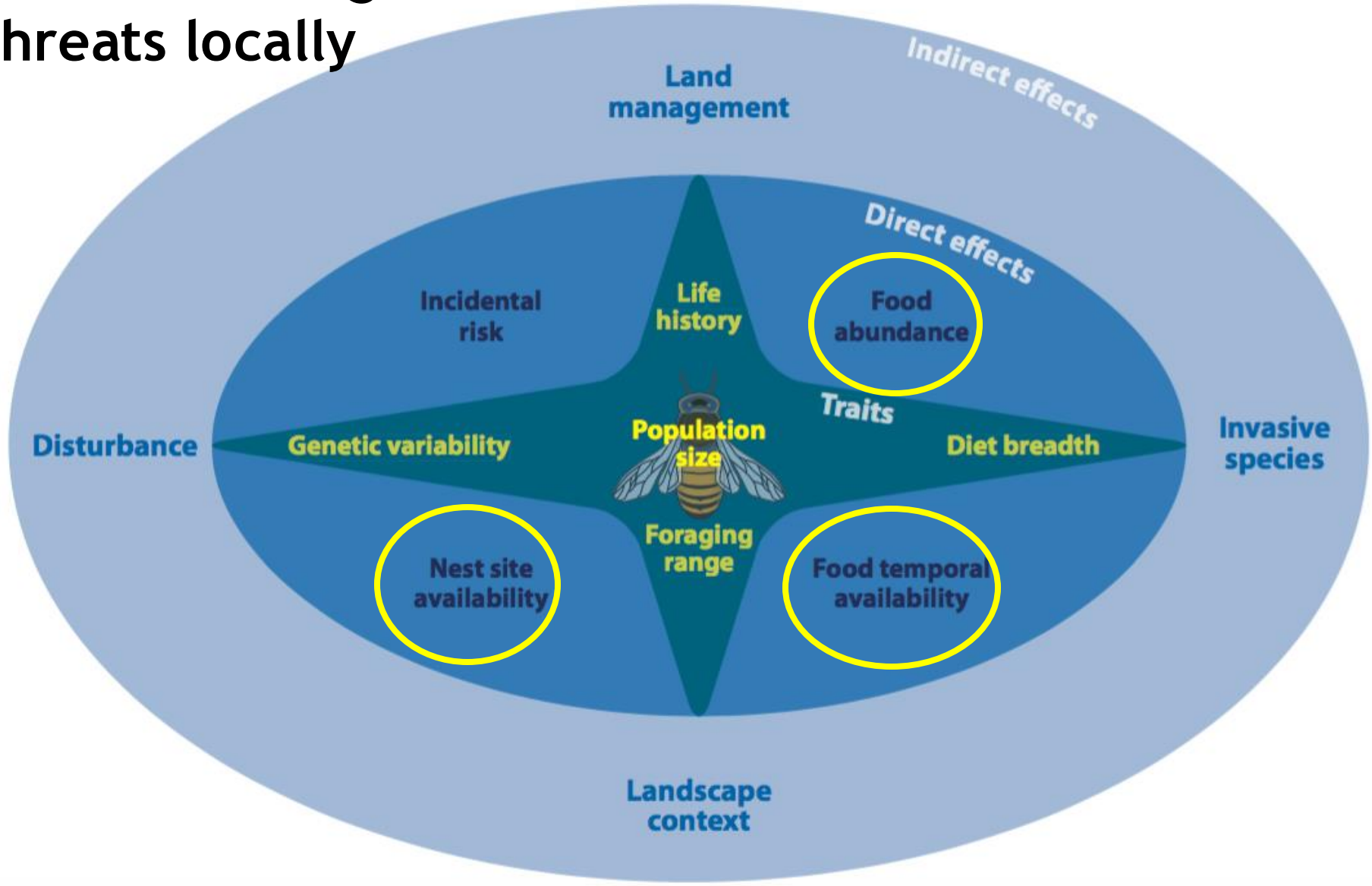
Increasing the Conservation Value of Transmission Line Easements for Wild Bees

Kimberly N. Russell, Ph.D.
Associate Professor
Department of Ecology, Evolution & Natural Resources
Rutgers University, New Brunswick

THE BEE TEAM
Russell Lab
Rutgers University

Goal for management: Address current threats locally



Roulston & Goodell 2011

Goal: Increase floral and nesting resources in ROW

- Analysis from Maryland (Partners: BGE, USGS, EPRI provided funding)

Biodivers Conserv
https://doi.org/10.1007/s10531-018-1552-8

CrossMark

ORIGINAL PAPER

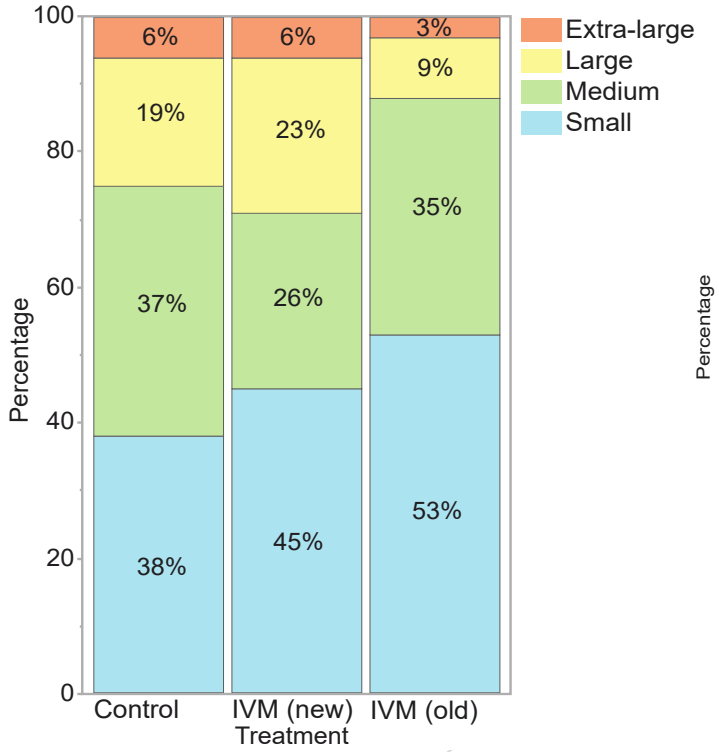
Increasing the conservation value of powerline corridors for wild bees through vegetation management: an experimental approach

