

You may have heard about the serious decline in the native pollinator and honey bee populations. The following is an excerpt from an article by Diana Carpinone and Fawn Gaudet in the Concord Monitor, 3/14/2021

New Hampshire is a beautiful state and as residents we are incredibly blessed to live here and have the opportunity to enjoy the natural beauty that attracts tourists and supports our economy.

Despite the bucolic appearance of our landscape, upon close investigation we find an ecosystem in trouble. New Hampshire's biodiversity is threatened by a variety of factors including habitat loss, climate change, pollution, invasive species and harmful pesticides.

New Hampshire's native pollinators and domestic honey bees are responsible for one in three bites of food that we eat. University of New Hampshire scientists have found a drastic decline in three of our native bumblebees and a significant decline in a fourth type of bumblebee. Of those, the rusty patched bumble bee is thought to be locally extinct. The Bee Informed Partnership reports 2019/20 total winter all colony losses of 47.73% in New Hampshire, higher than our neighboring states of Vermont, Maine and Massachusetts and the second highest losses of all states surveyed. Summer losses reached record highs nationwide in 2020. Various environmental stressors affect pollinators, including disease and parasites. Exposure to pesticides like the widely used neonicotinoid class, causes both lethal and sub-lethal effects, and makes bees more vulnerable to parasites and disease.

If you wish to read the complete article, you can find it here:

<https://www.concordmonitor.com/My-Turn-Bees-39358062>

There are several projects underway to help identify pollinator populations. Two projects are trying to collect data on bumble bees:

1. **Bumble Bee Watch:** This is a national program that includes information about bumble bees and provide ways in which you can record data on your encounters with bumble bees.
(<https://www.bumblebeewatch.org/?fbclid=IwAR24Ghir5OXR0e3jKrGK8jdkru4Sf1ZQcZV6D4oHPnHnKsh8VBPjWwYYCXk>)
2. **Ask a Bumble Bee:** This project is created and run by Sam Droege and Jenan El-Hifnawi with the USGS/FWS NBIML (US Geological Survey/Fish and Wildlife Service Native Bee Inventory and Monitoring Lab).

We are requesting your help in surveying Bumble Bees and their habitats this summer in the Northeast. We (USGS/FWS Native Bee Lab) have developed a simple Plant/Bumble Bee Survey that permits anyone to survey what plants Bumble Bees use anywhere there are Bumble Bees (literally). We call it "Ask a Bumble Bee." Our goal is to quantify which plants bumble bees use, rank them by that use, and also identify which ones they don't use.

So: You don't need to identify bumble bee species (though our goal is to get you there) Everything is non-lethal. You only need a cellphone (for taking pictures of plants), pencil, paper. You can survey any location where bumble bees occur. Your garden, arboretums, parks, plantings, natural areas, refuges, urban, suburban, farm, wilderness, roadsides, and weedy patches are all places we would like you to survey. The richer the plant diversity, the more plants are competing for bumble bees and clearer preference will be You can survey a site repeatedly throughout the year.

The target regions are the states: ME, NH, VT, CT, MA, RI, NY, NJ, VA, MD, DC, WV. What if you are not in those states or are in Canada, can you participate? Yes! And, we will process data from the primary states first and those outside later.

Basic instructions: 1) Half hour walk - You can take whatever path you like. 2) Take notes about all the blooming plants to 10 feet on either side of that path (yes, including invasives and garden flowering that are not native). 3) Count all the bees (and carpenter bees!) along this route and note what flowers they are on. 4) Take pictures of all the flowering species (so we can check IDs). 5) Take pictures of your field sheets and upload all the pictures using your phone (no apps to download!) Done, but we want you to do more than one survey really.

How can I get involved?: Just email Jenan El-Hifnawi (bumblebeecount@gmail.com) our fabulous coordinator and she will sign you up and can answer detailed questions.

When do things start?: Once you see the first bumble bee, of course. We are particularly interested in what flowers emerging queen's use. The poor things have been sitting underground all winter and are vulnerable to starvation if there are no plants to feed on. No queens, no bumble bees. So, we want to figure out what good queen food is.

