Benjamin T. Fraser, PhD

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Area of Expertise

Professional Skills	Spatial Data Analysis | Image Processing | Data Management | Mobile Data Collection| Scientific Communication | Technical Writing | Curriculum Development | Spatial Statistics | Geovisualization
Technical Skills	ArcGIS | Google Earth Engine | QGIS| Python | R | Structure-from-Motion | Flight Planning | LiDAR | SAR | Microsoft Product Suite

Professional Summary

For over 10 years, I have worked at the intersection of technical tools such as GIS (geomatics) and remote sensing, and applied fields such as forestry, wildlife conservation, and natural resource management. My research and technical consulting span scales ranging from individual tree surveys to multi-million-acre protected landscapes. As an Visiting Assistant Professor at UNH and Director of the Basic and Applied Spatial Analysis Lab, I focus on cutting-edge technologies such as Unpiloted Aerial Systems (UAS or UAV) and deep learning algorithms to evaluate their effectiveness in meeting the needs of local land managers. Most recently, my research has been in collaboration with the NH Division of Forests and Lands, to investigate the ability of new UAS methods for classifying oak tree recovery following the outbreak of spongy moth (*Lymantria dispar*). As a technical consultant for GIS, Image Analysis, and Machine Learning applications, my collaborators have included *Tetra Tech, Wildlife Conservation Society, the US Agency for International Development (USAID), the German Agency for International Cooperation (giz GmbH), SERVIR-SEA (NASA), Birdlife International, SIG-NAL*, and various state and governmental agencies. These projects, at some points, simultaneously span nine countries across three continents. My core area of expertise and interests include spatial data science, geovisualizaiton, spatial data accuracy, and natural resource conservation. Through these consultancies, I have become adept at project management and leading multi-organization training sessions for interdisciplinary teams, even those connected through language barriers. As I continue to grow my skills and connections, I look forward to enhancing the potential of the stakeholders that I come to collaborate with.

Education

Natural Resources and Environmental Studies, PhD September, 2021
University of New Hampshire
Durham, NH

Graduate Certificate in Geospatial Science May, 2019

M.S. Natural Resources September, 2017
University of New Hampshire
Durham, NH

B.S. Wildlife Conservation and Biology May, 2015
Minor in German Language
University of New Hampshire
Durham, NH

Achievements:
Granit State SAF Student of the Year (2018), Dean's List (2011-2015); Alpha Gamma Rho Omega Chapter Academic Scholarships; U.S. Air Force Commissioning.

Academic Experience

Visiting Assistant Professor August 2025 –Present
University of New Hampshire
Durham, NH

- Professor on record for the Introduction to Remote Sensing, Introduction to GIS, and Digital Image Processing courses (undergraduate and graduate curriculum).
- Director of the Basic and Applied Spatial Analysis Lab (BASAL).
- Develop and lead multidisciplinary geospatial research relating to local, regional, and global natural resource conservation.
- Establish and expand partnerships between the Department of Natural Resources and conservation organizations.

NHView State Coordinator August 2024 –Present
AmericaView
Durham, NH

- Collaborate with state and regional partners expand geospatial literacy, educational resources, and technical capabilities.
- Provide guidance and resources for educators regarding GIS and remote sensing technologies and methods.
- Perform tangible research on GIS and remote sensing technologies which will benefit the state of NH.

NSRC Program Manager October 2023 –Present
Northeastern States Research Cooperative

- Compile proposals and reviews based on fundamental and applied forestry research across the Northeastern United States.
- Worked with a team of Executives, Managers, and External Advisors to uphold the merits of a multimillion-dollar RFP.
- Distributed over $4 million dollars to projects meeting the core objectives of the program.

Postdoctoral Researcher October 2021 – August 2025
University of New Hampshire
Durham, NH

- Conduct novel research on New England forests, riparian habitats, freshwater ecosystems, and agricultural interests.
- Collect, post-process, and analyze UAV imagery and Lidar data to quantify natural resources.
- Built a network among students, faculty, and state agencies to progress interdisciplinary research projects.
- Maintain and advance spatial analysis lab computer hardware, computer software, processing capabilities, and field tools totaling over $100,000 in value and 100 TB of data.

Contemplative Photojournalism Mapping June 2019 – January 2020

- Assisted UNH Communications Professor Dr. Kevin Healey as a GIS Technical Expert.
- Created an ArcGIS StoryMap to communicate an interactive progressive media and ethics exercise.

