Influence of water availability on native wildflower phenology and pollinator attractiveness

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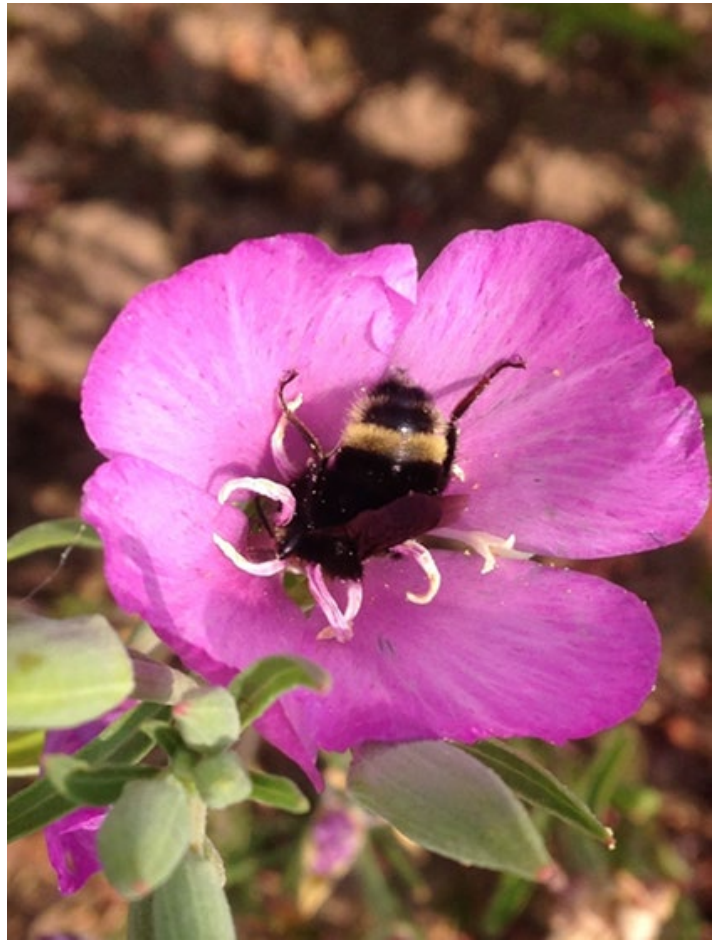
Native Plant Gardening is Popular

- Gardening with native plants is increasing in popularity
- Despite the popularity of native plant gardening, little is known about native plant performance in garden settings.
- Are floral bloom and survival impacted by gardening practices?

Western Red Columbine

Native Plants and Pollinators

- Targeted plantings are often suggested as ways to improve pollinator habitat in gardens
- *If* floral bloom and plant survival are impacted by gardening practices, what impact does this have on pollinators?

