The Rhode Island Pollinator Atlas: Conserving and Celebrating Insect Pollinators Through Community Science

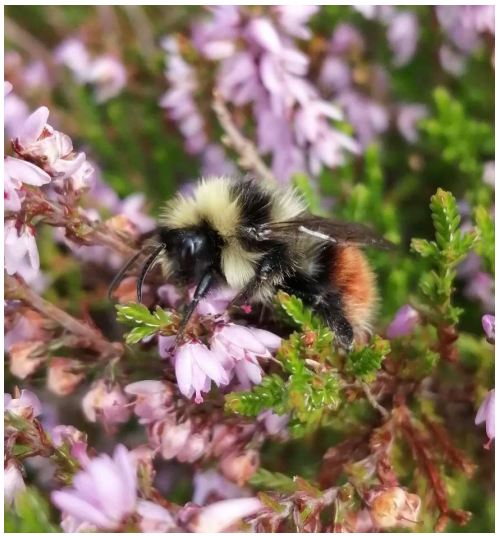
Dr. Katherine Burns, RIDEM Division of Fish & Wildlife

RHODE ISLAND FISH & WILDLIFE

DEM RHODE ISLAND

Introduction

- **Research assistant and science communicator (2014 – 2017)**
- **PhD Researcher at University College Dublin (2017 – 2021)**
  - Contributions and Conservation of Insect Pollinators in Ireland
- **Pollinator Atlas Entomologist (November 2021 – Present)**
  - Lead biologist on the Rhode Island Pollinator Atlas
  - “Outreach Biologist”



Why is animal pollination important?

Pollination

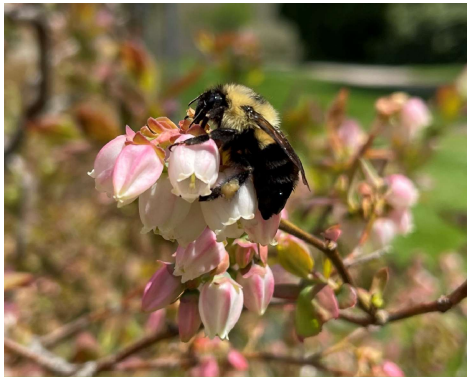
- Transfer of male part of a plant (pollen) to female part (stigma)
- Many different species of pollinators (e.g. insects, birds, mammals)
- <u>Majority of pollinators are insects (e.g. bees, flies, and moths)</u>

Animal pollination in natural systems

- 87.5% flowering plants depend on animal pollination
- Supports healthy food webs
  - Plant reproduction
  - Food for birds and mammals

(Ollerton et al., 2011)

Why is animal pollination important?



Insect pollination in agricultural systems

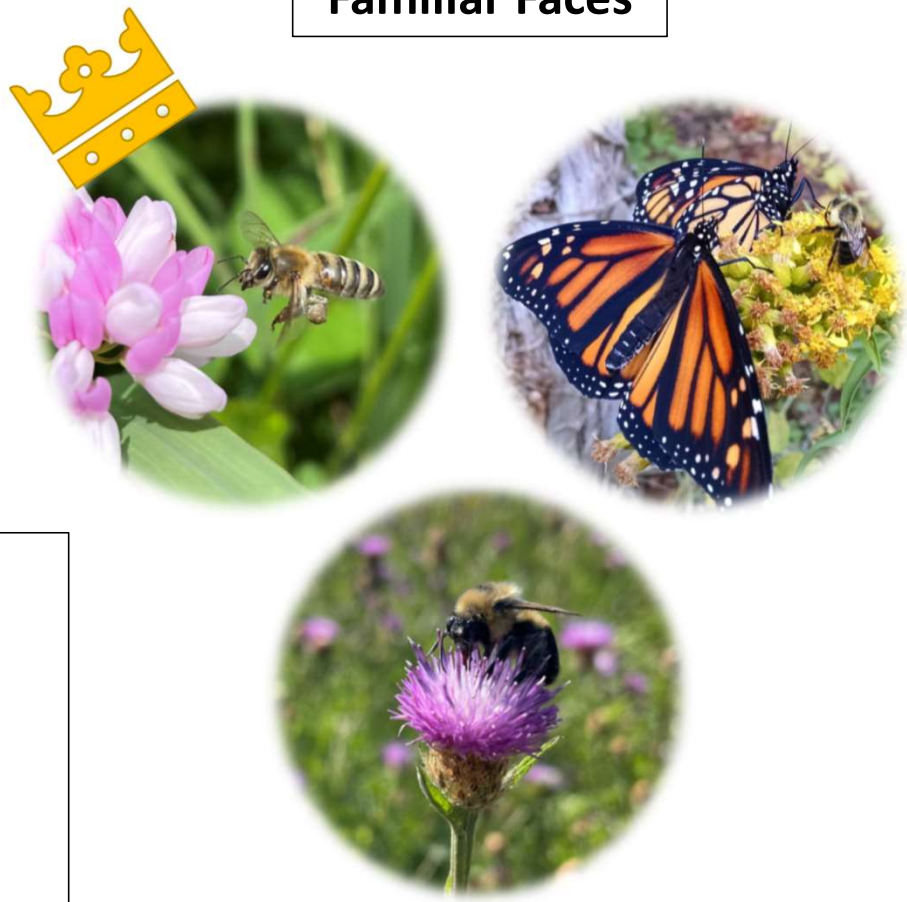
- 76% of global crops and 35% of global food production
- Nutrients (e.g. Vitamin C, Vitamin A, and Calcium)
- $147 and $485 billion per annum worldwide
- Increasing pollinator diversity can enhance services

