



Cover

Source: The Auk, 131(4)

Published By: American Ornithological Society

URL: <https://doi.org/10.1642/auk.2014.131.4.cover>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to

Mission and Scope

The Auk: Ornithological Advances is an international, peer-reviewed journal that publishes original research and scholarship advancing the fundamental scientific knowledge of bird species and broad biological concepts (e.g., ecology, evolution, behavior, physiology, genetics) through studies of bird species. Articles often introduce or employ innovative empirical and theoretical approaches and analyses.

Topics covered in the journal include:

- Evolutionary history and paleontology
- Systematics and nomenclature
- Behavioral ecology
- Foraging strategies and tactics
- Population biology and ecology
- Molecular ecology
- Community and landscape ecology
- Migration and orientation
- Spacing patterns and habitat use
- Genetics and genomics
- Epigenetics, and evolutionary development
- Physiology and biochemistry
- Morphology and anatomy
- Integrative and cross-disciplinary studies
- Theoretical and methodological advances
- Thematic reviews and opinion pieces

Joint Publishing Venture

The American Ornithologists' Union and the Cooper Ornithological Society have redefined and are jointly publishing their peer-reviewed, international journals of ornithology beginning in 2014. *The Auk* has become *The Auk: Ornithological Advances* and focuses on basic ornithological science. *The Condor* has become *The Condor: Ornithological Applications* and focuses on applied ornithological study. The redefined missions create an opportunity for the journals to work together to publish the best science in basic and applied ornithology and to build on their long histories as top journals in the field of avian biology.

The Auk: Ornithological Advances and *The Condor: Ornithological Applications* are managed by the Central Ornithology Publication Office (COPO), the joint publication management office of the American Ornithologists' Union and the Cooper Ornithological Society.



The Auk

Ornithological Advances

Volume 131 Number 4 October 2014



The Auk: Ornithological Advances

Volume 131, Number 4, Pages 457-788

October 2014

Editor-in-Chief: Mark E. Hauber

INTERNATIONAL JOURNAL OF THE AMERICAN ORNITHOLOGISTS' UNION



The Auk Ornithological Advances

INTERNATIONAL JOURNAL OF THE AMERICAN ORNITHOLOGISTS' UNION
www.aoucospubs.org

www.aou.org

EDITOR-IN-CHIEF Mark E. Hauber

Hunter College and the Graduate Center, The City University of New York, mark.hauber@hunter.cuny.edu

EDITORS Kimberly Bostwick, ksbostwick@icloud.com

James S. Sedinger, University of Nevada Reno, jsedinger@cabnr.unr.edu

Managing Editor: Kathleen E. Erickson, aoucospubs@gmail.com, (415) 435-1604, Fax: (707) 559-5030

Assistant Managing Editor: Mark C. Penrose, aoucospubs@gmail.com

Copyeditors: Richard Earles, Janice Faaborg, Scott W. Gillihan, Thalia Sachtleben

Abstract Translators: Carlos Daniel Cadena Ordoñez, Jessica Eberhard, Lucio R. Malizia, Karl S. Mokross, César Sánchez, Hélène Senechal

Central Ornithology Publication Office Coordinator: Bonnie S. Bowen, bonnie.bowen@gmail.com

