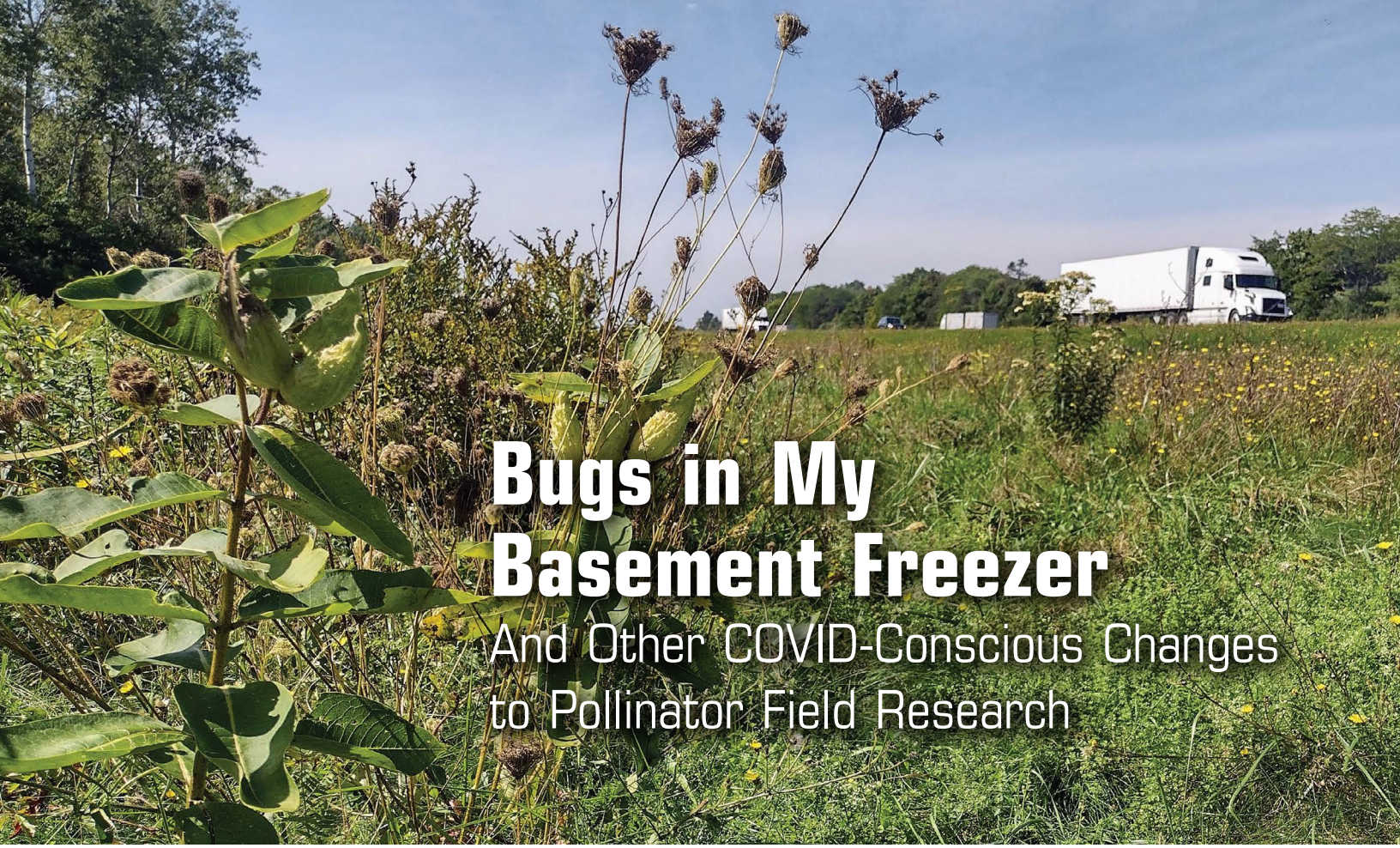

Bugs in My Basement Freezer

And Other COVID-Conscious Changes to Pollinator Field Research

Kaitlin Stack Whitney

KAITLIN STACK WHITNEY

The author is an assistant professor in the Department of Science, Technology, and Society of the College of Liberal Arts and extended program faculty in Environmental Science in the College of Science at the Rochester Institute of Technology in New York.

Native plants like common milkweed provide a natural habitat for wildlife and pollinators along this segment of the New York State Thruway that is on a reduced mowing schedule. This statewide research project is looking at how—and how much—mowing impacts pollinators.

Our research is one project within a larger movement to understand the contributions of transportation rights-of-way (ROWs) and other linear corridors to conservation. Our research objective is to examine if reduced roadside mowing along state highways is associated with changes in pollinating insect abundance and habitat quality for pollinators. We are answering this question through a large-scale experimental study in New York State across a range of landscapes and road characteristics—from north of the Adirondacks in forests and rolling hills in and near Plattsburgh, to Niagara Falls Boulevard, to Lake Ontario Parkway adjacent to apple orchards in Western New York, to NY-747 that takes travelers to New York Stewart International Airport near Newburgh, and roads that bring commuters to and from New York City. The project, Effects of a Modified Mowing Regime in NYSDOT ROWs on Pollinators and Vegetation, began in spring 2019 and is anticipated to be completed in 2023.