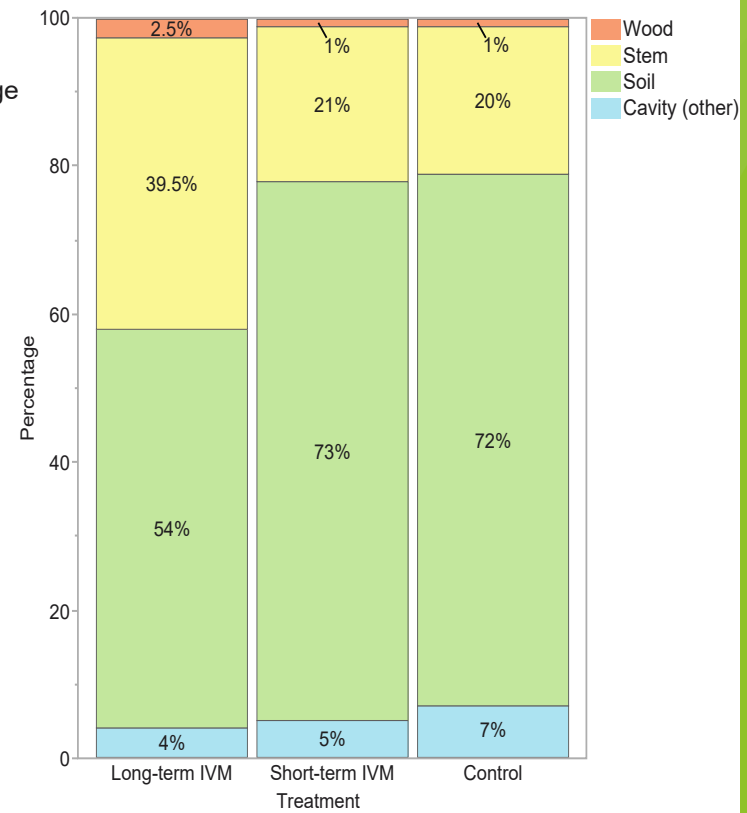
K. N. Russell[1,2] · G. J. Russell[1] · K. L. Kaplan[1] · S. Mian[1,4] · S. Kornbluth[3]

Received: 27 March 2017 / Revised: 17 April 2018 / Accepted: 2 May 2018

Increase floral and nesting resources in ROW: IVM

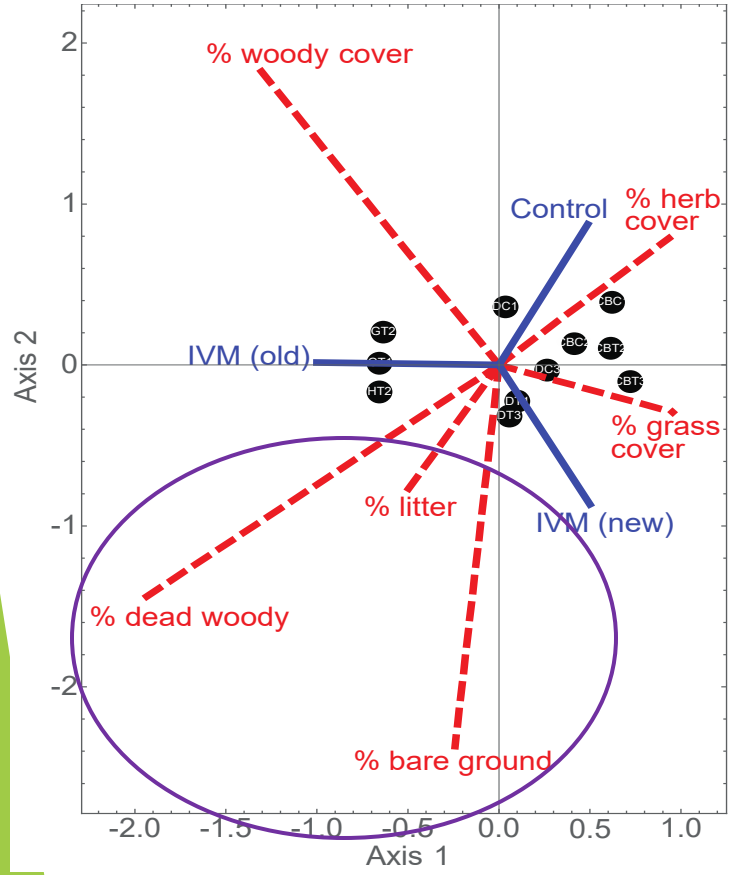
- Results
  - Significantly more species & individuals in IVM sites
    - All the cool bees are there
      - Parasitic species & social species & specialist species
      - Rare species
      - More stem & wood nesters
      - Smaller bees

