The Native Bees of North America- Essential Partners in Pollination and The stresses impacting their populations

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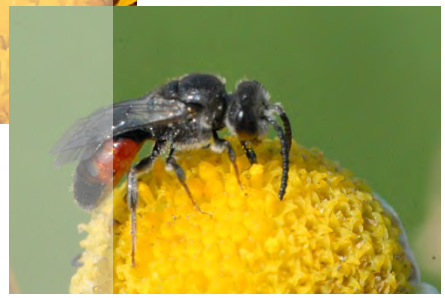
Photo by N. Singh

Partnership between flowering plants and pollinators

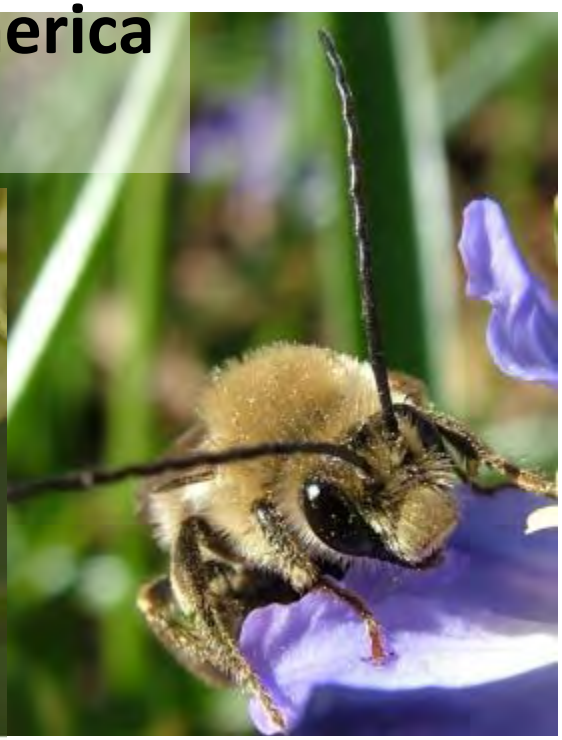
Bees & Wasps

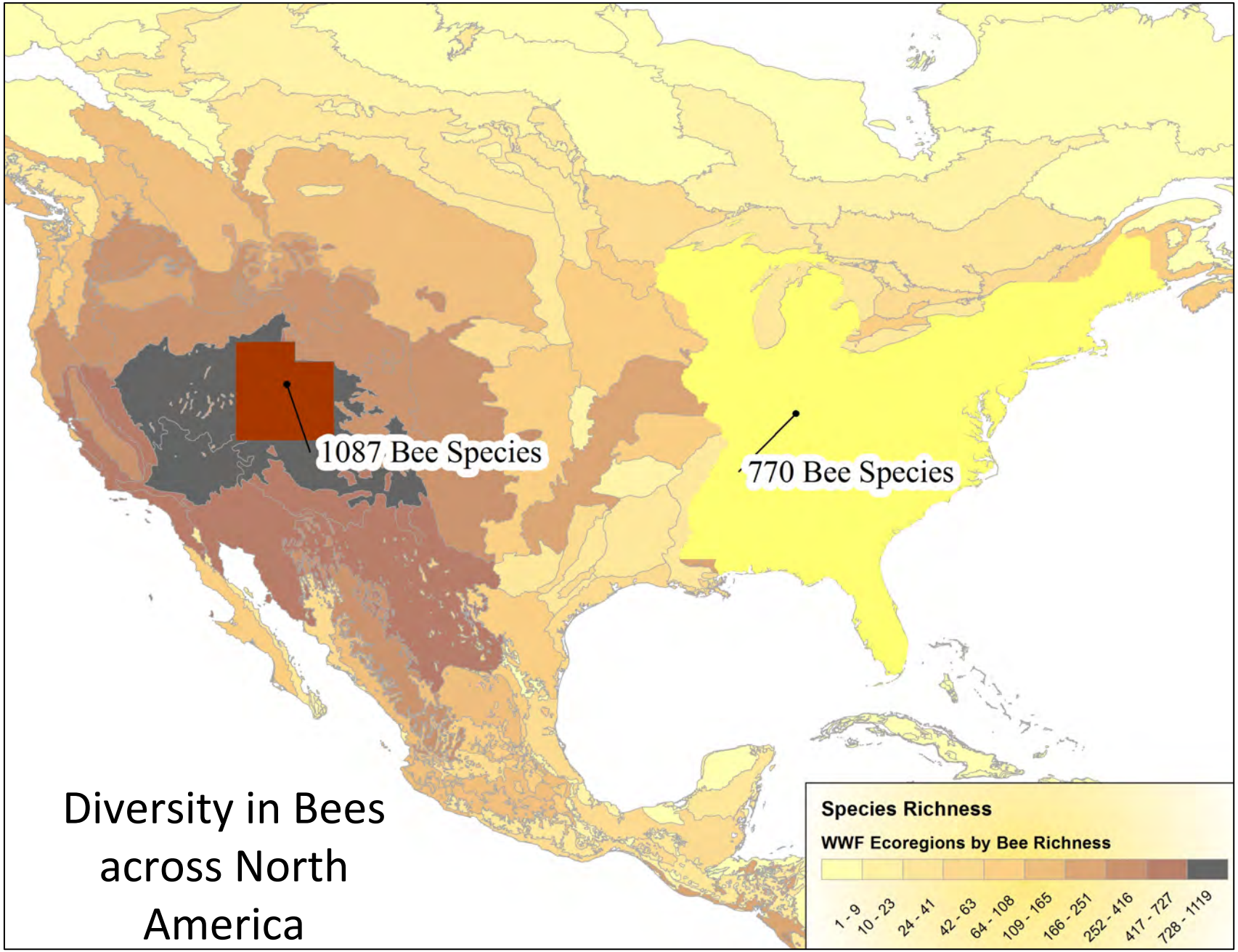
- **Hymenoptera** (includes bees wasps & ants)
- **Similarities:** Anatomy and Life Cycle, Nesting Habits, & Social Behavior (or lack of),
- **Differences:** Diets (wasps = carnivores, bees = vegetarians), Ecological Function (wasps = wolves, bees = sheep)
- And, of course...the **stinger**

