

An assessment of bee and wildflower diversity in the Long Island Solar Farm at Brookhaven National Laboratory

Trevor McIntosh, Department of Natural Sciences, Southern University at New Orleans,
New Orleans, LA 70126
Tim Green, Environmental Protection Division, Brookhaven National Laboratory, Upton
NY 11793

Abstract

Much of the world's agriculture relies on pollinators. Some of the most important pollinators are the many different families of bees. In the United States, bee populations have fallen over the years due to the use of pesticides and loss of habitat. This study aims to help understand the bee populations within the Long Island Solar Farm (LISF) in order to better manage them. The area of study includes solar arrays 1, 2, 4, and 6 of the LISF at Brookhaven National Laboratory (BNL). Each site is managed similarly and the assessment was done to accurately compare the different sites. In this study, bumble bees and honey bees are the main focus. The data was collected with details such as the vegetation each bee was found on to better understand their food and habitat preferences. Bees were caught, identified, recorded, and safely released back into their habitat within each site to assess and compare bee population and pollinator plants. By looking at the data collected, it can be determined whether there is a potential difference between the solar arrays within the entire solar farm based on relative abundance of pollinator and pollinator vegetation. This research is important as it is directly connected to the maintenance of the LISF. By conducting this research, there is the hope to continue updating the Environmental Protection Division's (EPD) database of pollinators and vegetation. This study has helped continued to bring attention to the importance of these insects to the world. It has helped to realize that many insects are not pests, but key workers that are a part of a sustainable future.



Kestrel 3000 Anemometer
(Handheld meteorological tool)

Introduction

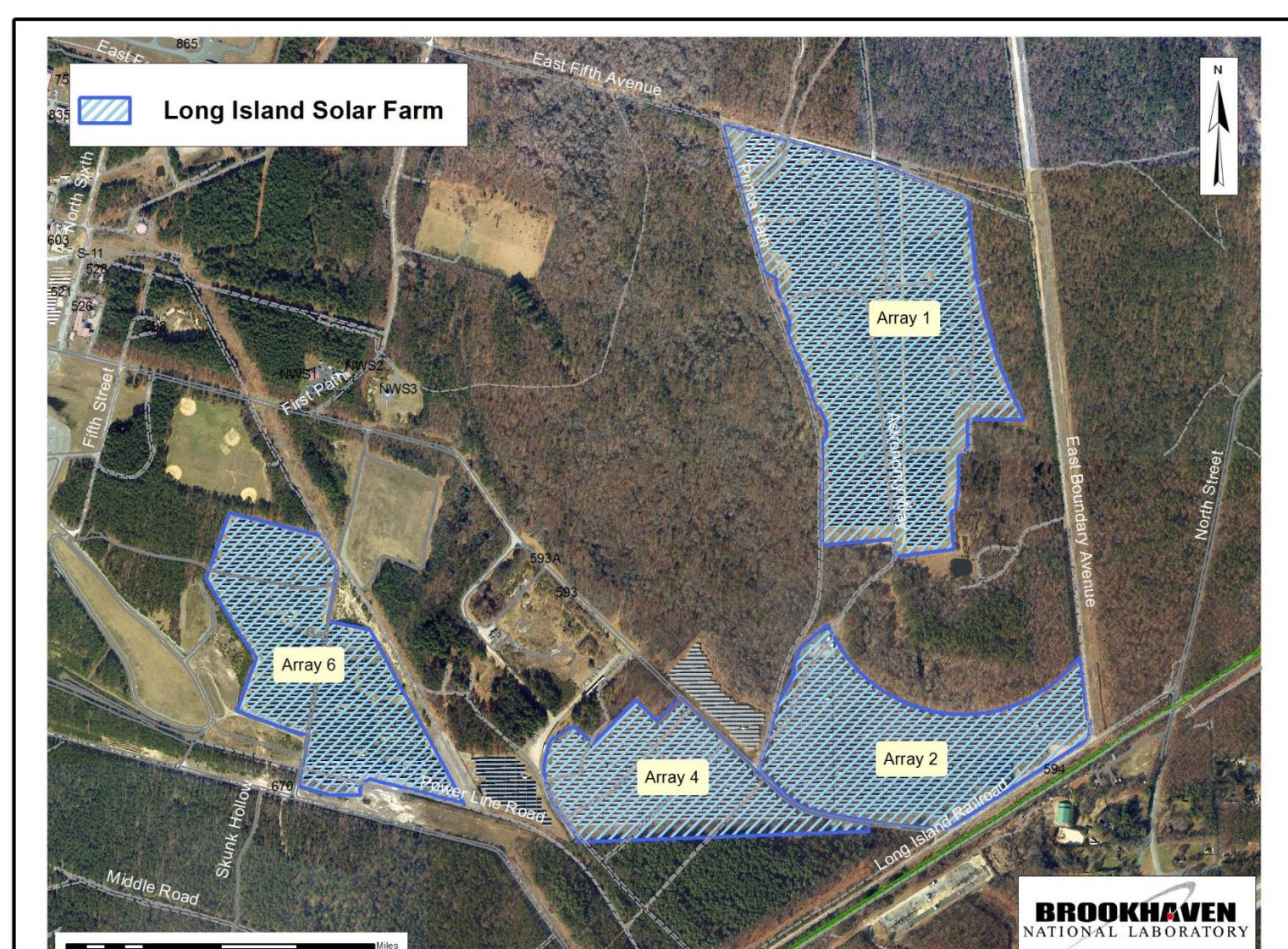
- Pollinators have some of the most important roles in pollinating flowering plants.
- A majority of these pollinators are known as bees.
- In the global economy surrounding agriculture, bees fulfill one of the largest duties to make modern agriculture possible.
- Over several years, North America alone has seen a decline in bee populations by the millions.
- Some of the causes include Colony Collapse Disorder, (CCD) which can be caused by several different factors including pesticides usage and loss of habitat which overall causes environmental stresses.
- There are different methods to reverse declining populations, but one explored in this project consists of utilizing areas of land or water and turning them into multipurpose facilities for pollinator preservation.



