

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

Dalebout, M.L., Baker, C.S., Steel, D., Robertson, K.M., Chivers, S.J., Perrin, W.F., Mead, J.G., Grace, R.V., and Schofield, T.D. **A divergent mtDNA lineage among *Mesoplodon* beaked whales: Molecular evidence for a new species in the tropical Pacific?** *Marine Mammal Science* 23(4): 954-966, 2007.

Domning, D.P., Thomason, J., and Corbett, D.G. **Steller's sea cow in the Aleutian Islands.** *Marine Mammal Science* 23(4): 976-983, 2007.

B. Recent articles with abstracts

Calleson, C.S. and Frohlich, R.K. **Slower boat speeds reduce risks to manatees.** *Endangered Species Research* 3(3): 295-304, 2007. O/A

Notes: Collisions with boats account for approximately 25% of all documented manatee *Trichechus manatus latirostris* deaths in Florida. The state of Florida, as well as the US Fish and Wildlife Service and various local governments, have established boat speed limits in areas frequented by manatees as a means of reducing risks. Boat speed limits are believed to reduce risks in 3 primary ways: (1) greater reaction time for the boat operator; (2) greater reaction time for the manatee; and (3) reduced severity of injuries in the event that a manatee is hit by a boat. We review the current research and other available information that forms the conceptual basis for this risk reduction method and also examine the primary objections that have been raised against requiring slower boat speeds. The available information supports the position that reducing boat speeds in specific areas is an appropriate, reasonable, and defensible management action. Additional research on how manatees detect and respond to boats would be very useful, as would further empirical studies assessing the effectiveness of existing boat speed limits.

Heide-Jorgensen, M.P., Laidre, K., Borchers, D., Samarra, F., and Stern, H. **Increasing abundance of bowhead whales in West Greenland.** *Biology Letters* 3(5): 577-580, 2007.

Notes: In April 2006, a dedicated survey of bowhead whales (*Balaena mysticetus*) was conducted on the former whaling ground in West Greenland to determine the current wintering population abundance. This effort included a double platform aerial survey design, satellite tracking of the movements of nine whales, and estimation of high-resolution surface time from 14 whales instrumented with time-depth recorders. Bowhead whales were estimated to spend an average of 24% (cv = 0.03) of the time at or above 2 m depth, the maximum depth at which they can be seen on the trackline. This resulted in a fully

corrected abundance estimate of 1229 (95% CI: 495 - 2939) bowhead whales when the availability factor was applied and sightings missed by observers were corrected. This surprisingly large population estimate is puzzling given that the change in abundance cannot be explained by a recent or rapid growth in population size. One possible explanation is that the population, which demonstrates high age and sex segregation, has recently attained a certain threshold size elsewhere, and a higher abundance of mature females appears on the winter and spring feeding ground in West Greenland. This in combination with the latest severe reduction in sea ice facilitating access to coastal areas might explain the surprising increase in bowhead whale abundance in West Greenland.

Fair, P.A., Mitchum, G., Hulsey, T.C., Adams, J., Zolman, E., McFee, W., Wirth, E., and Bossart, G.D. **Polybrominated diphenyl ethers (PBDEs) in blubber of free-ranging bottlenose dolphins (*Tursiops truncatus*) from two southeast Atlantic estuarine areas.** *Archives of Environmental Contamination and Toxicology* 53(3): 483-494, 2007.

Notes: Blubber tissue samples from bottlenose dolphins collected during the summers of 2003 and 2004 were screened for 13 (17, 28, 47, 66, 71, 85, 99, 100, 138, 154, 153, 183, 190) polybrominated diphenyl ethers (PBDEs) from dolphin populations in the Indian River Lagoon, FL ($n = 58$) and the Charleston Harbor estuary, SC ($n = 53$). Within each population, we investigated contaminant levels of PBDEs and the effects of factors including age, sex, the interaction of age and sex, and location. Six PBDE congeners (28, 47, 99, 100, 153, and 154) were routinely detected in all samples using gas chromatography/mass spectrometry methods. Significantly higher ($p \leq 0.0001$) mean Σ PBDE blubber concentrations were observed for Charleston dolphins ($\bar{X} = 5,860$ ng/g lipid; range = 429 - 22,780 ng/g lipid) when compared to Indian River Lagoon dolphins ($\bar{X} = 1,260$ ng/g lipid; range = 195 - 3,790 ng/g lipid). PBDE47 was the major congener representing $\sim 61\%$ of the Σ PBDE in both dolphin populations, followed by BDE100, BDE154, BDE99, BDE153, and BDE28, respectively. Significantly higher ($p < 0.0001$) mean Σ PBDE were observed in adult male dolphins compared to pregnant and adult female dolphins at both sites, with gender differences two-fold in the Indian River Lagoon and twelve-fold for Charleston. For Charleston dolphins, the juveniles in addition to the adult males also had significantly higher levels compared to pregnant and adult females. This study establishes baseline levels of PBDEs in bottlenose dolphins for these two areas and is the first assessment of PBDEs in free-ranging dolphins. The levels of PBDEs in Charleston dolphins represent some of the highest measured in marine mammals and warrants further investigation of these emerging, bioaccumulative chemicals and their potential deleterious effects.

Fischbach, A.S., Amstrup, S.C., and Douglas, D.C. **Landward and eastward shift of Alaskan polar bear denning associated with recent sea ice changes.** *Polar Biology* 30(11): 1395-1405, 2007.

