

### In this review:

- A. Recent publications available online
- B. Recent articles with abstracts

## A. Recent publications available online

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Meltofte, H. *et al.* 2007. **Effects of climate variation on the breeding ecology of Arctic shorebirds.** *Meddelelser om Grønland Bioscience* 59, Danish Polar Center, Copenhagen. 48pp.

### Available at:

[http://www.dpc.dk/graphics/Design/Danish/Videnscenter/DPC\\_publicationer/MoGpdf/MoG%20Bio/Bioscience%2059.pdf](http://www.dpc.dk/graphics/Design/Danish/Videnscenter/DPC_publicationer/MoGpdf/MoG%20Bio/Bioscience%2059.pdf)

**Notes:** About 50 species of shorebirds breed in the Arctic, where they constitute the most characteristic component of the tundra avifauna. Here, we review the impact of weather and climate on the breeding cycle of shorebirds based on extensive studies conducted across the Arctic. Conditions for breeding shorebirds are highly variable among species, sites and regions, both within and between continents. Weather effects on breeding are most moderate in the Low Arctic of northern Europe and most extreme in the Siberian High Arctic. The decision of whether or not to breed upon arrival on the breeding grounds, the timing of egg-laying and the chick-growth period are most affected by annual variation in weather. In large parts of the Arctic, clutch initiation dates are highly correlated with snowmelt dates and in regions and years where extensive snowmelt occurs before or soon after the arrival of shorebirds, the decision to breed and clutch initiation dates appear to be a function of food availability for laying females. Once incubation is initiated, adult shorebirds appear fairly resilient to variations in temperature with nest abandonment primarily occurring in case of severe weather with new snow covering the ground. Feeding conditions for chicks, a factor highly influenced by weather, affects juvenile production in most regions. Predation has a very strong impact on breeding productivity throughout the Arctic and subarctic, with lemming *Dicrostonyx* spp. and *Lemmus* spp. fluctuations strongly influencing predation rates, particularly in the Siberian Arctic. The fate of Arctic shorebirds under projected future climate scenarios is uncertain, but High Arctic species and populations appear particularly at risk. Climatic amelioration may benefit Arctic shorebirds in the short term by increasing both survival and productivity, whereas in the long term habitat changes both on the breeding grounds and in the temperate and tropical non-breeding areas may put them under considerable pressure and may bring some of them near to extinction. Their relatively low genetic diversity, which is thought to be a consequence of survival through past climatically-driven population bottlenecks, may also put them more at risk to anthropogenic-induced climate variation than other avian taxa.

## B. Recent articles with abstracts

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Creuwels, J.C.S., Poncet, S., Hodum, P.J., and Van Franeker, J.A. **Distribution and abundance of the Southern Fulmar *Fulmarus glacialisoides*.** *Polar Biology* 30(9): 1083-1097, 2007.

**Notes:** We reviewed published and unpublished literature to establish the status of the breeding distribution and abundance of Southern Fulmars *Fulmarus glacialisoides*. The species breeds widely throughout the Antarctic and on peri-Antarctic islands. From

breeding population data collated from 73 of these localities, we estimated the minimum global population to be about 400,000 breeding pairs. After adjusting for seasonal variation in numbers of breeding pairs based on studies at Ardery Island, East Antarctica, the total global population is estimated to be at least one million breeding pairs. Of this, 72% nest on islands of the Scotia Sea arc and the South Atlantic Ocean. The precision of the estimate on the total number of breeding pairs is low, as several colony estimates were only available as orders of magnitude. Furthermore, different timing of the surveys and the difficulties of censusing colonial cliff-nesting birds reduced the count accuracy. Currently, there are no known threats to the global population, although the effects of fishery activities are not fully known.

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Caron, C.M. and Paton, P.W.C. **Population trends and habitat use of harlequin ducks in Rhode island.** *Journal of Field Ornithology* 78(3): 254-262, 2007.

**Notes:** To assess population trends of Harlequin Ducks (*Histrionicus histrionicus*) in Rhode Island (U.S.A.), we analyzed Christmas Bird Counts and other historical surveys and also conducted surveys during the winter of 2005-2006. We estimated sex and age ratios, evaluated the effects of tidal regime and time of day on survey precision, and quantified habitat use. The population in Rhode Island experienced logistic growth from 1976 to 2004, with approximately 150 birds now wintering at three primary sites in the state. We estimated that the current ratio of males to females in the region was 1.6:1 (62% males) and that 13% of males were first-winter birds. Most Harlequin Ducks were observed in rocky habitats within 50 m of the shore or offshore islands. We detected the greatest numbers of birds, with the least amount of variation, during morning surveys at low tide, suggesting that this may be the most appropriate time for population monitoring. Increases in the Rhode Island population and male-biased sex ratios may indicate a local population recovery resulting from a hunting ban initiated in 1990. Although most Harlequin Ducks in eastern North America winter in Maine, the population in Rhode Island represents one of the largest in the southern part of their range.

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Friesen, V.L., Burg, T.M., and McCoy, K.D. **Mechanisms of population differentiation in seabirds.** *Molecular Ecology* 16(9): 1765-1785, 2007.