ESRI Massive Online Open Courses (MOOC)

- 'Cartography and Map Design' in ArcGIS Pro May 2019
- 'Earth Imagery at Work' Course in ArcGIS Pro March 2017

Professional Experience

GIS Research Solutions LLC January 2024 – Present
CEO

- Respond to RFPs related to geospatial intelligence and environmental conservation.
- Build the capacity of regional experts to leverage remote sensing, image processing, and GIS for their project specific needs.
- Develop client specific products including maps, reports, publications, and geovisualizations.

Geospatial Technical Consultant September 2024 – October 2024
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Remote

- Consult project managers on the practicality and level of effort required to quantify current trends in cashew (crop) production throughout several provinces in Cambodia.
- Use cutting edge GIS and remote sensing techniques to produce reliable estimates of cashew and cassava production between 2020 and 2024 in Cambodia.
- Present findings to diverse collaborators and funding agencies, including European Union (EU) stakeholders.

GIS and Remote Sensing Consultant February 2024 – August 2024
Wildlife Conservation Society, Lao PDR, Consultant
Remote

- Develop and teach more than 10 remote sensing and image processing lessons to non-English speaking GIS professionals and government officials.
- Evaluate the loss of protected forest across 7 landscapes, spanning over 6.9 million acres.
- Collaborate with regional project managers and landscape experts to concisely report the findings of a multi-year change detection analysis.
- Develop machine learning classification methods using integrated SAR (radar) and Optical satellite imagery.

GIS and Remote Sensing Trainer July 2023 – June 2024
Wildlife Conservation Society, Cambodia, Consultant
Remote

- Develop and teach 9 hands-on workshops covering fundamental methods in Google Earth Engine (GEE) and ArcGIS Pro for land cover and change detection mapping.
- Work with the WCS Cambodia GIS team and regional landscape managers to establish site specific analysis and spatial data documentation procedures covering 7.4 million acres.
- Ensure participants meet course objectives, including being able to adapt lessons to new environments or land cover/ land use scenarios.

GIS Specialist, Consultant June 2022 – May 2024
U.S. Agency for International Development via Tetra Tech
Remote

- Map and quantify changes in crop cover in 4 protected areas (7.7 million acres) of Cambodia.
- Organize and archive relevant spatial data, including satellite imagery and reference data, related to historic deforestation.

- Collaborate with local experts, international teams, and technical experts (e.g., Wildlife Conservation Society and REDD+) to meet interdisciplinary project objectives, such as commodity returns.
- Provide 2 hands-on trainings for Google Earth Engine and ArcGIS Pro for newly developed project methods in remote sensing and GIS.
- Compile both summary reports and detailed methodological reports for future project documentation.

Remote Sensing and Machine Learning Analyst July 2023 – April 2024
Tetra Tech, Consultant
Remote

- Develop geospatial analysis, machine learning, and spatial data exploration, techniques to enhance the capabilities of the Data, Analytics, and Technology (DAT) team.
- Work with the DAT team to determine best practices and preferred objectives of remote sensing and GIS analyses for deforestation and agricultural land use dynamics.
- Prepare a multiday workshop to adapt these methodologies (including novel code, statistical analyses, and visualizations) to targeted large area (i.e., country-wide) scenarios based on environmental conservation, international development, and water resources.

GIS Technician December 2018 – September 2023
Spatial Informatics Group – Natural Assets Laboratory (SIG-NAL)
Remote

- Identify and curate freely available spatial data layers for Akiachak, AK.
- Support reforestation and forest management objectives by creating versatile spatial data visualizations.
- Quantify carbon offset co-benefits for indigenous communities throughout the U.S.

GIS Web Application Specialist August – December 2021
AmericaView
Remote

- Designed and maintained ArcGIS Online StoryMaps for the AmericaView earth sensors and research committee.
- Enacted content and design changes based on user and committee feedback.

Geospatial Consultant February 2019 – Spring 2021
Geospatial Support Center – University of New Hampshire
Durham, NH

- Provided support for various spatial modelling software (e.g., QGIS, ArcGIS, Google Earth).

- Created and guided introductory and advanced workshops on geospatial software and analytical methods to diverse end users.
- Consulted on university projects featuring spatial mapping.
- Documented end user solutions using standardized communication management software.

Service

Academic Journal Reviewer (*35*)

- International Journal of Digital Earth, Remote Sensing, Drones, Forests, Ecology and Evolution, GIScience, Forest Policy and Economics, Ecological Informatics, Applied Sciences, Artificial Intelligence Review, Integrated Environmental Assessment and Management, Scientific Reports and International Journal of Remote Sensing.