Bee Diversity

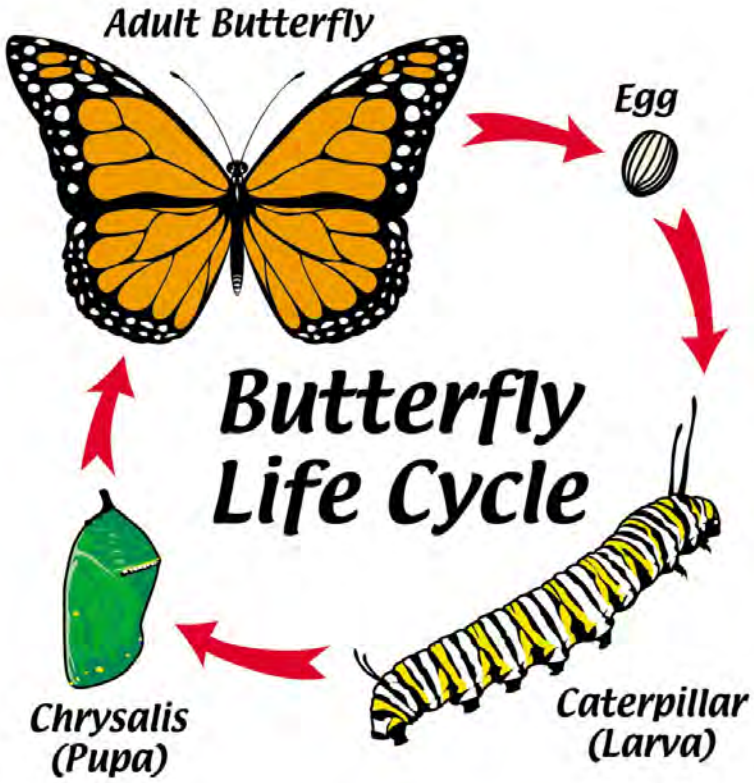


- 20,000 species globally
- 3,500 species in North America
- 1,100+ species in Utah





