

In this review:

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

O/A denotes an open access article or journal

A. Recent articles – no abstract

McClintock, J.B., Silva-Rodriguez, P., and Fraser, W.R. Southerly breeding in gentoo penguins for the eastern Antarctic Peninsula: further evidence for unprecedented climate-change. *Antarctic Science* 22(3): 285-286, 2010.

Thiebot, J.-B., Barbraud, C., Scofield, R.P., Cherel, Y., and Bretagnolle, V. New petrel records on Île Saint-Paul, southern Indian Ocean. *Notornis* 57(1): 50-53, 2010.

B. Recent articles with abstracts

Kubota, A., Watanabe, M., Kunisue, T., Kim, E.-Y., Tanabe, S., and Iwata, H. Hepatic CYP1A induction by chlorinated dioxins and related compounds in the endangered black-footed albatross from the North Pacific. *Environmental Science and Technology* 44(9): 3559-3565, 2010.

Notes: The present study assesses effects of dioxins and related compounds (DRCs) including polychlorinated dibenzo-*p*-dioxins, polychlorinated dibenzofurans, and dioxin-like polychlorinated biphenyls (DL-PCBs) on cytochrome P450 1A (CYP1A) expression level in liver of black-footed albatrosses (*Phoebastria nigripes*) collected from the North Pacific. Total 2,3,7,8-tetrachloro-dibenzo-*p*-dioxin (2,3,7,8-T4CDD) toxic equivalents (TEQs) derived from toxic equivalency factor for birds proposed by World Health Organization were in the range of 2100 to 10 000 pg/g lipid wt (120-570 pg/g wet wt). Simultaneously, microsomal alkoxyresorufin O-dealkylase (AROD) activities, including methoxy-, ethoxy-, pentoxy-, and benzyloxy-resorufin O-dealkylase activities were also measured in the same specimens. Total TEQs and TEQ (on wet wt basis) from some individual DRC congeners had significant positive correlations with AROD activities, suggesting induction of CYP1A by DRCs. Congeners like 2,3,7,8-T4CDD and most of the DL-PCBs that showed no significant positive correlations between the concentrations and AROD activities, exhibited significant negative correlations between AROD activities and the concentration ratio of the congener to a recalcitrant CB169, suggesting preferential metabolism of these congeners by induced CYP1A. As far as we know, this is the first direct evidence revealing that hepatic CYP1A level is elevated with the accumulation of DRCs in the wild black-footed albatross population. The present study gives more robust estimate of impacts of DRCs on CYP1A induction in this rare pelagic species than indexes like hazard quotient and TEQ-threshold comparison that have been so far carried out.

Bustnes, J.O., Moe, B., Herzke, D., Hanssen, S.A., Nordstad, T., Sagerup, K., Gabrielsen, G.W., and Borga, K. **Strongly increasing blood concentrations of lipid-soluble organochlorines in high arctic common eiders during incubation fast.** *Chemosphere* 79(3): 320-325, 2010.

Notes: Female common eiders (*Somateria mollissima*) starve during the nesting stage and may lose 30-45% of their initial body mass, mostly through lipid mobilization. In this study, the effects of fasting on the blood concentrations of three lipid-soluble organochlorines (OCs: polychlorinated biphenyl [PCB]-153; 1-dichloro-2,2-bis (p-chlorophenyl) ethylene [p,p'-DDE]; and hexachlorobenzene [HCB]) were examined in eiders breeding in the high Arctic. Blood samples were taken from females (n = 47) at day 5 and day 20 of the incubation period. The mean wet weight concentrations of PCB-153 and p,p'-DDE increased strongly between day 5 and day 20 (3.6 and 8.2-fold, respectively), while HCB increased less (1.7-fold). There was a strong negative association between daily increase in PCB-153 and clutch size, and a weaker relationship for p,p'-DDE, suggesting that maternal transfer to the eggs is a significant pathway of elimination of OCs in eiders. Moreover, poor body condition (body mass controlled for body size) late in the incubation period was associated with strong daily increase of both p,p'-DDE and PCB-153, which may suggest that the release of these compounds increases when lipid reserves become depleted. For HCB, the increase was mainly associated with increase in blood lipid concentrations, and weakly to the amount of burned lipids. The causes for the differences between the compounds are, however, poorly understood. Although the absolute levels of OCs in eiders were relatively low, their rapid build up during incubation is worrying as it coincides with poor body condition and weakened immune systems.

Wayland, M., Hoffman, D.J., Mallory, M.L., Alisauskas, R.T., and Stebbins, K.R. **Evidence of weak contaminant-related oxidative stress in glaucous gulls (*Larus hyperboreus*) from the Canadian Arctic.** *Journal of Toxicology and Environmental Health Part A* 73(15): 1058-1073, 2010.

Notes: Environmental contaminants are transported over great distances to Arctic ecosystems, where they can accumulate in wildlife. Whether contaminant concentrations in wildlife are sufficient to produce adverse effects remains poorly understood. Exposure to contaminants elevates oxidative stress with possible fitness consequences. The glaucous gull (*Larus hyperboreus*), an Arctic top predator, was used as a bioindicator for investigating relationships between contaminant levels (organochlorines and polychlorinated biphenyls [OC/PCB], mercury [Hg], and selenium [Se]) and measures of oxidative stress (glutathione [GSH] metabolism and lipid peroxidation) in Canadian Arctic ecosystems. Contaminant levels were low and associations between contaminant exposure and oxidative stress were weak. Nevertheless, glutathione peroxidase activity rose with increasing hepatic Se concentrations, levels of thiols declined as Hg and OC/PCB levels rose, and at one of the two study sites levels of lipid peroxidation were elevated with increasing levels of hepatic Hg. These results suggest the possibility of a deleterious effect of exposure to contaminants on gull physiology even at low contaminant exposures.