Guest Lecturer

- Introduce fundamental concepts of GIS for the CEP 614 Fundamentals of Community & Environmental Planning course.

GIS Technical Consulting

- Discuss current products and recommended practices with the ESRI Imagery Products Team.

Applied Remote Sensing Consulting

- Discuss field leading technologies (such as UAS and mobile data collection) and methods with the NH Department of Environmental Services, MA Department of Environmental Services, and NH Division of Forest and Lands

Teaching and Mentorship

Adjunct Faculty August 2024 – Present
White Mountain Community College

- Lead instructor for GIS211 GIS Applications course.

Lead Instructor Fall 2023 – Present
University of New Hampshire
Durham, NH

- NR 658 Introduction to Geographic Information Systems
  - Guide 150 undergraduate through the fundamental theories of spatial data, data management, and the use of ArcGIS software.
- NR 757/857 Remote Sensing of the Environment.
  - To teach a working knowledge and appreciation for remote sensing tools and fundamentals including photo interpretation, photogrammetry, mapping, and the characteristics of sensors.
- NR 759/ GEOG 759 Digital Image Processing for Natural Resources.

- Implement hands-on applications in image processing, spatial data exploration, and the translation of data into actionable information.

Undergraduate Research Manager Fall 2024 – Present
University of New Hampshire
Durham, NH

- Developed independent research projects related to GIS and remote sensing technologies and methods focused on New Hampshire natural resource conservation.
- Secured independent funding and resources for projects.
- Supervised and collaborated on research projects, scientific communication, and scientific publishing.

Graduate Research Committee Member Fall 2017 – August 2025
University of New Hampshire
Durham, NH

- Hunter Moore, M.S. Student, Natural Resources (Mobile Lidar).
- Molly Cahill, M.S. Student, Natural Resources (Hemlock Wooley Adelgid)
- Christine Bunyon, M.S. Student, Natural Resources (Freshwater Cyanobacteria).
- Sarah Reny, M.S. Student, Natural Resources (Forest Inventory and Monitoring).
- Molly Yanchuck, M.S. Student, Natural Resources (Riparian Invasive Species).

Curriculum Development February 2024 – May 2025
Bunker Hill Community College
Remote

- Worked with the Dean of Science, Engineering, and Mathematics to develop novel GIS curriculum which will initiate a GIS Certificate Program.
- Designed learning objectives and course materials for three courses: (1) Remote Sensing, (2) Advanced GIS, (3) GIS Project Capstone.
- Communicated the current needs of GIS professionals in the workplace.

Undergraduate Research Supervisor Summer 2018 – May 2024
University of New Hampshire
Durham, NH

- Coordinated 6 UNH summer undergraduate research fellowships.
- Managed and mentored ground-based forest inventory and GPS surveying.
- Advised UAS flight planning and geospatial analysis of multitemporal models.
- Supported award winning conference presentations and the publication of research results and methods.

Graduate Teaching Assistant August 2015 –Spring 2021
University of New Hampshire
Durham, NH

- Developed coursework for remote sensing and GIS to meet current best practices.
- Facilitated lessons for individuals, small teams, and classes up to 125 students.
- Guided photo interpretation, photogrammetry, and ArcGIS tutorials, assignments, and projects.

Natural Resources Lab Monitor Spring 2020 – Spring 2021
University of New Hampshire
Durham, NH

- Maintained academic software for the UNH natural resources computer lab.
- Provided licensing support for university professors, lecturers, and graduate students.
- Coordinated and assisted hardware configuration on routine intervals.

Funding

NHView 25' RCA May 2025
AmericaView
Role: State Coordinator
(*in review*)

- Sharing the effectiveness of technologies and methods for precision forestry and precision agriculture.
- Engage with private, state, and federal stakeholders throughout New Hampshire.

NSF ENGINES February 2025
NSF
(in review)

- Develop and guide new methods of precision forestry for complex natural forests, such as those in the Northeastern United States.

International Changemaker Grant December 2024
UNH Sustainability Institute
Role: Faculty Advisor (PI)

- Supervise and Mentor an interdisciplinary team of students in their support of Wildlife Conservation Societies goal in the management of protected landscapes in Cambodia.
- Develop student led, partner focused sustainability projects.
- Organize and facilitate a trip to WCS Cambodia offices in Phnom Phen, to conduct in-person trainings and discussions.

