

# Habitat for pollinators: Improving management of regionally significant Xeric grasslands, barrens, and woodlands in the northeast

## Bee Sampling Protocol

*Adapted from The Very Handy Bee Manual*

### Objectives

- This study seeks to provide insights into bee community responses to management in eastern xeric habitats.
- Two complementary methods will be implemented to collect bees from xeric habitats: bowl traps filled  $\frac{3}{4}$ + full with soapy water (non citrus detergent is used to break the surface tension to allow for the capture of bees and is also lethal), and hand netting including time-constrained and targeted netting. Sampling will be conducted once each in five two-week time windows between May and September.
- ***NOTE: Bee bowls are not specific to bees and catch a wide variety of insects including flies, butterflies, moths, wasps, beetles, etc. If your site has rare or protected insects (ie. Frosted elfin, Karner blue), do not use bee bowls during the flight periods of these animals unless you have permissions/permits from the appropriate agencies. For survey windows in which rare species are flying, just conduct the targeted netting. Bowls can be deployed when the insects are no longer flying.***

### Materials

- Bee bowls
- Soapy water (Blue Dawn Detergent only)
- Brine shrimp net
- Aerial insect nets
- Centrifuge tubes
- Whirl-pak bags
- 70% Ethanol
- Data Labels
- Pencils

### Methods

#### Survey Windows

- Sample (bee bowl and targeted netting) once in each of the two-week windows listed below
  - 5/1-5/14
  - 6/3-6/17
  - 7/1-7/23
  - 8/5-8/19
  - 9/10-9/24

## BEE BOWLS

### Bee Bowl Transects

- Transect will consist of 24 bee bowls painted fluorescent blue, fluorescent yellow, or white that are placed 5 meters apart. Transects will be placed in a single habitat type in a linear arrangement. Transects should be situated  $\geq 30$  meters from habitat edges. Transect lines do not have to be absolutely straight, they can be placed around dense clumps of vegetation and other obstacles. Make an effort to keep them pointing in the general direction of the cardinal points.
- Note the direction of the transect such as east-west, north-south.
- If possible, permanently mark end points of transect with field marker such as rebar or wooden stake, or by taking GPS points

### Bee Bowl Samples

- Prepare soapy mixture by adding a long squeeze of Blue Dawn Dish soap to a gallon of water. DO NOT USE CITRUS BASED SOAPS!!!! They decrease the capture rates.
- Place bee bowls on the ground 5 meters apart (pacing is fine) along the transect alternating blue, yellow, and white colors.
- Press tall vegetation aside before placing bowls so they are not obscured by vegetation.
- Fill bowls  $\frac{3}{4}$ + full with soapy water solution.
- Avoid putting bowls in areas of heavy shade because few or no bees will come to those bowls.
- Transect lines do not have to be absolutely straight, they can “wiggle” to avoid dense clumps of vegetation and other obstacles.
- Be sure that the bowls are level and placed firmly on the ground.
- Deploy bowls during warm ( $>60$  F<sup>0</sup>) clear or partly cloudy weather; however, if there has been a run of wet, cool weather, place the bowls out early on a day within a sampling window that looks as if it will be at best partly sunny and collect the following day.
- Collect bowls after 24 hours of being deployed. Alternatively, for more remote sites, bowls can be put out early in the morning (before 9) and picked up late in the afternoon (after 5.)
- The contents of the 24 transect bowls will be combined into one sample.
- Pour the contents of the 24 transect bowls into a brine shrimp net to strain bees from the soapy water.
- For each site, place the contents of a transect into a Whirl-Pak with ~2 tbs denatured alcohol diluted to 70%. A spoon can be used to transfer the contents of the net into Whirl-Paks.
- If you have time, please remove slugs, snails, and Lepidoptera before putting the sample into a Whirl-Pak. DO NOT try to sort out other insects, bees come in a variety of shapes and sizes and we would rather have to remove a few extra beetles and flies than take a chance on losing a bee specimen.
- ADD a Data Label internally to each Whirl-Pak!!! Labels will be written in PENCIL on Rite-in-the-Rain waterproof paper and placed IN each Whirl-Pak with the contents of the bowls. DO NOT WRITE ON THE OUTSIDE OF THE BAG OR USE A SHARP...EVER!!!!!!!!!!!!

**Did we mention: NO SHARPIE ON OR IN WHIRL-PAKS?**

The sharpie not only runs and becomes illegible, it also discolors and compromises the sample.

## NETTING

The Very Handy Bee Manual provides an excellent section on how to net bees and how to remove bees from nets. All participants are encouraged to read the section on Netting Technique, and view the YouTube videos listed below.

