

Nicholas E. Kolarik

nicholaskolarik@u.boisestate.edu

<https://orcid.org/0000-0003-0527-058X>

Applied science and engagement specialist in the Land Use Lab of the Human Environment Systems group at Boise State University.

RESEARCH INTERESTS

Spatial analyses of human environment interactions, natural resource management, and social-ecological systems; land systems science, remote sensing.

EDUCATION

Ph.D. in Ecology, Evolution, and Behavior

2024

Human Environment Systems group
Boise State University, Boise, ID

M.S. in Applied Geography

2019

University of Louisville, Louisville, KY

B.S. in Geography and Geosciences concentration in environmental analysis **2017**

University of Louisville, Louisville, KY

REFEREED PUBLICATIONS

In review

Kolarik, N.E., Cattau, M., Koehn, C., Roopsind, A., Williamson, M., Brandt, J.S., *In review*.
Conservation easements target high quality lands, but do not lead to increases in quality following implementation. Submitted to *Biological Conservation*.

Published

Clark, M., Hamad, H.M., Andrews, J., **Kolarik, N.**, Hopping, K., Hillis, V., Borgerhoff Mulder, M., 2024. A productive friction: Leveraging misalignments between local ecological knowledge and remotely sensed imagery for forest conservation planning. *Conservation Science and Practice*, e13247. <https://doi.org/10.1111/csp2.13247>

Shrestha, N., **Kolarik, N.E.**, Brandt, J.S., 2024. Mesic vegetation persistence: A new approach for monitoring spatial and temporal changes in water availability in dryland regions using cloud computing and the sentinel and Landsat constellations. *Science of The Total Environment* 917, 170491. <https://doi.org/10.1016/j.scitotenv.2024.170491>

Kolarik, N.E., Shrestha, N., Caughlin, T., Brandt, J.S., 2024. Leveraging high resolution classifications and random forests for hindcasting decades of mesic ecosystem dynamics in the Landsat time series. *Ecological Indicators* 158, 111445. <https://doi.org/10.1016/j.ecolind.2023.111445>

Clark, M., Andrews, J., **Kolarik, N.**, Omar, M.M., Hillis, V., 2024. Causal attribution of agricultural expansion in a small island system using approximate Bayesian computation. *Land Use Policy* 137, 106992. <https://doi.org/10.1016/j.landusepol.2023.106992>

Stevens, F.R., Gaughan, A.E., Salerno, J., Pricope, N.G., Cassidy, L., Bailey, K., Hartter, J.H., Drake, M., Weaver, A., **Kolarik, N.**, Maseka, H., Mosimane, A., 2023. Empirically modelling household vulnerability and food security across a southern African land system. *Journal of Land Use Science* 18, 315–333. <https://doi.org/10.1080/1747423X.2023.2226140>

Caughlin, T.T., Clark, M., Jochems, L.W., **Kolarik, N.E.**, Zaiats, A., Hall, C., Winiarski, J.M., Powers, B.F., Brabec, M.M., Hopping, K., 2023. Socio-ecological interactions promote outbreaks of a harmful invasive plant in an urban landscape. *Ecological Solutions and Evidence* 4, e12247. <https://doi.org/10.1002/2688-8319.12247>

Kolarik, N.E., Roopsind, A., Pickens, A., Brandt, J.S., 2023. A satellite-based monitoring system for quantifying surface water and mesic vegetation dynamics in a semi-arid region. *Ecological Indicators* 147, 109965. <https://doi.org/10.1016/j.ecolind.2023.109965>

Gaughan, A.E., **N.E. Kolarik**, F.R. Stevens, N.G. Pricope, L. Cassidy, J. Salerno, K. M. Bailey, M. Drake, K. Woodward, and J. Hartter. 2022. Using Very-High-Resolution Multispectral Classification to Estimate Savanna Fractional Vegetation Components. *Remote Sensing* 14 (3): 551. <https://doi.org/10.3390/rs14030551>.

Jochems, L.W., J. Brandt, A. Monks, M. Cattau, **N.E Kolarik**, J. Tallant, and S. Lishawa. 2021. Comparison of Different Analytical Strategies for Classifying Invasive Wetland Vegetation in Imagery from Unpiloted Aerial Systems (UAS). *Remote Sensing* 13 (23): 4733. <https://doi.org/10.3390/rs13234733>.