Field of Crown vetch and Bird's foot trefoil, (left)
Bombus. impatiens on Crown vetch (right).

Methodology and Study Site

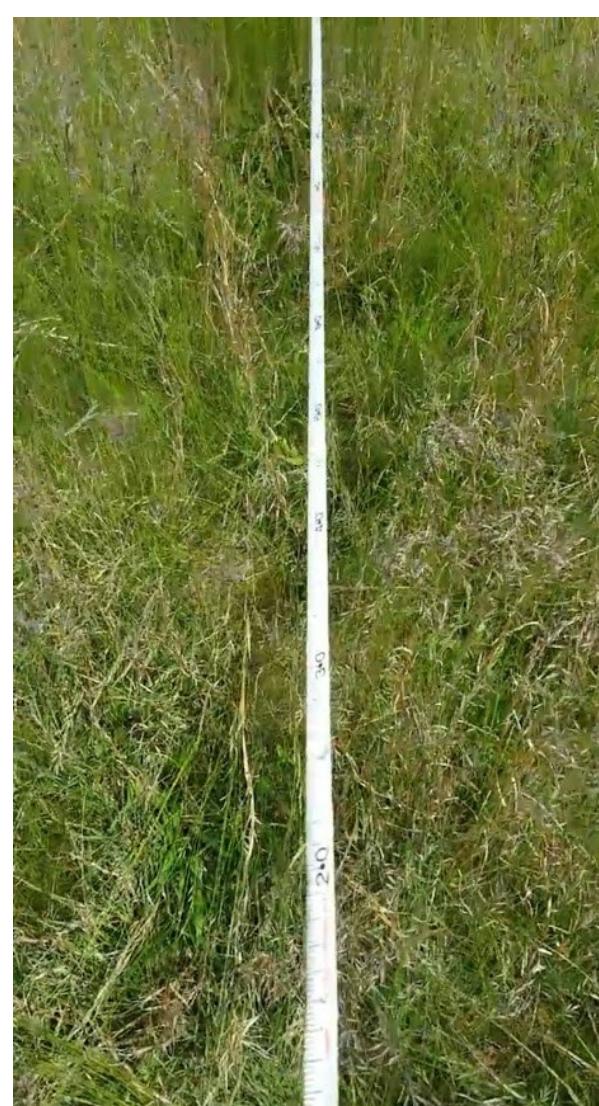
- The study site includes the Long Island Solar Farm, which is made up of 6 arrays/farms.
- The arrays studied include Solar farms, 1,2,4 and 6
- 70, 50m transects were established throughout the solar farm sites.
- Every transect, where data was collected, was in between the solar panels.
- Data collection consisted of walking these transects and observing the bees found and the type of wildflower they were on.
- For bumblebees to be observed, they were caught with an aerial net and then placed into a vial.
- If the bees were too hard to observed, the vials were placed into a chest of ice.
- This process allowed for the bees to be slowed down enough to be carefully observed.