NHView 24' RCA October 2024
AmericaView
Role: State Coordinator

- Evaluating Remote Sensing Methodologies for Characterizing New Hampshire Forests: A Martelescope Approach.
- Establish strategic partnerships that encompass all communities that may benefit from the use of RS/EO data, information, and applications

GIZ GmbH October 2024
German Agency for International Cooperation (giz GmbH)
Role: Geospatial Technical Lead

- Consult on and apply cutting-edge GIS and remote sensing analytics for crop type mapping throughout select Cambodian provinces.
- Present findings using detailed technical reports and oral presentations to non-technical project managers.
- Collaborate with project partners to integrate results into sustainability practices and recommendations.

Indigenous Forest Knowledge Fund (IFKF) 24' RFP September 2024
Northeastern States Research Cooperative
Role: Technical Consultant

- 'WaYS to Utilize Indigenous Knowledge and Technology'
- Lend remote sensing (UAS) data collection and processing expertise.
- Establish a self-contained protocol and education systems on UAS for WaYS.

Lao PDR GIS/GEE RFP February 2024
Wildlife Conservation Society (WCS) Lao
Role: Technical Lead/Project Manager

- Evaluate the loss of protected forest across 7 landscapes, spanning over 6.9 million acres.
- Collaborate with regional project managers and landscape experts to concisely report the findings of a multi-year change detection analysis.

GEE and Remote Sensing Consultant July 2023
WCS Cambodia
Role: Technical Lead/Project Manager

- Work with the WCS Cambodia GIS team and regional landscape managers to establish site specific analysis and spatial data documentation procedures covering 7.4 million acres.

UNH SURF Summer 2018 - Summer 2023
Hamel Center, University of New Hampshire
Role: Research Supervisor

- Supervised the application of 6 independent undergraduate researchers to the UNH Hamel Center Summer Undergraduate Research Fellowship (SURF).
- Ensured that participants meet their reporting and communication requirements, including participation in the Undergraduate Research Conference (URC).

Peer Reviewed Publications

Fraser, B.T., Congalton, R.G., Davis, P.H., Beaudry, T., Majewski, C., Palmer, A. Precision monitoring of brown-midrib corn in New Hampshire using Unmanned Aerial Vehicles: An exploration of remotely sensed data and methods. Agricultural Research **2025**, *under review*.

Fraser, B.T., Congalton, R.G., Ducey, M.J. Quantifying the accuracy of UAS-Lidar individual tree detection methods across height and diameter at breast height sizes in complex temperate forests. Remote Sensing **2025**, 17(6), 1010. https://doi.org/10.3390/rs17061010.

Chea, M.*, **Fraser, B.T.***, Nay, S., Sok, L., Strasser, H., Tizard, R. A Survey of Changes in Grasslands within the Tonle Sap Lake Landscape from 2004 to 2023. Diversity **2024**, 16, 448. https://doi.org/10.3390/d16080448.

Kanaskie, C.R.; Routhier, M.R.; **Fraser, B.T.**; Congalton, R.G.; Ayres, M.P.; Garnas, J.R. Early Detection of Southern Pine Beetle Attack by UAV-Collected 2 Multispectral Imagery. *Remote Sens.* **2024**, *16*, 2608. https://doi.org/10.3390/rs16142608.

Fraser, B.T., Robinov, L., Davidson, W., O'Connor, S., Congalton, R.G. A Comparison of Unpiloted Aerial System Hardware and Software for Surveying Fine-Scale Oak Health in Oak–Pine Forests. *Forests* **2024**, *15*, 706. https://doi.org/10.3390/f15040706.

Lopez, I.S., **Fraser, B.T.,** Congalton, R.G. 2023. Evaluating the use of Unpiloted Aerial Systems to detect and monitor beech bark disease in New England forests. *The Geographical Bulletin, 64(2), 61-73.*

Bunyon, C.L., **Fraser, B.T.**, McQuaid, A, Congalton, R.G. 2023. Using Imagery Collected by an Unmanned Aerial System to Monitor Cyanobacteria in New Hampshire, USA, Lakes. *Remote Sens. 15(11), 2839.* https://doi.org/10.3390/rs15112839.

