

PARKS STEWARDSHIP FORUM



NATIONAL PARK SERVICE PALEONTOLOGY



Co-published by the [University of California, Berkeley](#), [Institute for Parks, People, and Biodiversity](#), and the [George Wright Society](#).

Parks Stewardship Forum explores innovative thinking and offers enduring perspectives on critical issues of place-based heritage management and stewardship. Interdisciplinary in nature, the journal gathers insights from all fields related to parks, protected/conserved areas, cultural sites, and other place-based forms of conservation. The scope of the journal is international. It is dedicated to the legacy of [George Meléndez Wright](#), a graduate of UC Berkeley and pioneer in conservation of national parks.

Parks Stewardship Forum is published through [eScholarship](#), an open-access publishing platform subsidized by the University of California and managed by the California Digital Library. Open-access publishing serves the missions of the Institute for Parks, People, and Biodiversity and the George Wright Society to share, freely and broadly, research and knowledge produced by and for those who manage parks, protected/conserved areas, and cultural sites throughout the world.

The journal continues *The George Wright Forum*, published 1981–2018 by the George Wright Society.

Parks Stewardship Forum is distributed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0) that allows others to copy, distribute, translate, adapt, and build upon original submissions to *Parks Stewardship Forum*, as long as they provide appropriate credit to the author(s) and do not use the submission for commercial purposes. Anyone who uses or redistributes the submission under this license must indicate any changes that were made, must link to the license, and cannot imply that the author endorses them or their use. More information about this license is available at <https://creativecommons.org/licenses/by-nc/4.0/>.

Some photos published in *Parks Stewardship Forum* are covered by other Creative Commons licenses, which can be found [here](#). From time to time *Parks Stewardship Forum* also reprints, with permission, previously published material. Such material is subject to its original copyright, as indicated.

Parks Stewardship Forum is published at <https://escholarship.org/uc/psf>. A version designed for online reading is also available at <https://parks.berkeley.edu/psf>.

PSF is designed by Laurie Frasier • lauriefrasier.com



On the cover of this issue

Stephen J. Godfrey (Calvert Marine Museum) excavating a fossil dolphin skull at George Washington Birthplace National Monument, March 16, 2020. [NATIONAL PARK SERVICE/VINCENT L. SANTUCCI](#)

[INSET](#) Artwork depicting the dolphin as it might have appeared in life. [TIM SCHEIRER/CALVERT MARINE MUSEUM](#)

EDITORIAL BOARD

Jonathan B. Jarvis, University of California, Berkeley,
Institute for Parks, People, and Biodiversity
Dr. Steven R. Beissinger, University of California,
Berkeley
Rolf Diamant, George Wright Society
Professor Holly Doremus, University of California,
Berkeley

EXECUTIVE DIRECTORS

Dr. Patrick Gonzalez, University of California, Berkeley,
Institute for Parks, People, and Biodiversity
David Harmon, George Wright Society

EDITORIAL STAFF

Dr. Rebecca Conard, Managing Co-editor
Dorothy A. Davis, Co-editor,
“The Photographer’s Frame”
Gary E. Davis, Co-editor,
“The Photographer’s Frame”
David Harmon, Managing Co-editor
Dr. Gary Machlis, Editor, “Verse in Place”

EDITORIAL & ADMINISTRATIVE OFFICE

George Wright Society
P.O. Box 65
Hancock, MI 49930-0065 USA
1.906.487.9722
psf@georgewright.org

CONTRIBUTING TO PARKS STEWARDSHIP FORUM

We welcome proposals for papers in PSF’s two main departments: “New Perspectives,” for non-peer-reviewed articles that will be evaluated solely by the journal’s editors; and “Advances in Research and Management,” for articles that will undergo formal peer review. We also invite proposals for “The Photographer’s Frame,” our regular feature in which contributors tell a compelling conservation story in photographs.

More information and manuscript submission guidelines: <https://www.georgewrightociety.org/psfsubmissions>

Berkeley Institute for Parks, People, and Biodiversity

The University of California, Berkeley, Institute for Parks, People, and Biodiversity advances science and solutions to halt climate change, conserve biodiversity, and improve the experience of nature for all. The Institute conducts new scientific research and helps managers and policymakers apply the results to conservation of ecosystems around the world, especially in national parks and other protected areas.

Public protection of land and water serves important roles for climate change resilience and carbon solutions, endangered species, tropical forests, health and well-being, education, thriving economies, Indigenous cultures, and environmental justice. For these critical issues and other emerging questions, the Institute connects field managers and government policymakers to the high-level interdisciplinary research capabilities of the University of California, Berkeley. Institute researchers also communicate science-based solutions to motivate public action and cultivate future conservation leaders. With new scientific insights, the Institute aims to advance meaningful progress for nature and people.

<https://parks.berkeley.edu>



The George Wright Society advances the scientific and cultural resource values of parks, protected and conserved areas, cultural sites, and other forms of place-based conservation. The Society promotes research and resource stewardship across disciplines; brings practitioners together to share their expertise; provides avenues of communication among scholars, researchers, educators, practitioners, and the public; and supports informed conservation decisions and management actions that embrace these values. By uniting people from many different backgrounds around a common passion for protecting Earth’s natural and cultural heritage, we create the collaboration needed to meet today’s greatest conservation challenges.

