We developed a "multi-trialbiomarker- tool", combining molecular biomarkers (western blot of CYP1A1, CYP2B) and gene expression (qRT-PCR of HSP70, ER, AhR, E2F-1) with analysis of OCs, PAHs and PBDEs. In the first phase we explored the level and the effects of OCs, PBDEs and PAHs in skin biopsies of fin whales of the two populations. In the second (in vitro) phase we applied this approach to whale biopsy slices treated with mixtures of OCs and PBDEs in order to explore the toxicological effects of these contaminants. The multi-trial biomarker tool applied to skin biopsies underlined differences in OCs, OCs-EDCs, PBDEs, PAH levels and molecular and gene expression biomarker responses between the two populations, revealing a higher toxicological stress in the Mediterranean fin whales. Of particular concern were the high levels of low brominated PBDEs found in the Mexican whale specimens.

18. FOSSI, M.C., HOLCER, D., MALTESE, S., FORTUNA, C., DE STEPHANIS, R. and MARSILI, L. Preliminary results of organochlorines levels and biomarker responses in skin biopsies of Adriatic bottlenose dolphins (Mediterranean Sea).

*19. LEAPER, R., RENILSON, M., FRANK, V. and PAPASTRAVROU, V. Possible steps towards reducing impacts of

shipping noise. 5pp.

Concerns about increases in offshore ambient noise due to commercial shipping have resulted in a work program by the International Maritime Organization to develop technical guidelines to reduce shipping noise. Targets to reduce the contribution from shipping noise to ambient noise have also been endorsed by the IWC Scientific Committee. At frequencies below 300Hz, the underwater noise signature from large vessels will be dominated by propeller cavitation and the noisiest vessels are likely to be those that suffer excessive cavitation. Based on the distribution of source levels across merchant fleets, the noisiest 10% of vessels may contribute between around 48% and 88% of the total sea area ensonified by shipping noise to a given level, depending on assumptions about propagation conditions. Thus noise reduction targets could most easily be achieved by targeting measures at a relatively small percentage of the noisiest vessels. These measures may also result in efficiency savings which could pay back initial costs within 1 or 2 years. Reductions in overall ambient noise achieved through quieting the noisiest vessels may also assist whales in avoiding collisions with quieter vessels and contribute to a reduction in ship strike mortality. Many data gaps remain in the understanding of factors that contribute to the variation in noise output from different vessels and there is a clear need for systematic studies of vessel noise. The equipment and deployment of recording devices for studies of whale vocalisations, combined with individual vessel tracking, may provide opportunities to obtain data on noise signatures from ships.

SC/61/EM

*1. RUEGG, K., ANDERSON, E.C., BAKER, S.C., VANT, M., JACKSON, J. and PALUMBI, S.R. Have Antarctic minke whales increased in abundance because of 20th century whaling? 19pp.

Severe declines in megafauna worldwide illuminate the role of top predators in ecosystem structure. In the Antarctic, the 'Krill Surplus Hypothesis' posits that the killing of more than two million large whales led to competitive release for smaller krill eating species like the Antarctic minke whale. If true, the current size of the Antarctic minke whale population may be unusually high as an indirect result of whaling. Here we estimate long-term population size of the Antarctic minke whale prior to whaling by sequencing eleven nuclear genetic markers from 52 modern samples purchased in Japanese meat markets. Based upon Bayesian estimates of mutation rate and coalescence times among loci, we calculate long-term population size to be 670,000 individuals (95% CI: 374,000-1,150,000). Our estimate of long-term abundance is similar to or greater than contemporary abundance estimates, suggesting that competitive release and the 'Krill Surplus Hypothesis' are not required to explain current Antarctic minke whale abundance.

SC/61/IA

*1. PUNT, A.E. A note related to additional sensitivity tests for the Southern Hemisphere minke whale statistical catch-at-age analysis. 5pp.

Additional sensitivity tests are conducted to examine the impact of ignoring the data from JARPA on the outputs from the statistical catch-at-age analysis method of Punt and Polacheck (2008). The results suggest that the estimates of trends and natural mortality are most sensitive to ignoring the JARPA length-composition and age-at-length data while these estimates (and the associated measures of their uncertainty) are not very sensitive to ignoring the JARPA indices of relative abundance.

*2. PUNT, A.E. Ageing error effect size for the Southern Hemisphere minke whales. 17pp.

Simulations are used to assess the implications of different levels of ageing bias on the performance of the statistical catch-at-age method of Punt and Polacheck (2008). Simulations based on deterministic data suggest that a 20% under-estimate of age which changes over time to zero will lead to estimated time-trajectories of carrying capacity which match those from actual applications of the statistical catch-at-age analysis method when carrying capacity is time-invariant. Allowing for observation error makes the results more variable.

3. KELLY, N., PEEL, D., PIKE, D., BRAVINGTON, M.V. and GALES, N. An aerial survey for Antarctic minke whales in sea ice off east Antarctica: a pilot study.

Following on from test flights undertaken in January, 2008, a pilot aerial survey for minke whales was conducted within the sea-ice zone in Vincennes Bay, east Antarctica, throughout a 20 day period in December, 2008. The survey was completed using a fixed-wing aircraft (a CASA-212 400) flying from a base at Casey station (66° 17`S, 110° 32`E). The survey was double-platform, with two observers on each side of the aircraft. To augment observer data, video, infrared and photographic equipment were placed in the bottom of the aircraft fuselage. These cameras recorded the presence of whales in the area under the aircraft inaccessible to the observers and also recorded sea ice information. The survey area was rectangular in shape with a northern extent along latitude of 64° 47`S down to the coast; the western boundary was at105° 52` E longitude and an eastern boundary at 113° 15` E longitude; with a total area of 60,600 km^2. Line transects were parallel at 10 nautical mile spacing and orientated north-south. Exceeding a planned total transect length of 3,000km, the survey covered 5,500km on effort (a number of transects were repeated) in 40 hours of flying (over nine days). Around 76 Antarctic minke whales were observed, with group size ranging from one to four. A notable feature of this survey was the large number of killer whales observed (approximately 372). After completion of both test flights and a pilot study, the utility of the CASA-212 aircraft for aerial survey studies of minke whales in Antarctica has been demonstrated. A larger-scale aerial survey, extending from Vincennes Bay, across the north of the Shackleton Ice Shelf and into the east of the Davis Sea, is planned for the 2009/10 austral summer. .

*4. KELLY, N., PEEL, D., BRAVINGTON, M.V. and GALES, N. A planned aerial survey for minke whales in east Antarctica during summer 2009/10. 5pp.

Continuing on from a small-scale aerial survey for minke whales undertaken in east Antarctica during the summer of 2008/09, the Australian Antarctic Division is planning another aerial survey in the 2009/10 summer season. As in previous seasons, this aerial survey will be flown using fixed-wing CASA-212 aircraft and will be double-platform on each side of the aircraft. The survey has two aims: first, to test the hypothesis that Antarctic minke whales occur in significant numbers within sea ice inaccessible to research vessels; second, to provide data in order to model their distribution relative to sea ice habitat. It is planned that the 2009/10 aerial survey will be split into three phases in order to address a number of different hypotheses about the relationship of Antarctic minke whales and sea ice in east Antarctica; this survey will also span nearly 20° of longitude. The first phase, scheduled for December, 2009, will be a repeat of the aerial survey undertaken in Vincennes Bay December, 2008 (near 66° S 110°E) and will cover around 5,000 kilometres of transect effort. This first phase will allow a between-year comparison of whale abundance and distribution in the Vincennes Bay area. The second phase, scheduled from late December 2009 to mid-January, 2010, will shift survey effort north of the Shackleton Ice Shelf and into the eastern section Davis Sea (near 64° S 100°E) and will cover around 4,700 kilometres of transect effort. Historically, whale research voyages such as IDCR/SOWER have surveyed in this area but have not been able to access the Davis Sea or the polynyas that open up around the Shackleton Ice Shelf. In the third phase, scheduled to run from mid-January to early February, 2010, survey effort will return to the Vincennes Bay area and will cover around 5,500 kilometres. This last phase will allow an intra-season comparison of whale abundance and distribution.

5. KELLY, N., PEEL, D., BRAVINGTON, M.V. and HEDLEY, S.L. Optimal designs for circumpolar whale surveys: a model-based approach.

6. OKAMURA, H. and KITAKADO, T. Abundance estimates and some diagnosis of Antarctic minke whales from the historical IDCR/SOWER survey data using the revised OK method.

7. OKAMURA, H. and KITAKADO, T. Summary of simulation trials for Antarctic minke whale abundance surveys using the revised OK method.

8. KITAKADO, T. and OKAMURA, H. Estimation of additional variance with its application to abundance estimates based on the OK method.

9. PALKA, D.L. and SMITH, D.W. Description of simulations of the IWC/SOWER Southern Hemisphere minke whale abundance surveys.

*10. KLEPPE, T.S., SKAUG, H.J. and OKAMURA, H. Robustness of the hazard probability model. 8pp.

We compare the sensitivity of estimated effective strip half-width and detection function with respect to choice of hazard probability function (Q). The model is being fit under different erroneous assumptions about the parametric form of Q. This is done in an "infinite sample size" situation, where fitting the model by maximum likelihood amounts to minimizing the Kullback Leibler distance between the assumed and true models. The experiment is carried out in a setting which is relevant to minke whale sighting surveys both in the Antarctic and in the Northeastern Atlantic. It is found that the hazard probability model is fairly robust with respect to the choice of parametric class for Q. The largest observed bias in the resulting effective strip half-width is around 8%, while for most situations there was almost no bias.

*11. KOCK, K.H., SCHEIDAT, M., BOEBEL, O., BRÄGER, S., HERR, H., LEHNERT, K., LEHNERT, L.S., VERDAAT, H. and WILLIAMS, R. The occurrence of cetaceans along two transects from 57°S to Atka Bay (70°29.6'S/07°57.6'W). 19pp.

Following a successful pilot study in 2006 the German research vessel 'Polarstern' conducted a cetacean sighting survey in the Southern Ocean using helicopters near the Greenwich meridian from 12 to 27 December 2008. The cetacean survey was part of cruise leg ANT XXV/2 from 5 December 2008 to 5 January 2009. Two transects were covered: the first more westerly one started at 57°09.3' S/00°39.1' E and went to Atka Bay (70°29.6' S/07°57.6' W) whereas the second (return leg) followed a more easterly course from Atka Bay over Maud Rise to 57°03.1' S/12° 27.5' W. No observations could be conducted from 63 to 57°S on the return cruise due to fog (visibility <300 m) and swell. Standard line transect survey protocols were followed when the helicopter flew predesigned track lines. We were particularly interested in the distribution and abundance of minke whales in the pack-ice. Helicopter tracklines covered a total of 6321 km. Environmental information, including proportion ice coverage, was collected continuously. A total of 24 sightings of 28 minke whales were recorded with a maximum group size of 3. In addition 5 southern bottlenose whales and 1 killer whale were sighted inside the ice whereas several species were seen in open water north of 55°S. Helicopters can provide a useful means to collect sighting data for cetaceans. They cover long distances effectively and, in contrast to vessels, are particularly suitable of surveying areas of dense pack-ice.

*12. BURT, M.L. and ENSOR, P. Analysis of IO and BT search modes on the IWC-SOWER 2007/08 cruise. 8pp.

The 2007/08 IWC-SOWER cruise took place in Area IV between longitudes 105°E to 120°E and from the ice edge upto 180nm from the ice edge. This region was surveyed west to east alternating between IO mode and SS-II mode, and then resurveyed east to west alternating between BT-option 2 mode and SS-II mode. Although one of the main focuses of the cruise was to survey minke whales, there were few sightings of minkes and the most frequently sighted species was humpback whales. This paper summarizes the data collected on these species in IO mode and BT-option 2 mode. Given the small numbers of minkes detected only a crude estimate of abundance for minke whales is presented; a fuller analysis is presented for humpback whales. Using the BT-option 2 mode data, the estimate of minke whales is 1,123 animals (cv=44%). The estimate of humpback whales from the IO mode data is nearly 4,885 animals (cv=20%) which is nearly twice the estimate obtained from the BT-option 2 mode data. This is mainly due to a higher encounter rate obtained in IO mode; sightings from observers on three platforms are included whereas in BT-option 2 mode sightings from only one platform are included.

*13. LEAPER, R. Photographic measurements of bearings to sightings and scanning patterns of observers on the 2008/09 SOWER cruise. 4pp.

Downward pointing digital cameras were used to measure bearings to sightings and search patterns of observers on the 2008/09 SOWER survey. Estimated and measured bearings were obtained for a total of 62 sightings, mainly of humpback whales. These suggested little bias in angle estimation and a root mean squared error of 4.9°. These errors are similar to other studies and suggest errors in angle estimation may be almost as important as errors in distance estimation for calculation of perpendicular distances. Observers spent 80% of their time searching within 34° of the trackline and 5% at angles greater than 50°.

14. BRAVINGTON, M.V. and HEDLEY, S.L. Antarctic minke whale abundance estimates from the second and third circumpolar IDCR/SOWER surveys using the SPLINTR model.

SC/61/JR

*1. PASTENE, L., HATANAKA, H., FUJISE, Y., KANDA, N., MURASE, H., TAMURA, T., MORI, M., YASUNAGA, G., WATANABE, H. and MIYASHITA, T. Response to the 'Report of the Expert Workshop to Review the JARPN II Programme'. 21pp.

The International Whaling Commission's Scientific Committee carried out a workshop to review the progress made in the research conducted under the Japanese Whale Research Program under Special Permit in the North Pacific–Phase II (JARPN II) in its first six years (2002-2007). The review followed the new protocol agreed by the IWC SC in 2008. An Independent Expert Panel examined a total of 36 scientific papers prepared by Japanese scientists in response to the Terms of Reference of the workshop. Scientists related to the JARPN II research participated in the Workshop only with the aim of presenting papers on particular agenda items and to respond to questions of clarification and substance regarding the work that had been undertaken or further work that was expected to be undertaken. The report of the expert workshop to review the JARPN II programme is presented in document SC/61/Rep1. The present paper summarizes the views of scientists related to the JARPN II research on the scientific output of the review workshop, and the manner in which they are addressing the main scientific suggestions from the Independent Expert Panel. In general the workshop report produced by the Panel represents a fair and balanced evaluation of the work conducted by the JARPN II in its first six years. Most of the suggestions from the Independent Review Panel are considered useful and will contribute to improve the research output from the first six years as well as future research under the JARPN II.

*2. TAMURA, T., KONISHI, K., ISODA, T., OKAMOTO, R., BANDO, T. and HAKAMADA, T. Some examinations of uncertainties in the prey consumption estimates of common minke, sei and Bryde's whales in the western North Pacific. 24pp.

The purpose of this study was to examine the uncertainties in the prey consumption estimates of common minke whale (*Balaenoptera acutorostrata*), sei whale (*B. borealis*) and Bryde's whale (*B. edeni*) in the western North Pacific in response to some recommendations from the JARPN II review workshop. The uncertainties of some parameters and consumption estimates by different models were examined, and suggestions for future collection of data and works were made. The differences in consumption rates estimated from different models increased with body mass. At this stage it is not possible to disregard the difference of energy contents among the preys. If the proportion of the energy intake during high feeding season (P) was between 70-90%, the range of *H index* (feeding index in high feeding season) in common minke, sei and Bryde's whales were estimated in the range 1.05-1.72, 1.19-1.80 and 1.19-1.80, respectively. Daily prey consumption was estimated using two different models (Equation 6 providing the smallest estimates and Equation 7 providing the largest estimate) and the *H index* above, by sex and maturity status for each of the whale species. The range of daily consumption estimates of mature female common minke, sei and Bryde's whales were 47-158kg, 102-491 and 132-577 kg, respectively. A comparison of these estimates by the two models with actual stomach content weight suggested that consumption by Equation 6) appears to be underestimated because consumption estimates by this equation is equal to just a single intake. The range of total prey consumption in the JARPN II research area for common minke whales was 90 thousands tons (95%CI: 54-150 thousands tones) by Equation 6 and 260 thousands tones (95%CI: 155-438 thousands tones) by Equation 7, respectively. The value of Equation 7 was 2.9 times larger than the value of Equation 6. The validity of different models for estimating the total consumption can be investigated with additional data collected by JARPN II. In this way it might be possible in the near future to provide estimates with narrow range.

*3. YASUNAGA, G. and FUJISE, Y. Additional analyses on temporal trends and factors affecting mercury levels in common minke, Bryde's and sei whales in the western North Pacific. 3pp.

