Supporting wild and managed bee populations to improve alfalfa seed pollination

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Plus- Dr. Rena Schweizer, Jenny Gan, Harold Ikerd, Craig Huntzinger, Tien Lindsay,and Byron Love, (and graduate students and L/As)

FUNDED APRI PROJECT FOR 2025

Project Title: Supporting wild and managed bee populations to improve alfalfa seed pollination
Year(s) of Study: 2024–2025
Lead Investigator / Affiliation:

- Michelle Kirchner, Postdoctoral Research Entomologist, USDA-ARS Pollinating Insects – Biology, Management, & Systematics Research Unit, Logan, UT.
- Nevin Cullen, Postdoctoral Research Biologist, USDA-ARS Pollinating Insects – Biology, Management, & Systematics Research Unit, Logan, UT.
- Jonathan Koch, Research Entomologist, USDA-ARS Pollinating Insects – Biology, Management, & Systematics Research Unit, Logan, UT.

Kirchner previous research– Who is visiting the flowers? Methods

- 8 fields
- Two 45m transects/field

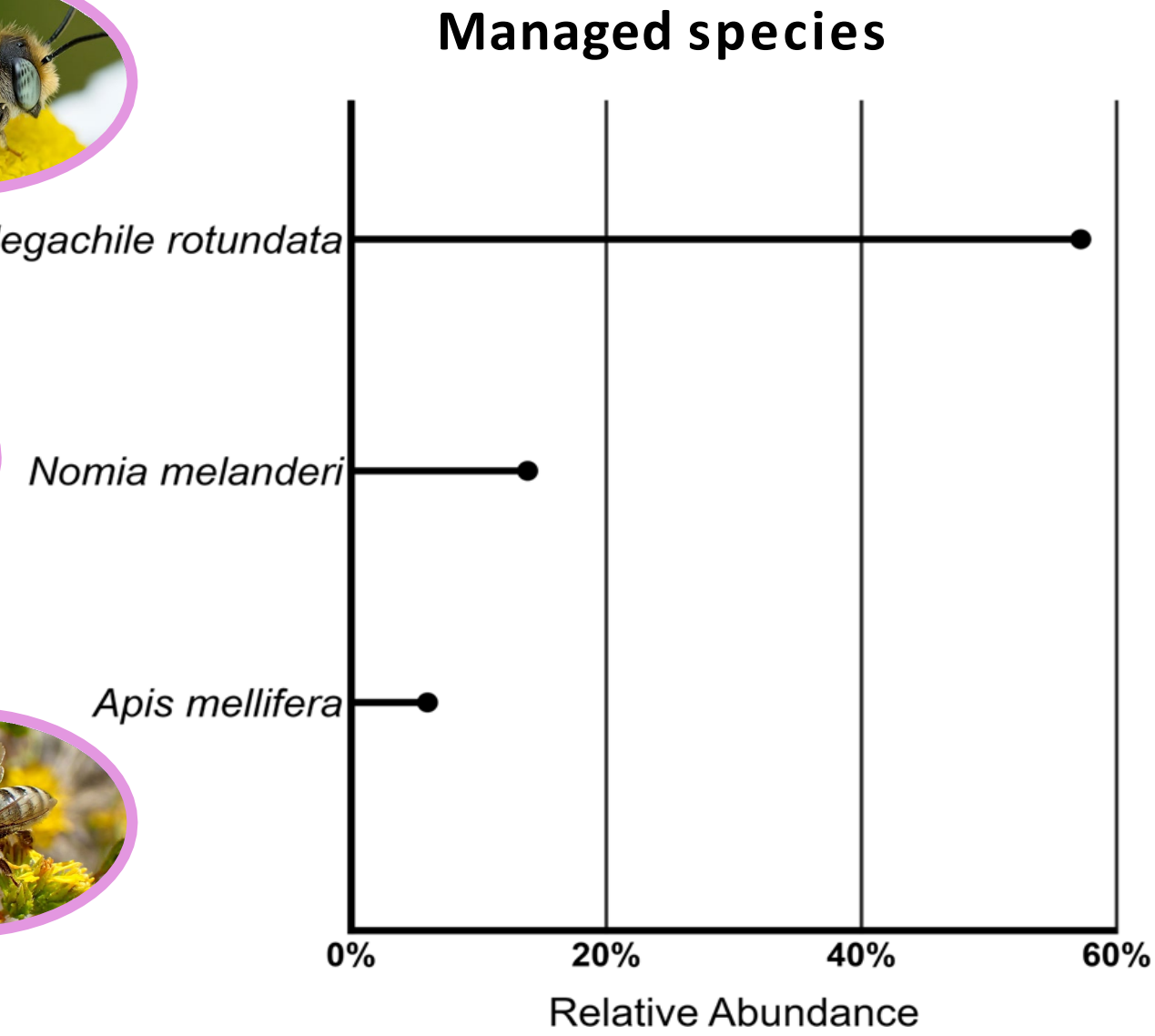
Kirchner previous research-- Methods

Insect Sampling

- Bee bowls – 5 sets/transect
  - Attract bees, wasps, & other flying insects

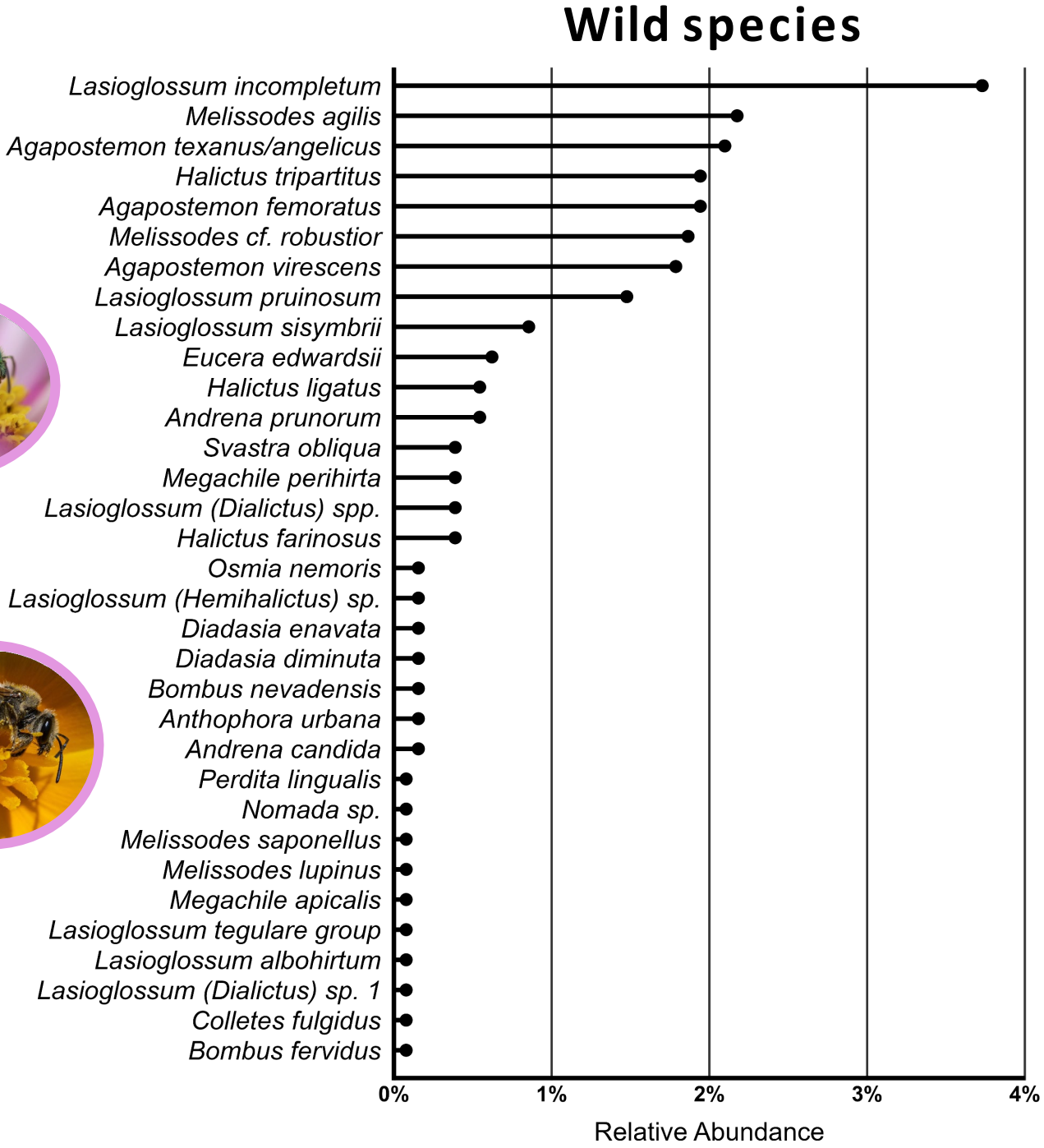
Kirchner previous research-- Results

- ~1300 bees in total
- Mostly managed bees



Additional visitors!

- ~1300 bees in total
- Mostly managed bees
- 33 species of wild bees
  - Made up **~25%** of bee community!



Research that was planned--

1. Perform additional bee surveys in 10 fields in WA and 5 fields in ID during June to July
   - ID the bee species
2. Document and capture bees visiting and determine if flower was tripped or nectar robbed
   - Sample flower that bee visited, plus the bee
3. Sample additional flowers in same fields to determine which bees were visiting those flowers and assign bee ID

