

In this review:

- A. Recent articles – no abstract available
- B. Recent articles with abstracts

O/A denotes an open access article or journal

A. Recent articles – no abstract available

Weir, C.R. and Dolman, S.J. **Comparative review of the regional marine mammal mitigation guidelines implemented during industrial seismic surveys, and guidance towards a worldwide standard.** *Journal of International Wildlife Law and Policy* 10(1): 1-27, 2007.

Ishii, A. and Okubo, A. **An alternative explanation of Japan's whaling diplomacy in the post-moratorium era.** *Journal of International Wildlife Law and Policy* 10(1): 55-87, 2007.

Williams, N. **Polar bears shift from thinning ice.** *Current Biology* 17(15): R571-R572, 2007.

Storelli, M.M., Barone, G., Piscitelli, G., Storelli, A., and Marcotrigiano, G.O. **Tissue-related polychlorinated biphenyls accumulation in Mediterranean cetaceans: Assessment of toxicological status.** *Bulletin of Environmental Contamination and Toxicology* 78(3-4): 206-210, 2007.

B. Recent articles with abstracts

Kiszka, J., Muir, C., and Jamon, A. **Status of a marginal dugong (*Dugong Dugon*) population in the lagoon of Mayotte (Mozambique Channel), in the western Indian Ocean.** *Western Indian Ocean Journal of Marine Science* 6(1): 111-116, 2007.

Notes: The dugong (*Dugong dugon*) is one of the most endangered mammal species in eastern Africa. Dugongs are exposed to many human-induced threats, such as by-catch in fishing gears and deliberate killing. In order to understand the conservation and management issues surrounding this species status assessments are needed. An assessment was conducted in Mayotte (Comoros, Mozambique Channel) in 2003 to determine the status and distribution of the dugong. Questionnaire surveys were carried out in August 2003 with local fishermen. Results of opportunistic sightings were collected from 1999 to 2005 (n=53), and aerial surveys were undertaken between July and November 2005. The three data sources provide historical and actual data on the status of the species. Dugongs were common in the lagoon before the 1980's, and then declined significantly due to hunting pressure and by-catch in fishing nets. In the 2000's, opportunistic sightings have been made regularly by recreational dive operators and microlight aircraft pilots. Recent sightings indicate calving in the lagoon of Mayotte, with several observations of mother-calf pairs. Measures to protect Mayotte's marine biodiversity, such as establishing a network of Marine Protected Areas, banning fishing nets and developing pelagic fisheries is expected to help ensure the future survival of the dugong in this area.

Nichols, C., Herman, J., Gaggiotti, O.E., Dobney, K.M., Parsons, K., and Hoelzel, A.R. **Genetic isolation of a now extinct population of bottlenose dolphins (*Tursiops truncatus*)**. *Proceedings of the Royal Society of London [B]* 274(1618): 1611-1616, 2007.

Notes: A number of dolphin species, though highly mobile, show genetic structure among parapatric and sometimes sympatric populations. However, little is known about the temporal patterns of population structure for these species. Here, we apply Bayesian inference and data from ancient DNA to assess the structure and dynamics of bottlenose dolphin (*Tursiops truncatus*) populations in the coastal waters of the UK. We show that regional population structure in UK waters is consistent with earlier studies suggesting local habitat dependence for this species in the Mediterranean Sea and North Atlantic. One genetically differentiated UK population went extinct at least 100 years ago and has not been replaced. The data indicate that this was a local extinction, and not a case of historical range shift or contraction. One possible interpretation is a declining metapopulation and conservation need for this species in the UK.

Lelli, B. and Harris, D.E. **Seal bounty and seal protection laws in Maine, 1872 to 1972: Historic perspectives on a current controversy**. *Natural Resources Journal* 46(4): 881-924, 2006.

Notes: Modern predator management balances conservation and preservation with the desire to exploit natural resources. Seals (marine predators) engender controversy because seals and humans both consume fish. To understand the foundation of current stakeholder positions concerning seals, we examined the history of seal legislation in Maine from 1872 to 1972, which included two bounty periods as well as limited legal protection. We analyzed the stakeholder interests that influenced Maine legislation and compared them to similar influences at work in a modern context, the Canadian Atlantic seal hunt. This history and analysis can provide lessons for seal management elsewhere.

Harper, E.R., Leger, J.A.S., Jody, A.W.A., Mazzaro, L., Schmitt, T., Reidarson, T.H., Tucker, M., Cross, D.H., and Puschner, B. **Tissue heavy metal concentrations of stranded California sea lions (*Zalophus californianus*) in Southern California**. *Environmental Pollution* 147(3): 677-682, 2007.

Notes: Concentrations of nine heavy metals (As, Cd, Cu, Fe, Hg, Pb, Mn, Mo and Zn) were determined in the hepatic and renal tissues of 80 stranded California sea lions (*Zalophus californianus*). Significant age-dependant increases were observed in liver and kidney concentrations of cadmium and mercury, and renal zinc concentrations. Hepatic iron concentrations were significantly higher in females than males. Animals with suspected domoic acid associated pathological findings had significantly higher concentrations of liver and kidney cadmium; and significantly higher liver mercury concentrations when compared to animals classified with infectious disease or traumatic mortality. Significantly higher hepatic burdens of molybdenum and zinc were found in animals that died from infectious diseases. This is the largest study of tissue heavy metal concentrations in California sea lions to date. These data demonstrate how passive monitoring of stranded animals can provide insight into environmental impacts on marine mammals.