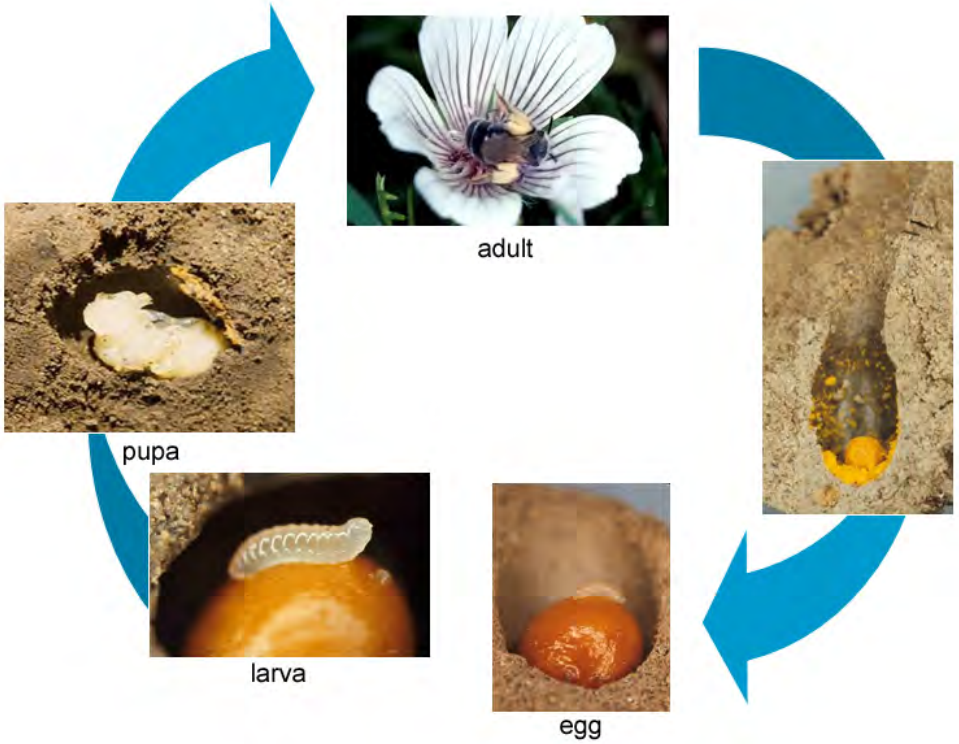
Diversity in Bees across North America



Bees are similar to Butterflies in terms of their Life Cycle

Butterfly larva: free living

Bee larva: confined in cell

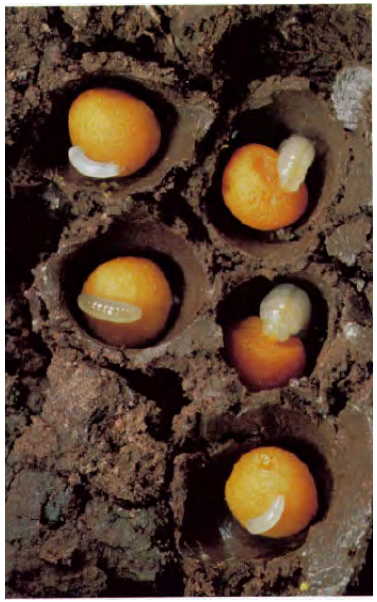


Implications

Majority of life spent in cell

No such thing as a “baby” winged bee

Solitary vs Social Behavior

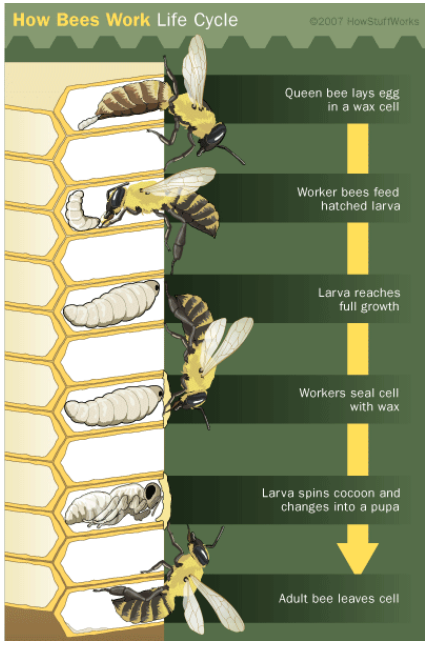


Solitary bees:

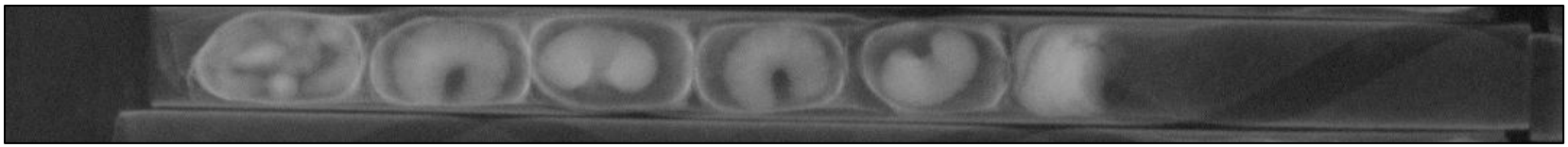
- Single "queen" per nest
- Mass provision of cells
- No contact or interaction with young
- No cooperation between adults
- Few cells (offspring) per nest = less to lose (aggressive behavior low)

Social bees and wasps:

- Single or few queen(s) per nest
- Progressive provision of cells
- Adults cooperate with brood care
- Many offspring per colony = more to lose (aggressive behavior high)



