Abhinav Shrestha
Geospatial and Remote Sensing Specialist
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Education

2021-2023	**M.S.** Geography, Dept. of Earth and Spatial Sciences, University of Idaho, Moscow, ID.	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, ID.	GPA: 4.0
2015-2019	**B.A.** Biology and Environmental Science, Coe College, Cedar Rapids, IA.	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 for detecting forest insect damage using drone-acquired point cloud data.
- **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.

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, execute drone imagery acquisition missions.

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

Responsibilities:

- Remote sensing and geospatial applied science federal contractor at the US Forest Service's Geospatial Technology and Applications Center (GTAC; https://www.fs.usda.gov/about-agency/gtac).
- Work entails analytical collaboration on various operational remote sensing and geospatial projects with USDA Forest Service (GTAC) partners.

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

Responsibilities:

- **Principal instructor** for Physical Geography Lab (GEOG 100L), principal instructor for Hydrologic Applications of GIS and Remote Sensing Lab (GEOG 424/524)
- **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, IA

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

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

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

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. *Remote Sensing of Environment* (*under review),* pre-print: https://doi.org/10.2139/ssrn.4943044

Hicke, J.A., Bright, B.C., Hanavan, R., Hudak, A., Meddens, A.J.H., **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. *General Technical Report* (*in press*), Rocky Mountain Research Station, United States Department of Agriculture Forest Service.

Presentations

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.

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, *Western Forest Insect Work Conference*, 25-27 April 2023, Seattle, WA.

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, 2019.

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.

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 & Skills

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

Courses: Hydrologic Applications of GIS and Remote Sensing Lab (Lab Instructor), GIS Programming (ArcPy/Python programming), Remote Sensing with UAS, Remote Sensing/GIS Integration, Data Wizardry in Environmental Science (R-programming), Global Climate Change, Advanced Forest Entomology, Fire Ecology, Statistical Analysis

Certificates: 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)

Courses: Urban Ecology, Environmental Microbiology, Analytical Chemistry, Behavior and Ecology of Vertebrates, Field Botany

Programming Languages & Software

R, RMarkdown, RShiny, Python, Git, GitHub, ArcGIS Pro, ArcPy, ArcGIS Notebooks, QGIS, ERDAS Imagine, Agisoft Metashape, CloudCompare, Emlid Studio, Forest Vegetation Simulator (FVS), VSCode, RStudio, VIM, Jupyter Notebooks

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

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

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

Professional References

The relation of the listed reference to the applicant is in parentheses.

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

Christine Bielema (Employment supervisor)**,** Laboratory Supervisor, Archer Daniels Midland (ADM) Carbohydrate Solutions, Cedar Rapids, IA. Email: Christine.Bielema@adm.com. Phone: (+1) 319-398-4343

Dr. Paula Sanchini (Undergraduate advisor), Henry and Margaret Haegg Professor of Biology and Environmental Science Administrative Coordinator, Department of Biology, Coe College, Cedar Rapids, IA. Email: psanchin@coe.edu.