

		Decade											
		<1900	00	10	20	30	40	50	60	70	80	90	2000
Count		4	1	0	1	1	1	0	4	1	3	3	3

# One Minute Bee Life History

- 4000 in North America
- 800 in the East
- 350 in Maryland
- Collect pollen and nectar
- Required for seed set by more than 1/2 the Ag and native plants
- Many co-evolved with individual plant genera
- 90 million years old

# One-half Minute More

- Nest in ground, beetle holes, or plant pith
- Many are nest parasites
- Most don't sting
- All but bumblebees are non-aggressive
- Found in ALL habitats
- Come out at different times of years
- Have habitat and plant preferences
- Can be managed at very small scales
- Open-successional habitats often limiting

# Bottlenecks

- No published list of state species
- Bees of the East > 40 years old
- Keys difficult
- Experts few and declining
- Taxonomy and names have changed

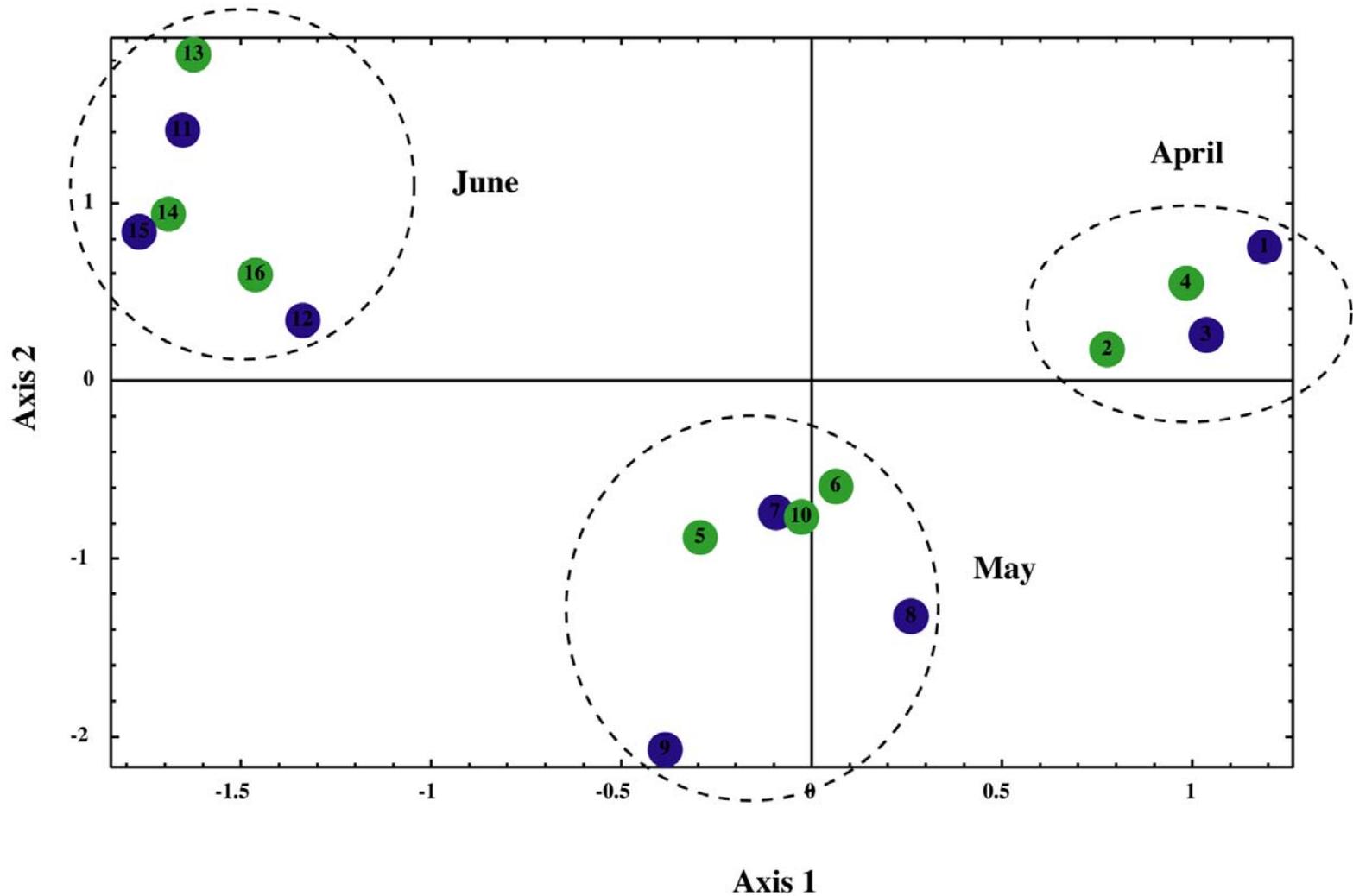


# Introduced Species

- 23 **Known** Non-native Bees
- Most nest in wood or plant stems
- Problem increasing
- *Hylaeus punctatus*
- *Osmia taurus*
- Impact on natives unknown



# Canonical Correlation Analysis: $p < 0.001$





# General Protocol

- Small colored bowls on ground
- Fill with soapy water
- Leave out for 8-48 hours
- Drain catch through brine shrimp net
- Whirlpak
- Pin, label
- Identify
- Database



# Bee Products

- Species Lists
- Relative Abundance
- Species Richness
- Frequency
- Percent Area Occupied
- Maps
- Changes once replicated
- Identify important habitats



# Volunteer Friendly

- 5<sup>th</sup> graders
- Albemarle County
- All but final determinations