This short paper presents an additional analysis on total mercury (THg) trend in common minke whale from the western North Pacific in response to some recommendations from the JARPN II review workshop. Specifically a generalized additive model (GAM) analysis was recommended to examine temporal trend of THg levels in common minke whales from sub-area 9 in the period 1994-2007. Results of this analysis suggest two periods: the first extending until 1999 showing a decreasing trend and a second from 2000 showing a stable trend. These results based on GAM are the same as those obtained in the original paper based on multiple linear regression analyses (Yasunaga and Fujise, 2009) (SC/J09/JR23). In response to other recommendation, a schematic figure on total Hg (THg) flow in the western North Pacific food web is presented and described in this paper.

*4. YASUNAGA, G. and FUJISE, Y. Additional analyses on temporal trends and factors affecting PCB levels in baleen whales in the western North Pacific. 5pp.

This short paper presents an additional analysis on PCB trend in common minke, Bryde's and sei whales from the western North Pacific in response to some recommendations from the JARPN II review workshop. The review Panel recommended that future studies on PCB must be carried out on a lipid weight basis. A total of fifteen whales in each species were additionally analyzed for fat contents and this was converted into concentrations in fat wt. basis. Results of the statistical analysis on PCB level trends in these baleen whale species were consistent with those originally presented by Yasunaga and Fujise (2009) (SC/J09/JR24).

*5. KANDA, N., GOTO, M., KISHIRO, T., YOSHIDA, H., KATO, H. and PASTENE, L. Updates of the analyses on individual identification and mixing of the J and O stocks around Japanese waters examined by microsatellite analysis. 14pp.

This paper is the revised version of SC/J09/JR26, which described the results of microsatellite analysis of the J and O stocks of common minke whales, presented to the Expert Workshop to review the JARPNII Programme. In this study, we attempted to distinguish sampled common minke whales into genetically distinct stocks using a combination of microsatellite analysis and a Bayesian clustering approach. Past studies indicated that two different stocks of common minke whales existed around the Japanese coast: O stock in the western North Pacific and the J stock in the Sea of Japan. Samples of 2,542 minke whales were collected during the offshore component of JARPN and JARPNII from 1994 to 2007, during the coastal component of JARPNII from 2002 to 2007, and from bycatches in the set net fishery along the Japanese coast from 2001 to 2007, and were analyzed using 16 microsatellite loci. Result of the Bayesian clustering analysis implemented in the computer program STRUCTURE (Pritchard *et al.*, 2000) indicated that our samples came from two genetically differentiated groups of minke whales. Approximately 91% of the individuals were assigned into the either stocks based on their high membership probability (>90%) obtained from the program. Spatial distribution of these assigned individuals clearly indicated that these two stocks were the J and O stocks. In addition, it was also found that 1) the O stock individuals appeared to migrate, although rarely, to the Sea of Japan, 2) the J stock individuals migrated to the 7W of the North Pacific side and very rarely to further east, and 3) the SA2 (western side of North Pacific coast) was mainly occupied by the J stock. Temporal distribution of the assigned bycatches collected from the SA7 (eastern side of Japan, North Pacific coast) where both the J stock and O stock whales were contained in the samples in about 50:50 indicated seasonal movement of the whales with the number of the O stock increased in spring. This study allowed us to better understand the pattern and dynamics of distribution of the minke whales inhabiting around Japan. The results of this revised version confirmed the main conclusion in SC/J09/JR26.

*6. HAKAMADA, T. and BANDO, T. Further morphometric analysis on stock structure in the western North Pacific common minke whale (*Balaenoptera acutorostrata*). 4pp.

Morphometric analysis on stock structure in western North Pacific common minke whales was conducted based on Principal Component Analysis (PCA) and discriminant analysis, following a recommendation from the JARPN II Review Workshop. Results of this analysis suggested significant difference in morphometrics between the 'J' and the 'O' stocks but no significant differences among 'O'-stock common minke whales from longitudinal sectors in the western North Pacific. Results from the PCA are consistent with those presented by Hakamada and Bando (2009) to the JARPN II Review Workshop (SC/J09/JR27).

*7. GOTO, M., KANDA, N., KISHIRO, T., YOSHIDA, H., KATO, H. and PASTENE, L.A. Further mitochondrial DNA analysis on stock structure in the western North Pacific common minke whales. 10pp.

This paper is the revised version of the mitochondrial DNA analysis presented in SC/J09/JR29 to cover the recommendations from the Expert Workshop to review the JARPNII Programme. Genetic variation at the mtDNA control region in the western North Pacific common minke whales was analyzed to examine the plausibility of four stock structure baseline scenarios adopted at the final stage of the *Implementation Simulation Trials* (*IST*s) process under the Revised Management Procedure by the IWC Scientific Committee in 2003. A total of 1,639 whales collected during JARPN and JARPNII surveys from 1994 to 2007 in the area from the Japanese coast to the offshore waters (to 170°E) on the Pacific side, was used for the analyses. The samples from 2002 to 2007 (n= 1,124) were not used during the previous ISTs process. Heterogeneity tests were based on the randomized chi-square test and Fst as recommended by the review Workshop. Significant mtDNA heterogeneity was found in sub-areas 7W (for both chi-square test and Fst in the sample of 2007) and 9W (for Fst in the sample of 1995). Additional analysis in sub-area 7W suggested that the source of heterogeneity was due to the occurrence of J stock animals in this sub-area. Our updated analysis based on a larger data set confirmed that 1) whales from the J stock existed in the 7W with low but large enough number to cause genetic heterogeneity observed in the 7W samples as well as between the 7W and other samples, 2) except the J stock whales, the survey area was mainly occupied by O stock, and 3) the baselines C and D were not supported because no other genetically distinct stock was observed in the survey area, however the genetic heterogeneity found in sub-area 9 by the *Fst* analysis in a single year should be further investigated in the context of baseline scenario A.

*8. KANDA, N., GOTO, M., KISHIRO, T., YOSHIDA, H., KATO, H. and PASTENE, L. Further microsatellite analysis of common minke whales in the western North Pacific. 14pp.

This paper is a revised version of the microsatellite analysis presented in SC/J09/JR30 to cover the recommendations from the Expert Workshop to review the JARPNII Programme. The IWC Scientific Committee (SC) completed the RMP *Implementation* for the western North Pacific common minke whales during the 2003 Annual Meeting. At the final stage of the *Implementation* process, the SC adopted four stock scenarios (baselines A, B, C, and D) in the western North Pacific (IWC, 2004). The SC did not examine the plausibility of each scenario at all, however, because it was afraid that any conclusions would not have been accepted by all. Consequently, the SC rated all of the scenarios the same 'high' plausibility irrespective of available information for each hypothesis. This study examined the plausibility of these four stock baseline scenarios by analyzing samples of minke whales collected during JARPNII as well as JARPN conducted from 1994 to 2007 using 16 sets of hypervariable microsatellite DNA markers. The samples from 2003 to 2007 were not used during the previous *Implementation* process. In addition to their collection years, we further divided the samples by their sighting sites into 7W (140.01°E -147.00°E), 7E (147.01°E -150.00°E), 8W (150.01°E -153.00°E), 8E (153.01°E -157.00°E), 9W (157.01°E -162.00°E), and 9E (162.01°E -170.00°E). All of the samples were polymorphic for the 16 microsatellites analyzed, and the genetic diversity was high. We examined if there was any evidence of genetic differences between the coastal and offshore samples collected in the same year from the 7W, among the samples collected in the different years from the same sub-area, and among the samples divided and compared on the basis of proposed stock divisions from each of the four baseline scenarios with the suspected J stock individuals (all individuals included) and without the suspected J stock individuals (individuals of unknown origin and O stock included) as well as with only the suspected O stock individuals (individuals of unknown origin and the J stock excluded). We found 1) whales from the J stock existed in the 7W with low but large enough number to cause genetic heterogeneity observed in the 7W samples as well as between the 7W and other samples, 2) except the J stock whales, the survey area was mainly occupied by O stock, and 3) the baselines C and D were not supported because no other genetically distinct stock was observed in the survey area. Our simulation study indicated that from genetics standpoint the statistical power for testing the baseline scenarios with our data set was quite high. Results of this revised paper confirmed the main conclusion in SC/J09/JR30.

*9. HAKAMADA, T. Additional analyses on the effects on J-stock of future JARPN II common minke whale catches. 4pp.

One of the tasks of the JARPN II review workshop was to review the effects of any catches on the relevant stocks. Regarding common minke whales some of the calculations on the effect of the catches on the J-stock based on conservative assumptions e.g., lower 90% confidence limit for abundance and MSYR (1+)=1%, showed a decline in the abundance. The review workshop recommended additional HITTER calculations considering the option of JARPN II catches=0. This short paper presents the results of these additional calculations. It was concluded that the effect of future JARPN II catches have a negligible effect on future population trajectory of the J stock.

SC/61/NPM

1. AN, Y.R., KIM, H.W., CHOI, S.G. and KIM, Z.G. Cruise report of the Korean cetacean sighting survey in the Yellow Sea, April-May 2008.
2. AN, Y.R., PARK, K.J., CHOI, S.G. and KIM, Z.G. Abundance estimation of northwest Pacific minke whales using the Korean sighting survey in 2008.
3. CHOI, S.G., PARK, K.J., AN, Y.R. and KIM, Z.G. Plan for the Korean cetacean sighting survey in the East Sea in 2010.
4. PARK, K.J., GOTO, M., AN, Y.R., KANDA, N., KIM, Z.G. and PASTENE, L. Update of the mtDNA control region

sequencing analysis of minke whales from Korean and Japanese waters.
5. OKAMURA, H. Revised estimate of $g(0)$ for the North Pacific common minke whale.
6. KITAKADO, T. Integration of abundance estimates for the common minke whales in the Sea of Japan/East Sea and Yellow Sea.
7. MIYASHITA, T. Abundance of the J-stock common minke whale using the Japanese sighting data with $g(0)=1$.
8. KANDA, N. Update of the microsatellute analysis of minke whales from Korean and Japanese waters.
9. GOTO, M. Stock structure scenario of common minke whales from Korean and Japanese waters as revealed by genetic data.

SC/61/RMP

*1. PUNT, A.E. A note related to determining 'abrupt changes in abundance' in simulation output. 7pp.

Alternative definitions for "abrupt changes" in population size for use when evaluating simulation trials which explore the impact of environmental variation on the ability to estimate MSYR are outlined. These definitions are based on the frequency of years in which abundance drops by x% over y years. Example plots, based on the results presented by Cooke (2009), are provided.

*2. BØTHUN, G., SKAUG, H.J. and ØIEN, N. Abundance of minke whales in the northeast Atlantic based on survey data collected over the period of 2002-2007. 13pp.

To estimate abundance of Northern minke whales (*Balaenoptera acutorostrata*) in the Northeast Atlantic, partial surveys have been conducted over the period 2002-2007. Each year two vessels equipped with two independent observer platforms each, surveyed an area approximately corresponding to a Small Area as used in the RMP implementation for North Atlantic minke whales. The total abundance for the areas covered over the period 2002-2007 is 108,000 (CV 0.23). Of these, 81,000 (CV 0.23) minke whales are within the Eastern Medium Area. These estimates are in accordance with the corresponding estimates from the previous survey period 1996-2001, but the uncertainty is larger. The uncertainty estimates are corrected for inter-annual variation in the spatial distribution of minke whales (additional variance).

*3. BØTHUN, G. and SKAUG, H.J. Description and performance of an automatic duplicate identification routine. 11pp.

The routine described in this document tries to identify duplicate observations of surfacing animals based on similarities in spatial and temporal appearance. The routine is tested on simulated data with properties inherited from survey data. The parameters in the routine is set by tuning. Given the suggested parameters setting the routine is able to correctly identify around 90% of true duplicate and still keep the number of falsely identified duplicate as low as possible. This is an improvement over earlier version of the routine.

4. BØTHUN, G. Further analysis of measurement error in radial distance.

*5. SKAUG, H.J. Inferring spatial cluster structure from line transect data. 14pp.

We propose a new method, based on the Markov modulated Poisson process, for fitting a spatial Neyman-Scott process to line transect data. The method is applied to sighting survey data for Northeastern Atlantic minke whales for the period 2002-2007. Variation in effective strip half-width along the transect line is accounted for. We obtain parameter estimates for the Neyman-Scott process by survey block.

*6. SKAUG, H.J., BØTHUN, G. and ØIEN, N.I. A comparison of observed surfacing rates in minke whales between surveys and VHF tagged animals. 5pp.

We compare surfacing rates of VHF-tagged minke whales with the surfacing rate among individuals encountered in the Norwegian line transect surveys in the Northeastern Atlantic for the period 2002-2007. The question is whether VHF-data are representative for the diving behaviour of minke whales in the survey area and period, or whether the average surfacing rate estimated from VHF-tracking is negatively biased. To account for the selection bias inherent in the surveys due to clustering of surfacings and individual heterogeneity in average surfacing rate, we use simulation. We find no evidence of negative bias in the VHF-based estimate of average surfacing rate, and hence not evidence for a positive bias in the resulting abundance estimate. This is consistent with what has been found previously for the survey period 1996-2001.

7. ØIEN, N., BØTHUN, G. and KLEIVANE, L. Summary of available data on northeastern Atlantic minke whale surfacing rates.

8. ØIEN, N. Report of the 2008 survey for minke whales in the Small Management Area ES - Svalbard.

9. GUNNLAUGSSON, T. and VIKINGSSON, G.A. Thoughts on NA fin RMP implementation, hypothesis IV and research.

*10. MACLEOD, K., BURT, L., CAÑADAS, A., LENS, S., ROGAN, E., SANTOS, B., URIARTE, A., VAN CANNEYT, O., VÁZQUEZ, J.A. and HAMMOND, P.S. Distribution and abundance of fin whales and other baleen whales in the European Atlantic. 16pp.

The abundance of fin whales (*Balaenoptera physalus*) and other baleen whales was generated from data collected during shipboard sightings surveys as part of the Cetacean Offshore Distribution and Abundance in the European Atlantic project (CODA). The survey area covered offshore waters beyond the continental shelf of the UK, Ireland, France and Spain. The area was stratified into four blocks and was surveyed by five ships during July 2007. Double platform methods employing the trialconfiguration method (BT-method) were used. Fin, sei (*B. borealis*) and minke whales (*B. acutorostrata*) were positively identified, with possible sightings of blue whales (*B. musculus*). Abundance was estimated for these species and for "large baleen whales" which included fin, sei, fin/sei and blue whales. Abundance for the larger species was estimated using the Mark-Recapture Line Transect design-based method and also model-based methods using density surface modelling. Sample size limitations dictated that conventional line transect sampling methods were used to estimate the abundance of minke whales. Estimates from the two methods were comparable but model-based methods improved the precision and were considered best estimates. The density of large baleen whale species was greatest in the southern end of the survey area and water depth, temperature and distance to the 2000m contour were important predictors of their distribution. The total abundance estimated for the entire survey area was 9,019 (CV=0.11) fin whales and 9,619 (CV= 0.11) large baleen whales. The uncertainty around these estimates due to duplicate classification and species identification were explored. The fin whale estimate is likely to be underestimated because it excludes unidentified large whales, of which a large proportion was likely to have been fin whales. Notwithstanding this, these large baleen whale abundance estimates are the first robust estimates (corrected for responsive movement and g(0)) for this area. The estimated abundance of minke whales was 6,765 (CV=0.99) and sightings were restricted to the northern blocks of the survey area. The minke whale estimate, although imprecise and likely underestimated, does provide a baseline figure for this area and, when considered with results from the SCANS-II continental shelf surveys of July 2005, gives a more comprehensive picture of this species in the European Atlantic. These abundance estimates are important contributions to the conservation and management of these species in the Northeast Atlantic.

*11. GUNNLAUGSSON, T., VÍKINGSSON, G.A. and RASMUSSEN, M.H. Aerial survey in Faxaflói, southwest Iceland in 2008, report and comparison to earlier surveys. 14pp.

An aerial survey was conducted in Faxaflói area South West Iceland in late June-July 2008. This is the 12th time that this area is surveyed in a similar manner. Density of common minke whales (Balaenoptera acutorostrata), the target species in these surveys, was similar to most earlier surveys and higher than in 2007 when densities were extremely low. Distribution of minke whales within the area is apparently more concentrated in shallow waters inside the Faxaflói bay in 2008 than in any earlier survey. The relative cue distribution, duplicates and measurement errors in the 2008 survey are presented.

*12. PAXTON, C.G.M., GUNNLAUGSSON, T. and MIKKELSEN, B. Mark-recapture distance sampling of minke whales from the Icelandic, Faroese and Russian components of T-NASS. 16pp.

The Trans North Atlantic Sightings Survey (T-NASS) was a multinational synoptic survey undertaken in June/July 2007 (Figure 1 for Faroese, Icelandic and Russian regions only). Here we combine survey data collected under different observer configurations (hereafter "modes") to estimate minke whale (*Balaenoptera acutorostrata*) numbers for the Faroese, Icelandic and Russian regions of the study. An aerial survey was conducted during the same period in the CIC (Costal Icelandic Central) block and gave an estimate corrected for availability at the surface of 15,055 (95% CI 6,357, 27,278) (CV 0.36, (Pike *et al.*

2008). Duplicate data showed that this estimate was likely little affected by perception bias. The vessels had little effort and no predesigned tracks in this area so no estimate is produced here.

