



BioOne COMPLETE

Cover

Source: The Auk, 133(2)

Published By: American Ornithological Society

URL: <https://doi.org/10.1642/auk.2016.133.2.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 133 Number 2 April 2016

The Auk: Ornithological Advances

Volume 133, Number 2, Pages 129–324

April 2016



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

Journals Director: Kathleen E. Erickson, aoucospubs@gmail.com, (415) 435-1604

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

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

Translators: Carlos Daniel Cadena Ordoñez, Lucio R. Malizia, Karl S. Mokross, Hélène Senechal

ASSOCIATE EDITORS

Zachary Aidala, Bloomfield College
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
James Dale, Massey University
Donald Dearborn, Bates College
Mark E. Deutchlander, Hobart and William Smith Colleges
Jack Dumbacher, California Academy of Sciences
Megan D. Gall, Vassar College
Ismael Galván, Doñana Biological Station - CSIC
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
David Koons, Utah State University
David Lahti, Queens College, The City University of New York
Adam Z. Lendvai, Virginia Tech
Catherine Lindell, Michigan State University
Bernard Lohr, University of Maryland, Baltimore County
Kathleen S. Lynch, Hofstra University
Elizabeth A. MacDougall-Shackleton, Western University-Canada
Gerald Mayr, Senckenberg Research Institute Frankfurt
Bill Monahan, USDA Forest Service
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
Stephen Pruett-Jones, University of Chicago
Wendy L. Reed, North Dakota State University
Christina Riehl, Harvard University
James W. Rivers, Oregon State University
Kristen C. Ruegg, University of California Santa Cruz
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
Daniel B. Thomas, Massey University
Andrea K. Townsend, Hamilton College
Elaina Tuttle, Indiana State University
Rachel Vallender, Canadian Wildlife Service
Eric Walters, Old Dominion University
L. LaReesa Wolfenbarger, University of Nebraska at Omaha
Timothy F. Wright, New Mexico State University

Book Review Editor: Jay Mager, Ohio Northern University, j-mager@onu.edu

In Memoriam Editor: Ted Anderson, McKendree University, ted020@centurytel.net

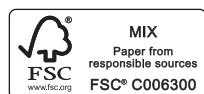
On the Cover: Adult male Great Bustard (*Otis tarda*) foraging on legumes, a preferred food source, in central Spain. Bravo et al. examined the dietary divergence in this most sexually size-dimorphic bird species (pp. 178–197). Photo credit: © Carlos Palacín

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. **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 and the Cooper Ornithological Society at www.aoucospubs.org. 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 AMERICAN ORNITHOLOGISTS' UNION

THE COUNCIL FOR 2015–2016

OFFICERS AND EDITOR

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

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: Rebecca T. Kimball, *Department of Biology, University of Florida*, 528 Bartram Hall, Gainesville, FL 32611, rkimball@ufl.edu

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

Executive Director: Melinda Pruett-Jones, 1400 S. Lake Shore Drive, Chicago, IL 60605, mpruettjones@gmail.com

ELECTIVE COUNCILORS

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

2018: Elizabeth P. Derryberry, Katie M. Dugger, Kevin E. Omland, Viviana Ruiz-Gutierrez

LIVING PAST PRESIDENTS

Susan M. Haig (2012–2014), John Faaborg (2010–2012), Edward H. Burt, 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)

STAFF

AOU Administrator: Crystal Ruiz, 1400 S. Lake Shore Drive, Chicago, IL 60605, aoubusinessmanager@gmail.com (312-665-7936)

AOU Membership Manager: Scott W. Gillihan, 5405 Villa View Drive, Farmington, NM 87402, aoumembership@gmail.com

MEMBERSHIP

Persons interested in becoming part of a diverse and inclusive community devoted to the scientific study and conservation of birds are invited to join the American Ornithologists' Union. Regular memberships are \$75 per year; a second Regular membership from the same household qualifies as a family member, for an additional \$28 per year; Early Professional memberships are \$45; Student memberships are \$28; Emeritus/Retired memberships are \$28; Special Countries memberships are \$28, designed for persons living in countries around the world (not offered to residents of 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); Life Memberships are \$2,600, paid in one sum or four annual installments of \$650. 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. 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.

SUPPORT THE AOU

AOU is grateful to receive contributions of any amount. Donations help support AOU's programs to advance ornithology as a profession and promote ornithologists at every career stage. Contributions may be sent to: AOU, 1400 S. Lake Shore Drive, Chicago, IL, 60605; or, can be made online through AOU's website, Americanornithology.org. Gifts to the AOU are tax-deductible to the full 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.