# A Replicates in a Grid Approach

- Define Study Area
  - State, County, Park
- Create Grid Overlay
  - Existing map grids
    - Topo, ADC, etc
  - Cells large enough for multiple survey points
- Define Sampling Rules



Click [simplify](#) to continue identification or on a blue link to see that kind.

**simplify**

28 kinds match:

[Agapostemon sericeus](#)

female

[Agapostemon sericeus](#)

male

[Agapostemon splendens](#)

female

[Agapostemon splendens](#)

male

[Agapostemon texanus](#)

female

[Agapostemon texanus](#)

male

[Agapostemon virescens](#)

female

[Agapostemon virescens](#)

male

[Augochlora pura\\_mosieri](#)

female

[Augochlora pura\\_mosieri](#)

male

[Augochlora pura\\_pura](#)

female

[Augochlora pura\\_pura](#)

male

[Augochlorella aurata](#)

female

[Augochlorella aurata](#) male

[Augochlorella gratiosa](#)

female

[Augochlorella gratiosa](#)

male

[Augochlorella persimilis](#)

female

[Augochlorella persimilis](#)

male

[Augochlorella striata](#)

Click here if you already know the genus | Genus - Abdomen underside 1st segment of female | Genus - Abdomen underside 4th segment of male | Genus - Abdomen underside fourth segment of male | Genus - Border of rear face of thorax | Genus - Labrum of male | Genus - Mandible, tip of female | Genus - Rear tibial spurs of female | Genus - Tegula, shape ... careful, look closely | Sex; number of antennal segments

Click on boxes to select them. Then click on any any identify button.  
Move up and down with the black & yellow arrows, above index, or scroll bar.