Hargreaves, A.L., Whiteside, D.P., and Gilchrist, G. **Concentrations of 17 elements, including mercury, and their relationship to fitness measures in arctic shorebirds and their eggs.** *The Science of the Total Environment* 408(16): 3153-3161, 2010.

Notes: Exposure to contaminants is one hypothesis proposed to explain the global decline in shorebirds, and this is of particular concern in the arctic. However, little information exists on contaminant levels in arctic-breeding shorebirds, especially in Canada. We studied potential contaminants in three biparental shorebird species nesting in Nunavut, Canada: ruddy turnstones (*Arenaria interpres*), black-bellied plovers (*Pluvialis squatarola*) and semipalmated plovers (*Charadrius semipalmatus*). Blood, feathers and eggs were analyzed for As, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, and Zn. We assessed whether element concentrations a) differed among species and sexes, b) were correlated among pairs and their eggs, and c) were related to fitness endpoints, namely body condition, blood-parasite load, nest survival days, and hatching success. Non-essential elements were found at lower concentrations than essential elements, with the exception of Hg. Maximum Hg levels in blood approached those associated with toxicological effects in other bird species, but other elements were well below known toxicological thresholds. Reproductive success was negatively correlated with paternal Hg and maternal Pb, although these effects were generally weak and varied among tissues. Element levels were positively correlated within pairs for blood-Hg (turnstones) and feather-Ni and Cr (semipalmated plovers); concentrations in eggs and maternal blood were never correlated. Concentrations of many elements differed among species, but there was no evidence that any species had higher overall exposure to non-essential metals. In conclusion, whereas we found little evidence that

exposure to the majority of these elements is leading to declines of the species studied here, Hg levels were of potential concern and both Hg and Pb warrant further monitoring.

Esler, D., Trust, K.A., Ballachey, B.E., Iverson, S.A., Lewis, T.L., Rizzolo, D.J., Mulcahy, D.M., Miles, A.K., Woodin, B.R., Stegeman, J.J., Henderson, J.D., and Wilson, B.W. **Cytochrome P4501A biomarker indication of oil exposure in harlequin ducks up to 20 years after the Exxon Valdez oil spill.** *Environmental Toxicology and Chemistry* 29(5): 1138-1145, 2010.

Notes: Hydrocarbon-inducible cytochrome P4501A (CYP1A) expression was measured, as ethoxyresorufin-O-deethylase (EROD) activity, in livers of wintering harlequin ducks (*Histrionicus histrionicus*) captured in areas of Prince William Sound, Alaska, USA, oiled by the 1989 Exxon Valdez spill and in birds from nearby unoiled areas, during 2005 to 2009 (up to 20 years following the spill). The present work repeated studies conducted in 1998 that demonstrated that in harlequin ducks using areas that received Exxon Valdez oil, EROD activity was elevated nearly a decade after the spill. The present findings strongly supported the conclusion that average levels of hepatic EROD activity were higher in clucks from oiled areas than those from unoiled areas during 2005 to 2009. This result was consistent across our sampling periods; furthermore, results generated from two independent laboratories using paired liver samples from one of the sampling periods were similar. The EROD activity did not vary in relation to age, sex, or body mass of individuals, nor did it vary strongly by season in birds collected early and late in the winter of 2006 to 2007. Indicating that these factors did not confound inferences about observed differences between oiled and unoiled areas. We interpret these results to indicate that harlequin chicks continued to be exposed to residual Exxon Valdez oil up to 20 years after the original spill. This adds to a growing body of literature suggesting that oil spills have the potential to affect wildlife for much longer time frames than previously assumed.

Gorman, K.B., Erdmann, E.S., Pickering, B.C., Horne, P.J., Blum, J.R., Lucas, H.M., Patterson-Fraser, D. L., and Fraser, W. R. **A new high-latitude record for the macaroni penguin (*Eudyptes chrysolophus*) at Avian Island, Antarctica.** *Polar Biology* 33(8): 1155-1158, 2010.

Notes: On 20 and 22 January 2007, we observed macaroni penguins (*Eudyptes chrysolophus*) on Avian Island, Antarctica, approximately 1° south of the Antarctic Circle along the Western Antarctic Peninsula (WAP) near Adelaide Island, a new high-latitude observational record for the species within this region of the continent. Additionally, we report several extra-limital sightings of macaroni penguins over the last decade at relatively lower latitudes along the WAP near Anvers Island, including observations of breeding attempts. Although vagrancy cannot be ruled out as a possible causal factor in our observations, we hypothesize that a climate-induced shift in the species' bio-geographic range may be in progress. In this context, our observations are similar to the well-documented range shifts and eventual establishment of breeding populations by other sub-Antarctic penguin species along the WAP, over the last three decades, in response to regional climate warming. We highlight that the few observations reported here do not provide conclusive evidence for any putative causal mechanism explaining the presence of macaroni penguins at locations outside their natural geographic range. However, our observations are important for developing a better understanding of the natural history of the species along the WAP.

Wilson, J.W., Burle, M.H., Cuthbert, R., Stirnemann, R.L., and Ryan, P.G. **Breeding success of Northern Rockhopper Penguins (*Eudyptes moseleyi*) at Gough Island, South Atlantic Ocean.** *Emu* 110(2): 137-141, 2010.

