

Ecological Restoration

Volume 37 ✎ Number 4 | December 2019

Informative Diversity Metrics for Tallgrass Prairie Restorations

EDITORIAL

Seeing Through an Empty Lot

Steven N. Handel

RESTORATION NOTES

Selecting High-dispersal Species for Precision Prairie Reconstruction on the Northwestern Great Plains

Peter Lesica and Stephen V. Cooper

Effects of Defoliation and Herbivore Exclosures on Growth and Reproduction of Transplanted Bunchgrass Seedlings

Justin M. Valliere

Habitat Restoration for Endemic Lizards in an Oilfield in Payunia, Argentina

Leandro M. Alvarez and Bárbara Guida-Johnson

ARTICLES

Genetic Diversity, Mating System, and Reproductive Output of Restored *Melaleuca acuminata* Populations are Comparable to Natural Remnant Populations

Melissa A Millar, Janet M Anthony, David J Coates, Margaret Byrne, Siegfried L Krauss, Matthew R Williams and Stephen D Hopper

Choosing Plant Diversity Metrics: A Tallgrass Prairie Case Study

Charlotte M. Reemts and James A. Eidson

Simulated Fire Season and Temperature Affect *Centaurea stoebe* Control, Native Plant Growth, and Soil (\pm)-catechin

Zachery T. Pitman and Todd A. Aschenbach

Use of Four Grassland Types by Small Mammal Species in Southern Minnesota

Jeff Port, Christine Crawford, Bethany Campbell, Rose Larson, Patty Lin-Celeste and Melody Walton

A Conceptual Planning Framework to Improve Integration of Reclamation with Site Remediation

Mark S. Laska and Alex Ireland



Ecological Restoration

Volume 37, Number 4



December 2019

- Editorial** 209
Seeing Through an Empty Lot
Steven N. Handel

RESTORATION NOTES

- Selecting High-dispersal Species for Precision Prairie Reconstruction on the Northwestern Great Plains 211
Peter Lesica and Stephen V. Cooper
- Effects of Defoliation and Herbivore Exclosures on Growth and Reproduction of Transplanted Bunchgrass Seedlings 213
Justin M. Valliere
- Habitat Restoration for Endemic Lizards in an Oilfield in Payunia, Argentina 217
Leandro M. Alvarez and Bárbara Guida-Johnson

ARTICLES

- Genetic Diversity, Mating System, and Reproductive Output of Restored *Melaleuca acuminata* Populations are Comparable to Natural Remnant Populations 222
Melissa A Millar, Janet M Anthony, David J Coates, Margaret Byrne, Siegfried L Krauss, Matthew R Williams and Stephen D Hopper
- Choosing Plant Diversity Metrics: A Tallgrass Prairie Case Study 233
Charlotte M. Reemts and James A. Eidson
- Simulated Fire Season and Temperature Affect *Centaurea stoebe* Control, Native Plant Growth, and Soil (\pm)-catechin 246
Zachery T. Pitman and Todd A. Aschenbach
- Use of Four Grassland Types by Small Mammal Species in Southern Minnesota 256
Jeff Port, Christine Crawford, Bethany Campbell, Rose Larson, Patty Lin-Celeste and Melody Walton
- A Conceptual Planning Framework to Improve Integration of Reclamation with Site Remediation 263
Mark S. Laska and Alex Ireland

ABSTRACTS

Climate Change	273	Propagation & Introduction	276
Coastal & Marine Communities	273	Reclamation, Rehabilitation, & Remediation	276
Ecological Design	274	Traditional and Local Knowledge	277
Ecological Literacy	274	Urban Restoration	277
Grasslands	274	Wetlands	277
Invasive & Pest Species	274	Wildlife Habitat Restoration	278
Lakes, Rivers, & Streams	275	Woodlands	278
Monitoring & Adaptive Management	275		

REVIEWS

Book Review

Protecting Pollinators: How to Save the Creatures that Feed our World <i>Jodi Helmer, reviewed by Michael Roswell</i>	280
--------------------------------------------------------------------------------------------------------------------------	-----

MEETINGS

281



Front Cover Feature: A hill-top remnant prairie at The Nature Conservancy's Clymer Meadow Prairie Preserve in Texas with pink American basketflower (*Centaurea americana*) and yellow claspingleaf coneflower (*Dracopis amplexicaulis*). Image credit: Charlotte Reemts

Back Cover Features:

Top: Roads and platforms supporting the oil and gas industry have left a matrix of disturbed patches across some protected areas. In the Payunia region of Argentina, Alvarez and Guida-Johnson constructed rock shelters at disturbed sites to examine whether these habitat alterations would increase lizard presence and abundance. Image credit: Leandro Alvarez

Middle: Flowering *Andropogon gerardii* adjacent to prairie restoration research plots at Pierce Cedar Creek Institute, Barry County, Michigan. Pitman and Aschenbach report that native grasses responded well to spring and summer burns targeting the invasive *Centaurea stoebe* (spotted knapweed). Image credit: Zachary Pitman

Bottom: Restoring California grasslands is challenging and techniques to improve transplanted bunchgrass productivity are needed. Although grazing and clipping may initially reduce plant growth, Valliere explores whether there are longer-term benefits from these treatments. His study tests the effects of defoliation on the compensatory growth of native California bunchgrass species by evaluating shoot mass and inflorescence count. Image credit: Justin Valliere

EDITORIAL BOARD

Scott Abella

Natural Resource Conservation LLC,
Boulder City, USA.

