Book Reviews

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Black J.M., Prop J. & Larsson K. 2007.
Wild goose dilemmas. Branta Press, Groningen.
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Many tables, figures and B/W photos. Illustrations and graphics by Mark Hulme & Dick Visser.
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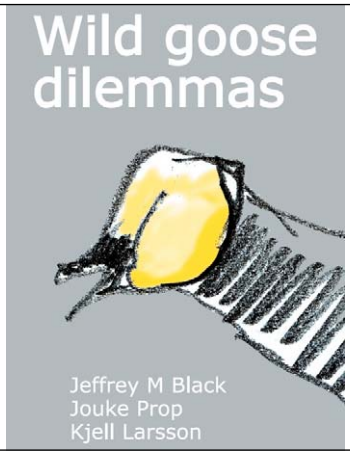

Goose populations are among the best-studied bird populations in the world. Their size and behaviour make them relatively easy to study during the entire annual cycle and allow the use of advanced research techniques like satellite telemetry. Moreover, geese are popular among many bird-watchers, enabling e.g. successful use of extensive colour-marking projects. Hence, an impressive number of scientific papers on various aspects of goose biology have been published in the past decades. In this book, Jeff Black, Jouke Prop and Kjell Larsson – all well-known goose researchers – summarise current knowledge on the Svalbard and Baltic populations of Barnacle Geese *Branta leucopsis*. Both populations have experienced a rapid population growth in the past decades. The Svalbard population benefited from protective measures and has recovered from hunting and collection of eggs, which drove the population nearly extinct only 60 years ago. The establishment of a breeding population of Barnacle Geese at Baltic spring-staging sites in 1971 (most likely originating from the Barents Sea population in Russia) on the other hand, represents a spectacular expansion from the Arctic into the temperate zone. The subsequent colonisation of most countries around the Baltic and the North Sea in the 1980s and 1990s shows how successful geese can be in this respect. In 2005, the Baltic population was already outnumbered by populations breeding at the North Sea shores, with as many as 6000 pairs (population 25 000 individuals) breeding in The Netherlands.

What makes a successful goose, and which individual characteristics drive population expansion? 'Wild goose dilemmas' addresses both questions, using Barnacle Goose as a model species. It deals with the numerous dilemmas individual geese are faced with during their lifetime and unravels the lines and constraints between individual decisions and the demography and distribution of the population as a whole. The contents includes 15 chapters and an online appendix. It starts with an extensive introduction to the species, the study areas and research techniques used (Chapters 1–3). The rest of the book is divided into three levels of decision processes: life-history decisions, like pair-bonds and family dynamics (Chapter 4–7); daily decisions like food finding and scheduling the annual cycle (Chapter 9, 11) and annual decisions like dispersal and exchange between populations (Chapter 12, 14). The remaining chapters deal with individual and population consequences (Chapters 8, 10 and 13, 15, respectively). It is especially this part of the book that will find a broad readership and is recommended reading for all involved in goose management. Most data used have been retrieved from studies on Svalbard Barnacle Geese by Myrfyn Owen, Jeff Black, Jouke Prop and co-workers from the Wildfowl and Wetlands Trust in the UK and the Animal Ecology Group of Groningen University in The Netherlands. Baltic Barnacle Geese have mainly been studied at the breeding sites at the

island of Gotland by Kjell Larsson and co-workers from Uppsala University. Migration and wintering strategies of this flyway are not dealt with in detail, although data are available from a series of studies. The recent colonisation of the North Sea area by breeding Barnacle Geese and the expansion in the Russian Arctic is hardly touched upon, but this merely reflects the fact that increase of goose populations might just go faster than the production of a book like 'Wild goose dilemmas', which must have taken the authors quite a number of years in addition to their regular duties. Moreover, most of the mechanisms described for Svalbard and Baltic breeding Barnacles will also apply to Russian and North Sea breeding populations. The interesting aspect of comparing the performance of breeding populations in different climatological (and changing) environments will be a challenge for goose research in the years to come.