SC/61/SCP

1. GALES, N., CLAPHAM, P. and BROWNELL, R.L. Comments on implementation of the Annex P process in the JARPN II review.

SC/61/SD

*1. WAPLES, R.S., HOELZEL, A.R. and IWC WORKING GROUP. Under development: guidelines for the analysis of population genetic data used in an IWC management context. 7pp.

Recently, an IWC workgroup developed guidelines for quality control of DNA data. Once the data have been collected, the next step is to analyze the data and produce results that are useful for addressing practical problems in the management of cetaceans. This is a complex exercise, as a wide range of analyses are possible, and users have a wide range of choices of software programs for implementing the analyses. Here we provide an outline for a document that would provide guidelines for analysis and interpretation of genetic data in a management context. We include a few worked examples to illustrate the type of content the document might contain. We encourage comments and suggestions from managers, cetacean biologists, and geneticists to help make the final document as useful as possible.

2. BOLAÑOS-JIMÉNEZ, J. Population status of the Atlantic spotted (*Stenella frontalis*) and bottlenose (*Tursiops truncatus*) dolphins in the State of Aragua, central coast of Venezuela, on the basis of photo-id techniques (winter 2009).

*3. ROSS, H.A. and SHEARMAN, H. GenBank sequence assessment for species assignment - control region sequences published for baleen whales in 2007. 10pp.

The tree-based methods in DNA Surveillance, in conjunction with the curated reference sequence alignments known as Witness for the Whales, were used to assign species identities to the 499 sequences from baleen whales published in Genbank during 2007. All of the sequences were assigned to the same species as that recorded in Genbank. For the common minke whale, 73 of the 74 sequences were not indentified in Genbank as belonging to one of the subspecies, while they could be assigned unambiguously using the WFTW references. There was uncertainty regarding whether blue whale sequences could be assigned to a subspecies. All of the sequences appeared to be of reliable quality. No geographic information was recorded for nearly all of the sequences.

SC/61/SH

*1. FÉLIX, F., CABALLERO, S. and OLAVARRÍA, C. Genetic diversity and population sturcture of humpback whales (*Megaptera novaeangliae*) from Ecuador based in mitochondrial DNA analyese. Update of SC/59/SH11. 12pp.

Information on the genetic characterization of humpback whales (Megaptera novaeangliae) breeding off Ecuador (2º10'S, 81º00'W; Breeding Stock G) is presented. Mitochondrial DNA was extracted and sequenced from 103 skin samples collected between 2002 and 2007 to establish the genetic diversity of Ecuadorian humpback whales. Samples were obtained either from beached animals (n=4), biopsies (n=1) or sloughed skin (n=98). Twenty nine different haplotypes were found, five of which were new and unique. Haplotype diversity (h±SD) was estimated to be 0.893 ± 0.023 and the nucleotide diversity (π±SD) 0.018 ± 0.009. A pair-wise analysis of molecular variance (AMOVA) was used to compare diversity within and between other areas of known distribution for this stock in the Southeast Pacific (Colombia and Magellan Strait) and the Antarctic Peninsula. Significant differentiation at both haplotype and nucleotide levels was found only with Magellan Strait ($p<0.0001$). When data from 2006 and 2007 were stratified by sex and year, significant differences were found at both haplotype and nucleotide level between females in 2006 and females in 2007 ($p<0.01$) and between females in 2006 and males in 2007 ($p<0.05$). Although the pooled dataset analysis suggests panmixia in the Breeding Stock G, stratified data by sex and year indicate some level of heterogeneity, possibly due to differential female migrating behaviour. Such heterogeneity would be also responsible of the skewed sex proportion toward males obtained (2.5:1). Further research and a larger number of samples from different sites are required to assess appropriately the structure of this population.

*2. FÉLIX, F. and BOTERO-ACOSTA, N. Distribution and seasonal occurrence of humpback whales (*Megaptera novaeangliae*) cows with calves in coastal waters of Ecuador. 11pp.

The distribution and seasonal occurrence of humpback whales (*Megaptera novaeangliae*) cows with calves were analyzed during the breeding season (June-October) around the Santa Elena Peninsula, Ecuador (2°10' S, 81°00' W). In 571 trips carried out between 2001 and 2008 aboard whalewatching boats, 135 groups containing cows with calves were recorded: 89 cow/calf pairs alone (CC) and 46 accompanied by one or more escort whales (CE). CC groups distributed in significantly shallower waters than CE groups (18.79m, SD = 9.66 and 23.63m, SD = 10.81, respectively; $p = 0.011$); particularly during the afternoon hours when the difference was around 8m. However, the distance of the sightings to the coast was not significantly different. First CE groups were recorded 20 days after the first CC groups and peaked with a delay of five days in respect to CC groups, suggesting a segregation of cow/calf pairs in the first days after birthing. Two cow/calf pairs were recorded with the same escort, in one case after one day and in a second case after four days. The maximum span of time for an identified cow with calf in the breeding area was 61 days. Our results show similarities with other breeding areas but also some differences, which are likely caused by different breeding and nursing strategies associated to particular environmental, ecological and social pressures. We warned about the potential impact that the increase of coastal activities may have on cows with calves nursing around this area.

3. MATSUOKA, K. and PASTENE, L. Summary of photo-id information of blue whales collected by JARPA and preliminary analysis of matches in the feeding grounds.

4. ROBBINS, J., CLAPHAM, P. and MATTILA, D. Conditional humpback whale migration: a review of the evidence.

5. COLLINS, T. Updated estimates of abundance for humpback whales in Gabon using photographic and genotypic data.

6. CARVALHO, I., POMILLA, C.C., LESLIE, M.C., AY-LING LOO, J., COLLINS, T., BEST, P.B. and ROSENBAUM, H.C. Temporal patterns of population structure of humpback whales in west coast of Africa (B1-B2 sub-stocks) based on mtDNA and microsatellite variation.

7. CERCHIO, S., ERSTS, P., POMILLA, C., LOO, J., RAZAFINDRAKOTO, Y., LESLIE, M., ANDRIANRIVELO, N., MINDON, G., DUSHANE, J., MURRAY, A., COLLINS, T. and ROSENBAUM, H. Updated estimates of abundance for humpback whale breeding stock C3 off Madagascar, 2000-2006.

8. RAZAFINDRAKOTO, Y., CERCHIO, S., COLLINS, T., ROSENBAUM, H. and NGOUESSONO, S. Similarity of humpback whale song from Madagascar and Gabon indicates significant contact between South Atlantic and southwest Indian Ocean populations.

9. MURRAY, A., CERCHIO, S., JENNER, C., MCCAULEY, R., RAZAFINDRAKOTO, Y., MCKAY, S., COUGHRAN, D. and ROSENBAUM, H. Comparison of humpback whale songs in the southern Indian Ocean indicate limited exchange between populations wintering off Madagascar and western Australia.

10. PATON, D.A., BROOKS, L., BURNS, D., KNIEST, E., HARRISON, P. and BAVERSTOCK, P. Abundance estimate of Australian east coast humpback whales (breeding stock Ei) in 2005 using multi-year photo-identification data and capture-recapture analysis.

Between 1999 and 2005, vessel based surveys were conducted during the annual humpback whale northern migration off Byron Bay on the east coast of Australia. A multi year sampling and capture recapture analysis was undertaken over this 7 year period. This analysis has provided a population estimate of

6796 (95% CI 3722 – 9870) for the number of humpback whales which migrated north past Byron Bay in 2005. This population estimate is consistent with other capture recapture and land based estimates for Breeding Stock E(I) and supports the growing body of data for the recovery of this population of humpback whales. .

*11. ALLEN, J.M., CARLSON, C., VIECHNICKI, J. and STEVICK, P. Interim Report: IWC Research Contract 16, Antarctic Humpback Whale Catalogue. 8pp.

College of the Atlantic (COA) has maintained a collection of humpback whale (*Megaptera novaeangliae*) identification photographs from the Antarctic since 1987. In 1998 the International Whaling Commission (IWC) approved funding to support the expansion of this catalogue to members of the IWC, with an aim to substantially improve the accessibility and organization of the database. The collection has been internationally collaborative from its beginning, with photographic contributions from 250 researchers and opportunistic sources. During the contract period, the Antarctic Humpback Whale Catalogue (AHWC) catalogued 407 photo-identification images representing 260 individual humpback whales from Antarctic and southern hemisphere waters. These images were submitted by 27 individuals and research organizations. Photographic comparison of submitted photographs to the AHWC during the contract period yielded 16 previously known individuals. These submissions bring the total number of catalogued whales identified by fluke, right dorsal fin/flank and left dorsal fin/flank photographs to 3069, 410 and 405 respectively. This report details these findings, as well as other recent advances in the AHWC.

12. WEDEKIN, L.L., ENGEL, M.H. and AZEVEDO, A. Abundance and growth rate of the humpback whale, *Megaptera novaeangliae*, in the Brazilian breeding ground (stock A): preliminary results of the aerial survey, 2008.

Population monitoring is crucial for defining the status of a species and its conservation strategies. In order to access the distribution, abundance and growth rates of the breeding stock A of the humpback whales (*Megaptera novaeangliae*), an aerial survey was done in 2008 covering the Brazilian coast until the 500 m isobath, from 5º to 24ºS. Abundance and density were estimated through standard line-transect Distance sampling. More than 2.700 nautical miles were flew during 84 transect lines, and 308 groups of humpback whales were observed. The curve that best fitted the distance data, based on the minimum AIC, was the half-normal with simple polynomial adjustment. The abundance of whales for the Brazilian coast, considering a g(0)=0.68, was estimated to be 7920 baleias (CV = 28.30%; CI 95% = 4444 to 14115). The growth rate for this population, based on the linear regression of the abundance (log transformed) from aerial surveys from 2001 to 2008, was 6.74% (±1.4; CI 95% = 2.79 to 10.68%). Growth rates varied among the different sampling strata from 4.3 to 11.8%. The distribution was similar to the last aerial survey (2005), when the Abrolhos Bank was observed to be the main concentration area in the Brazilian coast. The density of whales in the States of Alagoas and Sergipe, north from the Abrolhos Bank, increased since 2005 and may become important breeding areas for the species in the near future. The results presented here provide important subsidies for the conservation of the species in the Brazilian coast.

*13. ALBERTSON-GIBB, R., ACEVEDO, J., OLAVARRÍA, C., AGUAYO-LOBO, A., POOLE, M.M. and BAKER, C.S. Photo-identification comparison of humpback whales from the Antarctic Peninsula/Strait of Magellan and French Polynesia (breeding stock F). 7pp.

In light of the recent documentation of humpback whale migration between American Samoa and the Antarctic Peninsula, we undertook a comparison of individual identification photographs from French Polynesia and the Antarctic Peninsula and Strait of Magellan. The French Polynesia catalogue (n=439) spans 1995-2007 seasons, and the Antarctic Peninsula/Strait of Magellan catalogues (n=369) include the 1994/1995 season through the 2007/2008 season. These three photographic catalogues were compared by two researchers independently to search for possible matches between the two regions. No conclusive matches were found, although some photos were marginal quality. Given the sample size, this is not conclusive evidence against some whales migrating to the Antarctic Peninsula from the French Polynesia breeding ground. However, it does suggest that the Antarctic Peninsula is not the primary migratory destination of the French Polynesia breeding stock (Stock Fii).

14. ALBERTSON-GIBB, R., POOLE, M., CONSTANTINE, R. and BAKER, C.S. Capture-recapture estimation of abundance for humpback whales of French Polynesia (breeding stock F) using photo-identification.

*15. SOUTH PACIFIC WHALE RESEARCH CONSORTIUM. Report of the Annual Meeting of the South Pacific Whale Research Consortium, 9-12 February 2009. 15pp.

Members of the South Pacific Whale Research Consortium met at the University of Auckland from 8-12 February, 2009 to discuss (i) the results of fieldwork and analysis conducted during 2008 and, (ii) conservation initiatives in the region. As with previous synoptic surveys dating back to the austral winter of 1999, surveys of humpback whales were conducted to collect genetic samples, individual identification photographs and song recordings in the four primary regions: New Caledonia, Tonga (Vava'u), Cook Islands and French Polynesia (Moorea). Other regions surveyed in 2008 included Samoa, American Samoa, Fiji, New Zealand, Niue, Norfolk Island, Hervey Bay, Peregian Beach and Eden. A total of 218 photo-identified individuals recorded from throughout the Oceania region during 2007 were matched against the quality-controlled Oceania region photo-ID catalogues from the years 1999-2007. This revealed additional evidence of low levels of interchange among breeding grounds of Oceania. Following the genotype match reported between French Polynesia and Colombia (breeding stocks F and G) reported in the 2008 SPWRC report, a comparison of quality controlled flukes from French Polynesia and the Antarctic Peninsula was undertaken during 2008. This comparison did not produce any confirmed matches between the two regions. Song analysis for the years 2002-2006 showed a pattern of sequential movement of unique song types from eastern Australia, east across the breeding grounds of Oceania. Members once again expressed their opposition to Japan's continued lethal research programme in the Antarctic and their concern that the ongoing or planned hunt of fin and humpback whales could negatively impact small, recovering populations some of which are the subject of long-term, non-lethal research by the Consortium.

16. GEDAMKE, J. Geographic variation in Southern Ocean fin whale song.

17. GALES, N., ROBINSON, S., DOUBLE, M., GEDAMKE, J., JENNER, C., JENNER, M., PATON, D. and KING, E. Satellite tracking of southbound East Australian humpback whales (*Megaptera novaeangliae*).

*18. FÉLIX, F., RASMUSSEN, M.H., GARITA, F., HAASE, B. and SIMONIS, A. Movements of humpback whales between Ecuador and central America, wintering area of the breeding stock G. 7pp.

We compared catalogues of photo-identified humpback whales of three research groups working in the Eastern and Southeastern Pacific region. Whales were photographed between 1991 and 2008. The entire dataset included 1,387 individuals: 1,289 from Ecuador and 98 from Costa Rica-Panama. Four matches were found between these areas, all of them were inter-year re-sightings. The largest span of time between sightings was 11 years. Our data confirms that the wintering area of the Breeding Stock G extends approximately 3,000km along the coasts of at least five countries from north of Peru to Costa Rica. A larger sample from the northern breeding area would be important to improve our knowledge on whales' migration behavior, which would have implications for management and population modeling.

*19. OLSON, P.A. Blue whale photo-identification from IWC IDCR/SOWER surveys. 6pp.

Photographs of blue whales have been collected during annual IWC IDCR/SOWER surveys since 1987-1988. The archiving and analysis of these photographs has been undertaken to aid in the assessment of Southern Hemisphere blue whales. Over 22,000 photographs were obtained from all six IWC Management Areas during 20 Antarctic research cruises through 2008-2009. 15 years of photographs are currently available and were examined to identify individuals, yielding 207 whales. Photographs of individual whales were cross-referenced within and between years. Four whales were re-sighted in multiple years, all in Area III, including one whale with a 12-year sighting interval. 21 whales were re-sighted within a season during three years: re-sighting rates within a season for 2005-2006, 2006-2007 and 2008-2009 were 11%, 17% and 20% respectively. These rates suggest that blue whales exhibit some degree of residency within a summer feeding season.

20. KELLY, N., BALL, I., GALES, N., BRAVINGTON, M.V. and NICOL, S. Characterising feeding ground habitat of baleen whales in east Antarctica: a planned analysis.

21. GALLETTI, B., BROWNELL, R.L., CABRERA, E. and CARLSON, C. First aerial surveys to estimate abundance of blue whales off southern Chile.

22. GALLETTI, B., CABRERA, E., CARLSON, C. and BROWNELL, R.L. Update of 2009 field season of blue whales off Isla de Chiloé, Chile.

*23. HEDLEY, S.L., BANNISTER, J.L. and DUNLOP, R.A. Group IV humpback whales: abundance estimates from aerial and land-based surveys off Shark Bay, western Australia, 2008. 17pp.

Single platform aerial line transect and land-based surveys of Southern Hemisphere Group IV humpback whales *Megaptera novaeangliae* were undertaken to provide absolute abundance estimates of animals migrating northward along the western Australian coast. The aerial survey flew a total of 28 flights, of which 26 were completed successfully, from 24th June-19th August 2008. The land-based survey was undertaken from Cape Inscription, Dirk Hartog Island, during the expected peak of the whales' northward migration, from 8th-20th July. During the first week of the land-based survey, some double count effort was undertaken to provide information on the numbers of pods missed from the land station. The assumed period of northward migration was 2nd June-7th September. Estimated abundance of northward-migrating whales during that time is 21,750 (95% CI: (17,550 43,000)). This estimate is based on an estimate of relative abundance of surface-available whales of 11,850 (9,550-23,450), and an estimated g(0) of 0.54 (±0.21).

