

## Cover

Source: The Auk, 132(1)

Published By: American Ornithological Society

URL: <https://doi.org/10.1642/auk.2014.132.1.cover>

---

The BioOne Digital Library (<https://bioone.org/>) provides worldwide distribution for more than 580 journals and eBooks from BioOne's community of over 150 nonprofit societies, research institutions, and university presses in the biological, ecological, and environmental sciences. The BioOne Digital Library encompasses the flagship aggregation BioOne Complete (<https://bioone.org/subscribe>), the BioOne Complete Archive (<https://bioone.org/archive>), and the BioOne eBooks program offerings ESA eBook Collection (<https://bioone.org/esa-ebooks>) and CSIRO Publishing BioSelect Collection (<https://bioone.org/csiro-ebooks>).

---

BioOne is an innovative nonprofit that sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common

### 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 132 Number 1 January 2015



The Auk: Ornithological Advances

Volume 132, Number 1, Pages 1–320

January 2015

Editor-in-Chief: Mark E. Hauber

Jointly published by the American Ornithologists' Union and the Cooper Ornithological Society





# The Auk Ornithological Advances

## 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, ksostwick@icloud.com

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

**Managing Editor:** Kathleen E. Erickson, aoucpubs@gmail.com, (415) 435-1604

**Assistant Managing Editor:** Mark C. Penrose, aoucpubs@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

### 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

Donald Dearborn, Bates College

Mark E. Deutschlender, 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:** Jay Mager, Ohio Northern University, j-mager@onu.edu

**In Memoriam Editor:** Edward Burtt, Ohio Wesleyan University, ehburtt@owu.edu

**On the Cover:** An adult Virginia Rail (*Rallus limicola*) overlooking nesting habitat at Pleasant Lake, Maine, USA. This species responds to the threat of flooding by adaptively adding materials to the nest (see Robertson and Olsen pp. 37–45). Photo credit: Jonathan D. Mays

**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 or the Cooper Ornithological Society.*

**Submit manuscripts** online at [www.editorialmanager.com/auk](http://www.editorialmanager.com/auk). **Author instructions** are at [www.aoucpubs.org/page/instructions](http://www.aoucpubs.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 [aoucpubs@gmail.com](mailto:aoucpubs@gmail.com).

**Abstracting and indexing:** Articles appearing in *The Auk: Ornithological Advances* are abstracted and indexed in the databases listed online at [www.aoucpubs.org/page/mission](http://www.aoucpubs.org/page/mission).



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



# 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, [lanyo001@umn.edu](mailto:lanyo001@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](mailto: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](mailto:ajones@cmnh.org)

**Treasurer:** James R. Herkert, *Illinois Department of Natural Resources*, One Natural Resources Way, Springfield, IL 62702, [james.herkert@illinois.gov](mailto: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](mailto: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](mailto:mlmorrison@ag.tamu.edu)

**Executive Director:** Melinda Pruett-Jones, *The Field Museum*, 1400 S. Lake Shore Drive, Chicago, IL 60605, [mpruettjones@gmail.com](mailto:mpruettjones@gmail.com)

**Business Manager:** Scott W. Gillihan, 5405 Villa View Drive, Farmington, NM 87402, [aoubusinessmanager@gmail.com](mailto:aoubusinessmanager@gmail.com)

### ELECTIVE COUNCILORS

**2015:** Daniel R. Ardia, Maria Del Coro Arizmendi, Rebecca T. Kimball, Jorge L. Pérez-Emán

**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](http://www.osnabirds.org); [business@osnabirds.org](mailto: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](mailto:business@osnabirds.org). See [www.osnabirds.org](http://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.