**Notes:** Despite recent advances in population genetic theory and empirical research, the extent of genetic differentiation among natural populations of animals remains difficult to predict. We reviewed studies of geographic variation in mitochondrial DNA in seabirds to test the importance of various factors in generating population genetic and phylogeographic structure. The extent of population genetic and phylogeographic structure varies extensively among species. Species fragmented by land or ice invariably exhibit population genetic structure and most also have phylogeographic structure. However, many populations (26 of 37) display genetic structure in the absence of land, suggesting that other barriers to gene flow exist. In these populations, the extent of genetic structure is best explained by nonbreeding distribution: almost all species with two or more population-specific nonbreeding areas (or seasons) have phylogeographic structure, and all species that are resident at or near breeding colonies year-round have population genetic structure. Geographic distance between colonies and foraging range appeared to have a weak influence on the extent of population genetic structure, but little evidence was found for an effect of colony dispersion or population bottlenecks. In two species (Galapagos petrel, *Pterodroma phaeopygia*, and Xantus's murrelet, *Synthliboramphus hypoleucus*), population genetic structure, and even phylogeographic structure, exist in the absence of any recognizable physical or nonphysical barrier, suggesting that other selective or behavioural processes such as philopatry may limit gene flow. Retained ancestral variation may be masking barriers to dispersal in some species, especially at high latitudes. Allopatric speciation undoubtedly occurs in this group, but reproductive isolation also appears to have evolved through founder-induced speciation, and there is strong evidence that parapatric and sympatric speciation occur. While many questions remain unanswered, results of the present review should aid conservation efforts by enabling managers to predict the extent of population differentiation in species that have not yet been studied using molecular markers, and, thus, enable the identification of management units and evolutionary significant units for conservation.

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Long, P.R., Szekely, T., Kershaw, M., and O'Connell, M. **Ecological factors and human threats both drive wildfowl population declines.** *Animal Conservation* 10(2): 183-191, 2007.

**Notes:** Many wildfowl species are declining and 34 out of 159 extant species are globally threatened, some of which are the subject of specific conservation programmes. Here we investigate which factors predict declining population trends across 154

species of Anseriformes. First we show that there are proportionately fewer declining wildfowl populations in North America, Europe and Australasia than in south and central America, Africa and Asia. Second, we use phylogenetic comparative analyses to test whether population size, global range size and ecological, life-history and sexually-selected traits predict population trends. We also consider anthropogenic threats, and human impacts within the breeding and non-breeding ranges of species. Using phylogenetically independent contrasts we show that small population size and small global ranges are the most important intrinsic factors that predispose wildfowl species to declining populations. Many wildfowl are hunted but, contrary to expectation, hunting did not influence population trends. Declining populations were associated with high International Union for the Conservation of Nature (IUCN) threat category, although the relationship is not very strong ( $r = 0.134$ ,  $n = 129$  contrasts) possibly because the IUCN criteria integrate population size, range size and an assessment of threat. Two extrinsic factors were significant predictors of population declines: the increase in area of agricultural land within a species' range (an indirect measure of wetland loss), and the total number of different threat processes such as habitat loss and pollution that threaten a species. Taken together, our results strongly suggest that both anthropogenic threats and intrinsic ecological factors are influencing population declines in wildfowl.

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Phillips, L.M., Powell, A.N., Taylor, E.J., and Rexstad, E.A. **Use of the Beaufort Sea by king eiders breeding on the north slope of Alaska.** *Journal of Wildlife Management* 71(6): 1892-1898, 2007.

**Notes:** We estimated areas used by king eiders (*Somateria spectabilis*) in the Alaskan Beaufort Sea, how distributions of used areas varied, and characteristics that explained variation in the number of days spent at sea, to provide regulatory agencies with baseline data needed to minimize impacts of potential offshore oil development. We implanted sixty king eiders with satellite transmitters at nesting areas on the North Slope of Alaska, USA, in 2002-2004. More than 80% of marked eiders spent >2 weeks staging offshore prior to beginning a postbreeding molt migration. During postbreeding staging and migration, male king eiders had much broader distributions in the Alaskan Beaufort Sea than female eiders, which were concentrated in Harrison and Smith Bays. Distribution did not vary by sex during spring migration in the year after marking. Shorter residence times of eiders and deeper water at locations used during spring migration suggest the Alaskan Beaufort Sea might not be as critical a staging area for king eiders during prebreeding as it is postbreeding. Residence time in the Beaufort Sea varied by sex, with female king eiders spending more days at sea than males in spring and during postbreeding. We conclude the Alaskan Beaufort Sea is an important staging area for king eiders during postbreeding, and eider distribution should be considered by managers when mitigating for future offshore development. We recommend future studies examine the importance of spring staging areas outside the Alaskan Beaufort Sea.

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Davoren, G.K. **Effects of gill-net fishing on marine birds in a biological hotspot in the northwest Atlantic.** *Conservation Biology* 21(4): 1032-1045, 2007.

