

# Rebekah Fields | Curriculum Vitae

225 Mount Ave Missoula MT, 59801 720-235-2231 rebekah.l.fields@gmail.com

## Education

**M.S. Systems Ecology** – University of Montana, Missoula, Montana 2020-2022  
**B.S. Biology** – Concordia University, Seward, Nebraska 2014 - 2017

## Work Experience

**Spatial Ecologist** – University of Montana Spatial Analysis Lab, Missoula MT October 2023 - Present

Develop, coordinate, and integrate spatial and tabular databases, analyze data, and assist with the development of proposals, reports, and publications. Lead and manage key project deliverables, including the application of remote sensing techniques for ecological mapping and landscape analysis. Implement machine learning algorithms to automate classification processes, enhance predictive modeling, and analyze large datasets. Produce informational products for online resources and provide expert consultation to researchers and students. Oversee project timelines, resource and staff allocation and supervise student workers. Execute spatial data analysis, manage geospatial data, and support staff with data visualizations. Oversee field data collection and contribute to presentations, literature reviews, and scientific publications. Manage lab operations, develop partnerships with partners, and implement new technologies to enhance workflow efficiency and service delivery.

**Field Coordinator** – University of Montana Spatial Analysis Lab, Missoula MT January 2023 - October 2023

Oversaw field data collection by preparing data collection forms, coordinating crews, and selecting survey locations using raster and vector datasets. Trained multiple field crews of primarily undergraduate students on sampling methods, plant identification, use of GIS technologies and research methods.

Developed machine learning models to build out iterative sampling methods by using model predictions to identify areas of high probability and habitat suitability. Prepared data collection permits for public and private agencies across the state.

**NSF REU Mentor** – Salish Kootenai College Department of Geosciences, Pablo MT May-August 2021, 2022

Mentored undergraduate students during Research Experience for Undergraduates (NSF REU) with the geosciences program through University of Minnesota. Oversaw student research projects and helped direct their research as well as their presentations and papers for their final REU project. Projects included examining the spatial distribution of soil carbon using soils data, species distribution models, and developing spatial climate datasets for agricultural applications local to the Flathead Reservation, MT.

**Research Assistant** – Salish Kootenai College Department of Wildlife, Pablo MT April 2019-January 2022

Managed field data collection by sampling vegetation and surveying bumble bee populations. Collected detailed phenological data on huckleberry plants using trail cameras and temperature sensors. Gathered primary source pollen for microscope slides as well as secondary source pollen from bumble bees. Identified preserved specimens of bumblebees using dichotomous keys. Assisted with student coursework and laboratory management. Including overseeing research on pollen identification, soil moisture at huckleberry sites, huckleberry productivity, and floral diversity.

Substitute taught ecology field methods, avian studies, and wetland plants courses.

**Wildlife Technician** – US Forest Service, Salmon-Challis National Forest, Salmon ID May - September 2017

Used GIS and remote sensed data to locate suitable habitats for sage grouse leks and nesting. Ground truthed locations and collected vegetation and habitat data including species inventory and pollinator capture.

**Laboratory Teaching Assistant** – Concordia University, Seward, Nebraska 2016 - 2017

Work with professors to assist students with experiments and teach biological concepts. Prepared laboratory classes, met with students for tutoring, and worked with faculty to design lab experiments for students.

**Biological Technician** – Kenai National Wildlife Refuge, Soldotna, Alaska Summer 2016

Worked with biology refuge staff to complete research projects. Field work included remote location data collection through backpacking and aerial survey. Projects included invasive species

control and eradication, snowshoe hare population data, fire prevention survey, insect species evaluation and bird surveys. Most work involved GPS use for locating points or marking points and GIS preparation using Google Earth and ArcGIS.

**Research Assistant** – Concordia University, Seward, Nebraska

Spring 2016

**Auburn University REU Fellowship** – Auburn University, Auburn, Alabama

Summer 2015

## Teaching Experience

### Teaching

Introduction to Geographic Information Systems (GIS) and Cartography (GPHY 284, FORS 250)	January 2024-Present
Entomology, University of Montana (substitute)	February 2022
Ecology Field Methods, Salish Kootenai College (Substitute)	October 2019
Wetland and Riparian Habitats, Salish Kootenai College (Substitute)	October 2019

### Teaching Assistant

Soils, Water and Climate (NRSM 210), University of Montana	Spring 2021, 2022
Rangeland Management (NRSM 360), University of Montana	Fall 2021, 2022
Practice of Silviculture (FORS 349), University of Montana	Fall 2021
Intro to Forestry Field Methods (FORS 130), University of Montana	Fall 2021

## Speaking Events

<b>Montana Weed Control Association Annual Meeting</b>	2024
<b>Missoula Butterfly House and Insectarium</b>	2021, 2020
<b>Five Valleys Audubon Society</b>	2020
<b>Missoula Climate Lobby</b>	2019
<b>Salish Kootenai College Visit Day</b>	2019

## Research

### University of Montana

**Applying resource selection probability function to understand floral resource use in a common bumble bee, *Bombus vancouverensis***

*Bombus vancouverensis* is a common bumble bee in North America. Like many bumble bees, they are considered generalist species, but have known floral associations throughout the flowering season. Bumble bees acquire all their nutrients through the pollen they eat, and as consumers, they must forage to meet their nutritional requirements. Using ecological stoichiometry, we can examine the elemental composition of pollen and compare it to the ratio of elements in the bumble bee bodies to determine what flowers are most beneficial to meeting their nutrient requirements

through the flowering season. This will assist researchers with understanding how bumble bees forage for the flowers they pollinate, what flowers are more nutritious, and assist conservationists with targeted planting efforts.