1. Sex; number of antennal segments not  **index** **identify**

Female; 12  Male; 13

2. Click here if you already know the genus not  **index** **identify**

Agapostemon  Augochlora  Augochlorella  Augochloropsis



3. Genus - Border of rear face of thorax not  **index** **identify**

Encircled by a raised ridge  Without ridge



4. Genus - Rear tibial spurs of female not  **index** **identify**

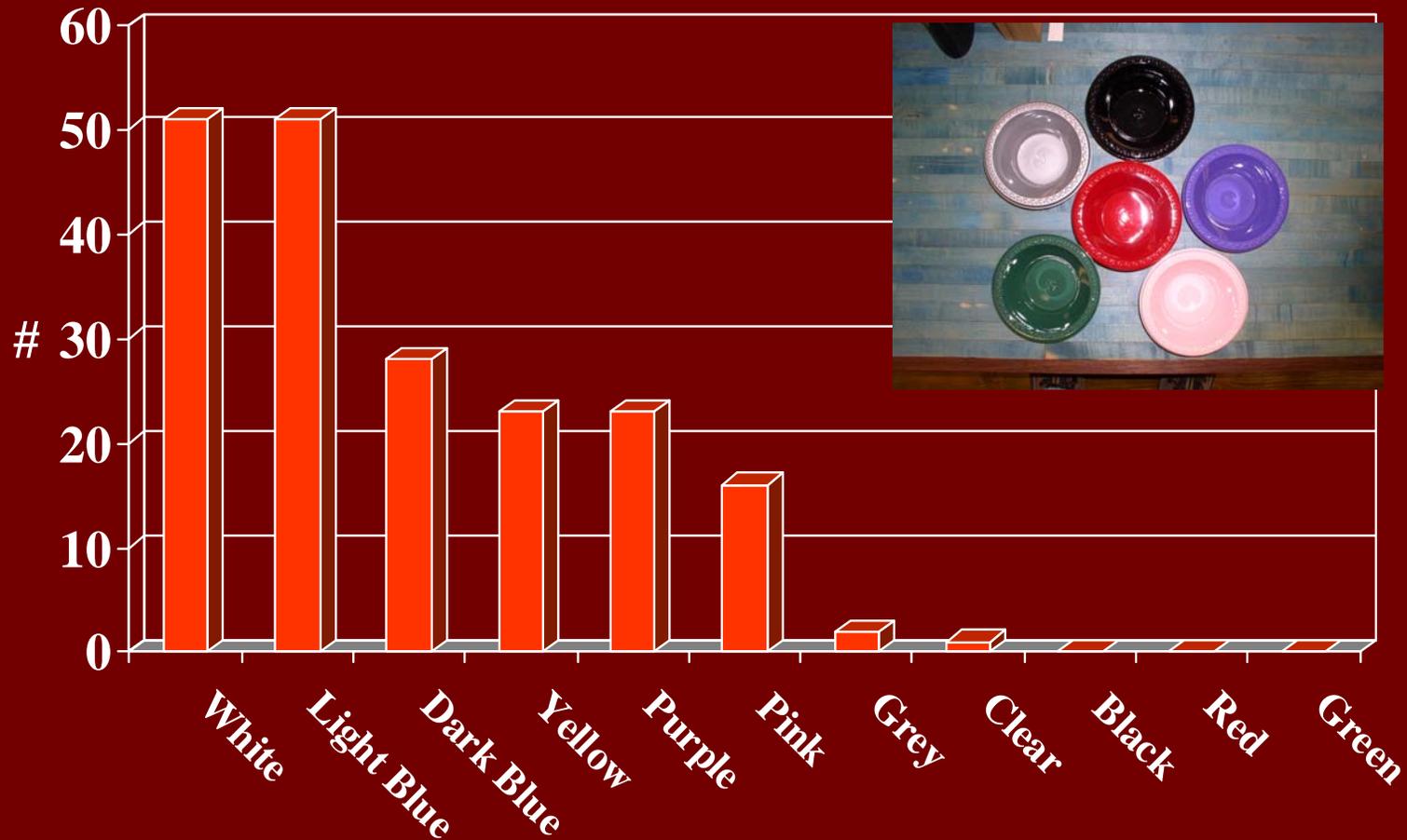
Like a coarse toothed comb  Simple or serrated