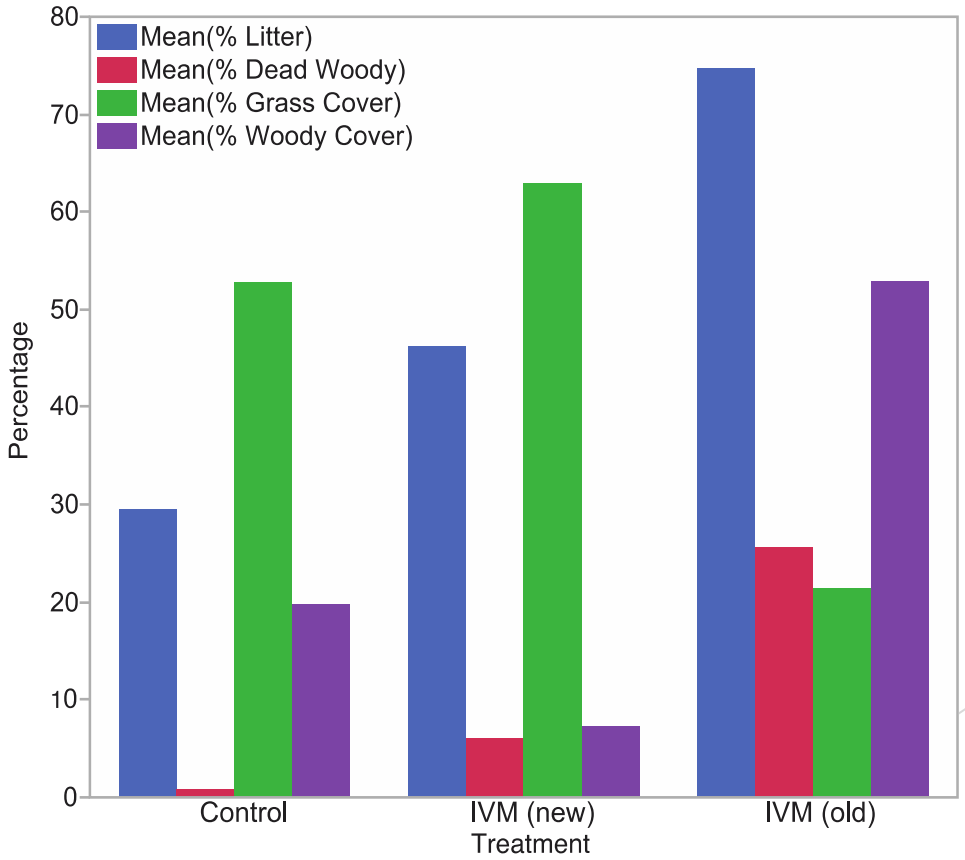


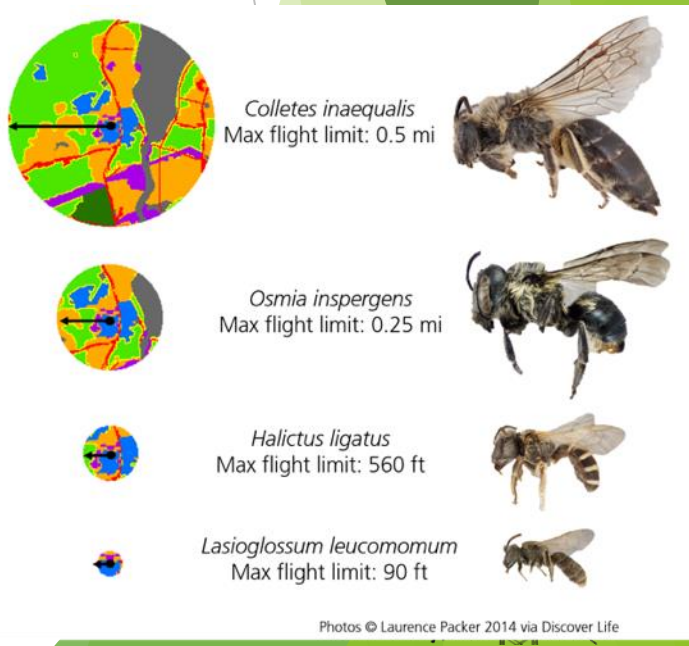


Increase floral and nesting resources in ROW: IVM

- Results
  - Potential Nesting habitat







Maryland: Conclusions

- Transmission line easements can provide valuable habitat for wild bees
  - Vegetation Management in ROW does matter
  - IVM is superior to mowing
    - Creates a robust and diverse bee community by providing both consistent floral and nesting resources
- How do ROW compare with other open areas in the landscape?
  - At the least, ROW are equivalent to isolated patches
  - Benefit comes from connectivity & consistency
  - Proximity to trees

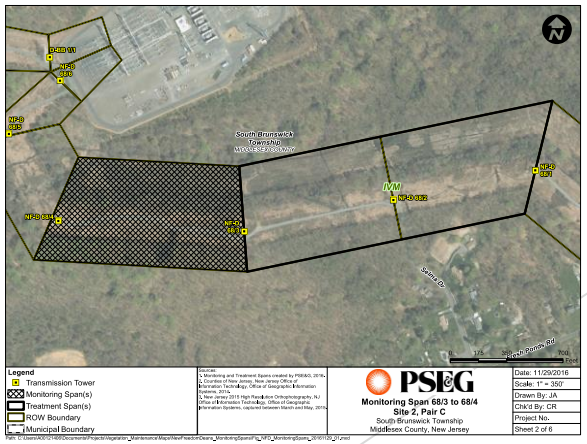
Current Project in NJ: Increase floral and nesting resources in ROW—IVM “plus”

- Overview: Can/should we do more than manage vegetation?
  - Test management techniques
    - Project 1: IVM, IVM+ seeding, Cut stubble
    - Project 2: Invasive species control + plug & tree planting
  - Cost benefit analysis

THE BEE TEAM

Russell Lab
Rutgers University

PSE&G



Project 1: IVM Plus – Raking & Seeding

Partners: PSEG, Rutgers
Approach: Evaluate cost-effectiveness of seeding vs. relying on local seed banks