There are four documents for the Ask a Bumble Bee project. These will be available for download on the Tuftonboro Ag. Comm. webpage (<https://www.tuftonboro.org/agricultural-commission>) or printed sheets will be available in the town office. If you have questions on this project, please contact Jenan (bumblebeecount@gmail.com) she usually responds promptly.

- **Instructions on How to do a Bumble Bee/Carpenter Bee Floral Survey**
- **Form if you can identify bumble bee species**
- **Form if you cannot identify bumble bee species**
- **Maya's Bumble Bee Survey: A short story, diagram, and field sheet**

Hopefully you'll find time to take some walks this year and participate in one or both of these studies.

Sue Wingate
Chair, Tuftonboro Ag. Comm.

Instructions on How to do a Bumble Bee/Carpenter Bee Floral Survey

What will I be doing?

In this survey you will walk around an area of your choosing and record all the flower species you see, *regardless of if bees are using them*, while observing which flowers bumble bees and carpenter bees are on.

Why do this?

By determining which flowers bumble bees/carpenter bees are observed on, we gain an understanding of the plants that they tend to use. This allows us to manage the environment to cater to them.

Requirements:

- Ability to identify bumble bees and carpenter bees. Example photos can be found by scanning the first QR code under “Bee Identification Resources” on page 4 of this document.
 - Identification of bumble bee species and sex is useful, but not required. There are two versions of the datasheet available: one for people who can identify bumble bee species (labelled “Use this datasheet if you *can* identify bumble bees to species”), and one for those who cannot (labelled “Use this datasheet if you *cannot* identify bumble bees to species”).
- “Seek by iNaturalist” app. This app identifies plant species in the field. It does not need Wi-Fi or cell service for identifications.
- Temperature is above 60° F and not raining. Time is 9:00 am – 4:00 pm.

Using “Seek by iNaturalist”:

- Download the ‘Seek by iNaturalist’ app to identify the blooming plants. Open the app and hit the green camera button at the bottom of the screen to begin identifying flowers.
- If Seek gives you an ID that you disagree with, record the ID that Seek has given you in the data collection table and record the species you believe it is in the “Notes:” box (e.g. “I think Sp. 3 was White Clover”)

Choosing a Survey Area:

- All locations containing flowers are viable (urban/suburban/wild are all important). The entire area should be roughly the same habitat type.
- Choose an area you could cover in approximately 30 minutes.
- Size and shape of the area surveyed are up to you.

Completing the datasheet:

Top header section:

- Determine latitude and longitude using a maps app on your phone, and report to at least 4 decimal places.
 - In Apple Maps, simply click on your location (blue circle) and scroll down.
 - In Google Maps, click close to your location (may need to click and hold), without hitting the blue circle to drop a pin within your survey area. Click on that pin (red logo) and scroll up to view the latitude and longitude.
- Percent clouds should be estimated, and temperature can be estimated or found online.
- If using the datasheet for people who *can* ID bumble bees to species, the “Notes:” box contains spaces to record up to 5 *Bombus/Xylocopa* species. Fill these species in as you

survey and identify them. If you encounter more than 5 species write results for the additional species in the notes section. For example, write “*B. fervidus* on flower 8”.

Conducting the survey:

- Prior to starting, scout out your survey area to get a rough idea of what flowers are around and their relative abundance. Consider practicing using Seek if you're unfamiliar.
- There should be 30 minutes of bee observational time, not including time spent filling out the top header section of the form or recording plant species. Write flowers as you survey and **extend the survey time to accommodate the time spent writing**.
- Walk around the area, recording each flower species that you come across. Use Seek to ID the plants and take a photo of each flower species, then record the species under “Plant Species/Description” and the time the photo was taken under “Photo time”.
 - Seek automatically saves photos to your camera roll. Use your camera roll to check the photo time and to access the photos when submitting data, as Seek does not store multiple photos of a single species.
 - If Seek is unable to determine the species, record the classification that Seek gave you along with a description of the flower (e.g., small yellow).
 - Make sure your photo is in focus and includes important characters. An expert will use the photos to confirm floral IDs. For Goldenrod, capture the flower head, base of stem, and underside of a leaf. For American Asters, capture the flower head, flower bract (underside of head), and basal leaves (leaves just above the ground). Record photo time as a range from the earliest to latest photo.
- There is no need to walk in any specific pattern or along a transect, simply roam wherever you see flowers, and record any flowers within a 10-foot radius of you.
- **Include all flowers whether bees used them or not. Don't forget to record small flowers on the ground and species with just one or two flowers.**