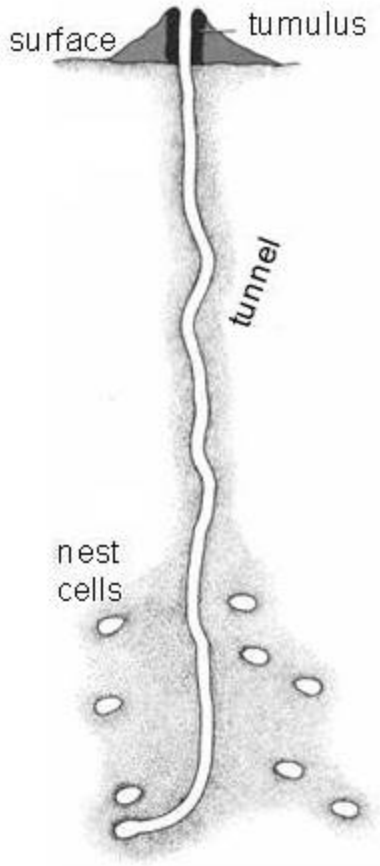
Cavity / Above ground nesting



Carpenter bees and Bumble bees- Cavities

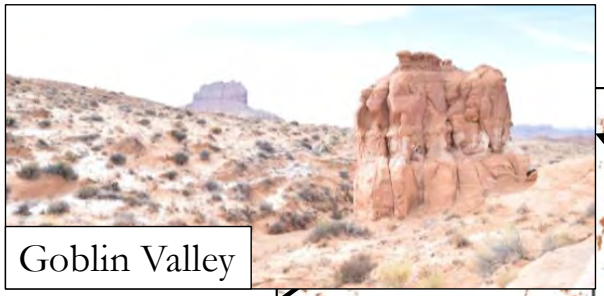
Many bees nest underground

(weed barrier cloth = bee barrier)



