

VOL. 100, NO. 6 SEPTEMBER 2020



JMBA

Journal of the Marine Biological
Association of the United Kingdom



CAMBRIDGE
UNIVERSITY PRESS

ISSN: 0025-3154

JMBA

JOURNAL OF THE MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM

EDITOR IN CHIEF: PROFESSOR JANE LEWIS
Shetland College, UHI, Shetland, UK

EDITORIAL BOARD

M. COCK, *Roscoff Marine Station, France*
N. DE VOOGD, *Netherlands Biodiversity Center, The Netherlands*
P. G. H. EVANS, *Sea Watch Foundation, UK*
M. FROST, *Marine Biological Association of the United Kingdom, UK*

C. HAUTON, *University of Southampton, UK*
D. M. PATERSON, *University of St Andrews, UK*
D. POWER, *University of the Algarve, Portugal*
H. SOLO-GABRIELE, *University of Miami, Florida, USA*

ASSOCIATE EDITORS

P. ANDERWALD, *Swiss National Park, Switzerland*
M. ARVEDLUND, *University of Copenhagen, Denmark*
J.A. BAEZA, *Smithsonian Marine Station, USA*
C.N. BIANCHI, *University of Genova, Italy*
J. CARTES, *Institut de Ciències del Mar de Barcelona, Spain*
B.K.K. CHAN, *Biodiversity Research Centre, Academia Sinica, Taiwan*
J. ELLIS, *Centre for Environment, Fisheries & Aquaculture Science (Cefas), UK*
M.R. ELPHICK, *Queen Mary University of London, UK*
C. FRID, *Griffith University, Australia*
S. FOWLER, *Save our Seas Foundation*
N. HICKS, *Scottish Association for Marine Science, UK*
J.G. HIDDINK, *Bangor University, UK*
M.Y. HU, *University of Kiel, Germany*
V. LAPTIKHOVSKY, *Falklands Islands Fisheries Department, UK*
M. LOUIS, *University of St Andrews, UK*

F. MALTAGLIATI, *University of Pisa, Italy*
T. MOENS, *University of Ghent, Belgium*
J.A. RAVEN, FRS, *University of Dundee, UK*
M.M. RIVADENEIRA, *Universidad Católica del Norte, Chile*
J.M. RUIZ, *Universidade da Coruña, Spain*
M. RUSSELL, *Villanova University, PA, USA*
A. SCHULZE, *Texas A&M University, USA*
M. STUMPP, *Helmholtz Centre for Ocean Research Kiel, Germany*
J. TAYLOR, *University of Salford, UK*
D. THIELTGES, *NIOZ Royal Netherlands Institute for Sea Research; Utrecht University, Netherlands*
P. THOR, *Norwegian Polar Institute, Norway*
O. S. WANGENSTEEN, *University of Barcelona, Spain*
D. WILCOCKSON, *Aberystwyth University, UK*
N. WHITELEY, *School of Biological Sciences, Bangor, UK*

Address all correspondence to: Journal of the Marine Biological Association, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK. (Tel: +44 (0) 1752 426493; e-mail: journal2@MBA.ac.uk)

EDITORIAL POLICY

The Journal of the Marine Biological Association UK (JMBA) is an international journal, publishing original research and reviews on all aspects of marine biology, to support the aims of the MBA. The topics of present interest for JMBA are:

- Marine ecology, behaviour and fisheries;
- Biodiversity and population studies of marine ecosystems, especially potential impacts of global warming, ocean acidification and climate change on ecosystem resilience;
- Physiology, biochemistry, genetics and molecular biology of marine organisms, including microbiology, particularly related to the integrative ecophysiology of marine organisms;
- Taxonomic syntheses, including molecular phylogenies;
- Morphology, life history and developmental biology of marine organisms, especially model systems;
- Chemical and physical oceanography, as directly relevant to marine biology;
- Marine environmental health, and in particular its relationship to human health and well-being.

In addition to papers describing original research, the journal will also publish short reviews and original viewpoints on topics of current marine biological interest.

Papers describing work involving experimental procedures on living animals will be published only if they comply with the legal requirements of the UK Home Office. In the case of species not covered by the current law, papers will be published only if it is judged that the experiments have been conducted in a humane manner and adequate precautions taken to minimize stress.

Authors may like to know that papers published in the *JMBA* are covered by the following abstracting or indexing services: *Animal Breeding Abstracts, ASEA, Biological Abstracts, Biological and Agricultural Index, Chemical Abstracts, Current Advances in Ecological Sciences, Current Contents, Current Titles in Oceanography, FISHLIT, Geological Abstracts, GeoRef, Helminthological Abstracts, Lead Abstracts, Nutrition Abstracts, Oceanic Abstracts, Selected Water Resources Abstracts, Zinescan.*

SUBSCRIPTIONS

The *JMBA-Journal of the Marine Biological Association of the United Kingdom* (print ISSN 0025-3154; electronic ISSN 1469-7769) is published eightfold in February, March, May, June, August, September, November and December. The 2019 subscription price (excluding VAT) of a volume, which includes print only is £1570 (US \$2513 in USA, Canada and Mexico), print and online access, is £1778 (US \$2844 in USA, Canada and Mexico). The online-only price available to institutional subscribers is £1349 (US \$2153 in USA, Canada and Mexico).

Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent or direct to the publisher: Cambridge University Press, Journals Fulfillment Department, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK, or in the USA, Canada and Mexico, to Cambridge University Press, 1 Liberty Plaza, Floor 20,

New York, NY 10006, USA. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from: Kinokuniya Company Ltd, PO Box 55, Chitose, Tokyo 156, Japan.

Periodical postage paid at New York, NY, and at additional mailing offices. **Postmaster:** send address changes in USA, Canada and Mexico to *Journal of the Marine Biological Association*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994-2133, USA.

Claims for missing issues should be made immediately on receipt of the subsequent issue.

COPYRIGHT/PHOTOCOPYING

The journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. Organizations in the USA which are also registered with CCC may therefore photocopy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to CCC of the per-copy fee of \$16.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0025-3154/2020.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19104, USA, is authorized to supply single photocopies of separate articles for private use only. Organizations authorized by the UK Copyright Licensing Agency may also photocopy material subject to the usual conditions. For all other use, permission should be sought from Cambridge or the American branch of Cambridge University Press. *Microfilm copies* of back numbers are available from University Microfilms International, 300 North Zeeb Road, MI 48106-1346, USA.

No part of this publication may otherwise be reproduced, stored or distributed by any means without permission in writing from Cambridge University Press, acting for the copyright holder.

Cover image: One of many hard-shell turtles found stranded around the UK and Ireland.

©2020 Marine Biological Association of the United Kingdom
(Registered Charity no. 1155893)

Information on the JMBA

ELECTRONIC ACCESS

JMBA: Journal of the Marine Biological Association of the United Kingdom is one of the titles included on Cambridge Core which can be found at:

<http://cambridge.org/MBI>

Further information on this and on other Press titles can be found at
<http://www.cambridge.org/core>