Notes: Polar bears (*Ursus maritimus*) in the northern Alaska region den in coastal areas and on offshore drifting ice. We evaluated changes in the distribution of polar bear maternal dens between 1985 and 2005, using satellite telemetry. We determined the distribution of maternal dens occupied by 89 satellite collared female polar bears between 137°W and 167°W longitude. The proportion of dens on pack ice declined from 62% in 1985-1994 to 37% in 1998-2004 ($P = 0.044$) and among pack ice dens fewer occurred in the western Beaufort Sea after 1998. We evaluated whether hunting, attraction to bowhead whale remains, or changes in sea ice could explain changes in den distribution. We concluded that denning distribution changed in response to reductions in stable old ice, increases in unconsolidated ice, and lengthening of the melt season. In consort, these changes have likely reduced the availability and quality of pack ice denning habitat. Further declines in sea ice availability are predicted. Therefore, we expect the proportion of polar bears denning in coastal areas will continue to increase, until such time as the autumn ice retreats far enough from shore that it precludes offshore pregnant females from reaching the Alaska coast in advance of denning.

Holt, S.J. **Whaling: Will the phoenix rise again?** *Marine Pollution Bulletin* 54(8): 1081-1086, 2007.

Notes: It is argued that Japan's authorities and entrepreneurs involved in whaling and the whale-meat trade have a long-term goal of rebuilding a large and profitable industry of pelagic whaling, particularly in the Southern Hemisphere, in the next 20 years or so. They have made large investments in this enterprise since the so-called moratorium on commercial whaling was adopted by the International Whaling Commission in 1982. These include, but are not confined to, state subsidizing of an expanding and diversifying 20-year programme of commercial whaling under provisions in all relevant international agreements since 1937 that permit unlimited and unilaterally decreed whaling, supposedly for scientific purposes, provided that

the commodities from the whales killed are fully utilized. The context of this is the monopoly of technical knowledge, special skills and the market for valuable whale-meat that Japanese enterprises acquired in the post-world war II period, having broken - in 1937 - the strongly defended de facto Anglo-Norwegian monopoly of technology, skills, access to Antarctic whaling grounds and the market for whale-oil that had existed until then. The attraction of 'scientific whaling' is not only that it by-passes any internationally agreed catch-limits but that it also circumvents all other rules - many dating from the League of Nations whaling convention of 1931 - regarding protected species, closed areas, killing of juveniles, less inhumane killing methods, etc. The groundwork is being laid to justify that resumed whaling on partially recovered whale stocks will be at the unsustainable levels that will be profitable again. This justification is based on spurious assertions that numerous and hungry whales threaten the world's fisheries, and that the abundance and possible increase in some whale species is impeding the recovery of other, severely depleted, and potentially more valuable species such as the blue whale. If the scenario presented here is correct it has important implications for attempts by the international community either to bring a negotiated end to commercial whaling or to bring all whaling back under international control, as the international law of the sea requires, and to ensure that any permitted exploitation of recovered whale populations will be sustainable, under a precautionary regime.

Neale, J.C.C., Small, R.J., Schmelzer, K.R., and T'jeerdema, R.S. **Blood concentrations of some persistent organohalogens in free-ranging spotted seals (*Phoca largha*) from Bristol Bay, Alaska.** *Journal of Toxicology and Environmental Health Part A* 70(20): 1776-1778, 2007.

Notes: In recent years, the relatively high levels of organochlorine contaminants and increasing levels of brominated flame retardants found in tissues of marine mammals have raised concerns that exposure to these marine pollutants may compromise individual health. In this pilot study, levels of 11 polychlorinated biphenyls, 3 polybrominated diphenyl ethers, and the DDT metabolite p,p'-diphenyldichloroethylene were analyzed in whole blood of 7 free-ranging spotted seals (*Phoca largha*) from Bristol Bay, Alaska, sampled during 2000 and 2001. Blood concentrations of analytes were generally low (< 1 ppb wet weight). Open-ocean foraging and feeding on a lower trophic level may contribute to the relatively lower levels of organohalogens found in this species as compared to the closely related harbor seal, *Phoca vitulina*, occurring in Bristol Bay.

Wang, J.Y., Yang, S.C., Hung, S.K., and Jefferson, T.A. **Distribution, abundance and conservation status of the eastern Taiwan Strait population of Indo-Pacific humpback dolphins, *Sousa chinensis*.** *Mammalia* 71(4): 157-165, 2007.

Notes: In 2002, a small population of Indo-Pacific humpback dolphins, *Sousa chinensis*, was discovered in the coastal waters of the eastern Taiwan Strait. Serious conservation concerns about this population led to a survey of most of the coastal waters of western Taiwan to better understand the status of this population. Surveys were conducted from boats (inshore waters) and a sea-kayak or land-based platforms (littoral waters inshore of large sandbars). Humpback dolphins were sighted 35 times, all within a stretch of inshore waters approximately 100 km (linear distance) and within 2 km from shore (none were observed in littoral waters). Including consideration of other records of this species, the main distribution of these dolphins was estimated to be approximately 515 km² of water off central western Taiwan, where industrialization is a serious and rapidly increasing issue. The population's abundance and density were estimated to be 99 individuals (coefficient of variation 51.6%) and 19.3 individuals/100 km², respectively, which is quite low when compared to the Pearl River estuary population. Assessing this population using the IUCN Red List criteria resulted in a "Critically Endangered" categorization, reinforcing the urgency of the situation.

