Abhinav Shrestha
Remote Sensing and Geospatial Specialist
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Education

2021-2023	**M.S.** Geography, Dept. of Earth and Spatial Sciences, University of Idaho, Moscow, Idaho, USA.	GPA: 4.0 Thesis title: *Combining Multispectral and Three-Dimensional Data from Drone Imagery to Detect Forest Insect Damage: An Evaluation of a Novel Approach to Identify the Vertical Structure of Damage in Trees in the Northern Rocky Mountains.* Advisor: Dr. Jeffrey Hicke, Dept. of Earth and Spatial Sciences, University of Idaho
2021-2023	**GIS Academic Certificate (graduate level)**, Dept. of Earth and Spatial Science, University of Idaho, Moscow, Idaho, USA.	GPA: 4.0
2015-2019	**B.A.** Biology and Environmental Science, Coe College, Cedar Rapids, Iowa, USA.	GPA: 3.93 Honors: *Magna Cum Laude,* Phi Beta Kappa, Phi Kappa Phi Senior Honors Thesis: *GIS-based study on topographical preference of common tree species in Palisades-Kepler State Park, IA* Advisor: Dr. Paula Sanchini, Dept. of Biology, Coe College

Research Experience

2021-2023 **Graduate researcher,** Dept. of Earth and Spatial Sciences, University of Idaho.

- **Principle investigator**, MS thesis project.
  Title: *Combining Multispectral and Three-Dimensional Data from Drone Imagery to Detect Forest Insect Damage: An Evaluation of a Novel Approach to Identify the Vertical Structure of Damage in Trees in the Northern Rocky Mountains.*
  Advisor: Dr. Jeffrey Hicke, Dept. of Earth and Spatial Sciences, University of Idaho.
  Responsibilities: develop a novel approach using remote sensing, GIS, image processing, and programming methodology for detecting forest insect damage using drone-acquired point cloud data. Publication: https://doi.org/10.3390/rs16081365
- **Collaborative researcher**, plant sciences and rangeland research project.
  Title: *A comparison and development of methods for estimating sagebrush shrub volume using unmanned aerial systems.*
  Principle Investigator: Georgia R. Harrison, Department of Plant Sciences, University of Idaho. This project was a part of Dr. Harrison's PhD dissertation.
  Responsibilities: develop workflow of estimating shrub canopy volume with 3D data from drones, construct and maintain a GitHub repository for collaborative code sharing. Publication: https://doi.org/10.1002/ecs2.4877

2022-2023 **Graduate Research Assistant**, NASA Commercial SmallSat Data Analysis (CSDA) project. Collaborative research project with the University of Idaho, Washington State University, and US Forest Service
Project title: *Using commercial satellite imagery to study insect outbreaks in the US: Outbreak characteristics and evaluation of Landsat-based algorithms*.
Principle Investigator: Dr. Arjan Meddens, School of the Environment, Washington State University, Pullman, WA.
Responsibilities: conduct collaborative research to develop machine learning image classification algorithms (RF, MLC, NN) that assess forest mortality using high-resolution satellite imagery, assist field crew with forest inventory data collection (FIA-based), perform logistics mapping by creating and maintain spatial databases, and execute drone imagery acquisition missions. Publication (*preprint*): https://doi.org/10.2139/ssrn.4943044

2017-2019 **Undergraduate Researcher,** Dept. of Biology, Coe College.
Principle investigator, senior honors thesis. Title: *GIS-based study on topographical preference of common tree species in Palisades-Kepler State Park, IA*. Advisor: Dr. Paula Sanchini, Dept. of Biology, Coe College.

2018 **GIS Research Technician,** Dept. of Psychology, Coe College.
Project title: *How roadway design affects cyclist-motorist interactions*. Principle Investigators: Kei Yoshida and Dr. Benjamin Chihak, Dept. of Psychology, Coe College.

Professional Experience

2024-2025 **Remote Sensing and Geospatial Specialist,** RedCastle Resources, Inc., Salt Lake City, Utah, USA

Responsibilities:

- Federal contractor at the USDA Forest Service's Geospatial Office (GO).
- Apply remote sensing and geospatial analyses to projects focused on resource and inventory mapping, and forest health monitoring and assessment. Project's spatial scales range from continent-level to U.S. national forests, and temporal coverage from seasonal to multi-year assessments.
- Research and develop operational remote sensing and GIS workflows for USDA Forest Service personnel with varying levels of technical expertise.
- Provide specialized support to the GIS helpdesk team by resolving programming and GIS issues routed for expert troubleshooting.
- Leverage programming languages (R, Python, JavaScript), Git/GitHub for collaborative development, GIS tools (ArcGIS Pro, ArcGIS Online, Google Earth Engine), Cloud Platforms (Google, AWS) and command-line scripting to support remote sensing and GIS operations.