Notes: Populations of Northern Rockhopper Penguins (*Eudyptes moseleyi*) are declining, and their breeding success is low compared with that of other species of *Eudyptes*. We tracked loss of broods and investigated how the response to threats by breeding birds and the density of nests in a colony influence breeding success of Northern Rockhopper Penguins on Gough Island. Brood loss was greatest (33-61%) during incubation and the early chick stage. Most (71%) hatchlings survived to form creches, and 73% of chicks present during early creche formation moulted into juvenile plumage. Breeding success was significantly positively correlated with the response to threats by breeding birds and the number of other breeding birds within a 1.5-m radius, a relationship that may be increasingly important in a declining penguin population.

Schielzeth, H., Kamp, J., Eichhorn, G., Heincke, T., Koshkin, M.A., Lachmann, L., Sheldon, R.D., and Koshkin, A.V. **Wader, gull and tern population estimates for a key breeding and stopover site in Central Kazakhstan.** *Bird Conservation International* 20(2): 186-199, 2010.

Notes: Population size estimates of waders, gulls and terns passing through or breeding in Central Asia are very scarce, although highly important for global flyway population estimates as well as for targeting local conservation efforts. The Tengiz-Korgalzhyn region is one of the largest wetland complexes in Central Asia. We conducted surveys in this region between 1999 and 2008 and present estimates of population size as well as information on phenology and age structure for 50 species of Charadriiformes. The Tengiz-Korgalzhyn wetlands are especially important for Red-necked Phalaropes **Phalaropus lobatus** and Ruffs **Philomachus pugnax** with, respectively, 41% and 13% of their flyway populations using the area during spring migration. The region is also an important post-breeding moulting site for Pied Avocets **Recurvirostra avosetta** and Black-tailed Godwits **Limosa limosa** used by, respectively, 5% and 4% of their flyway populations. Besides its key importance as a migratory stopover site, the study area is a key breeding site for the Critically Endangered Sociable Lapwing **Vanellus gregarius**, the Near Threatened Black-winged Pratincole **Glaucopis trichotis** and for Pallas's Gull **Larus ichthyaeus** with 16%, 6% and 5% of their world populations, respectively. We identified 29 individual sites that held more than 1% of the relevant flyway populations of at least one species of Charadriiformes. Including data on other species of waterbirds (mainly waterfowl), there were 93 sites that qualify for Important Bird Areas (IBA). About half of them are protected in a state nature reserve, while an additional 20% are recognised as IBAs. Nevertheless, 28 important sites are currently not recognised as IBAs nor are they protected by other conservation means. These sites require conservation attention.

Robertson, G., Candy, S.G., and Wienecke, B. **Effect of line shooter and mainline tension on the sink rates of pelagic longlines and implications for seabird interactions.** *Aquatic Conservation: Marine and Freshwater Ecosystems* 20(4): 419-427, 2010.

Notes: 1. The likelihood that seabirds will be hooked and drowned in longline fisheries increases when baited hooks sink slowly. Fishermen target different fishing depths by setting the mainline through a line shooter, which controls the tension (or slackness) in the line. An experiment was conducted in Australia's pelagic longline fishery to test the hypothesis of no difference in sink rates of baited hooks attached to mainline set under varying degrees of tension. 2. Mainline was set in three configurations typically used in the fishery: (a) surface set tight with no slackness astern; (b) surface set loose with 2 s of slack astern; and (c) deep set loose with 7 s of slack astern. 3. Tension on the mainline had a powerful effect on sink rates. Baited hooks on branch lines attached to tight mainlines reached 2 m depth nearly twice as fast as those on the two loose mainline tensions, averaging 5.8 s (0.35 m s^{-1}) compared with 9.9 s (0.20 m s^{-1}) and 11.0 s (0.18 m s^{-1}) for surface set loose and deep set loose tensions, respectively. 4. The likely reason for the difference is propeller turbulence. Tight mainline entered the water aft of the area affected by turbulence whereas the two loose mainlines and the clip ends of branch lines were set directly into it about 1 m astern of the vessel. The turbulence presumably slowed the sink rates of baited hooks at the other end of the branch lines. 5. The results suggest that mainline deployed with a line shooter (as in deep setting) into propeller turbulence at the vessel stern slows the sink rates of baited hooks, potentially increasing their availability to seabirds. Unless mainline can be set to avoid propeller turbulence the use of line shooters for deep setting should not be promoted as an effective deterrent to seabirds.

Pichegru, L., Gremillet, D., Crawford, R.J.M., and Ryan, P.G. **Marine no-take zone rapidly benefits endangered penguin.** *Biology Letters* 6(4): 498-501, 2010.

Notes: No-take zones may protect populations of targeted marine species and restore the integrity of marine ecosystems, but it is unclear whether they benefit top predators that rely on mobile pelagic fishes. In South Africa, foraging effort of breeding African penguins decreased by 30 per cent within three months of closing a 20 km zone to the competing purse-seine fisheries around their largest colony. After the fishing ban, most of the penguins from this island had shifted their feeding effort inside the closed area. Birds breeding at another colony situated 50 km away, whose fishing grounds remained open to fishing, increased their foraging effort during the same period. This demonstrates the immediate benefit of a relatively small no-take zone for a marine top predator relying on pelagic prey. Selecting such small protected areas may be an important first conservation step, minimizing stakeholder conflicts and easing compliance, while ensuring benefit for the ecosystems within these habitats.