(Eilers et al., 2011; Gallai et al., 2009; Klein et al., 2007; Lautenbach et al., 2012; Rader et al., 2016)

Who are the pollinators?

- **Charismatic "megafauna" of the pollinator world**
  - Widely recognizable
  - "Gateway" insect
- **Disproportionate attention**
  - Media attention
  - Conservation
  - Research and monitoring efforts

Familiar Faces



What about "Save the Bees" ?

- Honeybees are a non-native, managed livestock species
- Used for artisanal product production and crop pollination
  - Colony Collapse Disorder (CCD) in early 2000's
  - CCD no longer considered a major long-term threat
- More honeybees now than at any time in human history

Who are the pollinators?

- <u>Starting an apiary is not a conservation action</u>
- Resource competition and disease spread
- Responsible apiary management is key
    - Register apiary with the RIDEM Division of Agriculture
    - Request regular inspections of hives
    - Join a local beekeeping community
    - Avoid placing on conservation areas OR areas without ample forage availability

Who are the pollinators?

Unsung Heroes

The Other Bees!

- ~ 3,600 in North America (mostly solitary)
- ~ 250 species in Rhode Island
- 30% cavity nesters and 70% ground nesters
- Wide diversity of sizes, colors, and food preferences

Triple Threats!

- Wasps (~ 18,000 species in NA) and flower flies (~ 850)
- Pollination, pest control, and decomposition
- Flower Flies are resilient to changes in habitat

The Night Shift!

- Beetles (~ 30,000 species in NA) and moths (~ 12,000)
- Pollinate night blooming flowers
- Understudied and undervalued (but very important!)

Moth & Beetle: Spencer Hardy

What do pollinators need?

Food

- Nectar and pollen of native flowering plants
- Vegetal parts of the plant
  - Host plants for butterflies and moths
- Continuous flow of resources (spatial AND seasonal)

Shelter

- Most insects don’t require nests
- Bees and wasps live in nests
  - Bare ground, tussocky grasses, pithy stems
- Hibernation underground or in leaf litter

Safety

- Reduced chemical pesticide and fertilizer exposure
- Reduced outdoor lighting
- Hedgerows as windbreaks

