

Rachel Crafford

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RESEARCH STATEMENT

I am completing a dual master's in Ecology (May 2024) and Environmental Management (December 2024) at Western Colorado University. My current research focuses on using remote sensing methods to model bird community responses to habitat change in post-fire landscapes. I have collaborated on projects across the U.S. and Latin America, and have other research interests in seed dispersal, plant-pollinator interactions, and restoration ecology.

I am passionate about translating science into conservation strategies using strong stakeholder engagement and project management skills. My supplementary undergraduate coursework in Anthropology and formal DEI+ training inform my interdisciplinary approach to conservation, and I work to foster inclusivity in STEM and within my research.

SUMMARY OF QUALIFICATIONS

Research: Ecological research project design and implementation, presentation of findings (written/oral)

Quantitative: Data compilation and QA/QC, advanced statistical analysis and modeling

Project coordination: Project development and management, stakeholder engagement, meeting facilitation

Writing and editing: Published, peer-reviewed scientific reports, grant writing, manuscript editing

Leadership: Field crew leadership, DEI+ trained (URGE Curriculum), peer mentorship & advising

Technical: R & RStudio, ArcGIS Pro, QGIS, Agisoft Metashape, Google Earth Engine, Microsoft Suite

Field: Wildlife handling, habitat restoration, mist-netting, bird banding, forestry data collection, camera trapping, PIT-tagging (turtles), mark-recapture (insects), bird morphology data collection, drone piloting (FAA Part 107 licensed), wildland firefighter and fire behavior training (National Wildfire Coordination Group S-190 & S-130 certified)

Languages: English (native), Spanish (proficient)

EDUCATION

Western Colorado University, Gunnison CO

Master of Science in Ecology – May 2024

- **Master's Thesis:** "Impacts of wildfire at whole ecosystem scales: Leveraging remote sensing to model bird-habitat associations across historical and contemporary piñon-juniper landscapes."
- **Coursework:** Ornithology, Forest Ecology, Advancing DEI+ In Science, Fire Ecology and Management, Remote Sensing, Intro to GIS, Ecological Research Methods

Master of Environmental Management (Public Lands Management Track) – *anticipated December 2024*

- **Master's Project:** Mesa Verde Natural Resources Condition Assessment
- **Coursework:** Climate Change: From Science to Action, Public Lands Management, Integrated Skills for Environmental Management, Environmental Policy and Politics

Wheaton College, Norton MA, 2016-2020

BA Environmental Science, BA Anthropology, Minor in Environmental Studies

Magna cum laude

- **Honor's thesis:** "Stability and resilience of plant-pollinator networks in an Andean montane community in southern Ecuador"
 - **Anthropology thesis:** "Mothering Earth: Indigenous Eco-activism in the Americas"
 - **Coursework:** Environmental Science, Tropical Field Biology, Conservation Science, Aqueous Equilibria, Current Problems in Environmental Chemistry, Economic Botany, Marine Biology
 - **GPA:** 3.8 (4.0 scale)
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PROFESSIONAL EXPERIENCE

1. Wildlife Field Crew Lead & Technician June 2023 – November 2023; May 2024 – September 2024

Bureau of Land Management Gunnison Field Office, Western Colorado Conservation Corps

- Worked as Wildlife Technician for 2023 season, was rehired as Crew Lead in 2024.
- Deployed stationary acoustic monitors to collect data for North American Bat Monitoring Program in riparian areas in Gunnison County.
- Earned BLM Endangered Species Act of 1973 Training Certification.
- Conducted snowshoe hare pellet surveys in steep terrain and sometimes extreme conditions in an area targeted for fuels reductions treatments in the North Powderhorn Wilderness.
- Conducted broadcast acoustical surveys to monitor for American Goshawk in Gunnison Basin and North Powderhorn Wilderness. Wrote reports summarizing findings.
- Researched status, trends, and wrote species narrative for Prairie Falcon 2023 BLM Colorado Sensitive Species List.
- Decommissioned roads and restored Gunnison sage-grouse habitat by planting sagebrush seedlings.
- Conducted Gunnison prairie dog surveys and vaccination treatments on 150+ acres of public and private land. Monitored existing colonies and mapped new ones.
- Compiled and organized all datasheets related to various projects and entered raw data into Excel.
- Assisted AIM crew with sagebrush plant identification and monitoring; conducted plant surveys in subalpine forests.
- Conducted point-count surveys for breeding birds in subalpine habitat, Powderhorn Wilderness.
- Demonstrated use of hand-tools and off-road vehicle operation.

2. Private Contractor: LiDAR Research Assistant

December 2023 – September 2024

Rocky Mountain Biological Laboratory / United States Forest Service

- Determined which vegetation structures are useful to USFS and develop methods to extract these using RStudio from aerial LiDAR data collected by USFS contractors.
- Made vegetation structure maps (canopy cover, maximum tree height, etc.) for the entire GMUG (Grand Mesa, Uncompahgre, Gunnison) National Forest unit.
- Worked extensively in RStudio to extract metrics of interest from LiDAR point cloud data.
- Used ArcGIS Pro to develop map deliverables based on raster files of vegetation metrics derived from point cloud data.
- Developed a final report including summary of deliverables, maps, detailed workflow, and applications of deliverables for the USFS at the end of the term.