Dumont, Y., Russell, J.C., Lecomte, V., and LeCorre, M. **Conservation of endangered endemic seabirds within a multi-predator context: The Barau's petrel in Reunion Island.** *Natural Resource Modeling* 23(3): 381-436, 2010.

Notes: Seabirds breeding on islands are vulnerable to introduced predators, such as rats and cats, and the removal of such predators is generally viewed as a priority for seabird conservation and restoration. However, multiple invasive mammal species interacting may generate unexpected outcomes following the removal (eradication) of one species. Generally these indirect interactions are not well understood or demonstrated. We propose and study a prey (seabird)-mesopredator (rat)-superpredator (cat) model, taking into account the juvenile stages in the prey population, in order to direct conservation management for seabird conservation. We give a more biologically realistic differential system than those studied before (Courchamp et al. [1999]; Fan et al. [2005]), in particular for long-lived seabird species. We present a theoretical study and show existence and uniqueness of a positive solution as well as a qualitative study of the equilibria that may appear. Because standard numerical methods, usually implemented in scientific softwares, can fail to give the right biological approximations (Anguelov et al. [2009]), we propose a reliable algorithm that preserves most of the qualitative properties of the continuous system, using the theory of nonstandard finite difference methods. Finally, we use biologically realistic parameters available for the representative Barau's petrel (Pinet et al. [2008]), an endemic species from Reunion island, to present numerical simulations that support the theoretical study. Cats play the major role in seabird prey population dynamics. Seasonality in seabird breeding delays but does not prevent extinction. In all scenarios, cat control (or preferably eradication) is imperative to prevent extinction of vulnerable long-lived seabirds, like the Barau's petrel.

Syroechkovski, E.E., Tomkovich, P.S., Kashiwagi, M., Taldenkov, I.A., Buzun, V.A., Lappo, E.G., and Zockler, C. **Population decline in the spoon-billed sandpiper (*Eurynorhynchus pygmeus*) at northern Chukotka based on monitoring on breeding grounds.** *Zoologichesky Zhurnal* 89(6): 712-723, 2010.

Notes: The spoon-billed sandpiper is an endemic of the northern Russian Far East and one of the rarest wader species over the world. During the field survey (the summer of 2002) of the coast of Kolyuchinskaya Bay and in lagoons located to the east, the species breeding population has declined by 3-5 times since the 1970s and amounted to 50 breeding pairs. Reasons for this decline are uncertain. They seem to occur outside the breeding grounds, on staging or wintering areas in South Eastern Asia. The breeding productivity of spoon-billed sandpiper is relatively low, but it did not decrease in the recent decades. The breeding success in 2002 was higher than in the 1980s; however, it was still about half of the minimum level necessary to keep the local breeding population stable. Annual survival of spoon-billed sandpiper is about 5-15% lower than in several other small Calidridinae waders. An increased mortality rather than the decreased productivity appears to be responsible for the general decline of the spoon-billed sandpiper population. In the early 2000s, its total world population was estimated at 350-500 breeding pairs. The estimate of the spoon-billed sandpiper population obtained by Flint and Kondratyev (1977) is likely an overestimate.

Pistorius, P.A., Huin, N., and Crofts, S. **Population change and resilience in Gentoo Penguins *Pygoscelis papua* at the Falkland Islands.** *Marine Ornithology* 38(1): 49-53, 2010. **O/A**

Notes: Data on population size and breeding success of Gentoo Penguins *Pygoscelis papua* at the Falkland Islands have been collected since 1990 as part of the Falkland Islands Seabird Monitoring Programme (FISMP). During the austral summer of 2005/2006, the third five-yearly survey of all Gentoo Penguins breeding in the Falklands Archipelago was undertaken. Results are presented and compared to previous population estimates. The number of breeding pairs in 2005/2006 was estimated at 65,857, a decline of 42% since 2000, which was attributed largely to paralytic shellfish poisoning resulting from a harmful algal bloom event in 2002. Based on a selected number of colonies that were monitored annually, the population increased by over 95% since 2005, and numbered a record high of some 128,500 breeding pairs in 2008. On average, annual breeding success was 1.01 (ranging between 0.51 and 1.44) chicks per breeding pair. Although no particular trend was evident, breeding success was above average between 2004 and 2008 which is likely to contribute towards future population growth.

Hilton, G.M. and Cuthbert, R.J. **The catastrophic impact of invasive mammalian predators on birds of the UK Overseas Territories: a review and synthesis.** *Ibis* 152(3): 443-458, 2010.

Notes: The UK has sovereignty over 16 Overseas Territories, which hold some of the world's great seabird colonies and collectively support more endemic and globally threatened bird species than the whole of mainland Europe. Invasive alien mammalian predators have spread throughout most of the Territories, primarily since European expansion in the 16th century. Here we review and synthesize the scale of their impacts, historical and current, actions to reduce and reverse these impacts, and priorities for conservation. Mammalian predators have caused a catastrophic wave of extinctions and reductions in seabird colony size that mark the UKOTs as a major centre of global extinction. Mammal-induced declines of threatened endemics and seabird colonies continue, with four Critically Endangered endemics on Gough Island (Tristan da Cunha), St Helena and Montserrat directly threatened by invasive alien house mice **Mus musculus**, feral cats **Felis catus** and rats **Rattus** spp. Action to reduce these threats and restore islands has been modest in comparison with other developed countries, although some notable successes have occurred and a large number of ambitious eradication and conservation plans are in preparation. Priority islands for conservation action against mammalian predators include Gough (which according to one published prioritization scheme is the highest-ranked island in the world for mammal eradication), St Helena and Montserrat, but also on Tristan da Cunha, Pitcairn and the Falkland Islands. Technical, financial and political will is required to push forward and fund the eradication of invasive mammalian predators on these islands, which would significantly reduce extinction risk for a number of globally threatened species.

