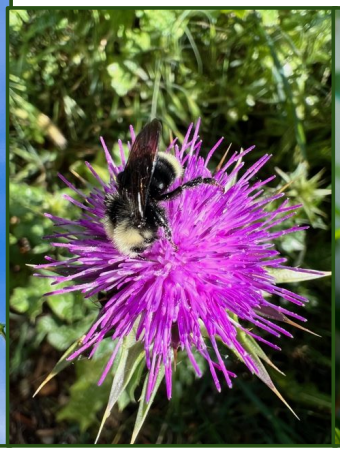
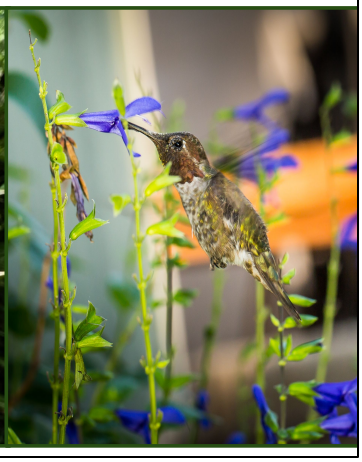
# Let's Talk About the Birds and the Bees






## UC Master Gardeners of Napa County

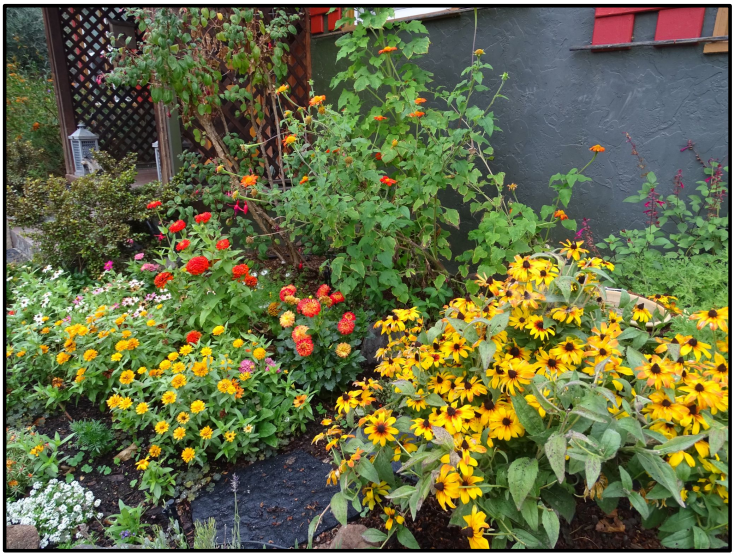
**http://napamg.ucanr.edu/**

*Our mission: "To extend research-based knowledge and information on home horticulture, pest management, and sustainable landscape practices to the residents of California and be guided by our core values and strategic initiatives."*

# Why do we care about pollinators?

The Pollinator Gardens' diverse plants with colorful blooms attract and support a variety of birds, butterflies, moths, and beneficial insects year-round. These visitors play a critical role in sustaining our ecosystem by helping our plants reproduce. One-third of our food supply relies on their work. Pollinator gardens provide the habitat, plants, pollen, and nectar to help us care for our wildlife partners.

# A Pollinator Paradise



What do you think attracts pollinators to this garden?

Ideas may include:

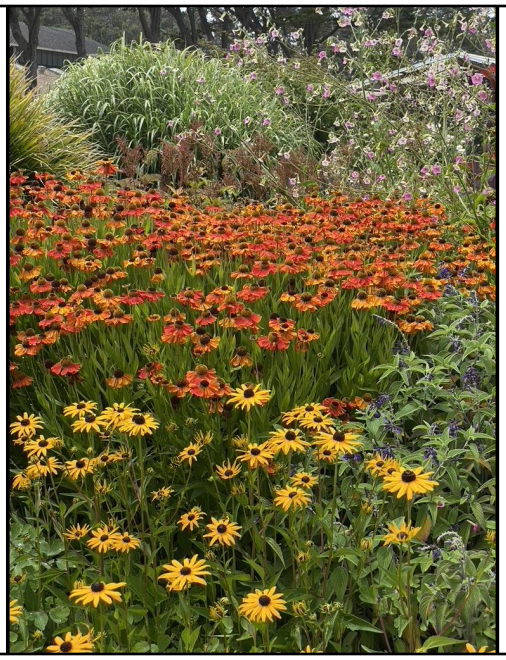
- Lots of color attracts birds, bees, butterflies
- Enough mass of each plant type to attract them
- Variety of plants