3. Graduate Research Assistant

August 2022 – May 2024

Western Colorado University

- Conceptualized and implemented master's thesis research: "Impacts of wildfire at whole ecosystem scales: Leveraging remote sensing to model bird-habitat associations across historical and contemporary piñon-juniper landscapes."
- Conducted field work doing bird point-counts. Trained and supervised one field assistant on field protocol for their first field-based experience.
- Camped overnight and hiked in primitive backcountry areas.
- Gathered and managed large amounts of data gathered from bird, habitat, weather, and topographic surveys.
- Processed over 500 LiDAR point cloud tiles using R to extract vegetation structure metrics.
- Used Google Earth Engine to obtain and process Landsat 8 OLI Satellite Imagery to extract NDVI.
- Used advanced statistical analysis (Bayesian hierarchical modeling) to determine bird-habitat associations in burned and unburned areas.
- Wrote a thesis-length report providing background information, methods, analysis, and major findings.
- Formally presented findings in April 2024 at Denver Audubon Society annual meeting, in June 2024 at North American Forest Ecology Conference, and in October 2024 at American Ornithological Society Annual Meeting in Estes Park, CO.
- Worked extensively with local Ute Mountain Ute tribe to conduct point-count surveys on their land. Attended and presented at Tribal Council meetings before getting permission to conduct surveys.
- Maintained contact with the tribe for sharing results.

4. Natural Resources Condition Assessment Team Member

October 2023 – present

Mesa Verde National Park, Conservation Science Partners, Western Colorado University

- Serving as a facilitator and author of a Natural Resources Condition Assessment for Mesa Verde National Park.
- Collaborating with NPS and Conservation Science Partners (non-profit)
- Engaging with 5+ stakeholder groups (researchers within academia, other state and federal agencies, non-profit organizations, local ranchers) to aggregate data related to key natural resources of interest in Mesa Verde.
- Data acquisition and organization, identification of gaps in the existing literature to determine where more data is needed.

- Developed a draft of the Study Plan outlining resources/datasets that have been obtained, planned statistical analysis needed, conducted GAP analysis, determined a protocol for assessing the condition of each natural resource (passerines, big game, seeps & springs, upland vegetation, etc.).
- Will present a final version of the NRCA to the Mesa Verde Natural Resources Department in October 2024.

5. Project Manager, SORP Visitor Use Management Strategies **October 2023 – December 2023**
Society for Outdoor Recreation Professionals (SORP), Western Colorado University

- Led a student working group as PM for the Integrated Skills for Environmental Management course at Western Colorado University.
- Facilitated meetings with group members and project sponsor to outline project deliverables and hold regular check-ins.
- Conducted a literature review of all existing Visitor Use Management case studies and developed a set of deliverables (leaflets) to disseminate information on interagency VUM strategies for outdoor professionals within SORP network.
- Delivered an oral and visual presentation of final product to class and project sponsor at the end of the class.

6. Avian Field Technician **July 2023**
University of Tennessee (Knoxville); FCAT Research Station (Ecuador)

- Assisted in gathering data for research on avian-mediated seed-dispersal networks in fragmented habitats.
- Mist-netted and banded birds, recorded morphological data, conducted pollen and fecal sample collection.
- Deployed and deconstructed mist nets and banding station regularly.

7. Field Crew Lead & UAV Technician **June 2022 – September 2022**
Rocky Mountain Biological Laboratory

- Led a team of REU undergraduate students in conducting field research exploring the effects of climate change on high elevation wildflower phenology.
- Served as a graduate mentor for these students during their first field season.
- Learned to identify Colorado's alpine flower community on the job, after not having worked in the state before. Obtained FAA part 107 UAV pilot's license before starting the job.
- Hiked, identified forbs, and flew a drone in rugged and steep terrain, often encountering inclement weather.
- Regularly spoke with tourists and recreators about the research project and the impacts of climate change on wildflowers in Crested Butte and other mountain communities.
- Processed drone imagery using Agisoft Metashape to ground-truth remotely sensed data.

8. Avian Field Technician **July 2018 – August 2018; August 2019**
Parque Nacional Cajas (Ecuador), Wheaton College (MA) Department of Biology

- Provided field work for a project studying diversity, abundance, and community structure of birds in the Andean cloud forest of southern Ecuador.
- Mist-netted, banded, and took morphological data from birds.

- Observed mixed-species flock composition and behavior.
- Collected pollen and fecal samples from birds that we caught.
- Worked as an undergraduate research assistant for two summers.