Jones, H.P. **Prognosis for ecosystem recovery following rodent eradication and seabird restoration in an island archipelago.** *Ecological Applications* 20(5): 1204-1216, 2010.

Notes: Invasive species are widespread and can have devastating effects on biota, especially insular biota. Invasive species eradications are increasingly employed to promote island recovery to preinvasion states. However, it remains unclear if additional restoration actions may be required on islands that were once heavily reliant on seabird guano for ecosystem functions. Active seabird augmentation has been suggested as necessary to exact ecosystem recovery on contemporary timescales in some cases. I use two experiments on offshore islands in Cook Strait, New Zealand, to test the hypothesis that seabird restoration will restore island ecosystem functioning following invasive rodent removal. The first is a small-scale single-island fertilization experiment that simulates seabird recovery. This experiment tested the recovery potential of offshore islands and was used to infer the density of seabirds needed to elicit ecosystem recovery. The second is a large-scale natural experiment that takes advantage of eight islands with differing rodent eradication and seabird restoration histories. I compared ecosystem functioning variables ($\delta^{15}\text{N}$, C:N ratios in soil, plants, and spiders, as well as arthropod abundance and diversity) on two islands that had rodents eradicated and two islands undergoing seabird augmentation with two control islands (never invaded by rodents) and two positive control islands (currently invaded by rodents). The results suggest that islands do have the potential for recovery given nutrient amendments, but that islands with rodents eradicated and islands undergoing seabird augmentation have not recovered most of their ecosystem function. Finer, intra-island analysis showed that seabird restoration projects have the potential to speed the recovery process, but that the projects on the studied seabird restoration islands were not advanced enough to produce island-wide recovery. The results suggest that high seabird densities (5-10 burrows/m²) are needed to promote recovery to never-invaded control levels. Seabird augmentation, through chick translocation and/or social facilitation with decoys, vocalization playbacks, and/or mirrors can supplement passive seabird recovery on islands where seabirds have been extirpated or extremely reduced by invasive predators. Such restoration efforts may be necessary to promote ecosystem recovery on contemporary timescales.

Capizzi, D., Baccetti, N., and Sposimo, P. **Prioritizing rat eradication on islands by cost and effectiveness to protect nesting seabirds.** *Biological Conservation* 143(7): 1716-1727, 2010.

Notes: To prioritize conservation actions on Italian islands we used the case study of the eradication of the black rat **Rattus rattus** to protect Cory's shearwater **Calonectris diomedea** and Yelkouan shearwater **Puffinus yelkouan**. We evaluated for each island the effectiveness of rat eradication by means of two different indices, both based on the relative importance of the island's nesting population of the two species at the national and regional scale, but differing in the parameters set at the divisor, i.e., respectively, the number of nesting pairs in rat-free islands and the number of islands occupied by shearwaters. We estimated analytically the monetary costs of rat eradication on each island. Islands at high risk of recolonization were excluded from

further analyses, while costs and effectiveness of rat eradication were compared for the remaining islands. Rat eradication was most cost-effectively carried out on the island hosting the largest colony of *P. yelkouan*. Eradicating rats from all the islands in the ranking provided benefits to 63.9% of the Italian population of *P. yelkouan*, but only to 7.1% of that of *C. diomedea*. Comparing costs and effectiveness of all possible island combinations, ranging from a minimum budget of 50,000 € and a maximum of 1,600,000 € (i.e. the cost for eradicating rats from all the listed islands), the maximum increase in effectiveness (marginal effectiveness) fell around a relatively small budget (200,000 €). For both species, when adopting the cost/effectiveness rankings, the number of pairs protected for 1000 € of investment was significantly higher than adopting rankings of effectiveness alone, demonstrating that conservation priorities are more efficiently identified by including monetary costs in the analysis.

Cook, A.J., Poncet, S., Cooper, A.P.R., Herbert, D.J., and Christie, D. **Glacier retreat on South Georgia and implications for the spread of rats.** *Antarctic Science* 22(3): 255-263, 2010.

Notes: Using archival photography and satellite imagery, we have analysed the rates of advance or retreat of 103 coastal glaciers on South Georgia from the 1950s to the present. Ninety-seven percent of these glaciers have retreated over the period for which observations are available. The average rate of retreat has increased from 8 Ma⁻¹ in the 1950s to 35 Ma⁻¹ at present. The largest retreats have all taken place along the north-east coast, where retreat rates have increased to an average of 60 Ma⁻¹ at present, but those on the south-west coast have also been steadily retreating since the 1950s. These data, along with environmental information about South Georgia, are included in a new Geographic Information System (GIS) of the island. By combining glacier change data with the present distribution of both endemic and invasive species we have identified areas where there is an increased risk of rat invasion to unoccupied coastal regions that are currently protected by glacial barriers. This risk has significant implications for the surrounding ecosystem, in particular depletion in numbers of important breeding populations of ground-nesting birds on the island.