Satellite image of the Long Island Solar Farm

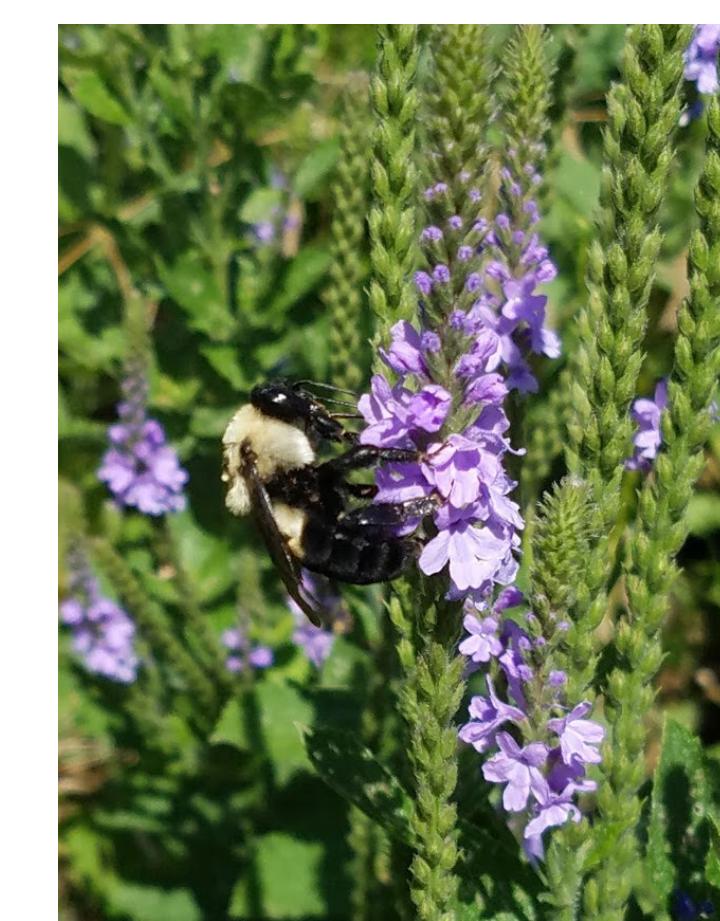
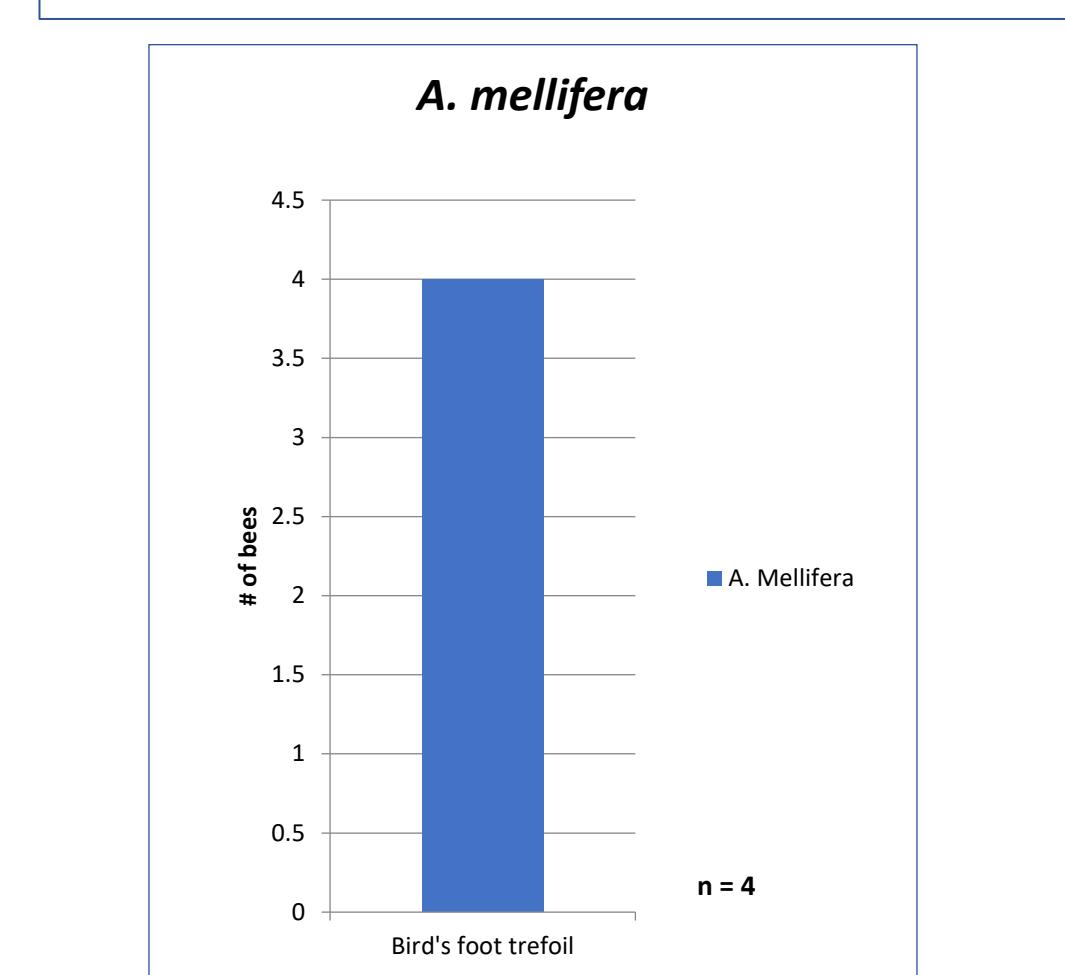
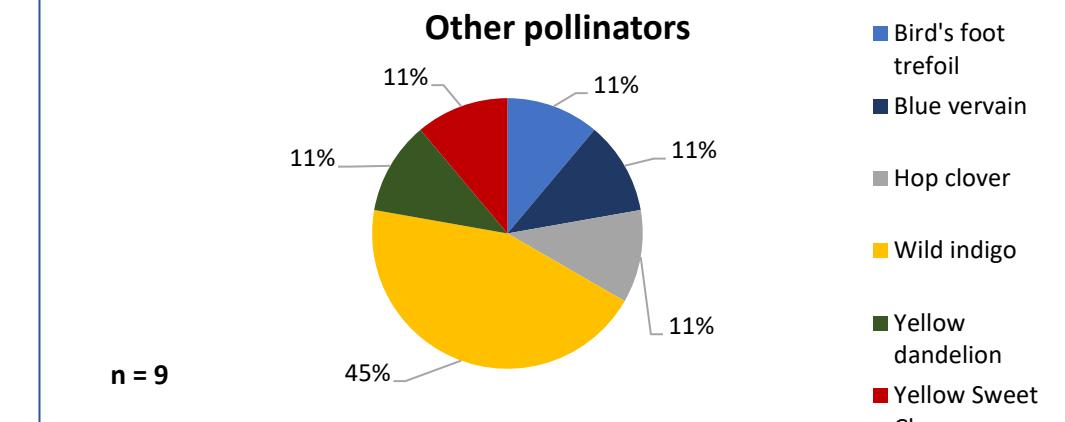
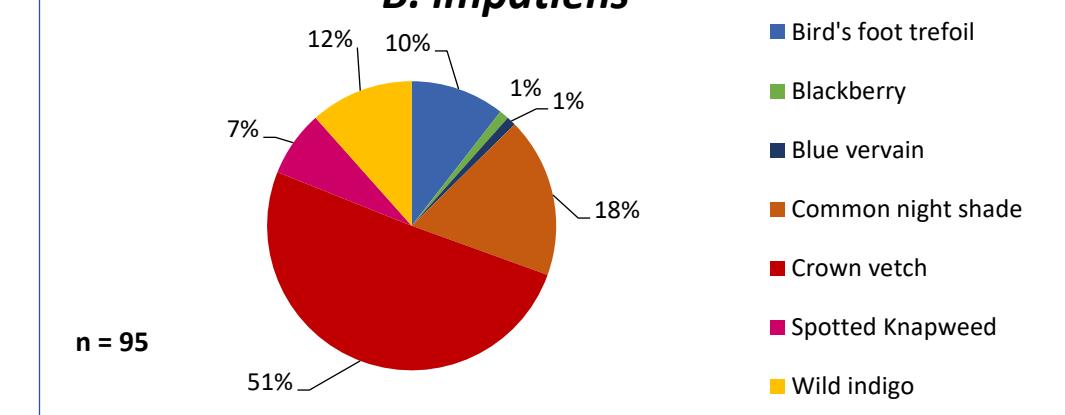
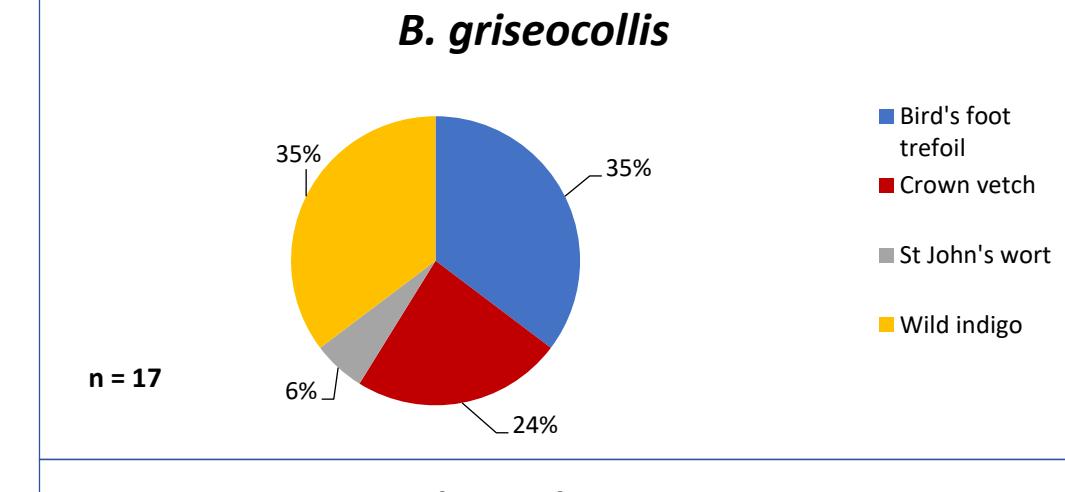
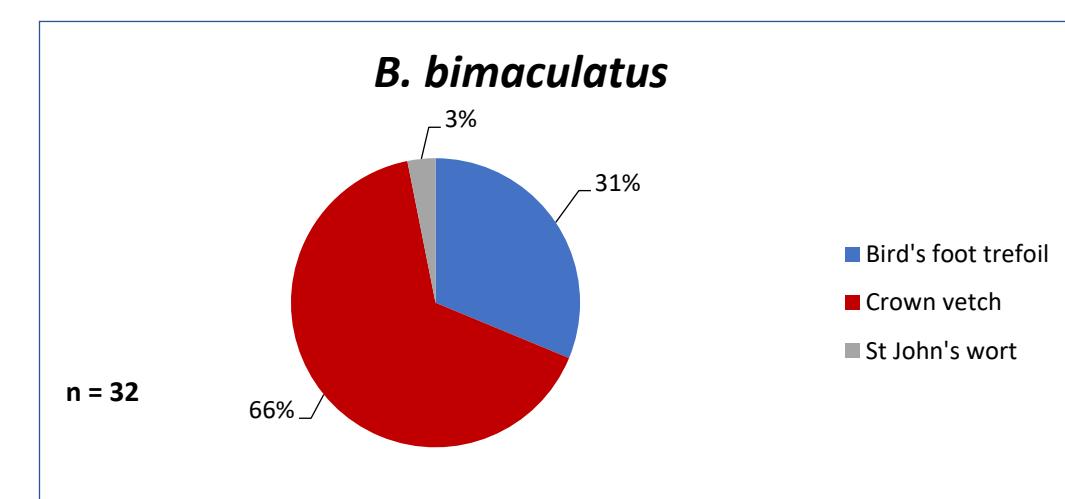