Fraser, B.T. Bunyon, C.L., Reny, S., Lopez, I.S., Congalton, R.G. 2022. Analysis of Unmanned Aerial System (UAS) Sensor Data for Natural Resource Applications: A Review. *Geographies*, *2*, 303-340. https://doi.org/10.3390/geographies2020021

Fraser, B.T., Congalton, R.G. 2021. Monitoring Fine-Scale Forest Health Using Unmanned Aerial Systems (UAS) Multispectral Models. *Remote Sens.* 13, 4873. https://doi.org/10.3390/rs13234873

Fraser, B.T., Congalton, R.G. 2021. A Comparison of Methods for Determining Forest Composition from High-Spatial-Resolution Remotely Sensed Imagery. *Forests* 12, 1290. https://doi.org/10.3390/f12091290

Fraser B.T., Congalton R.G. 2021. Estimating Primary Forest Attributes and Rare Community Characteristics Using Unmanned Aerial Systems (UAS): An Enrichment of Conventional Forest Inventories. *Remote Sensing*. 13(15):2971. https://doi.org/10.3390/rs13152971

Fraser, B. T., & Congalton, R.G. 2019. Evaluating the Effectiveness of Unmanned Aerial Systems (UAS) for Collecting Thematic Map Accuracy Assessment Reference Data in New England Forests. *Forests*, 10(1), 24. https://doi.org/10.3390/f10010024

Fraser, B. T., & Congalton, R.G. 2018. Issues in Unmanned Aerial Systems (UAS) data collection of complex forest environments. *Remote Sensing*, 10(6). https://doi.org/10.3390/rs10060908

Other Publications (i.e., Reports and Books)

Fraser, B.T., Bunyon, C.L., and Congalton, R.G. 2024. Conducting Structure-from-Motion (SfM) Modeling of Freshwater Environments using Unpiloted Aerial Systems (UAS): Challenges and Lessons Learned. *UNH Scholars Repository*.

Fraser, B.T. 2021. Characterizing Forest Stands Using Unmanned Aerial Systems (UAS) Digital Photogrammetry: Advancements and Challenges in Monitoring Local Scale Forest Composition, Structure, and Health. *Dissertation*. University of New Hampshire

Congalton. R.G., and **Fraser, B.T.** 2019. Chapter 2: Unmanned Aerial Systems (UAS) and Thematic Map Accuracy Assessment. *In: Sharma, J.B. 2019. Applications of Small Unmanned Aircraft Systems; Best Practices and Case Studies*. CRC Press, 17-34.

Fraser, B.T. 2017. Evaluating the Use of Unmanned Aerial Systems for Collecting of Thematic Mapping Accuracy Assessment Reference Data in New England Forest Communities. *Master's Thesis*. University of New Hampshire.

Presentations

2025; University of New Hampshire; Department of Natural Resources Seminar Series; Durham, NH - Oral

2023; Tetra Tech Monitoring Evaluation and Learning (MEL) Conference, Online - Oral

2023; Spring Northeast Arc Users Group (NEARC); University of Rhode Island - Poster

2023; University of New Hampshire; Department of Natural Resources Seminar Series; Durham, NH - Oral

2023; New England Society of American Foresters; Nashua, NH - Oral

2021; University of New Hampshire Digital Image Processing Course; Durham, NH - Oral

2020; University of New Hampshire Graduate Research Conference; Durham, NH – Poster

2019; Spring Northeast Arc Users Group; Keene, NH – Poster

2017; University of New Hampshire GIS Day; Durham, NH – Oral

2017; American Society of Photogrammetry and Remote Sensing; Baltimore, MD - Oral

2017; University of New Hampshire Graduate Research Conference; Durham, NH - Poster

2016; University of New Hampshire GIS Day; Durham, NH – Oral

Honors and Awards

2025; University of New Hampshire; Sustainability Institute International Changemaker Grant

2022; University of New Hampshire; UNH Open Access Publishing Fund

2021; University of New Hampshire; Gold - Sustainability Award (Research and Scholarship); BASAL Member

2020; University of New Hampshire; NRESS PhD Student Support Fund

2019; University of New Hampshire Graduate School; Summer Teaching Assistant Fellowship

2018; Society of American Foresters: Granite State: Graduate Forestry Student of the Year

2017; University of New Hampshire Department of Natural Resources; Ruth Farrington Fund

2017; University of New Hampshire Graduate School; Travel Grant

Relevant Affiliations and Certifications

- Northeastern States Research Cooperative (NSRC)
- AmericaView NH State Director
- Society of American Foresters
- Xi Sigma Pi Forestry Honor Society
- Alpha Phi Omega Community Service Fraternity
- ESRI Imagery Educators Community of Interest (ICE)
- American Society of Photogrammetry and Remote Sensing (ASPRS)
- NH Forest Ecosystem Monitoring Cooperative (FEMC) collaborator
- Alumni, Alpha Gamma Rho
- Eagle Scout, Boy Scouts of America
- Remote Pilot in Command (FAA UAV) Pilots License