

Wolf Trap National Park for the Performing Arts 2015 Bee Survey Report

Submitted by
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Halictus poeyi/ligatus, Sweat Bee

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Introduction

Over the past five years, pollinator gardens were created by Wolf Trap National Park for the Performing Arts to encourage pollinators and enhance the visitor experience. In June 2013, I began a photographic assay of the park's biota. My interest in bees started when I created native plant gardens at my home in 2007. I began participating in wildlife surveys in the Occoquan Bay region by the Audubon Society of Northern Virginia in 2009. We used our cameras to capture images to identify plants and insects. Bees became my focus. And in 2009, I began contacting Sam Droege for help in identifying bees. He saw my collection of photos and he connected me with Discover Life. I donated 2009 - 2011 photos. As time went on, I got better at identifying bees. But it became clear to do it well, I would need to have live specimens in order to see all the characteristics I needed for the Discover Life keys. In June 2013, I began photographing Wolf Trap's flora and fauna. I heard of the park's initiative to assess the pollinators at Wolf Trap. Phil Goetkin, who had planted the pollinator plants, wanted to know what pollinators had come. So timing was propitious for both of us. Phil contacted Sam Droege of US Geological Survey at Patuxent Research Station, MD to share protocol on collecting bees and to do the bee identifications. Our goal was to create a bee list.

July 8, 2013, Eric Prunchak and Allison Hay (both summer interns) and I placed our first glycol bee cups out. We were to compare the rich meadow in front of the Filene Center box office to grassy areas on the hill beside the Filene Center. The theory was that there would be far more pollinators in the meadow than in the grassy areas that had not been planted with nectar plants. Bees were collected from the cups every Wednesday, July 17, July 24, July 31, August 7, and August 14. We were surprised at the number of bees in the grassy meadows. I do not have all the data from 2013, just the first two sample dates. So that needs to be tracked down.

In 2014, we were recruited to join a regional study of springtime bees. This was initiated by Sam Droege and coordinated by Tim McMahon and Grace Savoy-Burke (of the University of Delaware). Locations in Maryland, Delaware and our site in Virginia participated in the study. The goal was to document the abundance and distribution of non-native and native bees in woodlands. Another goal was to create a baseline for future investigations of changes in the bee community or forests in the region. Another goal was to clarify the specialization of bees in forest types. The work was done by volunteers for each of the locations. And sampling protocol was used for consistency. Chris Schuster replaced Eric and Allison for 2014.

Our sampling season began in March 11 and ran through May 15 when the trees leafed out and the cups were no longer productive. We chose two transects where spring ephemeral wildflowers bloom in the park.

The Ephemeral Transect was located in bottomland near the Little Theater. There Spring Beauty (*Claytonia virginica*), Trout Lily (*Erythronium americanum*), Slender Toothwort (*Cardamine angustata*), Lesser Celandine (*Ranunculus ficaria*), Star Chickweed (*Stellaria pubera*), Common Blue Violet (*Viola sororia*), and Sessile Bellwort (*Uvularia sessilifolia*) were the dominant pollinator plants.

The Ericaceous Tract was located at the edge the old farm pond. The dominant pollinator plants there were Mountain Laurel (*Kalmia latifolia*), Swamp Fetterbush (*Leucothoe racemosa*), Spotted Wintergreen (*Chimophila maculata*), Lowbush Blueberry (*Vaccinium pallidum*), Black Huckleberry (*Gaylussacia baccata*), Highbush Blueberry (*Vaccinium corymbosum*), and Pinkster (*Rhododendron periclymenoides*).

I also netted bees in 2014 off of pollinator plants in other areas of the park as they bloomed. The goal was to catch as many species of bees as possible.

The study had many set-backs. We had 10 inches of snow the first week. The cups were vandalized with puncture holes the second week. The third week we had two snowstorms and 2 inches of rain. The fourth week the Lesser Celandine was sprayed with Rodeo which is lethal to bees and desirable ephemerals. But we did get samples, unusually full of bees. May 1, we had rain and a flood which washed away all the ephemeral cups. All new glycol cups were put out and the cups were relocated 15 feet further up the hill to avoid future floods. And then, the leaves came out and the cups were no longer productive at the May 15 sampling. It was a very rainy, snowy, cold spring. Deer occasionally tipped cups even though we tried to avoid obvious deer paths. But if a cup was empty it was noted.