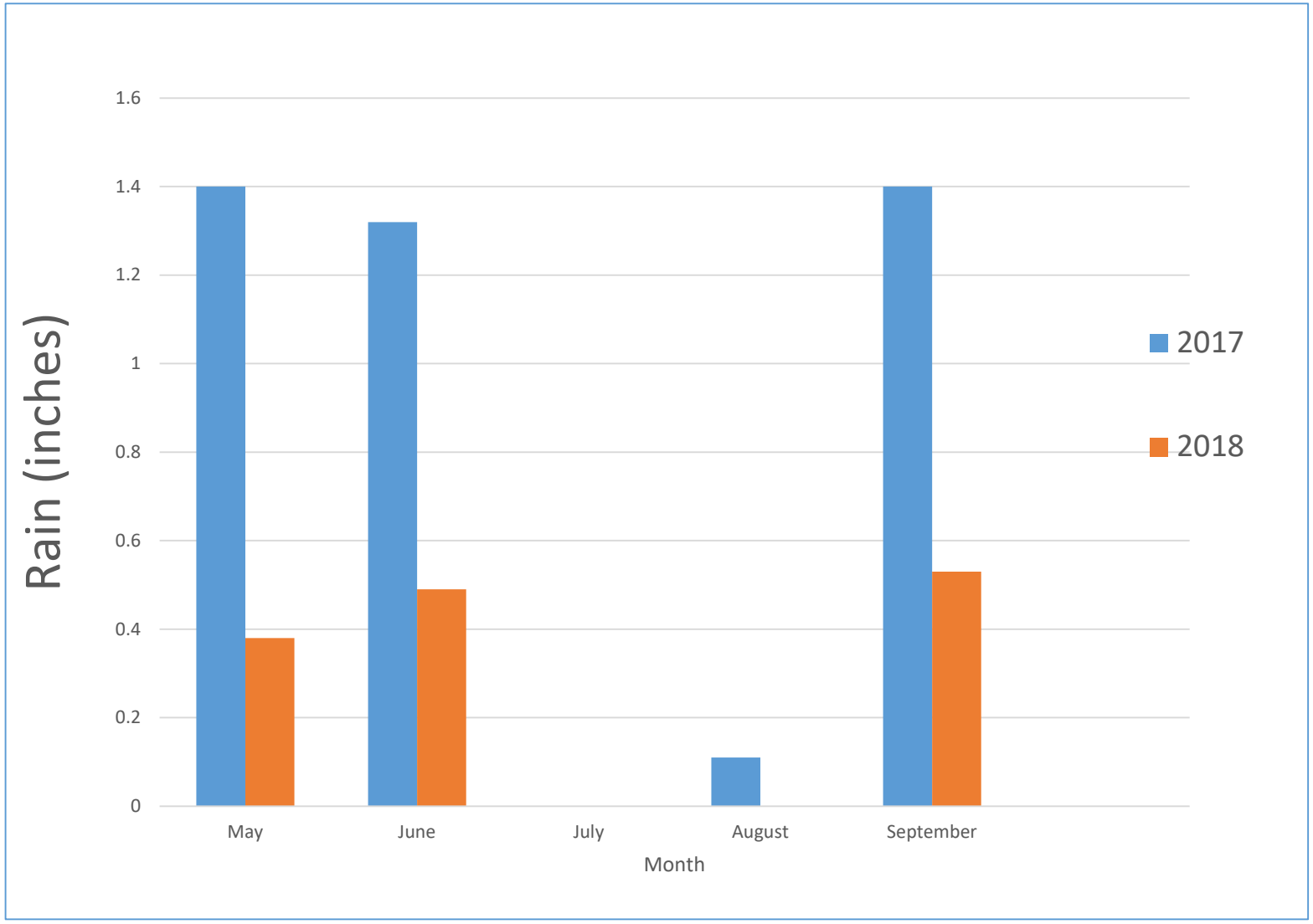


Clarkia amoena

Solidago canadensis

2017 vs. 2018 Rainfall

- May-Aug 2017: 2.87”
- May-Aug 2018: 0.87”
- Irrigated to establish perennials in 2018



Study Questions

- Does water availability change native plant bloom phenology?
  - Timing?
  - Length?

- Do phenological differences affect plants' attractiveness to pollinators?
  - Different bloom and flight times could create mismatches
  - Increased or decreased bloom length could change resource availability