24. FRANKLIN, W., FRANKLIN, T., JENNER, C., JENNER, M., GONCALVES, L., CERCHIO, S., ROSENBAUM, H., LEAPER, R., BROOKS, L. and CLAPHAM, P. Photo-identification comparison of humpback whale (*Megaptera novaeangliae*) flukes from Antarctic Area IV with western Australian, eastern Australian and east African fluke catalogues.

SC/61/SM

1. BROWNELL, R.L. Mass stranding events of pygmy killer whales, *Feresa attenuata*, from Taiwan and worldwide review.

*2. OVIEDO, L., ESTEVES, M.A., ACEVEDO, R., SILVA, N., BOLAÑOS-JIMÉNEZ, J., QUEVEDO, A.M. and FERNÁNDEZ, M. Abundance and distribution of common dolphin, *Delphinus* sp., off northeastern Venezuela: implications for conservation and management. 13pp.

The northeast coast of Venezuela hosts a high diversity of megafauna particularly related with high water productivity due to coastal upwelling. This area is mainly characterized by the existence of the greatest fisheries in Venezuela, mostly supported by a great abundance of small pelagic species. This would explain why the area supports a wide range of marine top predators, including cetaceans. The current status of cetacean populations off northeastern Venezuela is uncertain, mainly because research efforts have been very sparse. There are still many gaps of information in cetacean biology to establish a solid base-line that can be used for management decisions. Common dolphins are widely dispersed over the whole northeast basin, including waters off Araya and Paria Peninsula and the waters around Margarita, Coche and Cubagua Islands. Areas of higher densities coincide with the focal location of sardine fisheries and the most active upwelling in the northeast coast. Therefore, a scheme of management should consider the areas of major productivity along the coast as potential critical habitat for the species. Further data collection is recommended, increasing aspects as trophic ecology and the continuity of behavior sampling paired with the progression of the systematic line transect estimations.

*3. FERNÁNDEZ, M. and OVIEDO, L. Distribution and abundance of *Delphinus delphis* off the southern Pacific coast of Costa Rica. 8pp.

Short beaked common dolphin in the ETP is closely associated with one of the meso-scale physical features of the region: the Costa Rica Dome and has been termed as an indicator species for upwelling modified waters. The Southern Pacific coast off Osa Peninsula is a complex and rich marine ecosystem, cetaceans occurring within the marine habitats off Osa Peninsula, are an indication of ecosystem complexity, prey availability and overall of ecosystem health. This contribution is a preliminary spatial analysis on the distribution and abundance of common dolphins off the southern Pacific coast of Costa Rica during 2001-2006. Sightings records from 2001 - 2006 (n= 42) of short beaked common dolphin, were pooled together analyzed through descriptive statistic and incorporated into a GIS (ArcGIS 9.2). Spatial predictive models were constructed through a Gaussian Kriging Interpolation. While spatial distribution at a macro scale showed a relative proximity to the coast, the distribution of the common dolphin' APUE, and the predictive density model evidenced a particular spatial trend beyond the 200 m isobath, with an apparent absence in shelf waters. The clear distribution pattern off the shelf edge could be interpreted in association to preferred prey availability. Geographic distance and divergence between upwelling modified habitats within this region could potentially induce conditions that result in particularities in distribution patterns, potentialy related with the intensity of the jet winds responsible to the formation of thermal fronts. Further data analysis related with the latter hypothesis is in progress.

4. BOLAÑOS-JIMÉNEZ, J. Insights into the long-term residency pattern of the Atlantic spotted dolphin (*Stenella frontalis*) off the Aragua State, central Venezuela.

*5. READ, F.L., SANTOS, B., GONZÁLEZ, A.F., MARTÍNEZ-CEDEIRA, J., LÓPEZ, A. and PIERCE, G.J. Common dolphin (*Delphinus delphis*) in Galacia, NW Spain: distributions, abundance, life history and conservation. 6pp.

Galicia (NW Spain) is one of the world's main fishing areas and has a high abundance of marine mammals, the common dolphin Delphinus delphis being one of the most commonly sighted, particularly in offshore waters. The present report summarises results from recent studies on common dolphins in Galicia carried out by CEMMA in collaboration with University of Aberdeen, Instituto de Investigaciones Marinas (C.S.I.C) and Instituto Español de Oceanografía.

*6. CAÑADAS, A., BURT, L., MACLEOD, K., ROGAN, E., SANTOS, B., URIARTE, A., VAN CANNEYT, O., VÁZQUEZ, J.A. and HAMMOND, P.S. Abundance and distribution of common dolphins in the offshore NE Atlantic. 15pp.

The objectives of the Cetacean Offshore Distribution and Abundance in the European Atlantic project (CODA) were to map summer distribution, generate unbiased abundance estimates, and investigate habitat preferences of common dolphin and other cetaceans in offshore waters of the European Atlantic. The study area was stratified into four blocks and surveyed by five ships during July 2007. Survey methods replicated those used during the SCANS-II project and the survey areas were adjacent. The survey was conducted using a 'trial configuration' ('BT mode'), with two teams of observers located on each survey vessel. This document gives results for common dolphins (*Delphinus delphis*). There were a total of 165 sightings of small odontocetes from the Primary platform including 104 of common dolphins, 33 of striped dolphins and 28 of common/striped dolphins (not identified to species) encountered during 9,494 km of searching effort. Abundance estimates were obtained for common and common/striped dolphins combined, both with designbased and with model-based methods, for each block. The total abundance estimates for the whole study area were: 118,264 common dolphins (%CV=37.8; 56,915-245,740) with the design based method and 116,709 (%CV=33.7; 61,397–221,849) with the model-based method; and for common/striped dolphins combined 244,166 (%CV=48.0; 90,979-552,331) with the design-based method and 259,605 (%CV=36.9; 128,818-523,175) with the model-based method. The point estimates were very similar between the two methods for the two species groups. However, the estimated precision was much better for the model-based estimates, demonstrating the value of this approach in this case. The distribution patterns of common dolphins, with a clear preference for the Gulf of Biscay over other areas, are discussed. These results feed into a management framework developed under project SCANS II, and further developed under CODA, to determine safe bycatch limits for small cetaceans, in particular common dolphins.

7. PANIGADA, S. Winter absolute abundance of striped dolphins (*Stenella coeruleoalba*) in the Pelagos Sanctuary (western Mediterranean Sea) assessed through aerial survey.

*8. FERNANDEZ, M., OVIEDO, L., HARTMAN, K., SOUSA, B. and AZEVEDO, J.M.N. Differences in spatial distribution of two small delphinids (*Delphinus delphis* and *Stenella frontalis*) in two islands of the Azores archipelago. 6pp.

The archipelago of the Azores represents a special area of cetacean ocurrence, mostly due to its oceanic nature. In this area two small delphinids, the common dolphin and the Atlantic spotted dolphin, the former seeming to be present all year around, while the latter seems to be seasonal (summer). In this study we analyse their respective distribution in two different islands, Pico and São Miguel. Sighting records from 2005 to 2008 in Pico, and from 2008 in São Miguel, were pooled together, analyzed and incorporated into a Geographic Information System (ArcGis 9.3). In order to understand the relations between these species and the ecogeographical variables, a statistical treatment (Kruskal-Wallis) and an Ecological Niche Analisis (using Biomapper 4) were perfomed. While common dolphins and Atlantic spotted dolphins are statistically related with depth and slope in Pico, they are just statiscally related with depth in São Miguel. Moreover there are statiscal differences between their distribution in the two islands, suggesting differences on the ecological niche of the species depending on the island, probably related with differences on bathymetry features. There are also differences in distribution between common dolphins and Atlantic spotted dolphins in São Miguel, while in Pico they seem to cohabit in the same area, possibly indicating a niche overlap. In São Miguel, statiscal

differences in the distribution between the two species (in depth and in slope) are present, atlantic spotted dolphins showing more tolerance to deep waters. These results suggest the existence of differences on these two delphind populations' distributions depending on the island, probably due to different bathymetric features. Further work is being conducted in order to better understand their distribution and interactions.

9. ØIEN, N. Common dolphins *Delphinus delphis* in Norwegian waters.

10. KELLY, N., PEEL, D., BRAVINGTON, M.V. and GALES, N. A description of killer whales (*Orcinus orca*) observed in Vincennes Bay, eastern Antarctica.

During an aerial survey for Antarctic minke whales in east Antarctica in December, 2008, a notably large number of killer whales were also observed. The survey was completed using a fixed-wing aircraft and flown at 700ft. The survey area was rectangular in shape with a northern extent along latitude of 64° 47` S down to the coast; the western boundary was at 105° 52` E longitude and an eastern boundary at 113° 15` E longitude; with a total area of 60,600 km^2. During December, 2008 the sea ice edge was around 50-100km north of Vincennes Bay, but the bay itself had started to empty of ice. Allowing for errors in group-size estimation, around 370 killer whales were observed throughout the survey area; with group-sizes ranging from one to twenty. Based on their relatively small size, it is likely that the majority of the killer whales sighted during the aerial survey were Type C, with a small number of Type Bs also observed. These animals were distributed almost exclusively in less than 20% sea ice concentration, with most in ice-free areas. Most of the killer whales were observed in water less than 750m in depth, with a peak in observations around 500m. Due to the sheer number of killer whales observed, these animals featured often on the digital stills and video images taken with cameras mounted in the base of the aircraft. Adults, juveniles and calves were identifiable within these images. Another aerial survey is planned in the same region of east Antarctica next summer and there every possibility that a large number of killer whales will again be observed. In concert with altimeter and aircraft orientation data, there may also be an opportunity to extract killer whale body lengths from video and digital still images.

11. AMARAL, A.R., COELHO, M.M., BEHEREGARAY, L.B., SEQUEIRA, M., ROBERTSON, K.M. and MÖLLER, L.M. Worldwide phylogeography of the genus *Delphinus* revisited.

The genus *Delphinus* comprises two species and one subspecies: the short-beaked common dolphin, *Delphinus delphis* (Linnaeus, 1758), distributed in continental shelf and pelagic waters of the Atlantic and Pacific Oceans, the long-beaked common dolphin, *D. capensis* (Gray, 1828), distributed in nearshore tropical and temperate waters of the Pacific and Southern Atlantic Oceans, and the Arabian long-beaked common dolphin, *D. capensis tropicalis* van Bree, 1971, which occurs in the Indian Ocean. Here we present a worldwide phylogeographic study based on sequences of the mitochondrial DNA cytochrome b gene. A total of 251 individuals were analysed: 212 *D. delphis* from the Northeast and Northwest Atlantic, Northeast and Southwest Pacific; 21 *D. capensis* from the Northeast Pacific and 18 *D. capensis tropicalis* from the Indian Ocean. Haplotype and nucleotide diversities obtained were high when compared with other cetacean species, which is an expected signature of large long-term effective population size. Shared haplotypes between the two common dolphin species and subspecies were found, as well as between all oceans sampled. The median-joining haplotype network shows three differentiated groups that do not show any geographical or taxonomic correspondence. □ST and FST show that the tropicalis form is highly differentiated from both *D. delphis* and *D. capensis* populations. *D. delphis* populations from the Northeast and Southwest Pacific also show some differentiation from other populations. These results suggest that high levels of gene flow occur among populations and probably also among species, confounding population history and making the establishment of population boundaries very difficult. Several phylogeographical hypotheses for the observed pattern are currently being tested with recent developed methods that contemplate coalescent models to estimate demographic parameters. Additionally, data on at least 14 microsatellite data is being obtained in order to document the direction and magnitude of events of recent gene flow between ocean regions.

12. WESTGATE, A. and PALKA, D. Summary of current knowledge of common dolphins in US Atlantic waters.

13. DINIS, A., RIBEIRO, C., NICOLAU, C., ALVES, F. and FREITAS, L. Common bottlenose dolphin (*Tursiops truncatus*) occurrence, distribution and conservation status in Madeira Archipelago (Portugal).

Common Bottlenose dolphins are one of the best known cetacean species of the world. It has a cosmopolitan distribution and can be found in most of the world's warm temperate to tropical seas, in coastal as well as offshore waters. In the Northeast Atlantic is present from the west coast of Africa to the North of Scotland, including the Macaronesia region. Genetic studies that compared samples from Madeira Archipelago with the neighboring archipelago of Azores, Portugal-mainland and the region of Western North Atlantic indicates that bottlenose dolphins of North Atlantic belong to a large oceanic population and that levels of gene flow are high among these units. In order to access species distribution, occurrence and conservation status in Madeira archipelago, systematic nautical surveys (2001-2002, 2004; 2007-2008, 7811 km) were conducted, as well as photo-identification studies (1997-2007) and data on stranding records (1997- February 2009) and opportunistic sightings (1995-2008) was collected. A total of 44 sightings for surveys, 10 strandings records and 490 opportunistic sightings were recorded. For surveys common bottlenose dolphin was one of the three most abundant species during surveys, together with Atlantic spotted dolphin (*Stenella frontalis*) and common dolphin (*Delphinus delphis*). Monthly sighting index (sightings/100km) for systematic nautical surveys ranged between 0,00 (March) and 1,09 (December). Fifty-five photo-identification events allowed building a catalog with 170 individuals, including 21 with one or more annual resightings. Strandings for common bottlenose dolphin represents 9% of total stranding records and post-mortem exams reveal that 20% of deaths were related with anthropogenic causes. The distribution shows that the north of Porto Santo island has the highest sighting index (1,33) and that the species occurs more in inshore waters, up to 1000m depth and 11km offshore. Regional conservation status for this species is Least Concern (LC) and the IUCN is Data Deficient (DD). All data combined shows that Madeira Archipelago is an important area for this species, with year-round presence, high occurrence and heterogeneous distribution within the archipelago which indicates the existence of important sub-areas used for feeding, nursing and resting. .

14. BROPHY, J.T., MURPHY, S. and ROGAN, E. The diet and feeding ecology of the common dolphin (*Delphinus delphis*) in the northeast Atlantic.

15. CERCHIO, S., ANDRIANRIVELO, N., RAZAFINDRAKOTO, Y. and ROSENBAUM, H. Coastal dolphin hunting in the southwest of Madagascar: status of populations, human impacts and conservation actions.

16. VIEIRA, N., TEIZEIRA, A. and BRITO, C. Occurrence and relative abundance of common dolphins along the Portuguese mainland shore.

Throughout the years some researchers have dedicated their efforts to the study of cetaceans' occurrence off Portugal mainland. However, it is still missing a systemic scientific methodology for studying the presence of coastal small cetaceans. This work is a recent approach on the occurrence and relative abundance estimative of common dolphins (*Delphinus delphis*) off the west central coast of Portugal. Boat-based visual surveys were conducted in three different geographic locations, resulting in the sighting of several species; the most frequently observed small dolphin is the common dolphin. Occurrence of large groups of this species seems to take place along main ocean topographic features, like the Portuguese submarine canyons and we consider that great depths near shore are suitable habitats for more pelagic species of dolphins such as common dolphins. Future studies using linear transects and continuous long-term approaches will give further insight to small cetaceans' occurrence along Portugal mainland and its relation with different oceanographic features, particularly depths and distances to shore. On-going efforts in coming years added to this first approach will be required to obtain knowledge for the conservation of cetaceans.

17. BRITO, C., TEIZEIRA, A. and VIEIRA, N. Historical accounts about the occurrence and capture of common dolphins in Portugal mainland.

Historical oral sources indicate that common dolphins (*Delphinus delphis*), locally known as "toninhas", were observed and captured in large numbers off Portugal mainland during late 19th and 20th centuries. Historical occurrences given by naturalists and biologists indicate their presence all year round along the coast, with particular preference for certain areas. Also, recent observations of opportunity resulted in the same king of accounts. Between 1976 to 1978, a research for captured cetaceans in fish markets along the Portuguese shore was conducted and resulted in a total count of 45 cetaceans. Most captures were of small cetaceans (87% common dolphins), even though four baleen whales were registered. These cetacean captures were part of a local non industrial fishery, as they were not the main target, rather opportunistic catches or even by-catches of other fisheries. Delphinids were not protected by law at the time and were caught with hand harpoons or accidentally drowned in fish nets, sometimes sold at major fish markets like Sesimbra, Peniche and Póvoa de Varzim. In Portugal mainland a legislation protecting cetaceans came up in 1981, and since then only sporadic captures or by-catches occurred. In geographic areas where recent sightings are rare and information is sparse, becomes important to recur to alternative sources of data. Our contribution towards the compilation of

relevant "forgotten science", such as historical naturalistic observations, whaling data and observations of opportunity, will add new data to the occurrence of common dolphins in a poorly studied region. .