Floral Quantification:

- As you survey, take note of the abundance of each flower species. We use two measures of abundance: “# Lots” and “Floral Rank”
 - # Lots is a measure of floral distribution that explains if flowers are clumped together or dispersed across your survey area. For # Lots, imagine your survey path as a suburban road lined with 25 property lots. For each flower species estimate how many of the 25 lots contain a blooming flower of that species. It doesn't matter how much of each lot is covered by the flower species, only that the species occurs in the lot. Only consider area that is viable for plants (do not count area occupied by buildings, roads, lakes, etc.).
 - This is a **rough estimation** of how spread out each flower species is, so don't spend much time determining a precise value.
 - For uncommon flowers it will likely be easiest to tally patches as you pass them. For very common flowers it is often easiest to estimate the number of lots after the survey is complete.
 - Only count flowers that are **currently in bloom** (no buds or dead flowers)
 - Floral rank is a measure of sheer abundance of blooms. For floral rank, rank which flowers are most abundant relative to each other. This measure should factor in both the size of flowers and the quantity of them (e.g., hundreds of tiny

flowers may be equally abundant to ten larger flowers). Consider how much area each species could cover if you flattened out all the flowers to a flat surface.

Remember to only consider blooms, not other plant parts like stems and leaves.

- Let **1 be the most abundant species**, and your highest number be the least abundant.
- Multiple species can be tied for a single rank.
- **Keep both measures of floral abundance in mind while surveying to help yourself remember. If you forget to look out for abundance during your survey, consider retracing your steps afterwards to recall how abundant each flower was.**

Bee Counting:

- Use tallies to record bumble bees and carpenter bees as you see them. If you are identifying bumble bees to species, use the box corresponding to the appropriate sex and species (including sex and species unknown) as described below. If you are using the form for people who cannot identify bumble bees to species, disregard this step.
 - Below the sex headings (e.g. # Females), there are numbers 1-6. These numbers correspond to the species you recorded in the "Notes:" section.
 - For example, if you wrote "Sp. 1: B. *bimaculatus*" in the notes, and you see a B. *bimaculatus* female, record a line in the column below "1" and "# Females" and in the row of the plant species you saw the bee on.-
 - Use the unknown column unless you are 100% sure about your species ID.
 - If there are an overwhelming number of bees on a single species do not spend a long time identifying them all, just ID a few to estimate diversity and record the rest as unknown.

Instructions on how to upload datasheet and photos from surveys:

Method 1: Uploading Directly into Shared Drive (recommended):

1. Contact bumblebeecount@gmail.com to be added to the drive.
2. Download the Google Drive app.
3. Open the Google Drive app and select the "Shared" tab at the bottom of the screen.
4. There will be a folder named after you (i.e. folder name is your full name). Click on that folder to enter it and click the plus sign in the bottom right corner.
5. Select "Folder" to create a new folder with the following format: "Location name – Date" (e.g. Bee Lab – 06/14/2021)
6. Click on that folder to enter it, then click the plus sign in the bottom right corner and select "Upload"
7. Allow Drive to access your camera roll, and select all photos you took in a single survey **(including a photo of your datasheet!)**, then hit "UPLOAD".
 - a. You will be able to upload all photos at once, there is no need to do small batches.
8. The uploading will pause if you leave the app or stop using your phone, but the upload will not cancel (i.e. you can still reopen the app and it will finish uploading).