2021-2023 **Graduate Teaching Assistant**, Dept. of Earth and Spatial Sciences, University of Idaho, Moscow, Idaho, USA

Responsibilities:

- **Principal instructor** for Physical Geography Lab (GEOG 100L) and Hydrologic Applications of GIS and Remote Sensing Lab (GEOG 424/524) courses.
- **Online course developer** for Intermediate GIS course (GEOG 475) through University of Idaho's Center for Excellence in Teaching and Learning (CETL) department

2019-2021	**Quality Control Lab Analyst,** Archer Daniels Midland (ADM), Cedar Rapids, Iowa, USA Responsibilities: perform daily analytical tests for process and final samples of products, perform maintenance, calibration, and troubleshooting of all analytical laboratory equipment, perform job cycle checks, blind sample testing, cross lab studies, and review and validate standard operating procedures (SOP)
2016-2019	**Undergraduate Lab Assistant,** Dept. of Biology, Coe College, Cedar Rapids, Iowa, USA Responsibilities: prepare samples and solutions for quantitative analysis of genetic, tissue and microbiological experiments for all biology lab courses, maintain and update remote sensing equipment for field courses, maintain inventory of chemical stockroom, caretaker of plants and animals used for lab courses and research
2018	**IT Technician.** Dept. of Information Technology, Coe College Responsibilities: update and maintain hardware and software of all computers, printers, provide technical support
2018	**Undergraduate Tutor,** Dept. of Biology, Coe College Responsibilities: help students troubleshoot issues regarding remote sensing and field data integration with ArcGIS, answer any GIS related questions pertaining to the Spatial Ecology course (BIO 290)

Publications

Journal articles

Shrestha, A., Hicke, J.A., Meddens, A.J.H., Karl, J.W., Stahl, A.T., 2024. Evaluating a Novel Approach to Detect the Vertical Structure of Insect Damage in Trees Using Multispectral and Three-Dimensional Data from Drone Imagery in the Northern Rocky Mountains, USA. *Remote Sensing* 16, 1365. https://doi.org/10.3390/rs16081365

Harrison, G.R., **Shrestha, A**., Strand, E.K., Karl, J.W., 2024. A comparison and development of methods for estimating shrub volume using drone-imagery-derived point clouds. *Ecosphere* 15, e4877. https://doi.org/10.1002/ecs2.4877

Hicke, J. A., Bright, B. C., Hanavan, R. P., Hudak, A. T., Meddens, A. J., **Shrestha, A.**, & Stahl, A. T. (2024). Remote sensing of forest insect and disease outbreaks in the western United States: Tree, stand, and landscape responses and technologies and methods for detection and attribution. RMRS-GTR-443. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 92 p., 443. https://doi.org/10.2737/RMRS-GTR-443

Meddens, A.J.H., Bright, B.C., Neigh, C.S.R., Wooten, M., Caraballo-Vega, J., Egan, J., Hanavan, R., **Shrestha, A.**, Hudak, A., Hicke, J., 2024. Developing a Rapid Classification Approach for Using Very High-Resolution Satellite Imagery to Map Insect-Caused Forest Disturbances. (*under review),* pre-print: https://doi.org/10.2139/ssrn.4943044

Dissertations

Shrestha, A., Combining Multispectral and Three-Dimensional Data From Drone Imagery to Detect Forest Insect Damage: An Evaluation of a Novel Approach to Identify the Vertical Structure of Damage in Trees in the Northern Rocky Mountains, USA. *MS Thesis*. University of Idaho, Moscow, ID, December 2023.

Shrestha, A., GIS-Based Study on Topographical Preference of Common Tree Species in Palisades-Kepler State Park, IA, *Honors Thesis*, Coe College Department of Biology, Cedar Rapids, IA, May 2019.