Parks, S.E., Clark, C.W., and Tyack, P.L. **Short- and long-term changes in right whale calling behavior: The potential effects of noise on acoustic communication.** *Journal of the Acoustical Society of America* 122(6): 3725-3731, 2007.

Notes: The impact of anthropogenic noise on marine mammals has been an area of increasing concern over the past two decades. Most low-frequency anthropogenic noise in the ocean comes from commercial shipping which has contributed to an increase in ocean background noise over the past 150 years. The long-term impacts of these changes on marine mammals are not well understood. This paper describes both short- and long-term behavioral changes in calls produced by the endangered North Atlantic right whale (*Eubalaena glacialis*) and South Atlantic right whale (*Eubalaena australis*) in the presence of increased low-frequency noise. Right whales produce calls with a higher average fundamental frequency and they call at a lower rate in high noise conditions, possibly in response to masking from low-frequency noise. The long-term changes have occurred

within the known lifespan of individual whales, indicating that a behavioral change, rather than selective pressure, has resulted in the observed differences. This study provides evidence of a behavioral change in sound production of right whales that is correlated with increased noise levels and indicates that right whales may shift call frequency to compensate for increased band-limited background noise.

Pastor, T., Garza, J.C., Aguilar, A., Tounta, E., and Androukaki, E. **Genetic diversity and differentiation between the two remaining populations of the critically endangered Mediterranean monk seal.** *Animal Conservation* 10(4): 461-469, 2007.

Notes: The Mediterranean monk seal *Monachus monachus*, is a critically-endangered species of which only two populations, separated by c. 4000 km, remain: the eastern Mediterranean (150-300 individuals) and the Atlantic/western Sahara populations (100-130 individuals). We measured current levels of nuclear genetic variation at 24 microsatellite loci in 12 seals from the eastern Mediterranean and 98 seals from the western Sahara population and assessed differences between them. In both populations, genetic variation was found to be low, with mean allelic richness for the loci polymorphic in the species of 2.09 and 1.96, respectively. For most loci, the observed allele frequency distributions in both populations were discontinuous and the size ranges similar. The eastern Mediterranean population had 14 private alleles and the western Sahara had 18, but with a much larger sample size. Highly significant differences in allele frequencies between the two populations were found for 14 out of 17 loci. F_{ST} between the two populations was 0.578 and the estimated number of migrants per generation was 0.046, both clearly indicating substantial genetic differentiation. From a conservation perspective, these results suggest that each population may act as a source for introducing additional genetic variation into the other population.

Kirkman, S.P., Oosthuizen, W.H., Meyer, M.A., Kotze, P.G.H., Roux, J.P., and Underhill, L.G. **Making sense of censuses and dealing with missing data: trends in pup counts of Cape fur seal *Arctocephalus pusillus pusillus* for the period 1972-2004.** *African Journal of Marine Science* 29(2): 161-176, 2007.

Notes: Trends in the population of Cape fur seals *Arctocephalus pusillus pusillus* were estimated from counts of pups on aerial photographs of colonies taken between 1972 and 2004 to determine trends in the overall population and subpopulations. Incomplete coverage resulted in missing data in some years. Various methods of determining proxy values for missing data were assessed, and it was concluded that different methods were applicable to Namibian and South African colonies. This reflected variation in trends of pup counts between the countries, which was associated with differences in productivity between the southern and northern Benguela ecosystems. In Namibia, temporal changes in pup numbers were non-linear in some years and there was correspondence in fluctuations at most colonies. This appeared to be on account of an effect of periodic, wide-scale prey shortages that reduced birth rates. There was a northward shift in the distribution of seals in the northern Benguela system. In South Africa, pup counts were much less variable between years, probably on account of a relative stability of food supply. A linear approach was therefore suitable for determining proxy values for missing data at South African colonies. Pup counts suggest that there has been little change in the overall population of the Cape fur seals since 1993, when it was estimated at about two million animals.

Chivers, S.J., Baird, R.W., McSweeney, D.J., Webster, D.L., Hedrick, N.M., and Salinas, J.C. **Genetic variation and evidence for population structure in eastern North Pacific false killer whales (*Pseudorca crassidens*).** *Canadian Journal of Zoology* 85(7): 783-794, 2007.

Notes: False killer whales (*Pseudorca crassidens* (Owen, 1846)) are incidentally taken in the North Pacific pelagic long-line fishery, but little is known about their population structure to assess the impact of these takes. Using mitochondrial DNA (mtDNA) control region sequence data, we quantified genetic variation for the species and tested for genetic differentiation among geographic strata. Our data set of 124 samples included 115 skin-biopsy samples collected from false killer whales inhabiting the eastern North Pacific Ocean (ENP), and nine samples collected from animals sampled at sea or on the beach in the western North Pacific, Indian, and Atlantic oceans. Twenty-four (24) haplotypes were identified, and nucleotide diversity was low ($\pi = 0.37\%$) but comparable with that of closely related species. Phylogeographic concordance in the distribution of haplotypes was revealed and a demographically isolated population of false killer whales associated with the main Hawaiian islands was identified ($\Phi_{ST} = 0.47$, $p < 0.0001$). This result supports recognition of the existing management unit, which has geo-political boundaries corresponding to the USA's exclusive economic zone (EEZ) of Hawai'i. However, a small number of

animals sampled within the EEZ but away from the near-shore island area, which is defined as <25 nautical miles (1 nautical mile = 1.852 km) from shore, had haplotypes that were the same or closely related to those found elsewhere in the ENP, which suggests that there may be a second management unit within the Hawaiian EEZ. Biologically meaningful boundaries for the population(s) cannot be identified until we better understand the distribution and ecology of false killer whales.