PSEG Upland Seed Mix

PSE&G Upland Seed Mix	Color/Flowering Period						
Common Name	May	June	July	Aug	Sept	Oct	Nov
Medium Red Clover							
Perrenial rye grass							
Switchgrass							
Big Bluestem							
Partridge Pea							
Autumn bentgrass							
white clover							
Lanceleaf Coreposis							
oxeye sunflower							
black eyed susan							
purple coneflower							
showy ticktrefoil							
Broom sedge							
Blue false indigo							
wild bergamot							
tall white beardtongue							
Common milkweed							
Butterfly milkweed							

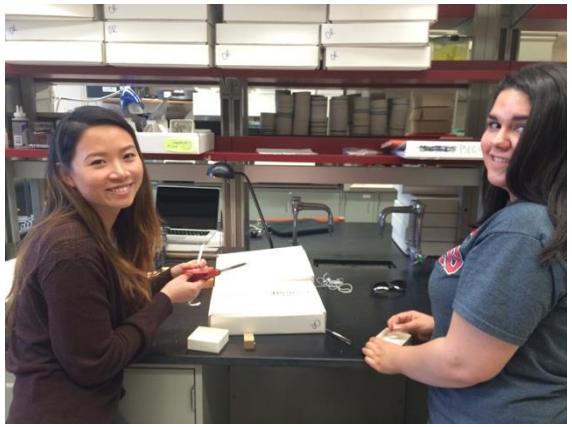
PSEG Wetland Seed Mix

PSE&G Wetland Seed Mix	Color/Flowering Period						
Common Name	May	June	July	Aug	Sept	Oct	Nov
Virginia wildrye							
Switchgrass							
Big Bluestem							
Deertongue							
Aslike clover							
redtop							
showy ticktrefoil							
blue vervain							
Swamp sunflower							
soft rush							
tick seed sunflower							
purple-stemmed aster							
tall white beardtongue							
marsh dense blazing star							
Golden alexanders							
Joe-pye-weed							
boneset							
swamp milkweed							

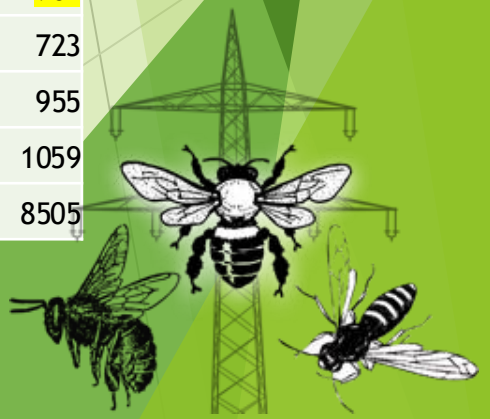
Powerlines in Suburbia: Can we do more than manage?

Progress

- 14,000 bees collected
  - Pinned, labelled
  - Genus IDs complete
  - ~60% of species IDs complete
  - 90% entered into database

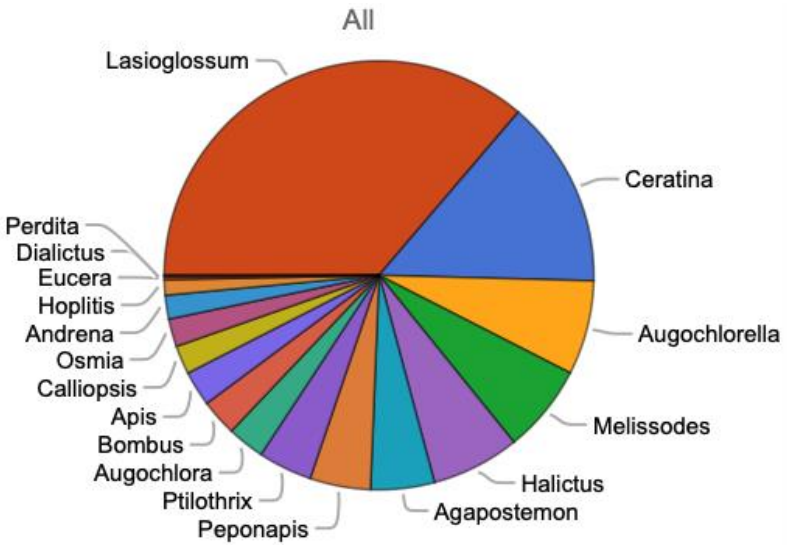


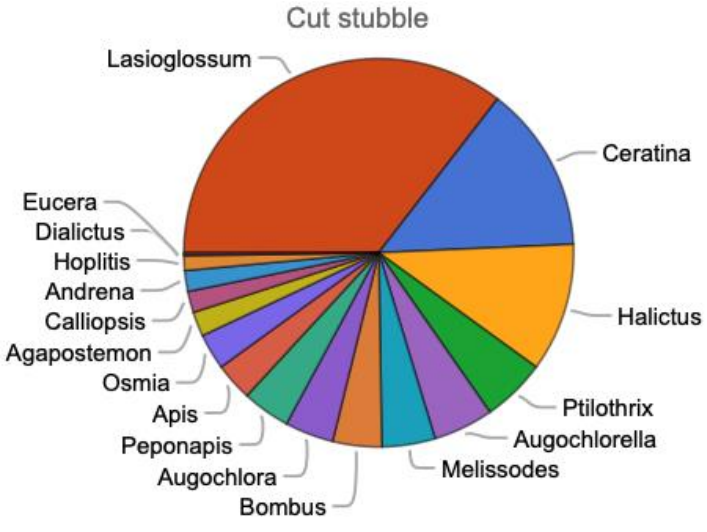
Site	TX	2017 (July)	2018 (July)	2019 (July)	2020 (July)	2021 (July)	2022 (July)	Sum
1	CS	205	195	111	69	70	144	794
5	CS	234	253	219	74	158	166	1104
7	CS	128	136	88	154	203	160	869
3	IVM	196	107	46	21	81	240	691
8	IVM	128	190	128	269	437	254	1406
4	IVM	178	225	104	126	76	195	904
2	IVM+	174	156	112	53	80	148	723
6	IVM+	121	140	273	146	102	173	955
9	IVM+	242	166	112	153	150	236	1059
Total		1606	1568	1193	1065	1357	1716	8505