'Wild goose dilemmas' is written in an accessible, vivid, style to attract a broader audience, including students attending courses in ecology and population biology. This is reflected in the extensive captions of each figure, graph and photograph, a summary of main conclusions at the end of each chapter and descriptions of the statistics used (of which more details are given in the online appendix). Moreover, several chapters clarify the questions still to be answered, stimulating further studies. The timing of publication is perfect. Nearly all goose species still show expanding populations, and increasingly interact with agricultural interests and management of nature reserves. For all dedicated goose watchers, but also those interested in population biology in general, the book is an excellent opportunity to upgrade their knowledge and understand the drivers of thriving goose populations. However, I doubt whether also habitat and wildlife managers will use it for management purposes. In the preface, they are specifically mentioned as target audience by the authors. Proposals for population-control measures, as recently put forward (and partly carried out) for breeding goose populations in The Netherlands, highlight the need to educate policy-makers and wildlife managers in many aspects. But especially these people will (unfortunately!) not be particularly interested in extensive reading of goose biology at such a detailed level, even if such knowledge is often necessary to understand the consequences and 'efficiency' of their management decisions.

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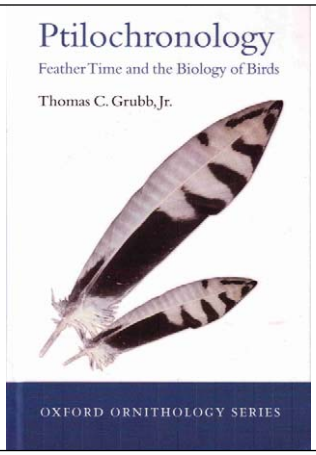
Grubb Jr. T.C. 2006. Ptilochronology: Feather time and the biology of birds. Oxford University Press. ISBN 978-0-19-929550-0. Hardback, 176 pp. EUR 82



Ptilochronology means 'feather time' and is a term coined by Thomas Grubb Jr., the author of the reviewed book. As dendrochronology makes use of growth rings of trees to establish how much a tree has grown in different years, so ptilochronology makes use of the fact that feathers have growth bars. When a feather is inspected closely, alternating light and dark bars can usually be observed (at least when the feather is not very large), and one dark and light bar together usually represent the feather growth over a 24 hour period. Thus by measuring the width of these bands it can be established how fast feathers have grown.

Grubb (1989) hypothesised that birds in better condition, for example through better access to resources, will grow their feathers faster, and in this way the width of the growth bars can potentially serve as a condition index. Animals allocate resources to processes involved in maintenance and repair of their bodies, such as the immune system, the repair of cells and DNA, but do so at the expense of resources allocated to other fitness enhancing processes such as territorial defence, mate attraction or reproduction. This trade-off is interesting, because the amount of resources allocated to maintenance and repair may determine how long individuals live. Unfortunately, most aspects of maintenance and repair are difficult to measure, in particular in free-living birds, making it difficult to assess for example effects of age, sex or habitat quality on the effectiveness of such processes. In this respect the replacement of feathers is a unique and useful feature of birds, because it is a component of maintenance and repair that is comparatively easy to measure. Ptilochronology may therefore be a valuable tool, and in the book the results are reviewed that have been obtained with this technique since its introduction in 1989.

Growth bars can be measured in feathers grown during the moult, but the time birds take to moult can depend on season. For example, birds that completed reproduction later in the season may replace feathers at a faster rate. Consequently, the natural variation in growth bars is affected by factors other than condition, undermining the basic assumption of ptilochronology. However, birds often replace plucked feathers within a period of 4–6 weeks. Inducing feather growth (usually of tail feathers) offers a way to measure growth bars of feathers grown at a time chosen by the investigator, thereby avoiding the natural variation caused by the timing of the moult. Grubb therefore advocates plucking feathers to measure growth bars in the replacement feathers, and I agree. Note however that replacement feathers are not always formed immediately; replacement may be postponed until the next moult, rendering the technique useless in these instances. For example, Cory's Shearwaters did not immediately replace feathers plucked at the start of the breeding season (Monteiro & Furness 1996), and neither did Jackdaws when tail feathers were plucked during the month preceding the breeding season (H.M. Salomons & S. Verhulst, unpubl.). The book does not present a systematic overview as to when plucking feathers may result in a replacement feather, presumably because the information required to develop some general rules is not yet available.