**Notes:** Marine biological hotspots, or areas where high abundances of species overlap in space and time, are ecologically important areas because energy flow through marine food webs, a key ecosystem process, is maximized in these areas. I investigated whether top predators aggregated at persistent spawning sites of a key forage fish species, capelin (*Mallotus villosus*), on the NE coast of Newfoundland during July and August 2000-2003. By examining the distributional patterns of top predators through ship-based surveys at multiple spatial and temporal scales, I found that the biomasses of birds -- dominated by Common Murres (*Uria aalge*) -- and mammals -- dominated by whale species -- were concentrated along the coast, with a biological hotspot forming near two persistent spawning sites of capelin in all years. The formation of this hotspot was well defined in space and time from middle of July to middle of August, likely coinciding with the spawning chronology of capelin. Within this hotspot, there was a high spatial and temporal overlap of Common Murres and gill nets set to capture Atlantic cod (*Gadus morhua*). This resulted in breeding murres becoming entangled in gill nets while feeding on spawning capelin. Despite an acknowledged uncertainty of bycatch mortality, estimates for the larger regional-scale area (1936-4973 murres/year; 0.2-0.6% of the breeding population) underestimated mortality relative to estimates within the hotspot (3053-14054 murres/year; 0.4-1.7%). Although fishing effort for Atlantic cod has declined substantially since the groundfish moratorium in 1992, chronic, unnatural, and additive mortality through bycatch continues in coastal Newfoundland. Restricted use of gill nets within this and other biological hotspots during the cupelin spawning period appears to be a straightforward application of the "ecological and biologically significant area" management framework in Canada's Oceans Act. This protection would minimize murre bycatch and maintain ecosystem integrity.

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Verreault, J., Gebbink, W.A., Gauthier, L.T., Gabrielsen, G.W., and Letcher, R.J. **Brominated flame retardants in glaucous gulls from the Norwegian Arctic: More than just an issue of polybrominated diphenyl ethers.** *Environmental Science and Technology* 41(14): 4925-4931, 2007.

**Notes:** Several, unregulated, current-use brominated flame retardants (BFRs), including hexabromobenzene (HBB), 1,2-bis(2,4,6-tribromophenoxy)ethane (BTBPE), pentabromo-ethylbenzene (PBEB), pentabromotoluene (PBT), and hexabromocyclododecane (as total-(a)-HBCD), were examined in egg yolk and plasma of male and female glaucous gulls (*Larus hyperboreus*) from the Norwegian Arctic. Also examined were BDE209 and 38 tri- to nona-BDE congeners and brominated biphenyl (BB) 101. The HBB, BTBPE, PBEB, and PBT had high detection frequencies and variability in male and female plasma and egg yolk samples, and their concentrations ranged from nondetectable (< 0.02 - 0.27 ng/g wet wt) to 2.64 ng/g wet wt. The detection frequencies and range of concentrations of non-BDE BFRs were generally highest in plasma of males relative to females. Total-(a)-HBCD concentrations were highest among the non-PBDE BFRs (up to 6.12 and 63.9 ng/g wet wt in plasma and egg yolk, respectively). Next highest was HBB with concentrations within a range comparable to the minor PBDEs monitored (e.g., BDE28, 116 and 155). Sum ( $\Sigma_{38}$ )PBDE concentrations ranged from 2.49 to 54.5 ng/g wet wt in plasma and 81.2 to 321 ng/g wet wt in egg yolk. The BDE209 was virtually nondetectable, whereas six octa-BDEs (i.e., BDE196, 197, 201, 202, 203, and 205), as well as three nona-BDEs (i.e., BDE206, 207, and 208, and potential BDE209 debromination products) were found sporadically in plasma and egg yolk. The results from this study suggest that in addition to PBDEs, several current use, non-BDE BFRs undergo long-range atmospheric transport and bioaccumulate at low levels in and are maternally transferred (to eggs) in glaucous gulls from the Norwegian Arctic.

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Elliott, J.E., Harris, M.L., Wilson, L.K., Smith, B.D., Batchelor, S.P., and Maguire, J. **Butyltins, trace metals and morphological variables in surf scoter (*Melanitta perspicillata*) wintering on the south coast of British Columbia, Canada.** *Environmental Pollution* 149(1): 114-124, 2007.

**Notes:** From 1998 to 2001 we examined spatial and temporal variation in uptake of contaminants by surf scoters (*Melanitta perspicillata*) in the Georgia Basin region of the Pacific coast of Canada. Samples were collected during late fall and early spring at industrialized and reference locations, carcasses examined, and tissues collected for histology, biomarkers, and contaminant analyses. Scoters from both Vancouver and Victoria harbours had significantly higher hepatic concentrations of Sbutyltins than birds from a reference site. In adult male surf scoters, hepatic Sbutyltins increased over the winter at two sites ( $p = 0.02$ ,  $n = 26$ ), while mercury increased ( $p = 0.03$ ,  $n = 15$ ) and selenium decreased at one site ( $p = 0.001$ ,  $n = 15$ ). Body condition decreased over the winter at both the treatment site, Howe Sound ( $p < 0.0001$ ,  $n = 12$ ), and the reference site, Baynes Sound ( $p = 0.02$ ,  $n = 15$ ). Multiple regression analysis using Akaike's Information Criteria (AIC(C)) showed an association between hepatic butyltin concentrations and overall body condition ( $p = 0.06$ ,  $r = -0.237$ ).

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Finkelstein, M.E., Grasman, K.A., Croll, D.A., Tershy, B.R., Keitt, B.S., Jarman, W.M., and Smith, D.R. **Contaminant-associated alteration of immune function in black-footed albatross (*Phoebastria nigripes*), a North Pacific predator.** *Environmental Toxicology and Chemistry* 26(9): 1896-1903, 2007.