Background

Over the past several decades, as insect populations have declined and natural habitats across the nation have disappeared, highway roadsides have emerged as critical sites of interest for pollinating insect conservation efforts. Roadside areas also can be highly disturbed areas, due to on-road traffic and roadside management practices like mowing. As a common vegetation management practice, mowing maintains shortened vegetation for safety reasons, including:

- Safe spaces for cars that may leave the roadway or need to pull over to do so;
- Short vegetation that may give drivers extra time to react before animals like deer enter the roadway; and
- Trees that cast shadows on the road that can cause ice to form, especially in places like New York with long, cold winters.

These compelling reasons to keep vegetation short are built into the required clear

zone that runs parallel to highways. Yet, often there is more roadside area beyond. There, the frequency and timing of mowing can cut down flowers in bloom that provide resources for animals, including pollinating insects. Reducing mowing may result in better quality habitat.

Evidence from mowing studies to date is mixed, potentially due to variation in spatial and temporal scales. For example, the majority of studies examining potential impacts of mowing roadsides have been conducted in only one growing season or with small sections of highway. Limited study size and length may not reveal how changes in mowing patterns impact pollinators, leading to inconclusive or conflicting results.

How Large of an Area Is Involved?

Roadside habitats are one kind of right-of-way. There are railway, energy, and utility right-of-way habitats, as well. All of these linear habitats have become the focus of potential conservation interventions. This is partially driven by a decline in more traditional natural habitats for wildlife—like wild prairies—and a growing body of biological survey data showing that wildlife—such as grassland birds and pollinating insects—successfully forage and nest in roadside habitats.

Looked at individually, these roadside parcels seem small. A roadside right-of-way may be only a few meters wide in some places. When considered together, however, roadside rights-of-way constitute an enormous area. The United States is estimated to have more than 10 million acres in highway roadside habitat, the most of any country in the world. Wildlife habitat is just one potential benefit that rights-of-way can provide. Others include carbon sequestration, renewable energy generation, and the growth of living snow fences for winter road safety.

Determining If Less Is Actually Better

To understand if reducing mowing along state highways—like those in our study area in New York—can provide and improve habitat for pollinating insects, our study compares the abundance and diversity of pollinating insects and habitat quality in roadsides where the current mowing schedule is followed, compared to areas where the mowing schedule is reduced. For example, we use methods including

- Assessing roadsides using the Rights-of-Way as Habitat Working Group Scorecard,[1] which provides a common language to talk about habitat, establishes a consistent valuation method, and supports shared reporting;
- Performing sweep net sampling of insects in which a field worker does a walking transect that brushes a sturdy canvas net through vegetation and knocks insects off plants;
- Making timed floral observations to directly observe how many and which kinds of insects are visiting flowers in the roadside; and
- Performing plant transects to measure the presence and relevant abundance of different kinds of desirable (e.g., wildflowers) and undesirable (e.g., invasive and noxious) plants.

Nel Botha, Pixabay

Mention pollinators, and images of bees and butterflies instantly come to mind. Although insects do the majority of pollination—that process of moving grains of pollen from the male anther of a flower to the female stigma—bats, birds, and other creatures, as well as flies, wasps, and beetles, are all pollinators.

This project requires a whole team of people across the state to maintain and monitor study sites. As the project lead, I bring expertise in insect ecology, conduct landscape-scale experiments, and mentor student research assistants. Another faculty collaborator on the project has expertise in environmental management and student training. To date, we have worked with a dozen undergraduate student researchers on this project, from a variety of disciplines. Two of these graduate students based their master's theses in environmental science on the project. One focused on if and how variability in road traffic and roadside mowing levels intersect to impact *Bombus* spp. (bumble bees) (*1*). Another thesis is examining how environmental conditions in the surrounding landscape of highways may influence if and how reduced mowing impacts invasive and noxious plant species in highway rights-of-way.

The partnership and support of many people working for the New York State Department of Transportation (DOT)

[1] More information can be found at https://rightofway.erc.uic.edu/pollinator-habitat-scorecard/.

has been essential for the project. While the study was being designed, New York State DOT staff identified candidate highway segments in their regions for potential inclusion. Roadsides included in the study are managed by New York State DOT staff; mowing operators ensure that the areas receiving the reduced mowing treatment are maintained to the terms of the study guidelines.

Additionally, many of the highway roadsides being monitored require on-site support to safely visit and conduct our observations. This means that New York State DOT staff are supporting the safety of our visit and the safe travel of highway traffic through measures like work zone signage, shoulder closures, or traveling along with us in an attenuator truck. This support has enabled our research team to drive more than 70,000 miles throughout New York since 2019—safely—while successfully monitoring sites and collecting samples. Throughout the project, a technical advisory board comprised of New York State DOT staff from across the state has provided invaluable feedback on interim reports and questions. For example, deciding on the size of the study segments was a collaborative conversation to determine how large study segments could be. These are working landscapes—although we want to understand, ecologically, what is happening at the largest possible scales, we also do not want to make the work of New York State DOT managers and mowers unreasonably hard or impossible.

