



Beetle in a Haystack: Successfully Engaging Volunteers in Early Detection and Monitoring Efforts for Southern Pine Beetle (*Dendroctonus frontalis*, SPB)

Kate O'Connor

Mohonk Preserve • 3197 Rt 44 55 Gardiner, NY 12525

A (Not So) Tiny Problem

Community science programs can be a valuable tool for land managers to identify and monitor emerging invasive species threats. However, relying on volunteers to correctly identify small, less charismatic organisms and collect quality data can pose a challenge.

By assembling a suite of existing, free, or low-cost tools, the Mohonk Preserve staff were able to create a cost-effective volunteer program to successfully detect and monitor the southern pine beetle (*Dendroctonus frontalis*, SPB) at Mohonk. SPB is native to the southern US but is undergoing range expansion due to climate change. It has caused widespread mortality in vulnerable pitch pine communities in New York.

Over five months in 2022, the Mohonk Preserve BeetleBusters program trained 10 volunteers to perform field surveys and maintain pheromone-baited funnel traps. The program saved 105 hours of staff time, made the first detection of southern pine beetle at Mohonk, and monitored stands for signs of outbreak.

Community Tools

A suite of free tools were used to schedule volunteers, collect data, and track project hours.

- SignUp.com (free) was used to schedule field training sessions, weekly volunteer shifts for surveys, and funnel trap checks
- The iMapInvasives platform (free) offers an app to record invasive species presence, absence, and treatments in the field. All records are verified by designated species experts. Records can be visualized or exported from the webmap.
- Volgistics (paid) volunteer software to track hours