Levin, M., Leibrecht, H., Mori, C., Jessup, D., and De Guise, S. **Immunomodulatory effects of organochlorine mixtures upon in vitro exposure of peripheral blood leukocytes differ between free-ranging and captive southern sea otters (*Enhydra lutris*).** *Veterinary Immunology and Immunopathology* 119(3-4): 269-277, 2007.

Notes: Organochlorines (OCs), notably polychlorinated biphenyls (PCBs) and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), are ubiquitous environmental contaminants. Contaminant-induced immunosuppression by OCs has been implicated as a co-factor in the deaths of thousands of marine mammals in infectious disease epizootics over the last two decades, and limited studies support the hypothesis that PCBs are immunomodulatory. This study represented a unique opportunity to assess the potential differences in susceptibility to OCs between captive and free-ranging sea otters originating from the same genetic population. In vitro immune assays were utilized to evaluate both innate (phagocytosis and respiratory burst) and acquired (mitogen-induced B and T lymphocyte proliferation) immune functions. Individual PCBs (138, 153, 169 and 180) as well as TCDD and all 26 possible combinations were tested. Mixtures were tested as they represent 'real life' exposure. Our results suggest that (1) different immune functions were sensitive to different OC mixtures in both magnitude and direction (enhancement/suppression) and (2) differences in sensitivities upon in vitro exposure to OCs occurred between free-ranging and captive otters. Differences in susceptibility could be explained by the acute stress of capture, the chronic stress of captivity or nutritional differences. Understanding differences in toxicity to different populations of sea otters will have important implications for risk assessment as well as conservation and management strategies.

Goldsworthy, S.D. and Page, B. **A risk-assessment approach to evaluating the significance of seal bycatch in two Australian fisheries.** *Biological Conservation* 139(3-4): 269-285, 2007.

Notes: A common issue faced by fisheries and marine protected species managers is how to estimate the potential impacts of bycatch and identify appropriate options for mitigation, in the absence of quantitative data. This problem formed the basis to a risk-assessment study aimed at quantifying the risks to Australian sea lion (*Neophoca cinerea*) and New Zealand fur seal (*Arctocephalus forsteri*) populations from bycatch in a trap (rock lobster) and demersal gillnet fishery off South Australia. The approach was to: (1) estimate the spatial distribution of foraging effort for different sex and age classes within each species; (2) compare these with the spatial distribution of fishing effort in order to develop spatial estimates of seal-fishery interaction probabilities; (3) undertake population viability analyses to identify the levels of bycatch that would place subpopulations of each species into different risk categories; and (4) examine different bycatch scenarios and identify subpopulations, regions and marine fishing areas with the greatest bycatch risk. Results suggest that the risk of subpopulation extinction, even from low levels of bycatch, was high for sea lions, but very low for fur seals and that the two fisheries lend themselves to different mitigation approaches: gear modification in the lobster fishery; and spatial management of fishing effort in the demersal gillnet fishery.

Meier, S.K., Yazvenko, S.B., Blokhin, S.A., Wainwright, P., Maminov, M.K., Yakovlev, Y.M., and Newcomer, M. W. **Distribution and abundance of western gray whales off northeastern Sakhalin Island, Russia, 2001-2003.** *Environmental Monitoring and Assessment* 134(1-3): 107-136, 2007. **O/A**

Notes: In 2001-2003, > 60,000 km of aerial surveys and 7,700 km of vessel surveys were conducted during June to November when critically endangered Korean-Okhotsk or western gray whales (*Eschrichtius robustus*) were present off the northeast coast of Sakhalin Island, Russia. Results of surveys in all years indicated gray whales occurred in predominantly two areas, (1) adjacent to Piltun Bay, and (2) offshore from Chayvo Bay, hereafter referred to as the Piltun and offshore feeding areas. In the Piltun feeding area, the majority of whales were observed in waters shallower than 20 m and were distributed from several hundred meters to similar to 5 km from the shoreline. In the offshore feeding area during all years, the distribution of gray whales extended from southwest to northeast in waters 30-65 m in depth. During all years, the distribution and abundance of whales changed in both the Piltun and offshore feeding areas, and both north-south and inshore-offshore movements were

documented within and between feeding seasons. The discovery of a significant number of whales feeding in the offshore area each year was a substantial finding of this study and raises questions regarding western gray whale abundance and population levels, feeding behavior and ecology, and individual site-fidelity. Fluctuations in the number of whales observed within the Piltun and offshore feeding areas and few sightings outside of these two areas indicate that gray whales move between the Piltun and offshore feeding areas during their summer-fall feeding season. Seasonal shifts in the distribution and abundance of gray whales between and within both the Piltun and offshore feeding areas are thought, in part, to be a response to seasonal changes in the distribution and abundance of prey. However, the mechanism driving the movements of whales along the northeast coast of Sakhalin Island is likely very complex and influenced by a multitude of factors.

Kurihara, N. and Oda, S. **Cranial variation in bottlenose dolphins *Tursiops* spp. from the Indian and western Pacific Oceans: additional evidence for two species.** *Acta Theriologica* 52(4): 403-418, 2007.