The Meadow/Field glycol cup bee study began on April 17, 2014. We used the same localities as in 2013. It was going on at the same time as the springtime bee survey for a few weeks. The study ran through October 14, 2014. We sampled the glycol cups weekly throughout the period. The May 1 flood did some damage and we had to replace a couple of cups. But otherwise it went well. We had two high school students assisting. We had some trouble with their inexperience and youthful exuberance. But there were a lot of bees to process. And it was interesting to mentor the interns in 2013 and the students in 2014. I hope they learned a little. The hot water for washing bees stopped working and some of the specimens were matted. Sam had at the end of the study 80 bees he could not identify because they were new to him. His latest e-mail said he had identified all the bees that he did not identify earlier. So we eagerly await his 2014 springtime bee report that he is currently working on. He is going alphabetically, now on 'B', and we are at the end of the list with 'W'. So sometime this fall or winter we may see his results. We have all the data for Meadow/ Field but no one has worked on it other than create a species list. We received the full 2014 bee report in spring of 2015. I will update the bee species list with all of the 2013 and newest 2014 data for this report.

In 2015, I was hired to continue the bee surveys at Wolf Trap. I worked alone with the exception of Chris collecting the bees when I could not. I processed them at home where I have a lab set-up with microscope and supplies. And I delivered them to Sam Droege in MD periodically. We began the Springtime Bee Survey on April 3, 2015 and it continued through May 18, 2015. The only change was the location of the Ericaceous tract. We located it to a higher location in the park above the Little Theater. We hoped we might see other species. No better location was found for the Ephemeral tract.

The Meadow/Field transects were not repeated. Chris Schuster and I decided that it would be more profitable to net bees in 2015. Many bees, which I had seen and photographed, were not ending up in the cups. And it would be helpful to note the plants they were nectaring on. The Center for Urban Ecology in Arlington, VA received samples of pinned bees of each species for storage record. And we keep a exhibit box of bees for Wolf Trap. If any bees are left over after CUE samples were taken, we were able to take samples for the park. So our goal was to collect bees to supplement both. Netting was done beginning April 2, and throughout the growing season, ending finally Sept. 25, 2015. I would only net a bee if I did not recognize it. There was no sense to net bees we already had. In conjunction with the bee sampling, I noted and counted butterflies to continue the butterfly survey we had begun in 2013. This was more labor intensive than glycol cups which are a passive collection method. But there were fewer bees to pin and send to Sam Droege. I followed the blooming plants throughout the park throughout the growing season. I found that the high value areas began to follow a predictable route. It took three hours to complete the circuit, sometimes more.

Survey areas are shown in Figure 1. Beginning at the maintenance area parking lot, the forest edges were sampled (Area A). Then, the areas on either side of Trap Road (Area A/B). I crossed over the road to the marsh boardwalk and into the woods slightly (Area B). Then along the lower parking lot to the bottom land behind the fence in (Area B). The parking field was examined. Next was the 'dimple' or the 'Meadow', and the box office garden (Area D). From there I followed the pathway along the park buildings to the butterfly bushes and vegetable garden. Turning right down the grassy hill to the 'Field' beside the Filene Center, the mowed and unmowed areas were checked (Area B/D). The low path along the stream was inspected regularly. Sometimes the area behind the Filene Center and woods (Area A, B, C, D) were sampled if nectar sources were available.



