Increasing the Awareness of Pollinators through Citizen Science

Social Impact Mini Grant
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Matthew R. Opdyke, Professor
Department of Natural Sciences, Engineering and Technology
Point Park University

Background

Major media outlets such as BBC News, Washington Post and National Geographic have all reported on the decline of pollinators around the world. In 2006, "colony collapse disorder" was a new term used to define the sudden loss of honey bees. According to the American Beekeeping Federation, 1 out of 3 bites of food Americans eat is derived from honey bee pollination.

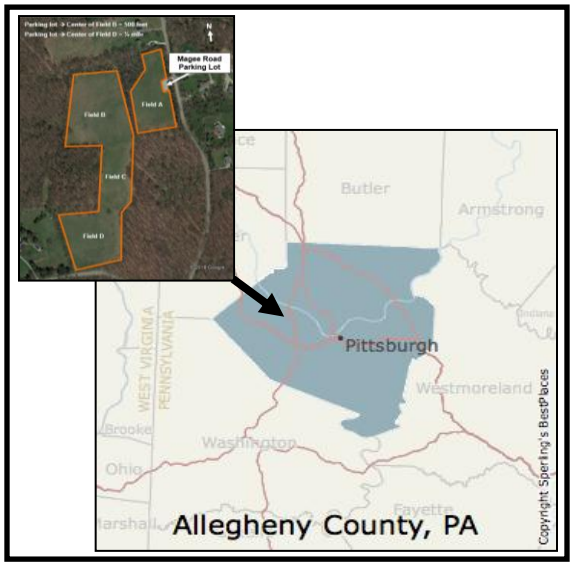
Building upon research on honey bees, a greater focus on native pollinators has broadened to include butterflies, beetles, flies and bees. In a 2017 comprehensive report published by the Center for Biological Diversity, more than half of native bees are declining in North America, with nearly 1 in 4 imperiled and at risk of extinction. To date, there is no comprehensive study in southwestern Pennsylvania on the status of pollinators.

The purpose of this Social Impact grant is to kick start a citizen science project to assess the status of pollinators in southwestern Pennsylvania. The project is known as Project Bee Watch. It began with an interest in studying native bees at an Allegheny Land Trust property near Sewickley. Allegheny Land Trust, Pennsylvania Game Commission and Point Park University collaborated on planting a wildflower meadow at Audubon Greenway in 2016. Point Park University conducted intensive surveys of pollinators in 2017; and began making contacts in the region to start a citizen science project. Citizen scientists help researchers maximize the amount of data collected on a project. Even more important, citizen science enables participants to increase their understanding of pollinators and become ambassadors in the protection of pollinators and their habitat.

Accomplishments

Pollinator Assessment

Audubon Greenway, an Allegheny Land Trust property located 12 miles northwest of Pittsburgh, consists of 17 acres of meadow. The site was chosen as the model for the citizen science project because of Point Park's close relationship with Allegheny Land Trust.

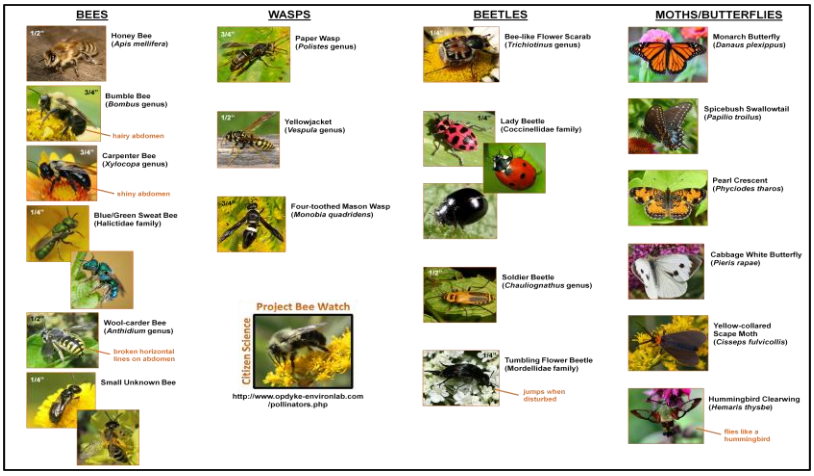


Citizen scientists were recruited through media outlets such as NEXT Pittsburgh and Sewickley Herald, direct contact with environmental organizations and an advertisement in a newsletter to Allegheny Land Trust members. Volunteers were split between two training sessions in May, with a total of twenty in attendance. The most dedicated volunteers were participants in the Pennsylvania Master Naturalist Program. Three of the Master Naturalists chose Project Bee Watch as their capstone project for certification. Additional help on the Project came from a biology intern, who was jointly funded by Point Park University and Allegheny Land Trust. Her

story is available on the Point Park website (pointpark.edu/news-arts-sciences/Paula-Ambrose-20).

One third of the grant funds were used to provide supplies to citizen scientists, which included a training manual and laminated identification guide, as well as, a bamboo sampling plot and magnifying lens. They were trained on where to place their sampling plot, which measured one square meter in area, to include the greatest diversity of flowers. Then to sit for 15 minutes identifying and recording all pollinators that entered their plot. Data sheets and additional supplementary materials were made available on Professor Opdyke's research website (www.opdyke-environlab.com/pollinators.php) and data was collected via email.