Notes: We examined the skulls of 72 bottlenose dolphins from the Indian and western Pacific Oceans to clarify the systematics in genus *Tursiops*. We also examined type skulls of *Tursiops aduncus* (Ehrenberg, 1832), *T. eurynome* (Gray, 1846), *T. catalania* (Gray, 1862), *Delphinus (Steno) gadamu* Owen 1866, *T. dawsoni* Lydekker 1908, and *T. truncatus* (Montagu, 1821). The specimens were divided into two groups, A and B, based on rostrum length and characters of the basal part of the rostrum. The rostrum of group A was longer and tapered abruptly near the base, whereas that of group B was shorter and tapered more gradually throughout its length. Group A contained specimens from western, central, and eastern Asia, Africa, and Australasia. Group B contained specimens from central and eastern Asia and Australasia. The six type skulls were also clearly divided into two groups; the type skulls of *T. aduncus*, *T. catalania*, and *Delphinus (Steno) gadamu* were included in group A, whereas the type skulls of *T. truncatus*, *T. eurynome*, and *T. dawsoni* were included in group B. This grouping was consistent with the genetic status. Therefore, we identified group A specimens as *T. aduncus* and group B specimens *T. truncatus*, the oldest scientific names related to the two groups.

Fortuna, C.M., Canese, S., Giusti, M., Revelli, E., Consoli, P., Florio, G., Greco, S., Romeo, T., Andaloro, F., Fossi, M.C., and Lauriano, G. **An insight into the status of the striped dolphins, *Stenella coeruleoalba*, of the southern Tyrrhenian Sea.** *Journal of the Marine Biological Association of the United Kingdom* 87(5): 1321-1326, 2007.

Notes: Drift-nets are known to result in high incidental catches of some cetacean species. Despite a UN moratorium on their use in the high seas and a ban in the Mediterranean by all European Union countries, including Italy (EC Reg. 1239/98), some fisheries continue to operate illegally. In 2002 and 2003 three line-transect surveys were conducted in the southern Tyrrhenian Sea around the Aeolian archipelago. These transects were designed to assess the presence, distribution and population size of cetacean species likely to be affected by accidental captures in this area. Data were only sufficient to estimate abundance for the striped dolphin. The best estimate (and first such estimate for this area) was 4030 individuals (CV=0.30, 95% CI=2239-7253) for May 2003. A rough estimate of striped dolphin by-catch, based on floating carcasses, was calculated as 36 by-caught animals over a period of 12 days (CV=0.58, 95% CI=11-113). These results, although approximate, are a cause for concern. Conservation and management implications of the results are discussed.

Regehr, E.V., Lunn, N.J., Amstrup, S.C., and Stirling, I. **Effects of earlier sea ice breakup on survival and population size of polar bears in western Hudson Bay.** *Journal of Wildlife Management* 71(8): 2673-2683, 2007.

Notes: Some of the most pronounced ecological responses to climatic warming are expected to occur in polar marine regions, where temperature increases have been the greatest and sea ice provides a sensitive mechanism by which climatic conditions affect sympagic (i.e., with ice) species. Population-level effects of climatic change, however, remain difficult to quantify. We used a flexible extension of Cormack-Jolly-Seber capture-recapture models to estimate population size and survival for polar bears (*Ursus maritimus*), one of the most ice-dependent of Arctic marine mammals. We analyzed data for polar bears captured from 1984 to 2004 along the western coast of Hudson Bay and in the community of Churchill, Manitoba, Canada. The Western Hudson Bay polar bear population declined from 1,194 (95% CI = 1,020-1,368) in 1987 to 935 (95% CI = 794-1,076) in 2004. Total apparent survival of prime-adult polar bears (5-19 yr) was stable for females (0.93; 95% CI = 0.91-0.94) and males (0.90; 95% CI = 0.88-0.91). Survival of juvenile, subadult, and senescent-adult polar bears was correlated with spring sea ice breakup date, which was variable among years and occurred approximately 3 weeks earlier in 2004 than in 1984. We

propose that this correlation provides evidence for a causal association between earlier sea ice breakup (due to climatic warming) and decreased polar bear survival. It may also explain why Churchill, like other communities along the western coast of Hudson Bay, has experienced an increase in human-polar bear interactions in recent years. Earlier sea ice breakup may have resulted in a larger number of nutritionally stressed polar bears, which are encroaching on human habitations in search of supplemental food. Because western Hudson Bay is near the southern limit of the species' range, our findings may foreshadow the demographic responses and management challenges that more northerly polar bear populations will experience if climatic warming in the Arctic continues as projected.

Higham, J.E.S. and Bejder, L. **Managing wildlife-based tourism: Edging slowly towards sustainability?** *Current Issues in Tourism* 11(1): 75-83, 2008.

Notes: It is increasingly acknowledged that cetacean-based tourism may not be as low in impact as many hope or presume, and that any long term and systematic human interactions with populations of wild animals need to be rigorously monitored and carefully managed. This paper reviews a series of recent developments in the management of tourist interactions with dolphins at Shark Bay (Western Australia). We argue that collectively these developments represent a paradigmatic shift in the way commercial tourism encounters with dolphins are managed. If so, they represent an important and long overdue advance in the general direction of sustainable management. However, the paper also strikes a note of caution. Shark Bay, a well managed site of relatively low level commercial dolphin-watching activities, carries important insights and austere warnings for the many high-intensity/low visitor management dolphin-tourism sites around the world.