Method 2: Emailing Photos to be uploaded:

1. The email bumblebeecount@gmail.com is prepared to receive photos, however, emails typically limit the size of a message to contain a maximum of 6 photos.
2. If you can compress your images into a ZIP file, do so for all your photos (including your data sheet) and send them to bumblebeecount@gmail.com in a single email. If not, send the images to bumblebeecount@gmail.com in groups of 6 photos or less.

Bee Identification Resources:

Bumble Bee vs Carpenter Bee vs Honey Bee



This PDF is intended for people who cannot identify bumble bees and carpenter bees. It contains pictures of bumble bees, honey bees, and carpenter bees and a brief description of how to differentiate between each genus.

https://www.xerces.org/sites/default/files/2018-05/12-052_01_Eastern_Bumble_Bee.pdf



This PDF is a guide to the bumble bees of the Eastern US. Beginning on page 14, there are sections on each common *Bombus* species within the Eastern US. The guide includes information on ID characteristics, range, phenology, and more.

<https://www.bumblebeewatch.org/app/-/species/profile>



This site provides identifying characters, lookalikes, seasonal patterns, ranges, and more for most *Bombus* species. This link goes to *Bombus affinis*, use the search bar to look up your local species.

<https://www.inaturalist.org/taxa/52775-Bombus>



This site provides photos of each bee species in the field. The link goes directly to the *Bombus* genus, use the search bar to look up your local species.

Reminders: Don't forget small flowers on the ground, or species with just one or two flowers! *Record all species currently in bloom, whether bees are on the flowers or not.* Only record flowers and bees within a 10-foot radius of you (feel free to walk up to them to get within 10 ft). Have 30 minutes of *bee observational time*, i.e. 30 minutes of looking for bees, not including time recording plant species or filling out the data sheet. For Goldenrods photograph the flower head, base of stem (just above the ground), and underside of a leaf. For American Asters, photograph the flower head, flower bract (underside of flower head), and basal leaves (leaves just above ground). For recording additional flowers, form continues onto Page 2.

State:	County(No abbreviations):		Location Name:	
Collector:	Date:	Start Time:	AM / PM	% Clouds:
Rain: Yes / No	Temperature:	Latitude:	Longitude:	
Notes: Sp. 1:	Sp. 2:	Sp. 3:		
Sp. 4:	Sp. 5:	Sp. 6: Bombus unknown		

[illegible]

<i>Plant Species/Description</i>	<i>Photo Time</i>	# Females						# Males						# Sex Unknown						# Lots	<i>Floral Rank</i>
		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6		
24																					
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		<i>Total # Bees on Page 2:</i>																			

Maya's Bumble Bee Survey: A short story, diagram, and field sheet

Maya, taking a break from her job managing an insurance firm, struck out across the street to the local park. The purposelessness of work fell away as she entered the park's large meadow to make one of her periodic bumble bee surveys. Here her contributions were clear...and came with no zoom calls or angry clients. She enjoyed these surveys and the dedicated time spent watching bumble bees partition the meadow's flowers. Some plant's flowers always harbored bumble bees and others, seemingly equal in bloom, unvisited. Since early Spring when queens emerged from hibernation, her routine included doing these surveys about once a week. She was happy to document their choices of favorite flowers as Spring gave way to Summer and now Fall.

As Maya entered the meadow, she immediately felt the connection to her bumble bee friend and took out the empty field sheet and a pen. By now she knew that she wouldn't encounter more than 25 flower species in this meadow, so she only brought page 1 of the survey form. When she occasionally surveys in her local botanical garden she always brings both pages so she can record all the flowers. She recorded State, County, and location, and with a quick glance at the sky she estimated cloud cover. Her cell phone told her that the temperature was in the 80s, and her Maps app gave her latitude and longitude.