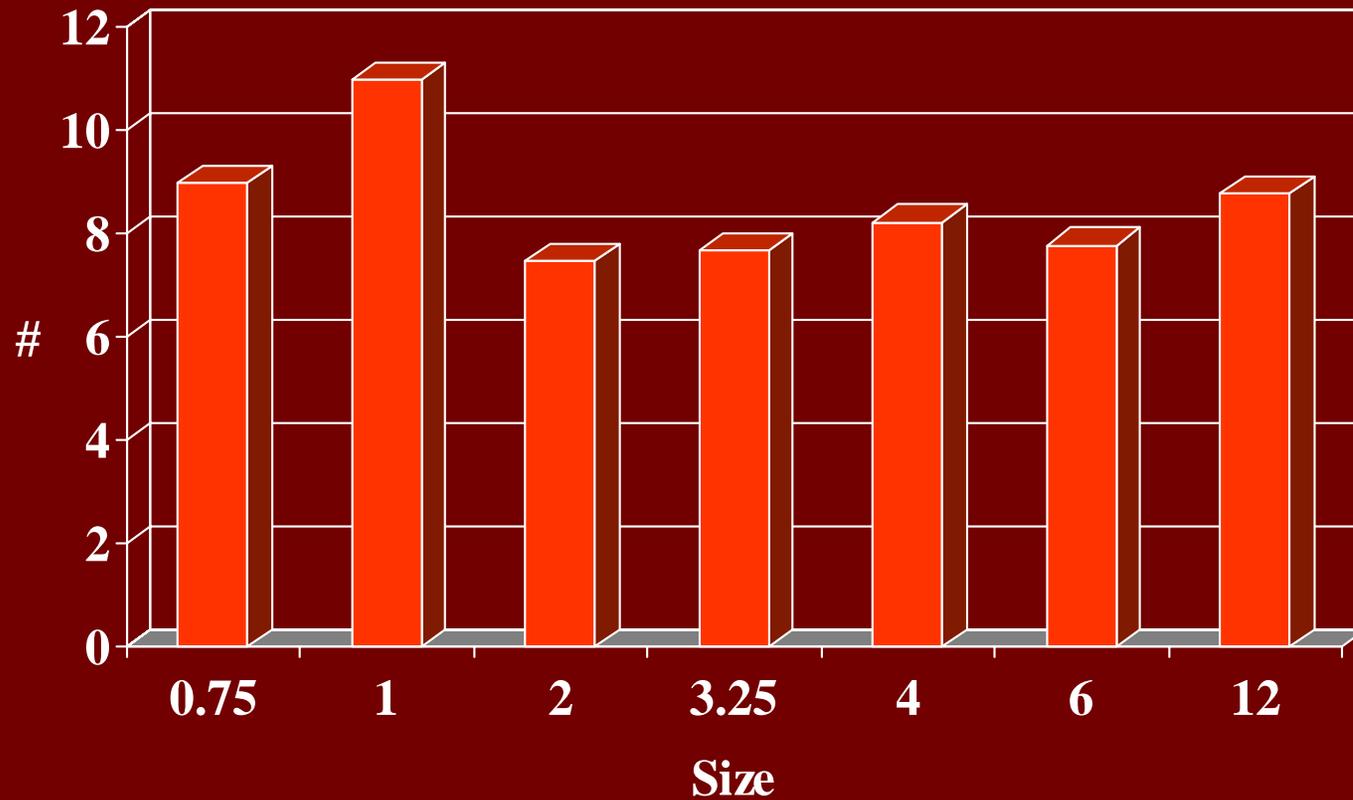
Figure 1. Neighbour-joining tree based on multiple sequence alignment of *Dialictus* barcode sequences.