Steven I Apfelbaum

Applied Ecological Services, Wisconsin, USA.

James Aronson

Center for Conservation and Sustainable
Development, Missouri Botanical Garden,
St. Louis MO, USA.

Myla Aronson

Department of Ecology, Evolution and
Natural Resources, Rutgers University NJ, USA.

Nicholas A. Barber

Department of Biology, San Diego State University
San Diego, California, USA.

Paulette Bierzychudek

Department of Biology, Lewis & Clark College,
Portland OR, USA.

Andrea Borkenhagen

Advisian, Calgary, Alberta, Canada.

Peter Bowler

Department of Ecology and Evolutionary
Biology, University of California, Irvine, USA.

Lindsay Campbell

USDA Forest Service Northern Research Station,
NY, USA.

Robin L. Chazdon

Department of Ecology and Evolutionary
Biology, University of Connecticut, USA.

Francisco A. Comín Sebastián

Pyrenean Institute of Ecology-CSIC, Spain.

Michele de Sá Dechoum

Department of Ecology and Zoology,
Federal University of Santa Catarina,
Florianópolis, Santa Catarina, Brazil.

David Drake

Department of Forest and Wildlife Ecology,
University of Wisconsin–Madison, USA.

Bram Gunther

New York City Urban Field Station, New York
City Department of Parks & Recreation, Bayside,
New York, USA.

Jason Hall

National Oceanic and Atmospheric Administration's
Northwest Fisheries Science Center Mukilteo
Research Station, Seattle WA, USA.

Francine Hughes

Department of Life Sciences,
Anglia Ruskin University, Cambridge, UK.

Basil Iannone

School of Forest Resources and Conservation,
University of Florida, Gainesville FL, USA.

Michelle Johnson

New York City Urban Field Station, USDA Forest
Service, Bayside, New York, USA.

Holly Jones

Department of Biological Sciences,
Northern Illinois University, DeKalb IL, USA.

Kristen Kaczynski

Department of Geological and Environmental
Sciences at California State University, Chico
CA, USA.

Kristy King

Natural Areas Restoration & Management
Forestry, Horticulture & Natural Resources,
New York City Department of Parks &
Recreation, Long Island City, New York, USA.

Márcia C.M. Marques

Department of Botany, Universidade Federal do
Paraná, Curitiba, Brazil.

David Moreno-Mateos

Basque Center for Climate change–BC3,
Basque Country, Spain.

Andrew Rayburn

Independent Consulting Ecologist, Davis CA, USA.

Carrie Reinhardt Adams

Environmental Horticulture Department,
University of Florida, Gainesville, USA.

David J. Robertson

Livermore, CO, USA

Ted Shear

Department of Forestry and Environmental
Resources, North Carolina State University,
Raleigh NC, USA.

Greg Spyreas

Illinois Natural History Survey, USA.

Katharine Suding

Department of Ecology & Evolutionary Biology,
University of Colorado Boulder CO, USA.

Alan Unwin

School of Environmental and Horticultural
Studies, Niagara College, Canada.

Ricardo Viani

Dept. de Biotecnologia e Produção Vegetal e
Animal,
Federal University of São Carlos, São Paulo State,
Brazil.

Kiri Joy Wallace

Environmental Research Institute,
University of Waikato, Hamilton, New Zealand.

Dennis Whigham

Smithsonian Environmental Research Center, USA.

Ken Yocom

Department of Landscape Architecture,
University of Washington, USA.

Kathryn Yurkonis

Department of Biology, University of North
Dakota, Grand Forks, North Dakota, USA.

Luis Zambrano González

Biology Institute, National Autonomous
University of Mexico (UNAM), Mexico.

JOURNAL STAFF

Editor: Steven N. Handel

Associate Editor: Tabby Fenn

Managing Editor: Paulina A. Arancibia

Abstracts Editor: Elena S. Tartaglia

Abstracts Contributors: Elena S. Tartaglia and
Paulina A. Arancibia

Rutgers, The State University of New Jersey
School of Environmental and Biological
Sciences: *Robert M. Goodman, Executive Dean*
Society for Ecological Restoration: *Jim Hallett,*
Chair



Printed on 30% recycled text paper.

Ecological Restoration is published quarterly by the University of Wisconsin Press. © by the Board of Regents of the University of Wisconsin System. No part of this publication may be reproduced without the written consent of the publisher, University of Wisconsin Press. Requests for permission to reprint an article or illustration should be made directly to UW Press, 728 State Street, Suite 443, Madison, WI 53706-1428, permissions@uwpress.wisc.edu, er.uwpress.org.