**Notes:** Environmental pollution is ubiquitous and can pose a significant threat to wild populations through declines in fitness and population numbers. To elucidate the impact of marine pollution on a pelagic species, we assessed whether toxic contaminants accumulated in black-footed albatross (*Phoebastria nigripes*), a wide-ranging North Pacific predator, are correlated with altered physiological function. Blood samples from adult black-footed albatrosses on Midway Atoll, part of the Hawaiian (USA) archipelago, were analyzed for organochlorines (e.g., polychlorinated biphenyls [PCBs] and chlorinated pesticides), trace metals (silver, cadmium, tin, lead, chromium, nickel, copper, zinc, arsenic, selenium, and total mercury), and a sensitive physiological marker, peripheral white blood cell immune function (mitogen-induced lymphocyte proliferation and macrophage phagocytosis). We found a positive significant relationship between organochlorines, which were highly correlated within individual birds ( $p < 0.001$ ,  $r > 0.80$ , Spearman correlation for all comparisons; PCBs,  $160 \pm 60$  ng/ml plasma [mean standard deviation]; DDTs,  $140 \pm 180$  ng/ml plasma; chlordanes,  $7.0 \pm 3.6$  ng/ml plasma; hexachlorobenzene,  $2.4 \pm 1.5$  ng/ml plasma;  $n = 15$ ) and increased lymphocyte proliferation ( $p = 0.020$ ) as well as percentage lymphocytes ( $p = 0.033$ ). Mercury was elevated in black-footed albatrosses ( $4,500 \pm 870$  ng/ml whole blood,  $n = 15$ ), and high mercury levels appeared to be associated ( $p = 0.017$ ) with impaired macrophage phagocytosis. The associations we documented between multiple contaminant concentrations and immune function in endangered black-footed albatrosses provide some of the first evidence

that albatrosses in the North Pacific may be affected by environmental contamination. Our results raise concern regarding detrimental health effects in pelagic predators exposed to persistent marine pollutants.

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Karpouzi, V.S., Watson, R., and Pauly, D. **Modelling and mapping resource overlap between seabirds and fisheries on a global scale: a preliminary assessment.** *Marine Ecology Progress Series* 343: 87-99, 2007.

**Notes:** Coexistence of foraging seabirds and operating fisheries may result in interactions such as competition for the same prey resources. We used GIS-based modelling at a scale of 0.5 x 0.5 degrees spatial cells to: (1) map the foraging distribution of seabirds; (2) predict their annual food consumption rates in a spatially explicit manner; and (3) estimate a spatially explicit seabird-fisheries overlap index. Information on population size, diet composition and foraging attributes of 351 seabird species was compiled into a Microsoft Access database. Global annual food consumption by seabirds was estimated to be 96.4 million tonnes (95% CI: 78.0 to 114.7 million tonnes), compared with a total catch of nearly 120 million tonnes by all marine fisheries. Krill and cephalopods comprised over 58% of the overall food consumed and fish most of the remainder. The families Procellariidae (albatrosses, petrels, shearwaters) and Spheniscidae (penguins) were responsible for over 54% of the overall food consumption. Seabird foraging distribution maps revealed that areas around New Zealand, the eastern Australian coast, and the sub-Antarctic islands had high species richness. However, temperate and polar regions supported high seabird densities and most food extracted by seabirds originated there. Furthermore, maps of food consumption rates revealed that most food consumed by seabirds was extracted from offshore rather than nearshore waters and from areas where seabird-fisheries overlap was low. The resource overlap maps identified 'hotspots' of highest potential for conflict between fisheries and seabirds. Thus, this study may provide useful insight when developing management approaches for designing offshore marine conservation areas.

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Wynn, R.B., Josey, S.A., Martin, A.P., Johns, D.G., and Yesou, P. **Climate-driven range expansion of a critically endangered top predator in northeast Atlantic waters.** *Biology Letters* 3(5): 529-532, 2007.

**Notes:** Global climate change is driving rapid distribution shifts in marine ecosystems; these are well established for lower trophic levels, but are harder to quantify for migratory top predators. By analysing a 25-year sightings-based dataset, we found evidence for rapid northwards range expansion of the critically endangered Balearic shearwater *Puffinus mauretanicus* in northeast Atlantic waters. A 0.6°C sea surface temperature increase in the mid-1990s is interpreted as an underlying controlling factor, while simultaneous northward shifts of plankton and prey fish species suggests a strong bottom-up control. Our results have important conservation implications and provide new evidence for climate-driven regime shift in Atlantic ecosystems.

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Veran, S., Gimenez, O., Flint, E., Kendall, W.L., Doherty, P.F., and Lebreton, J.D. **Quantifying the impact of longline fisheries on adult survival in the black-footed albatross.** *Journal of Applied Ecology* 44(5): 942-952, 2007.

**Notes:** 1. Industrial longline fishing has been suspected to impact upon black-footed albatross populations *Phoebastria nigripes* by increasing mortality, but no precise estimates of bycatch mortality are available to ascertain this statement. We present a general framework for quantifying the relationship between albatross population and longline fishing in absence of reliable estimates of bycatch rate. 2. We analysed capture-recapture data of a population of black-footed albatross to obtain estimates of survival probability for this population using several alternative models to adequately take into account heterogeneity in the recapture process. Instead of trying to estimate the number of birds killed by using various extrapolations and unchecked assumptions, we investigate the potential relationship between annual adult survival and several measures of fishing effort. Although we considered a large number of covariates, we used principal component analysis to generate a few uncorrelated synthetic variables from the set and thus we maintained both power and robustness. 3. The average survival for 1997-2002 was 92%, a low value compared to estimates available for other albatross species. We found that one of the synthetic variables used to summarize industrial longline fishing significantly explained more than 40% of the variation in adult survival over 11 years, suggesting an impact by longline fishing on albatross' survival. 4. Our analysis provides some evidence of non-linear variation in survival with fishing effort. This could indicate that below a certain level of fishing effort, deaths due to incidental catch can be partially or totally compensated for by a decrease in natural mortality. Another possible explanation is the existence of a strong interspecific competition for accessing the baits, reducing the risk of being accidentally hooked. 5. Synthesis and applications. The suspicion of a significant impact of longline fishing on the black-footed albatross population

was supported by the combination of a low estimate of adult survival for the study period, and a significant relationship between adult survival and a synthetic measure of fishing effort. This study highlights the sensitivity of the black-footed albatross to commercial longline fishing, and should exhort fishery management authorities to find adequate seabirds avoidance methods and to encourage their employment.