### **Predicting Huckleberry Habitat Using Species Distribution Models**

Black huckleberry, *Vaccinium membranaceum* is a common understory shrub across the northern and western US. Along with its considerable ecological importance as a keystone species, it's a culturally significant plant for the indigenous people of North America. Centuries of fire suppression have resulted in decreased suitable habitat and increased competition by taller and faster growing species. Using an ensemble species distribution model (SDM), six covariates were used to fit three SDMs: generalized linear modeling (GLM), generalized additive modeling (GAM), and a BioClim envelope model to determine current huckleberry distribution at 1km resolution and predict future distributions using the EC-EARTH3-Veg climate model for the years 2021-2040 and 2041-2060. Present models found spring temperatures and winter precipitation to be most important determinates in huckleberry distribution, with higher spring temperatures and decreased winter precipitation limiting occupancy probability. 2021-2040 climate projections found an initial decrease in distributions as spring temperatures increased, however 2041-2060 climate showed an increase in winter precipitation that was found to increase huckleberry probability. Understanding organisms' response to climate change is critical to conservation and using huckleberries provides insight into potential distributions of other organisms as well as important cultural preservation for future generations.

Spatial data was gathered and managed using ArcGIS and all analysis was done in R. Research presented at Grad Con 2022.

### **Using Classification Trees to Identify Bumble Bees**

Using a suit of taxonomically important data collected 2019-2020, a recursive partitioning classification tree and random forest model were trained to identify bumble bees to one of 12 species. The two methods were compared to explore the accuracy of identification. Random forest model had an accuracy of 93% and recursive partitioning had an accuracy of 88%. The models commonly confused species that are similar taxonomically suggesting similar decision making to dichotomous keys.

All analysis and training was done in R. Research presented at Grad Con 2021.

### **Salish Kootenai College**

April 2019-present

#### **Huckleberry Phenology**

Ongoing research into flowering phenology, overall plant health, berry production and the effects of temperature, soil, precipitation, and forest succession. Used trail cameras to track flowering periods. Conduct phenology surveys to pair with berry productivity surveys later in the year. All data were examined with coupled climate data to determine the effects of temperature and precipitation on phenological stages.

#### **Bumble Bee Pollination**

Examined the potential mutualistic relationship between huckleberries and spring emergent queens. Using sweep net sampling, focal surveys, pollen analysis and blue vane traps to understand foraging behavior, species distribution and diversity. Captured and identified bees using dichotomous keys to

create a species list as well as information on habitat, flowering resource availability and preferences.

### **Pollen Analysis**

Collected pollen baskets from captured bees and prepared microscope slides for identification. Used confocal microscope and light microscopy to identify pollen grains to family. Prepared primary sources for reference material.

### **Kenai National Wildlife Refuge**

May - August 2016

#### **HUC12 Slikok Creek Watershed**

Using NLCD data and GIS analysis, the Slikok Creek Watershed was sampled for an inventory of arthropod and avian species. Arthropods were sampled using sweep nets along a transect and preserved for identification to family prior to DNA analysis. Avian species were sampled using point-count surveys.

## Technology and Certifications

Google Earth Engine

ArcGIS and ArcPro including integrated Python functionality

R, Python, Tableau

Microsoft Programs

## Publications and Presentations

Thesis: Applying resource selection probability function to understand floral resource use by a common bumble bee, <i>Bombus vancouverensis</i>	December 2022
University of Montana Graduate Student Convention: Predicting Huckleberry Habitat Using Species Distribution Models	March 2022
Missoula Insectarium and Butterfly House Winter Newsletter: "The Buzz on Buzz Pollination"	December 2021
University of Montana Graduate Student Convention: Using classification trees to identify bumble bees	March 2021
The Missoulian: "Consider Huckleberries' Place in Grizzly Bear Management"	January 9, 2020
Towards conserving natural diversity: A biotic inventory by observations, specimens, DNA barcoding and high-throughput sequencing methods (Co-Author)	February 27, 2020
Mechanical and Physical Properties of OSB Exposed to High Temperature and Relative Humidity and Coupled with NIR Modeling	August 11, 2017
Peninsula Clarion Refuge Notebook Article: "Moss piglets? More common than you think on the Kenai."	July 7, 2016
Peninsula Clarion Refuge Notebook Article: "Elodea gone from the Kenai Peninsula?"	June 2, 2016

## References

Jessica Mitchell	406-544-9256	jessica.mitchell@mso.umt.edu
Sean Carter	251-509-6660	carter@earthtosean.com sean2.carter@umontana.edu
Janene Lichtenberg	406-212-5473	janene.lichtenberg@skc.edu