

Update: Mosquito Surveillance Program in Richmond Co., Georgia



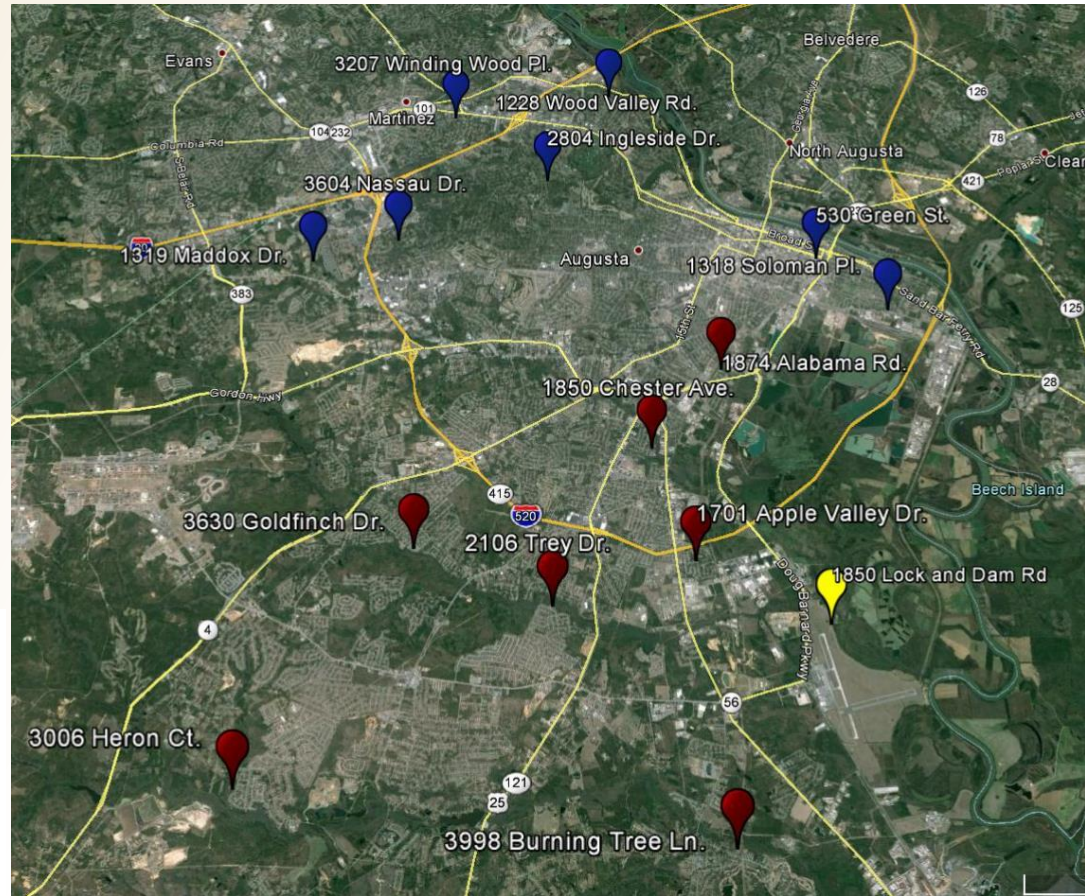
Project Scope

- Mosquito surveillance is conducted to support Richmond County Control Program
 - Must target problem species for effective control
 - Requires species identification and monitoring
- 14 sites selected county-wide in addition to the constructed wetland
 - Represent a variety of habitat types including swamps, rivers, and urban streams
- Each site is trapped every two weeks using a light trap and a gravid trap
 - Typical life cycle takes two weeks; can range from few days to a month

Richmond County

15 Sites

- North Route - 7
- South Route – 7
- Wetland - 1



- Wetland sampled weekly
- North/South Route sampled every 2 weeks

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Program Objectives

Current:

- Describe species assemblage at each site
- Compare relative abundance at each site
 - Support targeted control
- Track activity Patterns
 - Time of year, temperature, rainfall, other environmental cues

Future:

- Identify factors influencing community composition
 - Compare species assemblage and abundance among sites
 - Use GIS to find land attributes that best explain variation
- Prevalance of arboviruses
 - Early warning system

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Results

(Jan 2014 – Aug 2015)

678 trap nights (85 events)
30 species (56 in Ga)

Aedes

- *albopictus*
- *vexans*

Anopheles

- *crucians* complex
- *punctipennis* complex
- *quadrimaculatus*

Coquillettidia

- *perturbans*

Culex

- *coronator*
- *erraticus*
- *nigripalpus*
- *quinquefasciatus*
- *restuans*
- *salinarius*
- *territans*

Culiseta

- *inornata*
- *melanura*

Mansonia

- *titillans*

Ochlerotatus

- *atlanticus*
- *canadensis*
- *Infirmatus*
- *japonicus*
- *sollicitans*
- *triseriatus*

Orthopodomyia

- *signifera*

Genus	Number
Aedes	4355
Anopheles	13022
Coquillettidia	3235
Culex	44290
Culiseta	4
Male	820
Mansonia	3
Ochlerotatus	567
Orthopodomyia	25
Psorophora	226
Toxorhynchites	11
Unidentified	508
Uranotaenia	33
Total	67,099

Psorophora

- *ciliata*
- *columbiae*
- *ferox*
- *howardii*

Toxorhynchites

- *rutilus septentrionalis*

Uranotaenia

- *lowii*
- *sapphirina*

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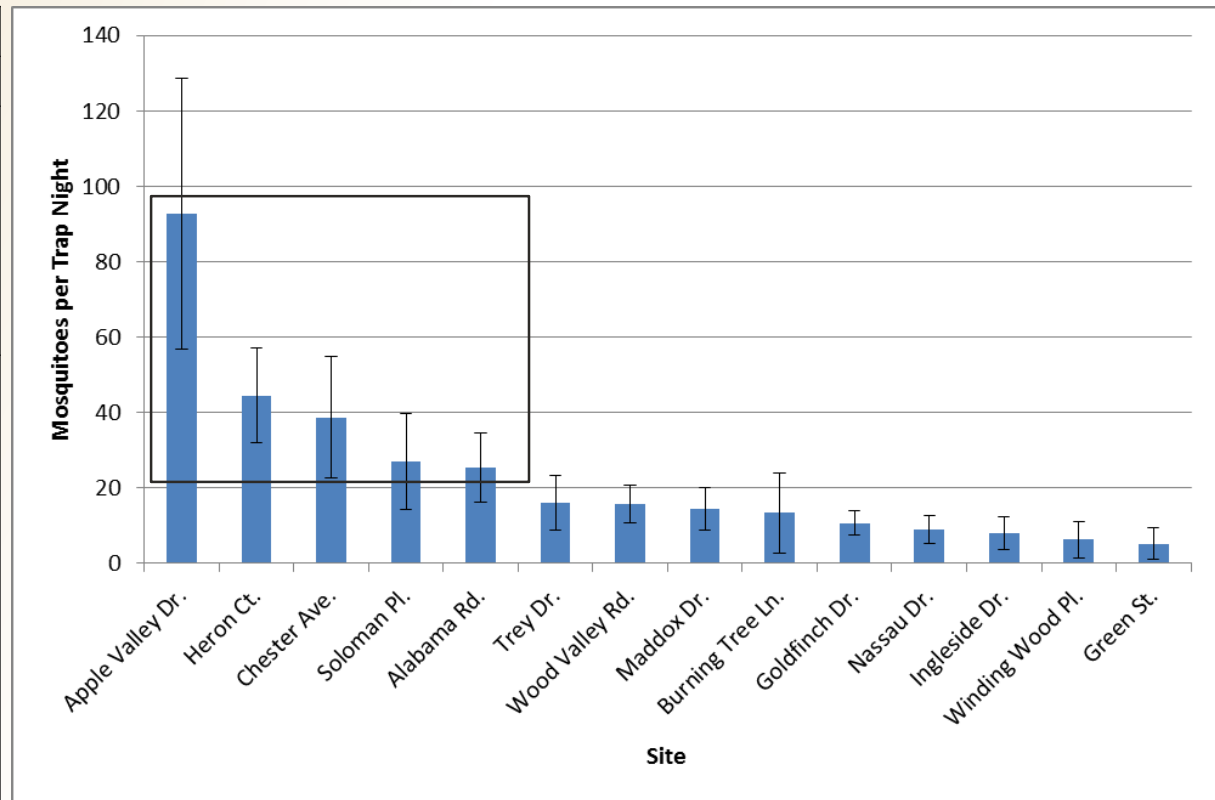
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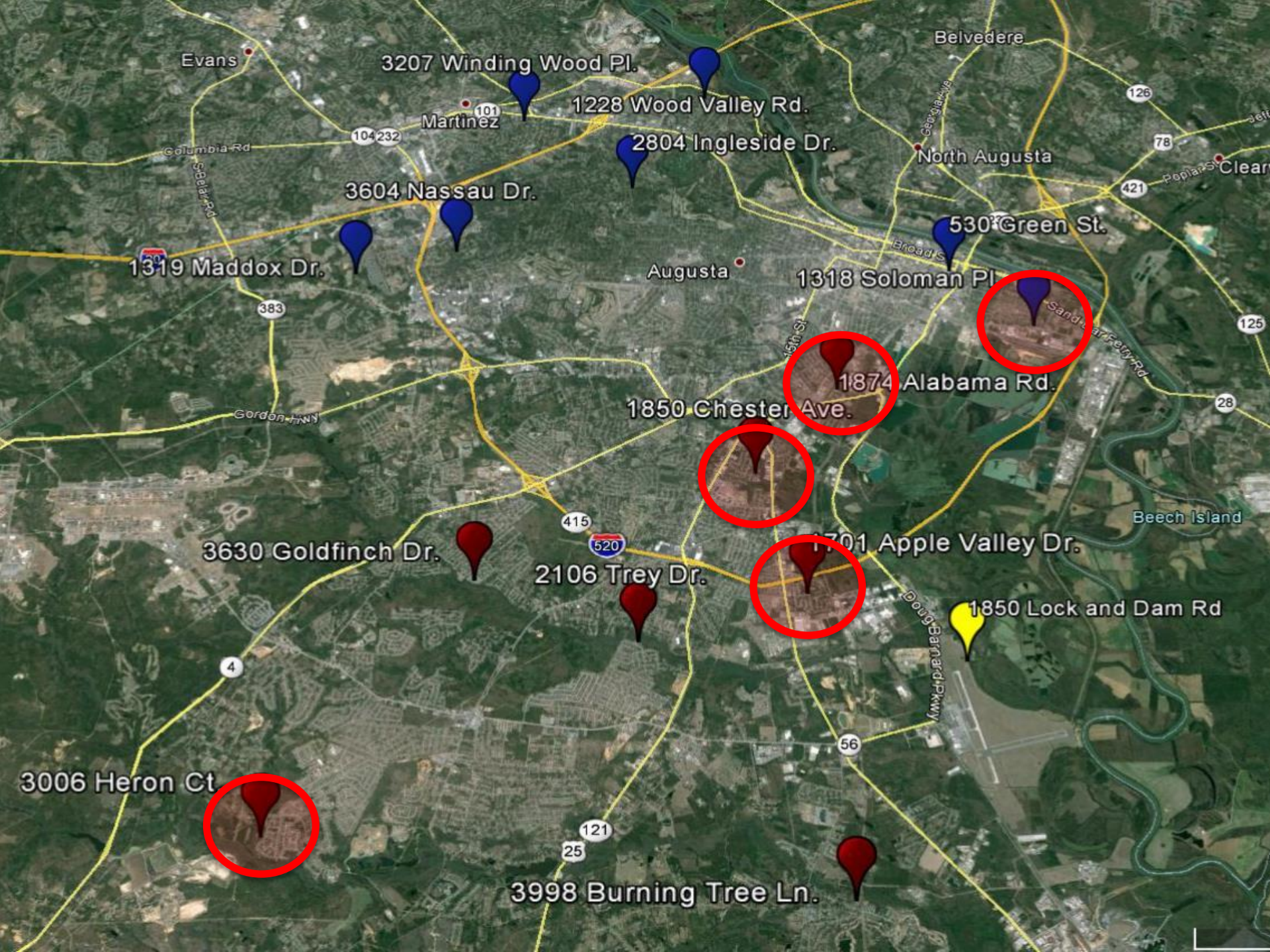
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Results – Total Counts

Site	Total Number
Wetland	53,259
Apple Valley Dr.	3,890
Heron Ct.	1,871
Chester Ave.	1,628
Solomon Pl.	1,163
Alabama Rd.	1,069
Trey Dr.	679
Wood Valley Rd.	678
Maddox Dr.	621
Burning Tree Ln.	564
Goldfinch Dr.	451
Nassau Dr.	384
Ingleside Dr.	344
Winding Wood Pl.	274
Green St.	224



- Wetland: 642 ± 499 mosquitoes/night
- 5 sites one order of magnitude higher than others