Contributions are welcome. Authors should upload their materials through *Ecological Restoration's* submission website, which can be found at er.uwpress.org. Submission guidelines can be found at uwpress.wisc.edu/journals/journals/er_submissions.html.

Authorization to reproduce material from this journal, beyond one copy for personal use or that permitted by Sections 107 and 108 of U.S. Copyright Law, is granted for a fee. For fee schedule and payment information, contact www.copyright.com; The Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, 978/750-8400, Fax: 978/750-4470.

Ecological Restoration is indexed in Elsevier BIOBASE, AGRICOLA, and in CSA's Ecology databases.

Ecological Restoration is affiliated with the Society for Ecological Restoration, 1017 O St. NW, Washington, DC 20001, 202/299-9518, ser.org. Members of the Society for Ecological Restoration receive *Ecological Restoration* at a discounted rate. Please visit the UW Press Web site at uwpress.wisc.edu/journals for more information.

Ecological Restoration was founded at the University of Wisconsin–Madison Arboretum.

Advertising: Call 608/263-0534 for current rates. Advertisements or references to products by brandname or trademark do not imply an endorsement by the editors or publishers of this journal.

Ecological Restoration (ISSN 1522-4740, E-ISSN 1543-4079) is published quarterly by the University of Wisconsin Press, 728 State Street, Suite 443, Madison, WI 53706-1428. Periodicals postage paid at Madison WI and at additional mailing offices.

Subscriptions: Individual (please pre-pay), \$85 print and electronic, \$73 electronic only; \$43 students; \$218 businesses and nongovernmental organizations; libraries and government agencies, \$322 print and electronic, \$296 electronic only. Non-U.S. subscribers please add \$40 for foreign shipping. All correspondence regarding subscriptions, advertising, and related matters should be sent to Journals Division, 728 State Street, Suite 443, Madison, WI 53706-1428, USA; uwpress.wisc.edu/journals. Members of the Society for Ecological Restoration receive *Ecological Restoration* at a discounted rate.

Please visit our Web site at uwpress.wisc.edu/journals for more information.

POSTMASTER: Send address changes to *Ecological Restoration*, 728 State Street, Suite 443, Madison, WI 53706-1428.

Submissions

We welcome submissions to *Ecological Restoration* from any part of the world. Submissions should relate to the restoration of plants, animals, ecological communities, or landscapes. We understand ecological restoration to be a multidisciplinary and diverse effort and welcome manuscripts considering ecological, and social aspects of restoration, as well as political, economic, legal, and regulatory issues, and other subjects related to ecological restoration. Relevant topics also include techniques and tools for planning, site preparation, species introduction, undesired species control, and monitoring. Manuscripts dealing with plant or animal community composition or general ecology must relate the work explicitly to ecological restoration practice and theory. Similarly, material dealing with reclamation or rehabilitation in a broader sense, or with restoration for economic purposes—economic forestry, range management, waste disposal—must be connected to ecological restoration.

Material may be submitted for the following categories (listed as they are encountered in the Journal):

1. Perspectives
2. Restoration Notes (shorter items, < 1500 words describing project updates, events, innovative technologies, preliminary or unusual findings, thought-provoking concepts, imaginative solutions, commentary, policy reports, etc.)
3. Research articles or reviews on ecological restoration theory, experiments, socio-ecological linkages, education, restoration history, practice
4. Case studies (full length articles describing a particular restoration project or location and lesson learned)
5. Book, journal, website, or movie reviews

Authors of full-length articles or reviews should submit their material online at er.msubmit.net. Manuscripts must be submitted with a cover letter stating that the material has not been previously published, and has not been submitted elsewhere and will not be until a final decision has been reached by the editor. Questions about the online submission site, or general inquiries may be emailed to ERjournal@sebs.rutgers.edu.

Review and Editing Process

Manuscripts are reviewed externally by experts in the field. The process requires approximately four to six months. Restoration Notes are reviewed and edited in-house unless additional expertise is required to evaluate the submission.

Style

Practitioners of ecological restoration are both a core audience and source of contributions to *ER*. Contributors should use a straightforward style free of unnecessary technical terms and jargon. We prefer the active voice (for example, “We measured three trees” instead of “Three trees were measured”). Please see our Submission Guidelines at er.uwpress.org for more information.

Tables, Photos, and Illustrations

Table and Figure captions should include useful and detailed information, and should be independent of the text. Figures will be reproduced in black and white in the print version of *Ecological Restoration* (usually requiring higher contrast) and can be reproduced in color in the online version. We use color photos on the front and back covers of the journal and welcome submissions of eye-catching, informative, high-quality photographs.

Page Charges

Payment of \$50 per page is requested from authors with research grant or other institutional funds available to underwrite publication costs. Invoices will be sent after composition of pages. Authors with no grant or institutional funds do not need to pay publication costs. Ability to pay page charges is not a condition for acceptance of a manuscript.