Figure 1. Survey Areas

Forest Bee Survey Protocol

Supplies

- 18 polypropylene tube trap stands (9 per transect) plus spares (see Sam)
 - 36 cups (12 white, 12 yellow, 12 blue) (see Sam)
 - Propylene glycol 100% (farm supply carries it for cows)
 - Aquarium net or paper filter to strain out the bees
 - Funnel helps to hold filter if using one
 - Ziploc bags to place bees or filter with bees into, one per transect per week
 - Label written in pencil (permanent markers can smear)
 - Container to put pre-mixed glycol solution into for the field, mark fill line
 - Small bucket to contain and carry supplies
- ### Setting up Transects
- Trap holders are placed 10 meters apart
 - Colored cups alternate (white, blue and yellow) along transect
 - The first trap should be roughly 50 meters from the edge of the forest
 - When filling the traps use half water and half glycol
 - Fill about 7/8 of the way to the top

Field Collection

- The traps are emptied once a week in the morning
- Samples are refrigerated until processed
- Sampling is from mid-March through mid-May, weather permitting
- There are 10-12 sample dates
- End sampling when forest leafs out, ephemeral wildflowers and bees decline
- Lift the cup from the trap holder
- Place a new cup of the same color into the trap ring (rinse old cup in lab)
- Strain the bees using a net or filter with funnel allowing the glycol to flow into the replacement cup in the trap
- Remove any large pieces of debris (be sure no bees are attached)
- Empty the bees into the pre-labeled transect Ziploc bag, or place filter into the Ziploc bag to prevent loss
- If cups are empty or broken, please note in your field notebook to report. Replace with the 50/50 glycol/water mixture
- If the cup is below 7/8 full, fill with full strength glycol
- Carry a container of half strength glycol and a container of full strength glycol in the field

Laboratory Processing

Supplies

- Tupperware container (7 cup) with pin holes in the lid to vent
- Blue Dawn dish washing liquid
- Aquarium net to strain
- Pint canning jar, with window screen crazy glued to the ring
- Data Vac electric duster (no heat)
- Standard clear plastic petri dishes
- Paper sticky note tabs
- Pencil
- #2 insect pins
- forceps
- Tacky Glue
- Watch with second hand, or timer, or cell phone stop watch
- Parchment paper
- Pinning board (can purchase or make from foam insulation board)
- Insect boxes provided by Sam

Washing

- Fill Tupperware container with 2" hot water and large squirt dish washing liquid
- Fill Ziploc with hot water to loosen bees from the bag so suspended
- Carefully pour bees into aquarium net over the sink (close trap), repeat if bee left
- Empty net contents into prepared Tupperware container
- If using a filter, carefully tear it open and drop the bees directly into container
- Place lid on container and vigorously shake for 3 minutes
- Open lid and remove any excess bubbles carefully so as not to lose any bees
- Pour bees and liquid through net to remove bees, rinse off suds under faucet
- Empty bees into canning jar and put on lid.
- Dry with electric duster until crunchy and smells like hay.
- Empty bees into pre-labeled petri dish
- Repeat for the next transect

Pinning

- Place parchment paper over pinning board
- Carefully separate bees from non-bees using a microscope or hand lens. Sam asks for the wasps since he wants to be sure they are not bees. Discard non-bees.
- Pin label to board (place, date, transect, collection method)

- Remove bees to pinning board with parchment paper surface
- Beginning with largest bees, begin pinning
- Pin should go through the bee thorax slightly off center
- Carefully hold the bee between thumb and index finger, protecting wings
- Insert pin through the bee, leaving enough room on the pin to grasp the head
- Place the bee to the right of the label
- Continue to work through the bees until you get to those too small to pin
- Put a small drop of tacky glue on left forefinger.
- Touch the pin to the glue low enough to grasp the pin with the bee on it
- Touch the bee to the glue on the pin, either on the side or underside.
- Lay the pin with bee on the parchment to dry.
- Continue until all bees are on pins
- Let the glue dry, then place the bees to the right of the label in insect box, largest to smallest and head facing towards the top
- Repeat for the next transect

The other forest bee survey groups just put them in zip lock bags and froze them. Then the bees were sent by mail to Sam Droege's lab. Since we were experienced, we continued to wash and pin our own for 2014 and 2015.

