



VOL. 90, NO. 5 AUGUST 2010

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: P. DANDO EXECUTIVE EDITOR: A. PULSFORD

Marine Biological Association of the United Kingdom, UK

ASSOCIATE EDITORS

- C.N. BIANCHI, *University of Genova, Italy*
J. CARTES, *Institut de Ciències del Mar de Barcelona, Spain*
B.K.K. CHAN, *Research Centre for Biodiversity Academia Sinica, Taiwan*
T-Y. CHAN, *Institute of Marine Biology, National Taiwan Ocean University; Taiwan ROC*
B. BETT, *National Oceanography Centre, UK*
J. ELLIS, *Centre for Environment, Fisheries and Aquaculture Science (CEFAS), UK*
P.G.H. EVANS, *University of Bangor, UK*
A. GEBRUK, *PP Shirshov Institute of Oceanology, Russia*
P.A. HENDERSON, *Pisces Conservation, Southampton, UK*
J.G. HIDDINCK, *University of Bangor, UK*
D. JOLLIVET, *Roscoff Marine Laboratory, France*
W. J. LANGSTON, *Marine Biological Association of the United Kingdom, UK*
V. LAPTIKHOVSKY, *Falklands Dept. of Fisheries, Falkland Islands*
J. LONG, *San Diego State University, Department of Biology, USA*
C. MACLEOD, *University of Aberdeen, UK*
T. MOENS, *Ghent University, Belgium*
P.D.R. MÖLLER, *Natural History Museum of Denmark*
K. NAGASAWA, *Hiroshima University, Japan*
B. OKAMURA, *Natural History Museum, London, UK*
J.C. PARTRIDGE, *University of Bristol, UK*
G. PIERCE, *University of Aberdeen, UK*
P.S. RAINBOW, *Natural History Museum, London, UK*
J.A. RAVEN, *FRS, University of Dundee, UK*
M.M. RIVADENEIRA, *Universidad Católica del Norte, Larrondo 1281, Coquimbo, Chile*
J.M. RUIZ, *Universidade da Coruña, Spain*
R.R. STRATHMANN, *Friday Harbor Laboratories, USA*
M. THIEL, *Universidad Católica del Norte, Chile*
M.C. THORNDYKE, *Kristineberg Marine Research Station, Sweden*
C.D. TROWBRIDGE, *Oregon State University, USA*
R. VAN SOEST, *Zoological Museum of the University of Amsterdam, The Netherlands*
J.S. WROBLEWSKI, *Memorial University of Newfoundland, Canada*

Address all correspondence to: The Executive Editor, Journal of the Marine Biological Association, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK. (Tel: +44 (0) 1752 633100; Fax: +44 (0) 1752 633102; e-mail: journal@mba.ac.uk)

EDITORIAL POLICY

The *JMBA* is an international journal which publishes papers on all aspects of marine biology. Papers should report the results of original research and must not have been published, or be under consideration for publication elsewhere. Papers should be in the form of original research, reviews or short communications. All papers will be rigorously refereed by international experts and subject to appropriate selection and prioritization. Contributions from all disciplines will be considered but the primary topics covered are: (a) ecology, behaviour and fisheries; (b) physiology, ecotoxicology and biochemistry; (c) molecular, microbiology and genetics; (d) oceanography, satellite imagery and modelling. Any author wishing to write a review should, in the first instance, send a proposal to the Executive Editor for consideration by the scientific editorial group.

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, ZinSCAN*.

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 2010 subscription price (excluding VAT) of a volume, which includes print only is £858 (US \$1456 in USA, Canada and Mexico), print and online access, is £988 (US \$1710 in USA, Canada and Mexico). The online-only price available to institutional subscribers is £820 (US \$1400 in USA, Canada and Mexico). Single parts are £118 (US \$200 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, The Edinburgh Building, Shaftesbury Road, Cambridge, CB2 8RU, UK, or in the USA, Canada and Mexico, to Cambridge University Press, Journal Fulfillment Department, 100 Brook Hill Drive, West Nyack, New York, 10994-2133, 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.

Periodicals 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 0025-3154/2007.

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 illustration: The grey seal, *Halichoerus grypus*, on the coast of Cornwall, UK. Photograph by Ruth Leeney

©2010 Marine Biological Association of the United Kingdom
(Registered Charity no. 226063)

Information on the JMBA

ELECTRONIC ACCESS

JMBA: Journal of the Marine Biological Association of the United Kingdom is one of the titles included in the Cambridge Journals Online service which can be found at: <http://journals.cambridge.org>
Further information on this and on other Press titles can be found at <http://journals.cambridge.org/> or <http://www.cambridge.org/>