# Bowl Color

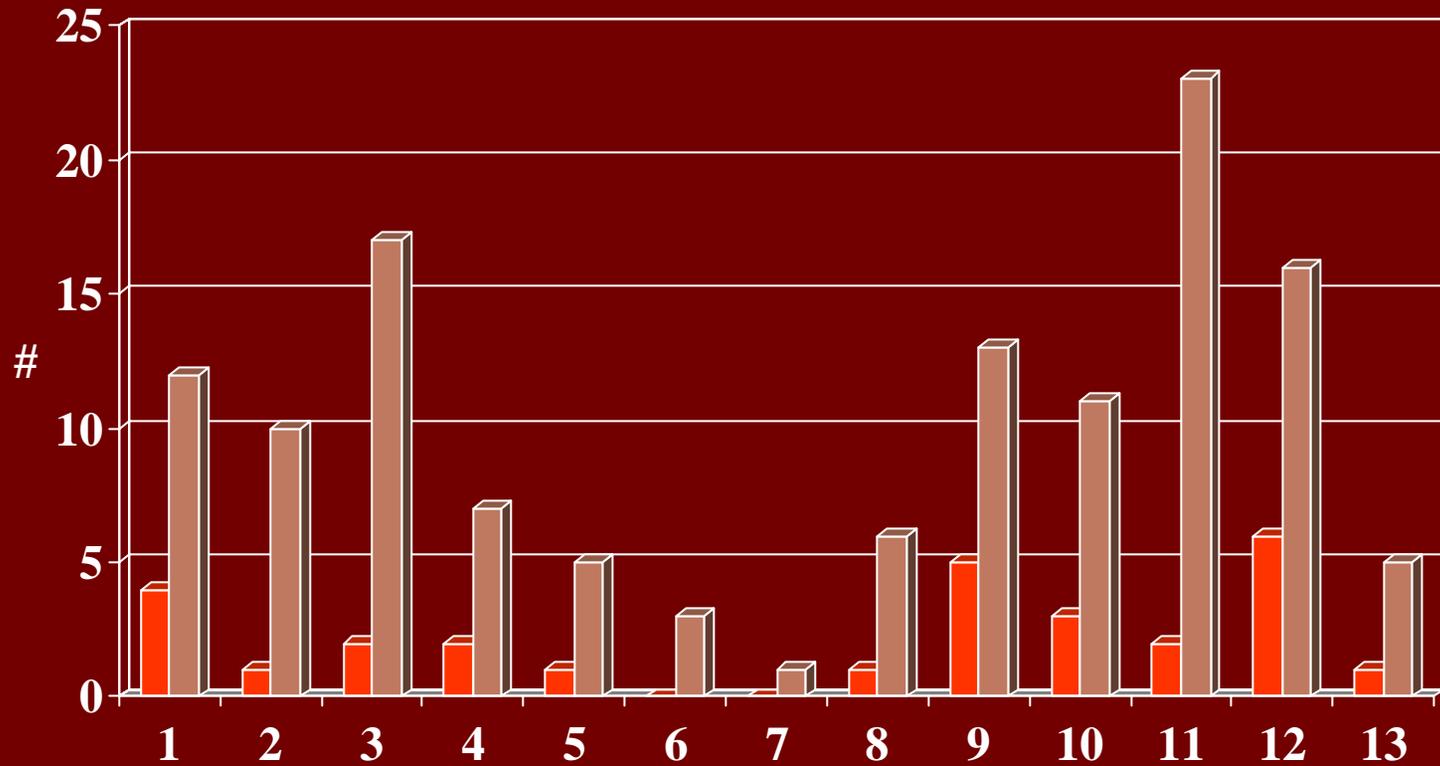




# Size of Bowls

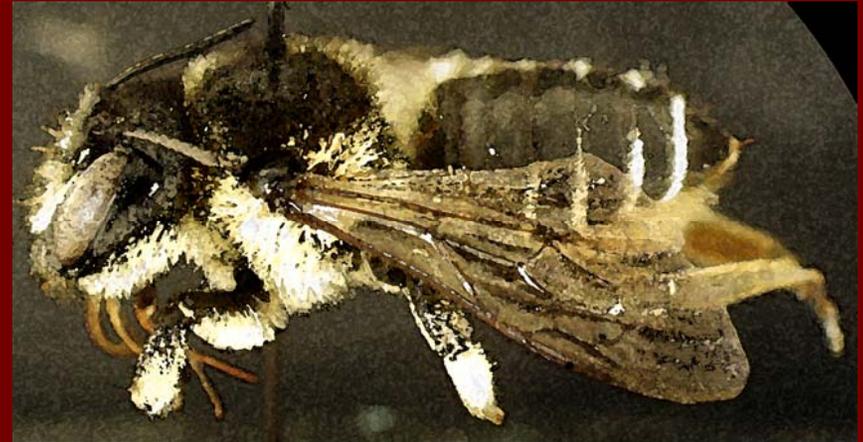


# Yellow vs. UV Yellow



# Piscataway and Fort Washington

- Primarily Bee Bowling
- Small Amount of Hand Collecting
- Monthly Surveys from April – Late September
- 30 Bowl Habitat Transects
- 103 Species Total
- 94 Piscataway, 3323 Specimens
- 51 Ft. Washington, 550 Specimens