Salerno, J., F.R. Stevens, A.E. Gaughan, T. Hilton, K. Bailey, T. Bowles, L. Cassidy, P. Mupeta-Muyamwa, D. Biggs, N. Pricope, A.W. Mosimane, H.L. Maseka, M. Drake, A. Weaver, S. Kosmas, K. Woodward, **N.E. Kolarik**, and J. Hartter. 2021. Wildlife Impacts and Changing Climate Pose Compounding Threats to Human Food Security. *Current Biology*, September. <https://doi.org/10.1016/j.cub.2021.08.074>

Woodward, K.B., N.G. Pricope, F.R. Stevens, A.E. Gaughan, **N.E. Kolarik**, M. Drake, J.S. Salerno, L. Cassidy, J. Hartter, K.M. Bailey, and H.M. Luwaya. 2021. Modeling Community-Scale Natural Resource Use in a Transboundary Southern African Landscape: Integrating Remote Sensing and Participatory Mapping. *Remote Sensing* 13 (631). <https://doi.org/10.3390/rs13040631>

Kolarik, N.E., A.E. Gaughan, F.R. Stevens, N.G. Pricope, K.D. Woodward, L. Cassidy, J.S. Salerno, and J. Hartter. 2020. A multi-plot assessment of vegetation structure using a micro-unmanned aerial system (UAS) in a semi-arid environment. *ISPRS Journal of Photogrammetry and Remote Sensing* 164: 84-96. <https://doi.org/10.1016/j.isprsjprs.2020.04.011>

Kolarik, N.E., M.G. Ellis, A.E. Gaughan, and F.R. Stevens. 2019. Describing Seasonal Differences in Tree Crown Delineation Using Multispectral UAS Data and Structure from Motion. *Remote Sensing Letters* 10(9): 864-873. Doi: 10.1080/2150704X.2019.1629708

Book chapters

Brandt, J, J. Schneider, **N. Kolarik**, E. Iskin, N. Shrestha, and N. Glenn. 2024. Beaver Rewilding: Ecological Processes in the intermountain West. Book chapter in “A Watershed Moment”. E. Brister and R. Frodeman, editors.

Reports

Boldt, J.A., J. G. Lant, and **N. E. Kolarik**. 2018. Flood-inundation study of the North Fork Kentucky River at Hazard, Kentucky: U.S. Geological Survey scientific investigation report.
<https://doi.org/10.3133/sir20185122>

PRESENTATIONS and POSTERS

Invited

Kolarik, N.E. Using earth observations to monitor riverscape conservation efforts in dryland systems. Presented at the Bud Werner Memorial Library, Steamboat Springs, CO. February 27, 2025.

Kolarik, N.E. Using earth observations to monitor riverscape conservation efforts in dryland systems. Presented at the Science on Tap series at Boise Brewing, Boise, ID. February 10, 2025.

Brandt, J.S., **N.E. Kolarik**, N. Shrestha, N. Glenn, J. Wheaton, W. Macfarlane. Beaver rewilding for drought and wildfire resilience. Presented at the NASA Carbon Cycle & Ecosystems Joint Science Workshop. College Park, MD. May 8, 2023.

Kolarik, N.E., N. Shrestha, and J.S. Brandt. Integrating remote sensing and ecological forecasting into decision support for beaver rewilding. Presented to Environmental Studies Undergraduate Capstone, Boise State University. January 23, 2023.

Kolarik, N. E., and J. S. Brandt. Quantifying water resources in the High Divide. Presented to Introduction to Remote Sensing, Boise State University. November 30, 2021.

Kolarik, N. E. A multi-plot assessment of vegetation structure using a micro-unmanned aerial system (UAS) in a semi-arid environment. Presented for the Unmanned Aerial Systems course at University of Louisville Department of Geography and Geosciences. April 9, 2021.

Kolarik, N. E., and J. S. Brandt. Quantifying water resources in the High Divide. Presented to University Foundations, Boise State University. November 17, 2020.

Kolarik, N. E., and J. S. Brandt. Quantifying surface water, wetlands, and wet meadows. Presented to the High Divide Collaborative, High Divide Collaborative Workshop. February 13, 2020.

Kolarik, N. E., and J. S. Brandt. Beaver Dam Analogs: A Project Driven Analysis. Presented to Environmental Studies Undergraduate Capstone, Boise State University. January 24, 2020.

International

Kolarik, N. E. Delineating tree crowns using multispectral point cloud data. Presented to the Department of Wildlife Management and Ecotourism, University of Namibia. June 7, 2018.

Domestic

Kolarik, N.E., and J.S. Brandt. Hindcasting water availability in semi-arid systems. Presented at the NASA Carbon Cycle & Ecosystems Joint Science Workshop. Silver Spring, MD. May 9, 2024 .

Kolarik, N.E., N. Shrestha, Brandt, J.S. Leveraging high resolution classifications for hindcasting decades of water resources dynamics in the Landsat time series with machine learning regression.

Presented at the NASA Carbon Cycle & Ecosystems Joint Science Workshop. College Park, MD. May 9, 2023.

Kolarik, N.E., N. Shrestha, and J.S. Brandt. Mapping and monitoring changes in mesic ecosystem dynamics in a topographically complex semi-arid system. Presented at the International Association of Landscape Ecology North America Annual Meeting, Riverside, CA. March 21, 2023.

Brandt, J., **N.E. Kolarik**, N. Glenn, J. Wheaton, P. Bailey, W. Macfarlane. Decision support for beaver rewilding. Presented at the NISAR community workshop, Pasadena, CA. August 31, 2022.