ASSOCIATE EDITORS

Lauryn Benedict, University of Northern Colorado

Camille Bonneaud, University of Exeter

Melissa Bowlin, University of Michigan-Dearborn

Luke K. Butler, The College of New Jersey

Bruce Byers, University of Massachusetts Amherst

C. Daniel Cadena, Universidad de los Andes

Phillip Cassey, The University of Adelaide

Christopher J. Clark, University of California Riverside

Robert L. Curry, Villanova University

Donald Dearborn, Bates College

Mark E. Deutchlander, Hobart and William Smith Colleges

Stephen J. Dinsmore, Iowa State University

Jack Dumbacher, California Academy of Sciences

Jennifer Gee, James San Jacinto Mountains Reserve

Sharon Gill, Western Michigan University

Tomáš Grim, Palacký University

D. Caldwell Hahn, USGS Patuxent Wildlife Research Center

Thomas P. Hahn, University of California Davis

Stefanie Ismar, GEOMAR Helmholtz Center for Ocean Research Kiel

Douglas H. Johnson, USGS Northern Prairie Wildlife Research Center

Jason Jones, Tetra Tech EBA

Jeff Kelly, University of Oklahoma

David Koons, Utah State University

David Lahti, Queens College, City University of New York

Adam Z. Lendvai, Virginia Tech

Catherine Lindell, Michigan State University

Bernard Lohr, University of Maryland, Baltimore County

Elizabeth A. MacDougall-Shackleton, Western University-Canada

Gerald Mayr, Senckenberg Research Institute Frankfurt

Bill Monahan, National Park Service Inventory & Monitoring Program

Troy G. Murphy, Trinity University

Paul M. Nolan, The Citadel (Military College of South Carolina)

Raul Ortiz-Pulido, Universidad Autónoma del Estado de Hidalgo

Sara Oyler-McCance, USGS Fort Collins Science Center

Juan L. Parra, Universidad de Antioquia

Wendy L. Reed, North Dakota State University

Christina Riehl, Harvard University

James W. Rivers, Oregon State University

Rebecca J. Safran, University of Colorado Boulder

Anna W. Santure, The University of Auckland

Terry Shaffer, USGS Northern Prairie Wildlife Research Center

Frederick H. Sheldon, Louisiana State University

Dave Shutler, Acadia University

Jill Soha, Duke University

Benjamin N. Taft, University of Wisconsin-Parkside

Andrea K. Townsend, University of California Davis

Elaina Tuttle, Indiana State University

Rachel Vallender, Canadian Wildlife Service

Eric Walters, Old Dominion University

L. LaReesa Wolfenbarger, University of Nebraska at Omaha

Book Review Editor: R. Todd Engstrom, Florida State University, engstrom@bio.fsu.edu, 13093 Henry Beadel Dr., Tallahassee, FL 32312

In Memoriam Editor: Edward Burt, Ohio Wesleyan University, ehburt@owu.edu

On the Cover: Breeding Cape Gannets (*Morus capensis*) attend to their solitary chicks, while mates are foraging at sea. Foragers may reduce feeding trips by 50% when using conspecifics as cues to orientate themselves toward a patch of food (see Thiebault et al. pp. 595–609). Photo credit: Ralf Mullers

Journal Information: *The Auk: Ornithological Advances* publishes original research and scholarship advancing the fundamental scientific knowledge of bird species and broad biological concepts (e.g., ecology, evolution, behavior, physiology, genetics) through studies of bird species. Appropriate topics include documentation, analysis, and interpretation of laboratory and field studies; theoretical or methodological developments; and reviews of information or ideas. Authors are encouraged to write papers from the perspective of general concepts and theories and to consider the relevance of their findings to taxa in addition to birds. Contributions are welcomed from around the world but must be written in English. *The articles in this journal reflect the research and opinions of the individual authors. As such, the articles do not necessarily reflect the opinions of the editors or any official policy of the American Ornithologists' Union.*

Submit manuscripts online at www.editorialmanager.com/auk. **Author instructions** are at www.aoucospubs.org/page/instructions.

Copying and permissions notice: To obtain rights and permission to reprint papers, figures, tables, etc., or parts thereof, previously published in *The Auk* and *The Auk: Ornithological Advances*, contact the Central Ornithology Publication Office (COPO) at aoucospubs@gmail.com.

Abstracting and indexing: Articles appearing in *The Auk: Ornithological Advances* are abstracted and indexed in the databases listed online at www.aoucospubs.org/page/mission.



The Auk: Ornithological Advances (ISSN 0004-8038, e-ISSN 1938-4254) is published online weekly by the American Ornithologists' Union at www.aoucospubs.org and is printed quarterly. Periodicals postage paid at Waco, TX, and at additional mailing offices. POSTMASTER: Send address changes to *The Auk: Ornithological Advances*, OSNA Business Office, 5400 Bosque Blvd., Suite 680, Waco, TX 76710; business@osnabirds.org. Printed quarterly by Allen Press on Forest Stewardship Council® certified paper.

The Auk: Ornithological Advances, Volume 131, Number 4, October 2014. ©2014 American Ornithologists' Union. All rights reserved.



