

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.

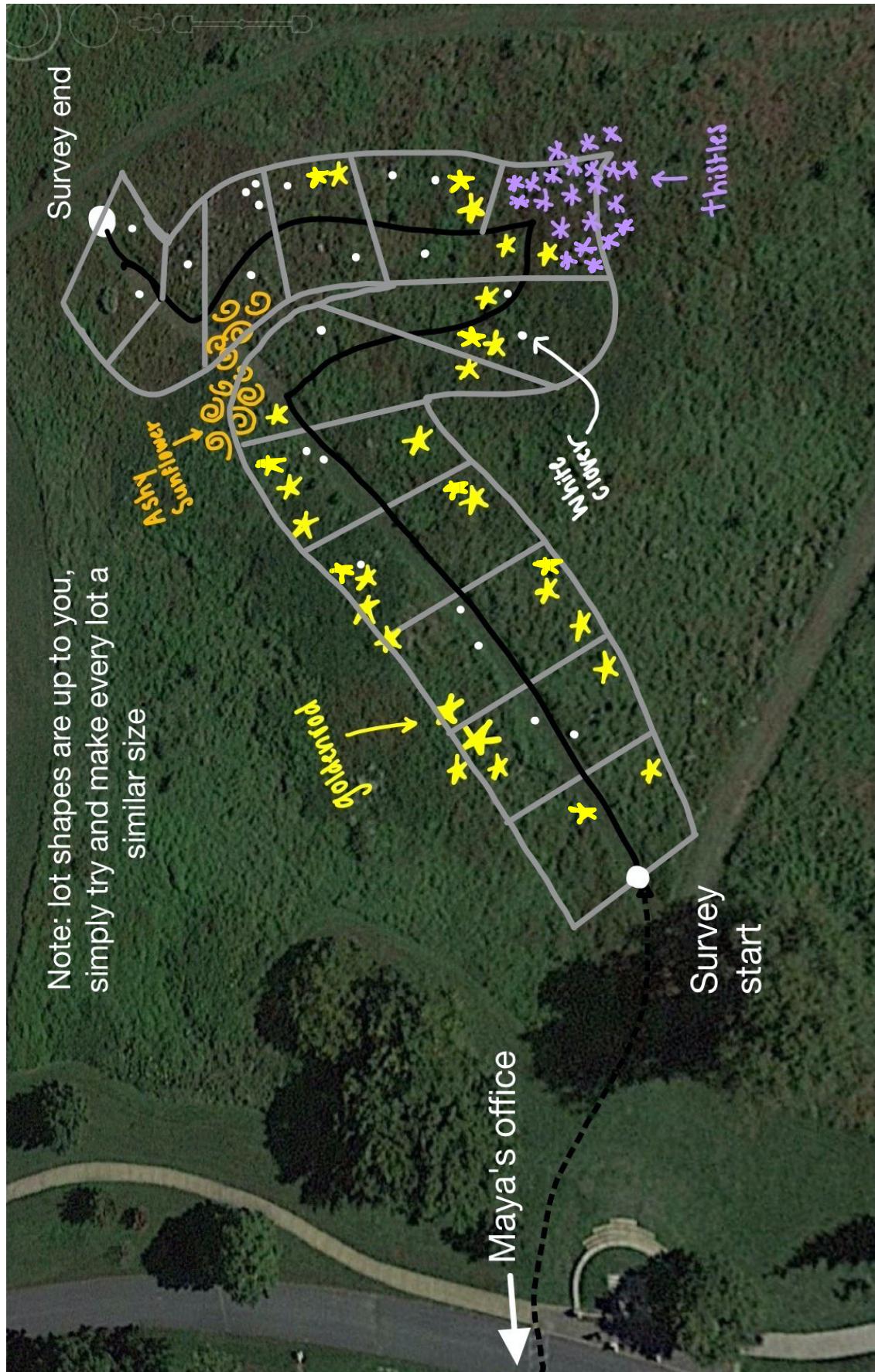
While walking through to refresh her memory, Maya imagined that her 20-foot-wide path was divided into 25 small, roughly equal-sized house lots. Going down her plant list species by species she estimated how many of those lots had at least one open flower in it for each species of plant. Most ended up 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:	MARYLAND	County/(No abbreviations)	Baltimore	Location Name:	FRIENDLY PARKS
Collector:	Mary Applebee	Date:	10 AUG 2021	Start Time:	11:15 AM
% Clouds:	30	Rain:	Yes AND	PM	
Notes:	Sp. 1: B. impatiens Sp. 4: Carpenteria Brasiliensis	Sp. 2: B. pensylvanicus Sp. 5: Sp. 6: Bombus unknown	Sp. 3: B. ferrugineus		

Plant Species/Description	Photo	# Females	# Males						# Sex Unknown	# Lots	Floral Rank
			1	2	3	4	5	6			
1 Goldenrod species	11:17	III									1
2 Red Clover	11:18			1							8
3 White Clover		1									10
4 White Sweet Clover	11:19										5
5 Black-Eyed Susan	11:20										2
6 Deepford Pink	11:21										8
7 Asthy Dovetailed	11:22										1
8 Nodding Lemon Plantain	11:23	III									3
9 Whorled Mountain Mint	11:27	II		1							10
10 Wild Stem	11:28										12
11 Spotted Knapweed	11:28										4
12 Spurred Species	11:30										6
13 Field Thistle	11:31										7
14 Desmodium Species	11:32										1
15 Small Yellow Thistle Thistle	11:34										7
16 Red Rubberwood Loriniota	11:34										5
17 NY Ironweed	11:34										9
18 Common Yarrow	11:42										2
19 Scent Heal	11:42										7
20											3
21											9
22											7
23											3
24											9
25											6
Total # Bees:	18	7	1	1	2	1	1	1	16		