Quillfeldt, P., Masello, J.F., McGill, R.A.R., Adams, M., and Furness, R.W. **Moving polewards in winter: a recent change in the migratory strategy of a pelagic seabird?** *Frontiers in Zoology* 7: art. 15, 2010. [O/A](#)

Notes: Background: During the non-breeding period, many birds migrate to milder areas, found closer to the equator than their breeding sites. Opposite movements are very rare. In the Southern Ocean, the abundance of ¹³C declines markedly with more southern latitude, providing a characteristic ¹³C isoscape. This can be used as a tracer for the movement of seabirds between breeding and inter-breeding areas, by comparing stable isotope ratios of feathers grown at different times of the year. **Results:** We studied seasonal movements of Thin-billed prions (*Aves*, *Procellariiformes*), breeding at the Subantarctic Falkland/Malvinas Islands, compared with those of Wilson's storm-petrels breeding in the Antarctic South Shetland Islands. The two species showed opposite migratory movements. While Wilson's storm-petrels moved to warmer waters north of the Drake Passage in winter, Thin-billed prions showed a reversed movement towards more polar waters. Carbon stable isotope ratios in recent and historical feathers indicated that poleward winter movements of Thin-billed prions were less common historically (45% in 1913-1915), and have only recently become dominant (92% in 2003-2005), apparently in response to warming sea temperatures. **Conclusions:** This study shows that pelagic seabirds can rapidly change migration strategies within populations, including migration towards more poleward waters in winter.

van de Pol, M., Vindenes, Y., Saether, B.E., Engen, S., Ens, B.J., Oosterbeek, K., and Tinbergen, J.M. **Effects of climate change and variability on population dynamics in a long-lived shorebird.** *Ecology* 91(4): 1192-1204, 2010.

Notes: Climate change affects both the mean and variability of climatic variables, but their relative impact on the dynamics of populations is still largely unexplored. Based on a long-term study of the demography of a declining Eurasian Oystercatcher (*Haematopus ostralegus*) population, we quantify the effect of changes in mean and variance of winter temperature on different vital rates across the life cycle. Subsequently, we quantify, using stochastic stage-structured models, how changes in the mean and variance of this environmental variable affect important characteristics of the future population dynamics, such as the time to extinction. Local mean winter temperature is predicted to strongly increase, and we show that this is likely to increase the population's persistence time via its positive effects on adult survival that outweigh the negative effects that higher

temperatures have on fecundity. Interannual variation in winter temperature is predicted to decrease, which is also likely to increase persistence time via its positive effects on adult survival that outweigh the negative effects that lower temperature variability has on fecundity. Overall, a 0.1 °C change in mean temperature is predicted to alter median time to extinction by 1.5 times as many years as would a 0.1 °C change in the standard deviation in temperature, suggesting that the dynamics of oystercatchers are more sensitive to changes in the mean than in the interannual variability of this climatic variable. Moreover, as climate models predict larger changes in the mean than in the standard deviation of local winter temperature, the effects of future climatic variability on this population's time to extinction are expected to be overwhelmed by the effects of changes in climatic means. We discuss the mechanisms by which climatic variability can either increase or decrease population viability and how this might depend both on species' life histories and on the vital rates affected. This study illustrates that, for making reliable inferences about population consequences in species in which life history changes with age or stage, it is crucial to investigate the impact of climate change on vital rates across the entire life cycle. Disturbingly, such data are unavailable for most species of conservation concern.

Ballard, G., Toniolo, V., Ainley, D.G., Parkinson, C.L., Arrigo, K.R., and Trathan, P.N. **Responding to climate change: Adélie Penguins confront astronomical and ocean boundaries.** *Ecology* 91(7): 2056-2069, 2010.

Notes: Long-distance migration enables many organisms to take advantage of lucrative breeding and feeding opportunities during summer at high latitudes and then to move to lower, more temperate latitudes for the remainder of the year. The latitudinal range of the Adélie Penguin (*Pygoscelis adeliae*) spans ~22°. Penguins from northern colonies may not migrate, but due to the high latitude of Ross Island colonies, these penguins almost certainly undertake the longest migrations for the species. Previous work has suggested that Adelies require both pack ice and some ambient light at all times of year. Over a three-year period, which included winters of both extensive and reduced sea ice, we investigated characteristics of migratory routes and wintering locations of Adélie Penguins from two colonies of very different size on Ross Island, Ross Sea, the southernmost colonies for any penguin. We acquired data from 3-16 geolocation sensor tags (GLS) affixed to penguins each year at both Cape Royds and Cape Crozier in 2003-2005. Migrations averaged 12 760 km, with the longest being 17 600 km, and were in part facilitated by pack ice movement. Trip distances varied annually, but not by colony. Penguins rarely traveled north of the main sea-ice pack, and used areas with high sea-ice concentration, ranging from 75% to 85%, about 500 km inward from the ice edge. They also used locations where there was some twilight (2-7 h with sun <6° below the horizon). We report the present Adélie Penguin migration pattern and conjecture on how it probably has changed over the past ~12 000 years, as the West Antarctic Ice Sheet withdrew southward across the Ross Sea, a situation that no other Adélie Penguin population has had to confront. As sea ice extent in the Ross Sea sector decreases in the near future, as predicted by climate models, we can expect further changes in the migration patterns of the Ross Sea penguins.

Zöckler, C., Htin Hla, T., Clark, N., Syroechkovskiy, E., Yakushev, N., Daengphayon, S., and Robinson, R. **Hunting in Myanmar is probably the main cause of the decline of the Spoon-billed Sandpiper *Calidris pygmeus*.** *Wader Study Group Bulletin* 117(1): 1-8, 2010.