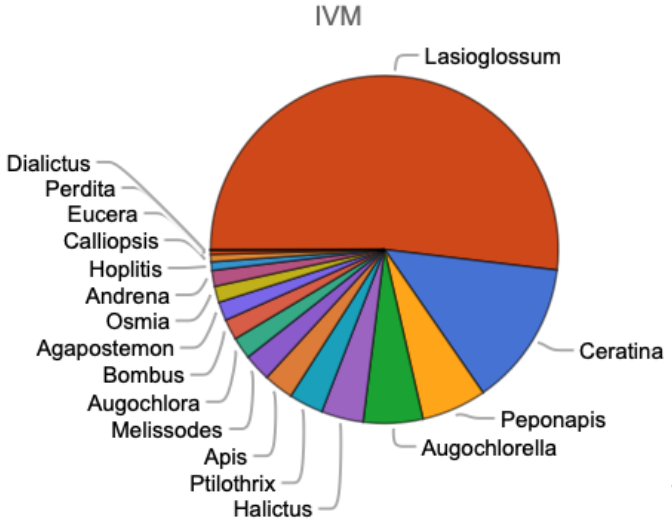


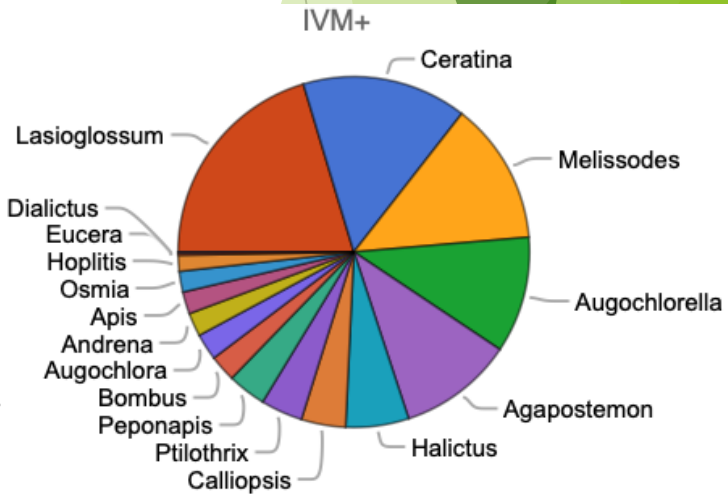
Powerlines in Suburbia: Can we do more than manage?