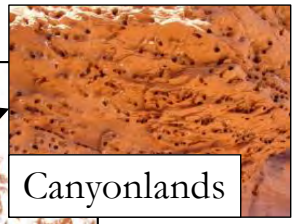
The Sandstone Bee, *Anthophora pueblo*

Michael Orr, Ph.D. Candidate, Biology, Utah State University



Goblin Valley

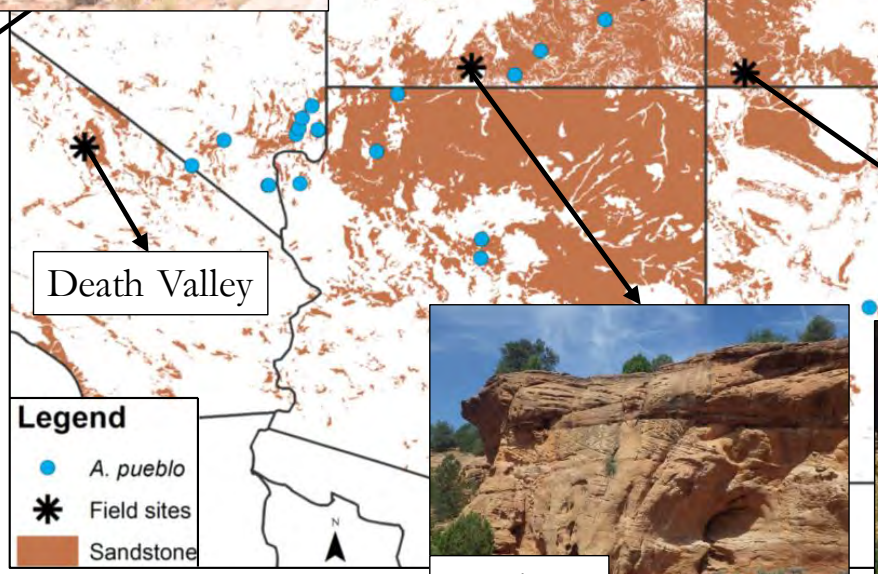
Temple Mountain



Canyonlands

Sample site

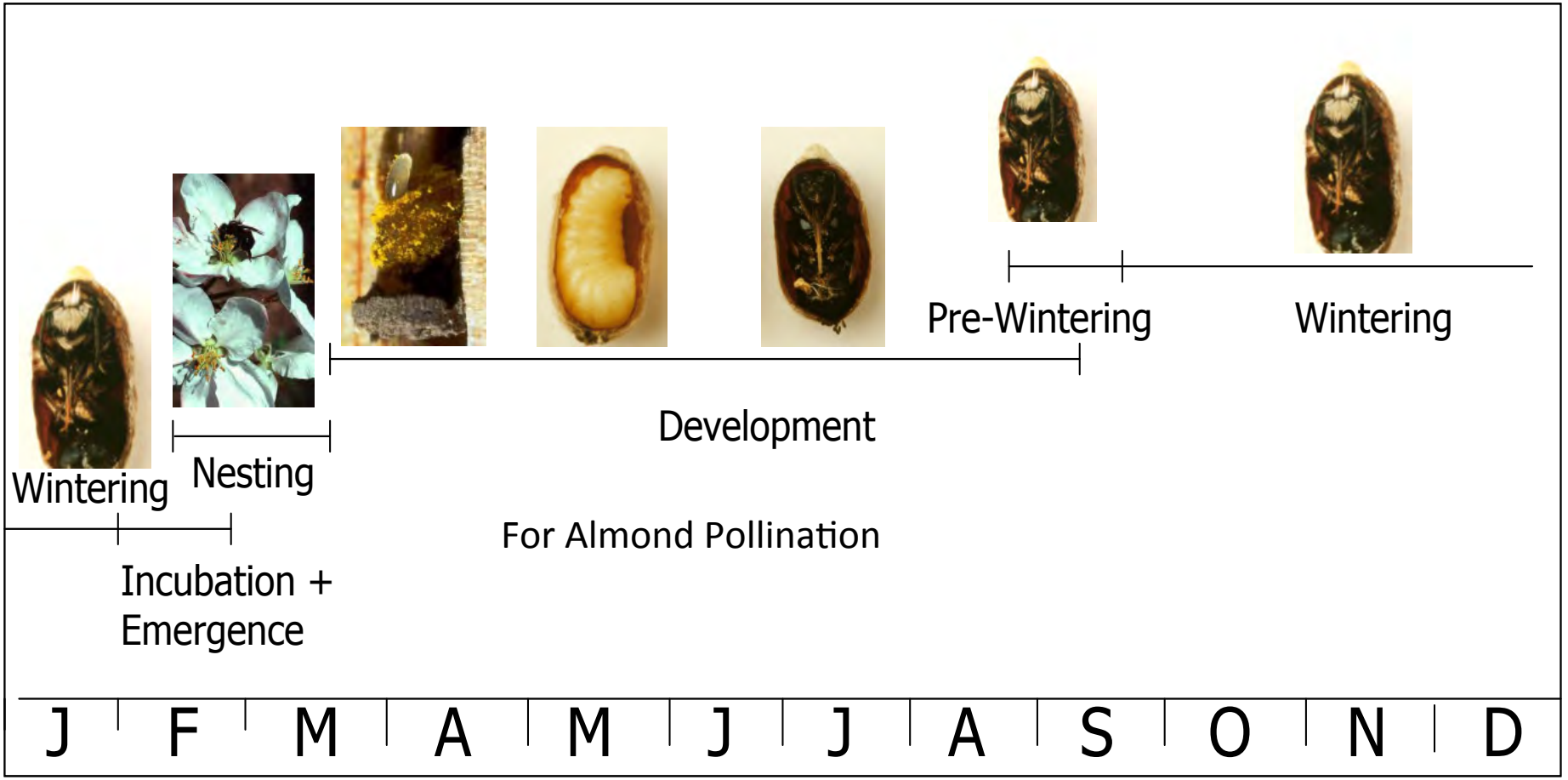
Death Valley



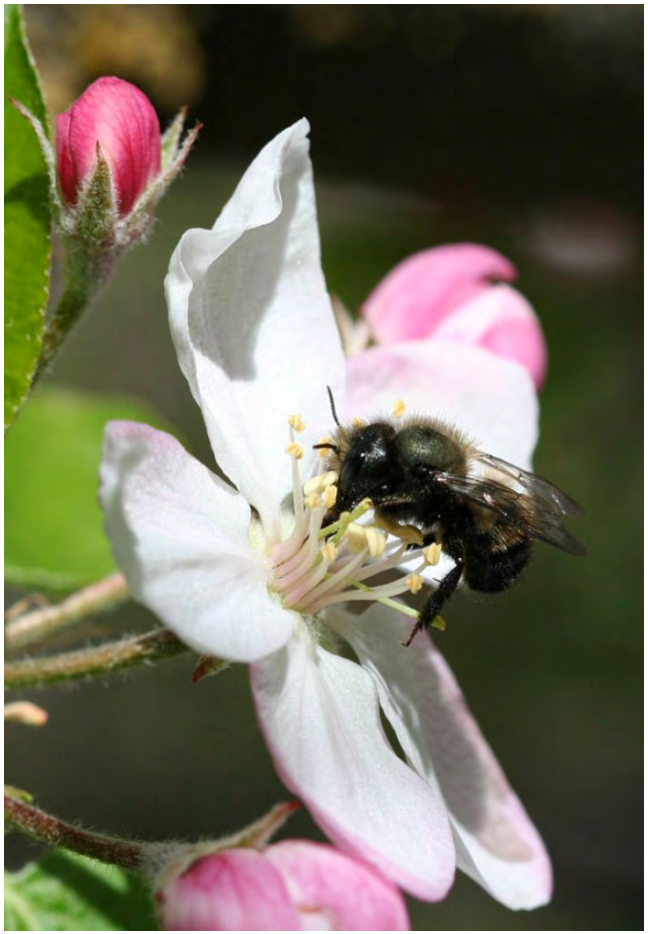
Escalante

Mesa Verde (nests in cliff dwellings)

Seasonality



Early Season



Mid Season

All Season

Diet

Pollen & Nectar

Foraging Strategy

Specialist vs. Generalist

Other Resources

Water