In the first part of the book on the basics, ptilochronology is introduced, including some introduction to the biology of feather (re)growth. The evidence from laboratory experiments bearing on the assumption that nutritional state affects the growth rate of feathers is also discussed. Technical details of the measuring procedure are presented in an appendix, which is brief and unfortunately does not include tips on what to do when growth bars are difficult to see. Although discussed elsewhere in the book, the appendix does not mention that under some circumstances there may be two growth bars per day, as was suggested for albatrosses (Langston & Rohwer 1996). This was thought to reflect that the main prey (squid) of the albatrosses were available around dawn and dusk, resulting in two active periods and two rest periods per day. This would suggest that perhaps in species whose lives are governed by the tidal cycles, such as many waders, approximately (!) two growth bars per day might be the rule. Most puzzling is that tail feathers of Pied Flycatcher nestlings have two growth bars per day as well (Kern & Cowie 2002); what causes this and how common this phenomenon is remains to be investigated. However, sufficient evidence is presented for (small) adult birds to conclude that in most cases a growth bar represents the feather growth of one day.

In the second part, on Applied Ptilochronology, an overview is given of the contribution of ptilochronology to the investigation of various aspects of avian biology, with chapters on habitat quality, nutritional consequences of self-cached food, social behaviour, individual quality, reproductive effort, nestling condition and prolonged brood care. These chapters consist of lengthy descriptions of the results reported in 2–6 papers

in which ptilochronology was applied, interspersed with some introductory paragraphs on general aspects of the topic. Most of these chapters show that ptilochronology can contribute substantially to furthering our understanding of the issue, and that ptilochronology may for example be a tool in conservation biology to assess e.g. habitat quality. The last chapter "takes stock and looks ahead".

To choose a specific technique as the focus of a book is a challenge, because it is difficult to produce a cohesive text given this constraint. However, Grubb coped well with this challenge, by mixing the results of the paper at hand with some general introduction to the chapter topic and by generously reserving space to background information on the specific study system. At the same time, to my personal taste the text consists too much of a succession of (lengthy) descriptions of the results of separate papers. In that sense the final chapter, where a condensed overview is given on some key issues, was for me the highlight of the book. Three particularly strong points of the book are that the text is very accessible, it does a good job in convincing the reader that ptilochronology deserves a wider application, and it highlights the many points where more research is needed. Since the basic technique is not difficult, some of this research can actually be done by anyone that regularly catches birds (provided local legislation does not prohibit plucking one or two tail feathers….). I would recommend this book to anyone who may be interested to take up this challenge.

Grubb Jr. T.C. 1989. Ptilochronology: feather growth bars as indicators of nutritional status. Auk 106: 341-320.

Kern M. & Cowie R.J. 2002. Ptilochronology proves unreliable in studies of nestling Pied Flycatchers. Ibis 144: 23-29.

Langston N.E. & Rohwer S. 1996. Molt-breeding tradeoffs in albatrosses: life history implications for big birds. Oikos 76: 498-510.

Monteiro L.R. & Furness R.W. 1996. Molt of Cory's Shearwater during the breeding season. Condor 98: 216-221.

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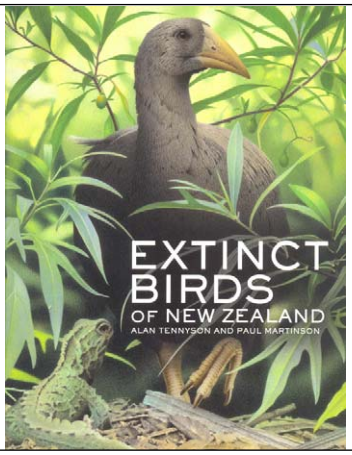
Tennyson A. & Martinson P. 2006. Extinct birds of New Zealand. Te Papa Press, Wellington. ISBN 978-0-909010-21-8. Hardcover 180 pp. Illustrated by Paul Martinson. EUR 37



Apart from bats, no mammals ever reached New Zealand in the 80 million years since it split from Gondwanaland. Birds, and to some extent insects, evolved to fill the vacant niches. The result was a splendid array of highly distinctive forms. But it wasn't to last. Sometime in the late 1200s the first Polynesians arrived on New Zealand, along with their rats. It was to be the start of repeated invasions of people and whatever they brought with them. It all culminated in the folly of the acclimatization societies of the nineteenth century who shipped in anything from foxes to yellowhammers to make the English in New Zealand feel more at home. The native birds were completely defenceless to all these newcomers. Like Hawaii, New Zealand is now a mass grave of one of the most rapid and well-documented avian mass extinctions in history.

