recorded in 2019 (of which 12 nested; Werkgroep Zeearend Nederland).

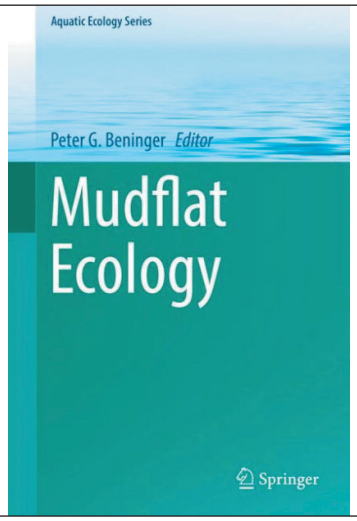
Overall, 'Rebirding' is one of many well-intentioned pleas to start taking nature conservation seriously. As such, it is a good read which should, however, not be taken too seriously. Good reasoning is alternated with nonsense, facts not always discriminated from fiction (hence, readers should check the original sources, and search for óther sources as biology is riddled with poor and contradictory science). And, perhaps even most importantly, it should be borne in mind that the book is about birds, i.e. a tiny part of all life. To base nature conservation on birds alone is ludicrous, to do so on just some birds even more so.

Balmford A. 2012. Wild Hope: on the front lines of conservation issues. University of Chicago Press, Chicago.

Knegtering E. 2009. The featheries and furries: species characteristics and tendencies in public species conservation. PhD-thesis University of Groningen. http://hdl.handle.net/11370/6b282768-c1aa-4f0c-b6d2-2e79143cca6b

Rob G. Bijlsma, Doldersummerweg 1, 7983 LD Wapse, The Netherlands, rob.bijlsma@planet.nl

Beninger P.G. (ed.) Mudflat Ecology. Springer Nature, Switzerland. Hardback, 429 pp.
ISBN 978-3-319-99192-4. €174.39.



"Mud is beauty in the making". With this phrase, after a poem of R.W. Service, 'Mudflat ecology' sets the tone for an appraisal of intertidal mudflats. Mudflats, as the various authors ("the mud club"!) in this monograph passionately argue, are not wastelands, but are highly-productive marine habitats, providing important ecosystem services. Moreover, mudflats are ecosystems with intriguing interacting physical, chemical and biological processes, worth studying. With the conviction that scientists of various disciplines should work together to make progress, this 429-page book covers a large variety of topics, including chapters on geology, microbiota, meia- and macrofauna, sedimentary processes, parasites, fisheries (but interestingly not fish) and, of course, shorebirds.

The shorebird chapter is written by Kimberly Mathot, Theunis Piersma and Robert Elner. In line with the scope of the book, together with a plea to redirect from the strong ornithological focus prevailing in shorebird science, the chapter highlights the integrating role that shorebirds play in mudflat food webs. Taking the morphology, physiology and behaviour (i.e. foraging mode) as a starting point, the authors discuss how shorebirds occupy a central place in mudflat trophic webs. Continuing on this line they illustrate, with examples from various mudflats, how shorebirds have a major predatory impact on their benthic prey populations (although quantifying this impact remains challenging) and benthic communities. They discuss how shorebirds may alter mudflat biogeochemistry and benthic communities and how shorebirds can have chemical impact on mudflats by defecation. The second part of the chapter focuses on how shorebirds integrate information on multiple fitness-relevant parameters (food and safety) when selecting intertidal habitat. Examples of how anthropogenically-disturbed mudflats in the Yellow Sea have various (although primarily negative) effects on shorebird populations and how climate change in the Arctic may have (cascading) consequences for mudflats and shorebirds are also discussed.

The most original aspect of the shorebird chapter is the focus on biofilm grazing. Only recently, it has been shown that shorebirds directly 'graze' the biofilm (the thin, matrix-enclosed community of microphytobenthos; Kuwea *et al.* 2008). It means that shorebirds are not only secondary consumers, they are also primary consumers, adding increasing levels of complexity to system understanding. Also, potentially this foraging mode could dramatically alter the physical structure of mudflats. Biofilm feeding appears most prevalent in small shorebirds ('peeps'), but all shorebirds appear

functionally able, and likely, to graze biofilm. Peeps, and biofilm grazing shorebirds, mainly occur in the American flyways. The authors hypothesise that small shorebirds are less abundant in the African-Eurasian flyways because they face high competition with other biofilm grazers.

Because all shorebirds, directly or indirectly rely on biofilm as a food source, the authors argue that biofilm is a critical component of habitat quality. Conservation planning needs to include protection of underlying processes shaping biofilm communities, and future work on shorebirds should focus on identifying and modelling the links between food web complexity and ecosystem resilience. Note that the authors take up their own challenge; they show for instance in a recent publication that the timing of migration of Western Sandpipers *Calidris mauri* coincides with a peak in biofilm (Schnurr *et al.* 2020).

The main goal of 'Mudflat ecology', published within Springers' Aquatic Ecology Series, is to establish mudflat ecology as a true, diverse, yet intrinsically and necessarily coherent, field of study. I think the various authors have made a good attempt at establishing a comprehensive synthesis on mudflat ecology, on the processes at lower trophic levels. I liked the emphasis throughout the book on the relationships between various components of mud, i.e. that physical processes and biological processes interact in a complex manner with the hydrodynamic regime. The book radiates a passion for mud, but given the often detailed and in-depth information on the large variety of topics it remains a book for scientists. The text often requires quite a bit of existing knowledge and should be read with attention. Unfortunately, to my taste, the figures and layout are not particularly appealing and add to the book's 'ivory tower' flavour.

The book ends with an appreciation of 'classical' fieldwork and descriptive studies, "which remain key to move science forward and deserve our consideration and respect". The authors state that "unfortunately, this glaring, fundamental truth will (….) be ignored by blinkered (…) journal editors". As an editor of Ardea I cannot agree more (see Bijlsma *et al.* 2014).

Bijlsma R., Kempenaers B. & Piersma T. 2014. Creating long-term value: Natural history is the basis. Ardea 122: 1–2.

Kuwae T, Beninger P.G., Decottignies P., Mathot K.J., Lund D.R. & Elner R.W. 2008. Biofilm grazing in a higher vertebrate: the western sandpiper *Calidris mauri*. Ecology 89: 599–606.

Schnurr P.J., Drever M.C., Elner R.W., Harper J. & Arts M.T. 2020. Peak abundance of fatty acids from intertidal biofilm in relation to the breeding migration of shorebirds. Front. Mar. Sc. 63: 1–17.

Roeland Bom, Department of Coastal Systems, NIOZ Royal Netherlands Institute for Sea Research, and Utrecht University, P.O. Box 59, 1790 AB Den Burg, Texel, The Netherlands