Collect Samples

Bee

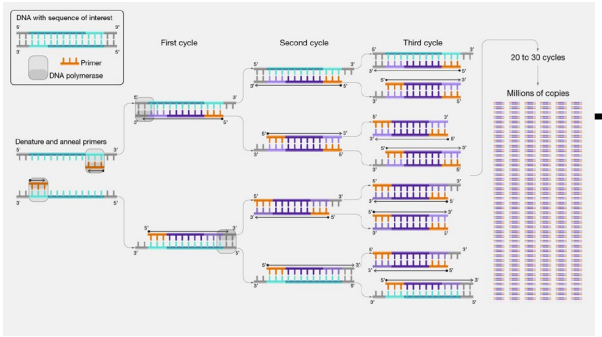
Flowers being visited by a bee

Flower

Extract DNA

Sequence DNA and Create Bee ID library

Amplify and Sequence DNA



Library of Bee Sequences

Success of eDNA to identify bee pollinators of flowers

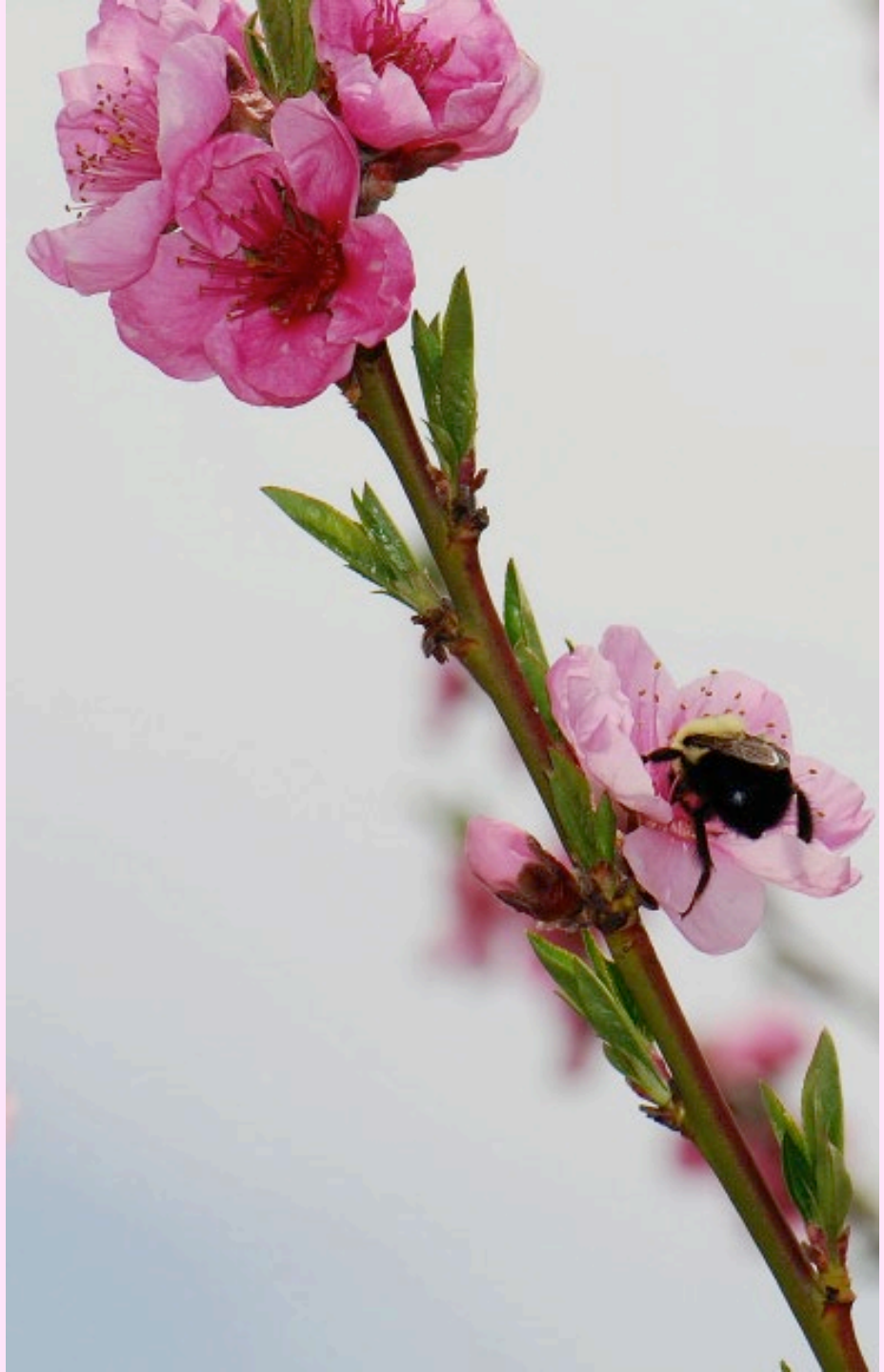
- USGS- Kara S Jones, David Pilliod, Aaron W Aunins
  - Arthropod detections from eDNA metabarcoding of flower filtrate and DNA derived from bulk samples of insects, 2025
  - Of 29 flowers observed to have bee visitors, only 10 had bee detections, and **incomplete reference databases prevented ID**
- Detections in Avocado flowers in Australia- Able to detected many arthropods and some bee species from eDNA extracted from the flowers
- Current project in our Unit- Identification and non-lethal survey of bees for USFWS in CA refuge, creating reference database for eDNA

Future-

Figure out how to promote or increase the populations of the other non-managed bee species responsible for seed set

- Where are they nesting?
- What is their life cycle?
- Potentially species could have been selected for tolerance of pesticides

- Introduce Abby Gill (new grad student with Kelsey Graham)



Questions or want additional details–

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