

Frances E. Buderman
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Education

- 2017 Ph.D., Fish, Wildlife, and Conservation Biology, Colorado State University
Dissertation: *Statistical methods for modeling the movement and space-use of carnivores*
Adviser: Mevin B. Hooten
- 2012 M.Sc., Wildlife and Fisheries Science, Pennsylvania State University
Thesis: *A joint Kaplan-Meier known-fate and Brownie tag-recovery model to estimate harvest and survival rates*
Adviser: Duane R. Diefenbach
- 2010 B.Sc., Natural Resources, Cornell University
Concentration: Applied Ecology

Employment

- 2020- Assistant Professor, Department of Ecosystem Science and Management, Pennsylvania State University, University Park, PA
- 2019 Post-Doctoral Fellow, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO
Supervisor: William B. Kendall
- 2017-19 Post-Doctoral Fellow, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO
Supervisor: David N. Koons
- 2017 Instructor, FW 370: Design of Fish and Wildlife Studies. Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO
- 2013-17 Graduate Research Assistant, Colorado Cooperative Fish and Wildlife Research Unit, Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO
Supervisor: Mevin B. Hooten
- 2010-12 Graduate Research Assistant, Pennsylvania Cooperative Fish and Wildlife Research Unit, School of Forest Resources, Pennsylvania State University, University Park, PA
Supervisor: Duane R. Diefenbach
- 2009 Intern, NSF Research Experiences for Undergraduates Program, Mountain Lake Biological Station, University of Virginia, Pembroke, VA
Supervisor: Edmund D. Brodie III and Eric B. Liebgold
- 2008 Intern, NSF Research Internship in Ocean Sciences, Marine Field Station, Department of Marine and Coastal Sciences, Rutgers University, Tuckerton, NJ
Supervisor: Ken W. Able and Thomas M. Grothues

Publications

Peer-Reviewed Publications

- Scharf, H.R. and *F.E. Buderman*. 2020. Animal movement models for multiple individuals. Wiley Interdisciplinary Reviews: Computational Statistics 12:e1506.
- Buderman, F.E.*, J.H. Devries, and D.N Koons. 2020. Multi-scale modeling to quantify the contribution of climate and land use changes to the development of an ecological trap in a

- migratory species. *Journal of Animal Ecology* 89:1961-1977.
- Allredge, M.W., *F.E. Buderman*, and K. Blecha. 2019. Human-cougar interactions in the wildland-urban interface of Colorado's Front Range. *Ecology and Evolution* 9:10415-10431.
- Buderman, F.E.*, M.B. Hooten, M. Allredge, E.M. Hanks, J.S. Ivan. 2018. Predatory behavior is primary predictor of movement of wildland-urban cougars. *Movement Ecology* 6:22.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2018. Large-scale movement behavior in a reintroduced predator population. *Ecography* 41: 126–139.
- Hefley, T.J., K.M. Brooms, B.M. Brost, *F.E. Buderman*, S. Kay, H.R. Scharf, J.R. Tipton, P.J., Williams, M.B. Hooten. 2017. The basis function approach to modeling autocorrelation in ecological data. *Ecology* 98(3):632-646.
- Hooten, M.B., *F.E. Buderman*, B.M. Brost, E.M. Hanks, J.S. Ivan. 2016. Hierarchical animal movement models for population-level inference. *Environmetrics* 27(6):322-333.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2016. A functional model for characterizing long distance movement behavior. *Methods in Ecology and Evolution* 7(3):264–273.
- Buderman, F.E.*, D.R. Diefenbach, C.S. Rosenberry, B.D. Wallingford, and E. S. Long. 2014. Effect of hunter selectivity on harvest rates of radio-collared white-tailed deer in Pennsylvania. *Journal of Wildlife Management* 78(8):1456-1465.
- Buderman, F.E.*, D.R. Diefenbach, M.J. Casalena, C.S. Rosenberry, and B.D. Wallingford. 2014. Accounting for tagging-to-harvest mortality in a Brownie tag-recovery model by incorporating radio-telemetry data. *Ecology and Evolution* 4(8):1439–1450.
- Able, K.W., T.M. Grothues, J.L. Rackovan, *F.E. Buderman*. 2014. Application of mobile dual frequency identification sonar (DIDSON) to fish in estuarine habitats. *Northeastern Naturalist* 21(2):192-209.
- Buderman, F.E.* and E.B. Liebgold. 2012. Effect of search method and age class on mark-recapture parameter estimation in a population of red-backed salamanders. *Population Ecology* 54(1):157-167.