Preliminary Results









Project 2: IVM Plus — Plug and sapling installation

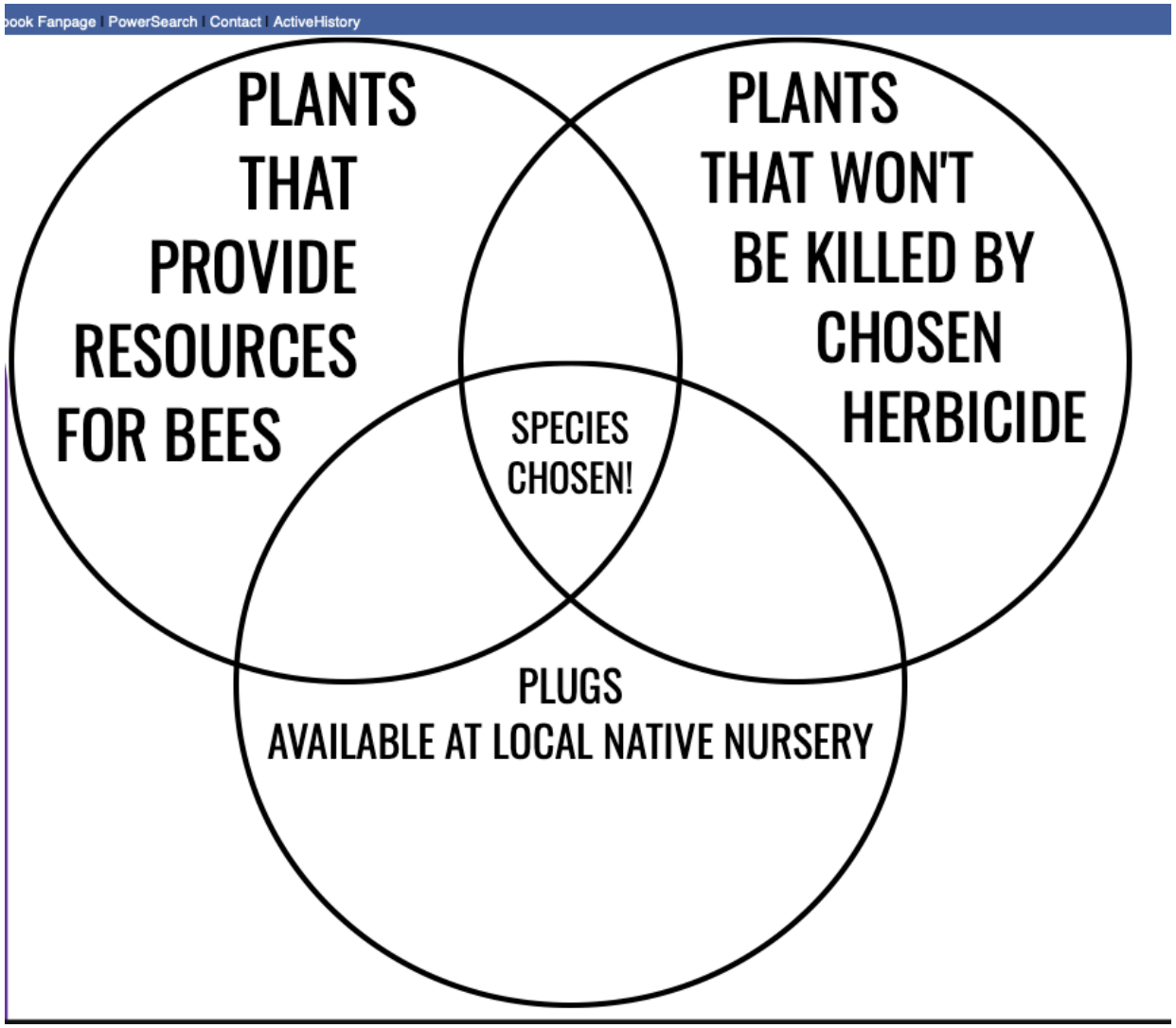
Partners

- Garden Club of NJ
- Rutgers Gardens/Rutgers
- NJ Tree Foundation
- NJ Audubon
- Amy Green Environmental
- PSEG

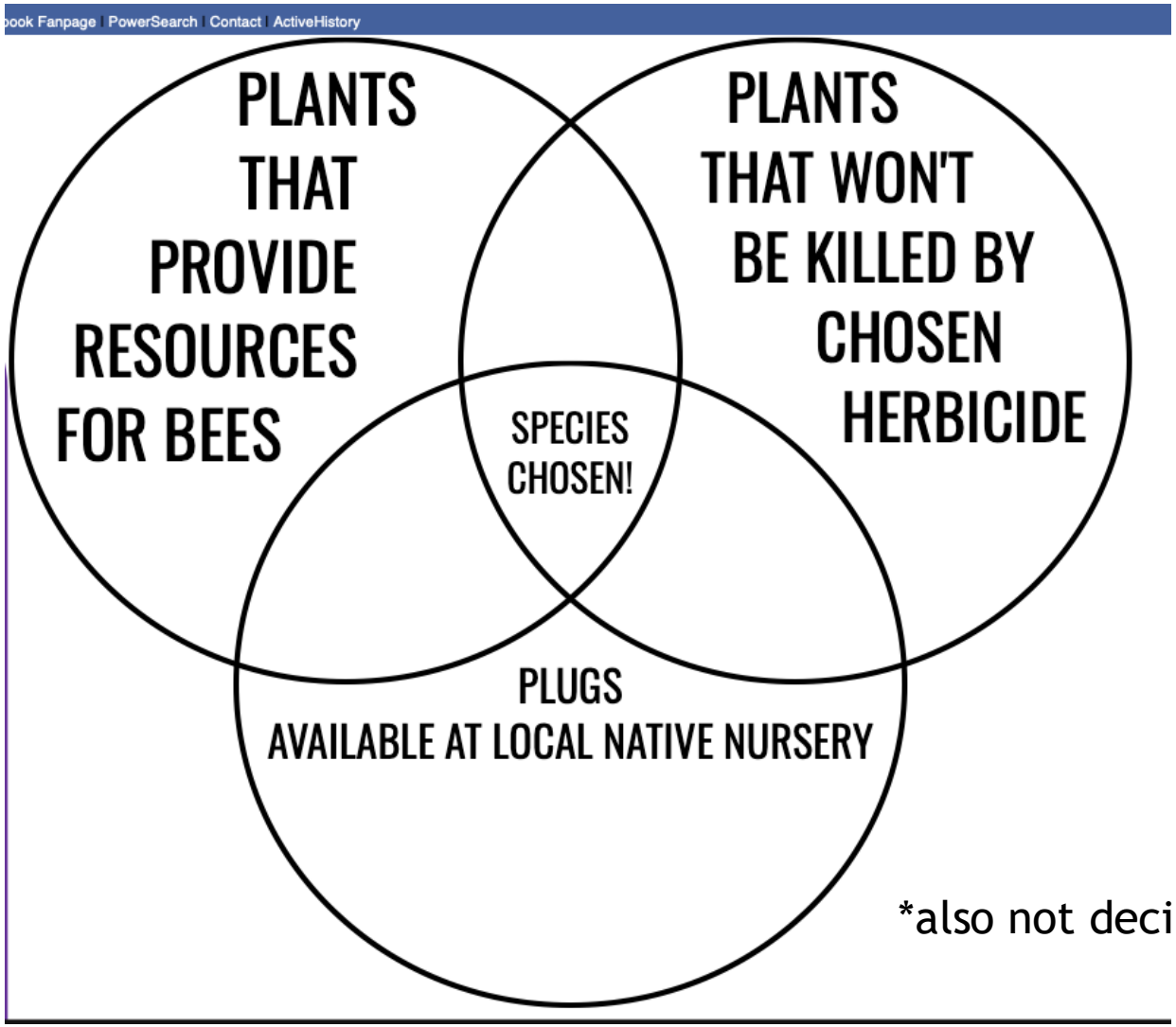
Approach

- Select high profile sites for intensive management
  - Elimination & control of invasives
  - Planting of plugs/shrubs/saplings
  - Floristic Quality Analysis & Bee Diversity

Choice of plugs?



Choice of plugs?