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Jehl, J.R. **Disappearance of breeding semipalmated sandpipers from Churchill, Manitoba: more than a local phenomenon.** *Condor* 109(2): 351-360, 2007.

**Notes:** As late as the 1940s the Semipalmated Sandpiper (*Calidris pusilla*) was the most abundant sandpiper breeding at Churchill, Manitoba. By the 1960s it had undergone a sharp decline, and by the mid-1990s the local population consisted of 11 pairs in a single colony. Nesting was last documented in 2001. Declines had also become evident at several other breeding sites along the Hudson Bay coast of Manitoba and Ontario, as well as in the number of migrants detected on the Atlantic coast of Canada and the northern United States. Information on the biology of the Churchill population in 1993-2004 largely agreed with that gathered at La Pérouse Bay, Manitoba, in the 1980s: reproductive success was good and new birds continued to join the colony; however, the number of breeding attempts by individuals was low and decreasing. As there is no evidence that the decline was related to local factors (e.g., altered habitats, climate change), it is probably attributable to mortality in the nonbreeding season, which leaves fewer birds available to return north. Whether causality can be fully resolved is problematic. Monitoring migrants can reveal population trends and studies on the breeding grounds can help frame hypotheses, but both approaches are time-consuming and provide only partial answers. In such cases, restoration of declining species may be best served by fostering habitat conservation throughout a species' range.

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Bustnes, J.O., Tveraa, T., Vatpe, O., Henden, J.A., and Skaare, J.U. **Reproductive performance and organochlorine pollutants in an Antarctic marine top predator: The south polar skua.** *Environment International* 33(7): 911-918, 2007.

**Notes:** Despite low levels of organochlorine contaminants (OCs) in Antarctic biota, some compounds may exceed the levels in equivalent Arctic species, and previous studies have found biochemical evidence of pollutant exposure in south polar skuas (*Catharacta maccormicki*), a common marine top predator in the region. In this study we examined relationships between fitness components (fecundity and adult return rate between breeding seasons) and concentrations of OCs in this species. In 65 nests, both males and females were caught, and using principal component analyses (PCA) we produced composite measurements (PC1 and PC2) of six highly correlated OCs measured in blood samples. Although the concentrations of OC were below those documented to have reproductive effects in other aquatic birds, we found that the eggs of females with high levels of OCs in the blood hatched later, and their chicks were in poorer condition at hatching, than females with low OC levels. Thus OCs may delay reproduction and reduce foetal growth in the skuas. However, there was no relationship between the parents' OC residues and the occurrence of non-viable eggs, although the proportion of nests containing non-viable eggs was high (47%). Moreover, there were no significant relationships between OCs and reproductive variables in males, even if males had higher OC levels than females, and no associations between OCs and adult return rate between breeding seasons.

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Feare, C.J., Jaquemet, S., and LeCorre, M. **An inventory of Sooty Terns (*Sterna fuscata*) in the western Indian Ocean with special reference to threats and trends.** *Ostrich* 78(2): 423-434, 2007.

**Notes:** The western Indian Ocean supports over 6 200 000 pairs of Sooty Terns, some in very large colonies. During the past two centuries colonies have exhibited increase, stability, decline and extinction. The main drivers of these trends have been habitat change and unregulated human exploitation, especially of adults; introduced predators appear to have little effect at the population level but may have prevented re-colonisation following habitat restoration. Regulated harvesting of eggs, based on increasing knowledge of Sooty Tern demography, appears to be sustainable. Some colonies now receive protection but it will be logistically difficult to extend this to all colonies. The main future threats are likely to be climate change and over-exploitation of tuna, on which Sooty Terns depend to feed. Sooty Terns should be monitored to provide insights into these and other perturbations of the marine ecosystem.

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Krasnov, Y.V., Barrett, R.T., and Nikolaeva, N.G. **Status of black-legged kittiwakes (*Rissa tridactyla*), common guillemots (*Uria aalge*) and Brunnich's guillemots (*U. lomvia*) in Murman, north-west Russia, and Varanger, north-east Norway.** *Polar Research* 26(2): 113-117, 2007.

**Notes:** Recent published estimates of the numbers of seabirds breeding along the coast of Murman have been partly based on data collected in the 1960s. Counts made in some of the largest colonies in 1999-2005 show that the present populations of black-legged kittiwakes (*Rissa tridactyla*), common guillemots (*Uria aalge*) and Brunnich's guillemot (*U. lomvia*) in Murman are approximately 110 000 pairs, 10 000-12 000 pairs and 2000-3000 pairs, respectively. In Varanger the numbers are ca. 32 000 pairs, 6000-7000 pairs and 400-500 pairs, respectively. Although there has been a large decline in black-legged kittiwake numbers in the Varanger region since 1980, there is no evidence of a similar decline in Murman at least until 1999. With the exception of one colony in Murman, numbers of common guillemots breeding throughout the region seem to have recovered after suffering a huge decline in 1986/87.