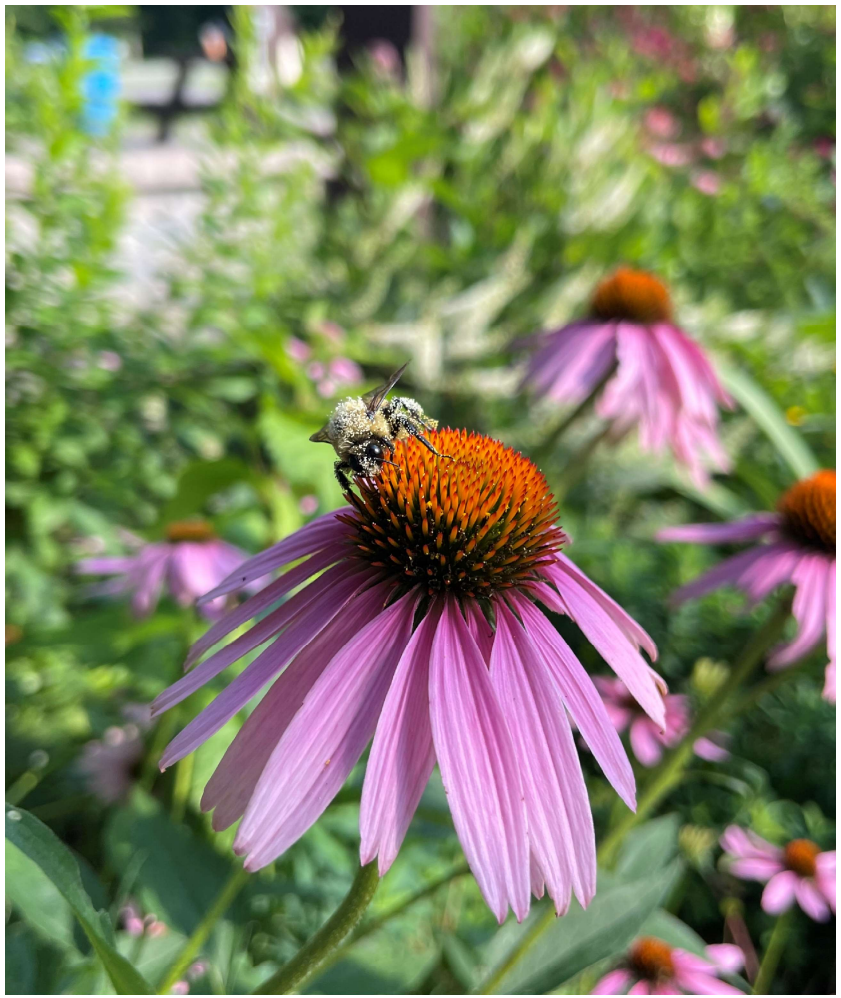
Threats to insect pollinators

Land Use Changes

- Increased urbanization or agricultural intensification
- Leads to habitat loss and habitat fragmentation

Pesticide Use

- Alter insect behavior (sublethal) or kill insects outright (lethal effect)
- Herbicides reduce number of flowers in the landscape



Threats to insect pollinators

Climate Change

- Alters emergence time of flowers and pollinators
- Timing mismatch reduces forage availability

Parasites and Diseases

- Prevalent in commercially raised bees and butterflies
- Spread to wild bees and butterflies

Pollinator Atlas: Background

Rhode Island Pollinator Atlas

- "A plan to comprehensively inventory Rhode Island's pollinating insects"
- Implications for future management
- Significant volunteer and outreach component

RHODE ISLAND
POLLINATOR ATLAS

Initial challenges…

- Many pollinating insect groups
  - Bees, flower flies, beetles, wasps, etc.
- Varying survey methods
- Specific ID skills

Bees, butterflies, moths, and flower flies
~20-year commitment

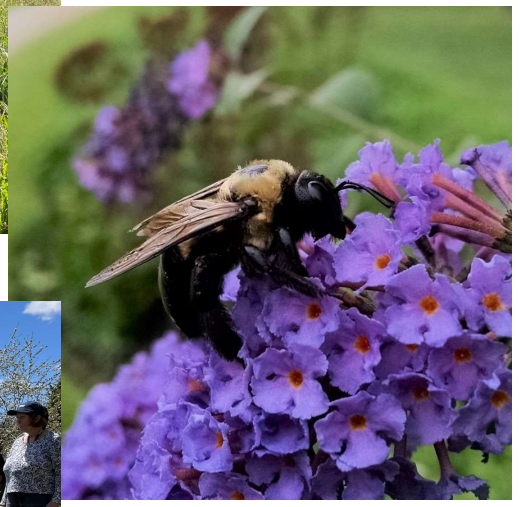
Pollinator Atlas: Projects

Insect Pollinator Monitoring

- Rhode Island Bumblebee Survey (RIBS)
- Rhode Island Wild Bee Observer (RIWBO)
- Rhode Island Wild Bee Survey – *Pilot Season*