18. BRITO, C. and VIEIRA, N. Captures of 'toninhas' in Angloa during the 20th century.

References to the capture of "toninhas", a Portuguese word used to common dolphins, *Delphinus delphis* (or eventually to stripped dolphins, *Stenella coeruleoalba*), are part of the 20th century fishing statistics of Angola. National fishing books for this former Portuguese colony, where consulted in the National Institute of Statistic in Lisbon and data, between 1940 and 1969, were obtained. Information, together with other captured fishes, is given in tons and, globally, 48.3 tons of "toninhas" were obtained. If we considered that these animals may height between 75 to 150 kg, we can calculate that number of captured individuals may vary between 320 and 650. There were some variations in the amounts of captures in each year, but they were almost continuous along the years. Even though, we cannot be completely certain about the species captured, as several small dolphins occur off Angola, it is evident that a fishing effort directed to these cetaceans did occur in the region. This is a small, but relevant, contribution to the knowledge about the global captures of small cetaceans, and is also indicative of their occurrence in this region.

*19. WINSHIP, A., MURPHY, S., DEAVILLE, R., JEPSON, P.D., ROGAN, E. and HAMMOND, P.S. Preliminary assessment and bycatch limits for northeast Atlantic common dolphins. 8pp.

Bycatch of common dolphins Delphinus delphis in the Northeast Atlantic is an international conservation issue. We assessed the impact of previous bycatch on this population and calculated preliminary bycatch limits that would be expected to achieve a specific conservation objective. The main result of the assessment was that the combination of data and model used was not informative about the main population parameters of interest: population growth rate, maximum population growth rate and carrying capacity. Given the shortcomings of the assessment, a preferable approach to calculating bycatch limits is a fully-tested procedure that can be expected to achieve conservation objectives in the face of the large uncertainties. We developed tunings of two such procedures (PBR and CLA) for common dolphins in the Northeast Atlantic. Preliminary bycatch limits ranged from 0.1-1.1% of the most recent point estimate of abundance depending on the procedure and the tuning to meet specific conservation objectives.

20. STOCKIN, K.A. and ORAMS, M.B. The status of New Zealand common dolphins (Genus *Delphinus*).

21. SHADBOLT, T., ELLIOTT, W. and COOPER, E. A review of the status and major threats to narwhal populations across their range.

Narwhals are one of the only cetaceans to occupy a special ecological niche in the Arctic ecosystem where many other mammals probably could not survive. They are considered an apex predator in the Arctic food chain. However narwhals are listed as Near Threatened by IUCN, and are subject to several threats, including climate change and overharvesting in some areas. This paper reviews the status of Narwhals, the predicted impact of climate change on the species, and the current sustainability of narwhal harvest across its range.

22. CREMER, M.J., SIMÕES-LOPES, P.C. and FLORES, P.A.C. Reviewing the status of the franciscana population in protected bay in southern Brazil as a tool for the establishment of a marine protected area.

23. JARAMILLO-LEGORRETTA, A., ROJAS-BRACHO, L., GERRODETTE, T. and TAYLOR, B. Report of the Vaquita Expedition 2008 and current conservation actions.

24. FLORES, P.A.C., OTT, P.H., MEIRELLES, A.C.O., SILVA, F.J.L., PARO, A., WEDEKIN, L.L. and HUBNER DE JESUS, A. Revisiting the conservation status of Guiana dolphin (*Sotalia guianensis*).

25. LAURIANO, G. Abundance estimate of striped dolphins in the Pelagos sanctuary through line transect surveys.

*26. AINLEY, D., BALLARD, G. and OLMASTRONI, S. An apparent decrease in the prevalence of 'Ross Sea killer whales' in the southern Ross Sea. 16pp.

Killer whales (*Orcinus orca*), both ecotype-B and -C, are important to the Ross Sea, Antarctica, ecosystem; the type-C referred to hereafter as "Ross Sea killer whale" (RS killer whale). Herein we review existing data on occurrence patterns and diet of RS killer whales, and present data on numbers observed in the southwestern Ross Sea. These "resident" whales appear to feed principally on fish, including Antarctic toothfish (*Dissostichus mawsoni*). On the basis of sea watches on the outer coast of Ross Island beginning in 2002-03, sighting frequency and average group size began to decrease beginning 2006-07 and thereafter; prevalence also decreased in nearby McMurdo Sound. We discuss trends with respect to environmental change as well as the initiation of industrial fishing for toothfish beginning in 1996-97. Consistent with a decrease in the catch-per-unit-effort of scientific fishing for toothfish in McMurdo Sound, we suggest that the change in Ross Sea killer whale numbers is related to a contraction of the toothfish stock, and not to changes in the physical environment. We surmise that in this closely-coupled foodweb, composed of very abundant penguin, seal and whale components, loss of the toothfish option for Ross Sea killer whales would force more direct competition for the smaller-fish prey. Therefore, the killer whales have opted to move out of the region.

27. MIRIMIN, L., VIRICEL, A., AMARAL, A.R., MURPHY, S., NORTHRIDGE, S., RIDOUX, V. and ROGAN, E. Population genetic structure of common dolphins in the north-east Atlantic using microsatellite loci and mtDNS control region markers.

*28. QUINTANA-RIZZO, E. Human-related problems affecting wild dolphin populations in the Pacific coast of Guatemala.

Many cetacean species are found along coastal areas, and thus are vulnerable to a variety of human activities. As part of a study examining the diversity, abundance, and distribution of costal cetacean species in the Pacific Coast of Guatemala, I have been able to identify two problems affecting small cetaceans' populations in the country: entanglement of dolphins in fishing nets and dolphin harpooning. Dolphins are harpooned to use their meat as shark bait. Interviews with fisherman indicate that the harpooning is a relatively common practice, which is used in two situations: 1) when fishermen do not have enough bait to catch sharks and 2) when sharks do not seem to like the non-dolphin bait provided by fishermen. Shark fishing is one the main practices used in some coastal towns. Shark fishing uses a technique called "cimbra", a pelagic longline that can be up to 10-15 km long and have a variable number of hooks. A cimbra can use a combination of bait. When only dolphin meat is used, this requires the killing of three dolphins. A cimbra that uses a combination of non-dolphin meat and dolphin meat requires killing one dolphin. Harpoons used to kill dolphins are long metal bars approximately 2 m long with a detachable sharpened head. In 2005, 353 fishermen were registered to have at least one cimbra in approximately 255 km of coastline. It is estimated that approximately 468,735 pounds of sharks are caught annually. Another problem faced by small cetaceans includes the incidental entanglement in fishing nets. On March 14, 2009, three dead dolphins were entangled in a ghost fishing net approximately 200 m long. According to the fisherman who works in the project, this type of net is used illegally to capture swordfish (*Istiophorus platyperus*) in offshore waters. The net probably floated with the currents close to shore as it was found at 3.5 nautical miles from the coast. Two of the dolphins, a male and a female, were in advanced stage of decomposition and were tentatively identified as *Tursiops truncatus*. Based on their size, they were probably adults. The third dolphin was a fresh carcass that probably got entangled that day. A necropsy revealed that this dolphin was a juvenile female *T. truncatus* 204 cm long in good health condition. A few days after the incident, a local fisherman reported to have seen at least 10 more dead dolphins in another location. Those animals were not entangled; just floating in the water at approximately 10 miles from shore.The fisherman who saw them said that they were in advance stage of decomposition and thus, their identification was not possible. Since it is uncommon to see these high number of dead dolphins in an area, it seems that their death was human related. One fisherman reported that around 20 dolphins get entangled in his net on a monthly basis. Mortality rates due to entanglement or harpooning have not been quantified or even studied in the country. Thus, their effects on local cetacean populations are unknown, but these preliminary reports indicate that the problems are potentially serious and should be studied. The documentation of the problems can help to raise awareness because the government has not taken any actions to try to resolve them.

29. FREITAS, L., DINIS, A., NICOLAU, C., RIBEIRO, C. and ALVES, F. An evaluation of common dolphin (*Delphinus delphis*) distribution, occurrence and conservation status in Madeira (Portugal), 2001 to 2008.

Assessment of population parameters is of primary importance to define a species conservation status and to apply management strategies. The waters around the Macaronesian archipelagos (NE Atlantic) bear common dolphin (Delphinus delphis) as one of the most abundant species, but apart from genetic studies that suggest a single population for this region, the available scientific information for this species in each archipelago is scarce. In order to evaluate the species distribution, occurrence and conservation status in Madeira archipelago we conducted a multiple assessment based on nautical (16,255km) and aerial (14,007km) monthly surveys and opportunistic sightings between 2001 and 2008 within predefined areas up to 40km off Madeira, Desertas and Porto Santo

islands. Additionally, stranding reports taken from 1986 to February 2009 were analyzed in order to assess temporal distribution and anthropogenic threats. With a total of 567 records from surveys and opportunistic sightings, common dolphin was found to be among the three most abundant species, together with Atlantic spotted dolphin and common bottlenose dolphin. Both nautical and aerial surveys showed that common dolphin annual average ranged between 11 and 32% of all taxa. Although common dolphin could be found year-round according to strandings and opportunistic records, the surveys indicated a clear seasonal pattern, defined as highly abundant in winter and spring and rare in summer and autumn. The number of sightings per 100km varied between 0 and 4.34 from January to May and was almost absent in the remaining months. When compared to the remaining observed species, common dolphin was mainly found inhabiting more inshore waters, up to 10km of the coast, which could explain the lower frequency observed in the more offshore predefined area (between Madeira and Porto Santo). It was found mainly in groups of average of 10 to 30 individuals (min. 1, max. 200). No relevant change was observed in the frequency along the study period. The post-mortem exams from 36 strandings of common dolphin (33% of all strandings) between 1994 and 2007 revealed that 25% of dead was related to anthropogenic origin (mainly incidental catches), 36% of natural causes and 39% undetermined. Due to this species high occurrence and since no direct threat was found to cause impact to population level, the opted regional conservation status for common dolphin in Madeira is coincident with the 2008 IUCN global status, as LC. The common dolphin high occurrence, as well as birthing and feeding, in Madeira archipelago, makes these waters an important area for this species distribution within the Macaronesian region.

SC/61/WW

*1. SCARPACI, C., LÜCK, M. and PARSONS, E.C.M. Recent advances in whalewatching research: 2008-2009. 25pp.

Whalewatching research encompasses a wide variety of disciplines and fields of study, including monitoring the biological impacts of whalewatching activities on cetaceans and assessments of the effectiveness of whalewatching management and regulations, to the sociological and economic aspects of whalewatching on communities hosting such activities. This article is the latest in a series of annual digests, which describes the variety and findings of whalewatching studies published over the past year, since June 2008. This article is the latest in a series of annual digests, which describes the variety and findings of whalewatching studies published since June 2008.

*2. LUKSENBERG, J. and PARSONS, E.C.M. The effects of aircraft on cetaceans: implications for aerial whalewatching. 10pp.

The effects of anthropogenic noise on marine mammals are a rich subject for study and have attracted considerable attention in the past two decades. Aircraft noise may not only affect the biology of cetaceans but may also skew aerial survey data. Since 1995 few studies have been published, but these have documented behavioral responses of cetaceans to aircraft in much greater detail.. This paper reviews and discusses progress in the study of aircraft noise effects on marine mammals since the landmark review of Richardson et al. (1995). In each of the studies reviewed here, cetaceans responded to aircraft to some extent, in most cases by diving. Several major gaps in knowledge on the effects of noise on marine mammals also apply to aircraft noise, e.g. quantification of received sound level, the role of vision, knowledge of baseline behavior, the effect on vocalizations. The possible implications for whalewatching by aircraft are discussed.

3. BOLAÑOS-JIMÉNEZ, J. Empowering local communities for responsible development of dolphin watching in Venezuela.

4. AVILA, I.C. and CORREA, L.M. Characterisation of whalewatching and its effects on behaviour of humpback whales in Bahía Málaga, Colombia, South America.

Bahía Málaga is the most important whalewatching site in Colombia, and its effect on whale behavior is a concern. The effect of whalewatching vessels on the behavior of humpback whales (*Megaptera novaeangliae*) was evaluated in the entrance of the Bahía Málaga, a breeding area (3˚53'N, 77˚22'W) from August to September, 2008. During 346.9 daytime hours from a 20 m high shore platform we sighted 2.4 groups per hour in the 28 km2 area. Most groups contained one adult or one adult plus one calf. We observed 18 whalewatching vessels with at least 6,663 tourists. Principally small boats (30-40 feet long) with a 10–30 person capacity are used in whalewatching, and a 1 hr whalewatching tour costs approximately $8USD. To evaluate the effect of whalewatching vessels on whales behavior, we followed during 71 hrs 39 whale groups (92.3% of these were adult-calf groups) using group-follow method and incident sampling before, during and after the whalewatching vessels arrived at the focal whale group. Each group of whales was typically observed by three whalewatching vessels (range = 1-42), for an average of 30.7 min per vessel. The modal distance of approach of whalewatching vessels towards whales was about 60.6 m. Upon sighting a whale, these vessels predominately pursued (92.3%) the whales, at fast speeds (>20 knots) (84.6%). When whalewatching vessels were present, whales presented more aerial behavior (flippering, tailslapping, spinbreaching, chinbreaching, tailbreaching) ($Q=9.68$; $p=0.008$), fast displacement (>3 knots) ($Q=35.08$; $p<0.001$) and erratic displacement ($Q=48.00$; $p<0.001$). Resting was significantly lower during the presence of whalewatching vessels ($Q=22.64$; $p<0.001$), and agitation did not change ($Q=0.66$; $p=0.716$). Considering the ecological importance of Bahía Málaga and particularly its importance as a whalewatching area, we recommend the development of sustainable tourism to minimize short-term effects on the behavior of whales and to vouch for the economic support of the local community.

*5. ANDREU, E., GALLEGO, P. and CERVERA, J.L. Long-finned pilot whale (*Globicephala melas*) response to whale-watching vessels in the Strait of Gibraltar. 14pp.

Four species of resident cetaceans coexist in the Strait of Gibraltar, of which the long-finned pilot whale is the most frequently observed. Our study was carried out between May and September during the past 4 years. Data was collected on the response of the target species towards whale-watching vessels (initial and general), and was categorised in 3 groups: approximation, indifference, and evasion. These 3 categories were statistically confronted against different variables (i.e. wind scale, wind direction, sea state, sighting duration, association with other vessels, etc.) using a table of contingencies. The response - be it initial or general - was statistically significant (p-value < 0,05) when confronted to some of the analysed variables. One of the main results of the study shows that the largest part of long-finned pilot whales sightings were represented by approximation or indifferent initial and general behavior towards the whale-watching vessels. Most of the evasive behavior was observed in the seasons of 2004 and 2005, coinciding with an increase in discoordination among whale-watching operators. We conclude that the evasive behavior of pilot whales in the Strait of Gibraltar is directly related to the cooperation between whale-watching vessels which is directed at limiting the activity's impact. In view of the results, it seems necessary to establish a carrying capacity for the number of whale-watching opreators in the Strait of Gibraltar and increase the collaboration between operators in order to ensure the activity is sustainable. It is also necessary to adjust the whale-watching codes of conduct with Morocco, as most sightings take place in Moroccan waters. This code of conduct should be implemented and enforced by a bilateral control body from Spain and Morocco.

*6. SCHAFFAR, A., MADON, B., GARRIGUE, C. and CONSTANTINE, R. Avoidance of whalewatching boats by humpback whales in their main breeding ground in New Caledonia. 9pp.

In recent years, whale and dolphin watching activities have developed rapidly in the South Pacific Island region. In particular, the presence of humpback whales during winter months attracts thousands of tourists every year. New Caledonia is one of the leading countries for humpback whale-watching in this region, with the industry focusing on the whale's main reproductive area in the southern lagoon of the island, recently listed as a World Heritage site. The growth of whale-watching activities in New Caledonia has remained uncontrolled since its start in 1995 and, until 2008 no measures had been implemented for the management of this industry. With concerns regarding the sustainability of these activities, a study was conducted between 2005 and 2007 in order to assess the effect of boats on the behaviour of a small endangered population of humpback whales overwintering in New Caledonia. All observations were made from a land-based research station, from which humpback whales were tracked in the presence and in the absence of boats using a theodolite. A multiple linear regression analysis showed that whales significantly increased their dive time from 2.7 (±2.4) to 3.1mins (±1.9), and decreased the linearity of their path when boats were present within 1000m of the animals. The effect on linearity also proved to increase with the number of boats. The combined use of vertical and horizontal avoidance strategies, commonly used by many species to avoid predators, suggests that the presence of boats represents a major disturbance for humpback whales. Due to the high site fidelity of the New Caledonian humpback whale population, such impact has the potential to be cumulative over the years. This short-term behavioural impact is also likely to induce higher energetic costs and could have longer term implications for humpback whales breeding in New Caledonia.