Barnosky, A.D. and Kraatz, B.P. **The role of climatic change in the evolution of mammals**. *BioScience* 57(6): 523-532, 2007.

Notes: The paleontological record of mammals offers many examples of evolutionary change, which are well documented at many levels of the biological hierarchy-at the level of species (and above), populations, morphology, and, in ideal cases, even genes. The evolutionary changes developed against backdrop of climatic change that took place on different scales, from rapid shifts in climate state that took only a few decades, to those that occurred over a millennial scale, to regular glacial-interglacial transitions with cycles of roughly a hundred thousand years, to long-term warming or cooling trends over hundreds of thousands to millions of years. Are there certain scales of climatic change that accelerate evolution? And what will the current global warming event do to evolutionary rates? Here we use paleontology - the study of fossils - to illustrate the scientific method behind answering such complex questions, and to suggest that current rates of global warming are far too fast to influence evolution much and instead are likely to accelerate extinctions.

Trites, A.W., Calkins, D.G., and Winship, A.J. **Diets of Steller sea lions (*Eumetopias jubatus*) in Southeast Alaska, 1993-1999.** *Fishery Bulletin* 105(2): 234-248, 2007. O/A

Notes: The diet of Steller sea lions (*Eumetopias jubatus*) was determined from 1494 scats (feces) collected at breeding (rookeries) and nonbreeding (haulout) sites in Southeast Alaska from 1993 to 1999. The most common prey of 61 species identified were walleye pollock (*Theragra chalcogramma*), Pacific herring (*Clupea pallasii*), Pacific sand lance (*Ammodytes hexapterus*), Pacific salmon (Salmonidae), arrowtooth flounder (*Atheresthes stomias*), rockfish (*Sebastes* spp.), skates (Rajidae), and cephalopods (squid and octopus). Steller sea lion diets at the three Southeast Alaska rookeries differed significantly from one another. The sea lions consumed the most diverse range of prey categories during summer, and the least diverse during fall. Diet was more diverse in Southeast Alaska during the 1990s than in any other region of Alaska (Gulf of Alaska and Aleutian Islands). Dietary differences between increasing and declining populations of Steller sea lions in Alaska correlate with rates of population change, and add credence to the view that diet may have played a role in the decline of sea lions in the Gulf of Alaska and Aleutian Islands.

Beatson, E. **The diet of pygmy sperm whales, *Kogia breviceps*, stranded in New Zealand: implications for conservation.** *Reviews in Fish Biology and Fisheries* 17(2-3): 295-303, 2007.

Notes: The stomach contents of 27 pygmy sperm whales, *Kogia breviceps*, stranded on New Zealand beaches between 1991 and 2003 are reported. These individuals comprise 16 males, 10 females, and one for which no sex information is available. The diet was found to include fish and crustaceans, but is comprised primarily of cephalopods, with 0-526 lower beaks, representing an estimated maximum of c. 60 kg of cephalopod prey consumed by any one whale. Cephalopod prey is attributed to 23 species from 13 families, and is dominated by juvenile individuals of the families Histioteuthidae and Cranchiidae (adults of which usually occur at depths exceeding 400 m). Perceived threats to this whale, particularly those affecting distribution and abundance of prey species, are also discussed. These are the first data reporting the diet of this whale species in New Zealand waters. A comparison of the diet of *K. breviceps* is made with that of the sperm whale, *Physeter macrocephalus* from New Zealand waters, and with the diet of *Kogia* known elsewhere.

Viaud-Martinez, K.A., Vergara, M.M., Goldin, P.E., Ridoux, V., Ozturk, A.A., Ozturk, B., Rosel, P.E., Frantzis, A., Komnenou, A., and Bohonak, A.J. **Morphological and genetic differentiation of the Black Sea harbour porpoise *Phocoena phocoena*.** *Marine Ecology Progress Series* 338: 281-294, 2007.

Notes: The ecological and conservation status of the geographically isolated Black Sea harbour porpoise is currently unknown. Although it has been suggested that Black Sea harbour porpoises are distinct from other populations, the implementation of specific conservation plans has been hindered by the absence of a genetic and morphological study with large sample sizes. We sought to test the hypothesis that Black Sea porpoises differ from those in the Atlantic Ocean using cranial morphology and mitochondrial DNA variation. A total of 177 adult skulls from the Atlantic coast of France, Danish North Sea including Skagerrak and Inner Danish Waters, Greenland and the Black Sea were scored for 22 morphological variables. A portion of the mitochondrial control region was sequenced for 146 ind. from the eastern north Atlantic, the northern Aegean Sea, the Sea of Marmara and the Black Sea. Within the Black Sea, we found relatively low levels of genetic diversity, and no statistically significant differentiation. However, the Black Sea population shares no haplotypes with the eastern Atlantic populations, suggesting that they have been separated for thousands of years. Black Sea porpoises also show significant morphological differences from other populations, with smaller body and skull size, wider and longer rostrum, smaller orbital length, smaller internal nares and condylar widths and larger occipital ridge. Our results demonstrate that harbour porpoises from the Black Sea, Sea of Marmara and the northern Aegean Sea (eastern region): (1) are genetically differentiated; (2) have been reproductively isolated for a considerable period of time; and (3) are likely to be on an independent evolutionary pathway. We recommend that harbour porpoises from the eastern region be recognized as the subspecies *Phocoena phocoena relictus*.