Netting

Netting is much simpler. I use a sturdy sweep net to cast and whip it to the back securing the bee in the fold. To avoid getting stung, I put a small amount of isopropyl alcohol on the bee while in the net. It works quickly and then I put the bee into a spice bottle filled with alcohol. It is stable until I get around to pinning them. I note in my field notebook what color top the bottle has for the plant that I netted off from. I use a net to strain the bees from the alcohol into a spare bottle. Washing is easier, just a quick rinse with hot water. Then into the drying bottle and blow dried. Pinning is the same.

Identifications

In Sam's lab, they create labels with scan codes that contain all the information for each bee. Sam Droege is a regional bee expert who created the Discover Life bee keys and he does all the identifications. We drive them up to him at the Patuxent Research Station, MD and retrieve them from him. He does it at his own pace, since he has lots of projects going. He provides spread sheets with all the data for us for each year. And the bee info can be accessed on Discover Life by six-digit identification number. He places them by species, with females (vertical facing the top) and males (horizontal facing right) into the box.

When we get them back, we separate out the bees for storage at the Center for Urban Ecology (CUE) in Arlington, VA. We choose a male and a female for each

species to give them. They get first pick from the specimens. We also select from the bees that are left for our display case, arranged male (horizontal) and female (vertical), for each species. So our Wolf Trap collection does not contain the complete species list.

Field Notes and Sampling Dates

- 4-2-15 Set out hoops for Forest Bee Survey, spring delayed one month.
Area A: **Netted** off of Spring Beauty, Lesser Celandine, stream bank
Area B: **Netted** off of Red Maple
- 4-6-15 Put out cups for Forest Bee Survey
Netted near Hellebore Swamp on the trail in Area D
Netted in woodland in Area C
Netted off Yoshino cherries in Wolf Trap Road median
Notes: Carpenter Bee, Honey Bee, *Andrena*, *Osmia*, *Nomada*
- 4-13-15 Chris collected bees
- 4-20-15 Collected bees from cups
Netted off of Bluebells (*Anthophora plumipes*)
Notes: Cups surprisingly full of bees
- 4-30-15 Collected bees
Netted off of Flowering Dogwood, Redbud, Red Chokeberry, Crabapple
Notes: *Osmia*, *Andrena*, *Bombus pensylvanica*, *B. impatiens*, *B. griseocollis*
Other blooms: Star Chickweed, Spring Beauty, Blue Violets, Oaks, Birches
- 5-4-15 Collected bees, cups needed topping
Notes: **netted** off Pinkster Azalea, ground-nesting bees (*Colletes*?), sandy banks
Swarms of (*Colletes inaequalis*) bees on streambanks crossed stream 2x
Nomada (pygmaea) intermixed with bee swarms
Trees leafing out, all flowering trees dropping petals except Red Chokeberry
- 5-11-15 Collected bees (none in Ephermal cups, a few bees in Ephemeral cups, flies)
Blooming: Ephemeral- no flowers, ferns over topping cups
Ericaceous- Dangleberry (*Vaccinium stamineum*)
Netted off of Black Cherry, Black Locust, Viburnum, Hollies?
- 5-18-15 Collected bees, ended Forest Bee Study, no/few bees
Took GPS coordinates:
Ericaceous tract: 38° 56' 23" N, 77° 15' 39" W
to 38° 56' 21" N, 77° 15' 41" W
Ephemeral tract: 38° 56' 23" N, 77° 15' 46" W to 38° 56' 20" N,
77° 15' 46" W (went around a stream curve)
Sorted and checked 2014 bees to send to CUE