UC ANR information link:
How to attract and maintain pollinators to your garden
https://anrcatalog.ucanr.edu/pdf/8498.pdf

# CREATE A HABITAT

A pollinator garden provides:

- Food
- Water
- Shelter/Cover
- Places to raise young
- …and does it Sustainably



All creatures (including us) have the four same basic needs in order to thrive. To entice and support any wildlife in our gardens, we need to provide food, water, shelter, and a place to rear and nurture young. And we need to do it in a way that supports the entire ecosystem, which means avoiding toxics and chemical intervention.

## FOOD

- Plan for the whole life cycle of the pollinator
- Variety of species and bloom times
- Long duration and sequence of bloom
- Different shapes of bloom for different pollinators
- Plant in 3-4’ blocks for visibility and access
- High quality pollen and nectar
- Plant in color (but note, pollinators see differently!)

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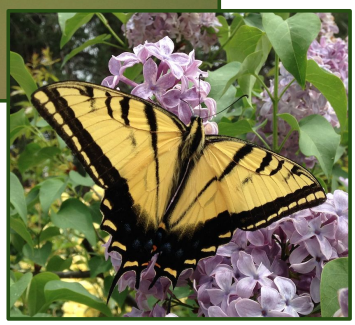
Pollinators provide 1 in every 3 bites of food we eat, according to Pollinator Partnership. Transfer of pollen is the plant’s goal, and nectar and pollen are the pollinator’s reward. Flora and fauna evolve together in interrelationship. If plants bloom earlier due to climate change, but species respond to seasonal changes in light, the food supply may not be available when the migrating species pass through. Planning for a longer nectar and pollen season can help.

# Nectar

Provides sugars (carbohydrates) and amino acids



Nectar is a source of carbohydrates and therefore energy for adult pollinators. As they seek the reward of the nectar, they are dusted with pollen which they casually disburse as they make their rounds.

# Pollen

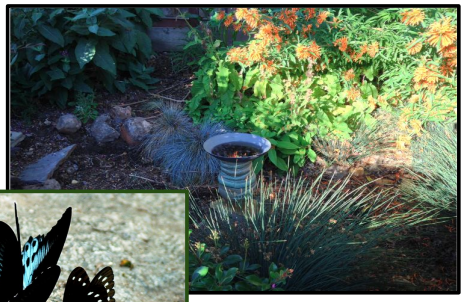
Provides protein, fats/lipids, starch, vitamins, and minerals

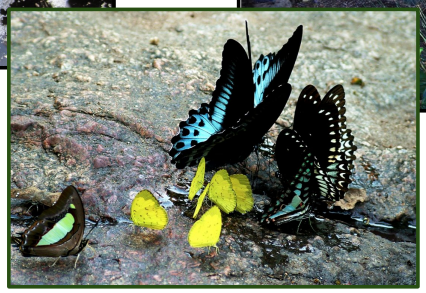
"Bee Loaf": Nectar and pollen combined to feed larval bees

Palynivores

Leafcutter bee, Pollen beetle, European honeybee

Numerous species of insects (**bees**, **wasps**, ants, **beetles**, flies, butterflies, moths), **mites**, spiders, and birds consume pollen as a food source. To more efficiently collect pollen, these **palynivores** have evolved various adaptations in their body parts and behavior. Pollinators like hummingbirds distribute pollen more casually as it collects on beak and head feathers.





## WATER

Accessible, nutrient-rich, shallow, with pebbles, leaves, or a stick or corks to stand on, and away from heavily scented plants. Dew works too and a little salt or wood ash, damp gravel or mud. Plan shelter nearby.