Gerber, L.R., Keller, A.C., and DeMaster, D.P. **Ten thousand and increasing: Is the western Arctic population of bowhead whale endangered?** *Biological Conservation* 137(4): 577-583, 2007.

Notes: Based on a series of 11 abundance estimates over 23 years, the western Arctic population of bowhead whale (WABW) has recovered substantially since it was listed under the US Endangered Species Act. We evaluate extinction risk for WABW to determine if this population should be considered for reclassification under the ESA. Given the uncertainty associated with distinguishing process error and observation error, we consider three scenarios reflecting different assumptions for process error. We applied the quantitative criteria for recovery and delisting using the approach proposed by [Gerber, L.R., DeMaster, D.P., 1999. An approach to endangered species act classification of North Pacific humpback whales. *Conservation Biology*, 13, 1203-1214] for large whales. To further examine the monitoring process and make recommendations for future data needs, we then re-ran the model using progressively smaller sub-samples of the census data. As longer time series of data were considered, the fraction of outcomes consistent with a "delisting" decision increased. For the 10 and 11-census year subsets, data unequivocally support a decision to delist this population for the 3 scenarios. Furthermore, the IUCN criteria for endangered and vulnerable are not met for this population of bowhead whale under any of our scenarios. Results from the population projections and application of the risk classification criteria are consistent with a determination that the risk of extinction for this population is insignificant in the foreseeable future.

Chilvers, B.L., Wilkinson, I.S., and Childerhouse, S. **New Zealand sea lion, *Phocarcos hookeri*, pup production — 1995 to 2006.** *New Zealand Journal of Marine and Freshwater Research* 41(2): 205-213, 2007.

Notes: The New Zealand sea lion (NZ sea lion), *Phocarcos hookeri*, is New Zealand's only endemic pinniped. Classified as vulnerable, it is one of the world's rarest pinnipeds. During the 1994/95 austral summer, a long-term population-monitoring programme of the Auckland Island colonies was initiated using standard procedures to estimate annual pup production. This paper reports the pup production estimates for the known NZ sea lion population over the last 12 years (1994/95 to 2005/06), and the variation in pup production estimates for the Auckland Islands. Sixty-four percent of the pup production for the entire NZ sea lion population occurred at Dundas Island, followed by Enderby Island (19%), and Figure of Eight Island (3%). These three sites are all at the Auckland Islands, making this area the primary breeding site for this species with 86% of all pup production occurring here. The remaining 14% were born at Campbell Island, with Otago Peninsula representing <0.1%. The pup production estimates for the NZ sea lion population varied considerably by year and breeding area. The most significant change recorded was at the primary breeding site for this species, the Auckland Islands, which had a 31% decline in pup production between 1997/98 and 2005/06 owing to a combination of disease events and incidental by-catch from commercial fishing activity.

Sonne, C., Dietz, R., Leifsson, P.S., Asmund, G., Born, E.W., and Kirkegaard, M. **Are liver and renal lesions in East Greenland polar bears (*Ursus maritimus*) associated with high mercury levels?** *Environmental Health* 6: art. 11, 2007.

O/A

Notes: In the Arctic, polar bears (*Ursus maritimus*) bio-accumulate mercury as they prey on polluted ringed seals (*Phoca hispida*) and bearded seals (*Erignathus barbatus*). Studies have shown that polar bears from East Greenland are among the most mercury polluted species in the Arctic. It is unknown whether these levels are toxic to liver and kidney tissue. Methods: We investigated the histopathological impact from anthropogenic long-range transported mercury on East Greenland polar bear liver ($n = 59$) and kidney ($n = 57$) tissues. Results: Liver mercury levels ranged from 1.1-35.6 $\mu\text{g/g}$ wet weight and renal levels ranged from 1-50 $\mu\text{g/g}$ wet weight, of which 2 liver values and 9 kidney values were above known toxic threshold level of 30 $\mu\text{g/g}$ wet weight in terrestrial mammals. Evaluated from age-correcting ANCOVA analyses, liver mercury levels were significantly higher in individuals with visible Ito cells ($p < 0.02$) and a similar trend was found for lipid granulomas ($p = 0.07$). Liver mercury levels were significantly lower in individuals with portal bile duct proliferation/fibrosis ($p = 0.007$) and a similar trend was found for proximal convoluted tubular hyalinisation in renal tissue ($p = 0.07$). Conclusions: Based on these relationships and the nature of the chronic inflammation we conclude that the lesions were likely a result of recurrent infections and ageing but that long-term exposure to mercury could not be excluded as a co-factor. The information is important as it is likely that tropospheric mercury depletion events will continue to increase the concentrations of this toxic heavy metal in the Sub Arctic and Arctic marine food webs.

Durden, W.N., Stolen, M.K., Adams, D.H., and Stolen, E.D. **Mercury and selenium concentrations in stranded bottlenose dolphins from the Indian River Lagoon system, Florida.** *Bulletin of Marine Science* 81(1): 37-54, 2007.

