

# Pollinators along the Carson River Watershed

## Ecology and Conservation



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# Why Pollinators?



Webber's ivesia  
USFWS, Sarah Kulpa



Churchill narrows buckwheat  
©Gary A. Monroe  
NPDT @ USDA-NRCS PLANTS Database



Palmer's penstemon



Astragalus whitneyi  
By Heptazane - Own work, CC BY 3.0,  
<https://commons.wikimedia.org/w/index.php?curid=4578523>



Globemallow

# Why Pollinators?





# Why Pollinators?





# Pollinators of northern Nevada

- **Bees**



- **Butterflies & Moths**



- **Flies**



- **Wasps**



- **Beetles**

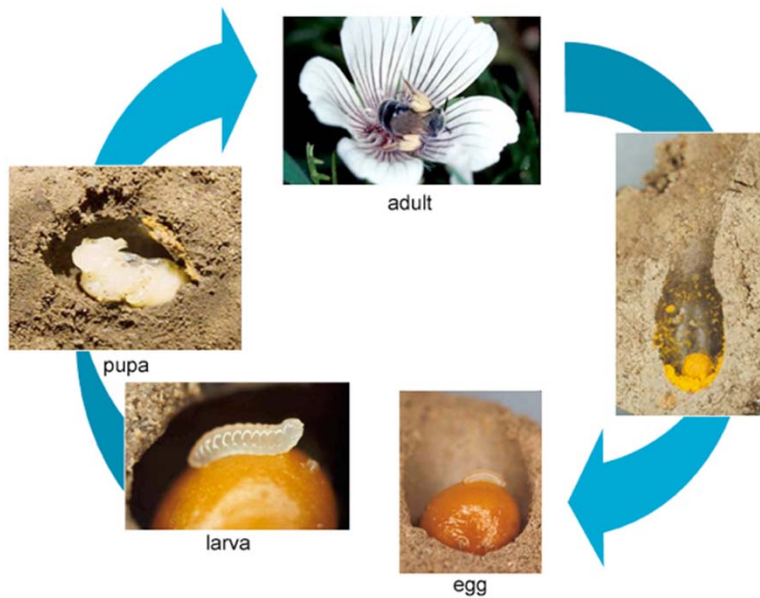


# Pollinator life cycles

## Complete metamorphosis

Distinct *larval* and *adult* life stages, with a *pupal* stage in between, resulting in major changes in body shape and sexual maturity

## Native groundnesting bee







# Pollinator needs

- Larval food source



wikipedia



<http://w3.biosci.utexas.edu/jha/wp-content/uploads//be532.jpg>

- Adult food source



- Habitat



The Bees in Your Backyard



Wikipedia



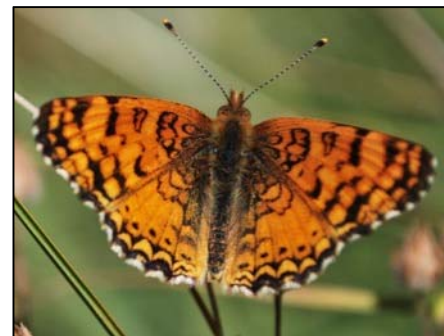
The Bees in Your Backyard



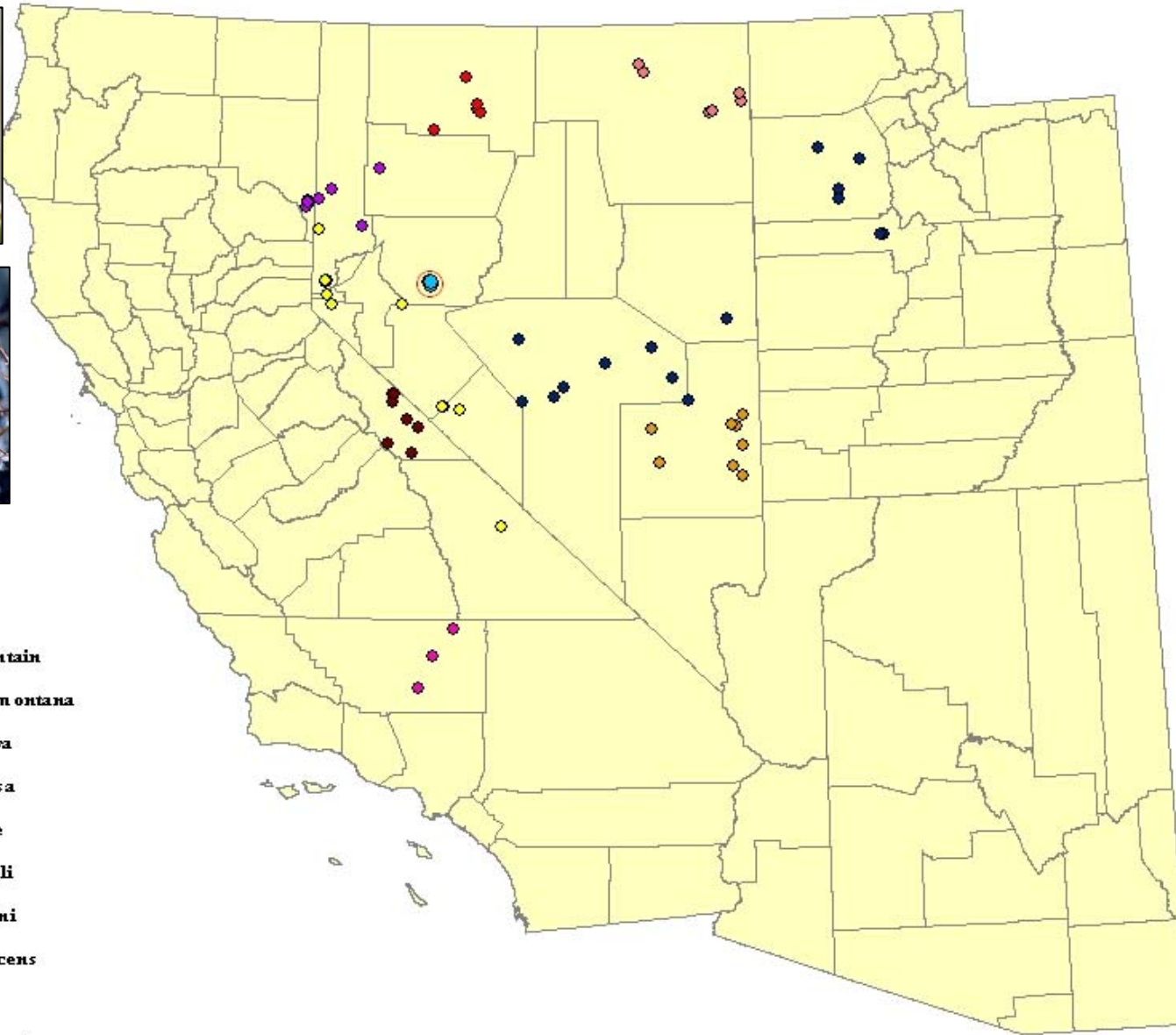


# Butterfly Diversity

- Douglas County- 126 species
- Carson City County- 119 species
- Lyon County- 109 species
- Storey County- 95 species
- Churchill County- 86 species
- Pershing County- 85 species



