REVIEWS

Piersma, T. & Koolhaas, A. 1997. *Shorebirds, shellfish(eries) and sediments around Griend, Western Wadden Sea, 1988-1996.* Nederlands Instituut voor Onderzoek der Zee (NIOZ) rapport 1997 - 7, Texel. ISSN 0923-3210.

Between 1990 and 1992, according to data published by the Scottish Office Agriculture & Fisheries Department, up to 118% of the biomass of cockles present in the Solway estuary in Britain was removed by commercial cockle fishermen. The figure of 118% is an ecological impossibility, granted. This probably resulted from the biomass of cockles present in the estuary being under-estimated, the biomass removed by the fishery over-estimated, or both. Nevertheless, this figure illustrates a simple point - commercial shellfisheries, using highly efficient, modern fishing methods, have the capacity to severely reduce the biomass of their principle target species, the edible cockle *Cerastoderma edule* and blue mussel *Mytilus edulis*.

The activities of these shellfisheries concern conservationists principally for two reasons. Firstly, estuaries are a vital habitat for many populations of migratory shorebird, some of which are dependent on these exploited bivalve molluscs for food, particularly the Oystercatcher *Haematopus ostralegus*. Secondly, the fishing methods used, particularly suction and mechanical dredgers, are widely believed to be damaging to the estuarine environment. There is now a growing body of evidence to suggest that Oystercatchers, in certain estuaries at least, are being adversely affected by shellfisheries (more about this later). However, there has been much less data on the wider environmental effects of fishing - until now. So, what's the story?

Griend is a small island in the western part of the Dutch Wadden Sea. Since 1988, Theunis Piersma and colleagues have been studying the ecology of Knots *Caladris canutus* during the summer and autumn on a 60 km² area of the intertidal flats that surround the island. These flats can roughly be divided up into four sectors: north, south, east and west. During the studies in these areas, data have been collected on intertidal sediments, invertebrates and Knots.

On 26 and 27 September 1988, suction-dredgers fished the northern sector for cockles. The most immediate effect of this fishing activity was that the surface layers of sediment, after fishing, consisted of large shell fragments that were usually buried much deeper in the mud, due to sediment reworking by the dredgers. Next, over the 1989/90 autumn and winter season the mussel-beds in the western sector were removed by fishing. The report by Piersma & Koolhaas claims that these fishing activities have had a very dramatic and quite long-term impact on the estuarine environment around Griend.

Following the fishing activities in the late 1980s, Piersma & Koolhaas argue that several important changes have occurred. Firstly, the sediments around Griend became significantly sandier, particularly in the northern sector fished by the suction-dredgers. Secondly, populations of cockles and the Baltic tellin *Macoma balthica*, important food supplies for Knots, showed large decreases in abundance in the western and northern sectors (affected by fishing), smaller decreases in the eastern sector and small increases in abundance in the southern sector. Thirdly, the number of Knots has decreased dramatically around Griend since 1988, and the birds no longer use the northern sector. This cascade of changes, the authors argue, has been driven by the fishing activities.

Fishing reworks the sediments and removes large quantities of bivalves, which are important for protecting the sediments against wave action (mussel-beds) and for the production of silty 'faeces' that have sediment binding properties. As a result, the sediments become sandier, which is bad for bivalves such as *Macoma* and bad for the Knots that eat them. As suction-dredging has been such a widespread fishing activity in the Wadden Sea in the late 1980s and early 1990s, these changes give great cause for concern, especially since mollusc-feeding shorebirds, such as Knots and Bar-tailed Godwits *Limosa lapponica*, that refuel in the Wadden Sea in summer and autumn, have declined dramatically in number in their main wintering site, the Banc d'Arguin in Mauritania, over recent years.

Should we believe the authors' claims? I ask this for two reasons. Firstly, as concerned conservationists we are often inclined to believe stories of environmental damage without carefully scrutinising the data (I include myself in this comment). Secondly, you can be sure that the shellfishing industry and government departments in various European countries will be looking very carefully at the basis of any claim that shellfishing activities cause environmental damage. The authors view their study as a historical experiment. Shellfisheries occurred in two sectors (north and west), there was a control sector with no obvious changes over time (east), and a sector with a contrasting treatment - engineering works that have expanded the island of Griend and so provided some protection from wave energy (south). This means that is important to

examine whether time series trends in sediments, invertebrates and birds vary significantly between sectors (experimental 'treatments') in order to evaluate the hypothesis that fishing has caused the proposed changes. If Piersma & Koolhaas are right, and fishing has affected these aspects of the estuarine environment, then we would expect these changes to be most pronounced within the sectors affected directly by fishing (north and west), and less apparent in the other sectors (east and south). Is this the case?