7. ROBBINS, J. and FROST, M. An online database for worldwide tracking of commercial whalewatching and associated data collection programs.

8. FLORES, P.A.C., DE O. LUNA, F. and MARTINS DA SILVA, J. Insights on dolphinwatching in Brazil.

9. GROCH, K.R., PALAZZO, J.T., CORREA, A.A., DA ROCHA, M.E.C., SERAFINI, P. and MOREIRA, L.M.D.P. Development of whalewatching activities in southern Brazil: conservation implications for right whales.

*10. SIRONI, M., LESKE, N., RIVERA, S., TABOADA, D. and SCHTEINBARG, R. New regulations for sustainable whalewatching at Península Valdés, Argentina. 10pp.

Whalewatching began informally at Península Valdés, Argentina in 1971. The activity was first regulated by Provincial Law 2381 in 1984. Since then, the number of tourists going on whale-watch tours to see southern right whales on this nursery ground increased dramatically, from 17,446 in 1991 to 113,148 in 2007 (548%). With this increase, changes in many aspects of the activity required that the regulations be updated and adapted to the new conditions. In a previous paper (Sironi et al. 2005) we described aspects of the local whalewatch regulations that by the 2000s had become inapplicable and that were analyzed during a workshop held in 2004. Here, we report the progress made in Chubut Province to improve whalewatch regulations from 2004 to the present. We provide a timeline of the history of whalewatching and associated events at Península Valdés for the period 1971-2009, including changes in commercial activity, permits granted to whalewatch companies, regulations, and the main points of the new Law 5714 for the conservation of the southern right whale enacted in 2008 that regulates the activity. We also provide statistics for whalewatching at Península Valdés updated to 2008.

11. SEQUEIRA, M., SILVA, M.A., DINIS, A., ELEJABEITIA, C., DE STEPHANIS, R., URQUIOLA, E., NICOLAU, C., PRIETO, R., OLIVEIRA, C., CRUZ, M.J. and FREITAS, L. Review of whalewatching activities in mainland Portugal, the Azores, Madeira and Canary archipelagos and the Strait of Gibraltar.

In areas where whales and dolphins concentrate on a regular basis, whalewatching activities tend to be implemented gradually, followed by a substantial growth. If improperly managed and regulated, this industry can have severe impacts on the cetacean populations targeted, as well as on their habitat. This paper intends to be a review of whalewhatching activities in mainland Portugal, the Macaronesian region (the Azores, Madeira and the Canary Islands) and the Gibraltar Strait. Whenever possible, data for each area include: 1) whalewatching history, including year of beginning of the activities, major areas, most abundant species; 2) types of platforms used, mean duration of trips, detection of animals (land based, active search); 3) legislation in place, including date of entry in force, compliance and enforcement; 4) number of companies licensed, number of visitors per year, expected growth and income; 5) information on whether impact assessment was carried (for species and areas) before allowing the activity and methodology used and 6) major problems identified.

SC/61/O

*1. WAPLES, R.S. and PLUMMER, M. Towards a scientific framework for assessing lethal vs non-lethal take of cetaceans. 3pp.

Assessing the utility of lethal vs non-lethal techniques for collecting information on cetaceans is a complex exercise, as a full assessment of this issue requires evaluation a host of normative factors (e.g., value judgements; tolerances of various types of risks; ethical considerations). On the other hand, some aspects of the assessment are largely scientific and can (in theory at least) be conducted in an objective manner. We briefly outline one possible framework (based on cost-effectiveness analysis) for conducting scientific assessments of the relative merits of lethal vs non-lethal sampling of cetaceans. We do not claim that the proposed framework is definitive, nor that it necessarily includes all important technical considerations. Rather, we suggest that it might be useful as a starting point for discussions about how to move forward with scientific evaluation of this key feature of scientific whaling.

*2. SKAUG, H.J., SCHWEDER, T. and LAAKE, J.L. The effect of heterogeneity in line transect surveys with discrete cues. 18pp.

We propose a new method, based on the Markov modulated Poisson process, for fitting a spatial Neyman-Scott process to line transect data. The method is applied to sighting survey data for Northeastern Atlantic minke whales for the period 2002-2007. Variation in effective strip half-width along the transect line is accounted for. We obtain parameter estimates for the Neyman-Scott process by survey block.

3. NISHIWAKI, S. Cruise report of the second phase of the Japanese Whale Research Program under Special Permit in the Antarctic (JARPA II) in 2008/09.

4. TAMURA, T. Cruise report of the second phase of the Japanese Whale Research Program under Special Permit in the western North Pacific (JARPA II) in 2008 (part I) - offshore component.

5. YOSHIDA, H. Cruise report of the second phase of the Japanese Whale Research Program under Special Permit in the western North Pacific (JARPN II) in 2008 (part II) - coastal component off Kushiro.

6. YASUNAGA, G. Cruise report of the second phase of the Japanese Whale Research Program under Special Permit in the western North Pacific (JARPN II) in 2008 (part II) - coastal component off Sanriku.

7. NISHIWAKI, S. Movements of Bryde's whales in the western North Pacific as revealed by satellite tracking experiments conducted under JARPN II.

8. KATO, H. Stauts report on conservation and management of western gray whales in Japan: May 2008-April 2009.

9. RIBEIRO, C., ALVES, F., DINIS, A., NICOLAU, C. and FREITAS, L. Monitoring programme of cetaceans in the waters of Madeira archipelago.

The Madeira Whale Museum established in 2004, a monitoring programme directed to the cetaceans populations occurring in Madeira waters. This programme resulted from the project "Project for the Conservation of cetaceans in Madeira archipelago – CetaceosMadeira" and involves nautical and aerial surveys, photo-id studies, a stranding network and monitoring of whale-watching and fisheries activities. Its scientific aims are: to update the knowledge on cetacean biology (e.g. population dynamics, distribution, occurrence); follow the identified threats and detect new ones and its impacts upon cetaceans; maintain a regular update on the conservation status of the cetacean species in the archipelago. The overall goal of this programme is to provide scientific knowledge to managers and government in order to promote measures for the conservation and sustainable management of the Madeira Cetacean populations. The programme is being slowly implemented in its different components and it is expected to be fully implemented by 2012. To date, 28 cetacean species were reported to Madeira archipelago representing an important natural richness to preserve, for its value to the marine ecosystem and biodiversity and for its economic value for the local whale watching industry. Among them are large whales (e.g. sperm whale, fin whale, or Bryde's whale), beaked whales and delphinids (e.g. Common Bottlenose dolphin, Atlantic spotted dolphin or common dolphin). Although all species are targeted on the monitoring programme, the most vulnerable to human activities and the most frequent will have special attention.

10. VIKINGSSON, G.A., OLAFSDOTTIR, D., GUNNLAUGSSON, T., PAMPOULIE, C., HALLDORSSON, S.D., GALAN, A., SVANSSON, V., KJELD, M., AUDUNSSON, G.A. and DANIELSDOTTIR, A.K. Research programme on common minke whales (*B. acutorostrata*) in Icelandic waters. A progress report, May 2009.

*11. CARREIRA, S., RIBEIRO, C. and FREITAS, L. Madeira Whale Museum educational program. 2pp.

The importance given to education is nowadays more evident, being recognised its relevance in the individual education and thus contributing for their social fit. Currently, the present idea of education is not restricted to the "classroom" and in that scope the Museums have assumed an important role as an educative space that can be seen in a wider learning context. Associated to the multiple spaces that promote education is inherent a non-formal learning which also include a variety of know-how to explore. In that sense the Madeira Whale Museum (MWM) developed the MWM Educational Programme available for all the Madeiran teaching schools and for the general population, thus becoming an institution able to develop a great multitude of contents/activities related with the marine environment. This theme can be studied through several sciences: biology, maths, physics, geography, oceanography and chemistry among others. Therefore, the MWM Educational Programme can act as a complement in the teaching process of the several school subjects and give an integrating vision of the marine environment. Being empathic animals for most people, cetaceans are just by themselves a good way to promote scientific education. Therefore we

will use this educational feature as a learning vehicle to promote the knowledge of the school curriculum contents of the several subjects.

*12. ALVES, F. and FREITAS, L. Compilation of scientific literature of cetaceans for Madeira region in 2001-2008. 22pp [with Annexes 134pp].

The IWC scientific committee annual meetings are important events to disseminate relevant information that directly or indirectly contributes to establish adequate conservation and management measures to cetaceans. The 2009 edition in Madeira is no exception, and therefore we take the opportunity to present an information document compiling the resume of papers that are either published, in press, submitted, or in preparation, project reports and thesis featuring relevant scientific information for cetaceans in Madeira (and Macaronesia) waters between 2001-2008. Full versions of the papers are also presented in the annexes for consult. All information included in these papers and reports were collected and analyzed by Madeira Whale Museum, and in collaboration with Department of Oceanography and fisheries from University of Azores and with INETI laboratory (Portugal). We hope this information document can contribute to better knowledge cetaceans' habitat use in this region and to help applying conservation measures. This is a "For Info" document for exclusive use at the IWC 61SC (Madeira, June 2009) and cannot be cited elsewhere without the authors' permission. The list of scientific literature included in this info document is presented at Index. **Annexes available on request**.

13. RINALDI, C., SEARS, R., STEVICK, P.T. and CARLSON, C. First resighting of a humpback whale between the French lesser Antilles and the North Atlantic feeding grounds off Canada.

*14. AINLEY, D. A history of the exploitation of the Ross Sea, Antarctica. 15pp.

Recent analyses of anthropogenic impacts to marine systems have shown the Ross Sea to be the least affected stretch of ocean on Earth, although historical effects were not included in the study. Herein the literature is reviewed to quantify the extent of extraction of biological resources from the Ross Sea continental shelf and slope beginning at the start of the 20th century; none preceded that. An intense extraction of Weddell seals *Leptonychotes weddellii* by the heroic expeditions and then by New Zealand to feed sled dogs in the 1950-80s caused the McMurdo Sound population to permanently decrease; otherwise no other sealing occurred. Blue whales *Balaenoptera musculus intermedia* were extirpated from waters of the Shelf Break Front during the 1920s, and have not reappeared. Minke whales *B. bonaerensis* likely expanded into their vacated habitat, but were then hunted during the 1970-80s; their population has since recovered. Some minke whales are now taken in "scientific whaling", twice more from the slope compared to the shelf. Other hunted cetaceans never occurred over the shelf and very few ever occurred in slope waters, and therefore their demise from whaling does not apply to the Ross Sea. No industrial fishing occurred in the Ross Sea until the 1996-97 austral summer, when a fishery for Antarctic toothfish *Dissostichus mawsoni* was initiated, especially along the slope. This fishery has grown since then with effects on the ecosystem recently becoming evident. There is probably no other ocean area where the details of biological exploitation can be so elucidated. It does appear that the Ross Sea continental shelf remains the least affected of any on the globe; the same can not be said of the slope.

15. HAKAMADA, T., MIYASHITA, T. and HATANAKA, H. Examination of the effects of planned tasked by Japanese small-type coastal whaling on 'O' and 'J' stock common minke whales.

16. CHILDERHOUSE, S. Report of the planning workshop of the Southern Ocean Research Partnership (SORP), Sydney, Australia 23-26 March 2009.

17. CHILDERHOUSE, S. Summary of outcomes from the planning workshop of the Southern Ocean Research Partnership (SORP), Sydney, Australia 23-26 March 2009.

SC/61/Progress Reports

*Argentina. 14pp.
*Australia. 25pp.
*Croatia. 9pp.
*Denmark. 5pp.
*Germany. 14pp.
*Italy. 25pp.
Republic of Korea.
*Mexico. 12pp.
*New Zealand. 11pp.
*Norway. 6pp.
*Spain. 15pp.
*USA. 45pp.

SC/61/Reps

*1. INTERNATIONAL WHALING COMMISSION. The Report of the Expert Workshop to review the ongoing JARPN II programme, 26-30 January 2009, Yokohama, Japan. 57pp.

SC/61/ForInfo

*1. WELLER, D.W. 2008. Report of the Large Whale Tagging Workshop convened by the US Marine Mammal Commission and US National Marine Fisheries Service, 10 December 2005, San Diego, California, USA. Contract Report to the US Marine Mammal Commission. Available from *http://www.mmc.gov/pdf/final_tagging_82608.pdf*. 32pp.

*2. DI GUARDO, G. 2008. Letter to the Editor. Dolphin morbillivirus in the Mediterranean Sea. Aquatic Mammals 34(4): 514-515.

*3. FERNÁNDEZ, A., ESPERÓN, F., HERRAÉZ, P., ESPINOSA DE LOS MONTEROS, A., CLAVEL, C., BERNABÉ, A., SÁNCHEZ-VIZCAINO, J.M., VERBOUGH, P., DE STEPHANIS, R., TOLEDANO, F. and BAYÓN, A. 2008. Morbillivirus and pilot whale whales, Mediterranean Sea. Emerging Infectious Diseases 14(5): 792-794.

An outbreak of a lethal morbillivirus infection of longfinned pilot whales occurred in the Mediterranean Sea from the end of October 2006 through April 2007. Sequence analysis of a 426-bp conserved fragment of the morbillivirus phosphoprotein gene indicates that the virus is more closely related to dolphin morbillivirus than to pilot whale morbillivirus.

*4. KRAHN, M.M., PITMAN, R.L., BURROWS, D.G., HERMAN, D.P. and PEARCE, R.W. 2008. Use of chemical tracers to assess diet and persistent organic pollutants in Antarctic Type C killer whales. *Marine Mammal Science* 24(3): 643-663.

Measuring chemical tracers in tissues of marine predators provides insight into the prey consumed and the predator's contaminant exposure. In this study, samples from Type C killer whales (*Orcinus orca*) biopsied in Antarctica were analyzed for chemical tracers (i.e., stable isotopes of carbon and nitrogen, fatty acids, and persistent organic pollutants [POPs]). Profiles of these individual tracers were very different from those of killer whale populations that have been studied in the eastern North and eastern Tropical Pacific. For example, _13C and _15N stable isotope values and most POP concentrations were significantly lower in the Antarctic population. In addition, multivariate statistical analyses of both fatty acid and POP profiles found distinctly different patterns for Antarctic Type C whales compared to those from whales in the other populations. Similar assays were conducted on four species of Antarctic marine fish

considered potential prey for Type C killer whales. Results were consistent with a diet of fish for Type C whales, but other species (e.g., low trophic level marine mammals or penguins) could not be eliminated as supplemental prey.

*5. HERMAN, D.P., MATKIN, C.O., YLITALO, G.M., DURBAN, J.W., HANSON, M.B., DAHLHEIM, M.E., STRALEY, J.M., WADE, P.R., TILBURY, K.L., BOYER, R.H., PEARCE, R.W. and KRAHN, M.M. 2008. Assessing age distributions of killer whale *Orcinus orca* populations from the composition of endogenous fatty acids in their outer blubber layers. *Marine Ecology Progress Series* 372: 289-302.

Knowledge of the age distributions of killer whale *Orcinus orca* populations is critical to assess their status and long-term viability. Except for accessible, well-studied populations for which historical sighting data have been collected, currently there is no reliable benign method to determine the specific age of live animals for remote populations. To fill this gap in our knowledge of age structure, we describe new methods by which age can be deduced from measurements of specific lipids, endogenous fatty acids (FAs) and FA ratios present in their outer blubber layers. Whereas correlation of wax and sterol esters with age was reasonable for female 'resident' killer whales, it was less well-defined for males and 'transients.' Individual short-, branched-, and odd-chain FAs correlated better with age for transients and residents of both sexes, but these single parameter relationships were population specific and seemingly varied with long-term diet. Alternatively, a simple, empirical multi-linear model derived from the combination of 2 specific FA ratios enabled the ages of individual eastern North Pacific killer whales to be predicted with good precision ($\sigma = \pm 3.8$ yr), appeared to be independent of individual diet and was applicable to both genders and ecotypes. The model was applied to several less well-studied killer whale populations to predict their age distributions from their blubber FA compositions, and these distributions were compared with a population of known age structure. Most interestingly, these results provide evidence for the first time that adult male transient killer whales appear to have lower life expectancies than do their resident counterparts in Alaska.

*6. KISZKA, J., PELOURDEAU, D. and RIDOUX, V. 2009. Use of body and dorsal fin disfigurements to assess the prevalence of fishery interactions in small cetaceans. *Western Indian Ocean Journal of Marine Science*: accepted*. 10pp.

*This paper has been accepted for publication in *Western Indian Ocean Journal of Marine Science* as: Kiszka, J., Pelourdeau, D. & Ridoux, V. Body scars and dorsal fin disfigurements as indicators of interactions between small cetaceans and fisheries around the Mozambique Channel island of Mayotte.