As she walked down the path, she noticed from afar that the goldenrods had started blooming and as she approached, she saw bumble bees visiting them. She recorded a start time on her field sheet (11:15). Upon realizing that she did not know which goldenrod species she was looking at she took out her cell phone and used the Seek app to identify the plant. Seek only gave her "Goldenrod" as an answer, so she shrugged and decided to let the coordinators figure out the species. She noted the time (11:17) and took a picture of the goldenrod. Because Goldenrod species are so tricky, Maya took additional photos of the flower head, base of the stem, and the underside of a leaf. Maya wrote "Goldenrod species" and 11:17 on her field sheet, because all 3 photos were taken within that minute. She realized that along the footpath there was blooming red clover and white clover. Confident in her ID, Maya took pictures, noted the time for each, and wrote both clovers down along with photo times on her field sheet.

After writing down and noting the time on a few more blooming flowers, she saw some bumble bee action on some Ashy Sunflowers. She moved close and leaned in to watch the action. On the near ones she could tell they were *Bombus impatiens* because they clearly had pale hairs only on the first abdominal segment, but it was more of a struggle to tell if they were males or females. On some she saw big balls of pollen on the hind legs, confirming females. On others, it was not so clear. For some she could see the bare area on the leg where the pollen would go (female) or the absence of this shiny bare area (making it a male). Since it was hard to see she recorded most of the *B. impatiens* as unknown sex with a few females recorded and only one male recorded that she was sure of. Other bumble bees on the Ashy Sunflowers were a bit too far away to tell even the species so she just tallied them as unknown species and unknown sex. In her past counts most of her bumble bee recordings were unknown sex, but she had gotten better at the ID part over time.

As she went along recording flowers and counting bumble bees, the usual pattern emerged - most of the bumble bees were only on a few plants. However, she did find one *B. impatiens* on the white clover in the path. The other popular plant was the goldenrod species which had several *B. impatiens* (the most common bumble bee in her area at that time of year) but also had a 3 nice dark-winged *B. pensylvanicus* specimens.

Outside of the well-worn path she could see a large patch of field thistles in bloom and decided to tromp off the path towards them to see what was happening there. Sure enough, several bumble bees including some *B. pensylvanicus* and one *B. fervidus*. As some of the plants were tall and large, she couldn't see some of the bees clearly enough to ID, giving her the usual compliment of unknown bumble bees. Along the way to the thistles Maya noted some blooming *Desmodium*. Seek identified the genus but again could not give her the species. She took a picture and recorded "Desmodium species" and the photo time. Thankfully none of the seeds were ripe enough to stick to her clothes. She recalls a few office meetings where people asked about the vegetation sticking to her clothes, and once even had to discreetly pick off a tick that was making its way up her leg.

Maya wandered her way back to the path, glad that she had swapped out her business suit for kakis and tennis shoes as she avoided some brambles. She passed a few more blooming plant species that had no bumble bees, but she diligently took their pictures and recorded them as learning what plants bumble bees did not use is just as important as learning which they did use. She still enjoyed looking at these bee-less plants because another gift of these surveys (besides escaping the office) was learning her wildflowers as she had wanted to do for years. Finding new blooming plant species was almost as fun as finding bumble bees.

The meadow had been there for years but other than the casual glance on her way into work, she never paid it much attention. She had no idea about all the life it contained, so many interesting kinds of flies, wasps, butterflies, skippers, and small bees that used the same flowers. Continuing her survey, Maya recorded a couple of a carpenter bees on the Clustered Mountain-mint along with some additional *B. impatiens*. By then it was 11:45, half an hour after she started, but she estimated that she had spent 5 minutes writing things down and scanning plants with Seek so she extended her count for the same amount of time. At the end it was easy to quickly total the bumble bee columns and then she had to pause to think about the distribution and abundance of flowers that she just passed by. Best to do a quick walk back along the path and get a flower refresher.