First, the sediment data. There is strong evidence to show that sediments around Griend have become sandier over time (Chapter 3, pages 21-23, and Figure 14). The data also suggest that the sectors around the island had significantly different sediment grain sizes *i.e.* some were sandier than others. However, there was no evidence that the change in sediment grain size between years varied significantly between sectors (page 23), as might have been expected if the sectors that had experienced fishing had become sandier at a faster rate than the other sectors. It would also have been valuable to compare directly between sectors the time series trends in sediment grain size. That is, has grain size increased more rapidly in the north and west sectors compared to the east and south sectors?

Next, the invertebrate data. The first thing that struck me about these data (Chapter 4) was that they have not been analysed, other than to show various data graphically. An analysis would have been tough given the likely autocorrelation in the data *i.e.* neighbouring years are likely to have similar abundances of a particular species. However, there are methods for the statistical analysis of such data. Nevertheless, it is possible to get some impression of abundance trends over time from the figures. The principle claim of the report is that *Macoma* and cockle abundances have declined over time most dramatically in the sectors that experienced fishing. The data appear, in my opinion, equivocal on this point. While the total biomass of cockles has declined dramatically since 1988 in the north and west sectors (Chapter 4; Figure 31), the biomass of cockles of suitable size for Knots was absent in 1988 in the north and west sectors, and appears to have increased in all sectors in recent years (*i.e.* 1992 onwards). In contrast, the biomass of *Macoma*, both in total and only of sizes suitable for Knots, has declined in all sectors since 1988 (Chapter 4; Figure 41). If fishing had precipitated a change towards sandier sediments, which in turn had reduced the suitability of the tidal flats for *Macoma* then the biomass of *Macoma* should have declined most dramatically in the north and west sectors, but, visually at least, this does not appear to be the case.

Finally, the Knot data. The evidence that Knot numbers around Griend have declined is compelling (Chapter 5; Figure 67). However, there is again no formal statistical comparison of trends in Knot numbers over time in the different sectors. Furthermore, inspection of the data (Chapter 5; Figure 66) suggests that Knot numbers and habitat use have declined in the north sector since 1988, but also in the east sector, which was not affected by fishing. This is contrary to what would have been expected if fishing had led directly to the declines in Knot numbers.

So, what has happened around Griend? The intertidal flats are clearly becoming sandier. There are also fewer *Macoma*, and, not surprisingly, fewer Knots. Is the shellfishing industry responsible? This is a tough question to answer because shellfishing might be responsible even though local changes around Griend are not well correlated with fishing activities. Widespread suction-dredging, removing cockles and mussel-beds, within the Wadden Sea could, in theory, have precipitated the changes proposed by Piersma & Koolhaas on a relatively large scale. However, the authors themselves state (page 24) that parts of the western Wadden Sea in the Netherlands is eroding, and that sediment grain sizes have increased since the 1950s in these areas. This is long before the advent of suction-dredgers. This raises the possibility that the changes the authors documented around Griend might represent a long-term change in the estuarine environment towards a higher energy, sandier habitat. There are a host of possible reasons why such a change might take place, but it is difficult, in my opinion, to solely blame the fishing industry against this background.

The report winds-up (Chapter 8) by referring to the Rio Declaration on Environment and Development in 1992, which states: *"Where there are threats of serious irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation"*. I entirely agree with this view, and I bet most conservationists in the world would too. It is designed to make sure that a particular means of exploiting a natural environment cannot continue because there is no clear-cut scientific case against it, even though the weight of circumstantial evidence suggests that it is damaging.