Evans

3207 Winding Wood Pl.

Belvedere

Martinez

1228 Wood Valley Rd.

126

Columbia Rd

104 232

2804 Ingleside Dr.

North Augusta

78

Clear

3604 Nassau Dr.

530 Green St.

421

1319 Maddox Dr.

Augusta

1318 Soloman Pl

383

Broad St

125

Gordon Hwy

1850 Chester Ave.

1874 Alabama Rd.

28

Beech Island

3630 Goldfinch Dr.

415

520

2106 Trey Dr.

1701 Apple Valley Dr.

1850 Lock and Dam Rd

4

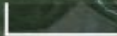
56

3006 Heron Ct

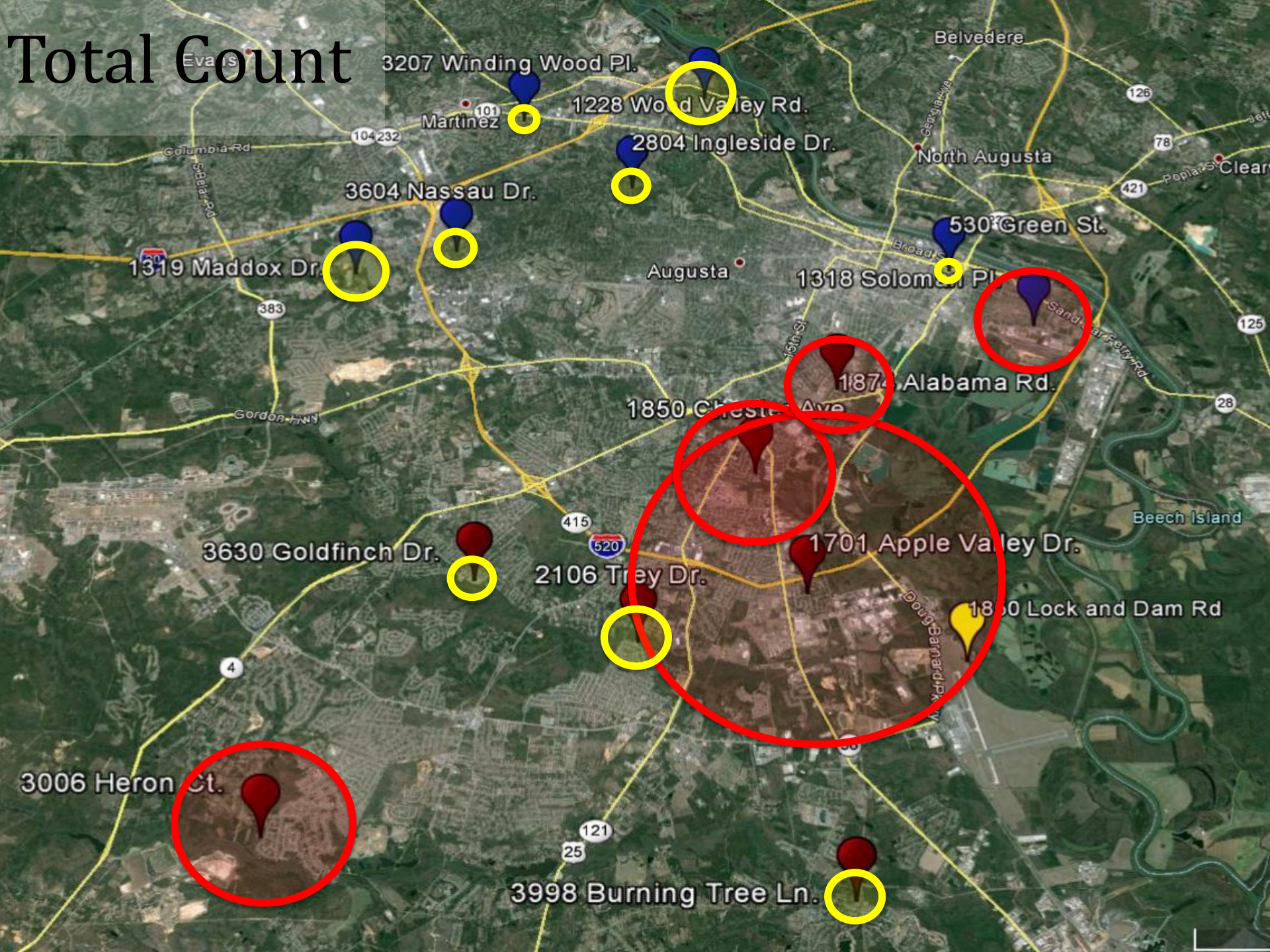
121

25

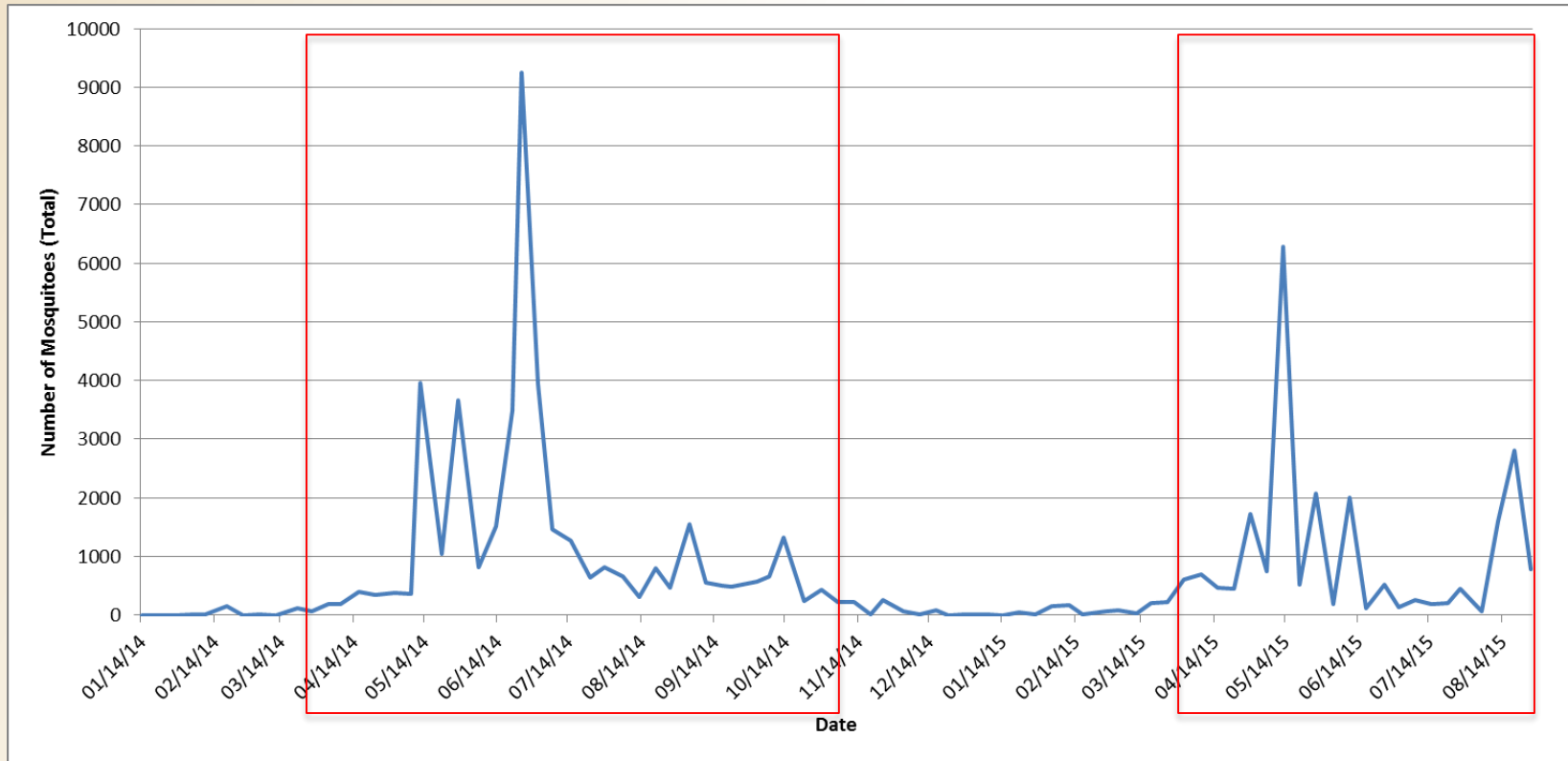
3998 Burning Tree Ln.



Total Count



Seasonal Abundance



Activity

High: Apr - Oct

Low: Nov - Mar

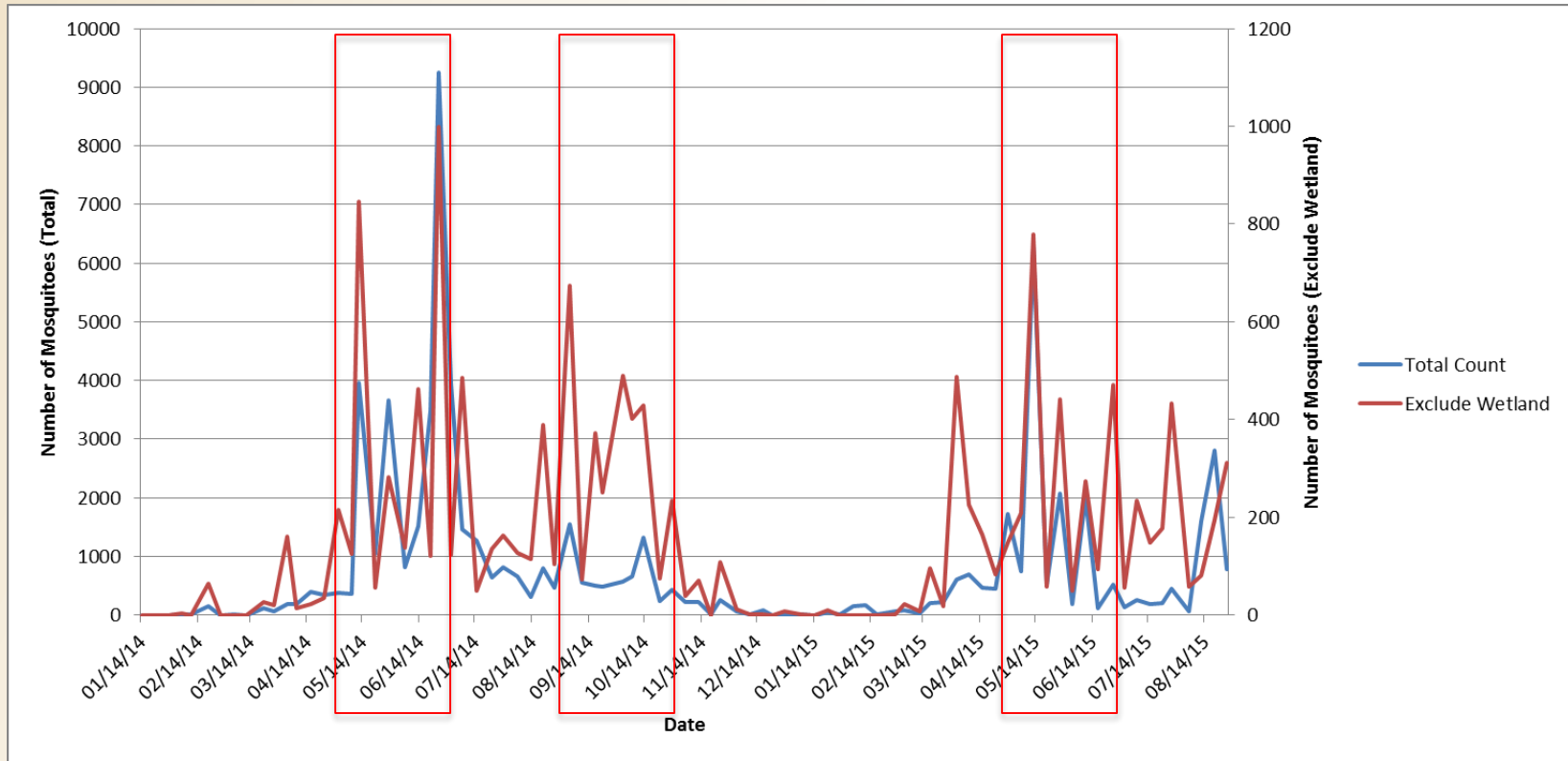
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Seasonal Abundance



Peak

Primary: May-Jun

Secondary?: Sept-Oct

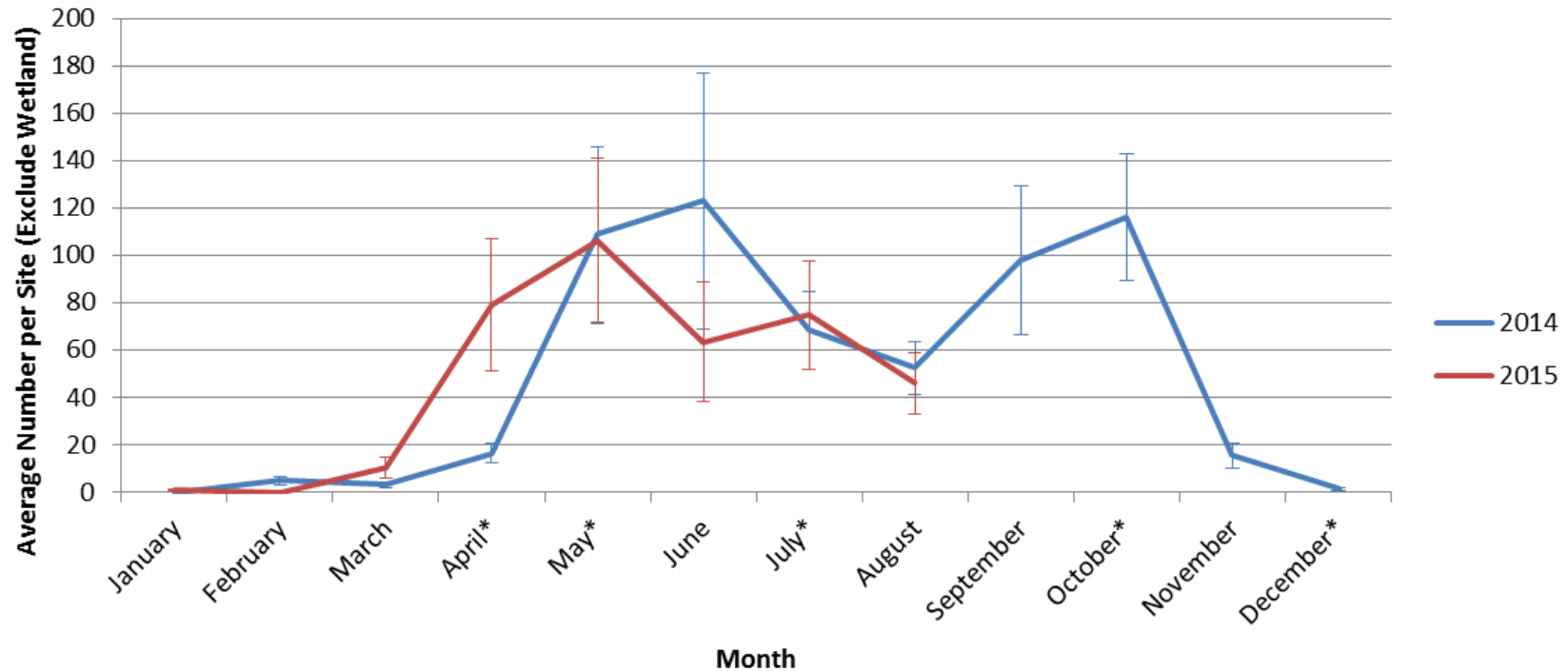
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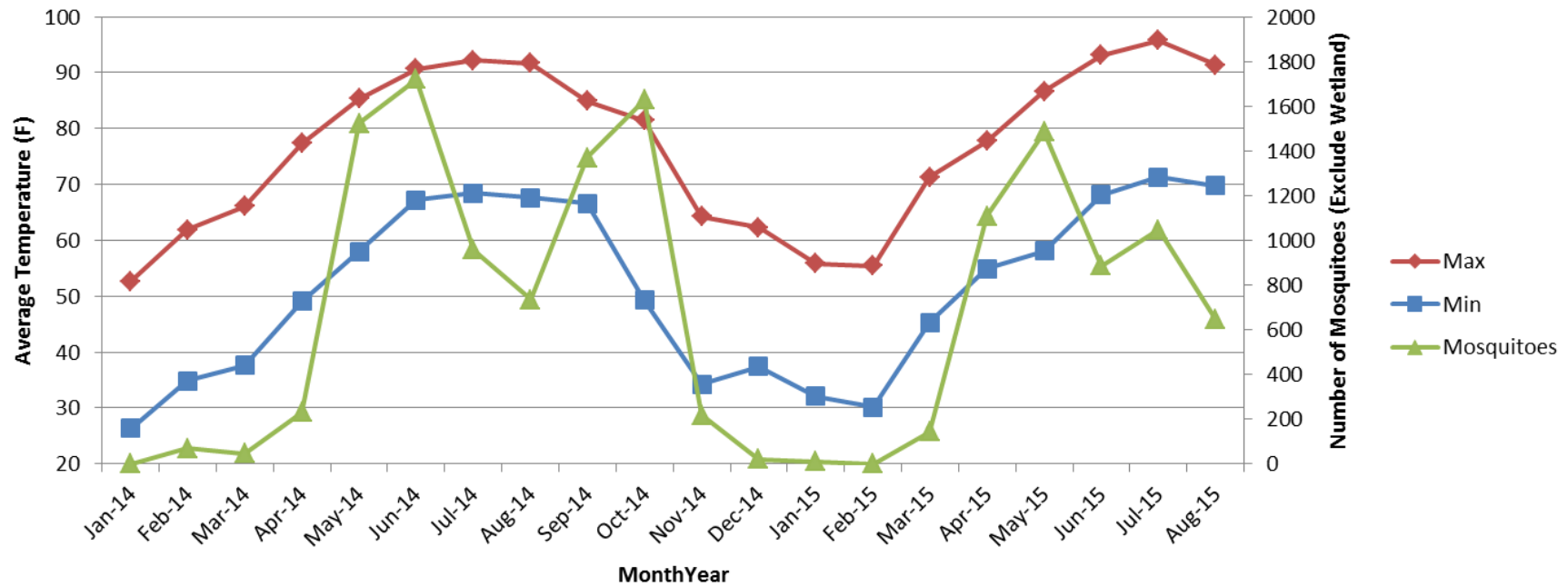
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Seasonal Abundance - Temperature