Rausch, R.L., George, J.C., and Brower, H.K. **Effect of climatic warming on the Pacific walrus, and potential modification of its helminth fauna.** *Journal of Parasitology* 93(5): 1247-1251, 2007.

Notes: The decreasing extent of sea-ice in the arctic basin as a consequence of climatic warming is modifying the behavior and diets of pagophilic pinnipeds, including the Pacific walrus, *Odobenus rosmarus divergens* Illiger, the species emphasized here. Mammals such as the walrus and bearded seal, *Erignathus barbatus* (Erxleben), cannot remain associated with the sea-ice, and continue to feed on their usual diet of benthic invertebrates inhabiting coastal waters to a depth of approximately 100 m, when the northwestward retreating ice reaches deep waters beyond the margins of the continental shelf. With reduction of their customary substrate (ice), the walrus has become more pelagic and preys more often on ringed seals, *Phoca hispida* Schreber. Dietary changes, with modifications of helminth faunas, may be induced by various factors. Increased consumption of mammals or their remains by walruses may lead to a higher prevalence of trichinellosis in them and to more frequent occurrence in indigenous peoples inhabiting the arctic coasts. To assess predicted effects on the composition of helminth fauna of the walrus, we recommend systematic surveys of their helminths as part of research on effects of climatic warming.

Skaug, H.J., Frimannslund, L., and Øien, N.I. **Historical population assessment of Barents Sea harp seals (*Pagophilus groenlandicus*).** *ICES Journal of Marine Science* 64(7): 1356-1365, 2007.

Notes: Harp seals are an important component of the Barents Sea ecosystem. Population size is estimated to have been around 6 million seals in 1875, when large-scale exploitation by Norwegian and Russian hunters started. The estimate is obtained by fitting a population dynamics model to all available sources of data on Barents Sea harp seals, but because of a lack of information about several key parameters in the model, the uncertainty associated with the estimate is large. A sensitivity study involving three different mechanisms for density-dependence results in a range estimate of 3-7 million seals in 1875.

Wise, J.P., Wise, S.S., Kraus, S., Shaffiey, F., Grau, M., Chen, T.L., Perkins, C., Thompson, W.D., Zheng, T., Zhang, Y., Romano, T., and O'Hara, T. **Hexavalent chromium is cytotoxic and genotoxic to the North Atlantic right whale (*Eubalaena glacialis*) lung and testes fibroblasts.** *Mutation Research/Genetic Toxicology and Environmental Mutagenesis* 650(1): 30-38, 2008.

Notes: Although hexavalent chromium is a known genotoxic agent in human and terrestrial mammals and is present in seawater and air, its effects on marine mammals including the endangered North Atlantic right whale are unknown and untested. The present study investigated the cytotoxic and genotoxic effects of hexavalent chromium in primary cultured North Atlantic right whale lung and testes fibroblasts and levels of total chromium in skin biopsies from North Atlantic right whales. Cytotoxicity was measured by clonogenic survival assay. Genotoxicity was measured as production of chromosome aberrations. Tissue chromium levels were determined from skin biopsies of healthy free-ranging whales in the Bay of Fundy using inductively coupled plasma optical emission spectroscopy. Hexavalent chromium-induced concentration-dependent increases in right whale lung and testes fibroblast cytotoxicity with the testes more sensitive to the cytotoxic effects. It also induced concentration-dependent increases in chromosomal aberrations in both cell types with no significant difference in sensitivity. Skin biopsy data indicate that North Atlantic right whales are exposed to chromium and accumulate a range of 4.9-10 µg Cr/g tissue with a mean of 7.1µg/g. Hexavalent chromium is cytotoxic and genotoxic to North Atlantic right whale cells. The whales have tissue chromium levels that are concerning. These data support a hypothesis that chromium may be a concern for the health of the North Atlantic right whales. Considering these data with chromium chemistry, whale physiology and atmospheric chromium levels further suggest that inhalation may be an important exposure route.

Goldstein, T., Mazet, J.A.K., Zabka, T.S., Langlois, G., Colegrove, K.M., Silver, M., Bargu, S., Van Dolah, F., Leighfield, T., Conrad, P.A., Barakos, J., Williams, D.C., Dennison, S., Haulena, M., and Gulland, F.M.D. **Novel symptomatology and changing epidemiology of domoic acid toxicosis in California sea lions (*Zalophus californianus*): an increasing risk to marine mammal health.** *Proceedings of the Royal Society of London [B]* 275: 267-276, 2008.

Notes: Harmful algal blooms are increasing worldwide, including those of *Pseudo-nitzschia* spp. producing domoic acid off the California coast. This neurotoxin was first shown to cause mortality of marine mammals in 1998. A decade of monitoring California sea lion (*Zalophus californianus*) health since then has indicated that changes in the symptomatology and epidemiology of domoic acid toxicosis in this species are associated with the increase in toxigenic blooms. Two separate clinical syndromes now exist: acute domoic acid toxicosis as has been previously documented, and a second novel neurological syndrome characterized by epilepsy described here associated with chronic consequences of previous sub-lethal exposure to the toxin. This study indicates that domoic acid causes chronic damage to California sea lions and that these health effects are increasing.