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Everaert, J. and Stienen, E.W.M. **Impact of wind turbines on birds in Zeebrugge (Belgium).** *Biodiversity and Conservation* 16(12): 3345-3359, 2007.

**Notes:** We studied the impact of a wind farm (line of 25 small to medium sized turbines) on birds at the eastern port breakwater in Zeebrugge, Belgium, with special attention to the nearby breeding colony of Common Tern *Sterna hirundo*, Sandwich Tern *Sterna sandwicensis* and Little Tern *Sterna albifrons*. With the data of found collision fatalities under the wind turbines, and the correction factors for available search area, search efficiency and scavenging, we calculated that during the breeding seasons in 2004 and 2005, about 168 resp. 161 terns collided with the wind turbines located on the eastern port breakwater close to the breeding colony, mainly Common Terns and Sandwich Terns. The mean number of terns killed in 2004 and 2005 was 6.7 per turbine per year for the whole wind farm, and 11.2 resp. 10.8 per turbine per year for the line of 14 turbines on the sea-directed breakwater close to the breeding colony. The mean number of collision fatalities when including other species (mainly gulls) in 2004 and 2005 was 20.9 resp. 19.1 per turbine per year for the whole wind farm and 34.3 resp. 27.6 per turbine per year for 14 turbines on the sea-directed breakwater. The collision probability for Common Terns crossing the line of wind turbines amounted 0.110- 0.118% for flights at rotor height and 0.007-0.030% for all flights. For Sandwich Tern this probability was 0.046-0.088% for flights at rotor height and 0.005-0.006% for all flights. The breeding terns were almost not disturbed by the wind turbines, but the relative large number of tern fatalities was determined as a significant negative impact on the breeding colony at the eastern port breakwater (additional mortality of 3.0-4.4% for Common Tern, 1.8-6.7% for Little Tern and 0.6-0.7% for Sandwich Tern). We recommend that there should be precautionary avoidance of constructing wind turbines close to any important breeding colony of terns or gulls, nor should artificial breeding sites be constructed near wind turbines, especially not within the frequent foraging flight paths.

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Johnson, J.A., Lanctot, R.B., Andres, B.A., Bart, J.R., Brown, S.C., Kendall, S.J., and Payer, D.C. **Distribution of breeding shorebirds on the Arctic Coastal Plain of Alaska.** *Arctic* 60(3): 277-293, 2007.

**Notes:** Available information on the distribution of breeding shorebirds across the Arctic Coastal Plain of Alaska is dated, fragmented, and limited in scope. Herein, we describe the distribution of 19 shorebird species from data gathered at 407 study plots between 1998 and 2004. This information was collected using a single-visit rapid area search technique during territory establishment and early incubation periods, a time when social displays and vocalizations make the birds highly detectable. We describe the presence or absence of each species, as well as overall numbers of species, providing a regional perspective on shorebird distribution. We compare and contrast our shorebird distribution maps to those of prior studies and describe prominent patterns of shorebird distribution. Our examination of how shorebird distribution and numbers of species varied both latitudinally and longitudinally across the Arctic Coastal Plain of Alaska indicated that most shorebird species occur more frequently in the Beaufort Coastal Plain ecoregion (i.e., closer to the coast) than in the Brooks Foothills ecoregion (i.e., farther inland). Furthermore, the occurrence of several species indicated substantial longitudinal directionality. Species richness at surveyed sites was highest in the western portion of the Beaufort Coastal Plain ecoregion. The broad-scale distribution information we present here is valuable for evaluating potential effects of human development and climate change on Arctic-breeding shorebird populations.

Burger, A.E. and Page, R.E. **The need for biological realism in habitat modeling: a reinterpretation of Zharikov *et al.* (2006).** *Landscape Ecology* 22(9): 1273-1281, 2007.

**Notes:** Zharikov *et al.* (2006: *Landscape Ecology* 21:107-120) modeled the nest-site habitat use of marbled murrelets (*Brachyramphus marmoratus*) in Desolation Sound (DS) and Clayoquot Sound (CS), British Columbia. They compared known nest sites, located with radio-telemetry, with randomly-located points within the same areas. Their conclusions suggest that murrelets tended to nest in disproportionately smaller fragments within the more disturbed DS landscape; streams, steeper slopes, and lower elevations were selected in both landscapes; murrelets nested closer to recent clearcuts than would be expected in the DS landscape; and survivorship of nestlings was greater in areas with recent clearcuts and was positively correlated with recent habitat fragmentation. These conclusions are contrary to current management guidelines in British Columbia, and therefore require close scrutiny. Our detailed examination reveals flaws in their use of data, application of modeling, and most seriously, interpretation of the results. Problems include: conceptual errors in the interpretation of models; inappropriate spatial resolution; confusing use and interpretation of fragmentation and patch size data; overemphasis of statistically significant but biologically trivial results; and ignoring some contradictory studies. We conclude that it would be risky to apply the results from Zharikov *et al.* in the selection of murrelet nesting habitat for management purposes in British Columbia. Our review identifies issues that may arise in other ecological modeling studies and stresses the need for biological realism in addition to statistical rigour.

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Zharikov, Y., Lank, D., Huettmann, F., and Cooke, F. **Interpreting habitat distribution models of an elusive species, the marbled murrelets: a response to Burger and Page.** *Landscape Ecology* 22(9): 1283-1289, 2007.