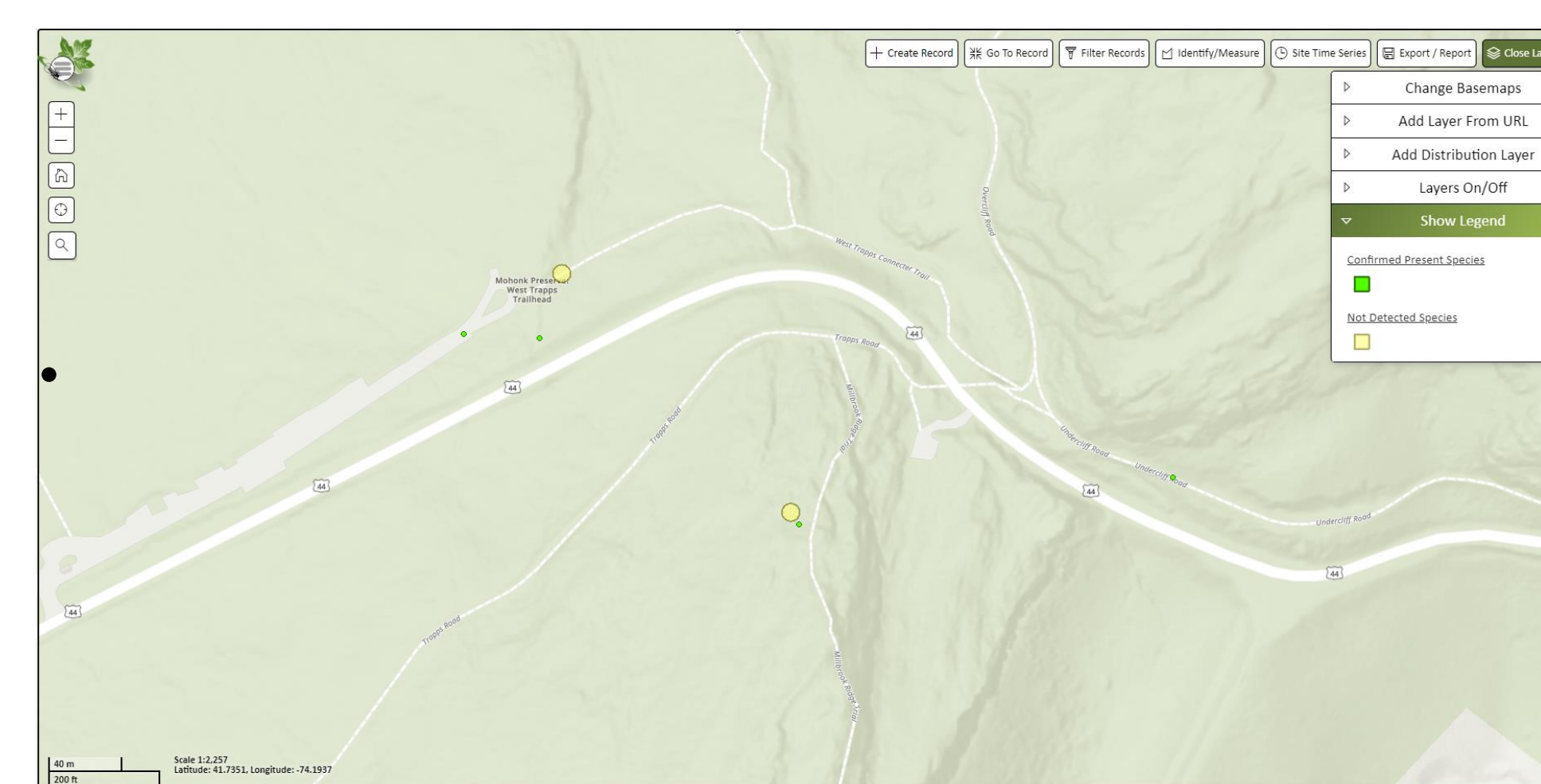
Program Development



- 30 volunteers were recruited in June through social media and email lists
- Google Forms and SignUp.com were used to schedule trainings and weekly volunteer shifts
- Volunteers attended a 1-hour field training session. They learned to identify and document signs and symptoms of SPB, collect samples from and maintain Lindgren funnel traps baited with pheromone lures (*frontalin*, alpha-beta pinene, and *endobrevicomin*), and to use the iMap Invasives app to record data.
- Volunteer hours were reported weekly and tracked using Volgistics