This book illustrates all 58 casualties of this onslaught in a vivid manner. The authors have done their best to reconstruct the appearance of these birds and something of how they lived based on remains, historical accounts (only for the recent losses), and knowledge of their presumed closest relatives among extant birds. The plates are wonderful, with each species set in its presumed habi-

tat. If only we could still go and see Moas being pursued by gigantic Haast's Eagles in the highlands of the South Island. For many species, the sense of loss is enhanced by it being illustrated alongside other native species that managed to stay out of the human's snares and rat's teeth.

The 58 species illustrated in this book are those that stood the test of taxonomic splitting and lumping that apparently also affects extinct taxa. For example, the New Zealand Swan and Pelican that featured in an earlier book (Gill & Martinson 1991) are now considered to have been conspecific with their Australian counterparts.

As the authors state in their introduction, the New Zealand avifauna offers an interesting chance to study the process of extinction. The introductory chapter documents what happened and which pest was responsible for which extinction. For a large part this is based on conjecture, but the authors nevertheless dismiss any role for other possible causes of extinction such as habitat loss or disease. The introduction leaves a lot of questions unanswered. For example, what is it about island life that makes these species so prone to extinction. In New Zealand even species that in other places are well-adapted to high predation risk, like Quail, got extinct. And what determined which species went extinct and which did not? Flightlessness is an obvious drawback when faced with vicious mammalian predators, but by no means all extinct birds were flightless. In fact, a glance at the extant avifauna of New Zealand doesn't reveal any obvious characteristic that is shared by the survivors. They appear to be an eclectic mix of species that were just a bit slow to get extinct (Kakapo and Takahe) and other typically eccentric species that look like they should have gone with the Moas, but which are doing just fine (Kea). Such idiosyncrasies also puzzle students of the great mass extinctions like the one that finished off the dinosaurs.

This is more than just a coffee-table book with pretty pictures to mesmerize over wonderful birds now gone. It should be a grim reminder of what rampant depletion of natural resources can do to us all. After all, when the Moas were gone the Maori found themselves with very little to eat and fell victim to widespread famine, war and cannibalism (Flannery 1994).

Flannery T. 1994. The Future Eaters: an ecological history of the Australasian lands and people. Reed New Holland, Sydney.
Gill B. & Martinson P. 1991. New Zealand's Extinct Birds. Random Century, Auckland.

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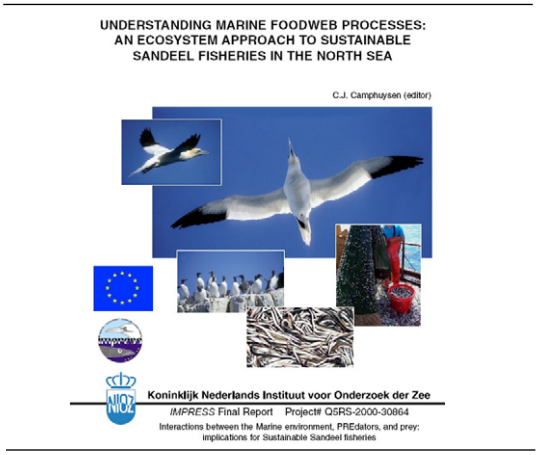
Camphuysen C.J. (ed) 2005. Understanding marine foodweb processes: an ecosystem approach to sustainable sandeel fisheries in the North Sea. IMPRESS Final Report, Royal Netherlands Institute for Sea Research, Texel. NIOZ report 2005–5. Can be downloaded from www.nioz.nl.