# Known locations of *Euphilotes pallescens* subspecies



## Legend

- Sand Mountain
- *E.p. arenamontana*
- *E.p. cabreva*
- *E.p. confusa*
- *E.p. ekirae*
- *E.p. emmeli*
- *E.p. mattoni*
- *E.p. pallescens*
- *E.p. ricei*
- *E.p. unnamed*

1-7 nnn nnn



*Courtesy of Dean Tonenna, BLM*





# The North American Butterfly Monitoring Network

*working together to advance knowledge on butterflies*



**NBMN Sites**

**Legend**

- 2016 Site
- 2017 Site

**2018 Nevada Butterfly Monitoring Network Training Workshops**

**Saturday April 28<sup>th</sup> and Sunday May 6<sup>th</sup>, 1-5 pm**  
(only need to attend one)

**Field Day Saturday, June 9<sup>th</sup>**

Google Earth  
© 2017 Google  
Image Landsat / Copernicus

**University of Nevada Museum of Natural History**

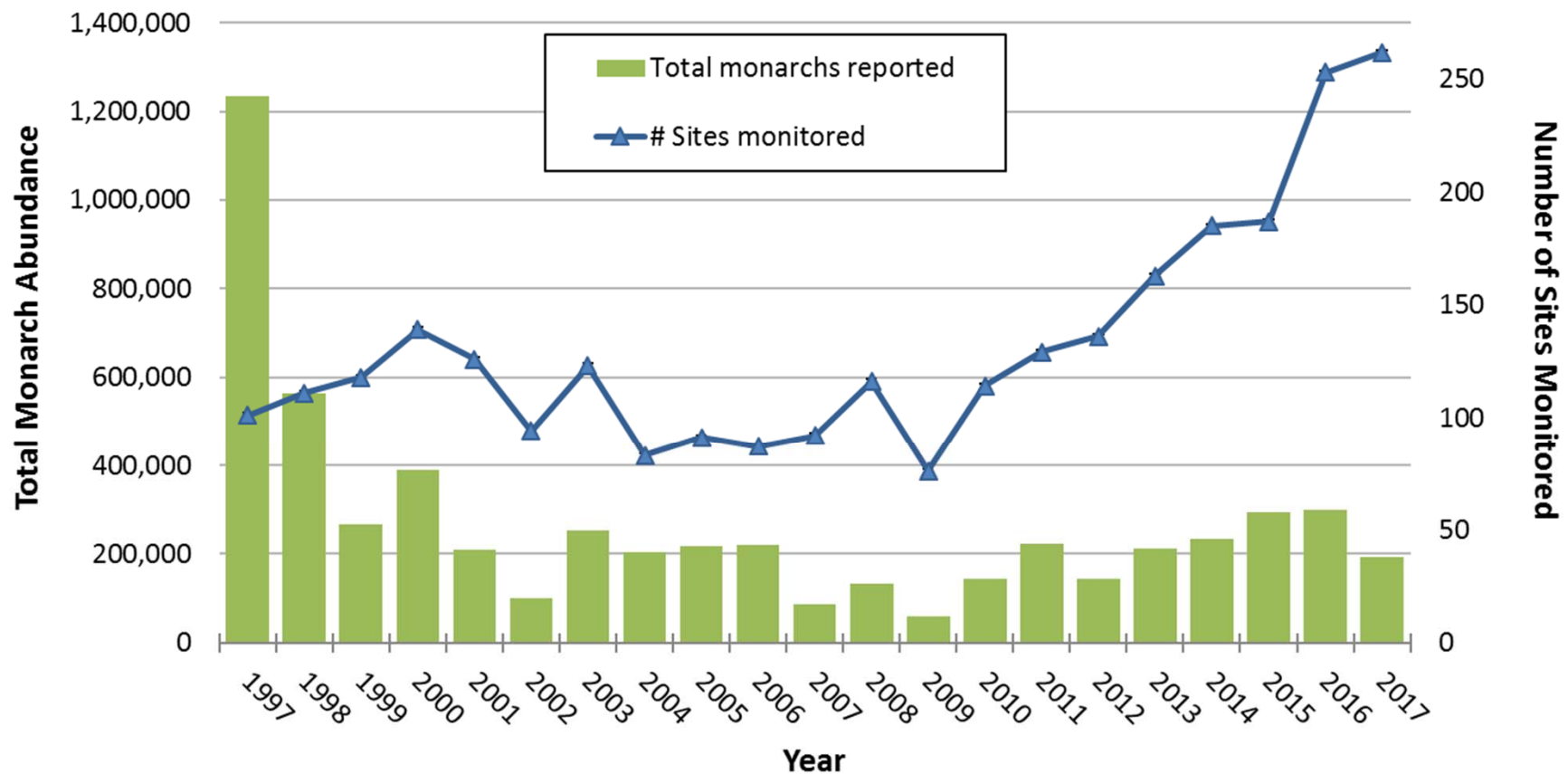
20 mi

# Monarchs and milkweeds

## The Xerces Society Western Monarch Thanksgiving Count

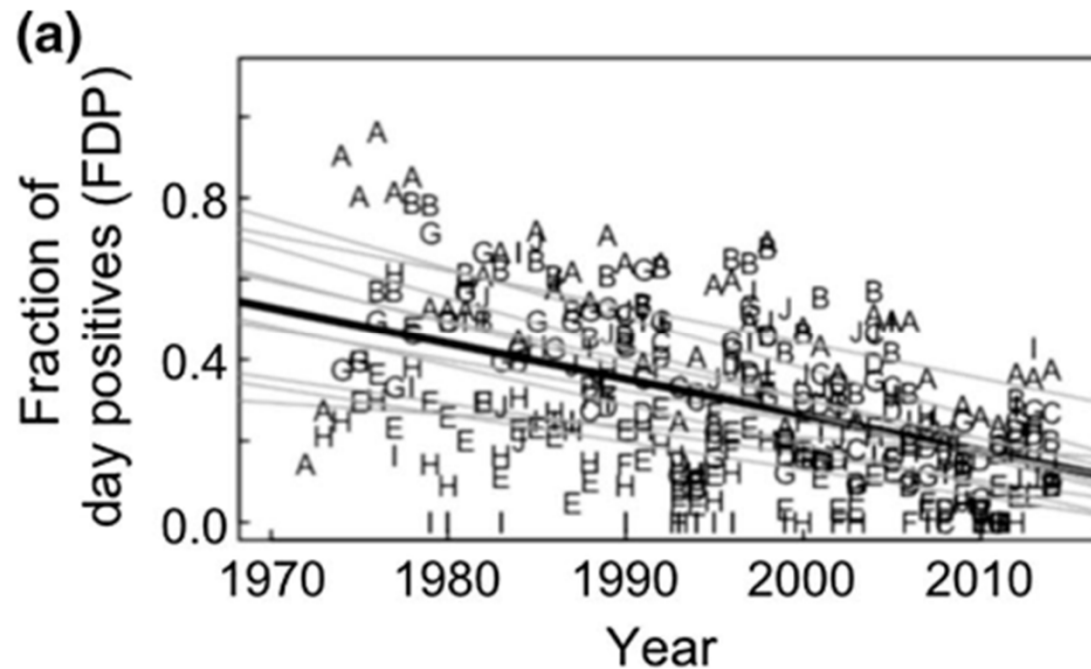
Total Abundance Estimates w/ Number of Sites Monitored  
from 1997-2017

© The Xerces Society for Invertebrate Conservation 2018





# Declines in summer monarch populations in California



Dr. Arthur Shapiro,  
UC Davis



Anne Espeset, UNR

# Documenting Known and Potential Monarch Breeding Areas in the Western US:

## A Review of Milkweed and Breeding Records in Eleven Western States

### Legend

- Monarch Breeding Records
- Milkweed Records

### USA Federal Lands

#### Federal Managing Group

- Forest Service
- Department of Defense
- Bureau of Land Management
- Fish and Wildlife Service
- National Park Service
- Bureau of Indian Affairs
- Bureau of Reclamation
- Other Agencies (NASA, DOE, DOT, DOP, TVA...)