Wade, P.R., Watters, G.M., Gerrodette, T., and Reilly, S.B. **Depletion of spotted and spinner dolphins in the eastern tropical Pacific: modeling hypotheses for their lack of recovery.** *Marine Ecology Progress Series* 343: 1-14, 2007. **O/A**

Notes: We assess the status of 2 dolphin stocks affected by purse-seine fishing in the eastern tropical Pacific and evaluate hypotheses for their lack of recovery. We use Bayesian methods and fit generalized models of logistic population growth to abundance estimates for northeastern offshore spotted dolphins *Stenella attenuata attenuata* and eastern spinner dolphins *Stenella longirostris orientalis*. In 2002, using the definition of depletion stipulated in the USA Marine Mammal Protection Act, northeastern offshore spotted dolphins were almost certainly 'depleted'. There is, however, uncertainty in the degree to which the stock was depleted. Eastern spinner dolphins were most likely depleted in 2002, but there is a small probability that this was not the case. Uncertainty in the degree to which both stocks were depleted stems from uncertainties in maximum net productivity levels and carrying capacities. Based on abundance data from 1979 to 2000, both stocks were estimated to have had maximum growth rates of <3 % yr⁻¹ with > 77 % probability, lower than the accepted minimum default value for dolphin populations with reproductive parameters (e.g. calving intervals) like those considered here (Reilly & Barlow 1986, *Fish Bull* 84:527-533; Wade 1998, *Mar Mamm Sci* 14:1-37). We fit models that are intended to be indicative of hypotheses that explain why neither dolphin stock has recovered. Our data and prior information provide equal posterior support to hypotheses which attribute the lack of recovery to the fishery and changes in the ecosystem. We conclude that (1) the purse-seine fishery can impact dolphin stocks beyond the impacts of observed fishery mortality, (2) there is uncertainty about the degrees to which such cryptic impacts have population-level consequences, and (3) the existing dolphin-safe labeling standard is, from a conservation perspective, robust to this uncertainty.

Mehta, A.V., Allen, J.M., Constantine, R., Garrigue, C., Jann, B., Jenner, C., Marx, M.K., Matkin, C.O., Mattila, D.K., Minton, G., Mizroch, S.A., Olavarria, C., Robbins, J., Russell, K.G., Seton, R.E., Steiger, G.H., Vikingsson, G.A., Wade, P.R., Witteveen, B.H., and Clapham, P.J. **Baleen whales are not important as prey for killer whales *Orcinus orca* in high-**

latitude regions. *Marine Ecology Progress Series* 348: 297-307, 2007.

Notes: Certain populations of killer whales *Orcinus orca* feed primarily or exclusively on marine mammals. However, whether or not baleen whales represent an important prey source for killer whales is debatable. A hypothesis by Springer *et al.* (2003) suggested that overexploitation of large whales by industrial whaling forced killer whales to prey-switch from baleen whales to pinnipeds and sea otters, resulting in population declines for these smaller marine mammals in the North Pacific and southern Bering Sea. This prey-switching hypothesis is in part contingent upon the idea that killer whales commonly attack mysticetes while they are in these high-latitude areas. In this study, we used photographic and sighting data from long-term studies of baleen whales in 24 regions worldwide to determine the proportion of whales that bear scars (rake marks) from killer whale attacks, and to examine the timing of scar acquisition. The results of this study show that there is considerable geographic variation in the proportion of whales with rake marks, ranging from 0% to > 40% in different regions. In every region, the great majority of the scars seen were present on the whales' bodies when the animals were first sighted. Less than 7% (9 of 132) of scarred humpback whales with multi-year sighting histories acquired new scars after the first sighting. This suggests that most killer whale attacks on baleen whales target young animals, probably calves on their first migration from low-latitude breeding and calving areas to high-latitude feeding grounds. Overall, our results imply that adult baleen whales are not an important prey source for killer whales in high latitudes, and therefore that one of the primary assumptions underlying the Springer *et al.* (2003) prey-switching hypothesis (and its purported link to industrial whaling) is invalid.

Hickie, B.E., Ross, P.S., Macdonald, R.W., and Ford, J.K.B. **Killer whales (*Orcinus orca*) face protracted health risks associated with lifetime exposure to PCBs.** *Environmental Science and Technology* 41(18): 6613-6619, 2007. O/A

Notes: Polychlorinated biphenyl (PCB) concentrations declined rapidly in environmental compartments and most biota following implementation of regulations in the 1970s. However, the metabolic recalcitrance of PCBs may delay responses to such declines in large, long-lived species, such as the endangered and highly PCB-contaminated resident killer whales (*Orcinus orca*) of the Northeastern Pacific Ocean. To investigate the influence of life history on PCB-related health risks, we developed models to estimate PCB concentrations in killer whales during the period from 1930 forward to 2030, both within a lifetime (~ 50 years) and across generations, and then evaluated these in the context of health effects thresholds established for marine mammals. Modeled PCB concentrations in killer whales responded slowly to changes in loadings to the environment as evidenced by slower accumulation and lower magnitude increases in PCB concentrations relative to prey, and a delayed decline that was particularly evident in adult males. Since PCBs attained peak levels well above the effects threshold (17 mg/kg lipid) in ~ 1969, estimated concentrations in both the northern and the more contaminated southern resident populations have declined gradually. Projections suggest that the northern resident population could largely fall below the threshold concentration by 2030 while the endangered southern residents may not do so until at least 2063. Long-lived aquatic mammals are therefore not protected from PCBs by current dietary residue guidelines.

Litz, J.A., Garrison, L.P., Fieber, L.A., Martinez, A., Contillo, J.P., and Kucklick, J.R. **Fine-scale spatial variation of persistent organic pollutants in bottlenose dolphins (*Tursiops truncatus*) in Biscayne Bay, Florida.** *Environmental Science and Technology* 41(21): 7222-7228, 2007.