Datasets

Shrestha, A., and Harrison, G.R., 2024. gharrison159/UAVShrubVolume: FinalMS (v3.0). Zenodo. https://doi.org/10.5281/zenodo.11371058

Zimmer, Scott N.; Houtman, Rachel M.; Leatherman, Lila S. T.; Housman, Ian W.; **Shrestha, Abhinav**; Shaw, John D.; Riley, Karin L. 2025. TreeMap 2020 CONUS: A tree-level model of the forests of the conterminous United States circa 2020. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2025-0031

Houtman, Rachel M.; Leatherman, Lila S. T.; Zimmer, Scott N.; Housman, Ian W.; **Shrestha, Abhinav**; Shaw, John D.; Riley, Karin L. 2025. TreeMap 2022 CONUS: A tree-level model of the forests of the conterminous United States circa 2022. Fort Collins, CO: Forest Service Research Data Archive. https://doi.org/10.2737/RDS-2025-0032

Presentations

Riley, K., Houtman, R., Zimmer, S., Leatherman, L., Housman, I., **Shrestha, A**. TreeMap and FuelMap: imputed tree and downed woody material information from the FIA databases for the forests of CONUS, background and methodological updates in the 2020 and 2022 datasets, contributed talk, *USDA Forest Service Forest Inventory and Analysis (FIA) Science Symposium*, 19-21 November 2023, Virtual Conference.

Shrestha, A., Hicke J. A., Meddens A. J. H, Karl J. W., Stahl A. T., Evaluation of a novel approach to detect the vertical structure of insect damage in trees using multispectral and three-dimensional data from drone imagery in the northern Rocky Mountains, USA, poster presentation, *72nd Western Forest Insect Work Conference*, 22-25 April 2024, Missoula, MT.

Shrestha, A., Hicke J. A., Meddens A. J. H, Karl J. W., Stahl A. T., Evaluating the combination of reflectances and three-dimensional point cloud from drone imagery for detecting forest insect damage, contributed talk, *University of Idaho GIS Day*, November 2023, Moscow, ID.

Harrison, G. R., **Shrestha A.**, Karl J. W., Seeing shrubs from the sky: an exploration of using drone-based method to estimate shrub canopy volume, contributed talk, *Ecological Society of America (ESA) Annual Conference*, 6-11 August 2023, Portland, OR.

Hicke, J. A., **Shrestha A.**, A. Meddens, A. Stahl, B. Bright, A. Hudak, R. Hanavan, Using Remote Sensing to Study Tree Damage from Insects, keynote speaker, *71st Western Forest Insect Work Conference*, 25-27 April 2023, Seattle, WA.

Shrestha, A., and Sanchini P, A Geographic Information System (GIS)-based study on topographical preference of common tree species in Palisades-Kepler State Park, contributed talk, *Coe College Student Research Symposium*, Coe College, Cedar Rapids, IA, 2019.

Obiesie, C., **Shrestha, A.**, & Sanchini, P. Distribution of Oaks (Quercus spp.) in Forests of Palisades-Kepler Park, Linn County, Iowa, poster presentation, *Coe College Student Research Symposium*, Coe College, Cedar Rapids, IA, 2018.

Yoshida, K**., Shrestha, A.**, & Chihak, B., "How Roadway Design Affects Cyclist-Motorist Interactions", poster presentation, *Tri-State Undergraduate Psychology Research Conference*, Loras College, Dubuque, IA, 2018.

Relevant Courses

University of Idaho, Moscow, ID (2021-2023)

Degree (GPA): M.S. Geography (GPA: 4.0)

Course (Grade):

- Advanced Forest Entomology (A)
- Fire Ecology (A)
- Remote Sensing/GIS Integration (A)
- Global Climate Change (A)
- Unmanned Aerial Operations (A)
- Statistical Analysis (A)
- Data Wizardry in Environmental Sciences: R programming (A)
- Programming in GIS: Python (A)
- Remote Sensing Application with Unmanned Aerial Systems-UAS (A)
- Human Geography (A)

- History and Philosophy of Geography (A)

Certificate (Department): Geographic Information Systems (GIS) Graduate Academic Certificate (Department of Earth & Spatial Sciences), Graduate Online Course Development Institute (Center for Excellence in Teaching and Learning (CETL))

Coe College, Cedar Rapids, IA (2015-2019)

Degree (GPA): B.A. Biology and Environmental Science (GPA: 3.93). *Magna Cum Laude* honor.