- State Boundaries
- US Counties

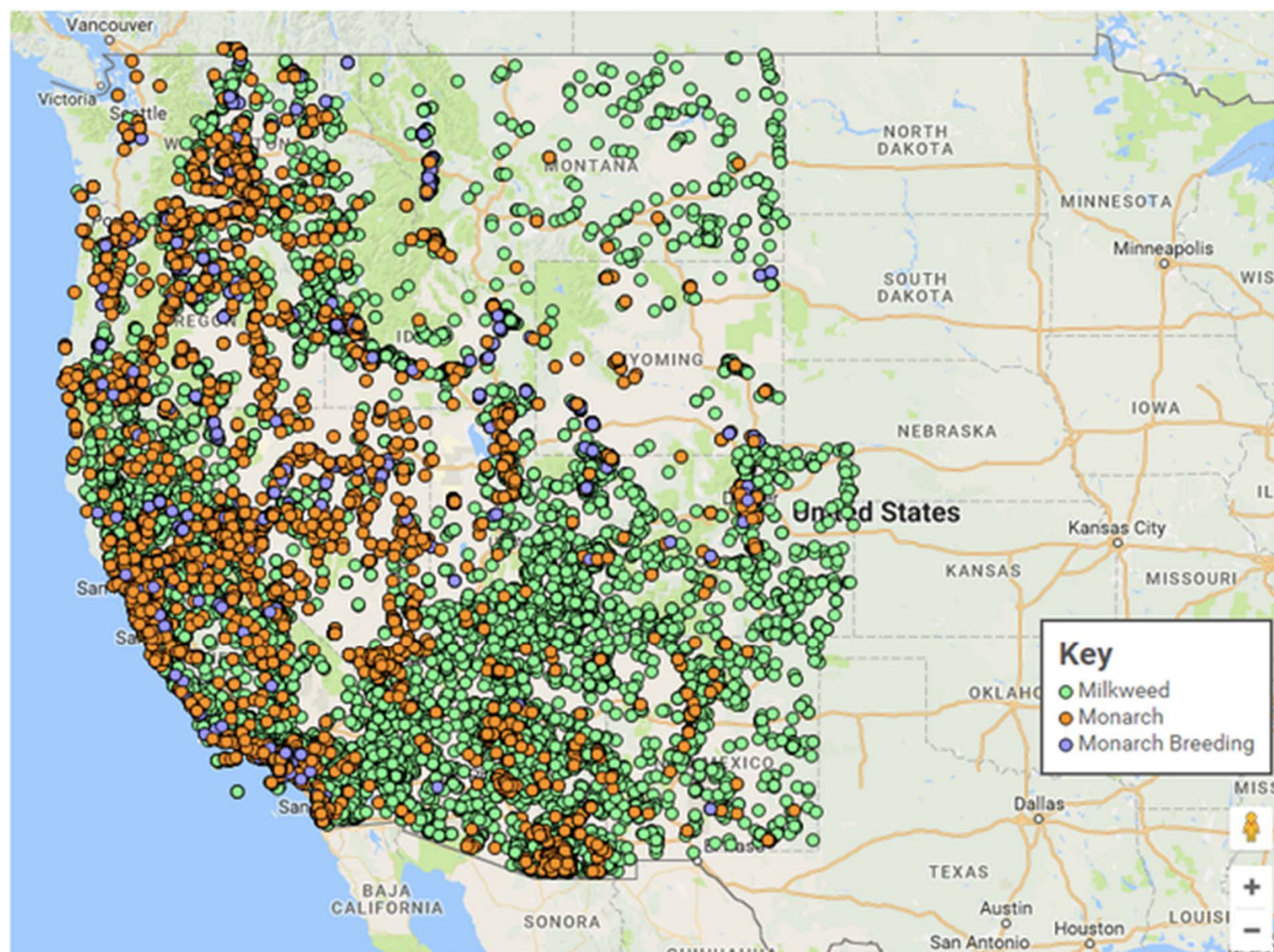
0 125 250 500 Miles

Data for this map have been provided by numerous individuals, agencies, herbaria, online databases, and reports. For a full list of data providers, please visit [www.xerces.org/milkweed-data-providers](http://www.xerces.org/milkweed-data-providers).

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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swiss topo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community









Pallid milkweed (*Asclepias cryptoceras* ssp. *cryptoceras*): The corona is purple and the corolla is pale green.

Corona

Corolla  
(petals)



Narrow-leaved milkweed (*Asclepias fascicularis*): The corona is white and the corolla is pink.



Showy milkweed (*Asclepias speciosa*): This species' fruits have a woolly texture and sometimes have warty projections.

Seed pods



Narrow-leaved milkweed (*Asclepias fascicularis*): This species' fruits are hairless and have an elongated, tapered shape.



## showy milkweed (*A. speciosa*)

- Flowers June-August
- white corona, pink corolla
- up to 4 ft.
- broad, hairy, opposite leaves
- broad, warty, hairy pods
- 500 ft.-8,200 ft.

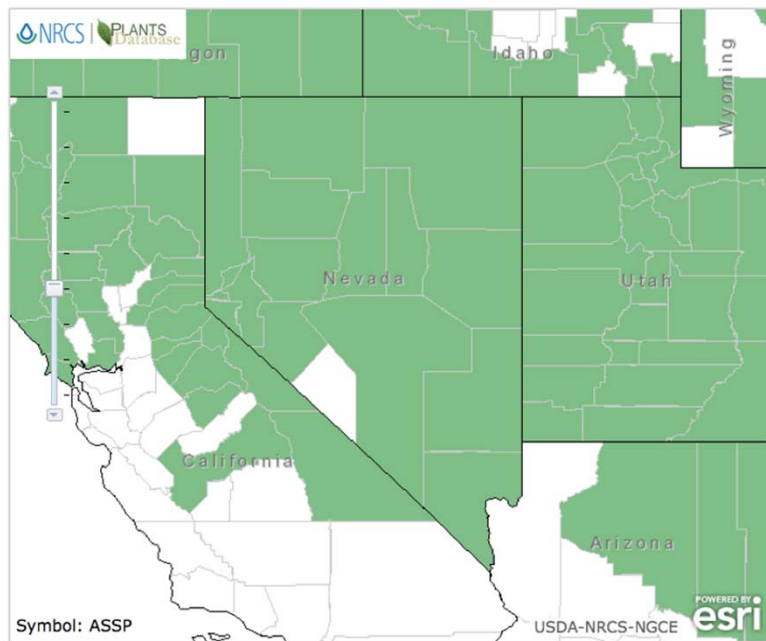


Photo: Mary Ellen (Mel) Harte, Bugwood.org

## whorled milkweed (*A. fascicularis*)

- Flowers June-August
- white/pink corona, pink corolla
- Up to 3 ft.
- narrow, opposite or whorled leaves
- narrow, smooth, hairless pods
- 1,600 ft.-6,500 ft.