- 5-28-15 **Netted** off of White Clover, Arrowwood, Mt. Laurel, Carolina Lupine
- 6-11-15 **Netted** off of Indian Hemp (*Apocynum cannabinum*) in Areas A/B,
Notes: **Mainly** Honey Bees, also *Bombus griseocollis*, *Bombus impatiens*,
Augochlorini, *Halictus*, *Andrena*, *Ceratina*, Carpenter Bee- mainly males
Netted off of Common Milkweed (*Asclepias syriaca*)
Notes: *Bombus griseocollis* (50), *B. impatiens* (40), Carpenter Bees (200)
Netted off Oak-leaf Hydrangea (*Hydrangea quercifolia*)
Notes: Honey Bee (50) Carpenter Bee (10) *B. griseocollis* (15 male, 2 female),
B. perplexus (7+), *B. impatiens* (3)
- 6-18-15 Observations: *Agapostemon virescens* on Ox-eye (*Heliopsis helianthoides*), *Halictus ligatus/poeyi* on *Coreopsis*,
Netted off Buttonbush (*Cephalanthus occidentalis*) Area A
Notes: mostly *B. impatiens*, some *B. perplexus* *B. griseocollis*, Carpenter Bee
Netted off Annabelle Hydrangea (small bees)
Netted off Common Milkweed
Notes: mostly *B. griseocollis*, few *B. impatiens* and *B. perplexus*, many female Carpenter Bees
Netted off Indian Hemp: *B. griseocollis*, *B. impatiens*, Carpenter Bees
Noted that *Agapostemon virescens* present on Ox-eye and Coneflower, lots of *Halictus ligatus/poeyi* on Black-eyed Susan (*Rudbeckia hirta*)
- 6-25-15 Observations: Workers of all Bumble Bees have emerged. On Buttonbush, fewer *B. griseocollis*, more *B. impatiens*, still plenty of *B. perplexus*, fewer Carpenter Bees, *Bombus bimaculatus*!
Netted off Common Milkweed a *Lasioglossum*, a *Halictus*,
Netted off Buttonbush, Indian Hemp
- 7-2-15 ?
- 7-11-15 NABA Butterfly Count, no bees netted, **Notes:** *Megachile mendica* on Buttonbush, *Bombus fervidus*, *B. perplexus*, *B. impatiens*, *B. griseocollis*, *B. bimaculatus* on *Monarda fistulosa*, *Halictus poeyi* on *Rudbeckia hirta*, Carpenter Bee on Passion Flower
- 7-16-15 **Netted** (just Squash Bees, *Peponapis pruinosa* noted)
- 7-23-15 Visiting parents in Illinois
- 7-29-15 Observations: *B. impatiens* males and females, *Augochlorella aurata*, Honey Bee, Carpenter Bee, *Svastra obliqua*, *Anthidium manicatum*, *B. griseocollis* males and worker, Honey Bee, *Megachile mendica*, *Megachile brevis* Joe-pye Weed almost exclusively *B. impatiens*, Mt. Mint has Honey Bees
Netted off Ironweed: *Svastra obliqua*? Hibiscus Bee?
Netted off *Monarda fistulosa*: *B. fervidus*. Small Carpenter Bee?, *B.*

perplexus?

- 8-6-15 Observations: Overcast, Porcelain Berry covered with *Auguchlorella aurata*; *Auguchlora pura*, *Halictus confusus*, male *B. impatiens*, Longhorn Bee?
Netted off Woodland Sunflower (*Helianthus divaricatus*) *Megachile frugalis*?
Svastra obliqua? Used by *B. impatiens*
Netted off Hedge Bindweed (*Ipomoea pandurata*) Hibiscus Bee?
Netted off Ironweed (*Vernonia noveboracensis*)
Netted off Sulphur Cosmos: *Triepeolus remigatus*
- 8-13-15 Observations: Mountain-mint (*Pycnanthemum muticum*) monopolized by Honey Bees, almost no native bees, wasps, butterflies or flower flies. Obedient Plant (*Physostegia virginiana*) used by Carpenter Bees and *B. impatiens*.
Netted off Northern Wild Senna (*Senna hepecarpa*) used by *B. impatiens*, *B. griseocollis* and *B. bimaculatus*, Yellow jackets, Netted off Melon
- 8-27-15 Observations: Thoroughwort host to *B. impatiens*, *Scolia dubia*, Honey Bee, *B. fervidus* and *B. impatiens* on Mexican Sunflower, *B. impatiens*, Carpenter Bee on Horse-nettle (*Solanum carolinense*)
Mainly *B. impatiens*, Carpenter Bee, Honey Bee
Netted off Ironweed, female *Mellisodes denticulata*, used by Carpenter Bee
Netted off Late-flowering Thoroughwort (*Eupatorium serotinum*) *Lestica* wasp
- 9-3-15 Observations: *B. impatiens* both sexes, Carpenter Bee, Honey Bee
Blooming: MW Tickseed Sunflower and Late-flowering Thoroughwort
Netted off Field Thistle (*Cirsium discolor*)
- 9-10-15 Rain and sick
- 9-17-15 Observations: Honey Bee, Carpenter Bee, *B. impatiens*, *B. bimaculatus*,
Netted off Midwestern Tickseed Sunflower (*Bidens aristosa*)
Netted off Late-flowering Thoroughwort (*Eupatorium serotinum*)
- 9-25-15 Observations: Carpenter Bee, *B. impatiens*, *B. griseocollis* female, *B. bimaculatus* female
Netted of *Bidens aristosa*, Midwestern Tickseed Sunflower