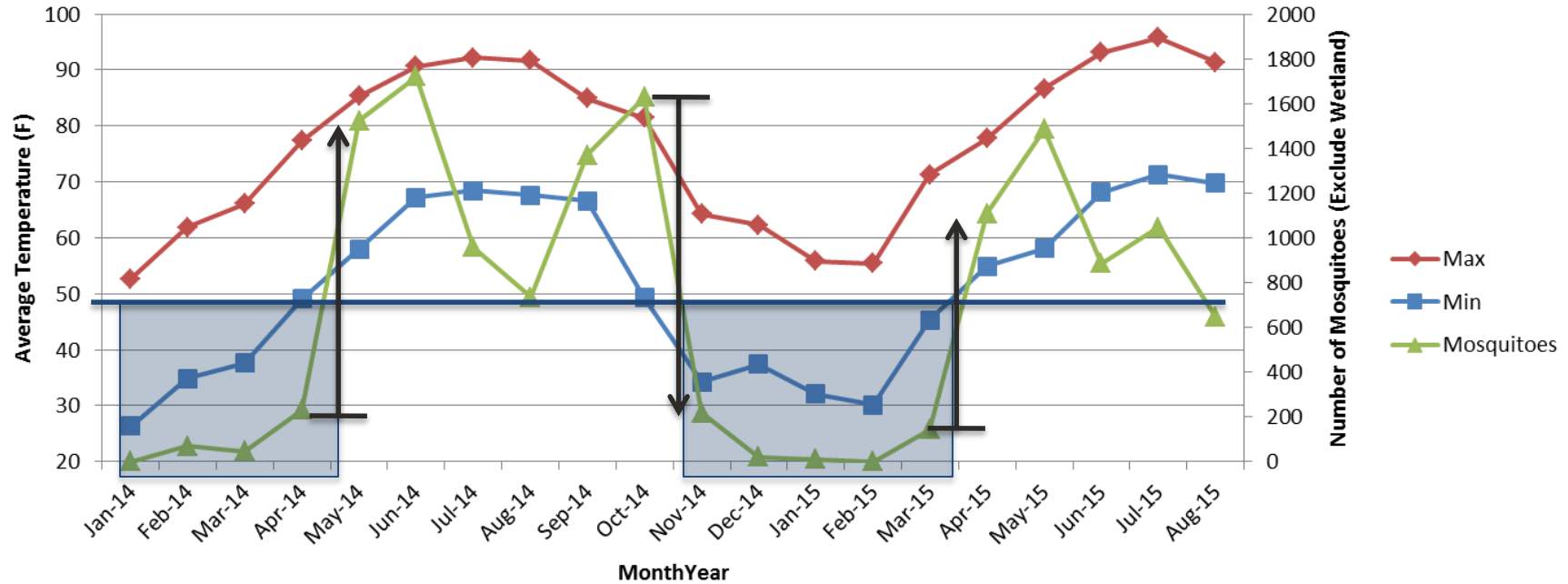
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Seasonal Abundance - Temperature



Temperature

Average Low > 50F

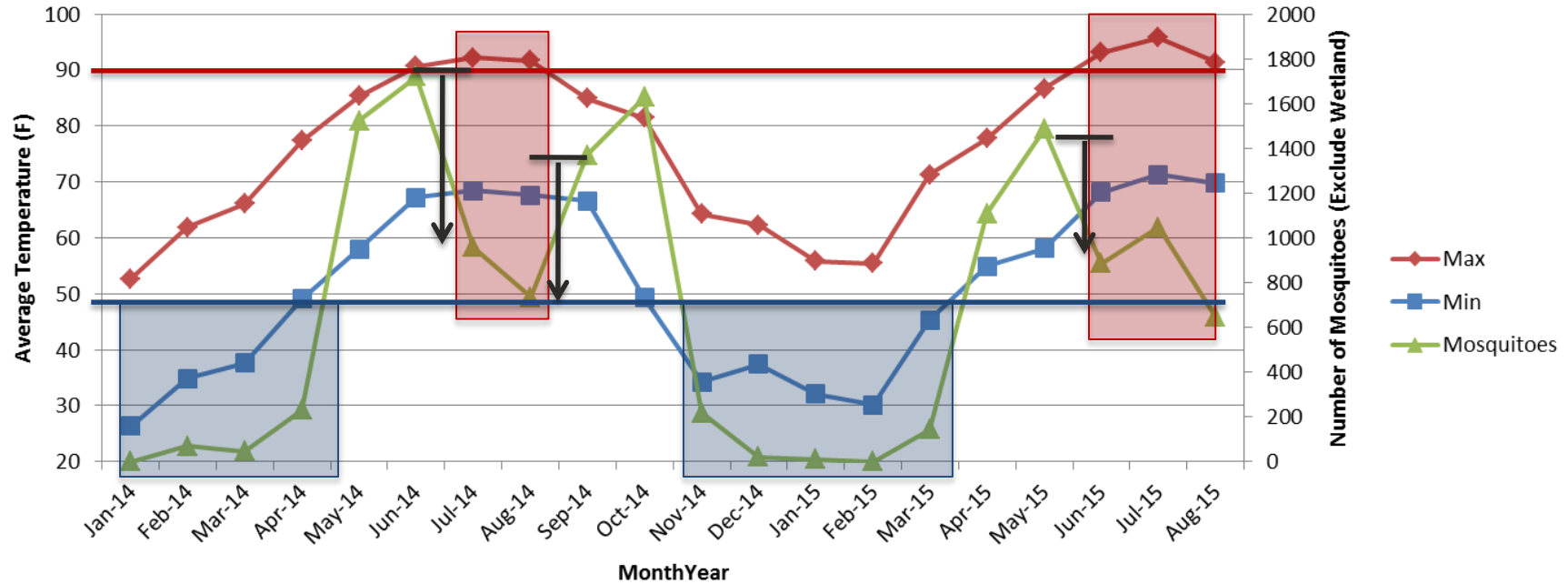
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Seasonal Abundance - Temperature



Temperature

Average Low > 50F

Average High < 90F

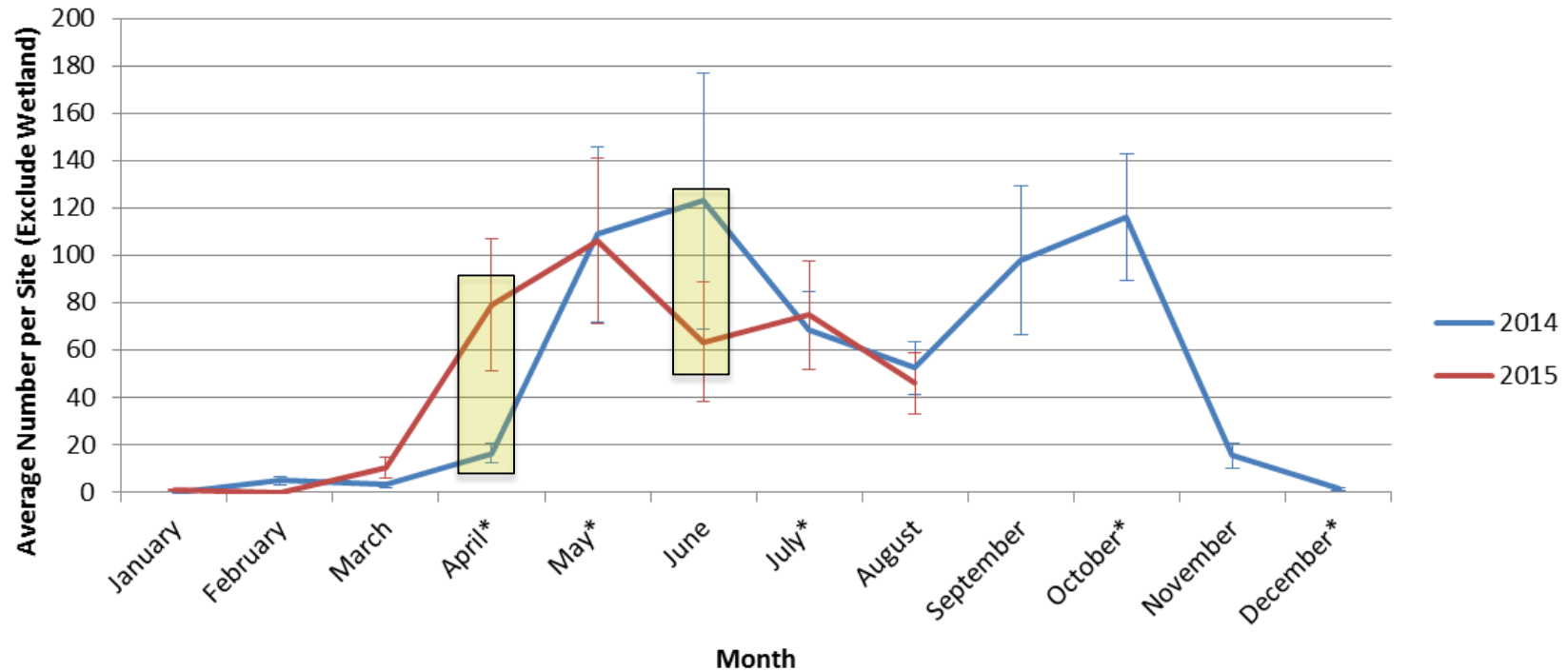
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Seasonal Abundance



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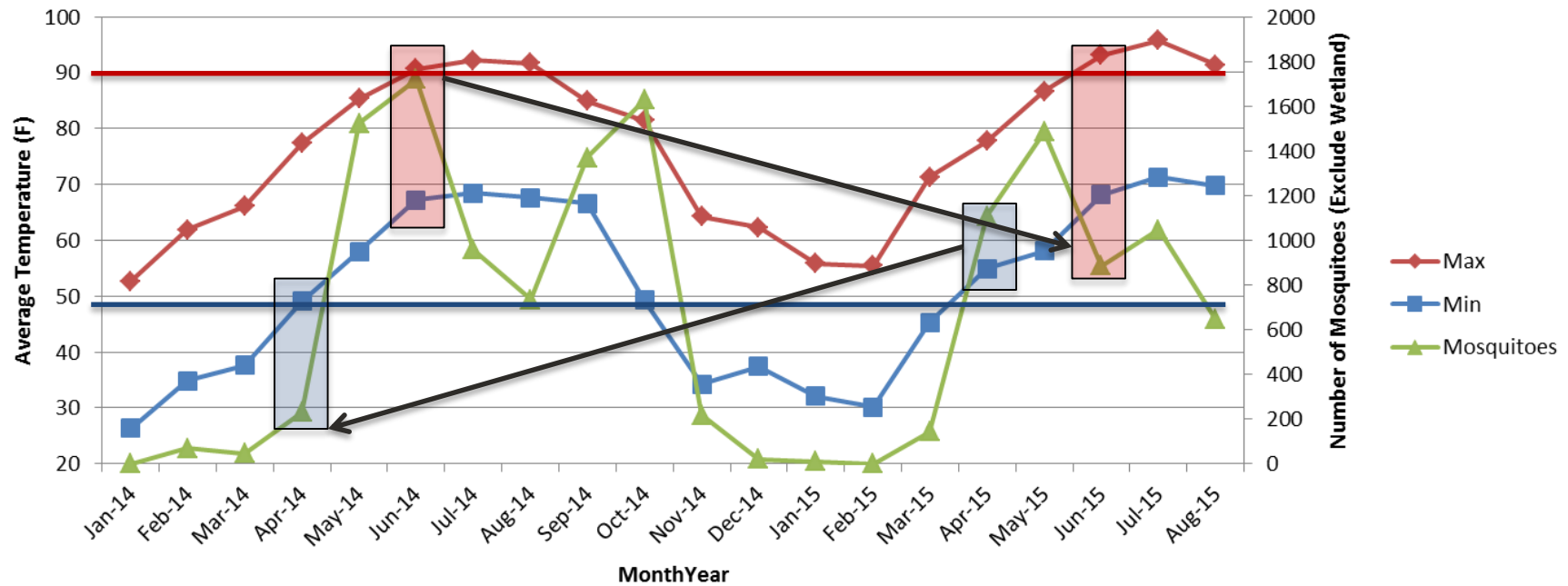
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Seasonal Abundance - Temperature



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Average High < 90F

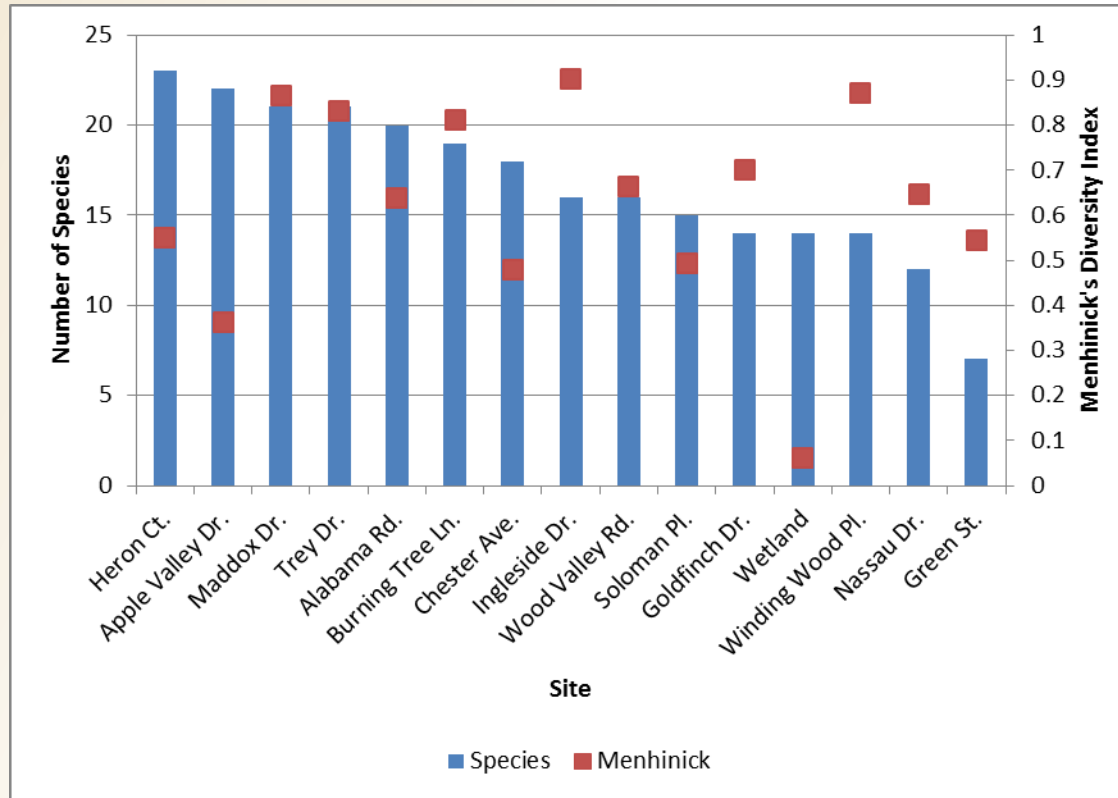
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Diversity – Species Richness



Number of Species

Min: 7 (Green St.)