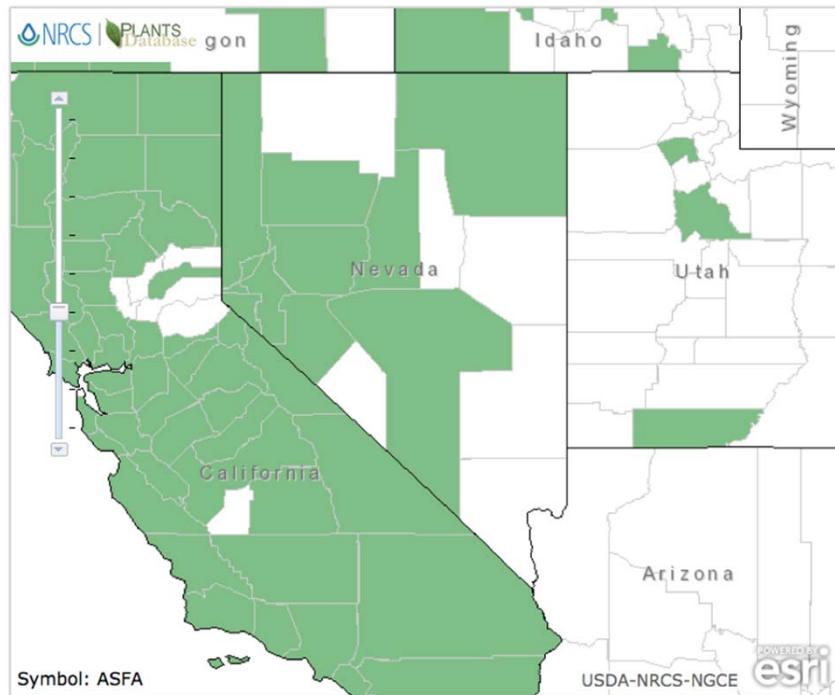


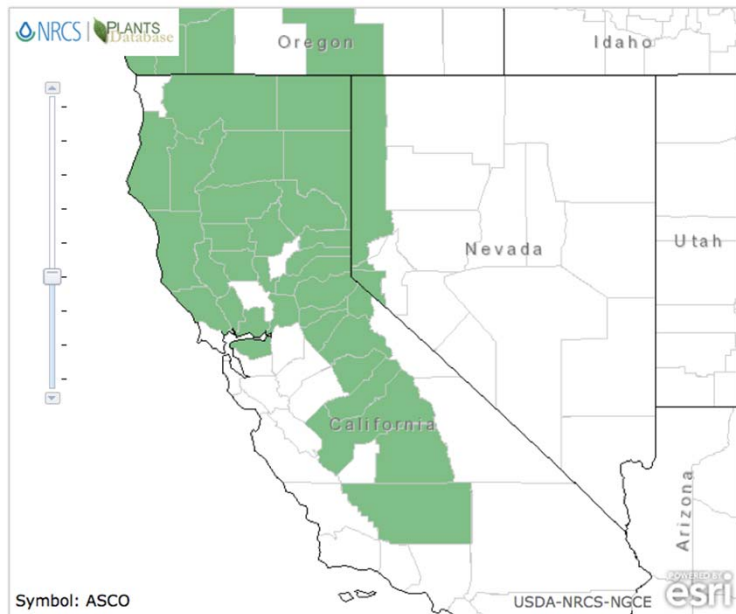
Photo: C. Scholl





## heartleaf milkweed (*A. cordifolia*)

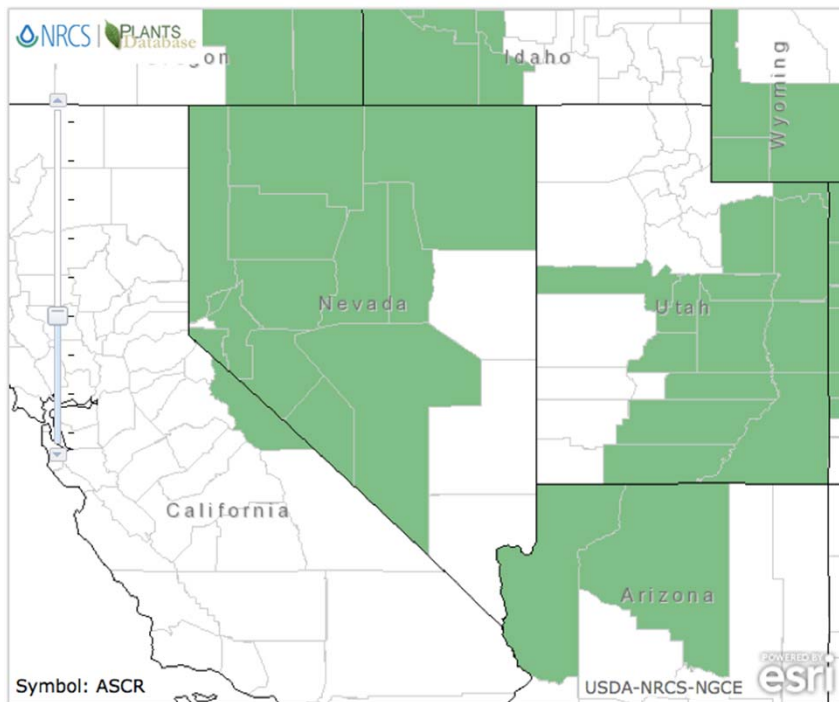
- Flowers May-July
- dark pink/purple corona, pink/white corolla
- Up to 4 ft.
- heart-shaped, waxy leaves
- smooth, pointed pods
- 3,200 ft.-8,200 ft.



By First Light at English Wikipedia, CC BY-SA 3.0,  
<https://commons.wikimedia.org/w/index.php?curid=8104679>

## pallid milkweed (*A. cryptoceras*)

- Flowers May-June
- purple corona, pale green corolla
- Up to 1 ft.
- waxy leaves
- oval, smooth, hairless pods
- 3,300 ft.-8,200 ft.