The problem for conservationists when viewing the wealth of potential environmental problems that face us in the world today is that this principle often appeals more to the heart than the head. While my heart finds it very easy to accept the arguments presented by Piersma & Koolhaas, my head finds it hard to easily find support for their case in their data. Clearly, something dramatic is happening to the tidal flats around Griend, but the data do not clearly show that these changes have been restricted to the sectors around Griend that experienced intense fishing in the late 1980s. Does this mean that shell fisheries are not damaging to the intertidal environment? Absolutely not. There is clear evidence that Oystercatcher populations are showing signs of stress in many estuaries that have seen a dramatic recent increase in the activities of shellfisheries. Piersma & Koolhaas themselves mention

evidence that the number of Oystercatchers breeding on islands in the Wadden Sea has declined. At the same time, the numbers of ringed birds found dead during the winter has increased, even though weather conditions have been mild. Comparable patterns have been recorded in Britain.

On the Wash in eastern England, large numbers of ringed Oystercatchers have been found dead during recent mild winters. This has been coincident with a low recruitment of juvenile cockles and mussels, but also with a high level of fishing effort by suction-dredgers. The Dee estuary, on the north-west English coast, has seen a decline in the number of wintering Oystercatchers, following the collapse of its cockle stocks following intensive, unregulated fishing. Emaciated corpses have been found regularly around the estuary over recent years during winter, and birds regularly use terrestrial grasslands to look for food, at high tide or when intertidal cockle stocks are depleted. These declines at particular sites are all the more unusual given the general increasing trend in wintering Oystercatcher numbers over the past 20 years in NW Europe. Contrast these problems with the situation seen in the Burry Inlet in south Wales. Here, a low intensity, well regulated cockle fishery, using traditional exploitation methods, has existed for over 100 years, and there have been no major recent declines in Oystercatcher numbers during winter.

These data, from various sites in NW Europe, when taken together, suggest that high levels of unregulated shellfishing, using efficient modern fishing methods, can be damaging to birds dependent on the shellfish for food, and is, therefore, evidence of environmental damage within the spirit of the Rio Declaration. Whether or not shellfishing also has more subtle, long-term effects on the intertidal environment, as suggested by Piersma & Koolhaas, hopefully time will tell.

At the moment, my head tells me the jury is out, but my heart tells me that they just might be right. Why not get hold of a copy of the report and make up your own mind?

Ken Norris, University of Reading

Mearns, B. & R. 1998. *The Bird Collectors.* Natural World, Academic Press, London. ISBN 0-12-487440-1. 472 pp.

This is an extraordinary book. When I first picked it up, I had not the slightest interest in the Victorian bird collectors, whose travels around the world amassed the huge collections of skins and eggs which laid the basis of our understanding of avian biogeography and taxonomy. I am now fascinated!

Barbara and Richard Mearns intriguing book explore the people who were collectors, their motivations and the cultural environment in which they collected (especially the growth of international trading organisations such as the Hudson Bay and Dutch East India Companies). Cross-cutting chapters illuminate just about every strata of collecting (skeletons, skins and eggs through to DNA and tape-recordings) and collectors imaginable. We have reviews of the activity of collectors that were army officers, women, doctors, clergymen and missionaries, collectors that were also bird artists, as well as the professional field collectors and latterly collectors who were conservationists.

An immense amount of research must have gone into this book. The sheer volume of historical information makes it a daunting read, but the structuring of many chapters in the form of a series of biographic portraits makes it most enjoyable to dip into.

Whilst the bulk of the book addresses the nineteenth century collectors, early chapters thoroughly cover the earliest history of bird collectors, and the final chapter presents a thought-provoking review of the modern day justification of maintaining both the old collections and continued collecting - in providing essential taxonomic support for the understanding of global and regional patterns of avian diversity - thus aiding the development of strong cases for conservation.

A detailed taxonomic index aids the location of details concerning who collected which species, whilst a fascinating appendix summarises the worlds top 69 museum collections with an indication of who were the main donors to each.

Whether your interests are in history, geography, exploration, the development of world trade, anthropology or (even!) birds, you will enjoy this book!

David Stroud

Rose, P.M. & Scott, D.A. 1997. *Waterfowl Population Estimates - second edition.* Wetlands International Publication 44, Wageningen, The Netherlands.

This second edition updates Rose & Scott's 1994 compilation of population estimates for all the world's waterfowl as part of a programme of three-yearly revisions timed to coincide with meetings of the Contracting Parties to the Ramsar Convention. The publication is an important source of otherwise dispersed information on the status of international waterfowl populations. There is useful background information on the use of waterfowl as indicators of important wetlands.