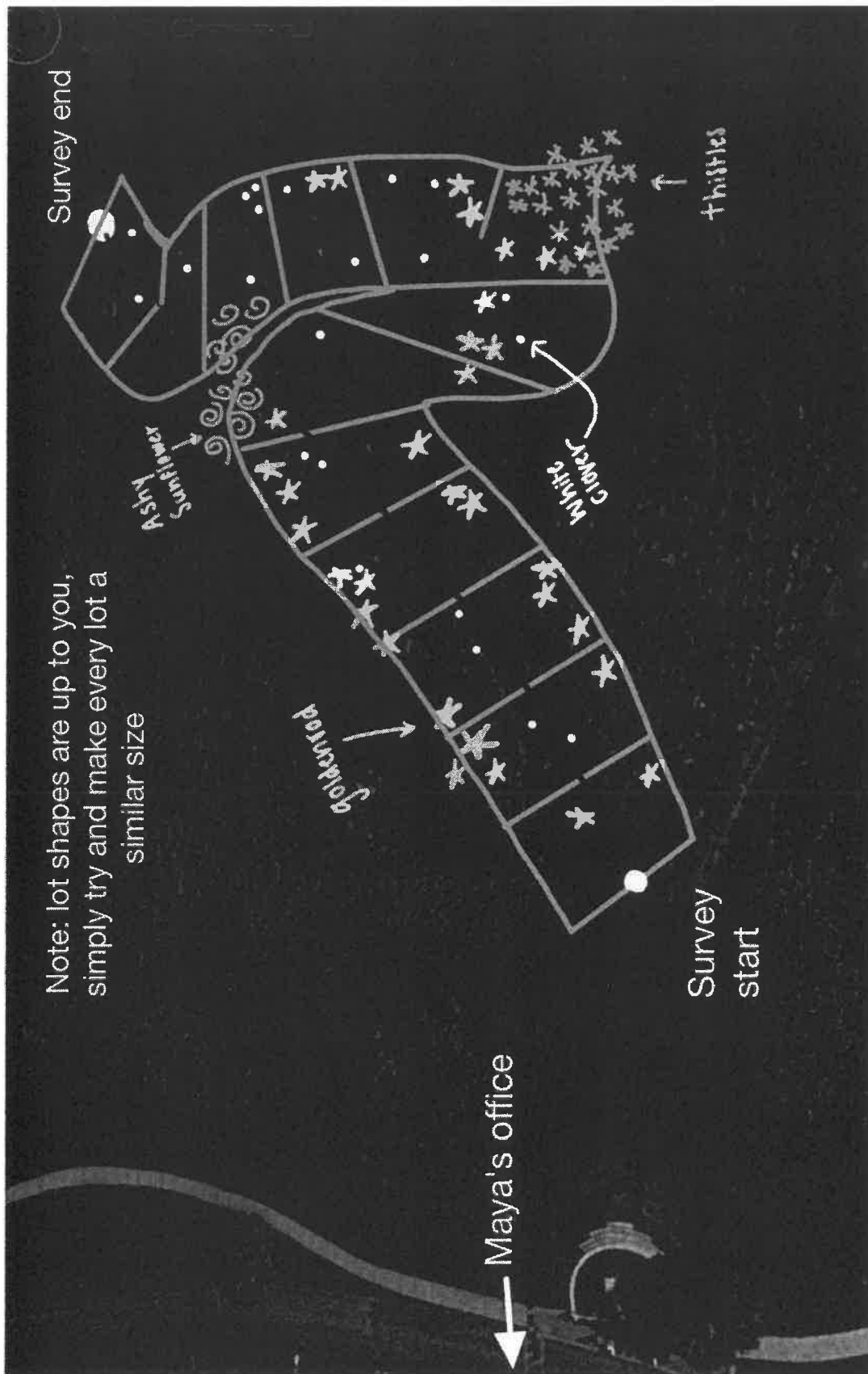
While walking through to refresh her memory, Maya imagined that her 20-foot-wide path was divided into 25 small, roughly equal-sized house lots. Going down her plant list species by species she estimated how many of those lots had at least one open flower in it for each species of plant. Most ended up only being in only one or two "lots", but some, like the goldenrod, were in many (she estimated 18 for goldenrod). She quickly tallied lot numbers for each plant species to give researchers an idea of how widespread each flower was across her walk.