Technical Reports

- Rosenberry, C., B.D. Wallingford, J.T. Fleegle, *F.E. Buderman*, and D.R. Diefenbach. 2012. Biological and social implications of a 7-day concurrent firearms season. Pennsylvania Game Commission Bureau of Wildlife Management, Project Annual Job Report.
- Wallingford, B.D., C. Rosenberry, *F.E. Buderman*, and D.R. Diefenbach. 2011. Biological and social implications of a 7-day concurrent firearms season. Pennsylvania Game Commission Bureau of Wildlife Management, Project Annual Job Report.

Popular Press

- F.E. Buderman*. 2016. On the Tail of Reintroduced Canada Lynx: Leveraging Archival Telemetry Data to Model Animal Movement. *methods.blog*: Official blog of *Methods in Ecology and Evolution*. March 3, 2016.
- Liebgold, E.B. and *F.E. Buderman*. 2012. Effect of search method and age on mark-recapture abundance estimation in salamanders. *FrogLog* 100:77.

Presentations

Invited Oral Presentations

- Buderman, F.E.*, D.N. Koons. 2019. Life-history traits predict species-specific effects of global change on breeding waterfowl in the Prairie Pothole Region. The 8th North American Duck Symposium, Winnipeg, MB.
- Buderman, F.E.*, D.N. Koons. 2019. Modeling multi-scale drivers of northern pintail demography in the Prairie Pothole Region. Meeting of the Pintail Action Group, Winnipeg, MB.

- Buderman, F.E.* 2019. Using animal locations to improve ecological inference and guide wildlife management. University of Vermont, Burlington, VT.
- Buderman, F.E.* 2018. From demography to movement: Gaining ecological insights from methodological advancements. Mississippi State University, Starkville, MS.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, M.W. Alldredge. 2018. Using basis functions for continuous-time inference on animal movement. The Wildlife Society 25th Annual Conference, Cleveland, OH.
- Buderman, F.E.*, 2018. Modeling movement and spatial ecology of mammals. University of Wyoming, Laramie, WY.
- Buderman, F.E.*, 2017. Development of mark-recapture and movement modeling techniques for applied wildlife questions. National Oceanic and Atmospheric Administration: Marine Mammal Lab, Seattle, WA.

Professional Oral Presentations

- Buderman, F.E.*, D.N. Koons. 2019. Temporally dynamic effects of agricultural practices on northern pintail demography and habitat selection in the Prairie Pothole Region. The Wildlife Society 26th Annual Conference, Reno, NV.
- Buderman, F.E.*, D.N. Koons. 2018. Modeling multi-scale drivers of northern pintail demography in the Prairie Pothole Region. The Wildlife Society 25th Annual Conference, Cleveland, OH.
- Buderman, F. E.*, M.B. Hooten, M.W. Alldredge. 2017. Timing of predation and carnivore movement in an urban-wildland interface. The Wildlife Society 24th Annual Conference, Albuquerque, NM.
- Buderman, F. E.*, M.B. Hooten, M.W. Alldredge. 2016. Mountain lion movement dynamics in the wildland-urban interface. The Wildlife Society 23rd Annual Conference, Raleigh, NC.
- Buderman, F. E.*, M.B. Hooten, M.W. Alldredge. 2016. Drivers of mountain lion movement in the Colorado Front Range. Central Mountains and Plains Section of The Wildlife Society Annual Meeting, Steamboat Springs, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2015. Spatial ecology and movement of reintroduced Canada lynx. The Wildlife Society 22nd Annual Conference, Winnipeg, MB.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Characterizing dispersal behavior in Canada lynx using a multi-scale integrated data movement model. The Wildlife Society 21st Annual Conference, Pittsburgh, PA.
- Buderman, F.E.* and D.R. Diefenbach. 2012. Using auxiliary known-fate data to improve harvest rate estimates from tag-recovery models. The Wildlife Society 19th Annual Conference, Portland, OR.
- Buderman, F.E.*, D.R. Diefenbach, C.S. Rosenberry, and B.D. Wallingford. 2012. An integrated population model approach to monitoring response of white-tailed deer populations to regulation changes. Pennsylvania Chapter of The Wildlife Society 19th Annual Meeting, State College, PA.
- Buderman, F.E.*, D.R. Diefenbach, C.S. Rosenberry, and B.D. Wallingford. 2012. An integrated population model approach to monitoring response of white-tailed deer populations to regulation changes. Southeast Deer Study Group 35th Annual Meeting, Sandestin, FL.
- Buderman, F.E.* and D.R. Diefenbach. Improving harvest estimates using known-fate data to inform a band-recovery model. 2011. Northeast Fish and Wildlife 67th Annual Conference, Manchester, NH.