Many birds prefer running water, but that is a challenge for delicate pollinators. Butterflies and bees can't swim and need shallow water or wet gravel or mud so they can stand and sip, a process called puddling. They draw nutrients from water and benefit from water that we would consider dirty. From studies by Butler and by Bonoan, "during much of the year they found that bees had a strong preference for sodium-rich water, regardless of plant diet. In the fall, however, when pollen is scarce, they showed a preference for water sources containing calcium, magnesium, and potassium, all of which are found in pollen. This demonstrated that honey bees have the ability to switch water sources to compensate for dietary nutrient deficiencies." So in your water basin, leave a few leaves, some gravel, and a stick for perching. And maybe a bit of salt or ash for mineral content. Wet gravel or mud is great.

## SHELTER

Leave plant material for overwintering

Tolerate a little chaos

Add structures

Leave some brush, dead wood, or unpruned shrubbery or grasses for shelter and overwintering. Rather than deadheading all your blooms, leave some for seed and shelter through the winter. Wait to cut back perennials and shrubs in early spring when the air begins to warm and creatures begin to stir. A little tolerance makes us better neighbors. Consider adding structures designed to encourage specific pollinators.

# A PLACE TO RAISE YOUNG

Undisturbed hiding places, nesting materials, bare earth for mud, dead wood for holes and habitat. Or something man-made, with care to prevent disease.

Many native bees and other insects use mud for nesting material and need access to bare ground (slightly damp if possible; otherwise they have to dig for it). Commercial nests for bees and birds are available, but research carefully. Many species have very specific evolved patterns and nesting sites, including artificial ones, must suit them. And they must be kept clean or they will risk mold and disease.

## SUSTAINABILITY

USE:

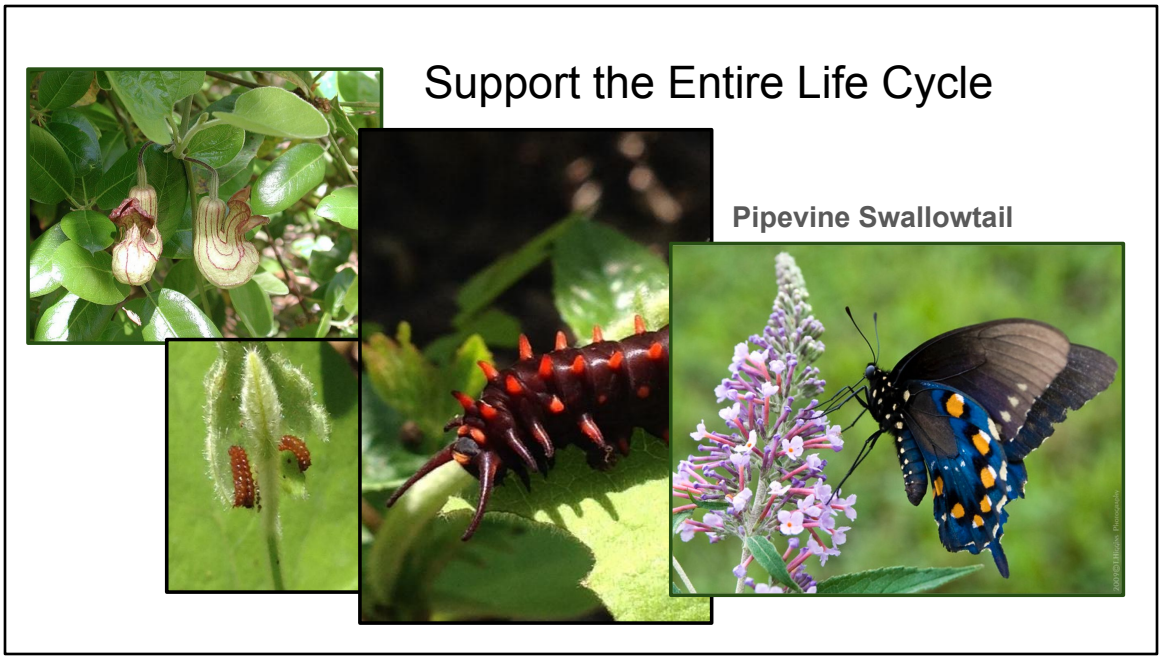
- IPM
- No-Till Gardening
- Wise Water Use
- Tolerance
- Compost
- Engagement!