<https://www.georgewrightociety.org>



CONTENTS • VOLUME 40/1

POINTS OF VIEW



LETTER FROM WOODSTOCK

From Yosemite to Presidio: Everyone Welcomed

6 *Rolf Diamant*



CLIMATE CHANGE SOLUTIONS

Keeping Snow and Ice Frozen with Renewable Energy Solutions to Halt Climate Change

13 *Patrick Gonzalez*

25 **Origins and Innovations of Science in the US National Parks:
The 2023 Leopold Lecture at the University of California, Berkeley**

THEME ARTICLES

NATIONAL PARK SERVICE PALEONTOLOGY

Vincent L. Santucci and Justin S. Tweet, guest editors

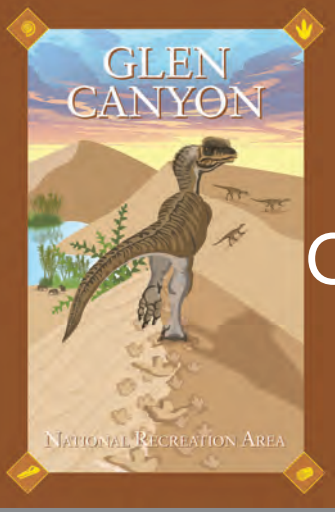
27 **The National Park System fossil record: Uncovering significant new paleontological discoveries through inventory, monitoring, research and museum curation**
Vincent L. Santucci, Justin S. Tweet, Christy Visaggi, and John-Paul M. Hodnett

39 **Ancient bat remains illustrate the role of caves as habitat anchors in the temporally dynamic landscape of the Grand Canyon**
Carol L. Chambers, Shawn Thomas, Vincent L. Santucci, Hattie Oswald, and Jason Ballensky

53 **Sharks in the dark: Paleontological resource inventory reveals multiple successive Mississippian Subperiod cartilaginous fish (Chondrichthyes) assemblages within Mammoth Cave National Park, Kentucky**
John-Paul M. Hodnett, Rickard Toomey, Rickard Olson, Kelli Tolleson, Richard Boldon, Jack Wood, Justin S. Tweet, and Vincent L. Santucci

69 **Incredible discoveries and devastation of paleontological resources in a changing world preserved at White Sands National Park**
David Bustos, Vincent L. Santucci, Daniel Odess, Patrick J. Martinez, and Clare J. Connelly

81 **Past, present, and future: A synthesis of paleontological resource monitoring and management at Badlands National Park**
Wayne A. Thompson and Ellen N. Starck



CONTENTS • VOLUME 40/1

Checking in on fossil sites: Advancing monitoring protocols and techniques for paleontological localities in National Park Service units
 91 *Aubrey M. Bonde, Vincent L. Santucci, and Torrey Nyborg*

How protecting shark teeth can lead to finding dolphins: George Washington Birthplace National Monument as a case study in developing and implementing paleontological resource monitoring
 103 *Justin S. Tweet and Vincent L. Santucci*

Research put into action: How a fossil inventory informed paleontological resource monitoring efforts preceding road construction at Theodore Roosevelt National Park
 115 *Charles Salcido, Justin S. Tweet, and Vincent L. Santucci*

The dinosaur-bearing rocks of Aniakchak National Monument and Preserve: A fossil resource of global interest
 127 *Anthony R. Fiorillo and Troy Hamon*

Microtomography of an enigmatic fossil egg clutch from the Oligocene John Day Formation, Oregon, USA, reveals an exquisitely preserved 29-million-year-old fossil grasshopper ootheca
 139 *Jaemin Lee, Nicholas A. Famoso, and Angela Lin*

Fossil woods of Yellowstone National Park
 181 *Elisabeth A. Wheeler*

New perspectives on NPS paleontological resource stewardship: Scientific, curatorial, and educational outcomes at Petrified Forest National Park
 197 *William G. Parker, Adam D. Marsh, Matthew E. Smith, Ben T. Kligman, Deborah E. Wagner, Phillip Varela, and Diana M. Boudreau*

Breaking out of the fishbowl: Integrating paleontological resource management and public engagement while inspiring stewardship through an open-door fossil preparation lab at Badlands National Park
 211 *Ed Welsh, Mary Carpenter, and Ellen Starck*

Updating conservation techniques for paleontology collections associated with Florissant Fossil Beds National Monument
 217 *Conni J. O'Connor, Elizabeth Burr, Catherine Cooper, and Herbert W. Meyer*



CONTENTS • VOLUME 40/1

Discovery, preservation, and protection of notable paleontological resources from Dinosaur National Monument, Utah and Colorado

243 *ReBecca Hunt-Foster*

Interdisciplinary approaches to reconciling legacy paleontological collections to advance discovery and improve resource management

257 *Lauren E. Parry and Erin E. Eichenberg*

The price of neglect: Revisiting Fossil Cycad National Monument (1922–1957)

271 *Vincent L. Santucci, Justin S. Tweet and Tim Connors*

ADVANCES IN RESEARCH AND MANAGEMENT

Health challenges of rangers—a planetary health workforce

284 *Francois Rerolle, Rohit Singh, Thomas Mascari, Hamera Aisha, Felipe Spina Avino, Osvaldo Barassi Gajardo, Melina Urh, Drew Mcvey, Mike Belecky, and William Moreto*

No longer news that’s fit to print? Climate change goes missing from national park newspapers

300 *Robert B. Lull and Wesley Wise*



THE PHOTOGRAPHER’S FRAME

Find hope with climate crisis triage

320 *Gary E. Davis and Dorothy A. Davis*



VERSE IN PLACE

Almost Human

330 *Peter Markus*