Weather Conditions

In general, our winter stayed three to four weeks longer than normal. The grass didn't green until mid-April, when it usually did in mid-March. So rather than starting in mid-March for our Forest Bee Survey, we waited until April 6 to put out traps for the transects. April was mild and the flooding of 2014 did not recur. We had an unusually wet mid-May through June. Record rainfall was recorded for May and June. July began to dry out. But it was followed by drought and record high temperatures. This went into the first part of September. Then, it turned drastically cooler in mid-September and the heavy rain returned enough to green up the grass again. In the beginning of October, there was a drastic change from 90s to 50s. The temperature shifted back and forth in that range. Then we dried up some and moderated mid-October. So the numbers of bees dropped off precipitously and I did no netting. In conclusion, it was a year of extremes. It is hard to know what effect it had on the bees. Ground-nesting bees were in saturated ground early summer. Do the larvae drown? Bees may have emerged before the ephemeral flowers bloomed. The disconnect is particularly hard on *Andrena* because they specialized extensively. The heat of summer may have caused bees to aestivate. And there would be a lack of nectar to sustain them since the herbaceous plants declined. So climate change causes extreme shifts in weather and may be contributing to bee declines.

Sampling Schedule

The Forest Bee Survey transects ran from April 6 through May 18.

Bee netting ran from April 2 through September 25.

Identifications

Identifications will be done over the winter 2015/2016 and Spring 2016 by Sam Droege and his crew. Data will be evaluated when we get the results.

Data Tables

The following are a series of data tables. First of **Wolf Trap Bee Species** within the park by year. To do this I needed to go through all the 2013 and 2014 data. This was a big effort. But since I had taken the samples, it was interesting. We have 109 bee species entries between the two years. There were 43 in 2013. There were 95 in 2014. So we added 58 species to the list in 2014. The asterisk indicates a species we have only because I have a photo of it on the Wolf Trap Flickr sets.

Next, is a table of **Wolf Trap 2014 Spring Bees**. It includes the bees recorded for the 2014 pan traps in the Ericaceous and Ephemeral transects as part of the Forest Bees Survey. Also, it includes the bees netted in spring 2014.