C. Scholl

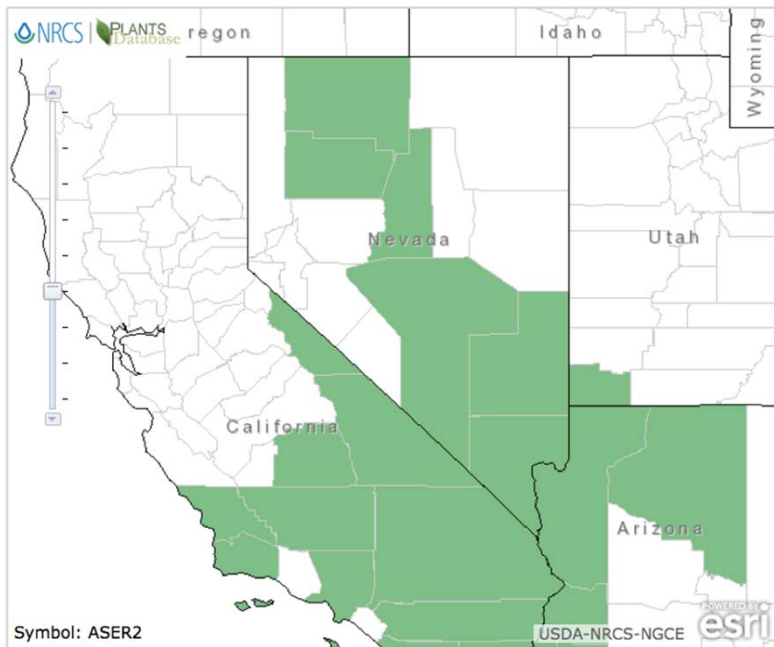


C. Scholl

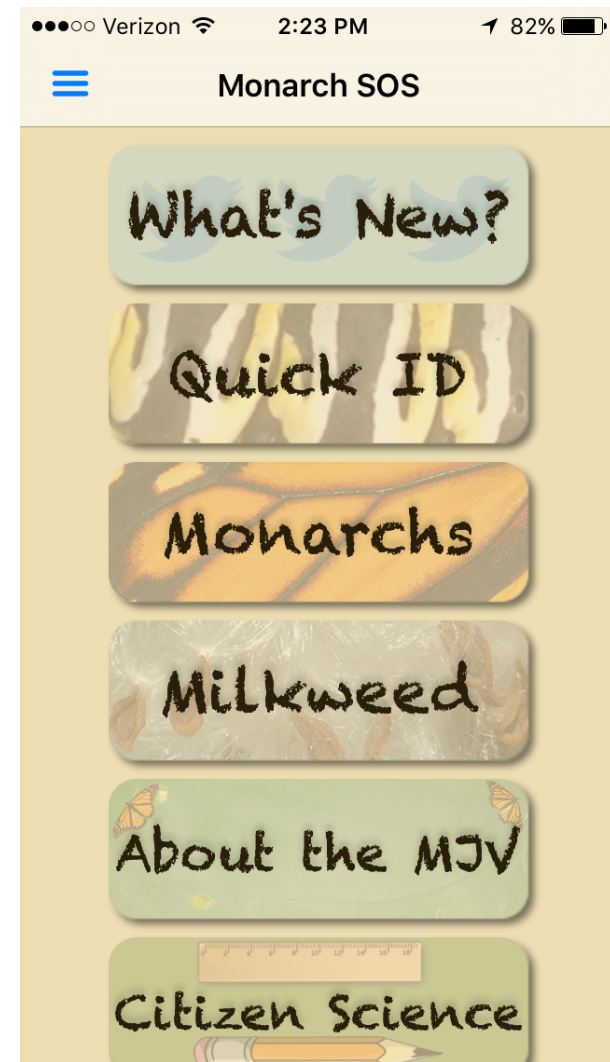


## desert milkweed (*A. erosa*)

- Flowers April-August
- light yellow corona, pale green/yellow corolla
- Up to 6 ft.
- hairy, opposite leaves
- hairy pods
- 500 ft.-6,700 ft.



# Monarch SOS app







## Native bee characteristics

- 4,000 species in North America
- 800 – 1,000 species in Nevada!
- 46 bumble bee species in N.A.
- 23 bumble bee species in Nevada





# Foraging preferences and constraints



Joseph Wilson





# Bee nests



<https://www.fs.fed.us>



[www.xerces.org](http://www.xerces.org)