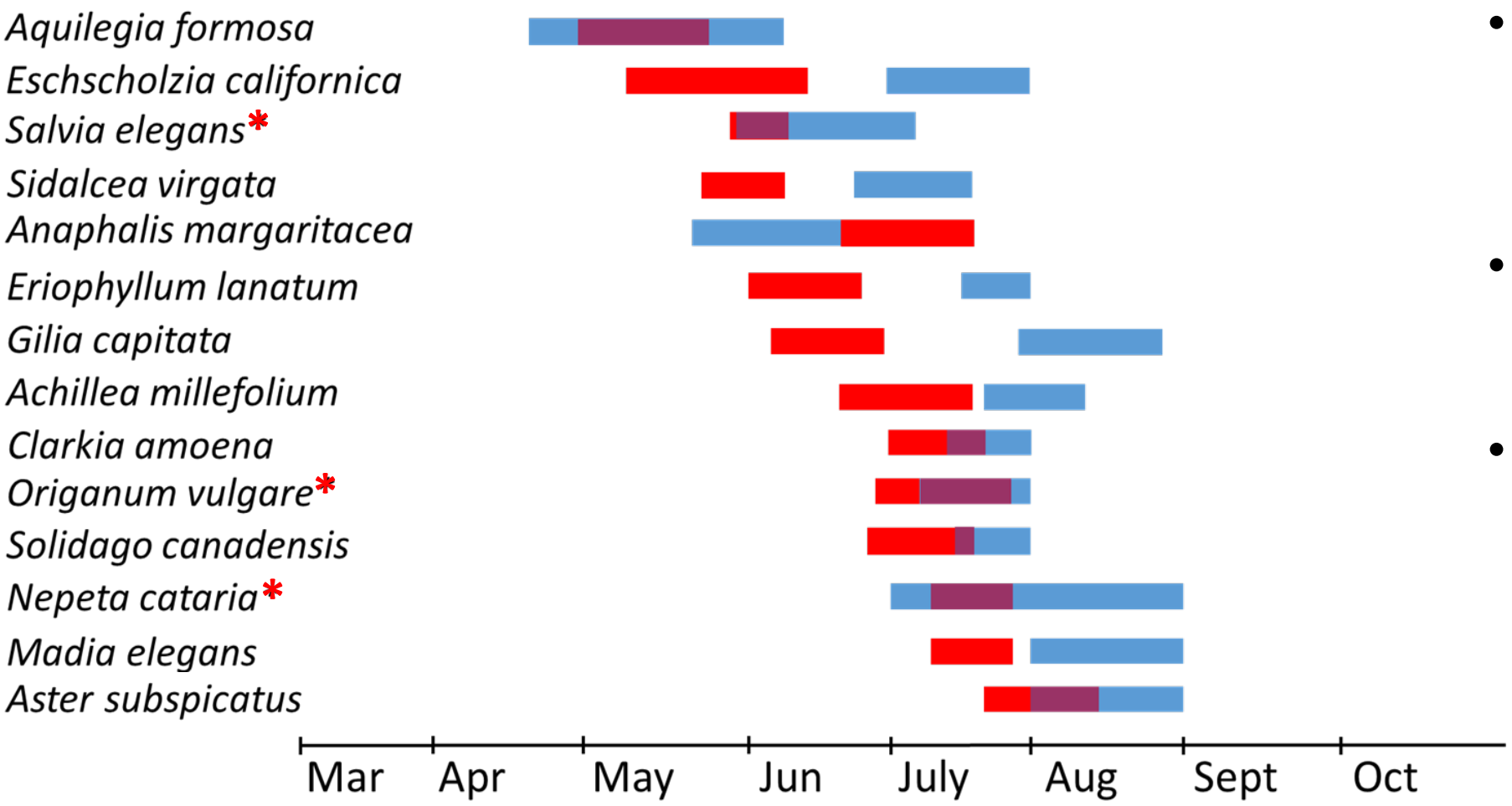
Field Study: Measuring Bloom Phenology

- Record duration of peak bloom for each species (27, total)
- Peak bloom = 75% or more of plot was in bloom.
  - For plants or plots that bloomed in succession (e.g. Oregano), 50% or more in bloom was the conservative threshold
  - Goal was to get three consecutive weeks of bee data
- Phenology data will allow gardeners to plant flowers with overlapping bloom

Yarrow plot in peak bloom, 2017

Yarrow plot in peak bloom, 2018

Peak Bloom Phenology



- 2018 peak bloom began 17.7 days earlier than 2017
- 2018 peak ended 28 days earlier
- 2018 bloom was 10 days shorter, overall

*= exotic garden species

Field Study: Pollinator Abundance & Diversity

- Perform timed pollinator counts
  - Timed for 5 minutes
  - Counted insects that landed on open flowers
- Vacuum sample insect communities
  - Census all insects present on flowers
  - Four overhead vacuum passes of each plot
- Week before, during, and after peak bloom