Notes: Mercury is a toxic metallic element that is known to bioaccumulate in many marine organisms. Mercury concentrations are routinely evaluated in Indian River Lagoon (IRL) fish, however, there are no published reports of these concentrations for IRL bottlenose dolphins, *Tursiops truncatus* (Montagu, 1821). Muscle ($n = 30$) and liver ($n = 19$) samples from stranded IRL dolphins were collected and analyzed for total mercury and selenium. Total mercury concentrations in liver samples ranged from 0.42 to 240 ppm wet weight (ww) (mean = 73.01 ppm) and concentrations in muscle samples ranged from 0.26 to 47 ppm ww (mean = 5.68 ppm). Mercury concentrations were not significantly different between males and females for both tissue types. Selenium concentrations ranged from 1.20 to 90.70 ppm ww (mean = 29.81 ppm) in liver tissue and 0.75 to 16.10 ppm ww (mean = 1.92 ppm) in muscle tissue. Selenium concentrations were positively correlated with mercury in both tissue types. Age and total length were good predictors for mercury concentrations in both tissue types. Future studies are needed to determine what effect mercury may have on the overall health of IRL dolphins.

Levin, M., Morsey, B., and De Guise, S. **Non-coplanar PCBs induce calcium mobilization in bottlenose dolphin and beluga whale, but not in mouse leukocytes.** *Journal of Toxicology and Environmental Health Part A* 70(13-14): 1220-1231, 2007.

Notes: Polychlorinated biphenyls (PCBs) have been demonstrated to modulate marine mammal immune functions; however, the underlying mechanisms involved are poorly understood. Cytosolic calcium (Ca^{2+}) is an important second messenger involved in numerous leukocyte functions. The direct effects of in vitro exposure to PCBs on Ca^{2+} mobilization were evaluated in leukocytes isolated from bottlenose dolphins, beluga whales, and B6C3F1 mice. Concentration- and time-response experiments with three non-coplanar PCBs (138, 153, 180), one coplanar PCB (169), and TCDD were tested. Exposure to the three non-coplanar PCBs significantly increased cytosolic Ca^{2+} in dolphin neutrophils, while PCB 180 significantly increased cytosolic Ca^{2+} , in beluga neutrophils. Two non-coplanar PCBs (138 and 153) significantly increased Ca^{2+} , in beluga monocytes, yet the response was delayed compared to that in neutrophils. Neither PCBs nor TCDD increased cytosolic Ca^{2+} in mouse neutrophils or monocytes. In experiments with Ca^{2+} -free medium, only PCB 153 increased cytosolic Ca^{2+} in dolphin neutrophils, though the increase was less than that observed with Ca^{2+} -supplemented medium, suggesting that extracellular Ca^{2+} was the predominant source for the rise in cytosolic Ca^{2+} . Furthermore, in cells incubated with Ca^{2+} -free medium, a significant increase in cytosolic Ca^{2+} was induced by thapsigargin following PCB exposure, indicating that intracellular Ca^{2+} was available, yet not mobilized by the PCBs, and further suggesting that PCBs mobilize extracellular Ca^{2+} . These results demonstrate for the first time the direct effects of non-coplanar PCBs on Ca^{2+} mobilization in marine mammals, which may be involved in the modulation of phagocytosis previously observed in these species.

Hammill, M.O. and Stenson, G.B. **Application of the precautionary approach and conservation reference points to management of Atlantic seals.** *ICES Journal of Marine Science* 64(4): 702-706, 2007.

Notes: Resource management requires a trade-off between conservation, economic, and political concerns in establishing harvest levels. The precautionary approach (PA) brings scientists, resource managers, and stakeholders together to identify clear management objectives and to agree on population benchmarks that would initiate certain management actions when those benchmarks are exceeded. A conceptual framework for applying the PA to marine mammals is outlined. For a data-rich species, precautionary and conservation reference levels are proposed. When a population falls below the precautionary reference level, increasingly risk-averse conservation measures are applied. A more conservative, risk-averse approach is required for managing data-poor species. The framework has been implemented for the management of commercial seal harvests in Atlantic Canada.

Wolkers, H., Corkeron, P.T., Van Parijs, S.M., Simila, T., and Van Bavel, B. **Accumulation and transfer of contaminants in killer whales (*Orcinus orca*) from Norway: Indications for contaminant metabolism.** *Environmental Toxicology and Chemistry* 26(8): 1582-1590, 2007. **O/A**

Notes: Blubber tissue of one subadult and eight male adult killer whales was sampled in Northern Norway in order to assess the degree and type of contaminant exposure and transfer in the herring-killer whale link of the marine food web. A

comprehensive selection of contaminants was targeted, with special attention to toxaphenes and polybrominated diphenyl ethers (PBDEs). In addition to assessing exposure and food chain transfer, selective accumulation and metabolism issues also were addressed. Average total polychlorinated biphenyl (PCB) and pesticide levels were similar, approximately 25 µg/g lipid, and PBDEs were approximately 0.5 µg/g. This makes killer whales one of the most polluted arctic animals, with levels exceeding those in polar bears. Comparing the contamination of the killer whale's diet with the diet of high-arctic species such as white whales reveals six to more than 20 times higher levels in the killer whale diet. The difference in contaminant pattern between killer whales and their prey and the metabolic index calculated suggested that these cetaceans have a relatively high capacity to metabolize contaminants. Polychlorinated biphenyls, chlordanes, and dichlorodiphenyldichloro-ethylene (DDE) accumulate to some degree in killer whales, although toxaphenes and PBDEs might be partly broken down.