Professional Poster Presentations

- Duane R. Diefenbach, *F.E. Buderman*, L.C. Gigliotti. 2017. Efficiency of joint-known fate and tag-recovery models for estimating harvest rates of large animals. EURING 2017 Analytical Meeting & Workshop, Barcelona, Spain.

- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Characterizing dispersal behavior in *Lynx canadensis* using a multi-scale integrated movement model. Joint 24th ICSA Applied Statistics Symposium and 13th Graybill Conference, Fort Collins, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Identifying dispersal in *Lynx canadensis* using a coupled telemetry model. Front Range Student Ecology Symposium, Fort Collins, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Identifying dispersal in *Lynx canadensis* using a coupled telemetry model. Colorado Chapter of The Wildlife Society Annual Meeting, Fort Collins, CO.
- Buderman, F.E.*, and D.R. Diefenbach. 2013. Accounting for tagging-harvest mortality in a Brownie dead-recovery model by incorporating radio-telemetry data. EURING 2013 Analytical Meeting & Workshop, Athens, GA.

Cooperator Presentations

- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2018. Spatial ecology and movement of reintroduced Canada lynx. Environmental Face-to-Face, Colorado Department of Transportation, Pueblo, CO.
- Buderman, F.E.*, M.B. Hooten, M.W. Alldredge. 2016. Hierarchical models for drivers of animal movement. Colorado Parks and Wildlife, Fort Collins, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Characterizing large scale lynx movement in Colorado. National Park Service, Fort Collins, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Characterizing large scale lynx movement in Colorado. Colorado Parks and Wildlife, Fort Collins, CO.
- Buderman, F.E.*, M.B. Hooten, J.S. Ivan, T.M. Shenk. 2014. Characterizing large scale lynx movement in Colorado. Colorado Department of Transportation, Denver, CO.
- Buderman, F.E.* Deer and Beer: One Graduate Student's Journey. 2011. Summer Seminar Series, Mountain Lake Biological Station, University of Virginia, Pembroke, VA.

Internship Presentations

- Buderman, F.E.* and E.B. Liebgold. 2009. Effect of age class and search method on parameter estimation in *Plethodon cinereus*. Research Experiences for Undergraduates Final Report, Mountain Lake Biological Station, University of Virginia, Pembroke, VA.
- Buderman, F.E.*, T.M. Grothues, and K.W. Able. 2008. Effect of Pier Shading on Prey Fish in the Hudson River, Using Dual Frequency Identification Sonar. Research Experiences for Undergraduates, Department of Marine and Coastal Sciences, Rutgers University, New Brunswick, NJ.

Teaching Experience Courses

- F2020 Instructor. WFS 497: Wildlife and Fisheries Data Analysis. Ecosystem Science and Management, Pennsylvania State University, University Park, PA
- S2020 Instructor. WFS 409: Mammalogy Lab. Ecosystem Science and Management, Pennsylvania State University, University Park, PA
- S2020 Instructor. WFS 408: Mammalogy. Ecosystem Science and Management, Pennsylvania State University, University Park, PA
- S2017 Instructor. FW 370: Design of Fish and Wildlife Studies. Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO
- S2015 Graduate Teaching Assistant. FW/STAT 673: Hierarchical Models in Ecology. Fish, Wildlife, and Conservation Biology/Statistics, Colorado State University, Fort Collins, CO
- F2008 Undergraduate Teaching Assistant. NTRES 210: Introductory Field Biology. Natural

Resources, Cornell University, Ithaca, NY.

