Madeline C. Hayes

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EDUCATION:

Master of Science in Remote Sensing and Geospatial Sciences **Expected May 2022**
Boston University, Boston, MA

Bachelor of Science in Environmental Sciences **May 2019**
University of Vermont, Burlington, VT
Concentration: Environmental Analysis and Assessment | **Minor**: Geospatial Technologies

Honors and Awards:
Presidential Scholar, University of Vermont **Aug 2015 - May 2019**
Dean's List, University of Vermont **Fall 2018 - Spring 2019**

PROFESSIONAL EXPERIENCE:

Research Assistant, NASA MEaSUREs **Jan 2022 - Present**
Boston University, Center for Remote Sensing

- Collecting training and validation data for local-to global scale annual mapping of land cover, land use, and land cover change
- Researching land cover and land use information to ensure detailed characterization of product accuracy

Remote Sensing Analyst and Unoccupied Aircraft Systems (UAS) Pilot **Dec 2019 - Aug 2021**
Duke University, Marine Robotics and Remote Sensing Lab

- Piloted fixed wing and multi-rotor platforms for UAS-based data collection
- Generated UAS data products with structure from motion techniques for GIS integration
- Developed automated classification algorithms and machine learning models for geospatial analysis of animal and habitat data

GIS Technician Team Lead and Unoccupied Aircraft Systems (UAS) Pilot **Jun 2018 - Nov 2019**
University of Vermont, Spatial Analysis Lab

- Led UAS operations, including flight planning, data acquisition, data processing, and GIS integration
- Created and integrated GIS data layers to manually correct land cover data
- Performed quality assurance and quality control on complex imagery and LiDAR datasets

U360 Business Sustainability Intern **Jan 2018 - May 2018**
Manomet, Inc

- Streamlined collection of business sustainability data through cultivation of relationships with small business owners
- Conducted research into sustainability plans to identify solutions and develop deployment plans

RESEARCH EXPERIENCE:

Remote Sensing for Water Quality Research **Jul 2020 - Jul 2021**
Duke University, Marine Robotics and Remote Sensing Lab

- Collaborated with the North Carolina Department of Environmental Quality to determine utility of drone technology for water quality assessment
- Conducted multispectral drone flight operations before, during, and after dredging events
- Created a Python programming workflow to extract turbidity measurements from raw images, including radiometric calibration and georeferencing of imagery
- Generated turbidity heat maps and image mosaics for comparison to in-situ measurements

Artificial Intelligence for Seabird Population Monitoring Research **Jan 2020 - May 2021**
Duke University, Marine Robotics and Remote Sensing Lab

- Processed drone imagery collected by the Wildlife Conservation Society in Argentina to generate orthorectified maps with photogrammetric techniques
- Built, trained, validated, and deployed a convolutional neural network for the automated detection and enumeration of seabirds in the Falkland Islands, Argentina
- Ran inference on entire seabird colony areas to generate automated detections
- Evaluated geostatistical techniques for breeding pair and active nest analysis

Drones for Invasive Species Management Research **Jun 2018 - Nov 2019**
University of Vermont, Spatial Analysis Lab

- Collaborated with the Vermont Department of Environmental Conservation to test the viability of drone technology for aquatic invasive species management
- Conducted drone flight operations and generated geospatial products to support the survey and removal of aquatic invasive species in the Lake Champlain Basin
- Analyzed true color and multispectral imagery to generate automated feature extraction algorithms for identification and quantification of the aquatic invasive species

PRESENTATIONS

Hayes, M.C. (April 2021). "Deep learning and drones to automate seabird population counts," ESRI Imagery and Remote Sensing Educators Summit.

Hayes, M.C. (March 2021). "Deep learning and drones to automate seabird population counts," Drones in the Coastal Zone Workshop.

Hayes, M.C. (November 2019). "Mapping water chestnut from above," North American Lake Management Society Symposium, Burlington, VT.

Hayes, M.C. (April 2019). "Mapping water chestnut from above," University of Vermont Student Research Conference, Burlington, VT.

PAPERS

Hayes, M.C., P.C. Gray, G. Harris, W.C. Sedgwick, V.D. Crawford, N. Chazal, S. Crofts, and D.W. Johnston (2021). Drones and deep learning produce accurate and efficient monitoring of large-scale seabird colonies. *Ornithological Applications, 123*, 1-16. DOI: 10.1093/ornithapp/duab022

Hayes, M.C., B. Puckett, C. Deaton, J.T. Ridge (2021). Estimating dredge-induced turbidity using drone imagery. *Preprints, 2022010424.* DOI: 10.20944/preprints202201.0424.v1

TEACHING EXPERIENCE:

Teaching Fellow, Crises of Planet Earth **Jan 2022 - May 2022**
Boston University, College of Arts and Sciences

Teaching Fellow, Introduction to Climate and Earth System Science **Sep 2021 - Dec 2021**
Boston University, College of Arts and Sciences

Teaching Assistant, Intro to GIS **Aug 2018 - Dec 2018**
University of Vermont, Rubenstein School of Environment and Natural Resources

U360 Alumni Assistant **May 2018 - May 2021**
Manomet, Inc

SKILLS AND CERTIFICATIONS:

ArcGIS, Python, R, QT Modeler, ENVI, Pix4D, eCognition, Google Earth Engine
FAA Part 107 Licensed Remote Pilot, 100+ flight hours