Notes: The rapid decline of the Spoon-billed Sandpiper population has led to a series of expeditions to locate the species' main wintering areas. Surveys conducted in Myanmar during 2008-2010 showed an estimated wintering population of over 200, which is probably more than half the world population. Within Myanmar, the key estuary is the Bay of Martaban. We found extensive evidence of the hunting of waders in all sites visited, mostly by the poorest people in each village. The majority of 26 bird-hunters questioned in 15 villages on the east side of the Bay of Martaban knew of Spoon-billed Sandpipers and most probably catch the species every year. Spoon-billed Sandpipers are not the hunters' primary target but, along with other calidrids tend to be caught more frequently in the mist nets they use for other target species, such as Pacific Golden Plover *Pluvialis fulva* and Eurasian Curlew *Numenius arquata*. It is likely that hunting in the wintering area is the major cause of the species' decline, which may have been exacerbated by the fact that the Spoon-billed Sandpiper's core wintering area happens to be an area of high hunting pressure. Urgent action is needed to find ways to give the local hunters economic alternatives to hunting. An awareness campaign will also help to persuade hunters to release Spoon-billed Sandpipers they catch. It is also vitally important to protect the habitats of the Bay of Martaban for its large waterbird populations. Without urgent conservation action we believe that the Spoon-billed Sandpiper will become extinct within 10-20 years.

Sandilyan, S., Thiyagesan, K., and Nagarajan, R. **Major decline in species-richness of waterbirds in the Pichavaram mangrove wetlands, southern India.** *Wader Study Group Bulletin* 117(2): 91-98, 2010.

Notes: The coastal wetlands of India, especially the mangrove areas, are important for a large number of migratory waterbirds. However, despite the wealth of these habitats in India, few studies have considered the diverse communities of waterbirds they support. This study, carried out during 2004-2007, focused on the Pichavaram mangrove wetland which is the second-largest area of mangroves in India. We compare our results with those of an earlier study during 1984-1988 and show that 40% of waterbird species no longer occur in the area. We collected data on those human activities that are likely to have been detrimental to waterbird populations and make management recommendations for their restoration.

Péron, C., Authier, M., Barbraud, C., Delord, K., Besson, D., and Weimerskirch, H. **Interdecadal changes in at-sea distribution and abundance of subantarctic seabirds along a latitudinal gradient in the Southern Indian Ocean.** *Global Change Biology* 16(7): 1895-1909, 2010.

Notes: Long-term demographic studies have recently shown that global climate change together with increasing direct impacts of human activities, such as fisheries, are affecting the population dynamics of marine top predators. However, the effects of these factors on species distribution and abundance at sea are still poorly understood, particularly in marine ecosystems of the southern hemisphere. Using a unique long-term data set of at-sea observations, we tested for interdecadal (1980s vs. 2000s) changes in summer abundance and distribution of 12 species of Albatrosses and Petrels along a 30 degrees latitudinal gradient between tropical and Antarctic waters of the southern Indian Ocean. There were contrasting effects of climate change on subantarctic seabird distribution and abundance at sea. While subtropical waters showed the highest rate of warming, the species that visited this water mass showed the greatest changes in distribution and abundance. The abundance of Wandering Albatrosses (*Diomedea exulans*), White-chinned Petrels (*Procellaria aequinoctialis*) and Giant Petrels (*Macronectes* sp.) declined markedly, whereas the other species showed contrasting trends or did not change. With the exception of the White-chinned Petrel, these decreases were at least partly related to regional increase in sea surface temperature. The southward shift of Wandering Albatross and Prions (*Pachyptila* spp.) distributions could be ascribed to species redistribution or decrease in abundance due to warming of the subtropical waters. Surprisingly, White-chinned Petrel distribution shifted northward, suggesting more complex mechanisms. This study is the first to document a shift in species range in the Southern Ocean related to climate change and contrasting abundance changes. It suggests that some species might experience more severe impacts from climate change depending on the water masses they visit. As climate changes are predicted to continue in the next decades, understanding species responses to climate change is crucial for conservation management, especially when their conservation status is critical or unknown.

Rolland, V., Weimerskirch, H., and Barbraud, C. **Relative influence of fisheries and climate on the demography of four albatross species.** *Global Change Biology* 16(7): 1910-1922, 2010.

Notes: Worldwide ecosystems are modified by human activities and climate change. To be able to predict future changes, it is necessary to understand their respective role on population dynamics. Among the most threatened species are top predators because of their position in the food web. Albatross populations are potentially affected by both human activities, especially longline fisheries, and climatic fluctuations. Based on long-term data (1985-2006), we conducted through a comparative approach a demographic analysis (adult survival and breeding success) on four albatross species breeding on the Indian Ocean sub-Antarctic Islands to assess the relative impact of climate and fisheries during and outside the breeding season. The study revealed that adult survival of almost all species was not affected by climate, and therefore probably canalized against climatic variations, but was negatively affected by tuna longlining effort in three species. Breeding success was affected by climate, with contrasted effects between species, with Southern Oscillation Index having an impact on all species but one. Differences in demographic responses depended on the foraging zone and season. In order to predict population trajectories of seabirds such as albatrosses, our results show the importance of assessing the relative influence of fishing and climate impacts on demography.

Wolf, S.G., Snyder, M.A., Sydeman, W.J., Doak, D.F., and Croll, D.A. **Predicting population consequences of ocean climate change for an ecosystem sentinel, the seabird Cassin's auklet.** *Global Change Biology* 16(7): 1923-1935, 2010.