Leaves

Waxes

Resins

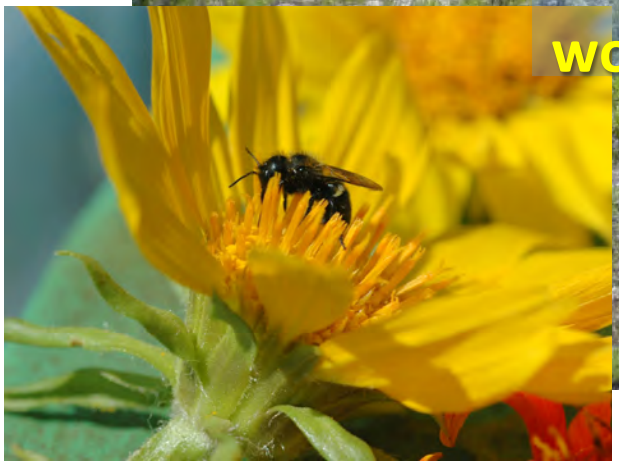
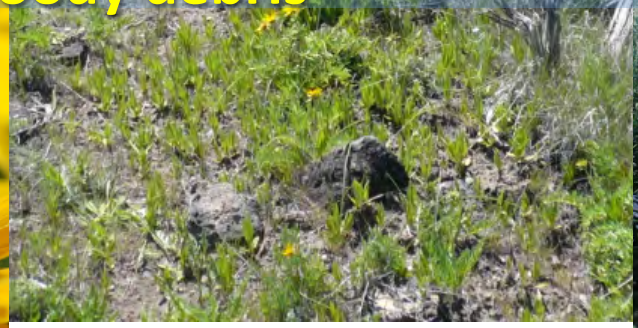
Floral Resources

Continuous bloom, pollen and/or nectar, weeds can be okay (dandelions)

Nesting Sites and Materials

Avoid thick grass, mulch

Provide bare ground, water, mud, woody debris

Chemical Free Zone

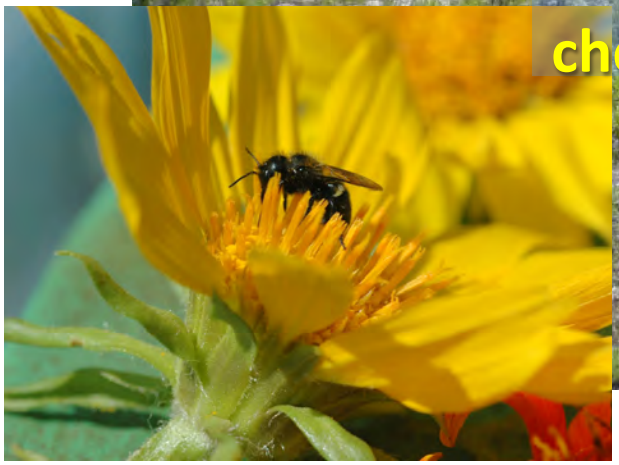
Avoid broad spectrum insecticides

Apply late evening & avoid bloom

Think Like a Bee

Foraging range (patchiness is okay)

Timing of disturbances (mowing, tilling, chemical applications)

