

Figure 1. Map of study area. We sampled the insect community using Lindgren funnel traps baited with 3 different chemical blends at 7 site pairs.

Each site pair consists of one pitch pine (*Pinus rigida* Mill.) and one white pine (*P. strobus* L.) site. These two pine species are evolutionarily distinct, belonging to different sub-genera of *Pinus*.



Figure 2. Trapping methods. We deployed 3 Lindgren funnel traps at each site, each with distinct chemical lures.

- 1. Novel tree-killing bark beetle pheromone
- 2. Co-evolved bark beetle pheromone
- 3. Pine tree chemical (control)

We will compare the insects attracted to 3 different chemical lures in pitch pine and white pine forests along a latitudinal gradient.



Which insects will respond to a novel tree-killing beetle pheromone?

Caroline Kanaskie and Jeff Garnas

Department of Natural Resources, University of New Hampshire



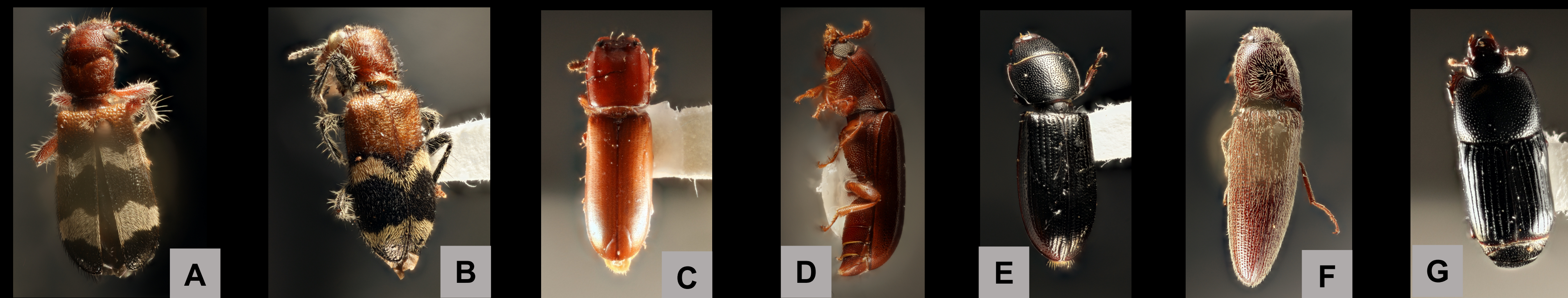
@Kanaskie_MSc
caroline.kanaskie@grad.unh.edu

Motivation

New England is home to the rare pitch pine barrens ecosystem, like those in Ossipee and Concord, New Hampshire. These pine barrens will soon be threatened by the southern pine beetle, which is able to survive further north due to warming winters. The southern pine beetle, or SPB, has the scientific name *Dendroctonus frontalis*, with *Dendroctonus* meaning “tree killers” in Greek. This name is fitting as the SPB, although individually smaller than a grain of rice, orchestrate mass-attacks of healthy pine trees. These attacks, carried out by thousands of beetles, can kill a tree in a matter of days. To coordinate the attacks, SPB produce and emit pheromones. These chemical signals draw not only other SPB, but other insects as well. These other insects are the focus of this chapter of my research—I want to know which insects respond to SPB pheromones in New England, where SPB has never been before. While SPB and its pheromones are novel in this region, other bark beetles (like those in the genus *Ips*) are common here. I will compare the insect community that responds to SPB pheromones and *Ips* pheromones, with tree defense chemicals as a control. I carried out the first field season of this study in summer 2020 at 14 sites across Maine, New Hampshire, and Massachusetts. This work will provide baseline knowledge of the regional insect species pools and will inform predictions about how the arrival of SPB in New England will impact our forests.

Preliminary Results

Outside of SPB’s native range, we captured several taxa known to be predators of SPB in traps baited with the SPB pheromone, frontalin. We are still working on sorting and identifying the insects we collected, but this early result gives us some confidence that SPB will encounter enemies in New England. These predaceous beetles include:



- A – *Thanasimus dubius*, the most well-studied and important predator of SPB
- B – *Enoclerus nigripes*
- C – *Aulonium* spp.
- D – *Corticus* spp.
- E – *Tenebroides* spp.
- F – Family Elateridae
- G – *Platysoma* spp.

18,000+ insects identified so far!
We will run the experiment again this summer to build a more robust dataset.

Take-home points

Warmer winters allow the southern pine beetle (SPB) to survive further north, putting our pines at risk. In New England, the primary host tree for SPB is pitch pine (*Pinus rigida*). Pitch pine is found in the ecologically rich and rare pine barrens, like the Ossipee pine barrens (NH). Understanding which insects will respond to SPB pheromones will help inform forest management and protect the rare pine barrens of this region.

