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BOOK REVIEW

Marine Mammal Science

The Beachcomber's Guide to Marine Debris inserted by the press

Michael Stachowitsch

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A book on the topic of marine debris maybe viewed by some as somewhat beyond the scope of review for Marine Mammal Science. However, defined as "any persistent, manufactured or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment" (The United Nations Environment Programme, UNEP, 2015), marine debris poses a considerable threat to wildlife and is increasingly recognized as a concern (Baulch & Perry 2014; Laist 1997). Entanglement, dismemberment, strangulation, ingestion, and drowning have all been documented across a wide range of species, with synthetic marine debris, notably plastic, globally recognized as a stressor for a variety of marine taxa (Moore, 2008). Indeed, Senko et al. (2020) reported over 40% of extant marine mammal species have become entangled or ingested in plastics alone. The impacts plastics have across these taxa has further seen it listed as one of the emerging issues identified for marine mammal conservation (Nelms et al., in press).

Michael Stachowitsch's "The Beachcombers Guide to Marine Debris" presents a richly illustrated field guide to marine debris, written in a light, informal tone that feels as if the author is in the same room with the reader. Comprising 16 chapters and almost 700 color images, this book could be considered "utter trash," quite literally. By documenting marine debris across the world's international beaches, Stachowitsch presents the ultimate field guide by detailing the extent of the problem and notably, the impacts that marine debris can illicit. The book is structured with an opening introduction followed by 15 chapters, which individually focus on everything from glass, metal, and plastics through to fishing gear, organic waste, and more. In each chapter, the author firstly identifies the types and subtypes of marine debris commonly observed before offering discussion on alternative products, as well as options for recycling and upcycling. Prevention strategies and clean-up recommendations for each of the sources are further detailed, extending this book somewhat beyond the scope of a typical field guide.

In a stark introduction, the reader is reminded that practically every item ever produced by humans has been discarded on a beach somewhere, and that marine pollution is a global problem that requires international solutions and legislation. Stachowitsch goes on to outline the extent of the marine debris problem and makes specific reference to the direct impacts of entanglement, dismemberment, strangulation and drowning in the context of marine mammals. Thereafter, direct references to marine mammal impacts are primarily focused in the chapters relating to plastic (Chapter 4), fishing gear (Chapter 11), and oil and tar (Chapter 15).

Stachowitsch details more than 200 types of plastic and the potential impacts such materials have on biodiversity and marine ecosystems. To do this, Stachowitsch addresses both the physical and chemical aspects of this pollutant type and their respective effects accordingly. Relating specifically to marine mammals, the chapter predominantly focuses on cetaceans and pinnipeds. Plastic threats, identified by the author as the main threat to marine mammals, include ingestion and entanglement. However, as is understood from the wider published literature, not all species are equally susceptible, with ingestion more frequently observed in teuthophagous species,

especially beaked and sperm (*Physeter macrocephalus*) whales (e.g., Abreo et al., 2016; Lusher et al., 2015). Furthermore, while cetaceans are known to become entangled in debris (Baulch & Perry, 2014), pinnipeds appear more susceptible, with ~70% of species having been recorded with entanglements (Laist 1997, Jepsen & de Bruyn 2019).

In Chapter 11, Stachowitsch goes on to detail why discarded fishing gear can be the most perilous marine debris for marine mammals. Citing that over 650,000 tonnes of fishing gear per annum are abandoned (accidentally or otherwise) at sea, the author exemplifies the magnitude of the problem. Both entanglement and amputation due to lost gear are listed as examples in cetaceans and pinnipeds. As widely documented though, entanglement can lead to energetic costs associated with increased drag, an inability to forage and/or evade predators and other threats (Allen et al., 2012, Jepsen & de Bruyn, 2019). However, these implications were not discussed within the current text, although noteworthy enough to have been mentioned, if only in brief.

Chapter 15 details the impacts oil has throughout the marine environment, including on marine mammals. Citing high-profile examples of oil spills like the *Torry Canyon*, *Amoco Cadiz*, and *Exxon Valdez* and the most recent, *Deepwater Horizon*, Stachowitsch draws the readers' attention to the obvious implications oil has on marine mammals, citing oil slicks and their impact on breathing and feeding. Here I think an opportunity was perhaps missed by the author to extend more into the less visual, longer term impacts such pollution can induce and for which are well documented (e.g., Lane et al. 2015, Smith et al. 2017).

Finally, marine mammals get a mention in the section on organic waste (Chapter 14), but this time as the source of contamination themselves. In this chapter, Stachowitsch explains the organic deposition marine mammal cadavers contribute when they beach cast or animals live strand and subsequently die or are euthanized. The method of euthanasia (ballistics through to chemical euthanasia) would further dictate what source of secondary pollution may occur as a result of euthanasia (i.e., shell cases, chemical residues within the carcass), although this was not noted in the text.

While not targeting marine mammals, "The Beachcombers Guide to Marine Debris" is noteworthy to marine mammal scientists as a one stop shop for marine debris identification. I can particularly see this guide being useful for biologists and pathologists undertaking postmortem examinations, since the high-quality photos could aid in the identification of unknown inorganic objects (or parts thereof) within stomach contents. My only real criticism is that reference to marine mammals beyond cetaceans and pinnipeds was lacking and that wider examination of impacts to other orders would have been beneficial. In conclusion, Stachowitsch offers the reader an easy, informative, and somewhat entertaining commentary on all matters of marine debris. A worthwhile read, if only for the pictures and wider overview perspective on this important topic.

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