THE AMERICAN ORNITHOLOGISTS' UNION

THE COUNCIL FOR 2014–2015

OFFICERS AND EDITORS

President: Scott M. Lanyon, *Department of Ecology, Evolution, and Behavior, University of Minnesota*, 1987 Upper Buford Circle, St. Paul, MN 55108, Layno001@umn.edu

President-Elect: Steven R. Beissinger, *Division of Ecosystem Science, University of California-Berkeley*, 130 Mulford Hall #3114, Berkeley, CA 94720, beis@berkeley.edu

Secretary: Andrew W. Jones, *Department of Ornithology, Cleveland Museum of Natural History*, 1 Wade Oval Drive, University Circle, Cleveland, OH 44106, ajones@cmnh.org

Treasurer: James R. Herkert, *Illinois Department of Natural Resources*, One Natural Resources Way, Springfield, IL 62702, james.herkert@illinois.gov

Editor-in-Chief of *The Auk: Ornithological Advances*: Mark E. Hauber, *Department of Psychology, Hunter College, City University of New York*, 628C Hunter North, 695 Park Avenue, New York, NY 10021, mark.hauber@hunter.cuny.edu

Editor of *Ornithological Monographs*: Michael L. Morrison, *Wildlife and Fisheries Sciences, Texas A&M University*, 210 Nagle Hall, MS 2258, College Station, TX 77843, mlmorrison@ag.tamu.edu

Executive Director: Melinda Pruett-Jones, *The Field Museum*, 1400 S. Lake Shore Drive, Chicago, IL 60605, aouexec@aou.org

Business Manager: Scott W. Gillihan, 5405 Villa View Drive, Farmington, NM 87402, aoubusinessmanager@gmail.com

ELECTIVE COUNCILORS

2015: Daniel R. Ardia, Maria Del Coro Arizmendi, Rebecca T. Kimball, Jorge L. Perez-Eman

2016: David N. Bonter, Kevin J. Burns, Deborah M. Finch, Patricia J. Heglund

2017: Colleen M. Handel, James W. Rivers, Rebecca J. Safran, David W. Winkler

LIVING PAST PRESIDENTS

Susan M. Haig (2012–2014), John Faaborg (2010–2012), Edward H. Burtt, Jr. (2008–2010), Erica H. Dunn (2006–2008), James A. Kushlan (2004–2006), Fred Cooke (2002–2004), John W. Fitzpatrick (2000–2002), Frank B. Gill (1998–2000), Richard C. Banks (1994–1996), Brina Kessel (1992–1994), Frances C. James (1984–1986), Wesley E. Lanyon (1976–1978)

MEMBERSHIP

Persons interested in birds are invited to join the American Ornithologists' Union. Regular membership costs \$75 per year; student memberships are \$28. Membership is \$28 for persons in all countries except the United States, Canada, Israel, Japan, Australia, New Zealand, and the following Western European countries: Iceland, Norway, Sweden, Finland, Denmark, Germany, The Netherlands, Belgium, Luxembourg, France, the United Kingdom, Ireland, Switzerland, Austria, Italy, Spain, and Portugal. All members receive access to the online version of *The Auk: Ornithological Advances* and the bimonthly *Ornithological Newsletter*. Quarterly print versions of *The Auk: Ornithological Advances* can be ordered by members for \$30/year. A life membership is \$2,600, paid in one sum or four annual installments of \$650. Individuals may join, renew memberships, and report changes of address through the Ornithological Societies of North America (OSNA): www.osnabirds.org; business@osnabirds.org; 5400 Bosque Blvd., Suite 680, Waco, TX 76710. Gifts of any amount for the Endowment Fund are welcome and should be sent to AOU, c/o Schneider Group, 5400 Bosque Blvd., Suite 680, Waco, TX 76710. Gifts to the AOU are tax-deductible to the extent permitted by law.

INSTITUTIONAL SUBSCRIPTIONS

The Ornithological Societies of North America (OSNA) handles institutional subscriptions: (254) 399-9636, business@osnabirds.org. See www.osnabirds.org for single-issue and subscription orders, claims information, and mail dates. Domestic claims for nonreceipt of issues should be made within 90 days of the mail date; overseas claims within 180 days.

The Auk: Ornithological Advances, Volume 131, Number 4, October 2014. ©2014 American Ornithologists' Union. All rights reserved.