Max: 23 (Heron Ct.)

Avg: 16.8

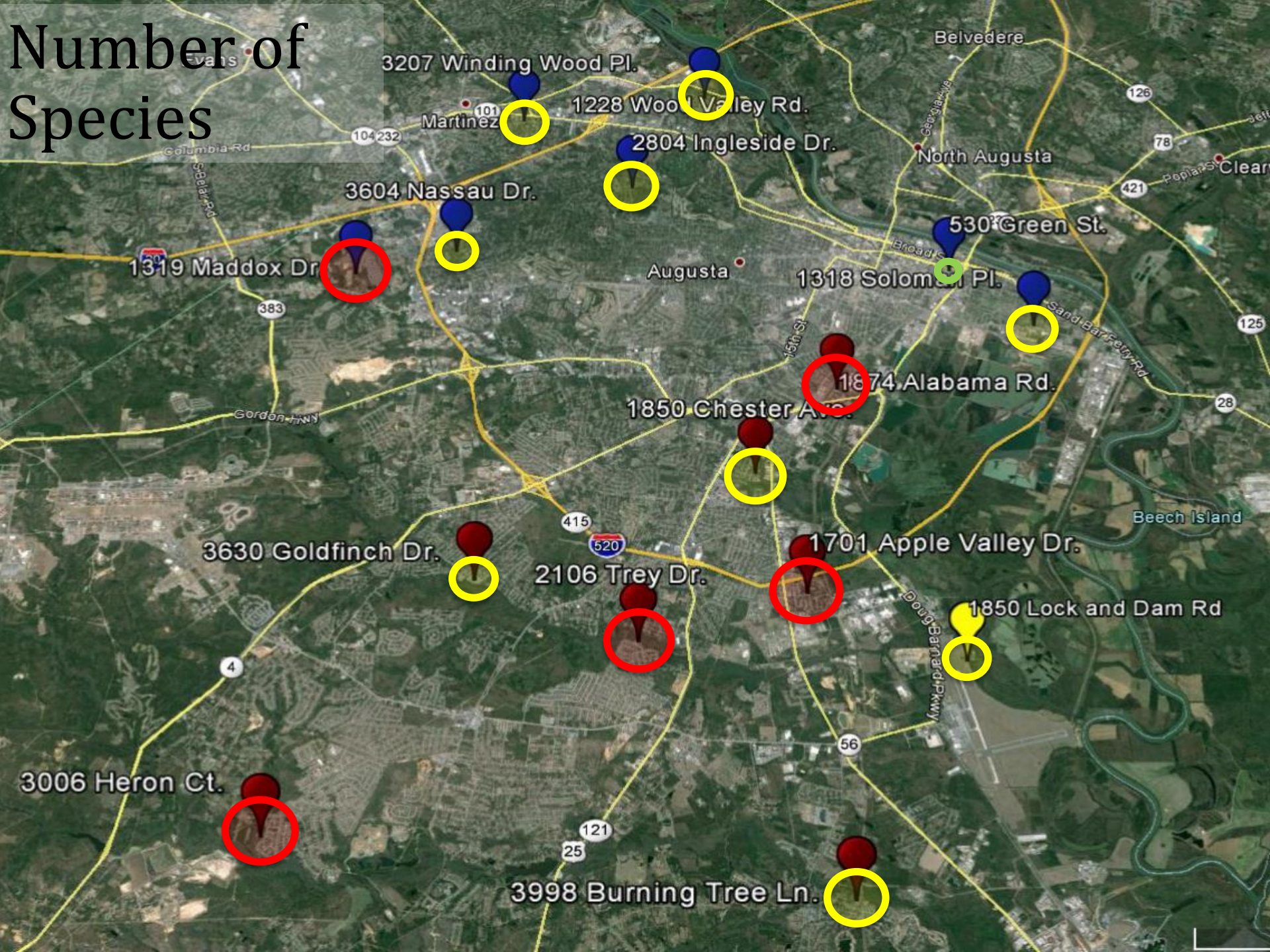
Menhinick's Diversity Index

- Corrects for high sample size

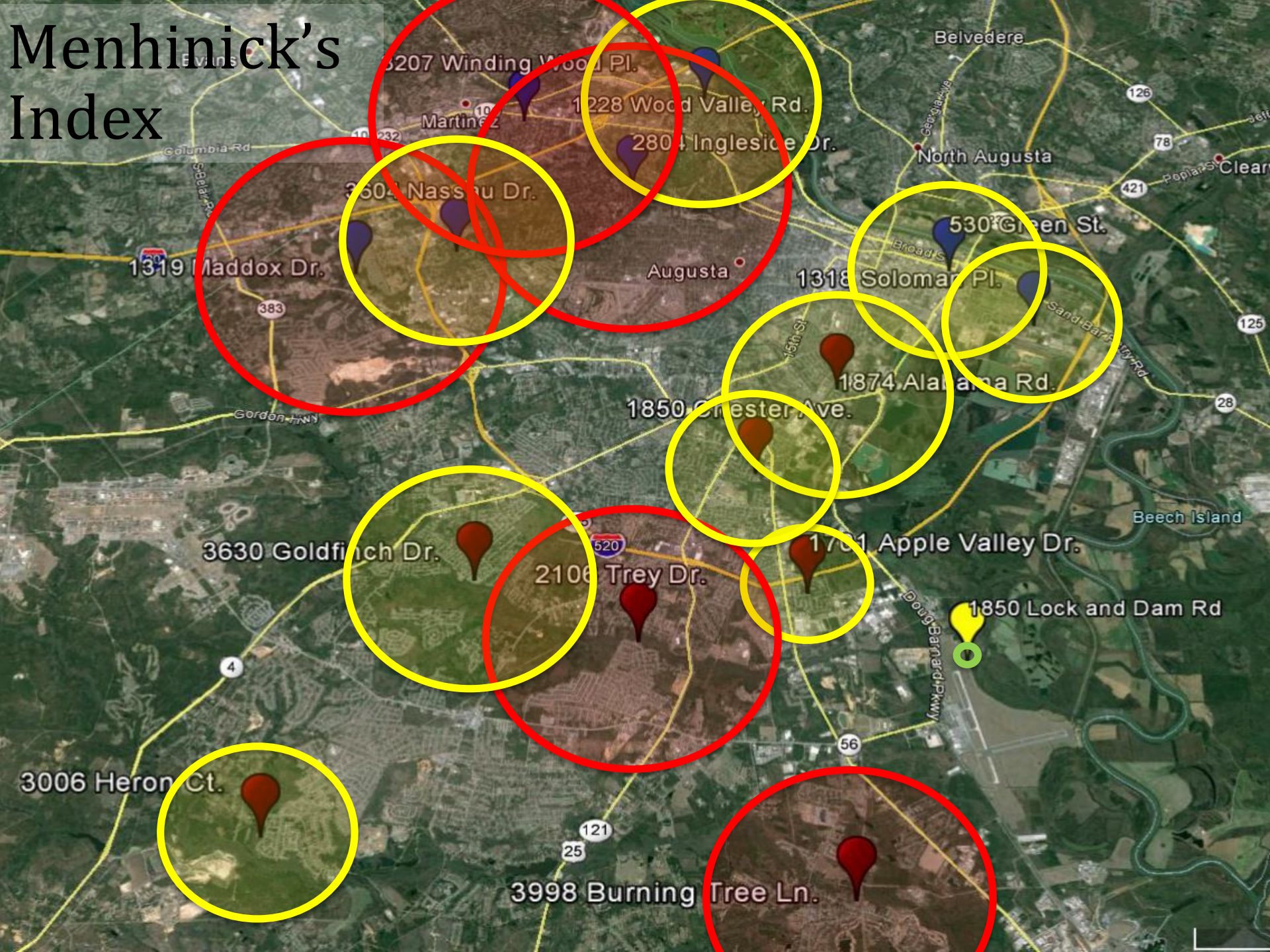
Min: 0.06 (Wetland)

Max: 0.90 (Ingleside Dr.)