Moller, L.M., Wiszniewski, J., Allen, S.J., and Beheregaray, L.B. **Habitat type promotes rapid and extremely localised genetic differentiation in dolphins.** *Marine and Freshwater Research* 58(7): 640-648, 2007.

Notes: The high potential for dispersal of many marine organisms often results in low population differentiation over large distances. Here, we report that dolphin communities living in very close geographic proximity (< 16 km) but in two different environments - open coast and enclosed embayment - exhibit unexpected genetic differentiation at nine microsatellite loci. Results based on a fixation index and a Bayesian clustering approach suggested that gene flow between communities within an embayment is high, as is gene flow between coastal communities. However, lower gene flow between embayment and open coast communities translated into substantial genetic differentiation between dolphin communities from the two environments, and assignment of individuals into two populations. Along with patterns observed in 403 bp of the mitochondrial DNA control region, the results suggest that restriction of gene flow likely occurred in the last 6000 years, after coastal dolphins colonised the embayment. We hypothesise that factors such as fidelity to the local area and resource and behavioural specialisations may have played a major role in promoting and maintaining genetic subdivision between dolphins of the two environments. Importantly, our study shows that habitat type can rapidly promote extremely fine-scale genetic structure in a long-lived, highly mobile marine mammal.

Kunisue, T., Sakiyama, T., Yamada, T.K., Takahashi, S., and Tanabe, S. **Occurrence of hydroxylated polychlorinated biphenyls in the brain of cetaceans stranded along the Japanese coast.** *Marine Pollution Bulletin* 54(7): 963-973, 2007.

Notes: Levels of hydroxylated polychlorinated biphenyls (OH-PCBs) and PCBs were measured in the brain of melon-headed whales (MW: *Peponocephala electra*), striped dolphins (SD: *Stenella coeruleoalba*) and finless porpoises (FP: *Neophocaena phocaenoides*) stranded along the Japanese coast during 2002-2003. Levels of OH-PCBs (including identified and unknown OH-P5CB, -H6CB, -H7CB and O8CB congeners) in the brain of MW, SD and FP were in the range of 20-290, 21-330 and 170-240 pg/g wet wt., respectively. Observed OH-PCB levels were 2-3 orders of magnitude lower than PCBs in the same individuals. OH-PCBs/PCBs ratios in MW, SD and FP brain were lower than those in blood of humans and wildlife and in the brain of polar bears reported previously. OH-PCBs were also detected in maternal and fetal brain of SID (1 pair), suggesting transfer of OH-PCBs into the fetal brain of odontocete cetaceans. When fetus/dam concentration ratios of OH-PCB congeners detected in maternal and fetal brain were estimated, the values were higher than those of PCB congeners, implying that OH-PCBs in maternal blood could be more easily transferred into fetal brain via placenta than PCBs.

Kanda, N., Goto, M., Kato, H., McPhee, M.V., and Pastene, L.A. **Population genetic structure of Bryde's whales (*Balaenoptera brydei*) at the inter-oceanic and trans-equatorial levels.** *Conservation Genetics* 8(4): 853-864, 2007.

Notes: Bryde's whales (*Balaenoptera brydei*) differ from other typical baleen whale species because they are restricted to tropical and warm temperate waters in major oceans, and frequent trans-equatorial movement has been suggested for the species. We tested this hypothesis by analyzing genetic variation at 17 microsatellite loci (N = 508) and 299 bp of mitochondrial DNA (mtDNA) control region sequences (N = 472) in individuals obtained from the western North Pacific, South Pacific, and eastern Indian Ocean. Combined use of microsatellite and mtDNA markers allowed us to distinguish between contemporary gene flow and ancestral polymorphism and to describe sex-specific philopatry. A high level of genetic diversity was found within the samples. Both nuclear and mtDNA markers displayed similar population structure, indicating a lack of sex-specific philopatry. Spatial structuring was detected using both frequency-based population parameters and individual-based Bayesian

approaches. Whales in the samples from different oceanic regions came from genetically distinct populations with evidence of limited gene flow. We observed low mtDNA sequence divergence among populations and a lack of concordance between geographic and phylogenetic position of mtDNA haplotypes, suggesting recent separation of populations rather than frequent trans-equatorial and inter-oceanic movement. We conclude that current gene flow between Bryde's whale populations is low and that effective management actions should treat them as separate entities to ensure continued existence of the species.

Castinel, A., Duignan, P.J., Pomroy, W.E., Lopez-Villalobos, N., Gibbs, N.J., Chilvers, B.L., and Wilkinson, I.S. **Neonatal mortality in New Zealand sea lions (*Phocarcos hookeri*) at Sandy Bay, Enderby Island, Auckland Islands from 1998 to 2005.** *Journal of Wildlife Diseases* 43(3): 461-474, 2007.