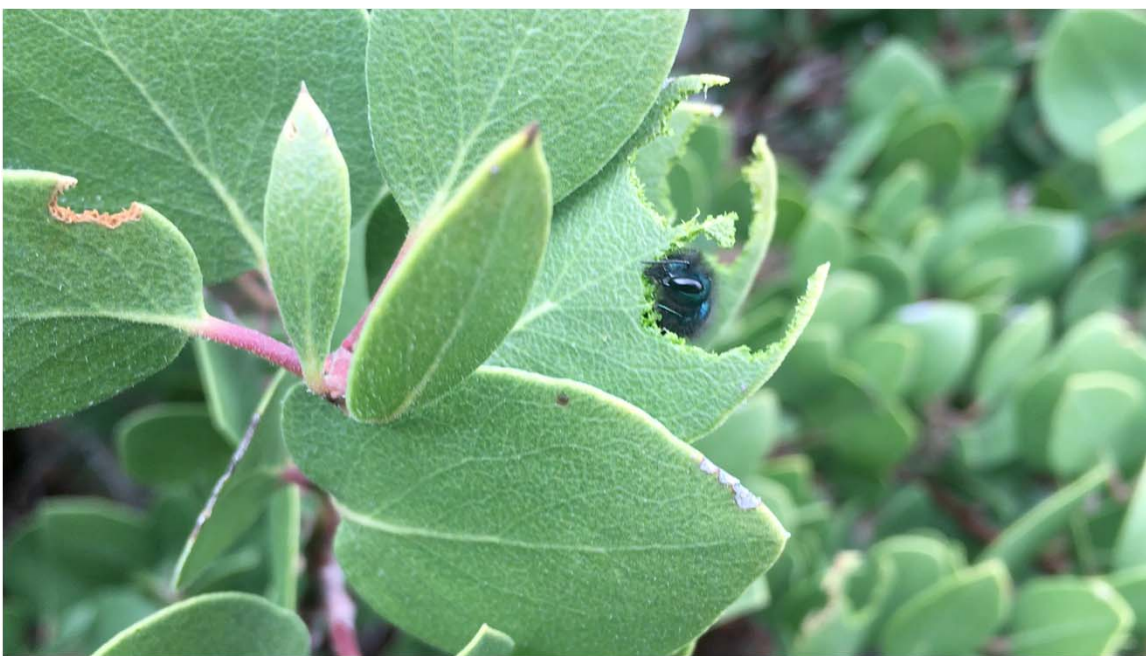


Youtube



Youtube

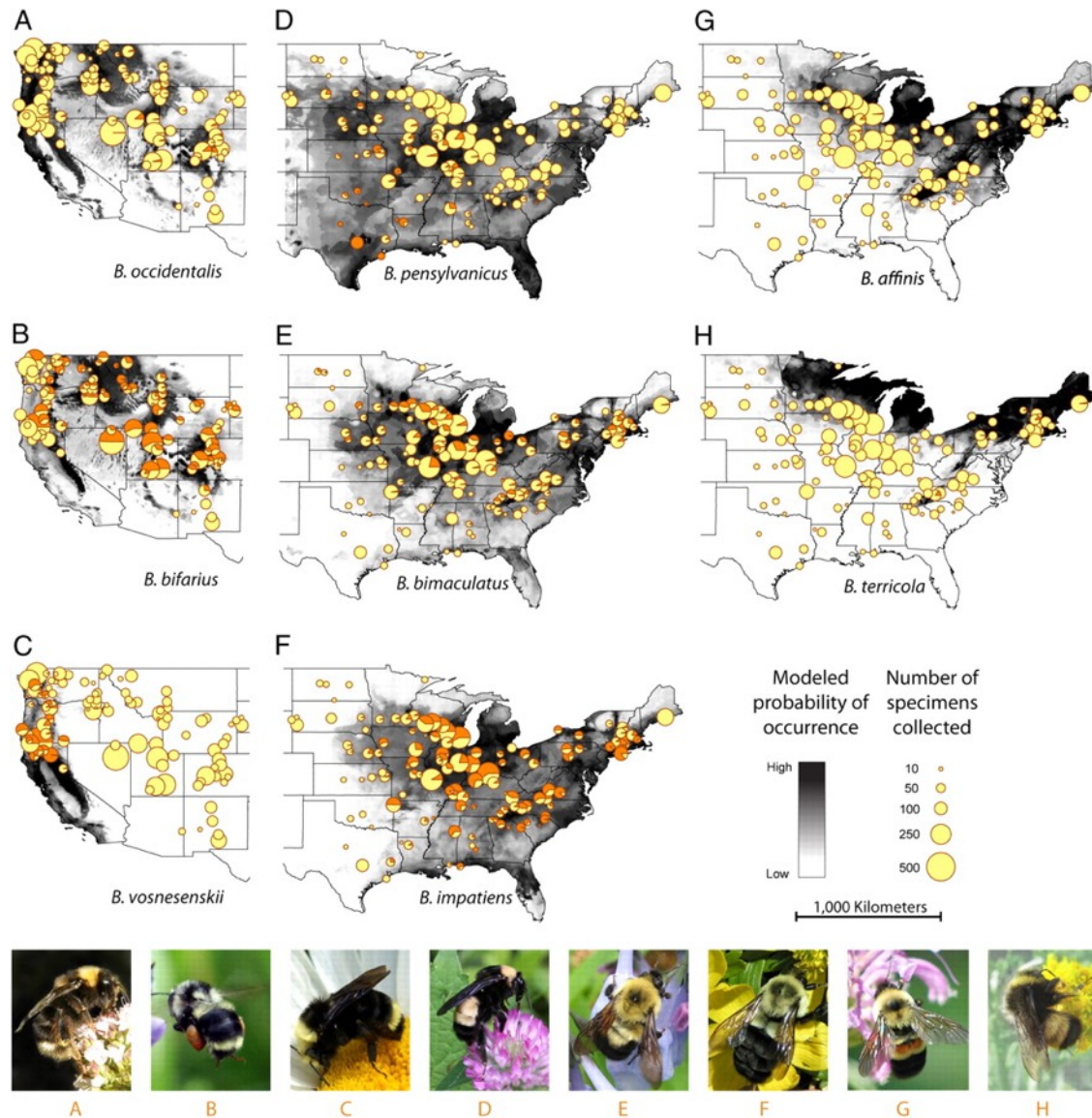




[www.beeediverse.com](http://www.beeediverse.com)



# Pollinator conservation

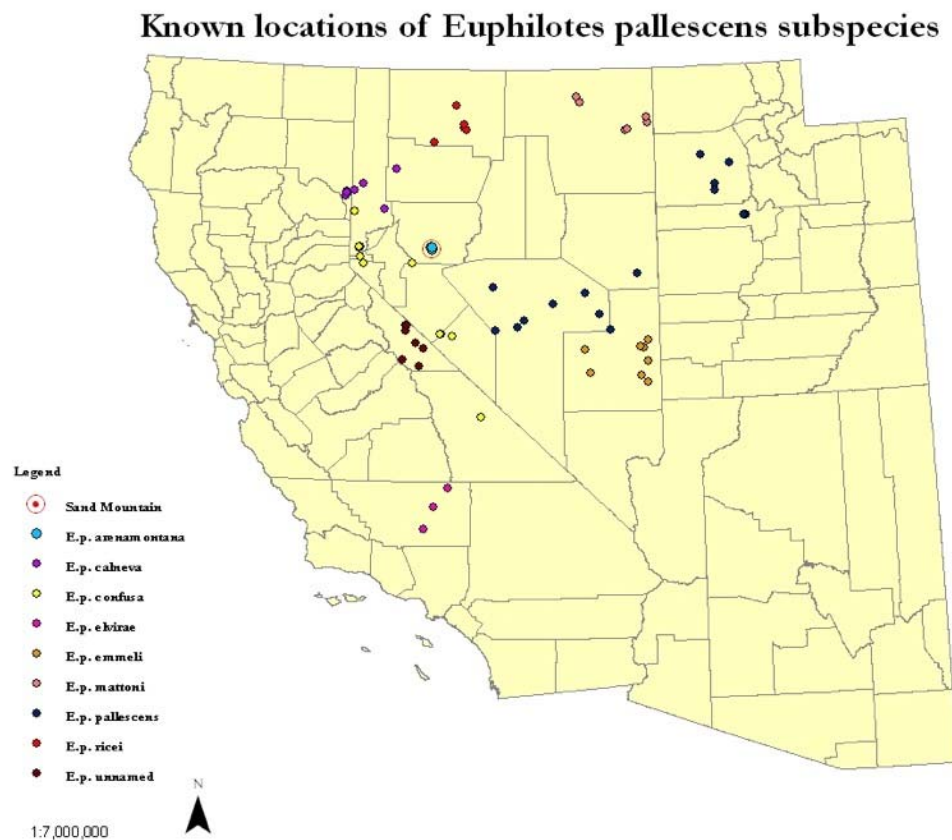


Cameron et al. 2011

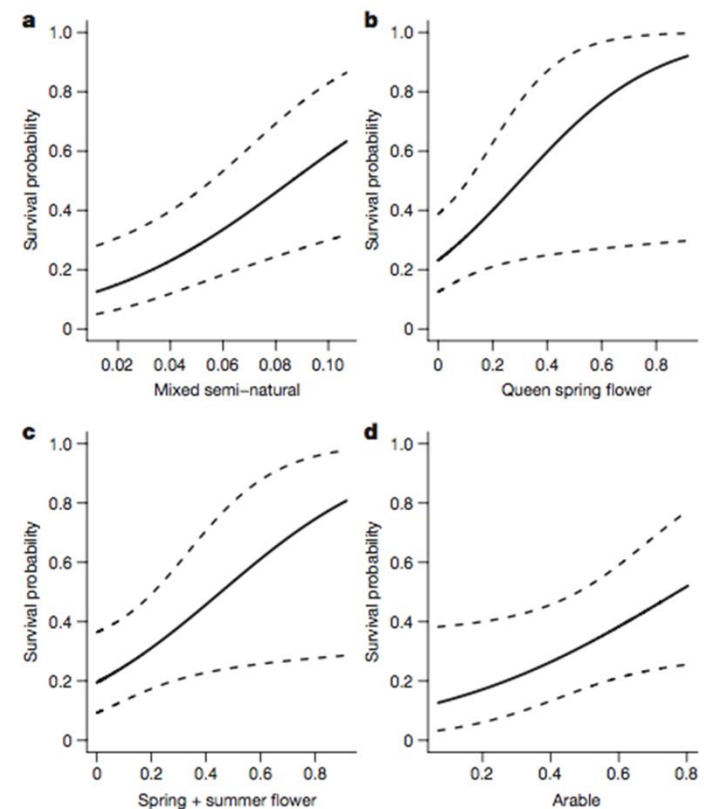


# Herbicides and Invasive Species

- Many pollinator species require native plant species



Wilson et al. 2013 (*J. Biogeo.*)



Carvell et al. 2017 (*Nature*)

# Pollinators and Invasive Species

- However, many pollinator species use nonnative or other 'weedy' plant species as well