Sandeels provide food for a range of fish, marine mammal, and seabird species in the North Sea, so it is unsurprising that the huge, industrial fisheries on sandeels have been the topic of hot debates since they first developed in the 1950s. This has motivated several international research projects, and one of the biggest is the recently concluded, EU-funded IMPRESS project (Interactions between

the Marine environment, PREdators, and prey: implications for Sustainable Sandeel fisheries). The final report of the IMPRESS project appeared in 2005. The book provides a synthesis of work in oceanography, fisheries science, but above all, seabird ecology. We, as seabird- and fish ecologist respectively, find it encouraging to see such integrative work, providing insight into an ecosystem all the way from lower trophic levels (i.e. plankton) to upper levels (i.e. seabirds). This is precisely the type of information that is essential for providing management advice on sandeel fisheries in an ecosystem context (cf. Frederiksen *et al.* 2006).

The 'principal study area' was a relatively small area of about 6000 km2 in SE Scotland, at the Firth of Forth, including the fishing grounds Wee Bankie, Marr Bank and Berwick Bank. An extended area of the northwestern North Sea around the principal study area was chosen as the 'study area at large', which covered almost 140 000 km^2. At these two different spatial scales, an extensive dataset was available from seabird at-sea surveys between 1991 and 2004. Between 1997 and 2003 fish biomass was sampled yearly in acoustic, trawl, grab and dredge surveys, not only for sandeels (mainly Lesser Sandeel *Ammodytes marinus*) but also for other fish species (herring etc.). Four seabird species were chosen as study species with different foraging styles and using different parts of the water column: the Northern Gannet *Morus bassanus*, European Shag *Phalacrocorax aristotelis*, Black-legged Kittiwake *Rissa tridactyla*, and Common Guillemot *Uria aalge*. From long-term monitoring programs on the Isle of May and Bass Rock (within the principal study area), colony counts and breeding success for these species were available between 1997 and 2003. Diet samples confirmed that sandeel was an important food item for these seabirds, especially for Kittiwakes and Shags. The report shows that too simple explanations between prey and predators should be avoided. For example, strong relationships of Kittiwake and Shag breeding success with sandeel availability were found. Unexpectedly, however, strong correlations were also found with herring abundance, a food item of negligible importance for both species. For Guillemots, breeding success was strongly correlated to Sprat Sprattus sprattus availability. But here density-dependent factors may have played a role too, because the breeding success declined over the study period, but the breeding population grew after the fishery had stopped in 2000.

Oceanographic data suggested that seven different regions could be distinguished based on bathymetry, productivity, stratification and tidal mixing, and the influence of freshwater. Apparently, shallow sea fronts are important areas for many foraging seabirds, because here most fish occur close to the surface. Some of the earlier data on foraging multi-species flocks were published in Ardea before (Camphuysen 1999) and get again much attention in this report. But for good reasons, we think, because still very little is known of grouping behaviour of animals at sea. Groups of Guillemots and Razorbills *Alca torda* herd schools of fish and drive them to the surface, making foraging more profitable for themselves, but also for surface-feeders like Kittiwakes and Gannets that are attracted by such foraging flocks. In a later stage, large gulls and skuas are alerted and are starting to interfere with these gatherings.

Foraging strategies were investigated in more detail with all sorts of dataloggers, not only to locate the feeding grounds, but also to record their behaviour at sea. Technological advancements go quickly in the field of foraging ecology of seabirds. Next to existing GPS-loggers, compass-loggers and VHF-transmitters, a special depth-temperature recorder was developed for IMPRESS. But not all birds liked the gadgets much, like the Kittiwakes that regurgitated these devices before they could be retrieved. The new foraging location data provided many new insights because the Isle of May/Bass Rock birds did not always forage at places where they were expected (based on at-sea observations). Guillemots were feeding closer than expected (on average 23 km from the colony) whereas Gannets were found up to West Norway. In IMPRESS, major advancements were achieved in getting estimations of the energetic requirements of foraging seabirds. In an experimental set-

up the behaviour and physiology of foraging seabirds were studied under different conditions (e.g. more or less prey). The experiments showed that hypothermia was not used as an energy-saving strategy during prolonged dives. Unfortunately, the efforts to extrapolate to population levels were not successful, as many parameters that are needed for the models are still lacking.