**How to Net Collect Wasps and Bees:** <https://www.youtube.com/watch?v=n6ZFlz3uA7E>

**Advanced Bee Netting:** <https://www.youtube.com/watch?v=SwYbv5bySPQ>

When it comes to netting bees, don't over think it, act. Again, DO NOT try to sort out other insects, bees come in a variety of shapes and sizes and we would rather have to remove a few extra beetles and flies than take a chance on losing a bee specimen. The bee lab will separate out bees from non-bees.

"Bees are lost when you hesitate or check your swing. If you see something that looks like a bee, capture it in your net. Once in your net you can decide whether or not to keep it. If you spend any significant time thinking about whether you should or should not swing, the capture opportunity will be missed as the bee will have moved on." From the Very Handy Bee Manual.

- Conduct aerial netting for 30 minutes before the bowls have been deployed or after they have been collected. The 30-minute netting can be divided among multiple persons. If putting bowls out in the morning and picking up in the evening, netting can take place when the bowls are out.
- Netting during peak bee activity for most bees should be from 10:00-2:00; however, this time window may be extended to 9:00-4:00 if days are warm, especially later in the season.
- Restrict area within 10 m on either side of the linear plot.
- Net bees on flowers, bees flying along the ground, on root balls, sandy banks, wherever you see bees flying. If you're not sure if it is a bee, catch it and include it in the sample. A lot of bees look like wasps or flies.
- Move among flower types (blueberry/aster, etc.) if more than one is in bloom, it is desirable to get even coverage of each plot, so try to spend no more than 5 min in a single patch if others are present. Plants with a high rate of bee visitation can be revisited after sampling other floral sources.
- As viewed in the YouTube videos, you can capture multiple bees in your net before they need to be removed. To remove bees, insert a centrifuge vial filled 2/3 full of soapy water into the net and shake bees into the vial. Stop the clock during the time the specimens are being transferred from the net to a centrifuge.
- At the end of the 30-minute net sample, strain bees from the soapy water in the centrifuge vials into the brine shrimp net that was used for bee bowls. Label as above for transect samples, with the exception that you will list capture method as "net."
- ADD a Data Label internally to each Whirl-Pak!!! Labels will be written in PENCIL on Rite-in-the-Rain waterproof paper and placed IN each Whirl-Pak with the contents of the bowls. DO NOT WRITE ON THE OUTSIDE OF THE BAG OR USE A SHARP...EVER!!!!!!!!!!!!!!

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## DATA LABELS

On each data label: **ALL FIELDS MUST BE FILLED IN**

- State
- Site
- Transect ID- **NO NUMBERS**; if you are sampling multiple transects at your site, each should be given a unique name
- Method- In order to make things easier, the same data label can be used for both the bee bowl and netting samples but you must identify the method by circling "Bowls" or "Netting"
- Date (##\_day\_spell out the month\_##year, e.g. 12 May 2017)
  - Date out: This is the date the bowls were put out into the field or the date you conducted a netting survey
  - Date In: This is the date the bowls were collected from the field (may be different than "Date Out" but should be no longer than 24 hours) or the date you conducted a netting survey
    - \*\*\*Note- the Date "Out" and "In" will be the same for netting surveys
- Time
  - Time Start Sample: The time you put the bowls out in the field (should be an evening or a morning) or the start of your netting survey
  - Time End Sample: The time you collect bowls or the end of your netting survey
- Collector Name: The name of the individual picking up the bowls or conducting the netting survey
- # of Bowls with liquid collected- We will all be putting out 24 bowls per transect (8 of each color) but things happen in the field (bowls leak, get tipped over, etc.) so record the total number of bowls picked that still contain liquid- this is important for sampling effort
- Weather notes (sunny or cloudy, windy or calm, high temperature, etc.)
- Top 1-5 Blooms: One-five most abundant plants in bloom at the site (genus is fine, ie. Solidago, Vaccinium, etc).
- Marking transects with colored field tape or flags will make it easier to find transects.

## Mailing Samples

- For those of you sending specimens to Sam Droege, you can mail all specimens to the address below in a padded envelope by regular mail. Be sure to put the specimens in several layers of zip locks so that nothing leaks out. Throw into the second level some paper towels. Make sure there is only a small amount of alcohol and that the bags are rolled all the way down and tight. In other words, drain most of the alcohol out of the bags.
- DO NOT WAIT TO MAIL SPECIMENS- send specimens within a month of collection
- Shipping Address:

Sam Droege  
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12100 Beech Forest Road  
Laurel, MD 20708-4006