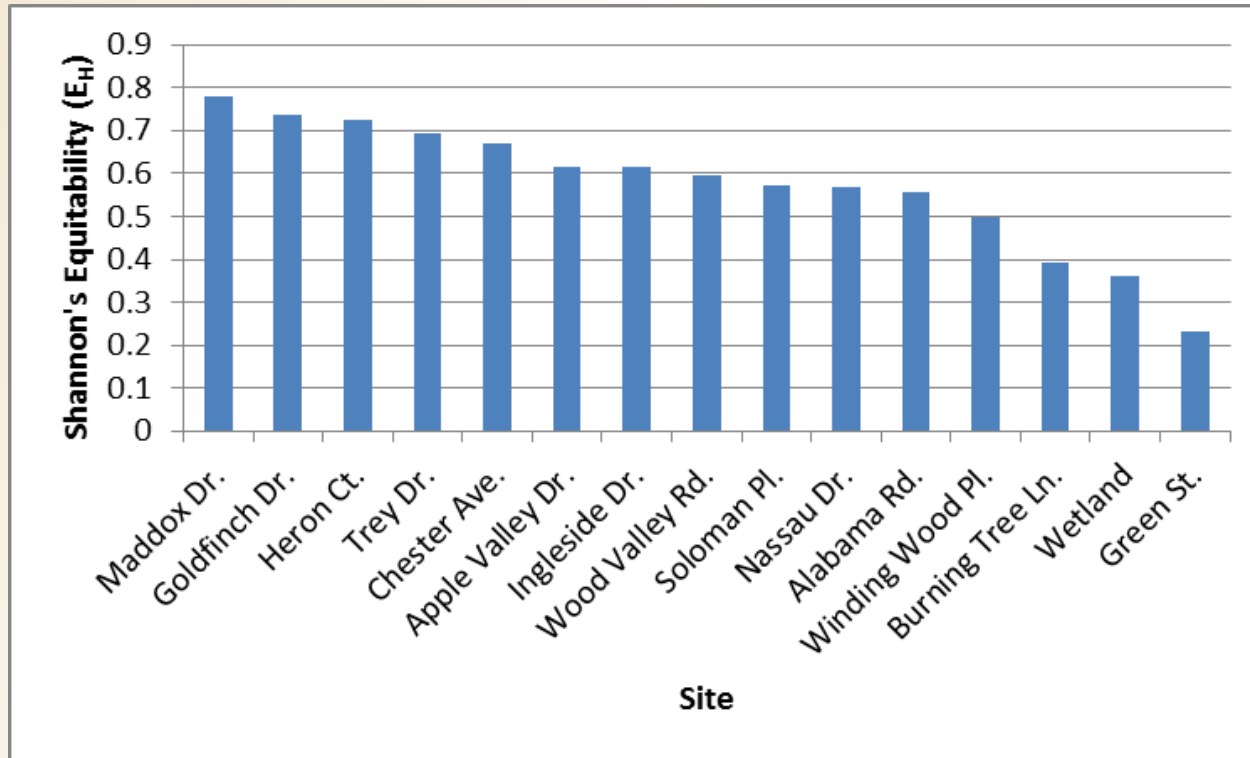
Number of Species



Menhinick's Index



Diversity – Species Evenness

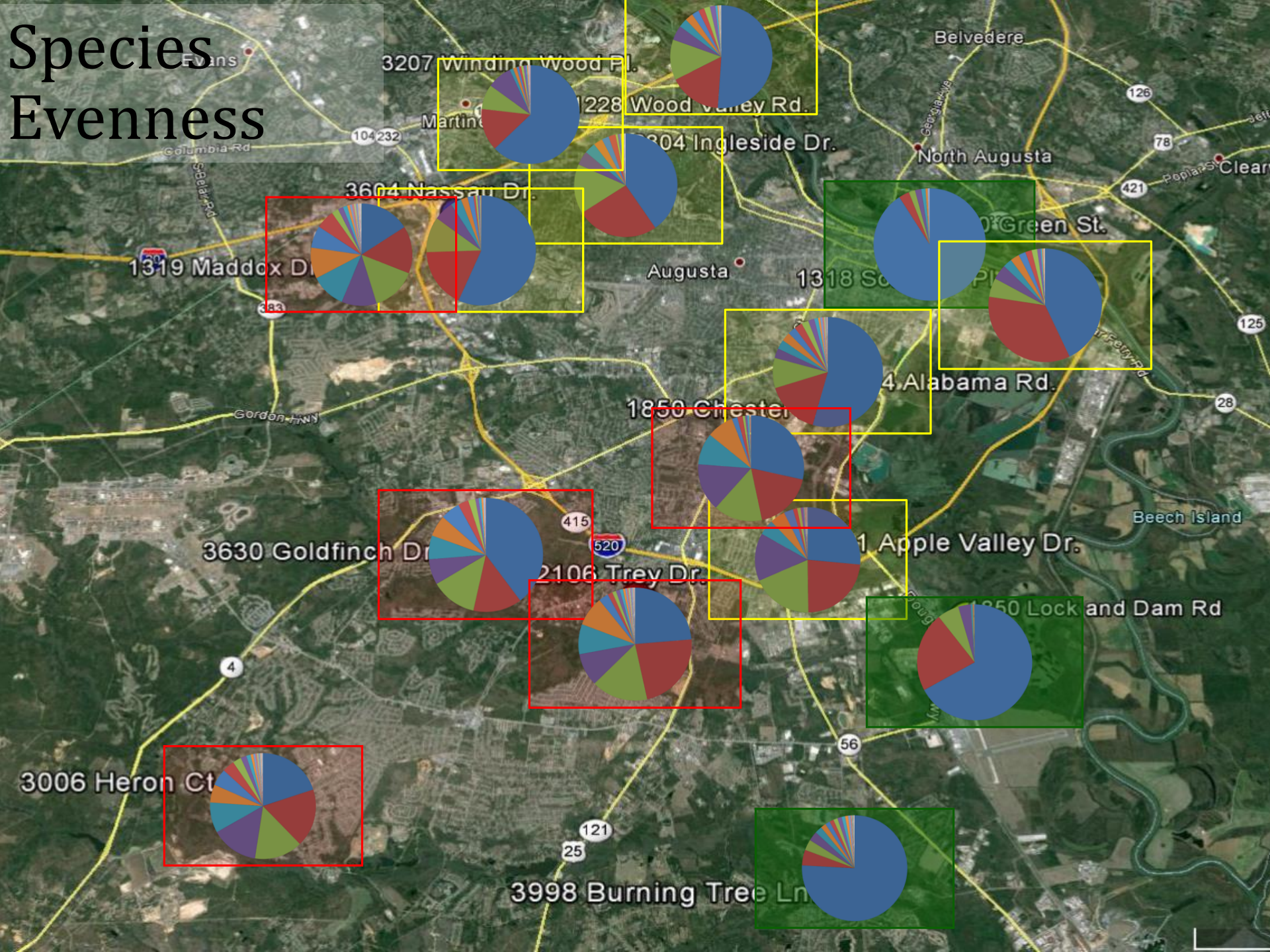


Min: 0.23 (Green St.)
Max: 0.78 (Maddox Dr.)
Avg: 0.57

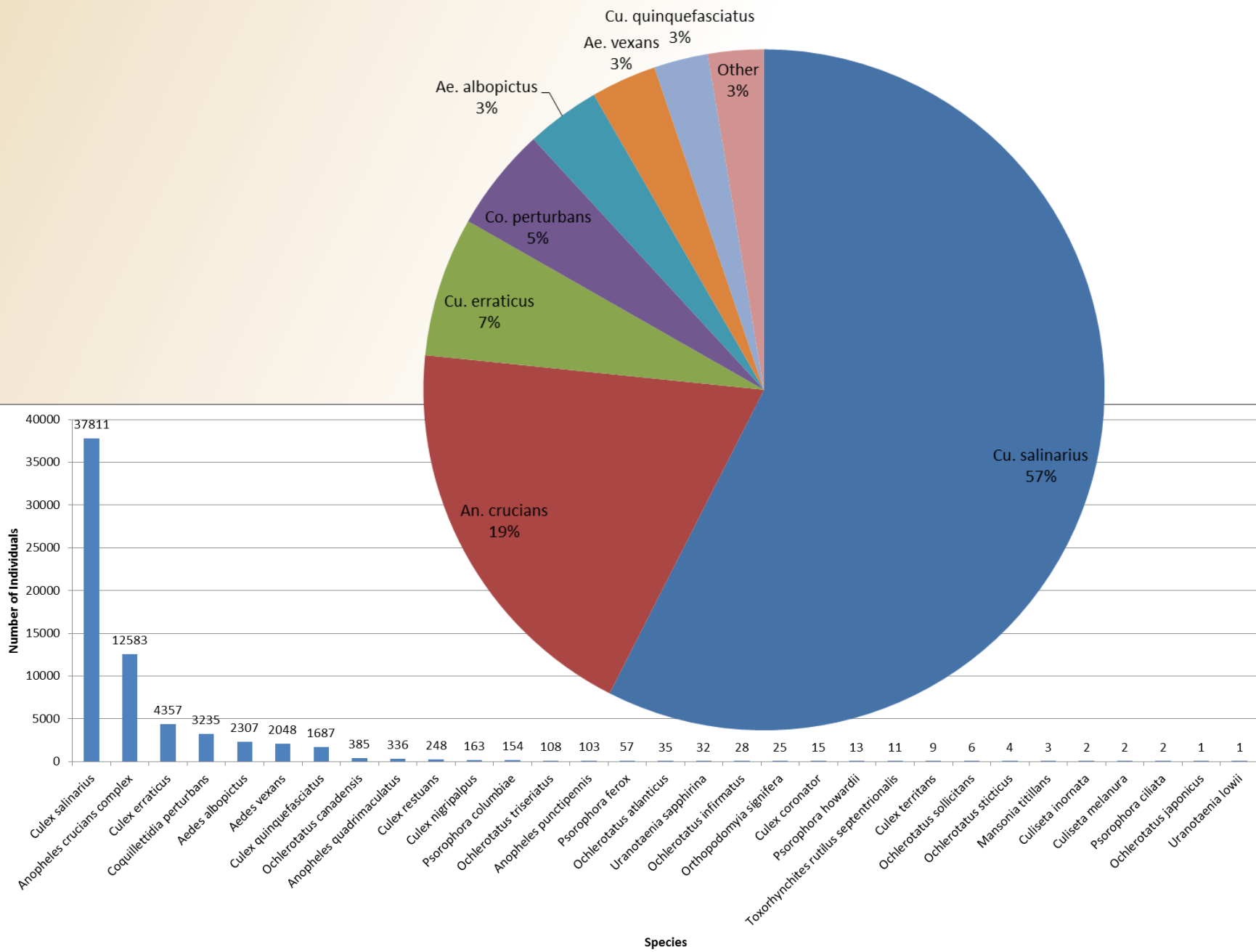
Shannon's Equitability

- Measure of relative abundance
- Ranges from 0-1

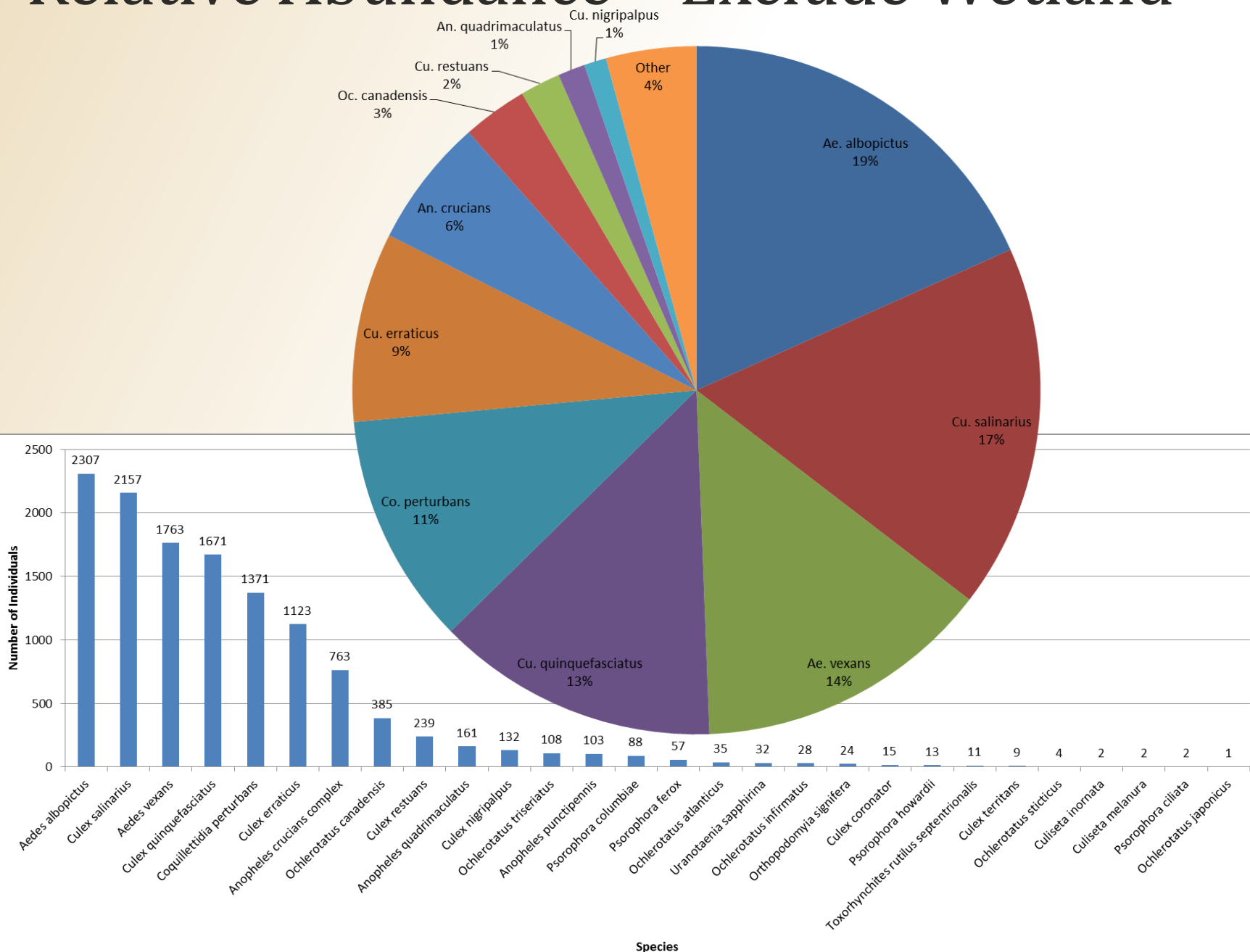
Species Evenness



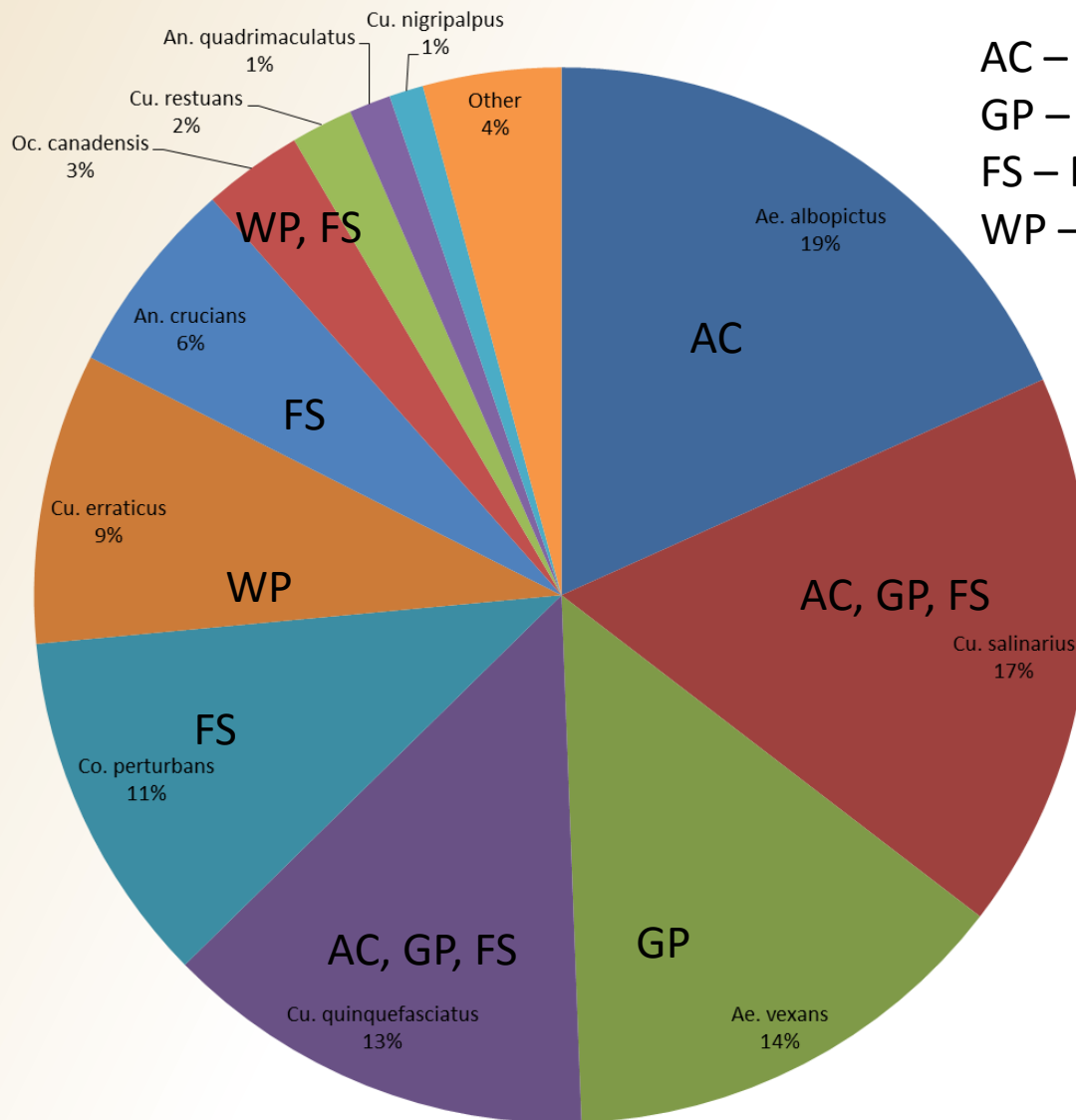
Relative Abundance



Relative Abundance – Exclude Wetland

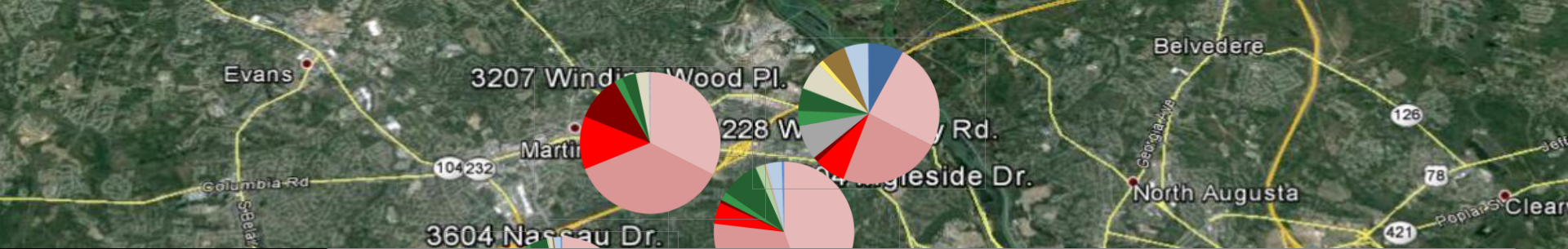


Relative Abundance – Exclude Wetland



AC – Artificial Container
GP – Grassland Pool
FS – Freshwater Swamp
WP – Woodland Pool