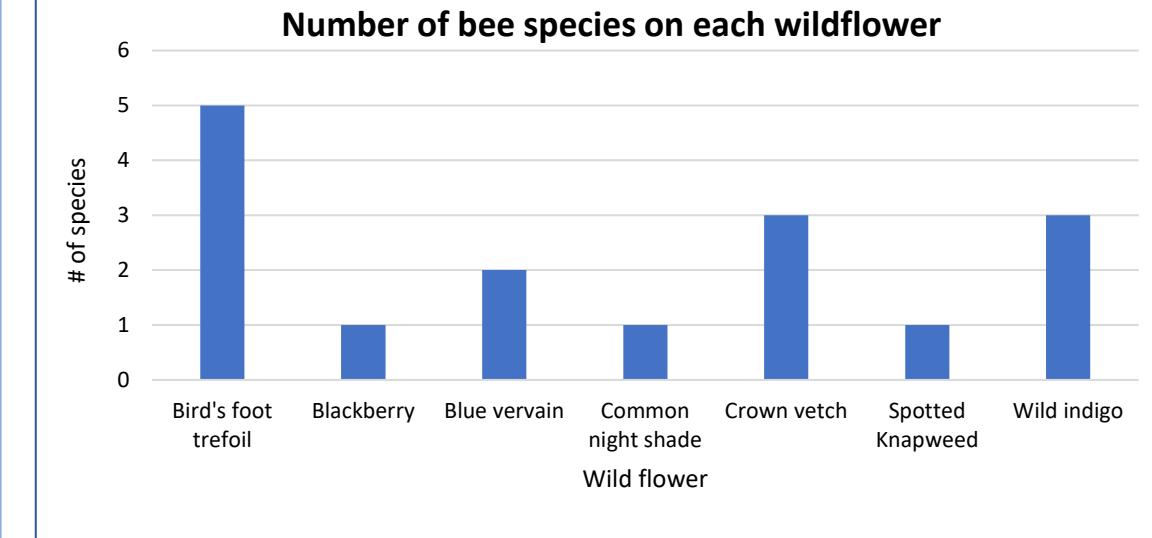
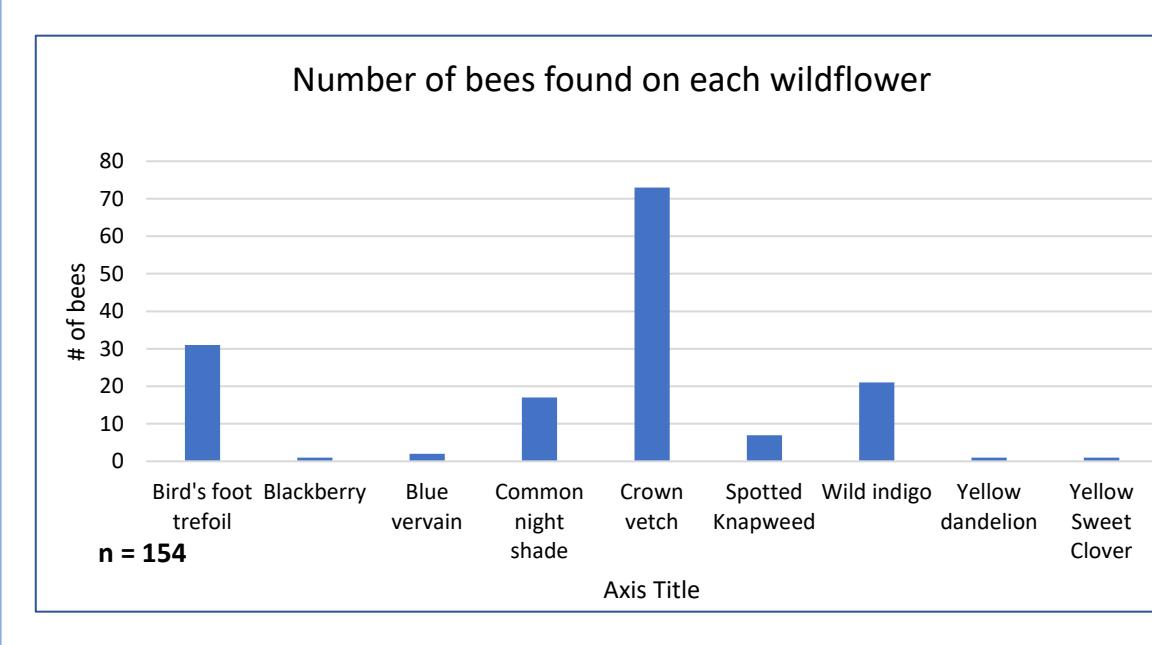
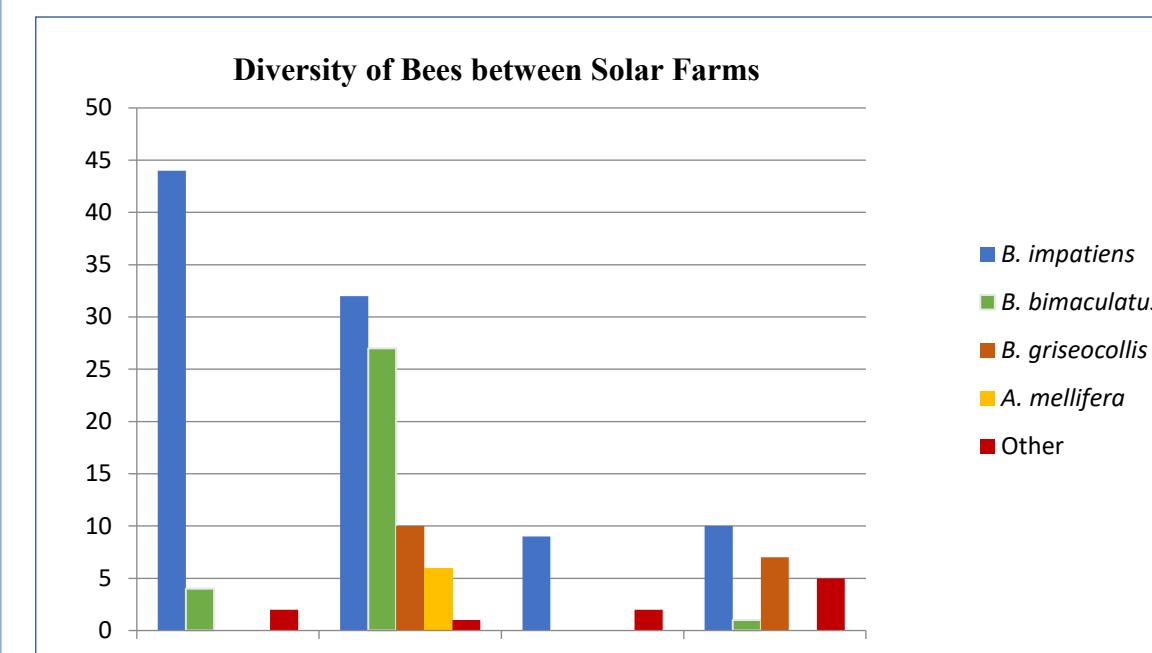


Bombus. griseocollis in vial.



Tape measure used to create transect.

Results



Bombus. impatiens on Blue vervain

Discussion

- It is assumed that the solar farms can support preservation of pollinating bees.
- The solar farms shared many similar wildflowers, but they also had differences such as particular types of flowers and varying abundance of individual flowers.
- Solar farm 2 had the most species of bees observed, but solar farm 1 had the highest bee population in total.
- Even though Solar farms 1 and 2 had a suitable population, farms, 4 and 6 lacked in comparison. Farms 4 and 6 had less flowering vegetation which can lead to less bee population.
- Overall, the rows between the solar farms are not consistently prominent, but there is the potential for greater ability to preserve pollinator population.
- Overall, this project is a base study and will lead to more studies that may greatly increase pollinator populations in the Long Island Solar Farm.

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