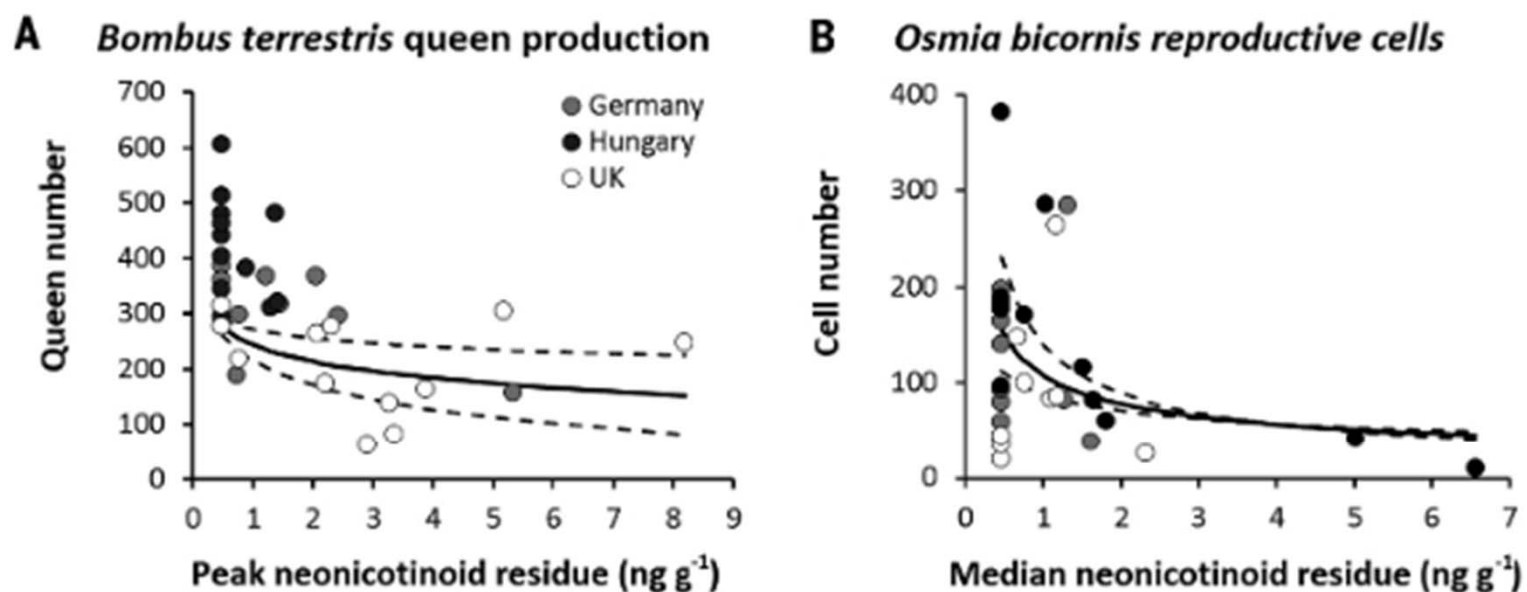




# Neonicotinoids



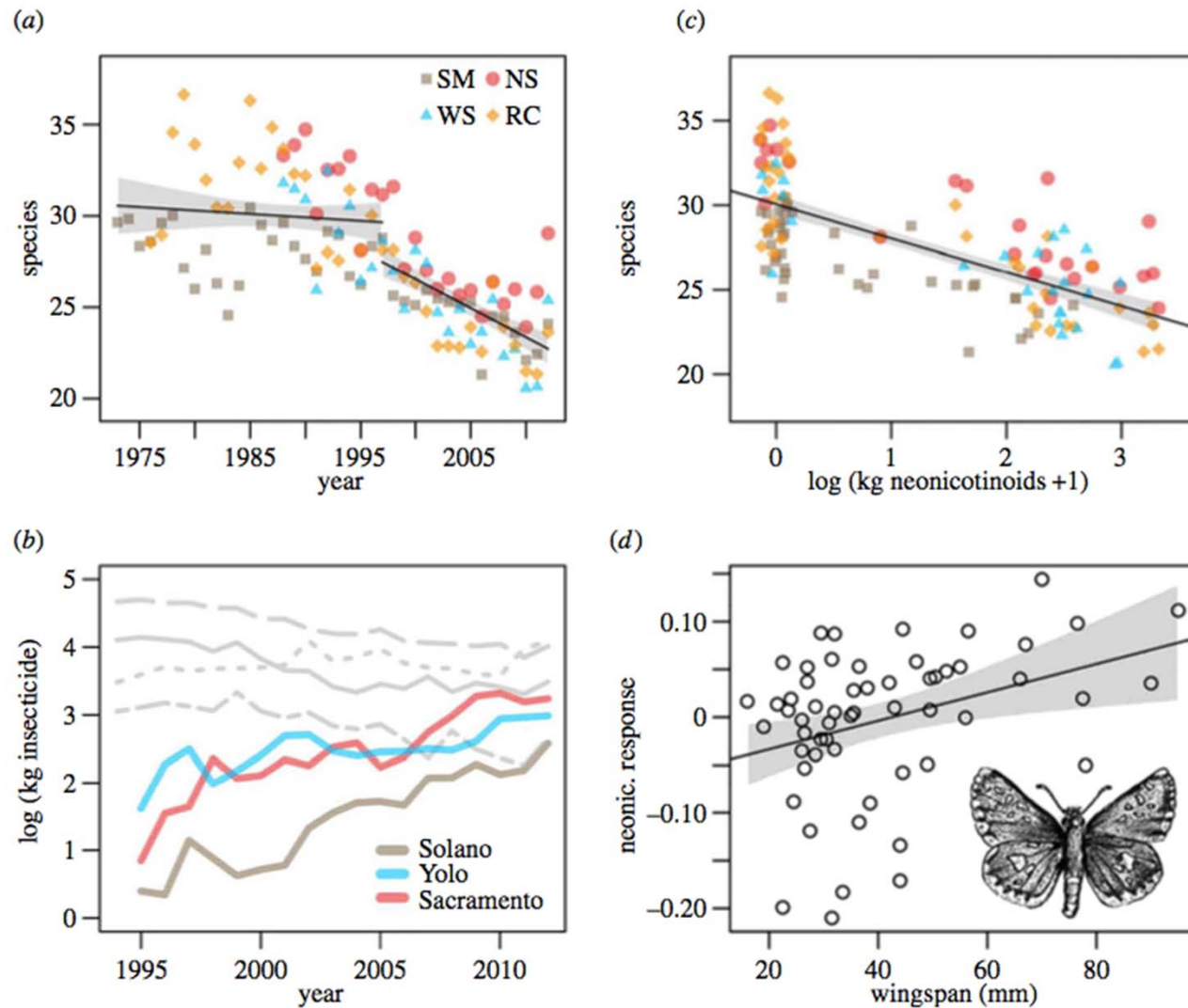
# Neonicotinoids- effects on bee health



**Fig. 3. Wild bee reproductive success in response to neonicotinoid nest residues.** Separate graphs are shown for the response of *B. terrestris* queen production and *O. bicornis* reproductive cell production to neonicotinoid residues found in nests. The significance of these relationships is based on a likelihood ratio test comparison of  $H_0: "y \sim \text{country}"$  and  $H_1: "y \sim \text{neonicotinoid} + \text{country}"$ . Neonicotinoid residues are based on summed concentrations of clothianidin, thiamethoxam, and imidacloprid.