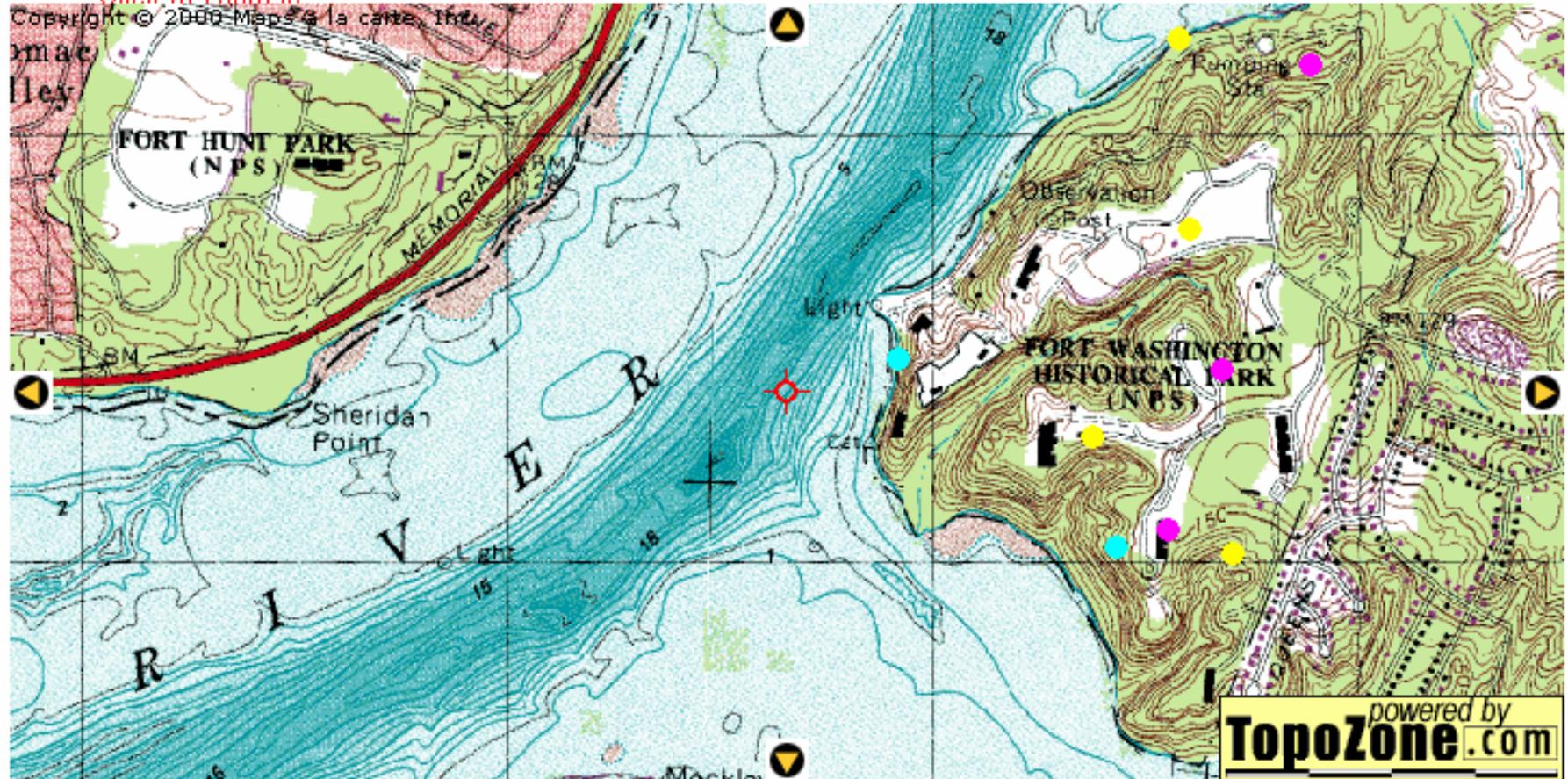




## Discover Life | Topozone | Global Mapper

[Help](#) | [Find place](#) | [Make map](#) | [Demo](#)