Outreach

- Pollinator Pals Critter Kit
- “Wildlife & You” Wildlife Factsheets
- RIDEM Publications
- Social media posts (e.g. “Pollinator Week”)
- YouTube series (e.g. “Wild Gardening”)
- Outreach events (e.g. pollinator walks)
- BioBlitz “Bee Bandits”



Pollinator Atlas: RIBS

Rhode Island Bumblebee Survey (RIBS)

- "Gateway insect" i.e. charismatic megafauna of the bee world
- ~ 50% of species in decline in Eastern North America
- Compliment current regional and state-specific efforts
  - Xerces Society for Invertebrate Conservation (Bumblebee Atlas)
  - URI Bumblebee Survey

Bumblebees in Rhode Island

- 5 out of 12 historical RI species undetected
- 3 historic RI bumblebee species are listed as *Vulnerable* (IUCN)
- IUCN Red Listed & Federally Listed: Rusty-Patched Bumblebee
- New species recently detected in 2021
- Gaps in geographic reach of status assessments

Colla, S. R., Gadallah, F., Richardson, L., Wagner, D., & Gall, L. (2012). Assessing declines of North American bumble bees (Bombus spp.) using museum specimens [Article]. Biodiversity and Conservation, 21(14), 3585-3595. https://doi.org/10.1007/s10531-012-0383-2

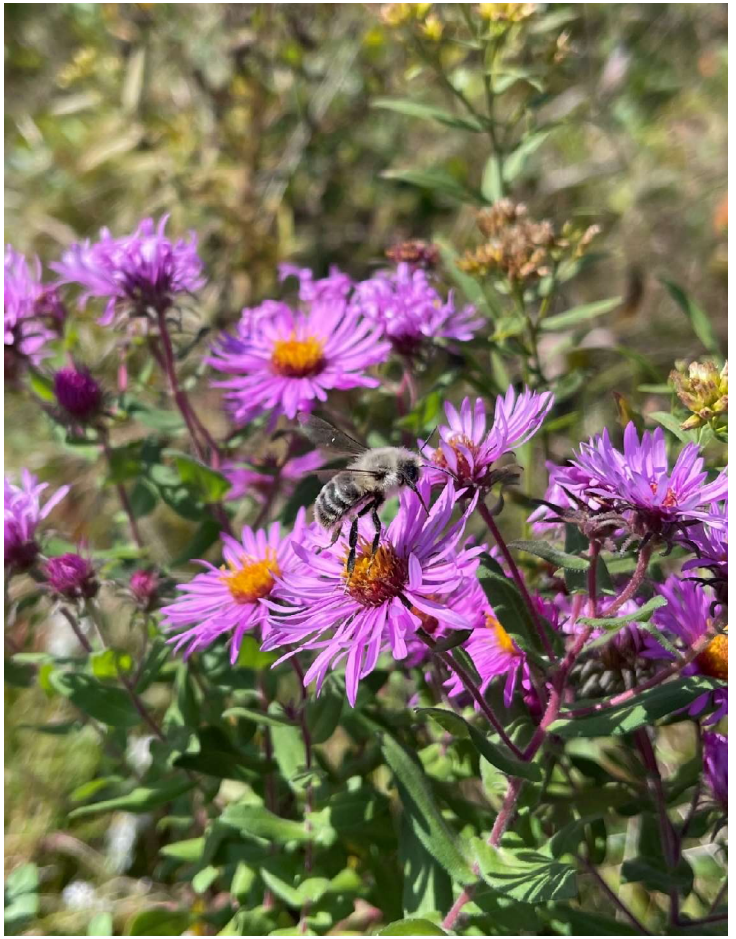
Pollinator Atlas: RIBS

Aims

- Determine the current status and distribution of RI bumblebee species
- Identify specific floral species and habitats associated with RI bumblebees
- Assess the relative abundances of RI bumblebee species
- Assess potential threats to RI bumblebees