Notes: As part of a health survey of New Zealand sea lions (*Phocarcos hookeri*) on Enderby Island, Auckland Islands (50°30'S, 166°17'E), neonatal mortality was closely monitored at the Sandy Bay colony for seven consecutive years. Throughout the breeding seasons 1998-99 to 2004-05, more than 400 postmortem examinations were performed on pups found dead at this site. The primary causes of death were categorized as trauma (35%), bacterial infections (24%), hookworm infection (13%), starvation (13%), and stillbirth (4%). For most pups, more than one diagnosis was recorded. Every year, two distinct peaks of trauma were observed: the first associated with mature bulls fighting within the harem and the second with subadult males abducting pups. In 2001-02 and 2002-03, epidemics caused by *Klebsiella pneumoniae* increased mortality by three times the mean in nonepidemic years (10.2%). The increased mortality was attributed directly to acute suppurative infection due to the bacterium and also to an increase in traumatic deaths of debilitated pups. Parasitic infection with the hookworm *Uncinaria* spp. was a common finding in all pups older than three weeks of age and debilitation by the parasite may have contributed to increased susceptibility to other pathogens such as *Klebsiella* sp. or *Salmonella* sp. This study provides valuable quantitative data on the natural causes of neonatal mortality in New Zealand sea lions that can be used in demographic models for management of threatened species.

van den Hoff, J., Burton, H., and Raymond, B. **The population trend of southern elephant seals (*Mirounga leonina* L.) at Macquarie Island (1952-2004).** *Polar Biology* 30(10): 1275-1283, 2007.

Notes: Total numbers of adult female southern elephant seals (cows) breeding at Macquarie Island were determined for 19 of the 52 year period between 1952 and 2004. Totals for 1952-1987 (exc. 1959 and 1985) were estimated from the relationship between censuses of the isthmus study area and concurrent censuses for the whole island. Totals for 1987-2004 were obtained by direct census of the entire island in mid-October. Cow numbers decreased from a maximum of about 40,000 in the 1950s to a minimum of 18,300 in 2000, but then increased slightly to 19,200 in 2004. Nonlinear and post-hoc linear analysis of the count data identified 1999 as the year when the exponential rate of change (r) slowed from -1.4% per annum to near zero. The rate of change was not uniform for each census sub-area counted (1987-2004), suggesting that certain terrestrially based density-dependent mechanisms were influencing the annual distribution of cows.

Lebeuf, M., Noel, M., Trottier, S., and Measures, L. **Temporal trends (1987-2002) of persistent, bioaccumulative and toxic (PBT) chemicals in beluga whales (*Delphinapterus leucas*) from the St. Lawrence Estuary, Canada.** *The Science of the Total Environment* 383(1-3): 216-231, 2007.

Notes: Temporal trends of persistent, bioaccumulative and toxic (PBT) chemicals were examined in beluga whales (*Delphinapterus leucas*) from the St. Lawrence Estuary (SLE), Canada. Blubber samples of 86 adult belugas were collected from animals stranded on the shore of the SLE between 1987 and 2002 and analyzed for several regulated PBTs, including polychlorinated biphenyls (PCBs), p,p'-dichlorodiphenyltrichloroethane (DDT) and its metabolites, chlordane (CHL) and related compounds, hexachlorocyclohexane (HCH) isomers, hexachlorobenzene (HCB) and Mirex. In addition, time trends of *tri*s(4-chlorophenyl) methane (TCPMe) and *tri*s(4-chlorophenyl)methanol (TCPMOH), two compounds that may originate from DDT formulations, were also examined. Concentrations of most of the PBTs examined had exponentially decreased by at least a factor of two (half-life time ($t_{1/2}$) < 15 years) in beluga between 1987 and 2002 while no increasing trends were observed for any of the PBTs measured. The decreasing trends of PBT concentrations in SLE beluga may be due to a decline in contamination of its diet following North American and international regulations on the use and production of these compounds or by a change in its diet itself or by a combination of both. Some PBTs did not exhibit any significant trends in

beluga possibly because the most intense elimination phase subsequent to legislative regulations occurred prior to the 1987-2002 time period. Other chemicals, such as θ -HCH, did not significantly decrease likely because they are still currently used in some restricted applications. Conversely, α -HCH showed a significant decreasing trend indicating that Σ HCHs is not representative of all HCHs. Both TCPMe and TCPMOH exhibited no trends in beluga during the time period examined. The metabolic capacity of SLE beluga has apparently accelerated the depletion of at least one PBT, namely CB-28/31. A significant relationship between the half-life of PBTs in beluga and log Kow was observed for most of the chemicals examined. Several factors are expected to have influenced the temporal changes of PBT concentrations in beluga which limit the usefulness of this species as a bioindicator of changes in PBT contamination in the SLE ecosystem.

Biuw, M. and et al. **Variations in behavior and condition of a Southern Ocean top predator in relation to *in situ* oceanographic conditions.** *Proceedings of the National Academy of Sciences [USA]* 104(34): 13705-13710, 2007.

Notes: Responses by marine top predators to environmental variability have previously been almost impossible to observe directly. By using animal-mounted instruments simultaneously recording movements, diving behavior, and *in situ* oceanographic properties, we studied the behavioral and physiological responses of southern elephant seals to spatial environmental variability throughout their circumpolar range. Improved body condition of seals in the Atlantic sector was associated with Circumpolar Deep Water upwelling regions within the Antarctic Circumpolar Current, whereas High-Salinity Shelf Waters or temperature/salinity gradients under winter pack ice were important in the Indian and Pacific sectors. Energetic consequences of these variations could help explain recently observed population trends, showing the usefulness of this approach in examining the sensitivity of top predators to global and regional-scale climate variability.

