



Range-wide salamander densities reveal a key component of terrestrial vertebrate biomass in eastern North American forests

August 14, 2024

Characterizing the population density of species is a central interest in ecology. Eastern North America is the global hotspot for biodiversity of plethodontid salamanders, an inconspicuous component of terrestrial vertebrate communities, and among the most widespread is the eastern red-backed salamander, *Plethodon cinereus*. Previous work suggests population densities are high with significant geographic variation, but comparisons among locations are challenged by lack of standardization of methods and failure to accommodate imperfect detection. We present results from a large-scale research network that accounts for detection uncertainty using systematic survey protocols and robust statistical models. We analysed mark–recapture data from 18 study areas across much of the species range. Estimated salamander densities ranged from 1950 to 34 300 salamanders ha^{-1} , with a median of 9965 salamanders ha^{-1} . We compared these results to previous estimates for *P. cinereus* and other abundant terrestrial vertebrates. We demonstrate that overall the biomass of *P. cinereus*, a secondary consumer, is of similar or greater magnitude to widespread primary consumers such as white-tailed deer (*Odocoileus virginianus*) and *Peromyscus* mice, and two to three orders of magnitude greater than common secondary consumer species. Our results add empirical evidence that *P. cinereus*, and amphibians in general, are an outsized component of terrestrial vertebrate communities in temperate ecosystems.

Citation Information

Publication Year	2024
Title	Range-wide salamander densities reveal a key component of terrestrial vertebrate biomass in eastern North America

DOI	10.1098/rsbl.2024.0033
Authors	Evan H. Campbell Grant, Jillian Elizabeth Fleming, Elizabeth Bastiaans, Adrienne Brand, Jacey Brooks, Catherine Devlin, Kristen Epp, Matt Evans, M. Caitlin Fisher-Reid, Brian Gratwicke, Kristine Grayson, Natalie Haydt, Raisa Hernández-Pacheco, Daniel J. Hocking, Amanda Hyde, Michael Losito, Maisie MacKnight, Tanya Matlaga, Louise Mead, David J. Munoz, William B. Peterman, Veronica Puza, Charles Shafer, Sean Sterrett, Chris Sutherland, Lily M. Thompson, Alexa R. Warwick, Alexander D. Wright, Kerry Yurewicz, David A. W. Miller
Publication Type	Article
Publication Subtype	Journal Article
Series Title	Biology Letters
Index ID	70257747
Record Source	USGS Publications Warehouse

US GS Org ani zati on	Eastern Ecological Science Center
--------------------------------------	-----------------------------------

Related

Connect

Evan Grant, Ph.D.

Research Wildlife
Biologist

Eastern Ecological
Science Center

Email:
ehgrant@usgs.gov
Phone:
[413-863-3823](tel:413-863-3823)

Jill Fleming (Former Employee)

Wildlife Biologist
Eastern Ecological
Science Center

Adriianne Brand

Wildlife Biologist

Eastern Ecological
Science Center

Email:
a.brand@usgs.gov
Phone:
[413-863-2462](tel:413-863-2462)

Charles Shafer

Biologist (Data
Scientist)

Eastern Ecological
Science Center

Email:
cshafer@usgs.gov
Phone:
[240-678-6385](tel:240-678-6385)

Contact

Eastern Ecological Science Center at the Leetown Research Laboratory

11649 Leetown Road
Kearneysville, WV 25430
United States

SCIENCE

[Science Explorer](#)
[Mission Areas](#)
[Programs](#)
[Regions](#)
[Science Centers](#)
[Observatories](#)
[Laboratories](#)
[Frequently Asked Questions](#)
[Educational Resources](#)
[Special Topics](#)

PRODUCTS

[Data](#)
[Maps](#)
[Publications](#)
[Multimedia Gallery](#)
[Web Tools](#)
[Software](#)
[U.S. Board on Geographic Names](#)
[The National Map](#)
[USGS Library](#)
[USGS Store](#)
[Park Passes](#)

NEWS

[Featured Stories](#)
[News Releases](#)
[Science Snippets](#)
[Technical Announcements](#)
[Employees in the News](#)
[Get Our News](#)
[Media Contacts](#)
[I'm a Reporter](#)
[Newsletters](#)

CONNECT

[Headquarters](#)
[Locations](#)
[Staff Profiles](#)
[Social Media](#)
[Careers](#)
[Contact Us](#)

ABOUT

[About Us](#)
[Survey Manual](#)
[Organization](#)
[Key Officials](#)
[Congressional](#)
[Budget](#)
[Careers and Employees](#)
[Doing Business](#)
[Emergency Management](#)

LEGAL

[Accessibility](#)
[FOIA](#)
[Site Policies](#)
[Privacy Policy](#)
[Site Map](#)
[DOI and USGS link policies apply](#)
[No FEAR Act](#)
[USA.gov](#)
[Vulnerability Disclosure Policy](#)



U.S. Geological Survey
U.S. Department of the Interior



Contact USGS

1-888-392-8545

answers.usgs.gov