Outcomes

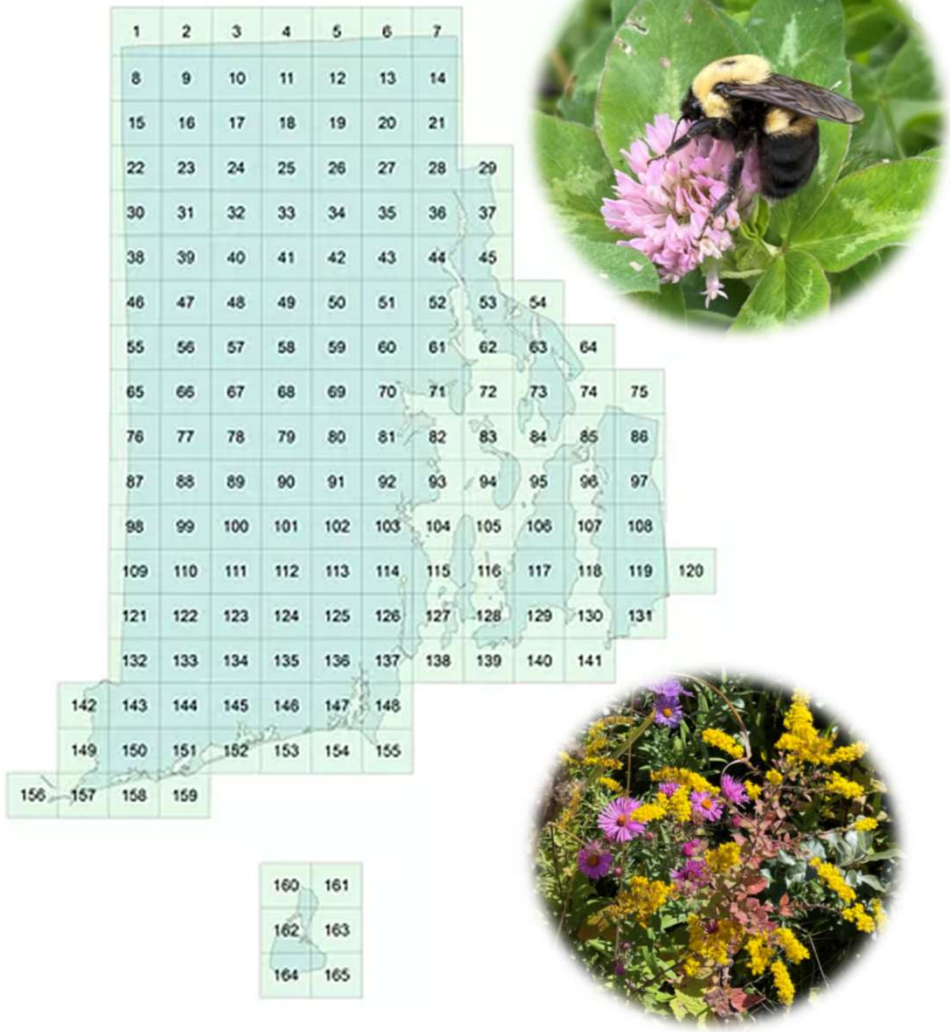
- Distribution map and write-up for each species
- Evidence-based recommendations for future habitat management
- Significant volunteer effort and community scientist engagement
- Engagement and outreach opportunities



Pollinator Atlas: RIBS

Overview

- Similar to Pacific Northwest Bumblebee Atlas
- 3-year data collection period
  - Pilot season in 2022
- 165 grid cells (5 x 5 km)
  - Same map as RI Breeding Bird Atlas
  - One volunteer per grid cell
- 1 ha (2.5 acres) survey site within cell
  - Visited once a month (April – October)
  - Differing emergence times and plant communities
- 45 person-minute point surveys
  - Bumblebees and Eastern Carpenter Bee
  - Rapid habitat assessment




Sound fun?
Join us for the 2024 Season!

Pollinator Atlas: RIWBO (iNaturalist)

Rhode Island Wild Bee Observer

- Submit incidental observations of bees
- Determine the status and distribution of RI wild bee species
- Support and augment data of more time-intensive surveys

iNaturalist

- Online community of naturalists
- Community science platform for recording observations living things
- Creates research-quality community science data
- Helps users identify the plants, animals, and fungi around them