As much as possible (and much is possible!) avoid using chemicals and toxins in your garden, using Integrated Pest Management instead. No-till gardening practices keep carbon and nutrients sequestered in the soil and ground nesting pollinators undisturbed. Use patience and tolerance, rather than over-grooming your garden. Capture water run-off and let it sink into the ground to boost groundwater and purify it of pollutants from roofs and hard surfaces. Compost, and use compost to keep the life in your soil strong, which will keep your plants and their visitors strong in turn. Be curious, engaged and aware. Consider the whole system as a community or even an organism. That's how interdependent it is, and we're part of the whole.

*"Integrated pest management, or IPM, is a process you can use to solve pest problems while minimizing risks to people and the environment. IPM can be used to manage all kinds of pests anywhere–in urban, agricultural, and wildland or natural areas."*

UC IPM link:
https://ipm.ucanr.edu/

UC IPM-WeedRIC weed ID
https://wric.ucdavis.edu/information/weedid.htm




Many pollinator species have adapted to use specific plants for food and protection. Provide plants with high quality nectar to attract and support adults, but also the plants those adults seek as food for their larvae. This is where tolerance comes in. Larvae eat a lot, leaving chewed plants and frass behind. If this interests you, plant where you can watch the action. If it is less tidy than you like, plant larval food plants in a back corner of the garden.

# Honeybee Keeping is Fascinating and Challenging

**Honeybees are hardworking but non-native pollinators.**

**They are not as effective at pollinating as most native pollinators.**

**They are subject to numerous diseases and pesticides making colonies fragile.**

**Maintaining colonies is expensive and time consuming.**

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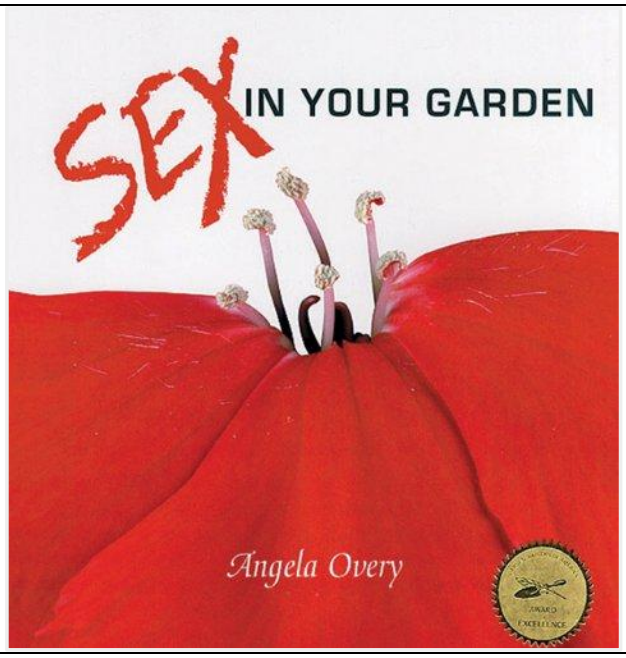
Encouraging native bees by adding nesting sites to your garden.

Various bee houses for native bees

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And you thought we were actually going to talk about birds and bees! THIS WAS THE GAME CHANGER! It all boils down to this. Flowering plants evolved incredibly complex reproductive strategies to be more successful at thriving in their habitats. Book: *Sex in your Garden* by Angela Overy

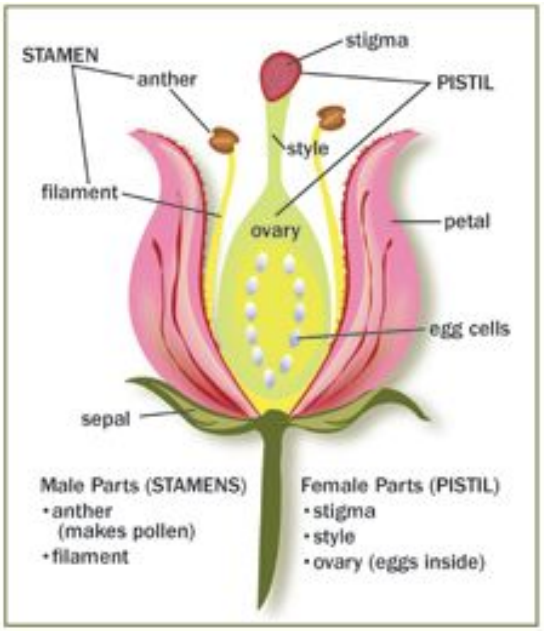
## Flowers Were Revolutionary!