Course (Grade):

- Cellular & Molecular Biology (A)
- Organismal & Ecological Biology (A)
- Topics in Evolution (A-)
- General Botany (A)
- Field Botany (A)
- Ecology (A-)
- Spatial Ecology (A)
- Urban Ecology (A)
- Introduction to Ornithology (A)
- Animal Physiology (A)
- Calculus (A)
- Statistical and Inferential Reasoning (A)
- Basic Physics (A)
- Principles of Structural Chemistry (A)
- General Chemistry II (A)
- Advanced Research Lab (A)
- Analytical Chemistry (A)
- Introduction to Environmental Studies (A)
- Behavior/Ecology of Vertebrates (A)
- Environmental Microbiology (A)

Skills

Programming Languages & Software

R, RMarkdown, RShiny, RStudio, Python, ArcPy, ArcGIS Notebooks, Jupyter Notebooks, Javascript, Google Earth Engine, Google Collab, Google Cloud Platform, Git, GitHub, ArcGIS Pro, QGIS, ERDAS Imagine, Agisoft Metashape, CloudCompare, Emlid Studio, Forest Vegetation Simulator (FVS), Linux

Instruments

Trimble GeoX7 GPS receiver, ProMark 220 GPS receiver, TruPulse Laser Rangefinder, High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC), Combustion Analyzer, Ion Chromatography (IC)

Languages

English (Native), Nepali (Native), Hindi (Native), Urdu (Intermediate)

Honors & Awards

2024	**Outstanding Graduate Student – Teaching (2023 – 2024)**, Dept. of Earth and Spatial Sciences, University of Idaho, Moscow, ID, USA
2023	**Outstanding Graduate Student – M.S research (2022-2023)**, Department of Earth and Spatial Sciences, University of Idaho, Moscow, ID, USA
2021-2023	**Graduate Assistantship**, Department of Earth and Spatial Sciences, University of Idaho, Moscow, ID, USA ($94,389)
2019	**DeJong Biology Research Award** for outstanding honors research in biology, Department of Biology, Coe College, Cedar Rapids, IA, USA
2019	**Phi Beta Kappa**, National Honors Society, Coe College, Cedar Rapids, IA, USA
2019	**Phi Kappa Phi**, National Honors Society, Coe College, Cedar Rapids, IA, USA
2015-2019	**Global Leadership Full-tuition Scholarship**, Coe College, Cedar Rapids, IA, USA ($155,000)

Involvement, Service & Engagement

2016-2019 **Executive Board Member**, International Club, Coe College
Roles: President (2018-2019), Vice President (2017-2018), and Public Relations Officer (2016-2017)
Responsibilities: organize events that promote cultural diversity within the general student body and local community, act as liaisons that represent the international student body to work with the Office of International Student Affairs and the Office of Student Development at Coe College

2017-2019 **International student representative,** Diversity and Inclusion Collaboration Committee, Coe College
Responsibilities: organize collaborative events with student leaders from identity-based student organizations at Coe College advocating for cultural diversity and minority representation

2016-2017 **Public Relations Officer,** Multicultural Fusion Club, Coe College
Responsibilities: coordinate communications between members, general student body, and local communities to promote participation for events organized by the club

2016 **International Student Orientation Leader,** Office of International Student Affairs, Coe College
Responsibilities: coordinate and oversee events that comprise of the International Student Orientation, mentor international students to ease their transition into a new environment

References

The references are grouped according to career and academic stages. The relation of the listed reference to the applicant is in parentheses.

Professional references

Lila Leatherman (Peer Mentor), Technical Team Lead, RedCastle Resources, Inc., Salt Lake City, UT. Email: lila.leatherman@gmail.com

Anna Peterson (Supervisor and Project Manager), Geospatial Project Manager, RedCastle Resources, Inc. Salt Lake City, UT. Email: apeterson5433@gmail.com

Eric Rounds (Project Manager), Remote Sensing Project Manager, RedCastle Resources, Inc., Salt Lake City, UT. Email: eric.rounds@redcastleresources.com

Academic references

Dr. Jeffrey Hicke (Graduate advisor, MS thesis committee member, collaborative researcher)**,** Professor**,** Department of Earth and Spatial Sciences, University of Idaho, Moscow, ID. Email: jhicke@uidaho.edu. Phone: (+1) 208-885-6240

Dr. Jason Karl (MS thesis committee member, collaborative researcher), Associate Professor of Rangeland Ecology and Harold F. and Ruth M. Heady Endowed Chair of Rangeland Ecology, Department of Forestry, Rangeland, and Fire Sciences, University of Idaho, Moscow, ID. Email: jkarl@uidaho.edu. Phone: (+1) 208-885-0255

Dr. Arjan Meddens (MS thesis committee member, collaborative researcher), Assistant Professor, School of the Environment, Washington State University, Pullman, WA. Email: arjan.meddens@wsu.edu. Phone: (+1) 509-335-8570

Dr. Karen Humes (Graduate teaching assistant supervisor), Professor, Department of Earth and Spatial Sciences, University of Idaho, Moscow, ID. Email: khumes@uidaho.edu. Phone: (+1) 208-596-5725