Alter, S.E., Rynes, E., and Palumbi, S.R. **DNA evidence for historic population size and past ecosystem impacts of gray whales.** *Proceedings of the National Academy of Sciences [USA]* 104(38): 15162-15167, 2007. **O/A**

Notes: Ecosystem restoration may require returning threatened populations of ecologically pivotal species to near their former abundances, but it is often difficult to estimate historic population size of species that have been heavily exploited. Eastern Pacific gray whales play a key ecological role in their Arctic feeding grounds and are widely thought to have returned to their prewhaling abundance. Recent mortality spikes might signal that the population has reached long-term carrying capacity, but an alternative is that this decline was due to shifting climatic conditions on Arctic feeding grounds. We used a genetic approach to estimate prewhaling abundance of gray whales and report DNA variability at 10 loci that is typical of a population of ~76,000-118,000 individuals, approximately three to five times more numerous than today's average census size of 22,000. Coalescent simulations indicate these estimates may include the entire Pacific metapopulation, suggesting that our average measurement of ~96,000 individuals was probably distributed between the eastern and currently endangered western Pacific populations. These levels of genetic variation suggest the eastern population is at most at 28-56% of its historical abundance and should be considered depleted. If used to inform management, this would halve acceptable human-caused mortality for this population from 417 to 208 per year. Potentially profound ecosystem impacts may have resulted from a decline from 96,000 gray whales to the current population. At previous levels, gray whales may have seasonally resuspended 700 million cubic meters of sediment, as much as 12 Yukon Rivers, and provided food to a million sea birds.

Nowacek, D.P., Thorne, L.H., Johnston, D.W., and Tyack, P.L. **Responses of cetaceans to anthropogenic noise.** *Mammal Review* 37(2): 81-115, 2007.

Notes: 1. Since the last thorough review of the effects of anthropogenic noise on cetaceans in 1995, a substantial number of research reports has been published and our ability to document response(s), or the lack thereof, has improved. While rigorous measurement of responses remains important, there is an increased need to interpret observed actions in the context of population-level consequences and acceptable exposure levels. There has been little change in the sources of noise, with the notable addition of noise from wind farms and novel acoustic deterrent and harassment devices (ADDs/AHDs). Overall, the noise sources of primary concern are ships, seismic exploration, sonars of all types and some AHDs. 2. Responses to noise fall into three main categories: behavioural, acoustic and physiological. We reviewed reports of the first two exhaustively, reviewing all peer-reviewed literature since 1995 with exceptions only for emerging subjects. Furthermore, we fully review only those studies for which received sound characteristics (amplitude and frequency) are reported, because interpreting what elicits

responses or lack of responses is impossible without this exposure information. Behavioural responses include changes in surfacing, diving and heading patterns. Acoustic responses include changes in type or timing of vocalizations relative to the noise source. For physiological responses we address the issues of auditory threshold shifts and 'stress', albeit in a more limited capacity; a thorough review of physiological consequences is beyond the scope of this paper. 3. Overall, we found significant progress in the documentation of responses of cetaceans to various noise sources. However, we are concerned about the lack of investigation into the potential effects of prevalent noise sources such as commercial sonars, depth finders and fisheries acoustics gear. Furthermore, we were surprised at the number of experiments that failed to report any information about the sound exposure experienced by their experimental subjects. Conducting experiments with cetaceans is challenging and opportunities are limited, so use of the latter should be maximized and include rigorous measurements and or modelling of exposure.

Branch, T.A. *et al.* **Past and present distribution, densities and movements of blue whales *Balaenoptera musculus* in the Southern Hemisphere and northern Indian Ocean.** *Mammal Review* 37(2): 116-175, 2007.

Notes: 1. Blue whale locations in the Southern Hemisphere and northern Indian Ocean were obtained from catches (303 239), sightings (4383 records of \geq 8058 whales), strandings (103), discovery marks (2191) and recoveries (95), and acoustic recordings. 2. Sighting surveys included 7 480 450 km of effort plus 14 676 days with unmeasured effort. Groups usually consisted of solitary whales (65.2%) or pairs (24.6%); larger feeding aggregations of unassociated individuals were only rarely observed. Sighting rates (groups per 1000 km from many platform types) varied by four orders of magnitude and were lowest in the waters of Brazil, South Africa, the eastern tropical Pacific, Antarctica and South Georgia; higher in the Subantarctic and Peru; and highest around Indonesia, Sri Lanka, Chile, southern Australia and south of Madagascar. 3. Blue whales avoid the oligotrophic central gyres of the Indian, Pacific and Atlantic Oceans, but are more common where phytoplankton densities are high, and where there are dynamic oceanographic processes like upwelling and frontal meandering. 4. Compared with historical catches, the Antarctic ('true') subspecies is exceedingly rare and usually concentrated closer to the summer pack ice. In summer they are found throughout the Antarctic; in winter they migrate to southern Africa (although recent sightings there are rare) and to other northerly locations (based on acoustics), although some overwinter in the Antarctic. 5. Pygmy blue whales are found around the Indian Ocean and from southern Australia to New Zealand. At least four groupings are evident: northern Indian Ocean, from Madagascar to the Subantarctic, Indonesia to western and southern Australia, and from New Zealand northwards to the equator. Sighting rates are typically much higher than for Antarctic blue whales. 6. South-east Pacific blue whales have a discrete distribution and high sighting rates compared with the Antarctic. Further work is needed to clarify their subspecific status given their distinctive genetics, acoustics and length frequencies. 7. Antarctic blue whales numbered 1700 (95% Bayesian interval 860-2900) in 1996 (less than 1% of original levels), but are increasing at 7.3% per annum (95% Bayesian interval 1.4-11.6%). The status of other populations in the Southern Hemisphere and northern Indian Ocean is unknown because few abundance estimates are available, but higher recent sighting rates suggest that they are less depleted than Antarctic blue whales.