– allowing plants to specialize

– fill new niches

– become ever more widespread

– This requires pollen from the stamens to fertilize the eggs in the ovary




SEXUAL REPRODUCTIVE parts of a flower.

All living organisms depend on plants to provide food, shelter, or oxygen. Therefore, plant reproduction is crucial to all other life on this planet. Different parts of the flower are specialized to help plants reproduce—to produce seeds that are used in new plant growth. Typical flowers have four main parts: pistil (stigma, ovary, and style), stamen (anther and filament), petals, and sepals. The female part of the flower, the pistil, includes the ovary, style, and stigma. Pollen attaches to the sticky stigma and this begins the process of pollination. The pollen travels down the style until it reaches the ovary where ovules are fertilized and will develop into seeds. Depending on the plant species, a flower may have male, female, or both male and female reproductive structures. Most flowers depend on bees, birds, or insects to help with the pollination process. Smell, color, and nectar attract pollinators to the flower. The male part of the flower, the stamen, consists of the anther and filament. The anther carries the pollen that fertilizes the female part of the flower and is held up by the thread-like filament. Petals are the colorful structures that help the flower attract pollinators. Petals also serve as a landing platform for insects and birds. For example, when a bee lands on the lower petal of a snapdragon, its weight causes the stamen to swing down and dust the bee with pollen. Petals of some plant species have stripes or other markings that guide pollinators to the nectar. The green, outermost petal-like structures of the flower are the sepals. Generally, there are the same number of sepals in a flower as petals. Sepals form the protective layer around a flower in bud. Flowers come in many shapes and sizes. Not all flowers contain the four flower parts featured in this lesson.

Flowers that contain both male and female parts are called complete flowers. Flowers that contain only male or only female parts are called incomplete flowers. Flowers can also be categorized as simple or composite. Simple flowers have only one set of parts, while composite flowers may contain hundreds of tiny individual forets. Common composite flowers are sunflowers, daisies, and dandelions
UC ANR
https://ucanr.edu/sites/btfnp/generaltopics/AnatomyPollination/Flower_Anatomy/

# There’s just one problem…

There’s just one problem…

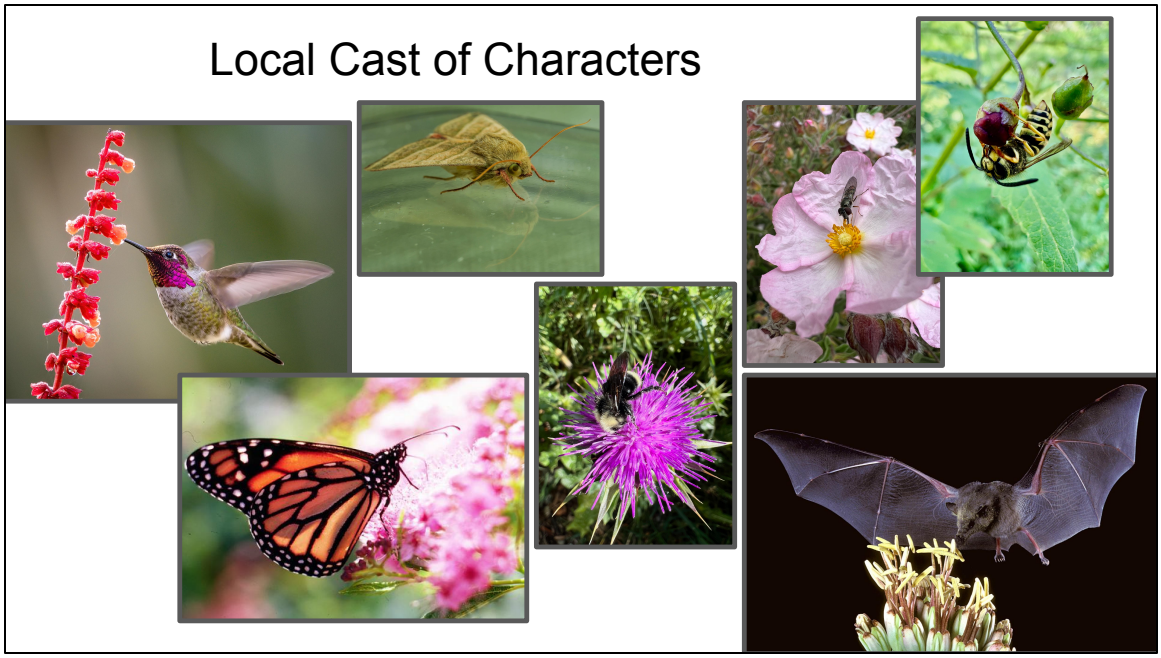
Plants don’t move!