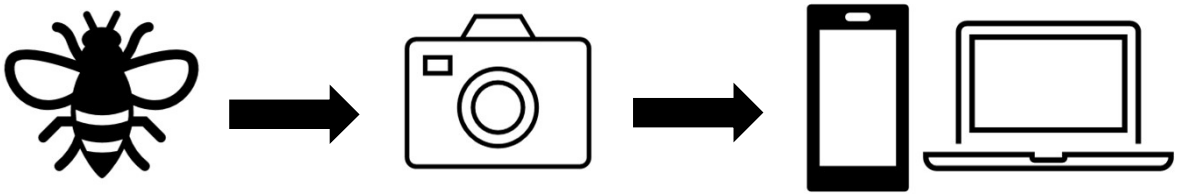
iNaturalist

Pollinator Atlas: RIWBO (iNaturalist)

1. See a bee

2. Take a picture of the bee

3. Submit photo to iNaturalist



Benefits of RIWBO

- Opportunity to learn more about the “bees in your backyard”
- VERY low time commitment
- Expert species ID verifications
- Both common and rare bee observations are welcome!


Sound fun?
Get outside and start taking pictures of bees!
S. Hardy

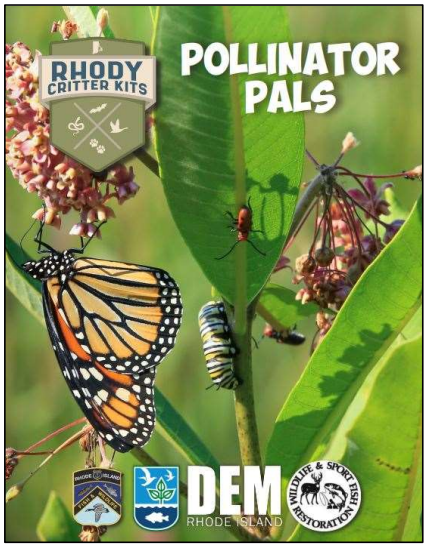
Pollinator Atlas: Outreach

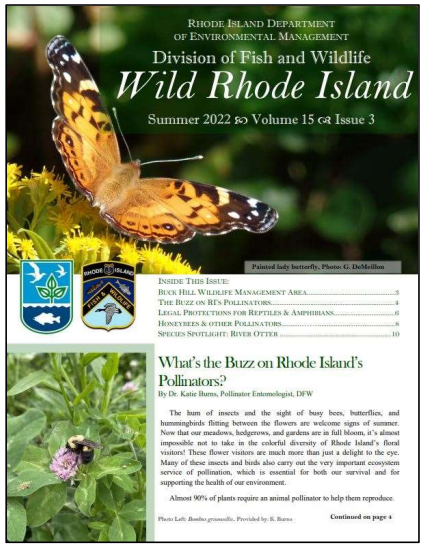
“Pollinator Pals” Critter Kit

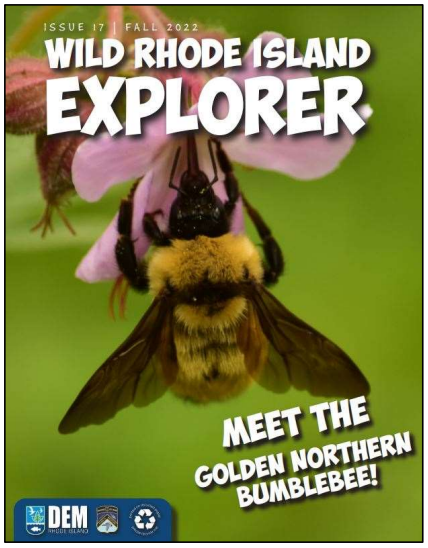
- Free wildlife curriculum kit for educators
- Contains lesson plans, activities, videos, and hands-on learning materials
- Learn about native pollinators and the conservation issues they face

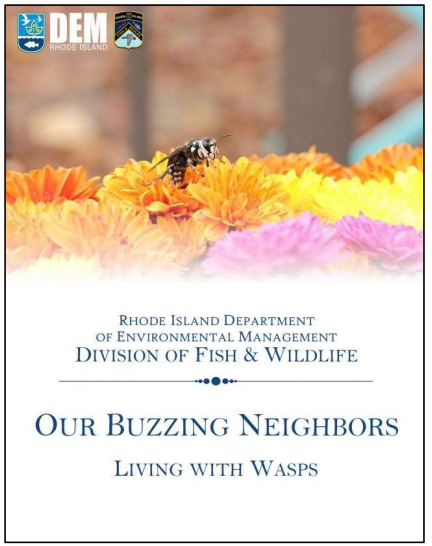
RIDEM Fish & Wildlife Pollinator Resources

- Journal Publications
  - *Wild Rhode Island*
  - *Wild Rhode Island Explorer*
- “Wildlife & You” Wildlife Factsheets
  - “Our buzzing neighbors: Living with Wasps”
  - “Wild Bees of Rhode Island”
  - “Butterflies of Rhode Island”
  - “Flower Flies of Rhode Island”









Thank you for your attention!