# Neonicotinoids affect butterflies



# Pesticide specifics

- In general, avoid the following:
  - spraying during daytime/blooming periods
  - Drift conditions
  - Non-target locations (water, pollen, nectar, nesting materials, etc.)
- Minimize use and plan timing for using:
  - Neonicotinoids
  - Pyrethroids
  - Organophosphates
  - N-methyl carbonates



<http://ucanr.edu>

Neonicotinoids currently registered in Nevada:

[Imidacloprid](#) (Admire, Gaucho)

[Thiamethoxam](#) (Cruiser, Platinum)

[Clothianidin](#) (Poncho)

[Acetamiprid](#) (Assail)

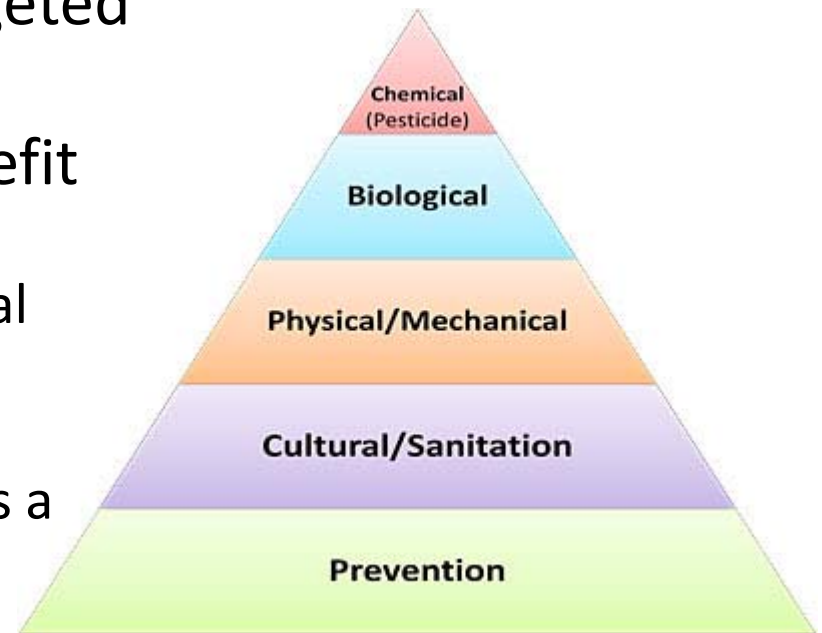


### Examples of Neonicotinoid Garden Products Used in the United States

Neonicotinoid	Garden & ornamental uses	Garden product trademark names
Imidacloprid	Foliar spray for turf and ornamental flowers, trees, and shrubs; soil drench for garden fruits and vegetables, and ornamental flowers, trees, and shrubs; trunk injection for trees; granules for turf and ornamental flowers, shrubs, or trees.	Bayer Advanced 3-in-1 Insect, Disease, & Mite Control Bayer Advanced 12 Month Tree & Shrub Insect Control Bayer Advanced 12 Month Tree & Shrub Protect & Feed Bayer Advanced Fruit, Citrus & Vegetable Insect Control Bayer Advanced All-in-One Rose & Flower Care concentrate DIY Tree Care Products Multi-Insect Killer Ferti-lome 2-N-1 Systemic Hi-Yield Systemic Insect Spray Knockout Ready-To-Use Grub Killer Monterey Once a Year Insect Control II Ortho Bug B Gon Year-Long Tree & Shrub Insect Control Ortho MAX Tree & Shrub Insect Control Surrender Brand GrubZ Out
Clothianidin	Granules for turf, and ornamental flowers, shrubs, or trees.	Bayer Advanced All-in-One Rose & Flower Care granules Green Light Grub Control with Arena
Thiamethoxam	Foliar spray for turf and ornamental flowers, trees, and shrubs; granules for turf and ornamental flowers, trees, and shrubs.	Amdro Quick Kill Lawn & Landscape Insect Killer Amdro Rose & Flower Care Maxide Dual Action Insect Killer
Acetamiprid	Foliar spray for garden fruits and vegetables, and ornamental flowers, trees, and shrubs.	Ortho Bug B Gon Garden Insect Killer Ortho Bug B Gon for Lawns Ortho Flower, Fruit and Vegetable Insect Killer Ortho Rose and Flower Insect Killer Ortho Rose Pride Insect Killer
Dinotefuran	Granules for turf and ornamental flowers, shrubs or trees; soil drench for ornamental flowers, trees, and shrubs.	Green Light Tree & Shrub Insect Control with Safari 2 G Safari Ortho Tree & Shrub Insect Control Plus Miracle Gro Plant Food

# Integrated Pest Management (IPM) and Beneficial Insects

- Control pests beneath an *economic threshold* using restrained and targeted methods
- Many IPM strategies naturally benefit pollinators
  - Identifying pests, hosts, and beneficial organisms before taking action
  - Chemical pesticides and herbicides as a last resort
  - Using targeted chemicals in space, time, and by species



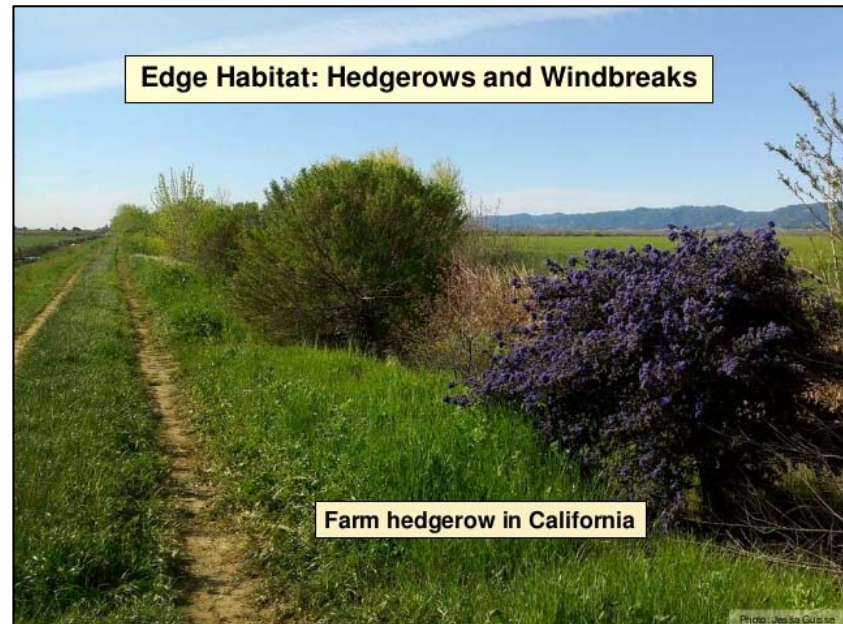


# Other Beneficial IPM Practices

- Enhancing natural predator populations
- Plant species selection
- Managing environmental conditions



<http://ucanr.edu/>



Edge Habitat: Hedgerows and Windbreaks

Farm hedgerow in California

[www.xerces.org](http://www.xerces.org)

# Integrated Pest Management and Pollinators

Some practices may be detrimental to pollinators under some conditions

- Burning
- Solarization
- Nonselective mechanical/  
physical controls
  - Tilling
  - Diatomaceous earth
  - Solarization
- Over-mulching





# Modifying IPM techniques

- Perform control tactics in a manner that maximizes pollinator habitat while still minimizing pest habitat
  - Sectioning, timing, and minimizing of disking, mowing, tilling, burning, and solarizing
    - **No more than 30% of habitat each time**
    - **5-10 yr. recovery**



# IPM techniques for protecting pollinator habitats

- Place insect traps in targeted locations
- Maintain cavity and soil nesting materials for bees and beneficial predators
  - Maintain some amount of native bare soil
- Select plant species carefully and for diversity
  - *Farming with Native Beneficial Insects* (Xerces)
  - *Attracting Native Pollinators* (Xerces)