Cetacean bycatch in fisheries occur in all oceans of the world. These interactions may have both lethal and nonlethal consequences (body injuries). In the lagoon of Mayotte (12°50'S, 45°10'E), in the northern Mozambique Channel, two main types of fisheries occur: handlining (inside the lagoon) and longlining (outside the barrier reef, over the insular slope). Here we aimed to characterise the level of interactions between small cetaceans and fisheries in this area using photo-identification photographs taken from July 2004 to April 2008 during dedicated cetacean surveys. Photographs were taken of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), melonheaded whales (*Peponocephala electra*) and short-finned pilot whales (*Globicephala macrorhynchus*). Injuries on the dorsal region (especially the dorsal fin) were characterised and associated to fisheries or intra-/interspecific interactions (with sharks and other cetacean species). Results suggest interactions with fisheries with the three species around Mayotte. Occurrence of interactions was the highest in the most coastal species, i.e. *T. aduncus*. This study underlines that interactions between fisheries and small cetaceans occur at varying levels around Mayotte. It also confirms the interest of the study of occurrence of body scars as an indicator of fishery exposure in cetaceans.

*7. CORKERON, P.J. 2008. Marine mammals' influence on ecosystem processes affecting fisheries in the Barents Sea is trivial. *Biology Letters* doi: 10.1098/rsbl.2008.0628. 3pp.

Some interpretations of ecosystem-based fishery management include culling marine mammals as an integral component. The current Norwegian policy on marine mammal management is one example. Scientific support for this policy includes the Scenario Barents Sea (SBS) models. These modelled interactions between cod, *Gadus morhua*, herring, *Clupea harengus*, capelin, *Mallotus villosus* and northern minke whales, *Balaenoptera acutorostrata*. Adding harp seals *Phoca groenlandica* into this top-down modelling approach resulted in unrealistic model outputs. Another set of models of the Barents Sea fish–fisheries system focused on interactions within and between the three fish populations, fisheries and climate. These model key processes of the system successfully. Continuing calls to support the SBS models despite their failure suggest a belief that marine mammal predation must be a problem for fisheries. The best available scientific evidence provides no justification for marine mammal culls as a primary component of an ecosystem-based approach to managing the fisheries of the Barents Sea.

*8. CORKERON, P.J. 2009. Reconsidering the science of scientific whaling. *Marine Ecology Progress Series* 375: 305-309.

Scientific whaling is one of the most publicly contentious applications of marine ecological research today. An evaluation of the second phase of Japan's Institute of Cetacean Research (ICR) program in the western North Pacific (JARPN II) is soon to be conducted under the auspices of the Scientific Committee (SC) of the International Whaling Commission (IWC). Previous IWC SC reviews identified serious problems with the programs, yet reached inconsequential conclusions, and the JARPN II review is the first under a new format. The basic design of this study—forestomach sampling coupled with acoustic and trawl surveys for prey—is an unsophisticated approach to investigating the foraging ecology of *Balaenoptera* spp. Published results of the JARPN II feasibility study demonstrate problems with the execution of field work. Data analyses were simplistic. Nonlethal studies into the foraging ecology of Balaenoptera spp., using far fewer resources, have produced more definitive information. The recent changes in the IWC SC review process should result in unambiguous advice on how to improve the design of JARPN II. If the review recommends improvements that are not acted upon by the program's proponents, the IWC may need to decide whether the JARPN II program can be considered to be scientific research under Article VIII of the International Convention for the Regulation of Whaling.

*9. SIMMONDS, M.P. and ELIOTT, W.J. 2009. Climate change and cetaceans: concerns and recent developments. *Journal of the Marine Biological Association of the United Kingdom* 89(1): 203-210.

At least a quarter of the world's cetaceans were recently confirmed as endangered and the situation may be worse as the status of many others remains unclear. Climate change is affecting the oceans and a number of studies have recently highlighted its potential impact on cetacean species - for example, there are important linkages between sea ice and krill, the primary prey for baleen whales in Antarctica. This paper provides a synthesis of new information available on this theme and considers its implications for the future conservation and management of cetacean populations and species. The more mobile (or otherwise adaptable) cetaceans may be able to respond to climate related changes, although the extent of this adaptability is largely unknown. However, there is broad agreement that certain species and populations are likely to be especially vulnerable to climate related changes, including those with a limited habitat range, or those for which sea ice provides an important habitat for the cetacean population and/or that of their prey. International conservation bodies, such as the Convention for Migratory Species and the International Whaling Commission, are striving to address these issues. The challenges presented by climate change require an innovative, large scale, long term and multinational response from scientists, conservation managers and decision makers. This response that should encompass a precautionary approach, including addressing the detrimental effects of other factors negatively impacting populations and species.

*10. NATOLI, A., CAÑADAS, A., VAQUERO, C., POLITI, E., FERNANDEZ-NAVARRO, P. and HOELZEL, A.R. 2008. Conservation genetics of the short-beaked common dolphin (*Delphinus delphis*) in the Mediterranean Sea and in the eastern North Atlantic Ocean. *Conservation Genetics.* DOI 10.1007/s10592-007-9481-1. 9pp.

Mediterranean Sea common dolphins have recently been listed as 'endangered' in the IUCN Red list, due to their reported decline since the middle of the 20th century. However, little is know about the number or distribution of populations in this region. We analysed 118 samples from the Black Sea, Mediterranean Sea and eastern North Atlantic at nine microsatellite nuclear loci and for 428 bps of the mtDNA control region. We found small but significant population differentiation across the basin between the eastern and the western Mediterranean populations at both nuclear and mtDNA markers (microsatellite FST = 0.052, mtDNA FST = 0.107, P values B 0.001). This matched the differential distribution and habitat use patterns exhibited by this species in the eastern and the western parts of the Mediterranean Sea. The assignment test of a small number of samples from the central Mediterranean could not exclude further population structure in the central area of the basin. No significant genetic differentiation at either marker was observed among the eastern north Atlantic populations, though the Alboran population (inhabiting the Mediterranean waters immediately adjacent the Atlantic ocean) showed significant mtDNA genetic differentiation compared to the Atlantic populations. Directional estimates of gene flow suggested movement of females out of the Mediterranean, which may be relevant to the population decline. Phylogenetic analysis suggested that the observed population structure evolved recently.

*11. NATOLI, A., CAÑADAS, A., PEDDEMORS, V.M., AGUILAR, A., VAQUERO, C., FERNÁNDEZ-PIQUERAS, P. and HOELZEL, A.R. 2006. Phylogeography and alpha taxonomy of the common dolphin (*Delphinus* sp.). *J. Evol. Biol.* 19:

943-954.

The resolution of taxonomic classifications for delphinid cetaceans has been problematic, especially for species in the genera *Delphinus*, *Tursiops* and *Stenella*. The frequent lack of correspondence between morphological and genetic differentiation in these species raises questions about the mechanisms responsible for their evolution. In this study we focus on the genus *Delphinus*, and use molecular markers to address questions about speciation and the evolution of population structure. *Delphinus* species have a worldwide distribution and show a high degree of morphological variation. Two distinct morphotypes, long-beaked and short-beaked, have been considered different species named *D. capensis* and *D. delphis*, respectively. However, genetic differentiation between these two forms has only been demonstrated in the Pacific. We analysed samples from eight different geographical regions, including two morphologically defined long-beaked form populations, and compared these with the eastern North Pacific populations. We found high differentiation among the populations described as long-beaked instead of the expected monophyly, suggesting that these populations may have evolved from independent events converging on the same morphotype. We observed low genetic differentiation among the short-beaked populations across a large geographical scale. We interpret these phylogeographical patterns in the context of life history and population structure in related species.

*12. KOSKI, W.R., MOCKLIN, J., DAVIS, A.R., ZEH, J., RUGH, D.J., GEORGE, J.C. and SUYDAM, R. 2009. Abundance of Bering-Chukchi-Beaufort bowehad whales (*Balaena mysticetus*) in 2004 estimated from photo-identification data. *J. Cetacean Res. Manage.* Submitted. 11pp.

Photographic surveys were conducted near Point Barrow during the spring migrations of the Bering-Chukchi-Beaufort (BCB) Seas stock of bowhead whales in 2003 and 2004 and in the northern Bering Sea in spring and near Barrow in fall of 2005. The 2003 survey was the most complete photographic survey of the population conducted to date. These surveys provided photo-identification data for use in capture-recapture analyses. A screening procedure was used to define which whales captured in 2003, 2004 and/or 2005 were marked and could be reidentified if photographed on another occasion, and an estimate of the number of marked whales was obtained using a closed population model for capture-recapture data. To account for unmarked whales, this estimate was divided by an estimate of the proportion of the bowhead population that is marked based on the 1989-2004 spring photographic surveys near Point Barrow. Abundance of the BCB bowhead population in 2004 was estimated to be 11,800 with CV 0.255, 95% confidence interval (7,200; 19,300) and 5% lower limit 7,800. This abundance estimate is consistent with expectations based on the results of the ice-based count of bowheads in 2001 and trends in abundance since 1978.

*13. FRANKLIN, W., FRANKLIN, T., GIBBS, N., CHILDERHOUSE, S., GARRIGUE, C., CONSTANTINE, R., BROOKS, L., BURNS, D., PATON, D., POOLE, M., HAUSER, N., DONOGHUE, M., RUSSELL, K., MATTILA, D.K., ROBBINS, J., ANDERSON, M., OLAVARRÍA, C., JACKSON, J., NOAD, M., HARRISON, P., BAVERSTOCK, P., LEAPER, R., BAKER, S. and CLAPHAM, P. 2009. Eastern Australia (E1 breeding grounds) may be a wintering destination for Area V humpback whales (*Megaptera novaeangliae*) migrating through New Zealand waters. *J. Cetacean Res. Manage.* In review. 13pp.

An update of SC/60/SH3. Investigation of the migratory movement of humpback whales past New Zealand in the 1950s and early 1960s suggested that the primary factor influencing the migratory flow past New Zealand was behaviour associated with breeding and feeding. To the north humpback whales gathered in concentrated breeding assemblages, along the Great Barrier Reef, Australia and nearby islands of the Western Pacific, at locations with suitable coastal conditions. To the south humpback whales dispersed widely across the Antarctic Area V feeding areas. Discovery Tag marks provided the first evidence of linkages between Eastern Australia, New Zealand and Oceania and Antarctic Area V feeding areas and also revealed low levels of intermingling of individual humpbacks between isolated tropical breeding grounds in Western Australia, Eastern Australia and Oceania. A simultaneous, near total collapse of the Eastern Australian, Norfolk Island, New Zealand and Oceania stocks occurred in the early 1960s as a result of commercial whaling, particularly the illegal whaling conducted by the Soviets in the Area V feeding areas. Recent photo-identification and genetic studies have identified at least five discrete breeding sub-populations in Australia and Oceania: Western Australia (D), Eastern Australia (E1), New Caledonia (E2), Tonga (E3), French Polynesia and the Cook Islands (F). Also evident are low levels of intermingling amongst breeding sub-populations consistent with the degree of genetic differentiation. Photo-identification has confirmed linkages between Antarctic Area V feeding areas and Eastern Australia and one genotype match has been reported between Antarctic Area V feeding areas and Oceania breeding grounds. Recent abundance estimates show steady increases of the Eastern Australian population, some recovery in the New Caledonia and Tonga population with little evidence of recovery at other known Oceania breeding grounds and in New Zealand. Studies to date have provided no conclusive evidence of the migratory destination of the New Zealand population traveling from Antarctic Area V feeding areas to tropical breeding grounds. Photo-identification matches were undertaken between humpback whale fluke catalogues from Eastern Australia (EA, n=1315), Oceania East (OE, n=513), Oceania West (OW, n=166) and New Zealand (NZ, n=13). Five matches were found between OE/OW, four matches between OW/EA and three matches between NZ/EA. The data are used to investigate and discuss the migratory destination of humpback whales traveling through New Zealand waters. We suggest the hypothesis that humpback whales with site fidelity to Eastern Australia may migrate past the South Island of New Zealand including through the Cook Strait and Foveaux Strait.

*14. FRANKLIN, T., FRANKLIN, W., BROOKS, L., GIBBS, N., CHILDERHOUSE, S., SMITH, F., BURNS, D., PATON, D., GARRIGUE, C., CONSTANTINE, R., POOLE, M., HAUSER, N., DONOGHUE, M., RUSSELL, K., MATTILA, D.K., ROBBINS, J., OSTERMANN, A., LEAPER, R., HARRISON, P., BAKER, S. and CLAPHAM, P. 2009. The Balleny Islands and Ross Sea (Antarctic Area V) may be the summer feeding area for Eastern Australian (E1 breeding group) humpback whales (*Megaptera novaeangliae*). *J. Cetacean Res. Manage.* In review. 12pp.

An update of SC/60/SH2. Discovery mark tagging provided the first evidence of linkages between Eastern Australian and Oceania Humpback whale breeding grounds and the Antarctic Area V feeding areas. Early investigation of movements of humpback whales in the Western Pacific led to the view that the Balleny Islands and the Ross Sea were the summer destination for humpbacks from Eastern Australia and the Oceania breeding grounds. Recent photo-identification studies provided further evidence of low levels of migratory interchange and complex linkages within Oceania and between Eastern Australia and Oceania. We report here the migratory movement of three humpback whales (Megaptera novaeangliae) between Eastern Australia (E1 breeding grounds) and the Area V Antarctic feeding area in the vicinity of the Balleny Islands. Using photo-identification techniques, comparisons between a Balleny Island fluke catalogue (n = 11 individuals), and existing fluke catalogues from Eastern Australia (n = 3120 individuals) and Oceania (n = 725 individuals), yielded three matches to Hervey Bay, Byron Bay and Ballina in Eastern Australia and no matches to Oceania. The Eastern Australia catalogue (n = 3120) was made up of Hervey Bay (n = 1556), Byron Bay, (n = 916) and Ballina (n = 648). The Oceania catalogue (n = 725) is made up of Tonga (n = 282); New Caledonia (n = 160); French Polynesia (n = 159); New Zealand (n = 41); Cook Islands (n = 36); American Samoa (n = 31); Vanuatu, Niue, Samoa and Fiji (n = 11) and Norfolk Island (n = 5). Only three previous individual photo-identification matches have been reported between Eastern Australia (E1 breeding grounds) and Antarctic Area V feeding areas in the vicinity of the Balleny Islands and the Ross Sea. Only one genotype match has been reported between Antarctic Area V feeding areas and Oceania breeding grounds. An analysis of the frequencies of whales seen and not seen in the Balleny Islands, Oceania and Eastern Australia, relative to the expected frequencies, based on the estimated population sizes and the sizes of the catalogues, supports the hypothesis that the summer feeding area for Eastern Australian humpback whales is Antarctic Area V, in the vicinity of the Balleny Islands and the Ross Sea.

*15. WARING, G. *et al*.,. 2009. North Atlantic right whale (*Eubalaena glacialis*): western Atlantic stock. Draft chapter in Waring *et al.*: US Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Report 2009. 11pp.

*16. PARSONS, E.C.M., DOLMAN, S.J., JASNY, M., ROSE, N.A., SIMMONDS, M.P. and WRIGHT, A.J. 2009. A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: best practise? *Marine Pollution Bulletin* 58: 643-651.

The United Kingdom's statutory conservation agency, the Joint Nature Conservation Committee (JNCC), developed guidelines in 1995 to minimise acoustic disturbance of marine mammals by oil and gas industry seismic surveys. These were the first national guidelines to be developed and have subsequently become the standard, or basis, of international mitigation measures for noise pollution during seismic surveys. However, relatively few aspects of these measures have a firm scientific basis or proven efficacy. Existing guidelines do not offer adequate protection to marine mammals, given the complex

propagation of airgun pulses; the difficulty of monitoring in particular the smaller, cryptic, and/or deep-diving species, such as beaked whales and porpoises; limitations in monitoring requirements; lack of baseline data; and other biological and acoustical complications or unknowns. Current guidelines offer a 'common sense' approach to noise mitigation, but in light of recent research and ongoing concerns, they should be updated, with broader measures needed to ensure adequate species protection and to address data gaps.

*17. CAÑADAS, A., DESPORTES, G. and BORCHERS, D. 2004. The estimation of the detection function and *g*(0) for short-beaked common dolphins (*Delphinus delphis*), using double-platform data collected during the NASS-95 Faroese survey. *J. Cetacean Res. Manage.* 6(2): 191-198.