Workshops and Short Courses

- 2020 Assistant. Introduction to Count Data. North American Ornithological Conference VII, Virtual.
 2017 Instructor and Organizer. Introduction to R. The Wildlife Society 25th Annual Conference, Cleveland, OH.
 2017 Instructor and Organizer. Introductory R. The Wildlife Society 24th Annual Conference, Albuquerque, NM.
 2016 Instructor. R Workshop. R for Wildlife Biologists. Central Mountains and Plains Section of The Wildlife Society Annual Meeting, Steamboat Springs, CO.
 2016 Assistant. Training in Bayesian Modeling for Practicing Ecologists. NSF. Colorado State University, Fort Collins, CO.
 2015 Instructor. R Workshop. Colorado Cooperative Fish and Wildlife Research Unit. Colorado State University, Fort Collins, CO.
 2015 Assistant. Training in Bayesian Modeling for Practicing Ecologists. NSF. Colorado State University, Fort Collins, CO.
 2014 Assistant. Training in Bayesian Modeling for Practicing Ecologists. NSF. Colorado State University, Fort Collins, CO.
 2013 Assistant. R Workshop. Colorado Cooperative Fish and Wildlife Research Unit. Colorado State University, Fort Collins, CO.

Guest Lectures

- 2015 Spatial Statistics. FW/STAT 673: Hierarchical Models in Ecology. Fish, Wildlife, and Conservation Biology/Statistics, Colorado State University, Fort Collins, CO.
 2015 Bayesian P-Values. FW/STAT 673: Hierarchical Models in Ecology. Fish, Wildlife, and Conservation Biology/Statistics, Colorado State University, Fort Collins, CO.
 2011 Deer Trapping and Monitoring. BIOL 3510: Field Methods in Wildlife Ecology. Mountain Lake Biological Station, University of Virginia, Pembroke, VA.

Funding

Grants Awarded

- 2020-21 National Park Service, co-PI, Changes in stream fish distribution and occurrence in seven National Park Service Units of the Eastern Rivers and Mountains Network, \$76,347.

Fellowships

- 2020-21 Harbaugh Faculty Scholar, College of Agricultural Sciences, Pennsylvania State University, \$4,326
 2016 Oscar and Isabel Anderson Graduate Research Fellowship, Warner College of Natural Resources, Colorado State University, \$1,650
 2014 Robert L. Tate Research Fellowship, Warner College of Natural Resources, Colorado State University, \$4,400
 2010 Robert W. Graham Endowed Graduate Research Fellowship, Pennsylvania State University, \$4,000

Travel Grants

- 2016 Travel Grant, Biometrics Working Group, The Wildlife Society, \$625
 2015 Annual Conference Travel Grant, Colorado Chapter, The Wildlife Society, \$2,000
 2015 Travel Grant, Biometrics Working Group of The Wildlife Society, \$625 (*declined*)
 2014 Travel Grant, The Wildlife Society, \$350

Awards and Nominations

- 2020 Nominated: Outstanding Undergraduate Teaching Award, Ecosystem Science and Management, Pennsylvania State University
- 2008 Harlan B. Brumsted Scholarship, Natural Resources, Cornell University, \$3350

Professional Activities and ServiceAppointments

- 2018-19 The Wildlife Society Biometrics Working Group Board Member – Advisory and Audit
- 2017-18 The Wildlife Society Biometrics Working Group Board Member – Technical Sessions

PSU Committees

- 2020 Outstanding Senior Selection Committee, Ecosystem Science and Management, Ecosystem Science and Management, Pennsylvania State University

Professional Affiliations

The Wildlife Society (2011-present): Biometrics Working Group (2015-present), Colorado Chapter (2014-present), Pennsylvania Chapter (2011-2013)

Journal Referee

Biological Conservation, Ecological Applications, Ecology and Evolution, Environmental Management, Journal of Animal Ecology, Journal of Applied Ecology, Journal of North American Herpetology, The Condor

Media Coverage

Cropping methods can mislead ducks. Margaret Evans, *The Western Producer*, September 10th, 2020.

Prairie Pothole farming hampers pintail duck success. Joshua Rapp Learn, *The Wildlife Society*, June 22nd, 2020.

Changes in cropping methods, climate decoy pintail ducks into an ecological trap. Jeff Mulhollem, *Penn State News*, May 26th, 2020.