Wolf Trap Bee Species

Bee Species	Specimens		
	2013	2014	2015
<i>Agapostemon virescens</i>	6	5	
<i>Andrena arabis</i>		2	
<i>Andrena barbara</i>		88	
<i>Andrena bradleyi</i>		1	
<i>Andrena carlini</i>		37	
<i>Andrena crataegi</i>		1	
<i>Andrena cressonii</i>		4	
<i>Andrena erigeniae</i>	*	8	
<i>Andrena heraclei</i>		2	
<i>Andrena hippotes</i>		1	
<i>Andrena illini</i>		3	
<i>Andrena imitatrix/morrisonella</i>		39	
<i>Andrena macra</i>		1	
<i>Andrena miserabilis</i>		19	
<i>Andrena nasonii</i>		42	
<i>Andrena near quintilis</i>		1	
<i>Andrena nuda</i>		1	
<i>Andrena perplexa</i>		21	
<i>Andrena personata</i>		1	
<i>Andrena pruni</i>		10	
<i>Andrena sp.</i>		4	
<i>Andrena tridens</i>		1	
<i>Anthidium manicatum</i>	5	2	
<i>Anthidium oblongatum</i>	12	15	
<i>Anthophila sp.</i>	2	1	
<i>Anthophora plumipes</i>	*	4	
<i>Apis mellifera</i>	38	42	
<i>Augochlora pura</i>	7	15	
<i>Augochlorella aurata</i>	10	66	
<i>Bombus bimaculatus</i>	1	1	
<i>Bombus fervidus</i>			*
<i>Bombus griseocollis</i>	8	12	
<i>Bombus impatiens</i>	92	42	
<i>Bombus pensylvanicus</i>		1	*
<i>Bombus perplexus</i>	4	5	
<i>Calliopsis andreniformis</i>		15	
<i>Ceratina calcarata</i>	4	16	
<i>Ceratina strenua</i>	4	8	
<i>Ceratina sp.</i>	1	1	
<i>Coelioxys octodentata</i>		1	
<i>Coelioxys sayi</i>		2	
<i>Colletes inaequalis</i>	*	3	

Bee Species	Specimens		
	2013	2014	2015
<i>Halictus confusus</i>	20	77	
<i>Halictus parallelus</i>		1	
<i>Halictus ligatus</i>	1		
<i>Halictus poeyi/ligatus</i>	20	40	
<i>Halictus rubicundus</i>	3	2	
<i>Heriades carinatus</i>	1		
<i>Hoplitis pilosifron</i>		2	
<i>Hylaeus affinis/modestus</i>	3	9	
<i>Hylaeus messilae</i>		2	
<i>Hylaeus modestus</i>	1		
<i>Lasioglossum birkmanii</i>		2	
<i>Lasioglossum bruneri</i>	3		
<i>Lasioglossum coeruleum</i>		1	
<i>Lasioglossum coreopsis</i>	1		
<i>Lasioglossum cressonii</i>	4	9	
<i>Lasioglossum ephialtum</i>		1	
<i>Lasioglossum foxii</i>		1	
<i>Lasioglossum fuscipenne</i>	3	49	
<i>Lasioglossum gotham</i>		3	
<i>Lasioglossum hitchensi</i>	3	7	
<i>Lasioglossum imitatum</i>	6	20	
<i>Lasioglossum leucocomum</i>	6		
<i>Lasioglossum pilosum/leucocomum</i>		70	
<i>Lasioglossum pilosum</i>	79	50	
<i>Lasioglossum planatum</i>		1	
<i>Lasioglossum patyparium</i>	1	3	
<i>Lasioglossum quebecense</i>	1	18	
<i>Lasioglossum sp.</i>	12	16	
<i>Lasioglossum subviridatum</i>		3	
<i>Lasioglossum tegulare</i>	1	4	
<i>Lasioglossum trigeminum</i>		2	
<i>Lasioglossum weemsi</i>	4	6	
<i>Megachile brevis</i>	6	6	
<i>Megachile mendica</i>	13	14	
<i>Megachile rotundata</i>	2	10	
<i>Megachile sp.</i>		1	
<i>Megachile sculpturalis</i>		*	
<i>Megachile xylocopoides</i>		*	
<i>Melissodes agilis</i>	2		
<i>Melissodes bimaculatus</i>	2	1	
<i>Melissodes desponsa</i>	2		
<i>Melissodes denticulata</i>		3	*
<i>Melissodes sp.</i>	1		
<i>Nomada bidentate group</i>		5	

Bee Species	Specimens		
	2013	2014	2015
<i>Nomada illinoensi/sayi</i>		2	
<i>Nomada imbricata</i>	*	9	
<i>Nomada luteoloides</i>		5	
<i>Nomada maculata</i>		1	
<i>Nomada near pygmaea</i>		1	
<i>Nomada pygmaea</i>		9	
<i>Nomada sp.</i>		1	
<i>Nomada sulphurata</i>		1	
<i>Osmia atriventris</i>		3	
<i>Osmia bucephala</i>		1	
<i>Osmia collinsia</i>		1	
<i>Osmia cornifrons</i>		9	
<i>Osmia georgica</i>		5	
<i>Osmia lignaria</i>		10	
<i>Osmia pumila</i>		8	
<i>Osmia taurus</i>		8	
<i>Pepanapsis pruinosa</i>	5	9	
<i>Ptilothrix bombiformis</i>	55	15	
<i>Sphecodes sp.</i>		1	
<i>Stelis lateralis</i>		1	
<i>Svastra obliqua caliginosa</i>			*
<i>Triepolus remigatus</i>			*
<i>Xylocopa virginica</i>	1	8	