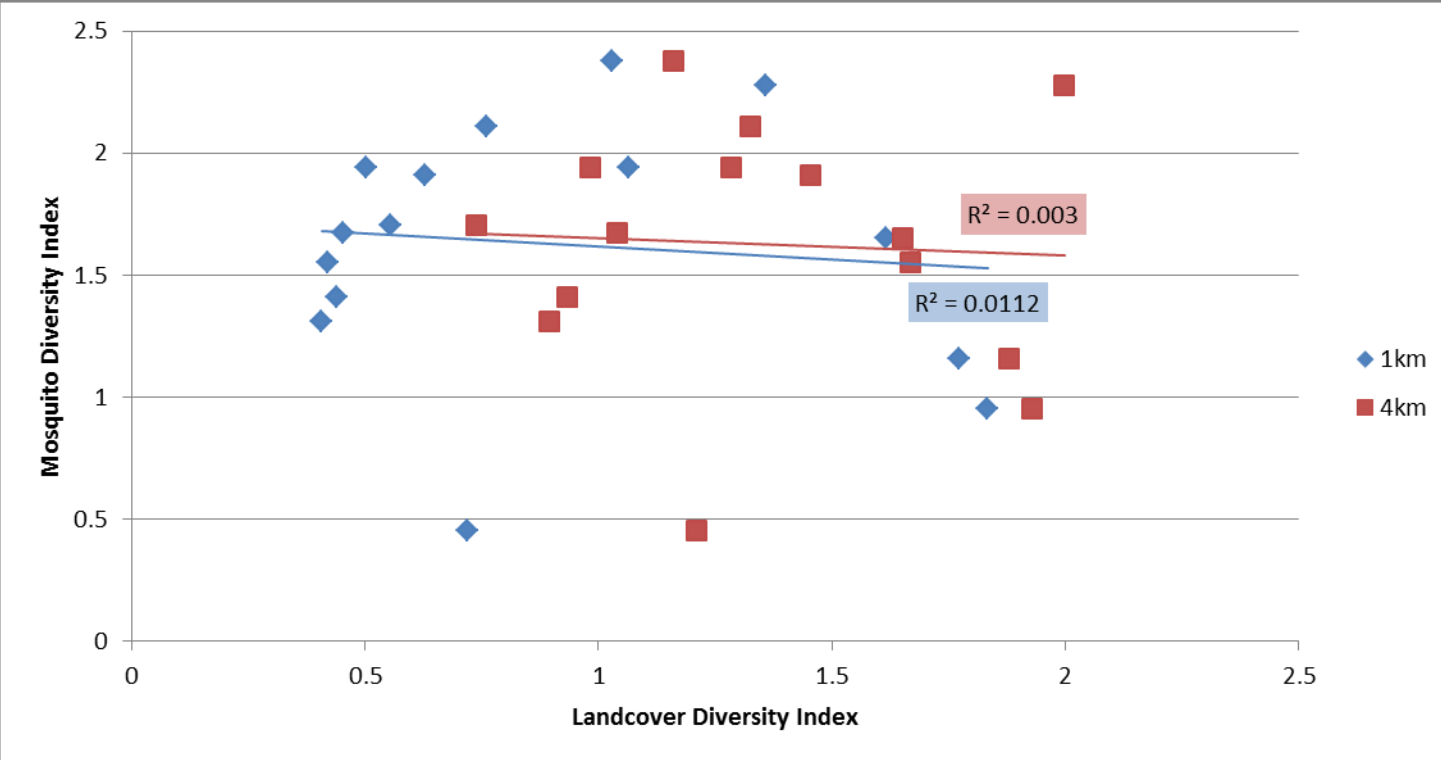




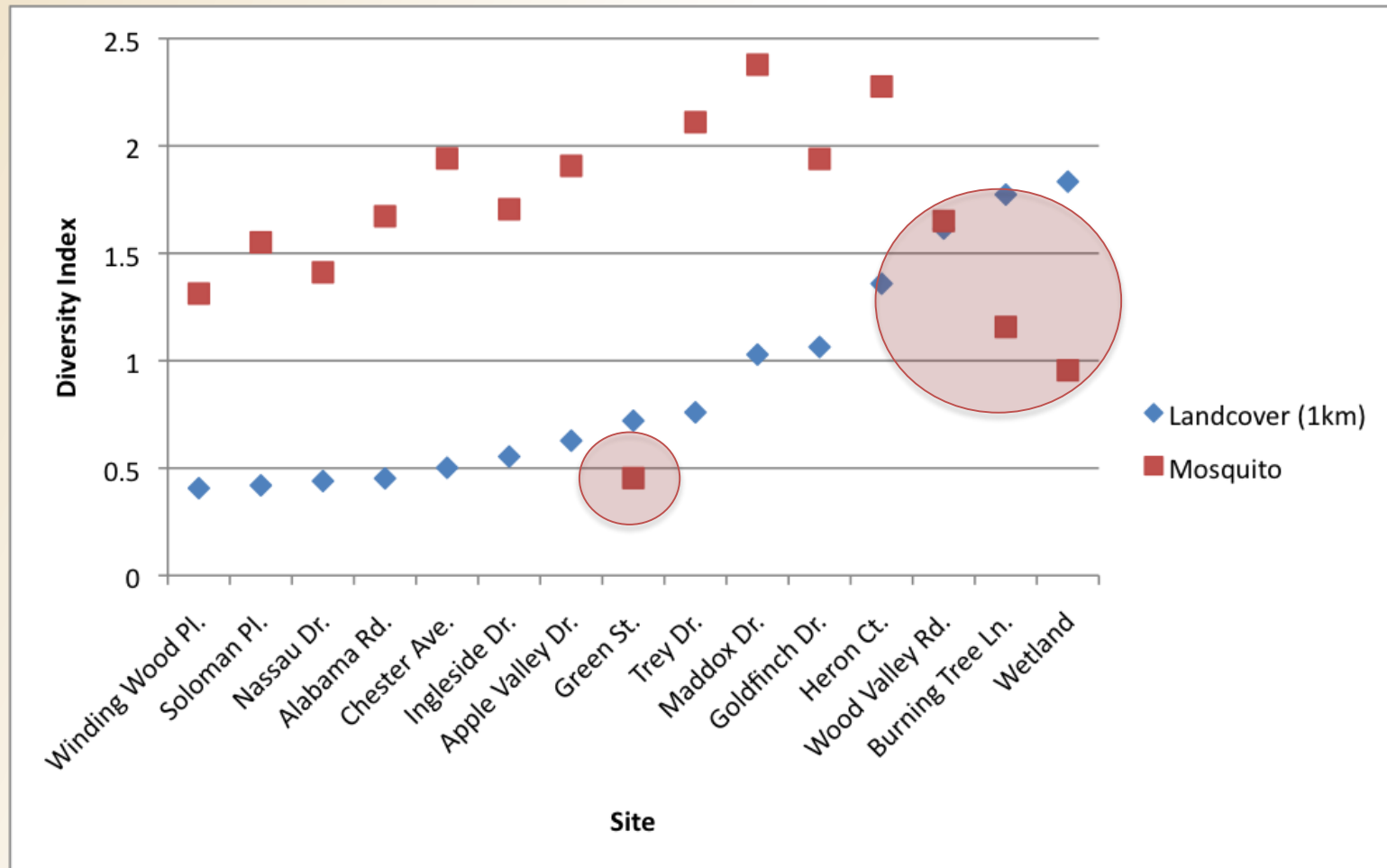
NLCD Land Cover Classification Legend

- 11 Open Water
- 12 Perennial Ice/ Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land (Rock/Sand/Clay)
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/Scrub
- 71 Grassland/Herbaceous
- 72 Sedge/Herbaceous*
- 73 Lichens*
- 74 Moss*
- 81 Pasture/Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

* Alaska only



Land Cover Diversity



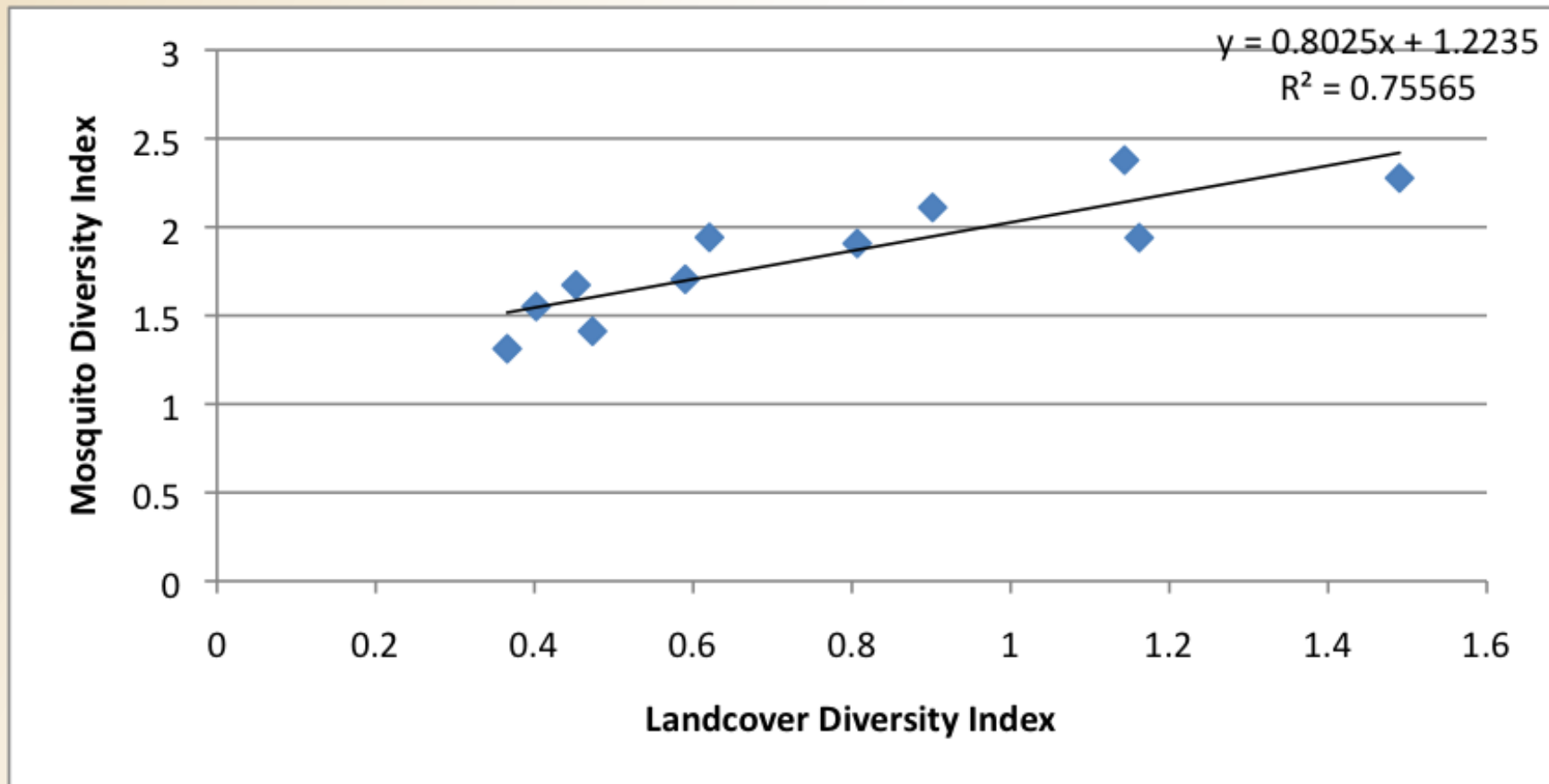
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Land Cover Diversity

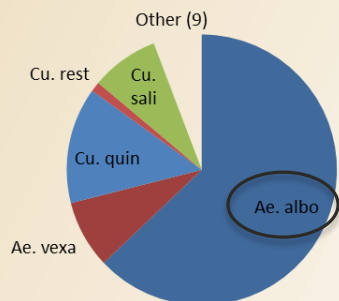


4 sites with low species
diversity were excluded:

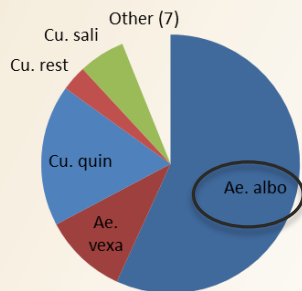
- Wetland
- Wood Valley Rd.
- Green St.
- Burning Tree Ln.

Top 5

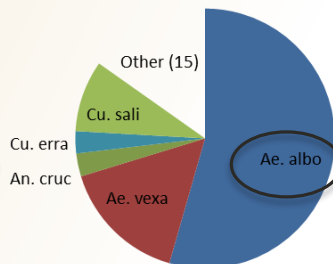
Winding Wood Pl.



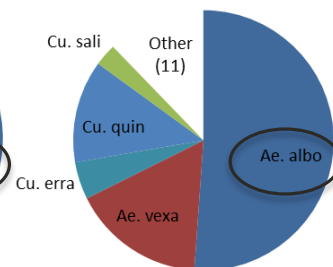
Nassau Dr.



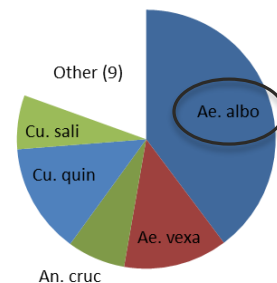
Alabama Rd.



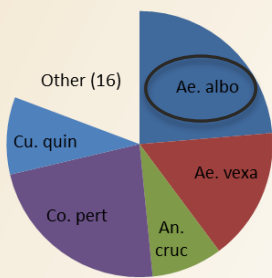
Wood Valley Rd.



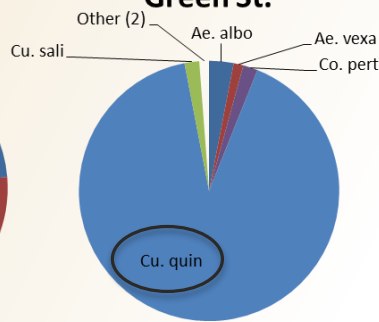
Goldfinch Dr.



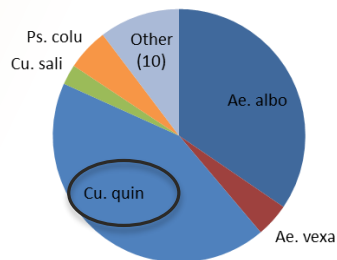
Trey Dr.



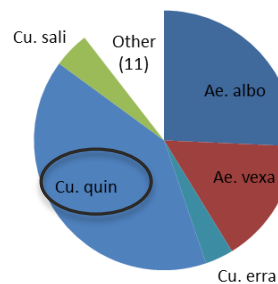
Green St.



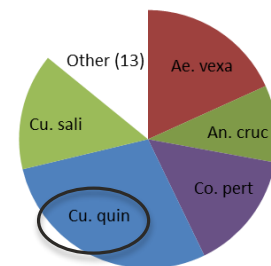
Soloman Pl.



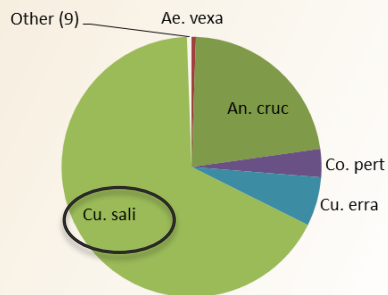
Ingleside Dr.



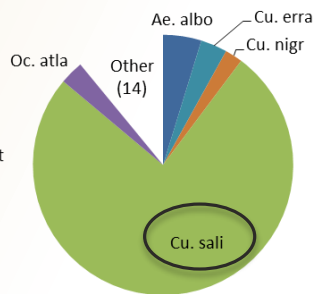
Chester Ave.