It is a major feat to condense so much into such a compact volume. Consequently, as recommended by the authors, the section on data presentation is essential reading to make the most of the data tables.

The tables present the most recent population estimates (individuals, not pairs), and highlight the pressing need to update various waterfowl population estimates, especially for waders – for

example, Smit & Piersma (1989) is still one of the definitive references for the East Atlantic Flyway waders (using early 1980s data for many EAF populations). It is hoped that the WSGs current programme to review and revise flyway estimates in Africa and Eurasia will be included in the next edition.

Population trends are categorised (stable, increasing etc.), but are not necessarily comparable between populations because they relate to different periods. Perhaps it would be useful to add a column indicating the applicable time period for each trend assessment without having to refer to the reference list. Additionally, so far there are no recognised standards for assessing when the magnitude of change equates to a decreasing or increasing trend. However, an indication of the reliability of the data is given.

The report represents an impressive example of international co-operation which is essential to ensure that updates are comprehensive. We can look forward to future editions of this publication becoming increasingly indispensable to conservationists, researchers and others with a keen interest in waterfowl population biology.

Rowena Langston

Costa, L.T. & Guedes, R.S. 1996. *Contagens de Anatídeos Invernantes em Portugal Continental. Invernos de 1993/94 a 1995/96.*
Estudos de Biologia e Conservação da Natureza 20, Instituto da Conservação da Natureza, Lisboa. 56 pp.

ICN/CEZH/CEMPA report summarising monthly counts of 22 species of Anatidae and six other species of waterbirds (no waders) at 77 mainland Portugese wetlands for the three winters 1993/94-1995/96. Evaluation of data confirms the international importance of the Tagus and Sado Estuaries, Santo André lagoon and Ria Formosa.

David Stroud

Also received

(these volumes may be reviewed in a future *Bulletin*)

WIWO Reports

Van den Brink, B., Bijlsma, R.G. & Van der Have, T.M. (eds.) 1997. European Swallows *Hirundo rusticola* in Botswana. WIWO-report No. 56. WIWO, Zeist. 102 pp. [Dfl. 20.00]

Van den Brink, B., Bijlsma, R.G. & Van der Have, T.M. (eds.) 1998. *European songbirds and Barn Swallows Hirundo rusticola in Ghana: a quest for Constant Effort Sites and Swallow roosts in December/January 1996/97.* WIWO-report No. 58. WIWO, Zeist. 53 pp. [Dfl. 15.00]

Veerman, T. & Wessels, H. (eds.) 1998. *Cranes* (Grus grus) *in NW-Russia in autumn 1996.* WIWO-report No. 59. WIWO, Zeist. 20 pp. [Dfl. 10.00]

Willems, F.J. & de Vries, E. 1998. *Ecological aspects of Pygmy Cormorants* Phalacrocorax pygmeus *at Prespa, Greece, May-August 1996.* WIWO-report No. 60. WIWO, Zeist. 70 pp. + tables and appendices. [Dfl. 25.00]

These WIWO reports can be purchased by paying the inidcated price in Dutch guilders [Dfl] (plus a Dfl. 15.00 administration cost for each separate order) to postal giro account 2.666.009 or to ABN-AMRO bank account 57.02.16.613 of Stichting WIWO, Fetha 23, 3633 CT Vreeland, The Netherlands; or by sending cash or a Eurocheque (both free of adminstration costs) to the same address.

Heckenroth, H. & Laske, V. 1997 *Atlas der Brutvögel Niedersachsens 1981-1995 und des Landes Bremen.* Naturschutz und Landschaftspflege in Niedersachsen, Hannover. 332 pp.

Dodman, T. (ed.) 1997. *A preliminary waterbird monitoring strategy for Africa: incorpoarting the Proceedings of the African Waterfowl Census Review and Development Workshop, Djoudj, Senegal, 6-10 February 1996.* Wetland International Publ. 43, Wageningen, The Netherlands. 169 pp.

RSPB, EN & ITE 1997. *The Wet Grassland Guide: managing floodplain and coastal wet grasslands for wildlife.* RSPB, Sandy, UK. 254 pp. [£17.95 from RSPB Publications, The Lodge, Sandy, Bedfordshire SG19 2DL, UK]