Notes: Bottlenose dolphins (*Tursiops truncatus*) are long-term residents and apex predators in southeast U.S. estuaries and are vulnerable to bioaccumulation of persistent organic pollutants (POPs). Dart biopsy samples were collected from 45 dolphins in Biscayne Bay (Miami, FL), 34 of which were matched using fin markings to a photo identification catalogue. Blubber samples were analyzed for 73 polychlorinated biphenyl (PCB) congeners, six polybrominated diphenyl ether (PBDE) congeners, and organochlorine pesticides including dichloro-diphenyl-trichloroethane (DDT) and metabolites, chlordanes, and dieldrin. Total PCBs (Σ 73PCBs) were present in the highest concentrations and were 5 times higher in males with sighting histories in the northern, metropolitan area of Biscayne Bay than males with sighting histories in the southern, more rural area [geometric mean: 43.3 (95% confidence interval: 28.0-66.9) vs 8.6 (6.3-11.9) μ g/g wet mass, respectively]. All compound classes had higher concentrations in northern animals than southern. The differences in POP concentrations found on this small geographic scale demonstrate that differential habitat use can strongly influence pollutant concentrations and should be considered when interpreting bottlenose dolphin POP data. The PCB concentrations in northern Bay dolphins are high as compared to other studies of estuarine dolphins and may place these animals at risk of reproductive failure and decreased immune function.

Trites, A.W., Deecke, V.B., Gregr, E.J., Ford, J.K.B., and Olesiuk, P.F. **Killer whales, whaling, and sequential megafaunal collapse in the North Pacific: A comparative analysis of the dynamics of marine mammals in Alaska and British Columbia following commercial whaling.** *Marine Mammal Science* 23(4): 751-765, 2007.

Notes: The hypothesis that commercial whaling caused a sequential megafaunal collapse in the North Pacific Ocean by forcing killer whales to eat progressively smaller species of marine mammals is not supported by what is known about the biology of large whales, the ecology of killer whales, and the patterns of ecosystem change that took place in Alaska, British Columbia, and elsewhere in the world following whaling. A comparative analysis shows that populations of seals, sea lions, and sea otters increased in British Columbia following commercial whaling, unlike the declines noted in the Gulf of Alaska and Aleutian Islands. The declines of seals and sea lions that began in western Alaska around 1977 were mirrored by increases in numbers of these species in British Columbia. A more likely explanation is that the seal and sea lion declines and other ecosystem changes in Alaska stem from a major oceanic regime shift that occurred in 1977. Killer whales are unquestionably a significant predator of seals, sea lions, and sea otters - but not because of commercial whaling.

Wade, P.R. *et al.* **Killer whales and marine mammal trends in the North Pacific - A re-examination of evidence for sequential megafauna collapse and the prey-switching hypothesis.** *Marine Mammal Science* 23(4): 766-802, 2007.

Notes: Springer *et al.* (2003) contend that sequential declines occurred in North Pacific populations of harbor and fur seals, Steller sea lions, and sea otters. They hypothesize that these were due to increased predation by killer whales, when industrial whaling's removal of large whales as a supposed primary food source precipitated a prey switch. Using a regional approach, we reexamined whale catch data, killer whale predation observations, and the current biomass and trends of potential prey, and found little support for the prey-switching hypothesis. Large whale biomass in the Bering Sea did not decline as much as suggested by Springer *et al.*, and much of the reduction occurred 50-100 yr ago, well before the declines of pinnipeds and sea otters began; thus, the need to switch prey starting in the 1970s is doubtful. With the sole exception that the sea otter decline followed the decline of pinnipeds, the reported declines were not in fact sequential. Given this, it is unlikely that a sequential megafaunal collapse from whales to sea otters occurred. The spatial and temporal patterns of pinniped and sea otter population trends are more complex than Springer *et al.* suggest, and are often inconsistent with their hypothesis. Populations remained stable or increased in many areas, despite extensive historical whaling and high killer whale abundance. Furthermore, observed killer whale predation has largely involved pinnipeds and small cetaceans; there is little evidence that large whales were ever a major prey item in high latitudes. Small cetaceans (ignored by Springer *et al.*) were likely abundant throughout the period. Overall, we suggest that the Springer *et al.* hypothesis represents a misleading and simplistic view of events and trophic relationships within this complex marine ecosystem.

Zimmer, W.M.X. and Tyack, P.L. **Repetitive shallow dives pose decompression risk in deep-diving beaked whales.** *Marine Mammal Science* 23(4): 888-925, 2007.

Notes: The impact of naval sonar on beaked whales is of increasing concern. In recent years the presence of gas and fat embolism consistent with decompression sickness (DCS) has been reported through postmortem analyses on beaked whales that stranded in connection with naval sonar exercises. In the present study, we use basic principles of diving physiology to model nitrogen tension and bubble growth in several tissue compartments during normal diving behavior and for several hypothetical dive profiles to assess the risk of DCS. Assuming that normal diving does not cause nitrogen tensions in excess of those shown to be safe for odontocetes, the modeling indicates that repetitive shallow dives, perhaps as a consequence of an extended avoidance reaction to sonar sound, can indeed pose a risk for DCS and that this risk should increase with the duration of the response. If the model is correct, then limiting the duration of sonar exposure to minimize the duration of any avoidance reaction therefore has the potential to reduce the risk of DCS.