How did flowering plants “solve” this dilemma?

How do plants get pollen and ova together to create a seed?

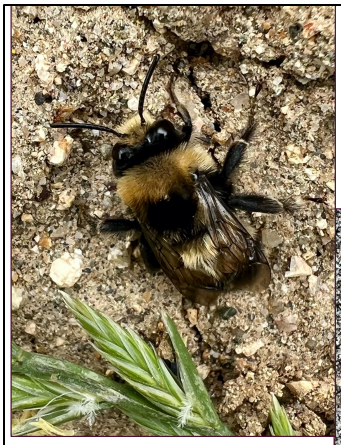
How did flowering plants “solve” this dilemma?

By creating molecules instead of legs!

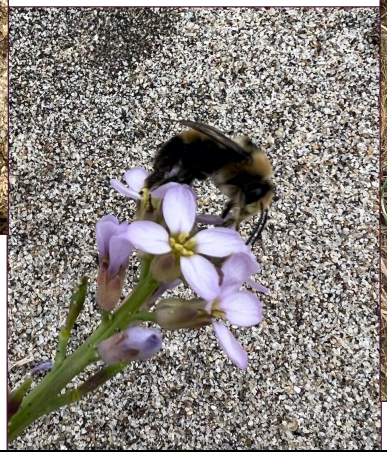



There are many more pollinators not just the honeybee.  They all find something enticing about the flowers that have evolved to lure them in.

POLLINATING BATS DO NOT EXIST HERE IN NAPA COUNTY



*Anthophora bomboides* ssp. *stanfordiana*



A bumble bee mimic known as the Stanford bumble-bee digger. The fuzzy digger bees are solitary, not social like the bumble bees they resemble, and dig tunnels to nest in in sand or along coastal bluffs. They rarely sting and are not aggressive but their appearance can fool predators who prefer to avoid a colony of bumble bees defending their nest.

Info link: https://www.smcmvcd.org/local-digger-bee

# Carpenter Bee

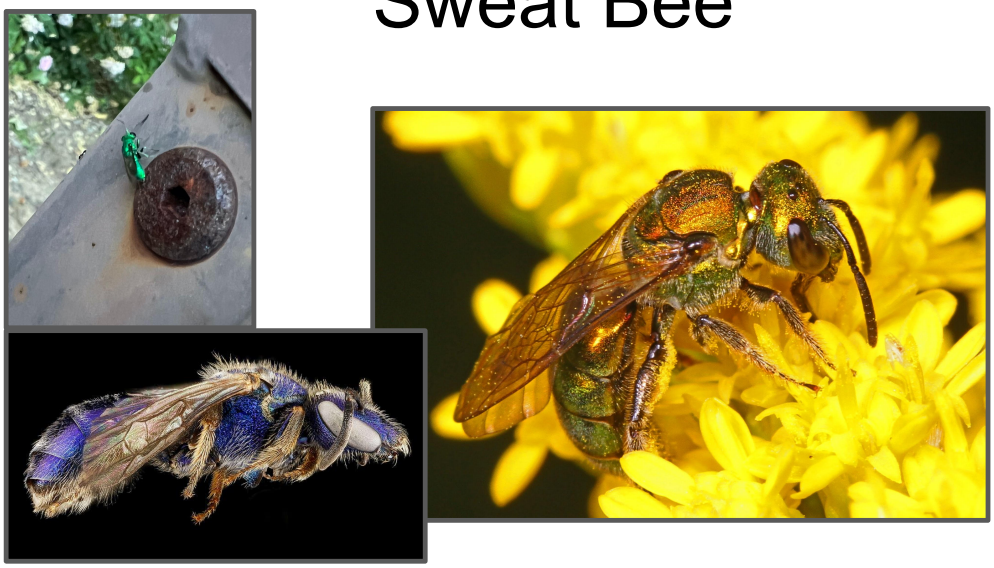
Carpenter bees are species in the genus Xylocopa of the subfamily Xylocopinae. The genus includes some 500 bees in 31 subgenera.[1] The common name "carpenter bee" derives from their nesting behavior; nearly all species burrow into hard plant material such as dead wood or bamboo. The main exceptions are species in the subgenus Proxylocopa, which dig nesting tunnels in suitable soil.
Info link: https://en.wikipedia.org/wiki/Carpenter_bee