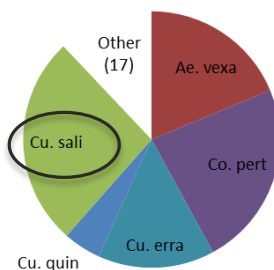
Wetland



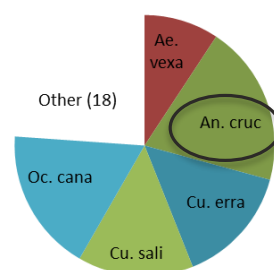
Burning Tree Ln.



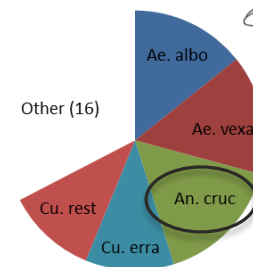
Apple Valley Dr.



Heron Ct.

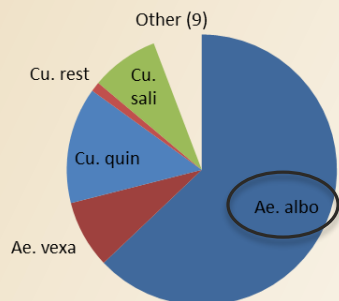


Maddox Dr.

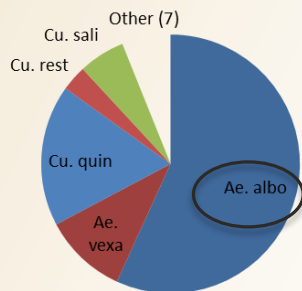


Top 5

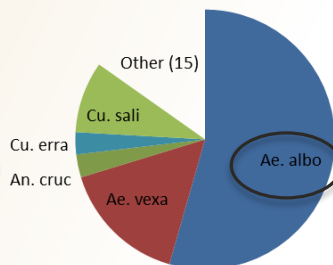
Winding Wood Pl.



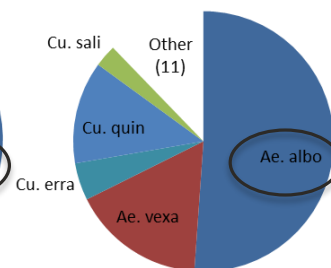
Nassau Dr.



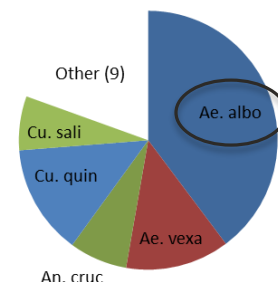
Alabama Rd.



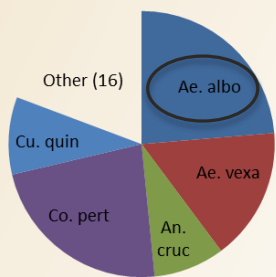
Wood Valley Rd.



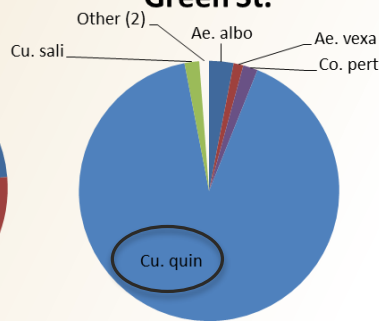
Goldfinch Dr.



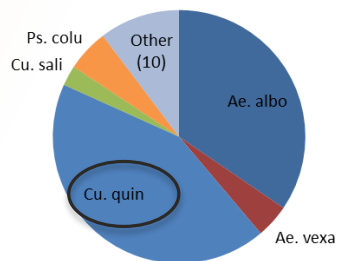
Trey Dr.



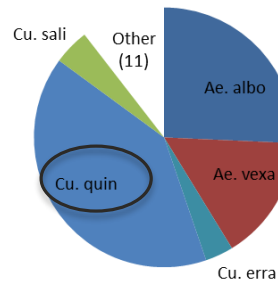
Green St.



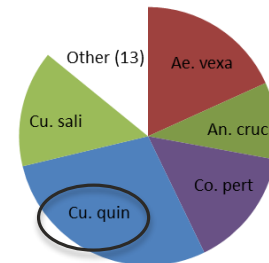
Soloman Pl.



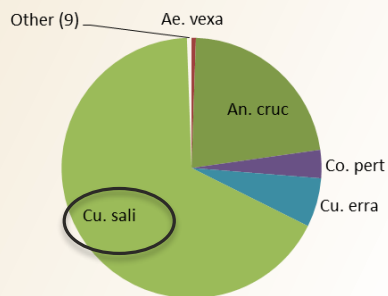
Ingleside Dr.



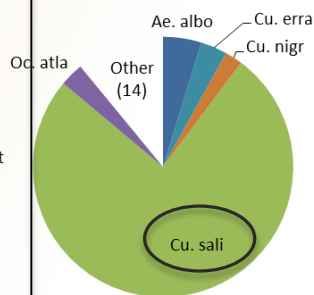
Chester Ave.



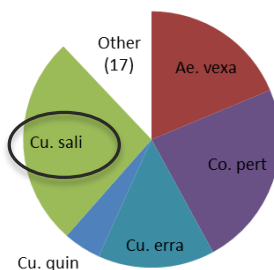
Wetland



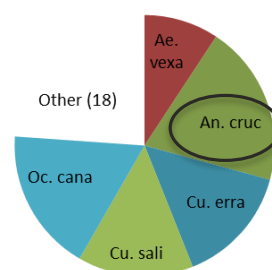
Burning Tree Ln.



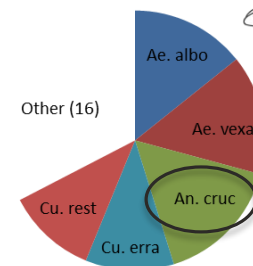
Apple Valley Dr.



Heron Ct.

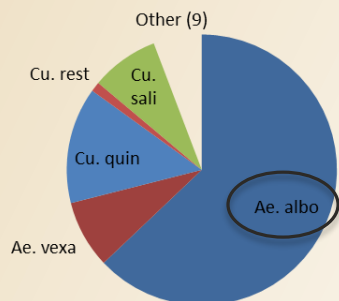


Maddox Dr.

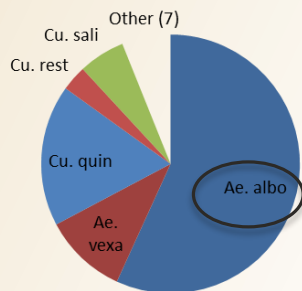


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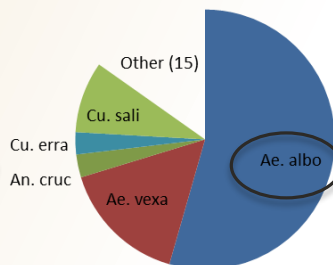
Winding Wood Pl.



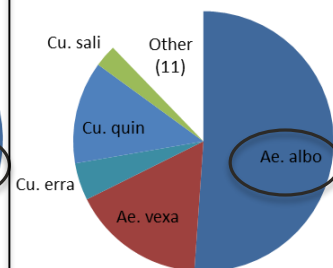
Nassau Dr.



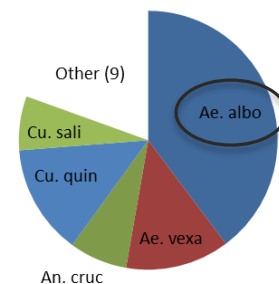
Alabama Rd.



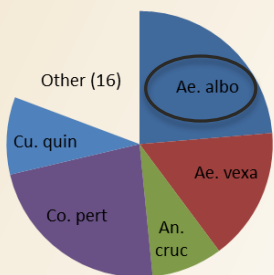
Wood Valley Rd.



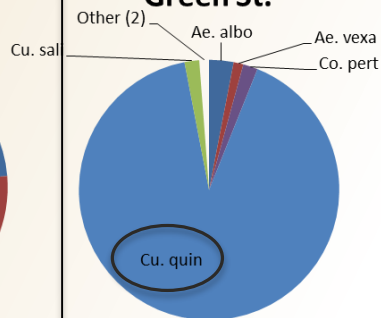
Goldfinch Dr.



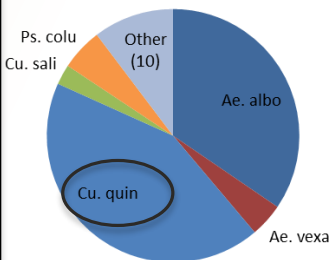
Trey Dr.



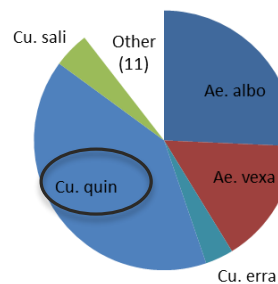
Green St.



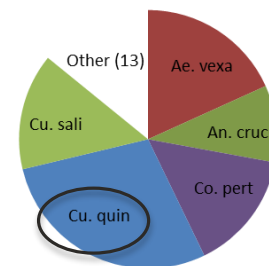
Soloman Pl.



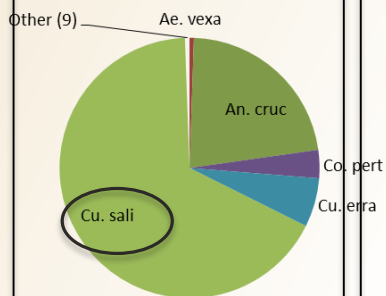
Ingleside Dr.



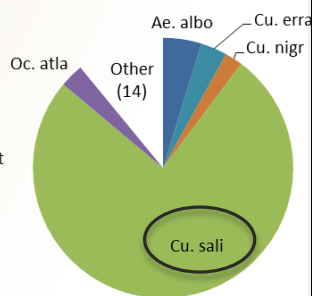
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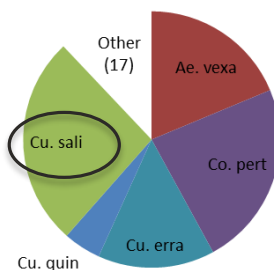
Wetland



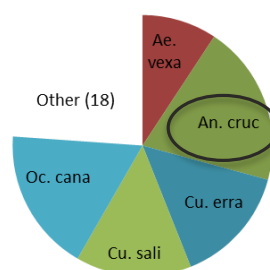
Burning Tree Ln.



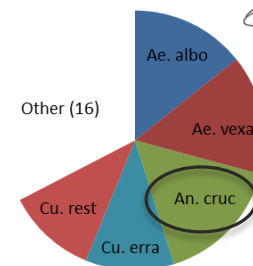
Apple Valley Dr.



Heron Ct.



Maddox Dr.



PHINIZY

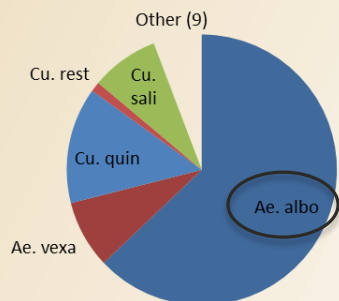
CENTER FOR
WATER
SCIENCES



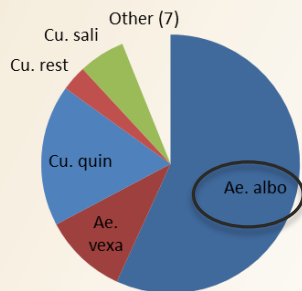
SWAMP
&
NATURE PARK

Top 5

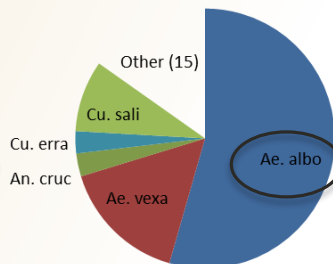
Winding Wood Pl.



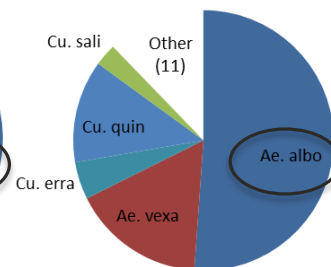
Nassau Dr.



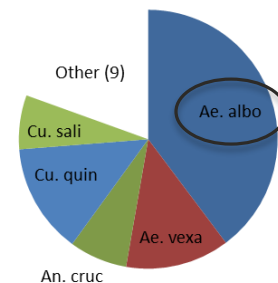
Alabama Rd.



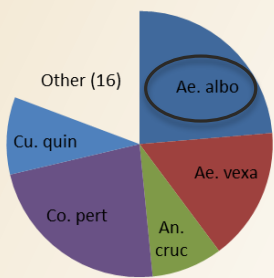
Wood Valley Rd.



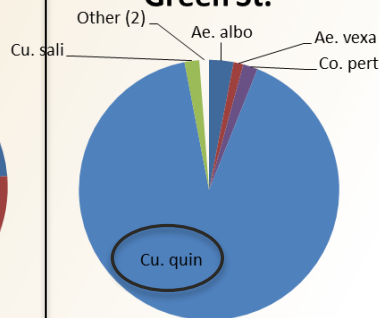
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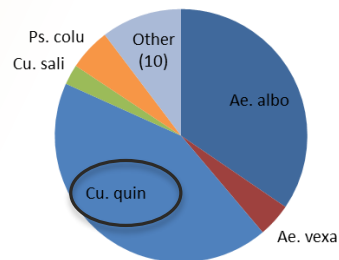
Trey Dr.



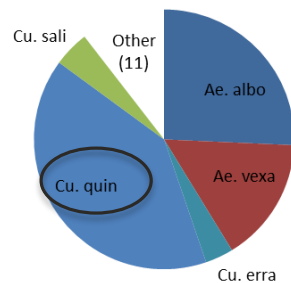
Green St.



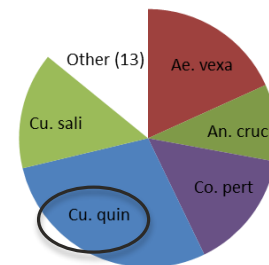
Soloman Pl.



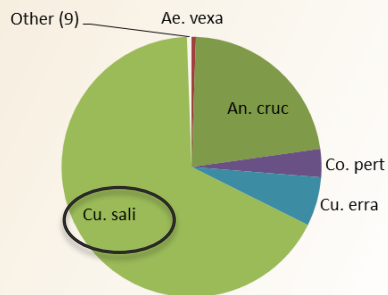
Ingleside Dr.



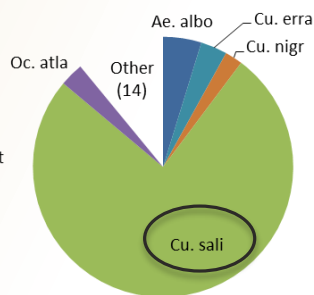
Chester Ave.