**Notes:** Burger and Page (this volume) evaluated our models of habitat preferences and breeding success of a threatened seabird, the marbled murrelet (*Brachyramphus marmoratus*), based on the largest available set of confirmed nest-sites found in coastal old-growth forest of the Pacific North-West. We believe our study documented novel and unexpected patterns of landscape-level distribution of marbled murrelets in both heavily logged and relatively intact old-growth landscapes and provided insights into how these patterns influence their reproduction, and, eventually, management. Considering the importance of the issue and to ensure appropriate and responsible use of the information we welcome discussion, detailed scrutiny and evaluation of our original results. Burger and Page claim to have identified flaws with model interpretation, data quality, statistical approaches, presentation and interpretation of our results that would invalidate our conclusions. We respond that most of their critique is irrelevant and/or misdirected with respect to our study and the interpretation of GIS data models, and that valid aspects of their claims do not critically affect our conclusions.

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Grippio, M.A., Cooper, S., and Massey, A.G. **Effect of beach replenishment projects on waterbird and shorebird communities.** *Journal of Coastal Research* 23(5): 1088-1096, 2007.

**Notes:** In an effort to identify the potential effects of beach replenishment projects on waterbird and shorebird communities, avian abundance, species richness, and behavior were monitored at three transects before and after beach replenishment. The length of the study was 2 years with weekly surveys for most of the year. Data were analyzed with a Before/After Control Impact Pairs (BACIP) design, which incorporated spatial and temporal data from a control beach and replenished beaches into one analysis. No significant changes in mean waterbird and shorebird abundance were detected after replenishment, although the data do suggest that habitat use by waterbirds might have increased at replenished beaches. Of the individual waterbird and shorebird species examined, only Laughing Gulls and Black-bellied Plovers exhibited a significant change in abundance after replenishment, with these species exhibiting an increase and a decrease, respectively. Postreplenishment changes in waterbird and shorebird species richness were not consistent. Waterbird feeding activity declined significantly after replenishment, but, overall, there was no strong evidence that shorebird and waterbird feeding activity were altered by replenishment. Despite the BACIP design, high variability was common for most parameters. Recommendations for future bird monitoring projects include the use of multiple control sites and scheduling surveys to reduce all potential sources of variability.

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Burger, J., Carlucci, S.A., Jeitner, C.W., and Niles, L. **Habitat choice, disturbance, and management of foraging shorebirds and gulls at a migratory stopover.** *Journal of Coastal Research* 23(5): 1159-1166, 2007.

**Notes:** Habitat choice and interactions of foraging shorebirds and gulls were studied at a migratory stopover in Delaware Bay, New Jersey. Foraging, vigilance, aggressive behavior, and habitat choice of shorebirds were affected by the presence of gulls. There were significant differences in the time each species devoted to actively feeding; knots spent significantly less time foraging than did the other species. Birds congregated in the habitats where their foraging rates were the highest. When turnstones and laughing gulls fed in larger conspecific flocks, they had higher foraging times. Red knots were most aggressive toward laughing gulls, turnstones were most aggressive toward herring gulls, sanderlings were most aggressive toward turnstones, and semipalmated sandpipers were most aggressive toward knots. There were significant differences in habitat use: 1) Gulls and turnstones were more abundant along the tide line, 2) turnstones were more abundant on the upper beach, 3) semipalmated sandpipers and turnstones were more abundant on sandbars, 4) only gulls fed on the beach mud, and 5) laughing gulls and semipalmated sandpipers were more common along creeks than were the other species. Within 5 minutes of a human disturbance, gulls returned to predisturbance levels, while the shorebirds did not. Shorebirds responded most strongly to the presence of dogs than to other disturbances and did not return to beaches following a disturbance by a dog. These observations suggest that there may be some competition for foraging space among foraging species, especially between the shorebirds and the larger gulls, that human disturbance affects shorebirds more strongly than gulls, and that shorebirds and gulls use the habitats differently. The data can be used to manage human disturbance and to protect habitats where the shorebirds have the highest foraging rates, but the least exposure to gulls.

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Kirkwood, R., Lawton, K., Moreno, C., Valencia, J., Schlatter, R., and Robertson, G. **Estimates of southern rockhopper and macaroni penguin numbers at the Idefonso and Diego Ramirez archipelagos, Chile, using quadrat and distance-sampling techniques.** *Waterbirds* 30(2): 259-267, 2007.

**Notes:** Populations of Southern Rockhopper (*Enduples chrysocome chrysocome*) and Macaroni (*E. chrysolophus*) Penguins at key breeding sites in the Southern Hemisphere have declined substantially in the past 50 years, but their statuses at important breeding sites in southern Chile are poorly known. In 2002, at two of the largest breeding sites in Chile, the Idefonso and Diego Ramirez Archipelagos, we determined the number of breeding pairs. Based on nest density checks (quadrat and/or point-distance techniques) in a sample of habitats and calculations of the areas of occupied terrain, we estimated there were 86,400 (CL95%: 54,000 to 135,000) Rockhopper pairs and 5,660 (2,280 to 11,900) Macaroni pairs at Idefonso, and 132,721 (88,860 to 185,665) Rockhopper pairs and about 15,600 Macaroni pairs at Diego Ramirez. Combined, the archipelagos hold about 28% of the world population of Southern Rockhopper Penguins.

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Cao, L., Pan, Y.L., and Liu, N.F. **Waterbirds of the Xisha archipelago, South China Sea.** *Waterbirds* 30(2): 296-300, 2007.