This paper examines the data for common dolphins collected during a general double-platform line transect cetacean survey carried out in waters around the Faroe Islands in 1995 (from southeastern Iceland to western Ireland) in order to determine the extent to which a correction factor can be estimated to account for animals missed on the trackline and for responsive movement towards the vessel. Amajor assumption of conventional distance-based methods is that all objects at zero distance from the line are detected (i.e. $g(0)=1$). If this assumption is violated the estimated density and hence abundance will be negatively biased. It also assumes that animals do not respond to the survey vessel before they are detected by the observers. If the animals are attracted to the vessel, for example, this will result in a positively biassed estimate. The $g(0)$ estimate was obtained using the method of Borchers *et al*. (1998). Visual inspection of the data suggested that the dolphins were attracted to the vessel and this was accounted for following the Buckland and Turnock (1992) approach. Coefficients of variation (CVs) and confidence intervals (CIs) were estimated using a non-parametric bootstrap procedure. During the survey, almost 1,700 n.miles were sailed on primary research effort. There were 153 common dolphin sightings including 52 duplicates. The chosen model for the detection function incorporated perpendicular distance, group size and Beaufort sea state. The resulting estimate of g(0) was 0.7961 (CV=0.14). Density estimates obtained under an assumption of no responsive movement are almost six times higher than when it is taken into account, highlighting the importance of collecting appropriate data to allow analysis of this potential problem in cetacean surveys.

*18. CAÑADAS, A. and HAMMOND, P.S. 2008. Abundance and habitat preferences of the short-beaked common dolphin *Delphinus delphis* in the southwestern Mediterranean: implications for conservation. *Endangered Species Research* 4: 309-331.

The Mediterranean sub-population of short-beaked common dolphin is believed to have suffered a steep decline in the Mediterranean in recent years, and in 2003 it was listed as endangered in the IUCN Red List of Threatened Species. Effective conservation will depend critically on our understanding of the relationship between the species and its habitats. The Alborán Sea is believed to be the most important remaining Mediterranean habitat for this species, and thus constitutes a vital source of information for the development of conservation measures. We used spatial modelling to estimate the abundance and explore the habitat use of common dolphins in this area, examining regional, seasonal and interannual variations, as well as the influence of biological factors such as presence of calves, interspecific relationships and behaviour. From 1992 to 2004, 37 385 km of non-systematic line transects generated 738 sightings in a 19 189 km2 study area. The point estimate of abundance was 19 428 (95% CI = 15 277 to 22 804) dolphins. Seasonal and geographical variations in abundance were detected, with higher average density in summer than in winter, and in the Western Alborán Sea than in the east Gulf of Vera, which has different physical/environmental characteristics. No overall trend in abundance was observed in the Alborán area. However, a decline was observed in the Gulf of Vera, with a summer density 3-fold lower in the period from 1996 to 2004 than in 1992 to 1995. A potential link of this decline with prey depletion due to the exponential growth of aquaculture in the area is discussed. Clear differences in habitat use were also found when examining the influence of biological factors. In particular, groups with calves and groups that were feeding preferred more coastal waters. This result could have important implications for the development of conservation measures for this species in the Mediterranean.

*19. KISZKA, J., CHARLIER, F. and RIDOUX, V. 2009. Individual and group behavioural reactions of small delphinids to remote biopsy sampling. *Marine Mammal Science*. Submitted. 7pp.

Assessing the impact of invasive research techniques on threatened marine species is critical to satisfy societal standards of animal welfare. Biopsy sampling is an effective technique to collect cetacean skin and blubber samples for various biological and ecological studies. However, determining the impact of this research practice is important, as impact may vary among sites, species and gear used. We examined the short-term behavioral reactions of four delphinid species (*Stenella longirostris*, *Stenella attenuata*, *Tursiops aduncus* and *Peponocephala electra*) to remote biopsy sampling around the tropical island of Mayotte (12°50'S, 45°10'E), in the southwest Indian Ocean. Two scales of behavioral reactions were considered: 1- the behavioral reaction on the individual (hit or missed), and 2- the effect on the focal group in which the targeted individual belonged to. Three main categories of behavioral responses were defined: low, moderate and strong. This study underlines that biopsy sampling induces moderate reactions of individuals. No inter-specific variations of responses, both at the scale of individuals and focal groups, were observed. No effect of group size and activity pattern was observed on levels of behavioral reactions. However, it was clear that biopsy success during sampling sessions were higher in species with large group size. This study confirms the low impact of remote biopsy sampling in small delphinids, both at the scale of individuals and groups.

*20. TAVARES, M., MORENO, I.B., SICILIANO, S., RODRIGUEZ, D., DE O. SANTOS, M.C., LAILSON BRITO JR, J. and FABIAN, M.E. 2009. Biogeography of common dolphins (genus *Delphinus*) in the southwestern Atlantic Ocean. *Mammal Review*. Accepted. 29pp.

1. The common dolphins (genus *Delphinus*) present one of most problematic taxonomies and complex distribution patterns among all cetaceans. Although the taxonomy and the distribution seem to have been clarified in the eastern North Pacific and Indo-Pacific Oceans, these questions are still unclear in the Southwestern Atlantic Ocean (SWA). 2. We reviewed data from strandings, incidental catches and sightings since 1922. Systematic surveys were conducted in five major areas. Twenty one natural history collections were examined to measure 135 skulls. 3. A total of 184 records of common dolphins were compiled. They apparently occur in three stocks in the SWA: one located in northern Brazil and two others from southeastern Brazil (~22ºS) to central Argentina (~42ºS). Two distinct patterns in habitat use by depth were observed: in southeastern Brazil, sightings were restricted to coastal waters, with depths ranging from 18 to 70 m. On the other hand, in the area that extends from southern Brazil to Central Argentina (from 28°S to 42°S), sightings were recorded in deeper waters, ranging from 71 m to 1,435 m, with the exception of occasional coastal sightings. The cranial analyses demonstrated that both short and long-beaked forms occur in the SWA. 4. In the SWA, *Delphinus* seems to occur associated to areas of higher productivity. One stock is associated with the productive waters discharged by the Amazon River and possibily with the coastal upwelling system off the coast of Venezuela, while the other stocks are correlated to the Cabo Frio upwelling system and the Subtropical Convergence. Our results indicate that the current taxonomy does not adequately reflect the amount of variation within the genus in the world.

*21. IVASHCHENKO, Y.V. and CLAPHAM, P.J. 2009. Bowhead whales, *Balaena mysticetus*, in the Okhotsk Sea. *Mammal Review*. In review. 24pp.

Little is known about the endangered population of bowhead whales, *Balaena mysticetus*, in the Okhotsk Sea (OS). Here, we review existing information about this stock, including much previously untranslated material published in Russian. Whaling for OS bowheads began in either 1846 or 1847, was pursued intensively for two decades, and continued sporadically until about 1913. Catches rsumed in 1967 when the USSR began killing bowheads illegally, although the number of whales aken remains unknown. Estimates of the pre exploitation population size have ranged from 3,000 to 20,000 whales, but all such estimates are based upon incomplete data (primarily from 19th century whaling) and untested assumptions; a better estimate cannot be attempted without further investigations of whaling logbook data to separate bowhead whale catches from those of North Pacific right whales (*Eubalaena japonica*). Information on historical and current distribution comes from whaling records (notably Townsend 1935) and from modern (notably Russian/Soviet marine mammal surveys. The latter include 41 surveys aimed at cetaceans, and others in which bowhead sightings were incidentally made during seal surveys; most of these surveys were conducted by Russian or Soviet observers, but interpretation of their results is frequently complicated by a lack of detail on methods and effort. Little is known about winter distribution; however, at least one Russian report suggests that OS bowheads can overwinter in pack ice. In spring and summer, bowheads spread out over open water, with known concentrations in Shelikhov Bay (northeastern OS) and off the Shantar Archipelago (northwestern OS). Although historical whaling data show bowheads in Shelikhov Bay in summer and early autumn, recent sightings there have not been later than June. However, this view is inevitably biased by effort, and it is noteworthy that extensive 19th century catches were made over much of the northern OS. Given this, it is likely that the present range and habitat use of the population is broader than existing data suggest. Although some areas of known present or historical concentration of bowheads correspond broadly with zones of biological productivity (including the Yamskoy upwelling near Shelikhov Bay,

Kashevarova Bank, and the waters around Iona Island), too little is known of these linkages to draw conclusions regarding factors which may determine habitat preferences. There is equivocal evidence for age or reproductive class segregation between Shantar and Shelikhov Bay, with the former hosting immature whales and lactating females and the latter adult whales. Genetic data indicate that the OS stock is separate from the Bering-Beaufort-Chukchi population, but that the two populations share a common ancestry, with mixing in the evolutionary past. There is no historical nor current evidence that bowheads ever leave the OS. From sighting data, Russian observers have put the current size of the OS stock in the low hundreds, but this is not based on quantitative analysis. Mark-recapture genotype data give the only current estimate of minimum abundance, at 247 whales; however, this is based on a single resighting between years, and may refer only to the whales found at Shantar, the only site where they have been studied in recent years. Overall, the OS bowhead population is very likely relatively small and remains unrecovered from the illegal Soviet whaling of the 1960's. Dedicated surveys and other research are required to better assess its status and conservation needs.

*22. SCHWEDER, T., SADYKOVA, D., RUGH, D.J. and KOSKI, W.R. 2009. Population estimates from aerial photographic surveys of naturally and variably marked bowhead whales. *JABES*. Accepted. 26pp.

Abundance, mortality and population growth of bowhead whales (*Balaena mysticetus*) are estimated from captures of 4894 putatively different individuals obtained from ten years of systematic photographic surveys conducted during the spring migration when most of the Bering-Chukchi-Beaufort population of bowheads migrates past Point Barrow, Alaska. A stringent matching protocol designed to prevent false positive matches of the naturally but variably marked individuals led to 42 resightings between years. The flip side of this stringency is a presence of false negatives, i.e. some true recaptures are not recognized as such. The problem of false negatives is addressed by modeling the capture process and the matching process. The captures of an individual are assumed to follow a Poisson process with intensity depending stochastically on the individual whale and on the year. The probability of successfully matching a capture to a previous capture is estimated by logistic regression on the degree of marking and image quality. Individuals are recruited by the Pella-Tomlinson population model, and their mortality rate is assumed to be constant. The point estimate of yearly growth rate is 3.2%, and bowhead abundance in 2001 is estimated to be 8250, similar to previous estimates.

*23. REEVES, R.R. and BROWNELL, R.L. 2009. Indo-Pacific bottlenose dolphin assessment workshop report: Solomon Islands case study of *Tursiops aduncus*. *Occasional Papaers of the Species Survival Commission*. 40. IUCN, Gland, Switzerland. 53pp.

Executive summary. Full report available on request.

*24. AINLEY, D., BALLARD, G., BLIGHT, L.K., ACKLEY, S., EMSLIE, S.D., LESCROEL, A., OLMASTRONI, S., TOWNSEND, S.E., TYNAN, C.T., WILSON, P. and WOEHLER, E. 2009. Impacts of cetaceans on the structure of Southern Ocean food webs. *Marine Mammal Science*. In press. 13pp.

*25. GERBER, L.R., MORISSETTE, L., KASCHNER, K. and PAULY, D. 2009. Should whales be culled to increase fishery yield? *Science* 323: 880-881.

*26. MORISSETTE, L., MELGO, J.L., KASCHNER, K. and GERBER, L. 2009. Modelling the trophic role of marine mammals in tropical waters: data requirements, uncertainty and validation. *Fisheries Center Research Reports* 17(2). 113pp.

*27. HAMMOND, P.S., MACLEOD, K., GILLESPIE, D., SWIFT, R., WINSHIP, A., BURT, M.L., CAÑADAS, A., VÁZQUEZ, J.A., RIDOUX, V., CERTAIN, G., VAN CANNEYT, O., LENS, S., SANTOS, B. and ROGAN, E. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). 43pp without appendices; 164pp with appendices.

*27-A. MACLEOD, K., BURT, M.L., CAÑADAS, A., ROGAN, E., SANTOS, B., URIARTE, A., VAN CANNEYT, O., VÁZQUEZ, J.A. and HAMMOND, P.S. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). Appendix I. Design-based estimates of cetacean abundnace in offshore European Atlantic waters. 16pp.

*27-B. CAÑADAS, A., BURT, M.L., MACLEOD, K., ROGAN, E., SANTOS, B., VÁZQUEZ, J.A. and HAMMOND, P.S. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). Appendix II. Model-based estimates of cetacean abundance in offshore European Atlantic waters. 19pp plus figures.

*27-C. CERTAIN, G., RIDOUX, V. and VAN CANNEYT, O. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). Appendix III. Scale-dependent spatial modelling of the distribution of a marine predator: fin whale distribution in the Bay of Biscay. 19pp.

*27-D. SWIFT, R.J., GILLESPIE, D., VÁZQUEZ, J.A., MACLEOD, K. and HAMMOND, P.S. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). Appendix IV. Abundance of sperm whales (*Physeter macrocephalus*) estimated from acoustic data for Blocks 2, 3 and 4 (French and Spanish sectors). 11pp.

*27-E. WINSHIP, A. and HAMMOND, P.S. 2009. Cetacean offshore distribution and abundance in the European Atlantic (CODA). Appendix V. Management framework to assess the impact of bycatch and recommend safe bycatch limits for common dolphin and other small cetaceans. 44pp.

*28. MORISSETTE, L., KASCHNER, K., MELGO, J.L. and GERBER, L.R. 2009. Are whales a threat to fisheries? demystify the myth in the Caribbean marine ecosystem. *Conservation Biology*. Submitted. 35pp.

*29. JEFFERSON, T.A., FERTL, D., BOLAÑOS-JIMÉNEZ, J. and ZERBINI, A. 2009. Distribution of common dolphins (*Delphinus* sp.) in the western Atlantic Ocean: a critical re-examination. *Mar. Biol*. 156: 1109-1124.

Due to indications that misidentifcation (largely confusion among dolphins of the genera *Delphinus* and *Stenella*) in the past had led to erroneous assumptions of distribution of the two species of common dolphins (*Delphinus delphis* and *D. capensis*) in the western Atlantic Ocean, we conducted a critical re-examination of records of the genus *Delphinus* from this region. We compiled 460 'plottable' records, required support for confirmation of genus and species identifications, and found many records lacking (and some clearly misidentified). When we plotted only the valid records (n = 364), we found evidence of populations in only three areas, and apparent absence throughout much of the tropical/subtropical regions. Off the east coast of the US and Canada, *D. delphis* is found from the Georgia/South Carolina border (32°N) north to about 47–50°N off Newfoundland. Since the 1960s, they have apparently been absent from Florida waters. There is no evidence that dolphins of the genus occur in the Gulf of Mexico. Reports of common dolphins from most of the Caribbean Basin are also rejected, and the only place in that region where they are conWrmed to occur is off central-eastern Venezuela (a coastal *D. capensis* population). Off eastern South America, common dolphins appear to be restricted to south of 20°S. There is a coastal long-beaked population found in the South Brazil Bight, and one or more short-beaked populations south and offshore of this (ranging south to at least northern Argentina). The results are very different from commonly-accepted patterns of distribution for the genus in the Atlantic. Most areas of distribution coincide with moderate to strong upwelling and common dolphins appear to avoid warm, tropical waters. This study shows that great care must be taken in identification of similar-appearing long-beaked delphinids, and that uncritical acceptance of records at face value can lead to incorrect assumptions about the ranges of the species involved.

*30. BEARZI, G., REEVES, R.R., NOTARBARTOLO DI SCIARA, G., POLITI, E., CAÑADAS, A., FRANTZIS, A. and MUSSI, B. 2003. Ecology, status and conservation of short-beaked common dolphins *Delphinus delphis* in the Mediterranean Sea. *Mammal Review*. 33(3): 224-252.

1. The recent decline in the Mediterranean population of short-beaked common dolphins *Delphinus delphis* has been the subject of scientific controversy and political indifference. Research on these animals has been very limited and there has been no large-scale, systematic effort to assess and monitor their

abundance and distribution. The consequent lack of data has prevented a good understanding of historical and ongoing trends. 2. Nonetheless, literature and osteological collections confirm that common dolphins were widespread and abundant in much of the Mediterranean Sea until the late 1960s and that their decline occurred relatively quickly. Today, common dolphins remain relatively abundant only in the westernmost portion of the basin (Alboràn Sea), with sparse records off Algeria and Tunisia, concentrations around the Maltese islands and in parts of the Aegean Sea, and relict groups in the south-eastern Tyrrhenian and eastern Ionian Seas. Otherwise, these dolphins are rare in, or completely absent from, Mediterranean areas where information is available. 3. Circumstantial evidence and qualitative judgements by the authors suggest that the following factors may have contributed to the decline of common dolphins: reduced availability of prey caused by overfishing and habitat degradation; contamination by xenobiotic chemicals resulting in immunosuppression and reproductive impairment; environmental changes such as increased water temperatures affecting ecosystem dynamics; and incidental mortality in fishing gear, especially gillnets. The cumulative importance of these factors is poorly understood, and as a result, few conservation measures have been implemented. 4. This paper reviews current knowledge and suggests priorities for action aimed at identifying and mitigating the main threats to common dolphins in the Mediterranean, with the ultimate goal of restoring the species' favourable conservation status in the region.