9. Diamondback Terrapin Research Intern

June 2018 – August 2018

Cape Cod National Seashore, Wellfleet Bay Wildlife Sanctuary

- Collected life history data for a project studying the effects of salt-marsh development and fragmentation on breeding success and predation on threatened diamondback terrapin turtle.
- Gathered morphological data from and PIT-tagged turtles, recorded nest locations, and relocated nests to protected areas.
- Communicated often with curious recreationalists about the work that we were doing to protect terrapins. Provided information about ways in which they could help the Audubon Society's efforts.

PUBLICATIONS

Crafford, R.E., Breckheimer, I. K., Jones, H. J., Coop, J. D. (2024). Leveraging Remote Sensing to Model Bird-Habitat Associations Across Fire-Affected Piñon-Juniper Landscapes. [Manuscript in preparation].

Jones, A, McTague, S, Suraci, J, & **Crafford, R.** (in prep). Natural resource conditions at Mesa Verde National Park: Findings & management considerations for selected resources. Natural Resource Report NPS/MEVE/NRR— 2024/XXXX. National Park Service, Fort Collins, Colorado.

Lussier, N. M., **Crafford, R. E.**, Reid, J. L., & Kwit, C. (2024). Seeding success: Integrating seed dispersal networks in tropical forest restoration. *Biotropica*, 00, e13347. <https://doi.org/10.1111/btp.13347>

Knowlton, J. L., **Crafford, R. E.**, Tinoco, B. A., Padrón, P. S., & Wilson Rankin, E. E. (2022). High Foraging Fidelity and Plant-Pollinator Network Dominance of Non-native Honeybees (*Apis mellifera*) in the Ecuadorian Andes. *Neotropical Entomology*, 1-6.

Crafford, R. E. (2020). Stability and resilience of plant-pollinator networks in an Andean montane community in Southern Ecuador (Undergraduate thesis, Wheaton College, [Norton, Mass.]).

PRESENTATIONS

Oral Presentations, "Impacts of wildfire at whole ecosystem scales: Leveraging remote sensing to model bird-habitat associations across historical and contemporary piñon-juniper landscapes," North American Forest Ecology Workshop, North Carolina State University, June 2024; American Ornithological Society, Estes Park, CO, October 2024.

Oral Presentation, "Leveraging remote sensing to model bird-habitat associations across fire-affected piñon-juniper landscapes," Lois Webster Fund/Denver Audubon Society Annual Meeting. April 16, 2024.

Poster Presentation, “Stability and resilience of plant-pollinator networks in an Andean montane community in southern Ecuador,” National Collegiate Research Conference, Harvard University. January 2020.

Poster Presentation, “Stability and resilience of plant-pollinator networks in an Andean montane community in southern Ecuador,” North American Congress for Conservation Biology. (Postponed due to COVID-19)

Poster Presentation, “Mixed species flock network structure at El Gullan Biological Station, La Paz Ecuador,” National Order of the Arrow Conference. (Postponed due to COVID-19)

OUTREACH AND LEADERSHIP

Student Grader, Environmental Science Course Fall 2020

Hired following undergraduate graduation to grade student assignments and exams. Held review sessions and met one-on-one with students in the Environmental Science class at Wheaton.

Activity Leader, Youth Climate Action Summit November 2019

Worked with the Audubon Society of Massachusetts to bring together over 120 students from three area high schools; facilitated discussions about environmental issues and developed ‘action plans’ for students to implement at their schools.

Teaching Assistant, Ecology Course Spring 2019

Hired to TA the Ecology course intended for science majors at Wheaton. This course was an overview of necessary skills to conduct research in biology, with an emphasis on reading and discussing scientific literature, carrying out lab exercises, summarizing and analyzing data, and presenting research in oral and written forms.

Sophomore Peer Mentor 2017-2018

Helped freshman students navigate major selection, course registration, and school-life balance; facilitated advisor-advisee introductions and supported students during their transition to college.

HONORS AND AWARDS

Denver Audubon Society Lois Webster Fund 2023

\$2,500 grant to support field work for master’s thesis research.

National Science Foundation Research Traineeship 2022

\$34,000 stipend & tuition waiver for first year of graduate program.

Phi Beta Kappa Honors Society Graduate Scholarship 2022

\$6,000 awarded to select Wheaton College graduates to support further education in the sciences.

Clinton V. MacCoy Prize in Ecology 2020

\$2,000 award given to two seniors per year for depth of interest in Ecology and intention

to continue in the field of Biology after graduation from Wheaton College.

Davis International Fellowship 2019

\$5,000 granted to help select Wheaton students conduct international research.

Merit Scholars Stipend 2018

\$3,000 granted to support summer research or internship experiences.

TriBeta Biological Honors Society 2018 – present

Wheaton College, MA chapter.

May Fellows Academic Honors Society 2016 –2020

Wheaton College, MA.

REFERENCES

Dr. Ian Breckheimer

Scientist, Rocky Mountain Biological Laboratory; Adjunct Professor, Western Colorado University

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