Questions?

RIDEM Division of Fish & Wildlife

Great Swamp Field Headquarters

277 Great Neck Road

West Kingston, RI 02892

Email: Katherine.Burns.CTR@dem.ri.gov

https://dem.ri.gov/fish-wildlife/conservation-research/drhode-island-pollinator-atlas

BONUS SLIDES

Pollinators in decline

19% of North America's butterflies facing extinction (NatureServe)

- 93 RI Species of Greatest Conservation Need
- RI state listed butterfly: Frosted Elfin
- IUCN Red Listed: Monarch Butterfly

25% of North America's bumblebees are in decline (Cameron *et al.* 2011)

- Three historic RI bumblebee species are listed as *Vulnerable* (IUCN)
- IUCN Red Listed & Federally Listed: Rusty-Patched Bumblebee
- The Golden Northern Bumblebee rare, but still found in RI

Honeybees - Colony Collapse Disorder (CCD)

- Die-offs in the early 2000's
- Combination of parasites, diseases, and pesticide exposure
- No longer considered a major long-term threat (Elias, 2022)

Photos by R. Bonoan

Pollinator Atlas: RIWBS

Rhode Island Wild Bee Survey

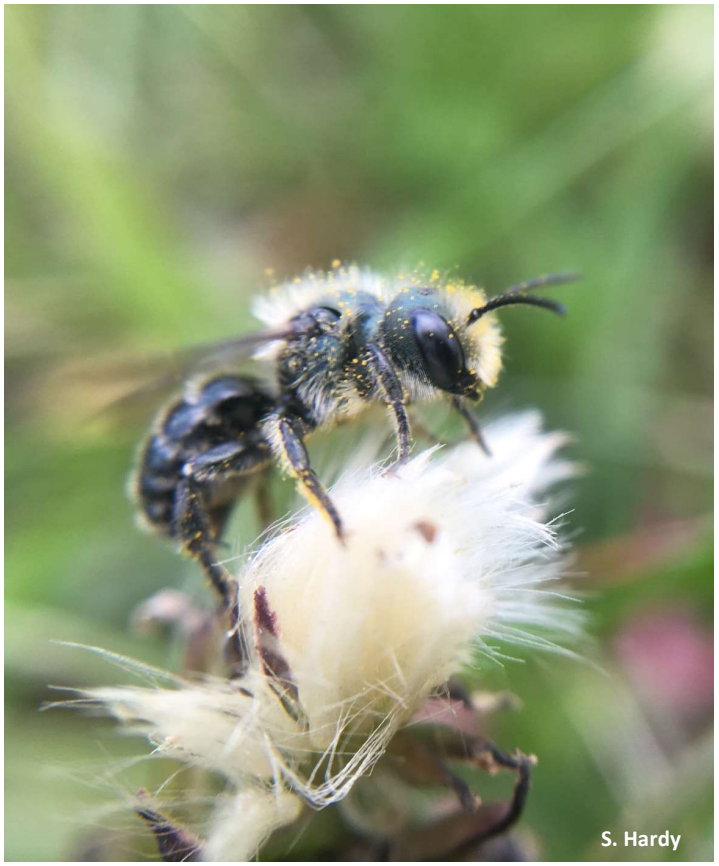
- Survey of solitary and small eusocial & communal bee species
- Rhode Island's bees have never been comprehensively surveyed
- Most bees can't bee identified without a microscope

Aims

- Determine the current status and distribution of RI wild bee species
- Identify specific floral species and habitats associated with RI wild bees
- Assess potential threats to RI wild bees

Methods

- Monthly bee surveys
- Targeted netting & pan traps
- Rapid habitat assessment (e.g. floral and nesting resources)



Coming Soon!