COVID-19 Impacts to the Research Plan

At the onset of the COVID-19 pandemic in 2020, we faced new challenges in coordinating this enormous team effort. For example, campus and state safety protocols and procedures were changing rapidly, requiring frequent meetings and coordination. Planning for fieldwork was challenging at the beginning, when masks and hand sanitizer were in high demand and often not available for field workers. So, we got creative: The university purchased cloth masks from a well-known local suit manufacturer

Kaitlin Stack Whitney

The author, pictured here, instituted changes like masking while in the field during the height of the COVID-19 pandemic. Some of the changes to how research was performed, like remote work, will remain.

that converted its production to meet COVID-19 needs, and I purchased hand sanitizer in bulk from a local distillery that similarly converted their facilities from making alcohol for drinking to alcohol for sanitizing.

Other problems were simply humorous. In spring 2020, my university—Rochester Institute of Technology—like many workplaces, was required to close. To ensure the safety of the frozen samples collected from highways during the previous summer, I moved them to my home. This meant that until campus reopened several months later, my basement freezer safely held hundreds of samples filled with thousands of dead insects collected from highways across the state. My kids thought this was pretty weird and definitely wondered about mom's job. Weird or not, we made it work. The campus closure continued through the summer 2020—including all through our field season. This meant that we could do the outside fieldwork all along New York State highways, but we were not allowed inside the buildings on campus all summer.

Although pivoting during the height of the pandemic was unanticipated, the need to adapt revealed the following silver linings:

- We were able to keep our team employed and safe throughout the pandemic. Fortunately, roadside monitoring work is outdoors and easily accommodates social distancing.
- Sampling methods for measuring plants and insects were largely unaffected by modifications needed for distancing and masking.
- We adapted training to be online over video and in written documents.
- The expansion of remote work was a welcome reminder that lots of people can contribute to transportation research, even if they do not want to or cannot come out onto the roadside.
- Using videoconferencing and networked file sharing, several students based in far-flung locations around the country were able to contribute to the analysis of audio and photo samples taken in past years.
- Remote work provided flexible and inclusive options for team members.

At this stage of the pandemic, campus has reopened and many pandemic measures have abated, but some collaborators still need to work remotely for their health and safety. As the research continues, we are glad to have them as part of the team.

REFERENCE

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Bee Positive
Airports Establish Pollinator Programs

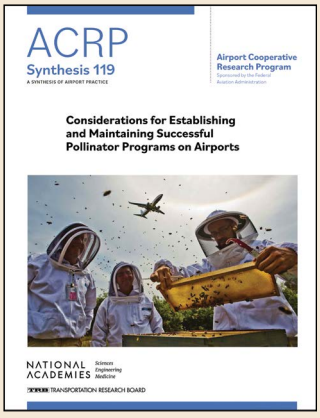
JOSEPH D. NAVARRETE

The author is a senior program officer at the Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine in Washington, DC.

Over the past several years, some airports have implemented pollinator-friendly practices and programs that restore habitat for bees. *ACRP Synthesis 119: Considerations for Establishing and Maintaining Successful Pollinator Programs on Airports* summarizes experiences and practices from several of these programs.[1]

The research effort to produce the synthesis report included collecting information from existing sources and conducting surveys and interviews with airport operators, beekeepers, and other land managers, including state departments of transportation. *ACRP Synthesis 119* provides examples of pollinator-friendly programs designed to improve habitat and forage for native and managed pollinators, as well as examples of beekeeping programs that engage the public. The report also discusses how pollinator-friendly programs can be developed and managed, their cost, and the unique challenges airports face—such as operational issues, liabilities, and wildlife hazard management. Checklists and resources are included.

[1] Read *ACRP Synthesis 119* at https://nap.nationalacademies.org/read/26680.



According to *ACRP Synthesis 119*, airports have been establishing pollinator-friendly practices and programs since 1999. What are their lessons learned?

Artur Pawlak, Pixabay

Bees do not need much more than an open field, hive body boxes as brood chambers, and an attentive beekeeper. Airports, which by necessity often have an abundance of unused land, are a natural match. The Flight Path Program at Seattle–Tacoma International Airport and other programs involving pollinator awareness, innovative research, and environmental stewardship are showing how airports can provide a home for bees.

Which Program Is Most Popular?

Beekeeping programs are the most common type of pollinator-friendly program found at airports. These programs involve the active management of honeybee colonies by a local beekeeper on airport land. A less common practice is for airports to establish pollinator habitat management programs that seek to preserve and enhance the landscape around the airport to provide food and a habitat for pollinators.

Airports reported a wide range of benefits from having pollinator-friendly programs, including improved public relations, community engagement opportunities, expanded sustainability profiles, and airports being established as environmentally responsible land managers.