Wolf Trap 2014 Spring Bees

Species	Pan Trap								Netting							
	20-Mar	3-Apr	10-Apr	17-Apr	24-Apr	1-May	8-May	15-May	2-Apr	9-Apr	10-Apr	19-Apr	25-Apr	1-May	8-May	12-May
<i>Andrena arabis</i>					1	1										
<i>Andrena barbara</i>			32	2	6		3	1			1				2	
<i>Andrena bradleyi</i>			1													
<i>Andrena carlini</i>			9	4	11					1						
<i>Andrena confederate</i>															1	
<i>Andrena crataegi</i>															1	
<i>Andrena cressoni</i>															1	
<i>Andrena erigeniae</i>	2		1	1				1		1						
<i>Andrena heraclei</i>				1												
<i>Andrena hippotes</i>															1	
<i>Andrena illini</i>															3	
<i>Andrena imitatrix/morrisonella</i>			1		3					8		1	3		5	
<i>Andrena miserabilis</i>											2	2			2	
<i>Andrena nasonii</i>			8		12	1	4	1				2			3	
<i>Andrena near quintilis</i>									1							
<i>Andrena nuda</i>												1				
<i>Andrena perplexa</i>						1	1							1		
<i>Andrena personata</i>			1													
<i>Andrena pruni</i>										4	2	2				
<i>Andrena sp.</i>										2	1					
<i>Andrena tridens</i>													1			
<i>Apis mellifera</i>											1				1	
<i>Anthophora plumipes</i>													1	3		
<i>Augochlorella aurata</i>										1						1
<i>Bombus griseocollis</i>				1												
<i>Ceratina calcarata</i>				1	1		1									
<i>Ceratina sp.</i>															1	
<i>Colletes inaequalis</i>															1	2
<i>Halictus confusus</i>					1										2	
<i>Halictus poeyi/ligatus</i>															2	5

Species	Pan Trap								Netting							
	20-Mar	3-Apr	10-Apr	17-Apr	24-Apr	1-May	8-May	15-May	2-Apr	9-Apr	10-Apr	19-Apr	25-Apr	1-May	8-May	12-May
<i>Halictus rubicundis</i>					1											
<i>Hylaeus messilae</i>																2
<i>Lasioglossum birkmani</i>						1	1									
<i>Lasioglossum cressonii</i>			4	1												
<i>Lasioglossum ephialtum</i>								1								
<i>Lasioglossum foxi</i>					1											
<i>Lasioglossum gotham</i>			1													
<i>Lasioglossum imitatum</i>			2		1											
<i>Lasioglossum planatum</i>			1													
<i>Lasioglossum quebecense</i>			6		6	1	1		2	1					1	
<i>Lasioglossum subviratum</i>			1													
<i>Lasioglossum weemsi</i>						1										
<i>Nomada bidentate group</i>					2					1						
<i>Nomada illinoensi/sayi</i>										1						
<i>Nomada imbricata</i>					1		2									
<i>Nomada luteoloides</i>			1	2	1				1							
<i>Nomada maculata</i>							1									
<i>Nomada near pygmaea</i>							1									
<i>Nomada pygmaea</i>			2	2	1		2	1								
<i>Nomada sp.</i>									1							
<i>Nomada sulphurata</i>										1						
<i>Osmia atriventris</i>													1			
<i>Osmia cornifrons</i>			1				1						2			
<i>Osmia pumila</i>					1		1			1		1	1			
<i>Osmia taurus</i>			2	2	1											