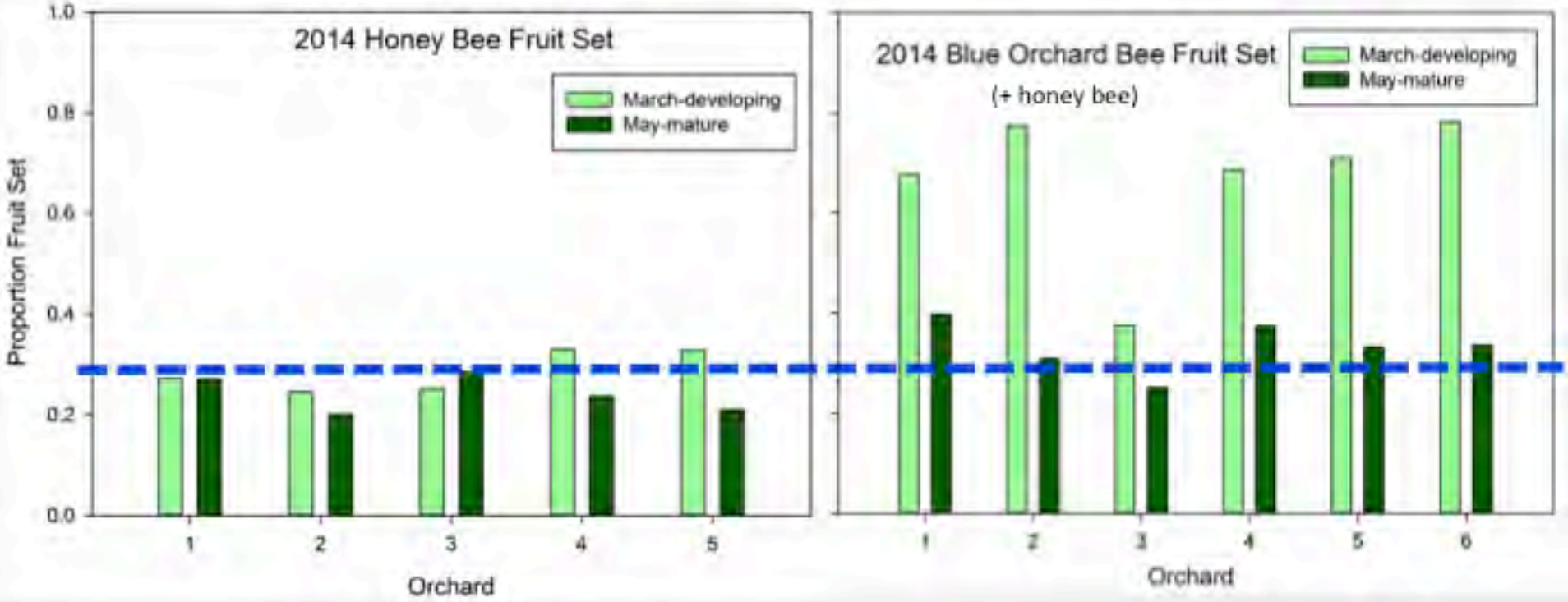


Pollination efficacy, including male bees– pollination of crops

Squash pollinators of the Americas survey-USA, Mex

Blue Orchard Bee Effect on Almond Yield

Proportion of Flowers (per limb) that Set Fruit



- BOBs + HBs increase fruit set
- Tree physiology, water, pests, environment affect final nut yield

funding from USDA-NIFA, SCRI grant:
Developing Sustainable Pollination Strategies for U.S. Specialty Crops (Award 2012-51181-20105).

Rare Plant Studies

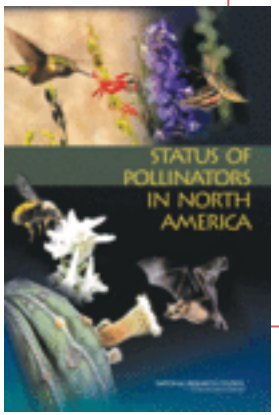
Of 35 species:
33 require pollinator vectors
28 solely pollinated by bees
Some pollinator limited

Bees and fire- Western areas

Bees to pollinate farmed seed for restoration

- Phenology
- Range
- Floral preference
- Pollination
- Manageable nesting
- Sustainable populations
- Multi-use pollinators

Decline in pollinators in the United States--- Both in number of species and the population size of each species



STATUS OF POLLINATORS IN NORTH AMERICA

THE NATIONAL ACADEMIES PRESSWashington, D.C.