Scientific Name	Common Name
Agastache foeniculum	Anise hyssop
Asclepias tuberosa*	Butterfly milkweed
Aster ericoides	Heath aster
Aster laevis	Smooth aster
Coreopsis tripteris	Tall coreopsis
Echinacea purpurea	Purple coneflower
Eupatorium hyssopifolium	Hyssop leaved boneset
Euthamia caroliniana	Slender goldentop
Monarda fistulosa	Wild bergamont
Penstemon hirsutus	Hairy beardtongue
Pycnanthemum incanum	Hoary mountain mint
Rudbeckia maxima	Tall coneflower
Solidago graminifolia	Grass-leaved goldenrod
Solidago speciosa	Showy goldenrod
Vernonia glauca	Upland ironweed
Schizachyrium scoparium	Little bluestem

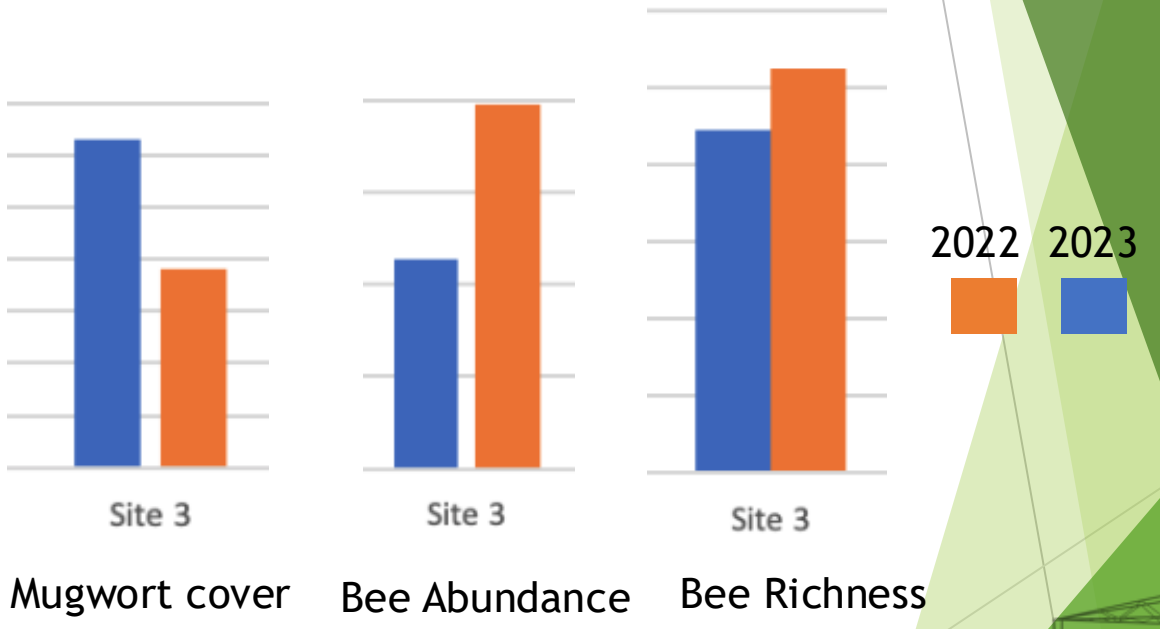
*also not decimated by deer!

Powerlines in Suburbia: Pollinator Pathways

- Other site
  - Mugwort Control
  - Initial vegetation survey informed plug choice
    - Promote & supplement what already exists there

Pollinator Pathways Project

- Preliminary (qualitative) results
  Prevalence of mugwort declining
  - *Only* with repeated applications of herbicide
  - Desired species increasing
  - Increase in bee diversity associated with decline in abundance of mugwort for most sites



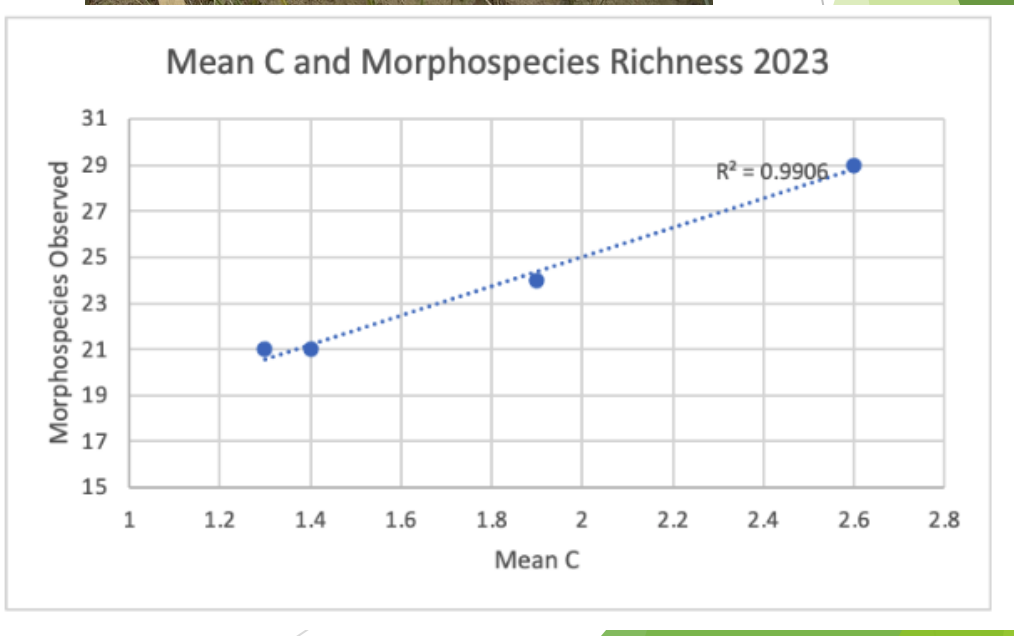
From GH Cook Thesis of Joey Shrager ‘23

General Conclusions from Powerline Work

- “Controlled succession” can create valuable habitat for native bees
  - Modify what is already there
- Seeding can improve some sites, but plugs are better
  - Best to build on what is already there
- Controlling invasives is important (but not easy!!)
  - Pick your battles
- Consider nesting site diversity
  - Leave litter & dead stems