Click to zoom in



**Zoom out** West-East: 3657.6 meters

 **NAD83** 38.71029°N 77.03927°W; **UTM** 18 322689E 4286601N

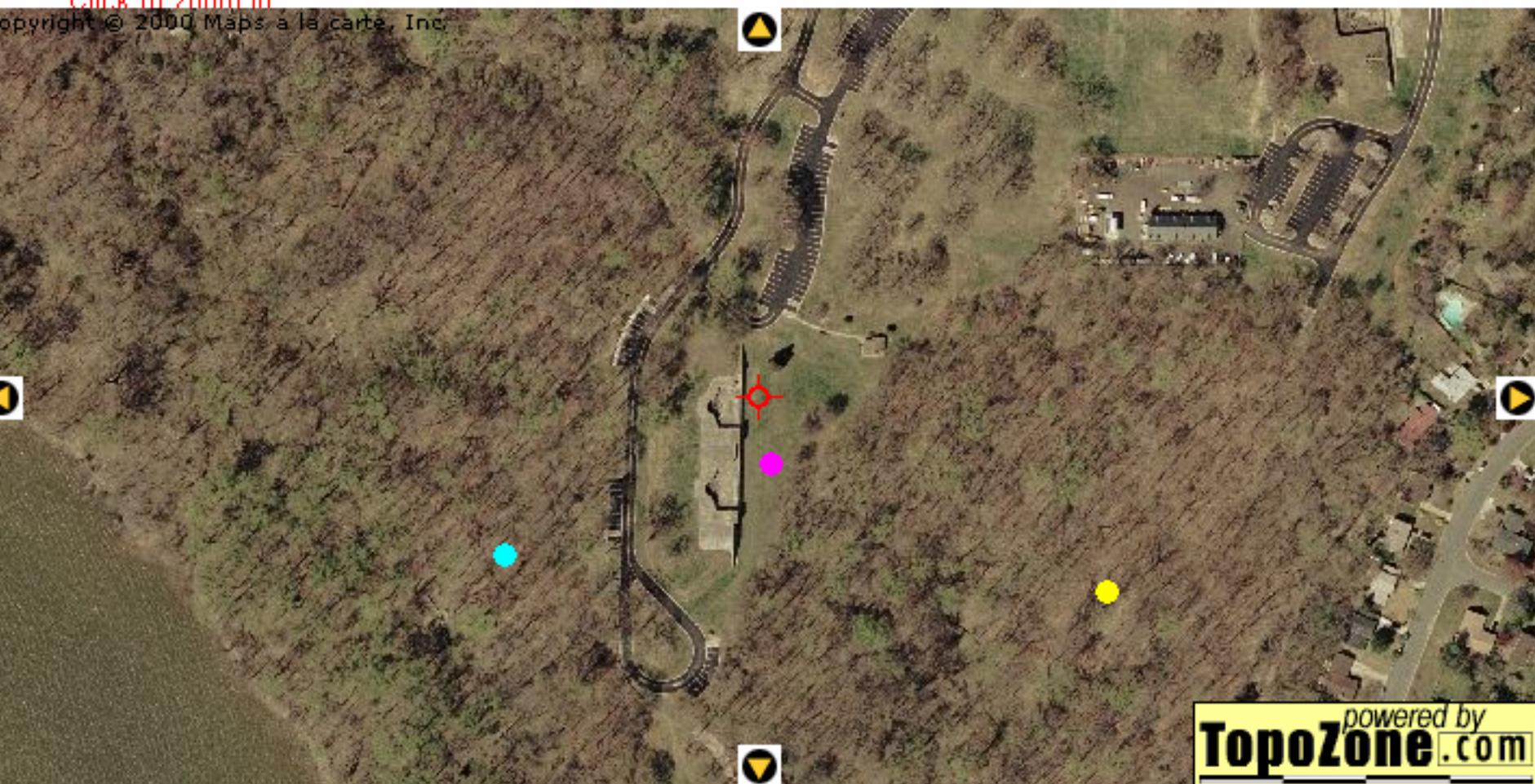
-  **Osmia pumila** @ Sam Droege, U.S. Geological Survey (975)
-  **Osmia atriventris** @ Sam Droege, U.S. Geological Survey (220)
-  **Osmia lignaria** @ Sam Droege, U.S. Geological Survey (94)

Discover Life | Topozone | Global Mapper

Help | Find place | Make map | Demo

Click to zoom in

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Zoom out West-East: 720 meters

 **NAD83** 38.70779°N 77.02888°W; **UTM** 18 323587E 4286304N

[Osmia pumila](#) @ Sam Droege, U.S. Geological Survey (975)

[Osmia atriventris](#) @ Sam Droege, U.S. Geological Survey (220)

[Osmia lignaria](#) @ Sam Droege, U.S. Geological Survey (94)

# NPS Urban Plantings Study

Gopaul Noojibail (NPS), Christina Osborn  
(NPS),  
Sam Droege (USGS)