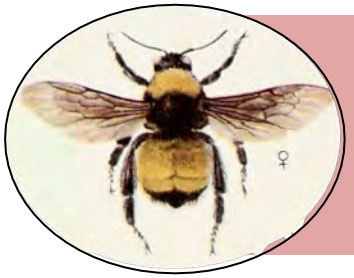
www.nap.edu

The U.S. Fish and Wildlife Service has proposed listing the rusty patched bumble bee (*Bombus affinis*) as endangered under the Endangered Species Act.

https://www.fws.gov/midwest/endangered/insects/rpbb/factsheetrpbb.html

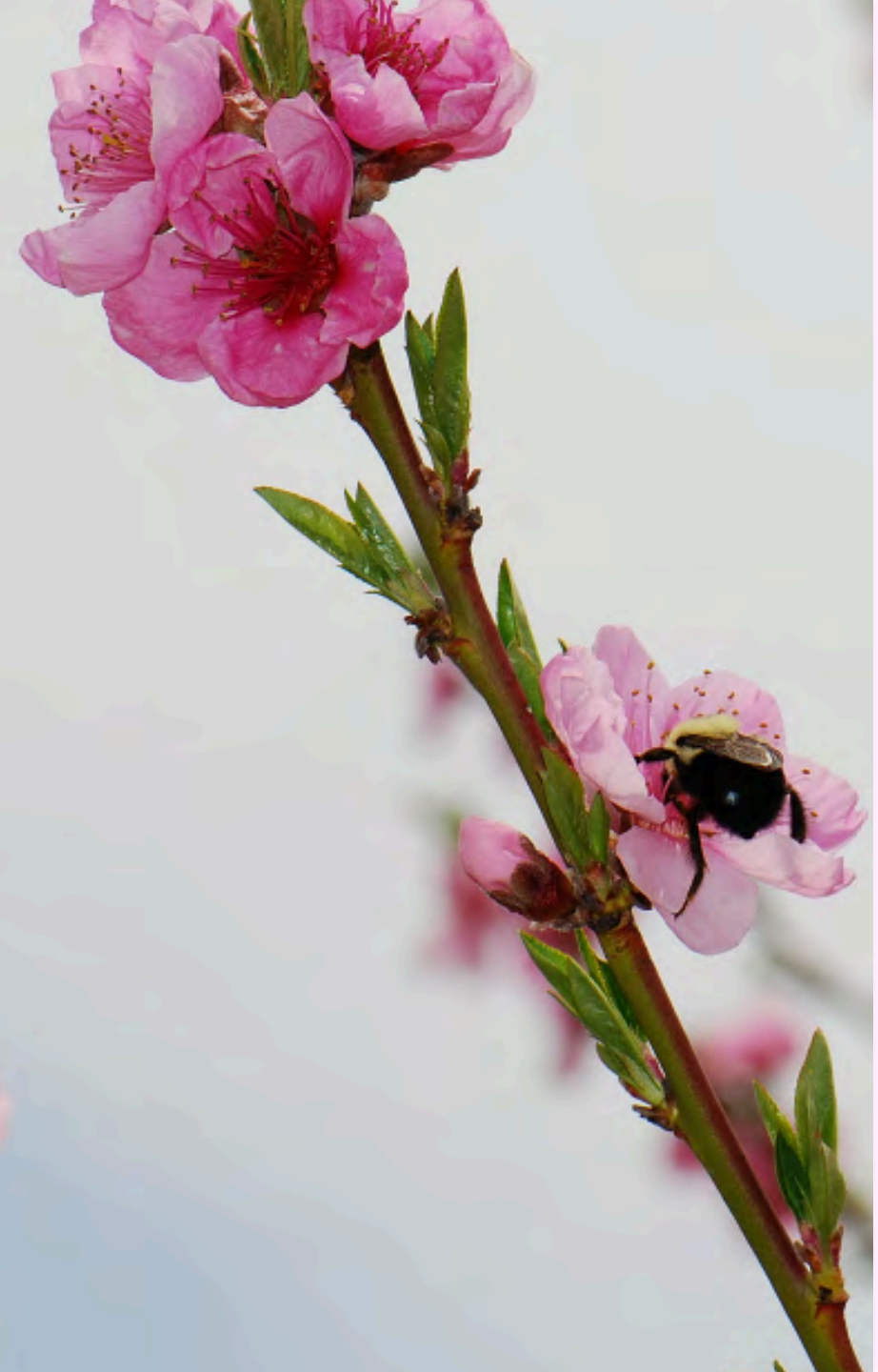
Four P's – Which one to blame *(or should we blame all four?)*

- **Pathogens**
- **Poor Nutrition**
- **Pesticides**
- **Parasites (mites, protozoa, etc)**



Summary

- Non-Apis pollinators are likely being impacted by many of the same factors affecting honey bee colonies in the United States
  - *Pathogens, Pesticides, Poor Nutrition and Parasites*
- It is critical to understand these impacts and develop methods to remediate or eliminate these factors-- such as development of Integrated Pest and Pollinator Programs and Managed *(and Wild)* Pollinator Protection Plans



Thank you for inviting me!

An Invitation to you- exchange of knowledge with us at the Bee Lab