**Notes:** The Xisha Archipelago, South China Sea, was surveyed for waterbirds in March-April 2003 and April-August 2004. Forty-five waterbird species were recorded, making a grand total of 53 species for the Archipelago when earlier published records are included. The Archipelago is of great importance for the Red-footed Booby (*Sula sula*), with an estimated 10% of the world population breeding on Dong Island. Other breeding seabird species were Great Frigatebird (*Fregata minor*), Great Crested Tern (*Sterna bergii*) and Sooty Tern (*S. fuscata*), and it is believed that Black-naped Tern (*S. sumatrana*) and Roseate Tern (*S. dougalli*) also breed there. Compared to 1926, the number of seabirds, and the islands on which they breed, has declined greatly. The data for Ardeidae and shore-birds provide information on migration and, possibly, wintering strategies of these species. Despite habitat degradation and human disturbance, the Xisha Archipelago is still important for breeding seabirds and there is an urgent need to improve the conservation status of this bird group.

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Igual, J.M., Forero, M.G., Gomez, T., and Oro, D. **Can an introduced predator trigger an evolutionary trap in a colonial seabird?** *Biological Conservation* 137(2): 189-196, 2007.

**Notes:** Animals use environmental cues, social information and behavioural decision-making rules moulded by natural selection to decide where to breed. We assessed whether the presence of an alien nest predator, the Black Rat (*Rattus rattus*) is used by a colonial seabird, the Cory's shear-water (*Calonectris diomedea*), as an environmental cue in the selection of breeding sites. We compared potential habitat preference using quality of breeders and nest fidelity as response to nest predation between two sub-colonies with different habitat characteristics, breeding success and predation pressure. Quality of individuals was better in the predated habitat and birds did not perceive the presence of predators signalling differences in predation risk

and in turn of breeding success. This failure of perception could be at two levels: in the selection of habitat for first breeding and in the breeding dispersal following a reproductive failure. Preference for the sub-colony with higher predation risk suggests the presence of an evolutionary trap. In fact, the introduction of alien predators probably transformed the behaviour of shearwaters in a maladaptive response due to a mismatch between the new environmental factors and their behavioural and evolutionary algorithms. This can be a common pattern in other species with little behavioural plasticity, evolved in stable environments free of predators.

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Genovart, M., Oro, D., Juste, J., and Bertorelle, G. **What genetics tell us about the conservation of the critically endangered Balearic shearwater?** *Biological Conservation* 137(2): 283-293, 2007.

**Notes:** The Balearic shearwater *Puffinus mauretanicus* is one of the most critically endangered seabirds in the world. The species is endemic to the Balearic archipelago, and conservation concerns are the low number of breeding pairs, the low adult survival, and the possible hybridization with a sibling species, the morphologically smaller Yelkouan shearwater (*P. yelkouan*). We sampled almost the entire breeding range of the species and analyzed the genetic variation at two mitochondrial DNA regions. No genetic evidence of population decline was found. Despite the observed philopatry, we detected a weak population structure mainly due to connectivity among colonies higher than expected, but also to a Pleistocene demographic expansion. Some colonies showed a high imbalance between immigration and emigration rates, suggesting spatial heterogeneity in patch quality. Genetic evidence of maternal introgression from the sibling species was reinforced, but almost only in a peripheral colony and not followed, at least to date, by the spread of the introgressed mtDNA lineages. Morphometric differences were not correlated with mtDNA haplotypes and introgression is probably due to a secondary contact between the two species several generations ago. Overall, results suggested that the very recent demographic decline in this critically endangered species has not yet decreased its genetic variability, and connectivity found among most colonies should help to reduce species extinction risk. Spreading of introgression should be monitored, but the species is not jeopardized at the moment by genetic factors and the major conservation actions should concentrate at enhancing adult survival.

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Millus, S.A., Stapp, P., and Martin, P. **Experimental control of a native predator may improve breeding success of a threatened seabird in the California Channel Islands.** *Biological Conservation* 138(3-4): 484-492, 2007.

**Notes:** Predation by native deer mice (*Peromyscus maniculatus elusus*) is considered the greatest threat to nest success of Xantus's Murrelet (*Synthliboramphus hypoleucus scrippsii*), a small, crevice-nesting seabird, on Santa Barbara Island, where about half of the known US population breeds. Reduction of mouse predation has been proposed as one way to increase reproductive success on Santa Barbara Island, California. Between February and June 2004, approximately 1650 mice were translocated from the largest and most consistently monitored murrelet colony on the island, reducing mouse population density significantly relative to a control site. During the translocation period, significantly fewer eggs were preyed upon by mice (20.5%) than the average (36.7%) between 1993 and 2005, excluding 2004. Productivity in 2004 (1.11 eggs hatched nest<sup>-1</sup>) was also significantly higher than the 12-year average (0.93 eggs hatched nest<sup>-1</sup>). More eggs were laid and hatched in 2004 than in most previous years, but overall, hatching success was not markedly higher, in part because other reasons for nest failure, e.g., abandonment, egg mortality, were important in 2004. Although local mouse removals may effectively reduce egg predation on a limited scale, particularly during periods when risk may be higher because alternative prey for mice are scarce, island-wide eradication of mice is not practical or desirable here because of the mouse's endemic status. Because a combination of other terrestrial and at-sea factors are known to influence population viability of Xantus's Murrelet, conservation strategies that incorporate intensive efforts both on land and at sea will likely be the most effective.

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