Sampling bees on California poppy

2017 vs. 2018 Pollinator Visitation Results

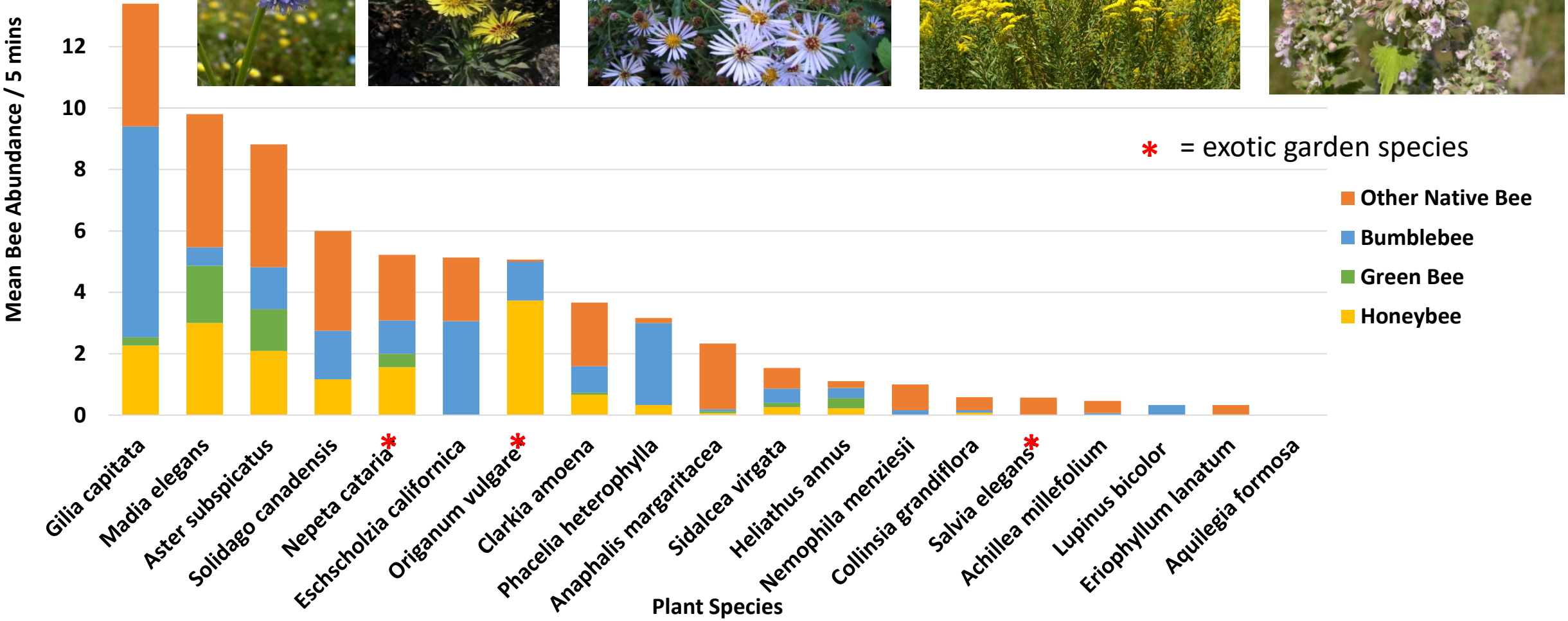
- Overall visitation differed between years, and was higher in 2018
- Shorter bloom periods did not result in reduced bee visitation
- Most attractive flower species differed between years
- Honeybees disproportionally visited exotic species

Longhorn bees on Columbine

2017 Mean Bee Abundance by Plant Species







2018 Mean Bee Abundance by Plant Species





* = exotic garden species

What Does This Mean?

- Water availability may influence wildflower phenology in the garden
  - Less water → advanced bloom and shorter bloom

- How does this impact pollinators?
  - ✓ Providing longer bloom period (more resources)
  - ✓ More overlap in floral bloom
  - X Potential mismatch between plant bloom and bee flight periods

- Consider how water availability may influence phenology when designing a planting palette for pollinators

Pollinators on native wildflowers