Next Maya looked at the rank column. This was more straightforward, as it is just about the volume of bloom rather than how that bloom was distributed across her walk. The job at hand was to roughly rank the flowers by amount of bloom area. She thought about all the flowers, only counting blooms that were open and available to her bumble bees. She skipped over things that were completely closed, like morning glories and evening primrose plants, and only included the open flowers on the Bergamot despite an abundance of flowers that had gone to seed, making them of no interest to a bumble bee. In her mind she flattened all the blooms out for each species and ranked them from most bloom area at number 1 (goldenrod again) to plants with small bloom area at high numbers. Often plants, especially less abundant ones, had roughly the same amount of bloom so she gave them the same rank.

In this way the scientists could tell roughly which plants were providing the most "flower power" to bumble bees while accounting for some plants having tiny flowers and some plants having big flowers. She was sure that it was not very precise and that some college student with all the time in the world

could do an exact count, but she knew that the idea was to quickly assess the blooms in her counting area so that the bumble bee counts could be later matched to that bloom pattern.

She put her clipboard on the ground, carefully took a picture of her entire field sheet, and then used the Google Drive app to make a subfolder in her designated Google Drive folder named "Friendly Park – 10 AUG 21". Still using the Google Drive app, she uploaded her field sheet photo and flower photos to the folder she just created. With bumble bee and flower meditation done, Maya felt renewed. She knew so much more about her local natural world now and this meadow had become important to her. It was no longer just a nice green spot, but a place of complexity and patterns. She was beginning to decipher these patterns for bumble bees and flowers as she watched the bumble bees shift from plant species to plant species across the year. She also had made an important contribution that will help create and save more meadows like hers. As she walked across the street and back to a desk, computer, and responsibilities for she felt a bit lighter and more tolerant



Reminders: Don't forget small flowers on the ground, or species with just one or two flowers! **Record** all species currently in bloom, whether bees are on the flowers or not. Only record flowers and bees within a 10 foot radius of you (feel free to walk up to them to get within 10 ft if possible). Ensure you have 30 minutes of bee observational time, i.e. 30 minutes of looking for bees, not including time recording plant species or filling out the data sheet.

State:	County:	Location Name:	Floral Rank
MARYLAND	Baltimore	FRIENDLY PARK	
Collector: Moya Applebee	Date: 10 AUG 2021	Start Time: 11:15 AM	
% Clouds: 30	Rain: Yes	Temperature: 80.5	
Notes: Sp. 1: <i>B. impatiens</i>	Sp. 2: <i>B. pensylvanicus</i>	Sp. 3: <i>B. ferrugineus</i>	
Sp. 4: <i>Centurus Bess</i>	Sp. 5:	Sp. 6: <i>Bombus unknown</i>	

Plant Species/Description	Photo Time	# Females	# Males	# Sex Unknown	# Lots	Floral Rank
1 SPANZIO SPICES	11:17	1	1	1	6	1
2 RED CLOVER	11:18	1	1	1	6	2
3 WHITE CLOVER	1					3
4 WHITE SNAREBUSH	11:20					4
5 BLACK-EYED SUSAN	11:20					5
6 DEERFOOD PINK	11:23					6
7 ASHY DOGWOOD	1					7
8 NERDOW LEAVED PLANTAIN	1					8
9 WOODRUE MEN MINT	11:27	1	1	1	6	9
10 WINGSTEM	11:28					10
11 SPOTTED KNAPWEED	11:28					11
12 SPURGE SPECIES	11:30					12
13 FIELD THISTLE	1					13
14 DESMODIUM SPECIES	1					14
15 SMALL YELLOW THISTLE THING	11:34					15
16 SPOTTED RUTABAGA	11:34					16
17 NY IRONWEED	11:42					17
18 COMMON YARROW	1					18
19 SELF HEAL						19
20						20
21						21
22						22
23						23
24						24
25						25

Total # Bees:	18	7	1	1	2	1	16
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