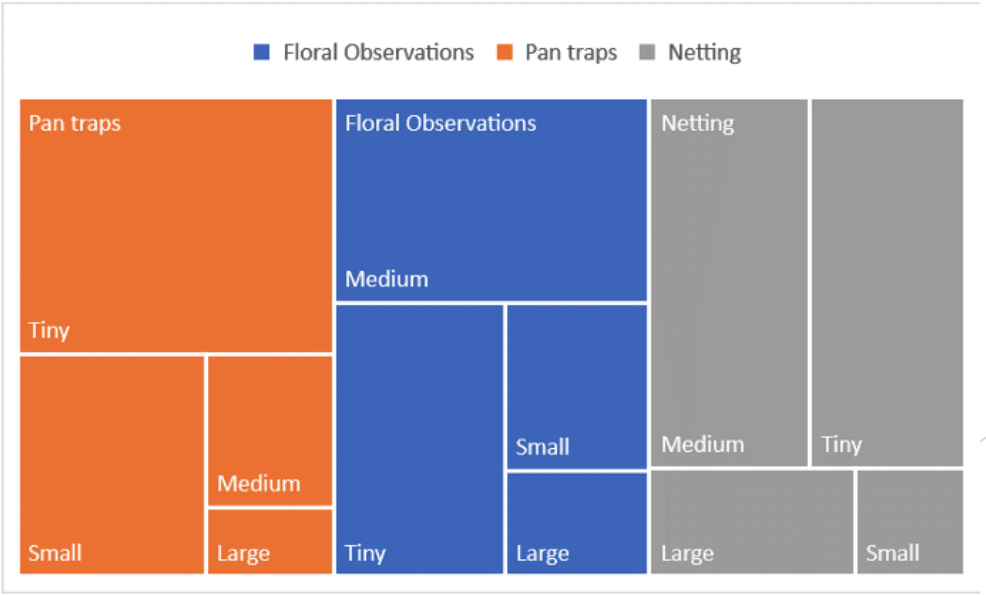
How to Measure Success locally?

- Indirect
  - Quadrat surveys to estimate nest site diversity
    - % Woody cover
    - % dead woody
    - % bare ground
    - % litter
  - Floral surveys to estimate food resources
    - Modified Universal Floristic Quality Assessment



How to Measure Success locally?

- Direct
  - Bowl Traps or Netting
    - Requires specialist ID
  - Floral Observations
    - Timed/Spatial quadrats
    - Snapshot of diversity

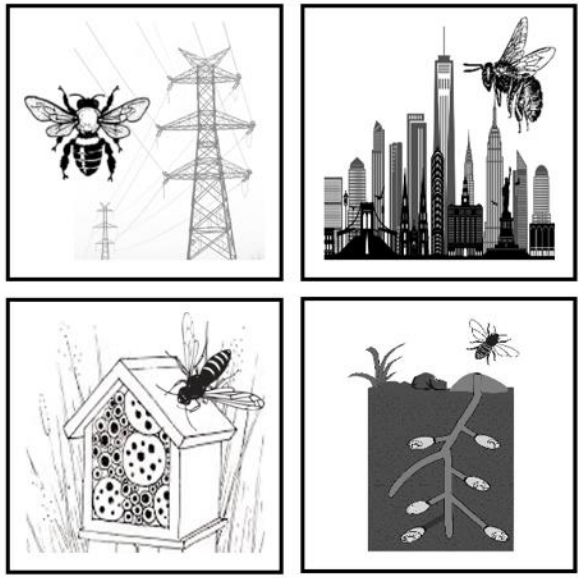


Thanks to everyone on The Bee Team (too many to thank!!)

THE BEE TEAM

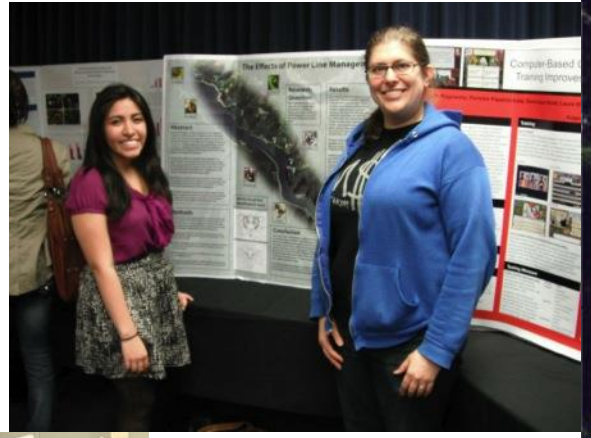
Russell Lab
Rutgers University

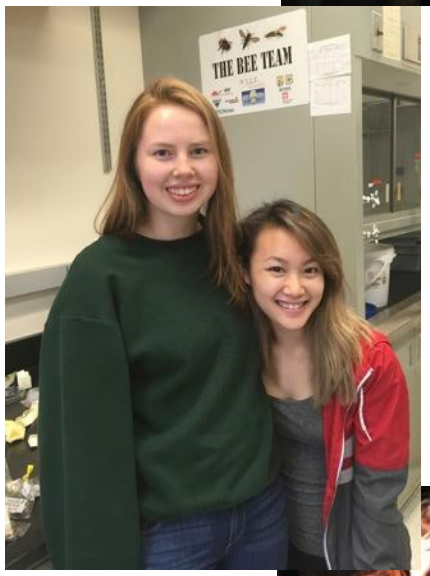
PSE&G



DAVEY
Proven Solutions for a Growing World

EPRI
ELECTRIC POWER RESEARCH INSTITUTE





The Bee Team