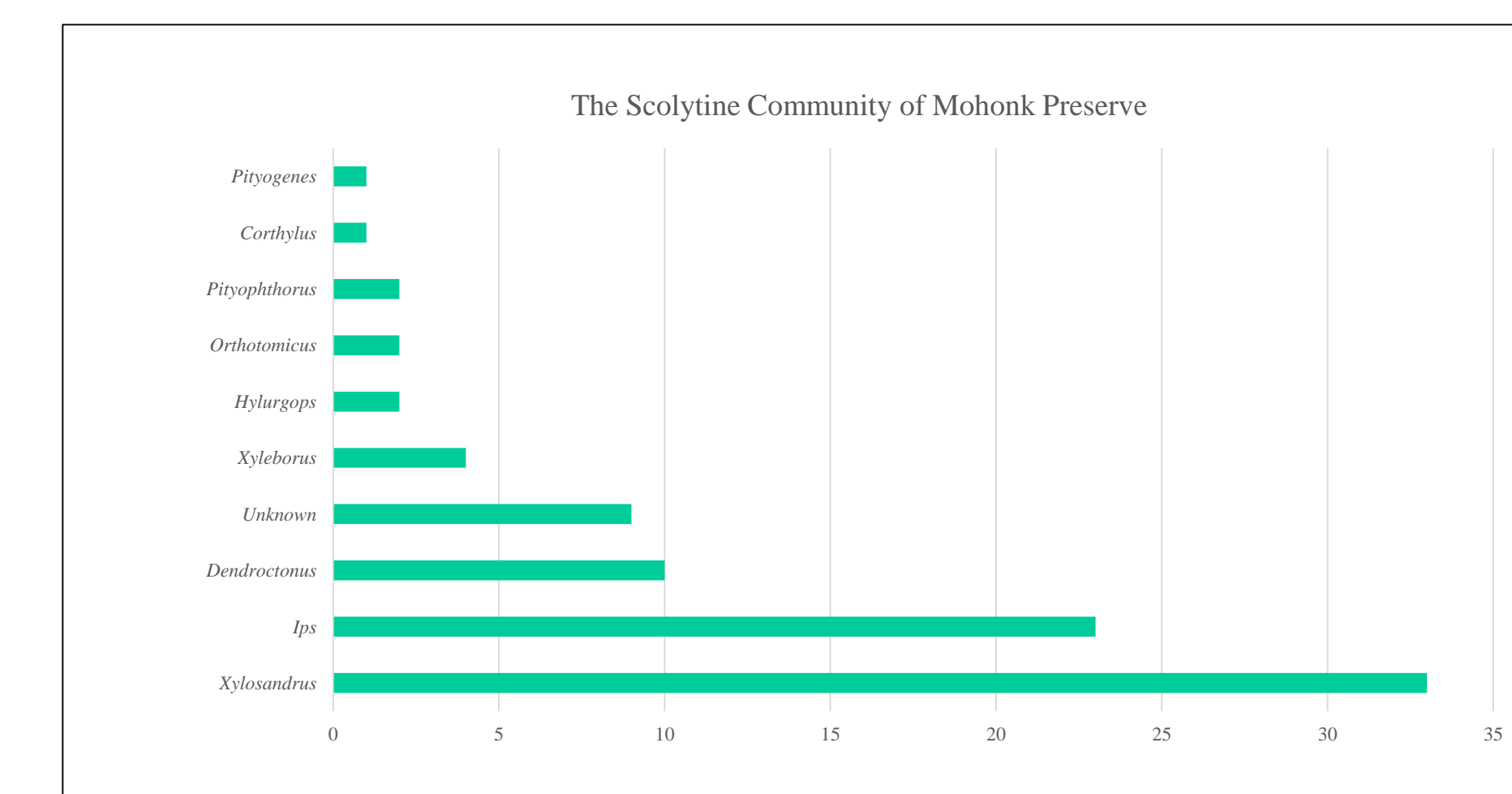
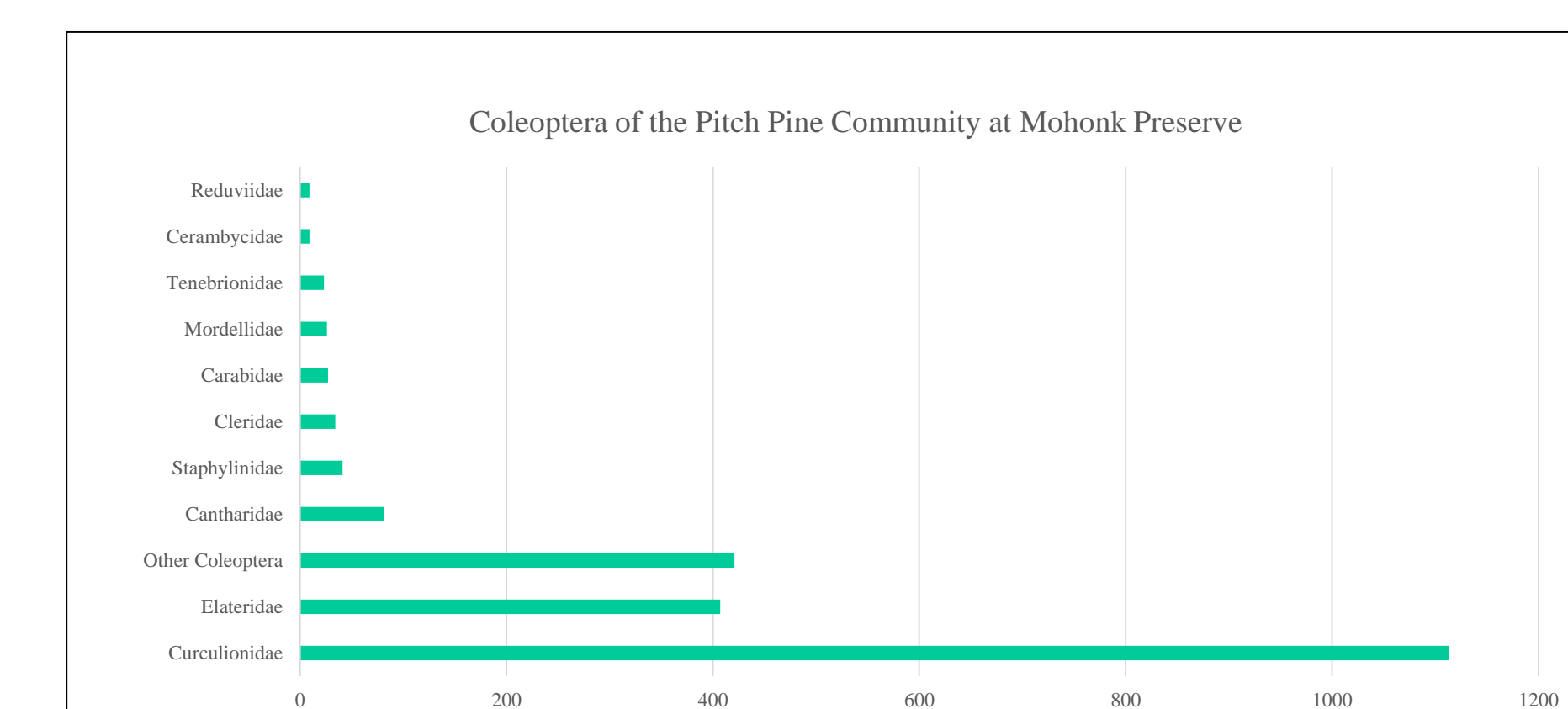
- Trap samples were processed by staff and trained interns
- iMap detections were confirmed by experts at the New York Department of Environmental Conservation
- Monthly e-newsletters shared trap collection information, photos, and iMap stats to keep volunteers engaged