Kolarik, N. E., A. Roopsind, A. Pickens, and J. S. Brandt. Development of a satellite-based water resource monitoring system specific to semi-arid systems. Presented at the NISAR community workshop, Pasadena, CA. August 31, 2022.

Kolarik, N. E., A. Roopsind, A. Pickens, and J. S. Brandt. Development of a satellite-based water resource monitoring system specific to semi-arid systems. Presented at the International Association of Landscape Ecology North America Annual Meeting, Virtual. April 11, 2022.

Kolarik, N. E. A multi-plot assessment of vegetation structure using a micro-unmanned aerial system (UAS) in a semi-arid environment. Presented at the American Association of Geographers Annual Meeting, Washington, D.C. April 4, 2019.

Kolarik, N. E., A.E. Gaughan, and F.R. Stevens. Crown delineation using multispectral point cloud data. Presented at the American Association of Geographers Annual Meeting, New Orleans, LA. April 13, 2018. DOI: 10.13140/RG.2.2.25621.63209

Kolarik, N. E. Crown delineation using multispectral point cloud data. Presented at the Graduate Student Regional Research Conference, University of Louisville. March 2, 2018.

OTHER PRODUCTS

Kolarik, N.E., Shrestha, N., Iskin, E., and Brandt, J. Decision Support Tool – GEE Web App for Monthly MRRMaid - <https://nekolarik.users.earthengine.app/view/monthly-mrrmaid>;

Shrestha, N., **Kolarik, N.E.**, Iskin, E., and Brandt, J. Decision Support Tool – GEE Web App for Mesic Vegetation Persistence. <https://ns-boise.users.earthengine.app/view/mvp>

Pricope, N. G. and **N. E. Kolarik**. Taking the bird's eye view over the KAZA landscape. <https://storymaps.arcgis.com/collections/73d3b47c9305483f9b7866aed1bcd3e5?item=4>

GRANTS AND AWARDS

2025-present Co-Investigator and Lead Scientist - NASA Biological Diversity & Ecological Conservation. Increasing scale and ensuring sustainable transfer of the Mesic Restoration Monitoring aid (MRRMaid) decision support tool for beaver rewilding. \$750,000

2023-present Graduate student co-Investigator - USDA NIFA Data Science for Food and Agriculture Systems. Creating opportunities for voluntary participation in climate-smart agriculture in the western United States

2021 - present Future-Investigator Future Investigators in NASA Earth and Space Science and Technology (FINESST). Data fusion and back-casting for describing water resource dynamics and the associated effects of land management in a semi-arid system. \$135,000

2020 - present Graduate student co-Investigator - NASA Biological Diversity & Ecological Conservation. Integrating remote sensing and ecological forecasting into decision support for beaver rewilding.

PUBLIC ENGAGEMENT

NASA satellites reveal restoration power of beavers, 2023. Mongabay Environmental News. <https://news.mongabay.com/2023/09/nasa-satellites-reveal-restoration-power-of-beavers/> (accessed 9.12.23). Role: Interviewee

Keck, A., 2023. "Beaver Believers" See Impacts of Rewilding Via NASA Data. NASA. [nasa.gov/feature/researchers-become-beaver-believers-after-measuring-the-impacts-of-rewilding](https://www.nasa.gov/feature/researchers-become-beaver-believers-after-measuring-the-impacts-of-rewilding) (accessed 9.12.23). Role: Interviewee

TEACHING

2025 Guest lecturer, Boise State University Stats Hour

- Introduction to Google Earth Engine

2025 Guest lecturer, Boise State University Human Environment Systems

- HES610 – Spatial Analysis for Environmental Research (Landscape Ecology) (1 lecture, 1 lab assignment)

2019 Adjunct lecturer, University of Louisville Department of Geography and Geosciences

- GEOS200 – The Global Environment (1 semester)

RELATED EXPERIENCE

2019-2021	Research assistant, High Divide Drought Decision Support Platform (DDeSuP) • Development of workflow for detection of surface water and mesic areas using Google Earth Engine • Parameterization of a predictive model for water resources
2019	Research assistant, San Andreas Fault Observatory at Depth (SAFOD) Project • Implementation of structure from motion to create three-dimensional models of core samples • Development of workflow for virtual manipulation of core samples
2017 – 2019	Research assistant KAZAVA Project (https://kazava.weebly.com/) • Field work in Botswana and Zambia- collection of UAS data, <i>in situ</i> validation measurements, and reference samples • Presentation of research at University of Namibia • UAS data processing using a structure from motion approach
2017 – 2018	Research assistant, OKI USGS Water Science Center Specialized Water Modeling and Applied Technology group – student contract • Geospatial analysis • Development of Python tools
2016 – 2017	Physical science technician, OKI USGS Water Science Center Sediment Lab - student contract
2016	Undergraduate Teaching assistant, GIS and Water Resources

RELATED SKILLS

Software: Python, R, Javascript, Bash, Google Earth Engine, ArcGIS, ENVI, SNAP, Microsoft Office
Analysis: Bayesian and frequentist statistics, machine learning, spatial statistics, time series analysis, econometrics