

The International Journal of Conservation

ISSN 0030-6053 Fauna & Flora International A company limited by guarantee registered in England 2677068 Registered Charity 1011102

A registered 501(c)(3) non-profit organization EIN #04-2730954 in the United States of America

A non-profit charitable institution ABN 75132715783 in Australia

FFI, 4th Floor, Jupiter House, Station Road, Cambridge, CB1 2JD, UK Tel: +44 1223 571000; Fax: +44 1223 461481

E-mail: info@fauna-flora.org http://www.fauna-flora.org

FFI USA, 1720 N Street, NW, Washington, DC 20036, USA Tel: +1 202 375 7766; E-mail katie.frohardt@fauna-flora.org

FFI Australia, PO Box R697, Royal Exchange, NSW 1225, Australia Tel: +61 39416 5220; E-mail ffiaustralia@fauna-flora.org

Editor

Dr Martin Fisher, FFI, UK

Editorial Assistants

Elizabeth Allen, FFI, UK Nikki Burton, FFI, UK

Senior Editors

Professor Bill Adams University of Cambridge, UK Professor Andrew Balmford, FRS University of Cambridge, UK

Dr Porter P. Lowry II Missouri Botanical

Garden, USA and France

Dr Mike Maunder Florida International

University, USA

Dr Jeffrey A. McNeely IUCN — The World Conservation Union, Switzerland Professor E. J. Milner-Gulland Imperial

College London, UK

Dr John G. Robinson Wildlife Conservation Society, USA

Professor William Sutherland University

of Cambridge, UK

International Board of Editors

Dr Elizabeth L. Bennett USA Dr Robert K. Bonde USA

Dr Katrina Brown UK

Professor Neil Burgess Denmark

Dr Robert H. Cowie USA Dr Jenny Daltry France

Dr Brendan Fisher USA

Professor Brendan J. Godley UK

Professor Rhys Green UK

James Igoe USA

Professor Zhigang Jiang China

Dr K. Ullas Karanth India

Dr Gustavo Kattan Colombia

Professor Sandra Knapp UKAshish Kothari *India*

Dr Kathy MacKinnon UK

Dr David Mallon UK

Dr Charudutt Mishra India and USA

Professor Yaa Ntiamoa-Baidu *Ghana*

Dr David Obura Kenya Sara Oldfield UK

Professor Hugh Possingham Australia

Dr Kent H. Redford USA

Dr Jon Paul Rodriguez Venezuela

Dr Anthony B. Rylands USA

Dr Philip Seddon New Zealand

Dr Noah Sitati Kenya

Dr Bob Smith UK

Dr Paul Smith UK

Dr Rashid Sumaila Canada

Dr Matt Walpole UK

Dr Sven Wunder Brazil

Fauna & Flora International **Patron**

Her Majesty The Queen

President

Lindsay Bury

Vice Presidents

Baroness Amos

Sir David Attenborough, OM, FRS Professor David Bellamy, OBE

The Lord Browne of Madingley, FR Eng

Field Marshal Sir John Chapple, GCB,

CBE, DL

Dame Judi Dench

Dr Lee Durrell

Stephen Fry

Rupert Goodman

Edward Hoare

Professor Frederick Kayanja

Professor Jonathan Kingdon

HRH Princess Laurentien of the

Netherlands

Rove McManus Sir Mark Moody-Stuart

Dr Lisbet Rausing

Hugh Sloane

Jon L. Stryker

Dr Charlotte Uhlenbroek

The Rt Hon Baroness Young of Old Scone

Council

Chair Andrew Sykes

Vice Chair Professor Paul Racey

Treasurer Philip Prettejohn

Chief Executive Officer Mark Rose

Virginia Drabbe-Seemann

Stephen Georgiadis

Dr Charlotte Grezo

Dr Sandra Knapp

Professor Nigel Leader-Williams

Philip Merricks, MBE, DL

Professor E.J. Milner-Gulland

Professor Callum Roberts Diana van de Kamp

Charles Whitbread

John Wotton

US Board of Directors

Chair Melissa Shackleton Dann

Vice Chair Clea Newman Soderlund

Treasurer C. Jonathan Fischer

Secretary Dorette Louise Fleischmann

Virginia M. Busch

Marc I. Ebbin

Thomas S. Foster

Blaine T. Phillips

Mark Rose

Beth Ann Ruoff

Amelia Salzman

Charles C. Savitt

Victoria Stack

Karen B. Winnick

Anita Winsor-Edwards

Australian Board of Directors

Chair Kevin Skelton

Secretary John Taberner

Hon. Treasurer Michael Forsdick

Lisa Gay

Tim King

Mark Rose

Deborah Snelson

Luca Tacconi

Subscriptions Oryx (ISSN 0030-6053) is published four times a year (one volume per annum) in January, April, July, and October. The 2012 subscription price (excluding VAT) of a volume, which includes print and electronic access, is £461.00 (US \$830.00 in USA, Canada and Mexico). The electronic-only price available to institutional subscribers is £383.00 (US \$686.00 in USA, Canada and Mexico).

Orders, which must be accompanied by payment, may be sent to any book seller, 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: Journals Fulfillment Department, Cambridge University Press, 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 members should provide their VAT registration number. Japanese prices for institutions (including ASP delivery) are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo 156, Japan. Prices include delivery by air. Periodicals postage paid at New York, NY, and at additional mailing offices. Postmaster: send address changes in USA, Canada and Mexico to: Oryx, 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 issues.

FFI Member Subscription Membership of Fauna & Flora International starts from £40 a year for concessions and £75 for other members (or equivalent price in dollars/euros). For more information about FFI membership visit http://www.fauna-flora.org/membership. Enquiries about back issues for members should be addressed to the Membership Secretary (members@faunaflora.org) at FFI.

Back volumes Copies of the current volume and two previous volumes can be obtained from Cambridge University Press at the above address. Requests for previous volumes should be directed to the Membership Secretary (members@ fauna-flora.org) at FFI.

Copyright and Permissions This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. Organizations in the USA who are also registered with C.C.C. may therefore photocopy material (beyond the limits permitted by Section 107 and 108 of U.S. Copyright law) subject to payment to C.C.C. of the per-copy fee of \$16.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0030-6053/2012 \$16.00. 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 copy material subject to the usual conditions. For all other use, permission should be sought from Cambridge University Press.

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.

Internet Access This journal is included in the Cambridge Journals Online service which can be found at: http://journals.cambridge.org For further information on other Press titles access http://uk.cambridge.org or http://us.cambridge.org

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-government, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.