Borge, T., Bachmann, L., Bjornstad, G., and Wiig, O. **Genetic variation in Holocene bowhead whales from Svalbard.** *Molecular Ecology* 16(11): 2223-2235, 2007.

Notes: Bowhead whales (*Balaena mysticetus*) are distributed in the Arctic in five putative stocks. All stocks have been heavily depleted due to centuries of exploitation. In the present study, nucleotide sequence variation of the mitochondrial control region was determined from bone remains of 99 bowhead whales. The bones, ^{14}C dated from recent to more than 50 000 BP, were collected on Svalbard (Spitsbergen) and are expected to relate to ancestors of the today nearly extinct Spitsbergen stock. Fifty-eight haplotypes were found, a few being frequent but many only found in one individual. The most abundant haplotypes of the Spitsbergen stock are the same as those most abundant in the extant Bering-Chukchi-Beaufort (BCB) Seas stock of bowhead whales. Although F-ST indicates a slight but statistically significant genetic differentiation between the Spitsbergen and the BCB stocks this was not considered informative due to the very high levels of genetic diversity of mitochondrial DNA haplotypes in both bowhead whale stocks. Other measures such as K-ST also indicated very low genetic differentiation between the two populations. Nucleotide diversity and haplotype diversity showed only minor differences between the Spitsbergen and BCB stocks. The data suggest that the historic Spitsbergen stock — before the severe bottleneck caused by whaling — did not have substantially more genetic variation than the extant BCB stock. The similar haplotypes of the Holocene Svalbard samples and the current BCB stock indicate significant migration between these two stocks and question the current designation of five distinct stocks of bowhead whales in the Arctic.

Baker, C.S., Cooke, J.G., Lavery, S., Dalebout, M.L., Ma, Y.U., Funahashi, N., Carraher, C., and Brownell, R.L. **Estimating the number of whales entering trade using DNA profiling and capture-recapture analysis of market products.** *Molecular Ecology* 16(13): 2617-2626, 2007.

Notes: Surveys of commercial markets combined with molecular taxonomy (i.e. molecular monitoring) provide a means to detect products from illegal, unregulated and/or unreported (IUU) exploitation, including the sale of fisheries bycatch and wild meat (bushmeat). Capture-recapture analyses of market products using DNA profiling have the potential to estimate the total number of individuals entering the market. However, these analyses are not directly analogous to those of living individuals because a 'market individual' does not die suddenly but, instead, remains available for a time in decreasing quantities, rather like the exponential decay of a radioactive isotope. Here we use mitochondrial DNA (mtDNA) sequences and microsatellite genotypes to individually identify products from North Pacific minke whales (*Balaenoptera acutorostrata* ssp.) purchased in 12 surveys of markets in the Republic of (South) Korea from 1999 to 2003. By applying a novel capture-recapture model with a decay rate parameter to the 205 unique DNA profiles found among 289 products, we estimated that the total number of whales entering trade across the five-year survey period was 827 (SE, 164; CV, 0.20) and that the average 'half-life' of products from an individual whale on the market was 1.82 months (SE, 0.24; CV, 0.13). Our estimate of whales in trade (reflecting the true numbers killed) was significantly greater than the officially reported bycatch of 458 whales for this period. This unregulated exploitation has serious implications for the survival of this genetically distinct coastal population. Although our capture-recapture model was developed for specific application to the Korean whale-meat markets, the exponential decay function could be modified to improve the estimates of trade in other wildmeat or fisheries markets or abundance of living populations by noninvasive genotyping.

Clapham, P. and Van Waerebeek, K. **Bushmeat and bycatch: the sum of the parts.** *Molecular Ecology* 16(13): 2607-2609, 2007. **O/A**

Notes: In many developing countries, the killing of wild animals for commercial purposes (the bushmeat trade) is a significant factor in the reduction of biodiversity, and probably represents a major threat to the survival of many more populations than we know. This includes marine species such as cetaceans, sea turtles and sirenians ('marine bushmeat'), which are often neglected in the discussion of this issue. Estimating the impact of the bushmeat trade anywhere is problematic because even the most thorough visual surveys of meat markets cannot easily translate an observed quantity of butchered products into the number of animals killed. In this issue of *Molecular Ecology*, Baker *et al.* provide a powerful new tool for such assessments: molecular identification of commercially available products from a depleted population of minke whales in South Korea is combined with genotyping and novel capture-recapture methods to estimate not only the number of individuals taken, but also the persistence of the resulting products in the marketplace.