Laminated ID Guide:



The sampling period of citizen science surveys was between June and September. Seven citizen scientists participated, accounting for 124 sampling plots and 31 hours. The citizen scientists helped to increase sampling intensity by 400% beyond what Professor Opdyke accomplished alone.

Thirty-six different wildflower taxa was surveyed. The three most frequently visited wildflowers were New York Ironweed (*Vernonia noveboracensis*), Butterfly Weed (*Asclepias tuberosa*) and Bull Thistle (*Cirsium vulgare*). The table below lists the wildflowers that were visited by more than 20 bees per 100 flowers, making them the most attractive for bees.

Aster, White	Goldenrod	Spreading Dogbane
Black-eyed Susan	Indian Tobacco	Sowthistle
Bull Thistle	Mint	St. Johnswort
Butterfly Weed	New York Ironweed	
Common Milkweed	Queen Anne's Lace	

Bees accounted for 60% of all pollinators, with a density of 11 bees per acre per minute. According to research by Washington State University, 20,000 honey bees are required to pollinate an acre of fruit trees, which is supported by a similar study in New Zealand looking at white clover. The honey bee density is half what is needed to pollinate the wildflowers at the Allegheny Land Trust property; but the native bees make up the difference to satisfy the requirements stated in research. The benefit of this knowledge is to be able to assess the status of pollinators in the region to coordinate efforts of protecting bees and their habitat. The dominant bees in the study included the non-native honey bee, the native bumble bee and several different taxa of sweat bee.

Beetles and flies accounted for 20% and 10% of all pollinators, respectfully. Butterflies only accounted for 5% of all pollinators but exhibited the greatest diversity. Several species of skipper butterflies were observed, as well as, the monarch butterfly and the hummingbird moth.




Benefits of research:

- Assists homeowners in choosing wildflowers that are beneficial for pollinators
- Educates the community about the importance of pollinators and their evolutionary relationship with wildflowers
- Engages citizen scientists to take an active role in protecting nature and passing on their knowledge to others
- Provides baseline data of pollinators on surveyed properties, helping them to focus their management to improve pollinator habitat
- Assesses the status of pollinators in southwestern Pennsylvania for long-term studies on population trends

Bee Hotels

One-third of the grant funds were used for construction supplies to build bee hotels. Students from Professor Opdyke's ecology class (BIOL 235) built mason bee and bumble bee hotels in March; and hung them at Audubon Greenway in April. The intern monitored the hotels for activity throughout the summer.

Although none of the bumble bee hotels attracted bumble bees, all of the mason bee hotels were utilized. Mason bees colonized the larger holes and resin bees colonized the smaller holes. The bee hotels will continue to be monitored and cared for beyond the scope of this grant. They will also be used for teaching school groups and the public about the pros and cons of establishing bee hotels.

Pollinator Festival

One-third of the grant funds were used to organize and host a pollinator festival on July 28 to celebrate pollinators. Advertisements were given to local stores in Sewickley, printed in newspapers such as the Pittsburgh Tribune and shared with schools and environmental organizations in the region. The vendors included Point Park University showcasing the results of Project Bee Watch and promoting native bees, Allegheny Land Trust hosting activities for kids, Burgh Bees promoting bee keeping, Pennsylvania Master Gardener program and Audubon Society. Approximately 25 people attended, including families of all ages.


TRIB LIVE

Pollinator Festival part of Project Bee Watch

MARY PICKELS | Thursday, July 26, 2018, 12:03 p.m.

The importance of bees and pollination will be the focus of a Pollinator Festival Saturday at the Audubon Greenway Conservation Area in Sewickley.

Scholarly Publications and Presentations
A poster displaying results from Project Bee Watch was presented at the Pollinator Festival. The results were also advertised in a 90.5 WESA story published in September (*wesa.drupal.publicbroadcasting.net/post/allegheny-countys-bees-love-nectar-rich-native-milkweed#stream/0*).

Professor Opdyke and students are planning to further present at the Botanical Society of America and Pennsylvania Academy of Science in 2019.

Multiple years of data from more than one sampling site are necessary to publish in a scientific journal, thus, publications will not occur for at least three years. More data is also required before publishing in newsletters of organizations participating in Project Bee Watch as a way to reach local community members.

Grants
To further support the expansion of the project, Opdyke is pursuing grants through National Geographic, Pennsylvania Department of Environmental Protection and crowdfunding. A graduate assistant is also pursuing a grant through Pennsylvania Academy of Science to support travel and presentation costs.

Future Goals

The Social Impact grant funded the initiation of Project Bee Watch. The current list of organizations interested in participating next year include Allegheny Land Trust, Pittsburgh Botanical Garden, Audubon Society's Beechwood Farms Nature Reserve, Allegheny County's Latodami Nature Center and Pennsylvania Department of Conservation and Natural Resource's Jennings Environmental Education Center. The goal is to have five different organizations participating in Project Bee Watch, with one or two high schools participating.

Acknowledgements

I wish to thank Allegheny Land Trust for their support in attracting citizen scientists to the project, allowing us to conduct the project on their property and helping to organize and host the Pollinator Festival. Paula Ambrose, the Point Park University intern, was also instrumental in helping to promote the project, communicate with citizen scientists and conduct pollinator surveys. Finally, this project would not be possible without the Social Impact grant generously provided by the Center for Inclusive Excellence and Department of Community Engagement at Point Park University.