

Permit 2025-016:

Response Summary:

Name:

Chelsea Miller

Department or Organization:

University of Akron

Email Address:

cmiller3@uakron.edu

Web Address where the public can learn more about this proposed activity (optional):

chelseanicolemiller.com

Are you requesting renewal of a previously approved permit applicaton?

No

Type of activities at The University of Akron Field Station and Bath Nature Preserve

Research

Title of project or class name and course number:

Understanding ant overwintering under climate change and urbanization

Date/Dates requested:

Monday, Sept. 8 2025 - 1 April 2025

Number of people in group:

6-7

I am requesting permission to use a Research Area.

Yes

I am requesting permission to use a Sensitive Area.

No

I am requesting permission to use areas outside of the designated Research or Sensitive

Areas.

No

I would like to use the Martin Center for Field Studies and Environmental Education for this prop...

Yes

Will the activity involve destructive sampling/collecting?

Yes

Which Research Areas?

18 Acres

Beefy's Woods

Garden Pond

Grandview Alley

Round Top

South Woods

Please indicate any preparation or set-up you will need in the Martin Center for Field Studies an...

We will be setting up semi-permanent warming chambers (approximately 5 x 5 m²) outside the Martin Center for Field Studies and Environmental Education building (on the lawn, within reach of electrical). These will consist of a custom-built digital control center ("Antduino") housed inside a 1 ft² rubbermaid box, mounted on a cinderblock. Connected to the Antduino will be sets of wires extending to 1) plastic garden sheeting, and 2) a garden heat mat, both substrates will be buried ~1/2 inch into the ground (covered with a thin layer of soil). On top of each substrate will be 5 ant colonies housed in closed tupperware containers. The entire set up will be fenced in (2 ft tall wooden stakes will be sunk around the perimeter and 1 inch chicken wire mesh will be secured to and over the chamber.) For now, we are only setting up 1 chamber at the field station, and will set it up the week of Sept. 8. Our goal will be to use this singular chamber to collect data on ant overwintering through the 2025-2026 winter season. If all goes well, we would like to add a second and third chamber at other places at UAFS in the future.

Please explain how the material will be collected (including equipment), and an estimate of how m...

We are not collecting materials EXCEPT for acorn ant colonies (which we will collect from different locations at UAFS, including Beefy's woods, south woods, etc.) periodically

throughout the year (mainly spring and fall). To do so, we search under mature oak and hickory trees and locate aged and hollow tree nuts. We crack these open and collect entire colonies of native ants that are living inside. These are transferred to our laboratory at the University of Akron, where they're housed and acclimated, and then are deployed to be part of our warming experiment.

Provide a brief description of (1) your proposed activities, (2) goals, and (3) impacts of your u...

This project investigates how winter climate variability and urbanization interact to shape population and community dynamics in temperate forest ant communities. In mid-latitude ecosystems, winter conditions are changing rapidly, with increasing temperature variability, frequent thaw events, and reduced snowpack. These shifts are intensified in cities via the urban heat island (UHI) effect, yet the ecological consequences of winter warming, particularly for overwintering ectotherms, remain understudied. In this project, we will address this gap using forest ant communities as a system to explore: 1) how winter variability affects ants at cellular, organismal, and ecological levels; 2) the physiological mechanisms that detect and respond to temperature variability, and how they scale to population and community outcomes; and 3) the consequences of overwintering responses for community assembly and species distributions under future climates. To address these questions, we will integrate molecular assays (transcriptomics), behavioral experiments, and data from field-based open-air warming chambers. Ant colonies will be experimentally exposed to ambient, +3°C, and +5°C winter conditions across urban-rural gradients, using a custom-built, open-source Arduino-based system ("Antduino") capable of simulating warming. Field and lab data will later be used to build trait-informed species distribution models (SDMs), linking mechanistic responses to large-scale biodiversity projections. Impacts of this project to the Field Station and Bath Nature Preserve will be minimal--the warming chambers are semi-permanent but non-destructive. There may be opportunities for public outreach and educational activities affiliated with this research.

By checking this box, I agree to the above terms and state that all of the above information is c...

I agree