# Planted Meadow



# “Waste” Spots



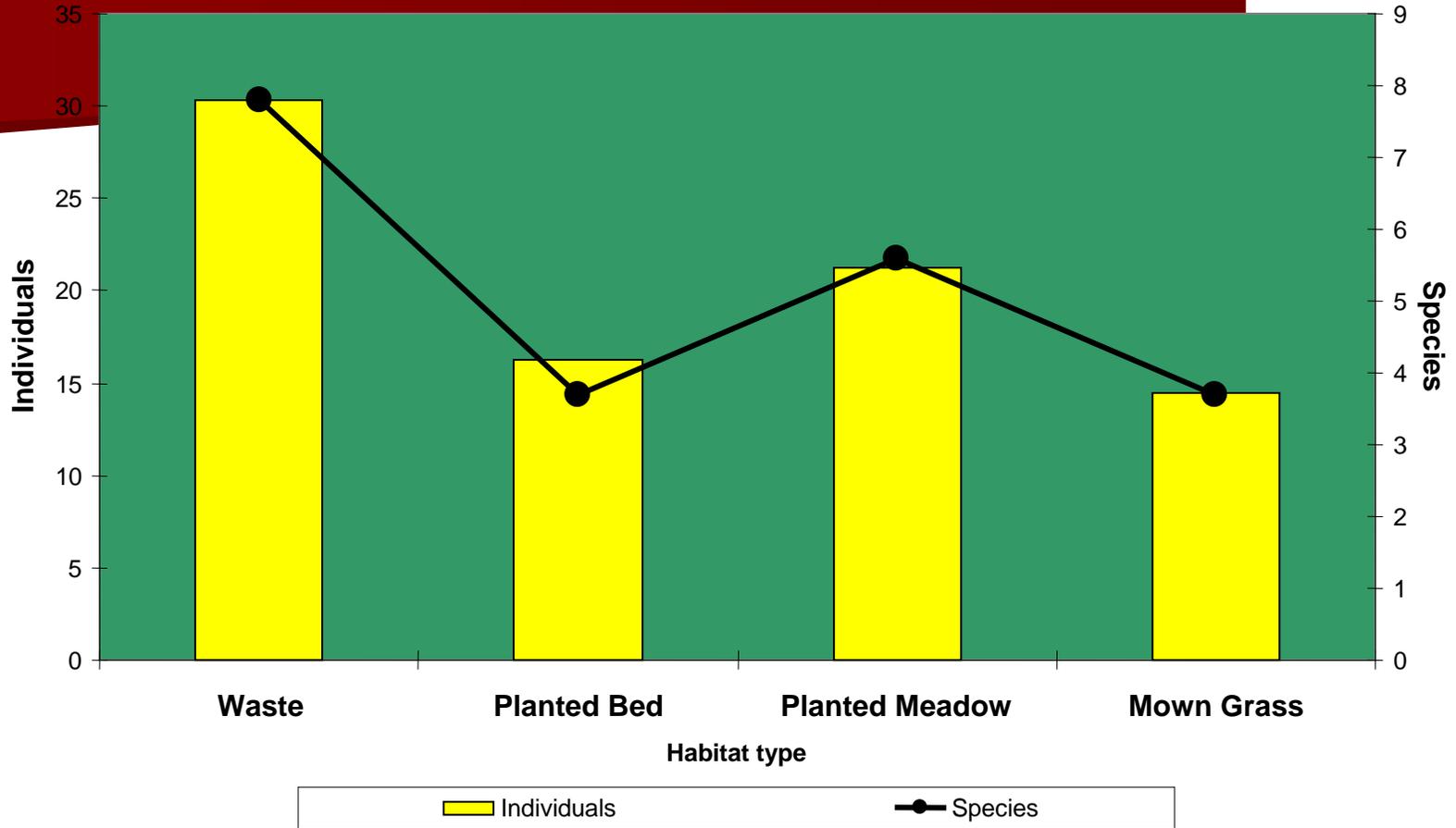
# Planted Gardens



# Mown Grass



# Mean Number of Individuals and Species per Plot



# George Washington Parkway

- Turkey Run Ephemerals
- Potomac Gorge BioBlitz

# Sam Droege

- [sdroege@usgs.gov](mailto:sdroege@usgs.gov)
  - 301-497-5840
- USGS, Patuxent Wildlife Research Center
  - [online.sfsu.edu/~beeplot](http://online.sfsu.edu/~beeplot)
  - [www.discoverlife.org](http://www.discoverlife.org)