In IMPRESS the sustainability of the sandeel fishery was examined by looking at the ecosystem under basically two different levels of fishing pressure in different periods (relatively high fishery pressure in 1997 and 1998, and from 1999 to 2004 virtually no fisheries). Unfortunately, this time-series is still relatively short which makes it difficult to disentangle fisheries from other potential drivers of sandeel population dynamics. For approximately the same 'wider study area', Frederiksen *et al.* (2006) suggested that sandeel stock dynamics are not primarily driven by 'top-down' predation (either by natural predators or by fishing), but by other, 'bottom-up' drivers changing the ecosystem. These – likely climate-related – factors are changing plankton abundance and distribution, thereby affecting all higher trophic levels (Frederiksen *et al.* 2006). Moreover in 2004, after the main field activities for IMPRESS had stopped, most seabirds in Scotland showed a catastrophically poor breeding success. Interestingly, sandeel recruitment in 2003 was high and these events came rather unexpected. Guillemots were feeding their chicks at a normal rate, but with relatively 'low quality' food (sandeels and sprats with abnormally low energy content). Furthermore, sandeels were almost completely absent from their diet in this year (Wanless *et al.* 2004). Up to now, fishery has been suspended, but the question remains which level of sandeel fishing would be sustainable.

Finally, some critique could be given on an apparent mismatch between the project's title and actual coverage. Sandeel population dynamics, and sandeel fishing pressure, essentially are mainly viewed in a context of to what extent these may affect populations of seabirds. Really, seabirds are the main 'players' in the report but they are neither mentioned in the title of the project nor in the title of the final report. But sandeels are also important prey to several marine mammal and a rather long list of piscivorous fish species. It is the potential negative effects of the industrial fisheries on such commercially valuable species as Cod *Gadus morhua*, Haddock *Melanogrammus aeglefinus*, Plaice *Pleuronectes platessa* and Sole *Solea solea* that have been upsetting Dutch, British and other trawlermen for several decades now. Furthermore, it could be pointed out that the overwhelming majority of sandeel fishing, both nowadays and historically, occurs in more central parts of the North Sea out of reach of the study species when they are breeding (with the exception of Gannets). Hence, the current 'main' sandeel fishing grounds are relatively insignificant for (breeding) seabirds (e.g. Furness & Tasker 2000), and thus it could be questioned if relationships found at a relatively small scale close to the Scottish coast, apply to the North Sea ecosystem and North Sea sandeel fisheries in general.

The report is not a complete synthesis of all aspects of the North Sea ecosystem (although it may come close if we consider only the Wee Bankie region), but it is a highly informative update on the current knowledge of especially the higher trophic levels. Integration of all aspects that IMPRESS tried to tackle will probably take more time, especially the physiological and behavioural data in relation to the population and ecosystem level. Unlike many journal papers or book chapters, results that did not really work out the way the authors would have liked, are also shown in this report. We found it very refreshing to see these 'negative results' that are inevitable when progressing in science. The pages (240 in total, excluding the appendices that are given in the accompanying CD) are overloaded with graphs, tables, distribution charts and other details. This information is great for specialists working on seabirds in this area, but might be somewhat too much for the more general reader. Luckily, the report has a good summary and synthesis guiding the reader through all the information. Overall, an impressive piece of work, indeed.

Camphuysen C.J., Webb A. 1999. Multi-species feeding associations in North Sea seabirds: jointly exploiting a patchy environment. Ardea 87: 177–198.

Frederiksen M., Edwards M., Richardson A.J., Halliday N.C., Wanless S. 2006. From plankton to top predators: bottom-up control of a marine food web across four trophic levels. J. Anim. Ecol. 75: 1259–1268.

Furness R.W., Tasker M.L. 2000. Seabird-fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea. Mar. Ecol. Prog. Ser. 202: 253–264.

Wanless S., Harris M.P., Redman P., Speakman J.R. 2004. Low energy values of fish as a probable cause of major seabird failure in the North Sea. Mar. Ecol. Prog. Ser. 294: 1–8.

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