Notes: Forecasting the ecological effects of climate change on marine species is critical for informing greenhouse gas mitigation targets and developing marine conservation strategies that remain effective and increase species' resilience under changing climate conditions. Highly productive coastal upwelling systems are predicted to experience substantial effects from climate change, making them priorities for ecological forecasting. We used a population modeling approach to examine the consequences of ocean climate change in the California Current upwelling ecosystem on the population growth rate of the planktivorous seabird Cassin's auklet (*Ptychoramphus aleuticus*), a demographically sensitive indicator of marine climate change. We use future climate projections for sea surface temperature and upwelling intensity from a regional climate model to forecast changes in the population growth rate of the auklet population at the important Farallon Island colony in central California. Our study projected that the auklet population growth rate will experience an absolute decline of 11-45% by the end of the century, placing this population on a trajectory toward extinction. In addition, future changes in upwelling intensity and timing of peak upwelling are likely to vary across auklet foraging regions in the California Current Ecosystem (CCE), producing a mosaic of climate conditions and ecological impacts across the auklet range. Overall, the Farallon Island Cassin's auklet population has been declining during recent decades, and ocean climate change in this century under a mid-level emissions scenario is projected to accelerate this decline, leading toward population extinction. Because our study species has proven to be a sensitive indicator of oceanographic conditions in the CCE and a powerful predictor of the abundance of other important predators (i.e. salmon), the significant impacts we predicted for the Cassin's auklet provide insights into the consequences that ocean climate change may have for other plankton predators in this system.

Colabuono, F.I., Taniguchi, S., and Montone, R.C. **Polychlorinated biphenyls and organochlorine pesticides in plastics ingested by seabirds.** *Marine Pollution Bulletin* 60(4): 630-634, 2010.

Notes: The occurrence of plastic objects in the digestive tract was assessed in eight species of Procellariiformes collected in southern Brazil and the occurrence of polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs) in the ingested plastics pellets and plastic fragments was evaluated. PCBs were detected in plastic pellets (491 ng g⁻¹) and plastic fragments (243-418 ng g⁻¹). Among the OCPs, *p,p'*-DDE had the highest concentrations, ranging from 68.0 to 99.0 ng g⁻¹. The occurrence of organic pollutants in post-consumer plastics supports the fact that plastics are an important source carrying persistent organic pollutants in the marine environment. Although transfer through the food chain may be the main source of exposure to POPs to seabirds, plastics could be an additional source for the organisms which ingest them, like Procellariiformes which are the seabirds most affected by plastic pollution.

O'Hara, P.D. and Morandín, L.A. **Effects of sheens associated with offshore oil and gas development on the feather microstructure of pelagic seabirds.** *Marine Pollution Bulletin* 60(5): 672-678, 2010.

Notes: Operational discharges of hydrocarbons from maritime activities can have major cumulative impacts on marine ecosystems. Small quantities of oil (i.e., 10 ml) results in often lethally reduced thermoregulation in seabirds. Thin sheens of oil and drilling fluids form around offshore petroleum production structures from currently permissible operational discharges of hydrocarbons. Methodology was developed to measure feather microstructure impacts (amalgamation index or AI) associated with sheen exposure. We collected feather samples from two common North Atlantic species of seabirds; Common Murres (*Uria aalge*) and Dovekies (*Alle alle*). Impacts were compared after feather exposure to crude oil and synthetic lubricant sheens of varying thicknesses. Feather weight and microstructure changed significantly for both species after exposure to thin sheens of crude oil and synthetic drilling fluids. Thus, seabirds may be impacted by thin sheens forming around offshore petroleum production facilities from discharged produced water containing currently admissible concentrations of hydrocarbons.

Masden, E.A., Haydon, D.T., Fox, A.D., and Furness, R.W. **Barriers to movement: Modelling energetic costs of avoiding marine wind farms amongst breeding seabirds.** *Marine Pollution Bulletin* 60(7): 1085-1091, 2010.

Notes: Proposals for wind farms in areas of known importance for breeding seabirds highlight the need to understand the impacts of these structures. Using an energetic modelling approach, we examine the effects of wind farms as barriers to movement on seabirds of differing morphology. Additional costs, expressed in relation to typical daily energetic expenditures, were highest per unit flight for seabirds with high wing loadings, such as cormorants. Taking species-specific differences into account, costs were relatively higher in terns, due to the high daily frequency of foraging flights. For all species, costs of extra flight to avoid a wind farm appear much less than those imposed by low food abundance or adverse weather, although such costs will be additive to these. We conclude that adopting a species-specific approach is essential when assessing the impacts of wind farms on breeding seabird populations, to fully anticipate the effects of avoidance flights.

Camphuysen, K.C.J. **Declines in oil-rates of stranded birds in the North Sea highlight spatial patterns in reductions of chronic oil pollution.** *Marine Pollution Bulletin* 60(8): 1299-1306, 2010.

Notes: Strandings of oiled seabirds are used to signal the problem of chronic oil pollution. Species-specific oil rates reflect the risk for marine birds to become oiled at sea. High oil rates were characteristic for seabirds common in areas with frequent oil spills; low oil rates for birds wintering away from the busiest shipping lanes. Declining trends in oil-rates were found, reflecting a reduction in the amount of oil intentionally discharged over the past 50 years. Spatial patterns in the risk to become oiled could be identified, when the winter distribution patterns of the affected birds were incorporated in the analysis. Declines in oil rates were most pronounced in coastal birds. These trends were consistent with tendencies to police nearshore waters more effectively than offshore waters. While levels of chronic oil pollution are much reduced, future emphasis should be to reduce chronic oiling more effectively in offshore waters.