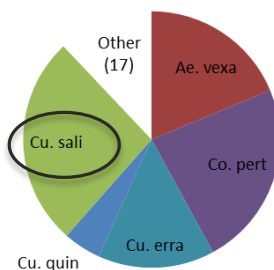
Wetland



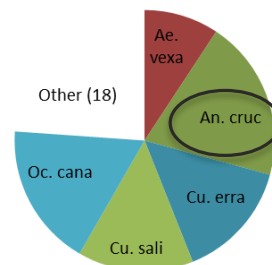
Burning Tree Ln.



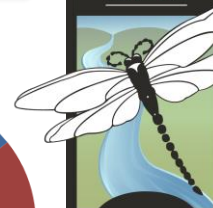
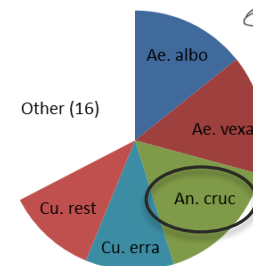
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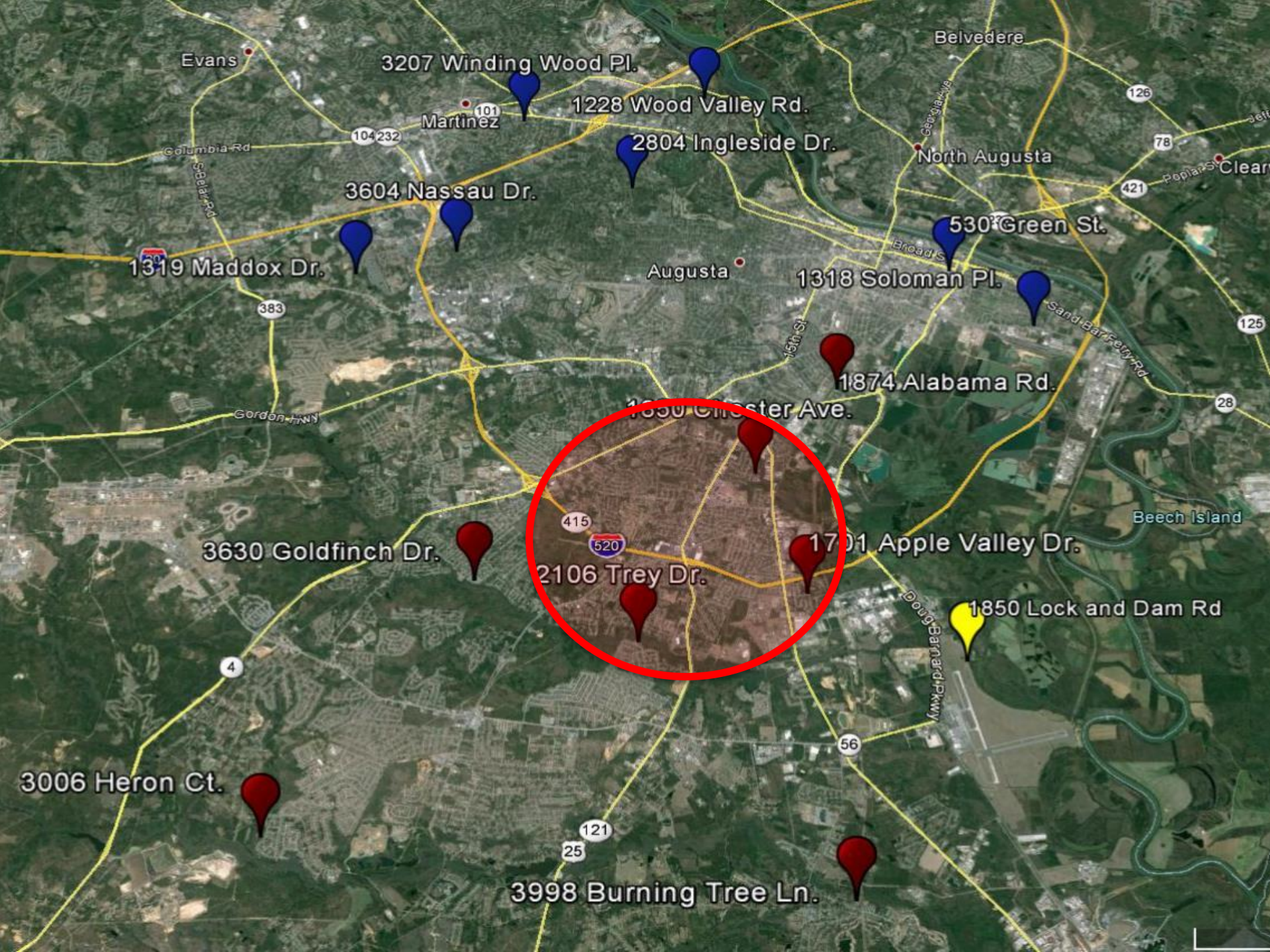


Heron Ct.



Maddox Dr.





Evans

3207 Winding Wood Pl.

Belvedere

Martinez

1228 Wood Valley Rd.

126

Columbia Rd

104 232

2804 Ingleside Dr.

78

3604 Nassau Dr.

North Augusta

Clear

1319 Maddox Dr.

383

530 Green St.

421

Augusta

1318 Soloman Pl.

125

Gordon Hwy

1874 Alabama Rd.

28

1650 Chester Ave.

Sand Bar Ferry Rd

Beech Island

3630 Goldfinch Dr.

415

520

1701 Apple Valley Dr.

2106 Trey Dr.

1850 Lock and Dam Rd

4

3006 Heron Ct.

56

Doug Barnard Pkwy

121

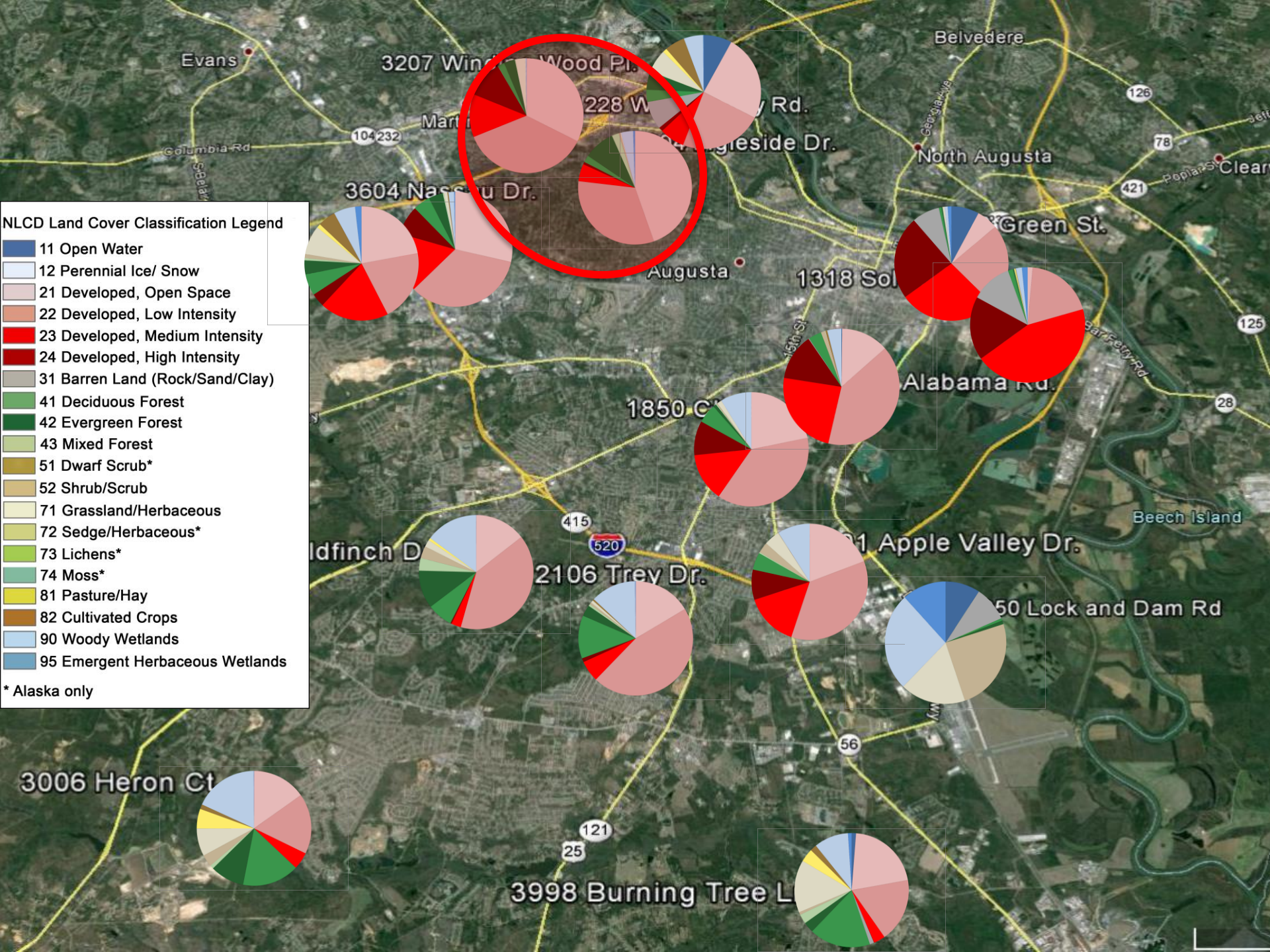
25

3998 Burning Tree Ln.

NLCD Land Cover Classification Legend

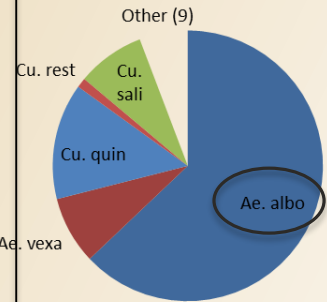
- 11 Open Water
- 12 Perennial Ice/ Snow
- 21 Developed, Open Space
- 22 Developed, Low Intensity
- 23 Developed, Medium Intensity
- 24 Developed, High Intensity
- 31 Barren Land (Rock/Sand/Clay)
- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest
- 51 Dwarf Scrub*
- 52 Shrub/Scrub
- 71 Grassland/Herbaceous
- 72 Sedge/Herbaceous*
- 73 Lichens*
- 74 Moss*
- 81 Pasture/Hay
- 82 Cultivated Crops
- 90 Woody Wetlands
- 95 Emergent Herbaceous Wetlands

* Alaska only

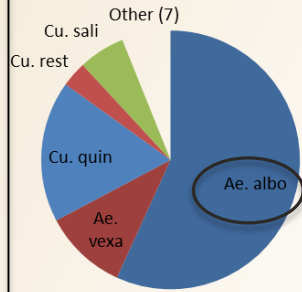


Top 5

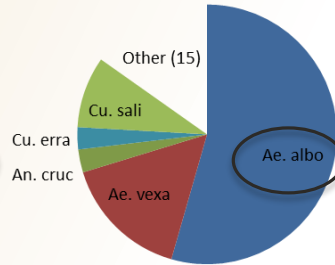
Winding Wood Pl.



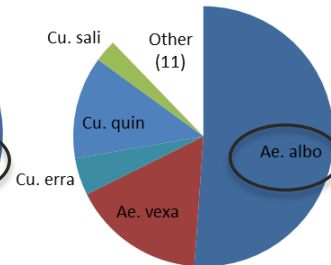
Nassau Dr.



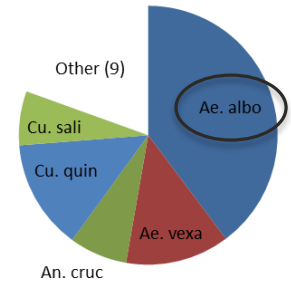
Alabama Rd.



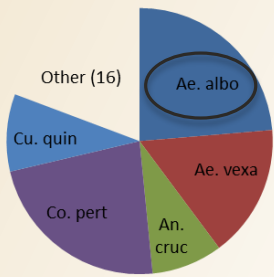
Wood Valley Rd.



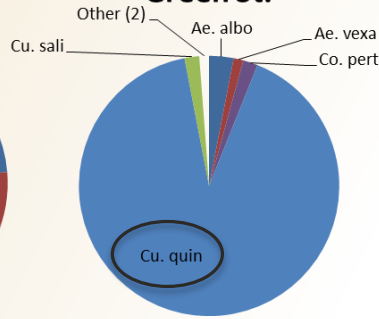
Goldfinch Dr.



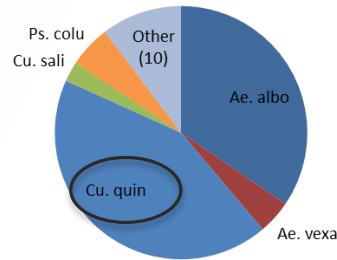
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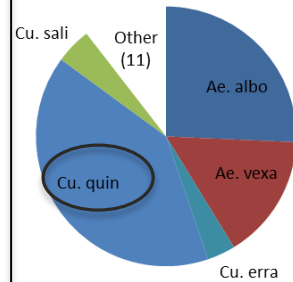
Green St.



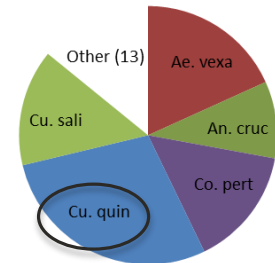
Soloman Pl.



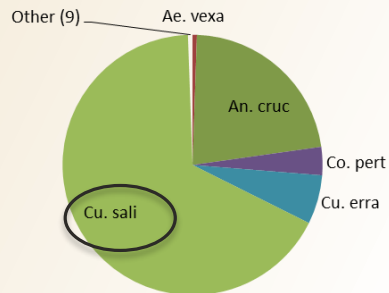
Ingleside Dr.



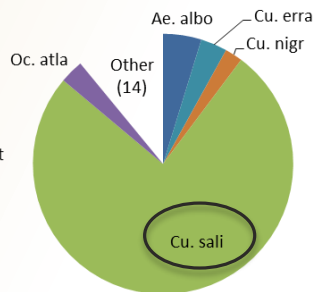
Chester Ave.



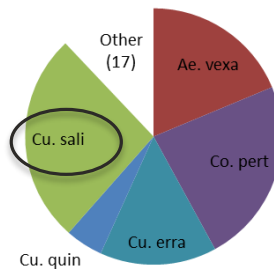
Wetland



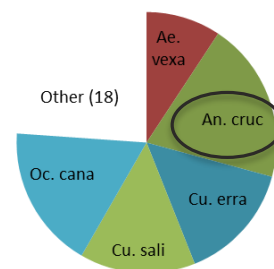
Burning Tree Ln.



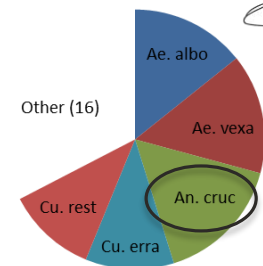
Apple Valley Dr.



Heron Ct.



Maddox Dr.



Acknowledgements

Fred Koehle

Richmond County Mosquito Control

Rosmarie Kelly

Georgia Department of Public Health

Knox Foundation

PHINIZY
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SCIENCES



SWAMP
— & —
NATURE PARK