Top: volunteer Erika Liguori changes trap pheromone lures. Bottom: the iMapInvasives platform provides a simple app for expert verified community data collection and a web map for visualizing and exploring records.

2022 Results

- Volunteers reported a total of 104 hours of effort which included training, Lindgren funnel trap collections, and survey effort for signs and symptoms of SPB between June and October 2022.
- SPB was first collected from a Mohonk trap by a volunteer on 9/2/2022.
- The 2022 trapping season recovered a total of 11 SPB (4 female, 6 male, 1 unknown).
- Field surveys did not find signs of SPB outbreak in pitch pine (*Pinus rigida*) stands.
- A total of 2,226 specimens were collected, including SPB predator *Thanasimus dubius*, other native bark beetles, and a high relative abundance of the invasive bark beetle *Xylosandrus crassiusculus*.



Top: Count of coleopteran collected from baited Lindgren funnel traps in 2022. Bottom: Count of scolytines collected from traps in 2022.

Future Work

- Train select volunteers to use dichotomous keys and a reference collection to assist with specimen ID in the future.
- Continued monitoring of SPB and predator abundance, sex ratios, and survey for signs of outbreak in Mohonk's pitch pine stands.
- 2022 bycatch to be sequenced to provide a more extensive guide to the insect community of the Mohonk's pitch pines.
- Use bark beetle community composition and abundance data to assess the impacts of wildland fire, changing weather patterns, and silvicultural strategies (e.g. prescribed fire, thinning) in Mohonk's pitch pine forests.



Mohonk Preserve protects the Shawangunk Mountain region and inspires people to care for, enjoy and explore the natural world.

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Contact Information

Kate O'Connor

Applied Forest Ecologist, Mohonk Preserve

Ph: 845-299-0919 ext 1232

Email: koconnor@mohonkpreserve.org

Web: <http://mohonkpreserve.org>