Interesting note: Rather than going in the front door they cut a slit at the base of the flower to reach the nectar and avoid pollinating the flower in the process

# Wool carder Bee

The Wool Carder Bee belongs to the family Megachilidae, which includes Leaf-cutter, Wool Carder, and Mason bees. Megachilidae is a family of mostly solitary bees whose pollen-carrying structure - called a scopa- is on the bottom rear of the abdomen. Whereas other bee families mostly carry pollen exclusively on the hind legs; like non-native-European honey bees or our native-humble bumble bees.
This interesting bee gets part of its name "carder" from its behavior of scraping off hair from fuzzy leaves and stems of hirsute plants such as lamb's ears ornamental or the common Mullein weed. Both of these are non-native plants. The female Wool-Carder uses her mandibles to scrape and collect the soft downy hairs off hirsute-plants to use in building her nest for her young. She then transports her carded harvest of soft plant fibers to her nest site and uses them to line her brood cells.
Information link: https://acmg.ucanr.edu/Over_the_Fence/Wool_Carder_Bees/

# Sweat Bee



Like other bees, these are helpful pollinators. The males can be particularly abundant in late summer around flowers.
Information link:
https://ucanr.edu/sites/insectconnect/Identification_information/Green_sweat_bee/

# Birds, Butterflies, Insects, Moths, Wasps

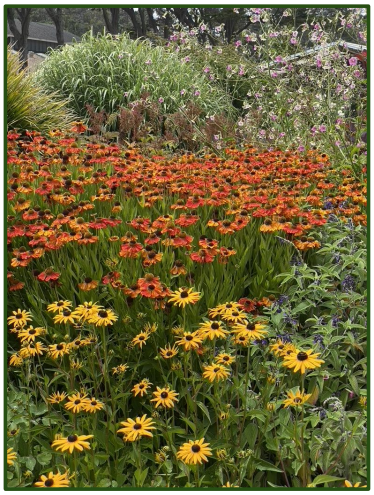
There are about 350,000 pollinator species in the world. While bees might be the most well-known, other insects, including butterflies, flies, moths, beetles, and wasps, also pollinate. Birds, bats, other small mammals, and lizards can act as pollinators, as well.
Information link:
https://wildlife.ca.gov/Science-Institute/Pollinators#:~:text=Ruby%2Dthroated%20hummingbird%20(Archilochus%20colubris).&text=While%20bees%20might%20be%20the,act%20as%20pollinators%2C%20as%20well.

Mimics……..Is it a bee? Is it a wasp? It's a flower fly!
Information link:
https://publicgarden.ucdavis.edu/news/flower-flies-beneficial-bee-mimics

# Pollinator party facts:

- We tend to think of pollination as mutually beneficial between plant and pollinator. Not always so.
- Many pollinators use plant parts and substances to assist in their own reproduction. It's sometimes a 2-way street.
- Mimicry and deceit often prevail.
- Some pollinators are specialists and some are generalists.
- Some bees collect the scents of flowers to use for their own purposes. "Bee perfume" if you will.

# Plant to attract Pollinators



- ❏ Diversity of species and bloom times
- ❏ Specialized flower structures with different shapes for different pollinators
- ❏ Plant in 3-4’ blocks of color for visibility and access
- ❏ Native plants support native pollinators
- ❏ High quality pollen and nectar producers
- ❏ Plant for year-round benefit
- ❏ Long duration and sequence of bloom
- ❏ Strong scents for pollinating insects

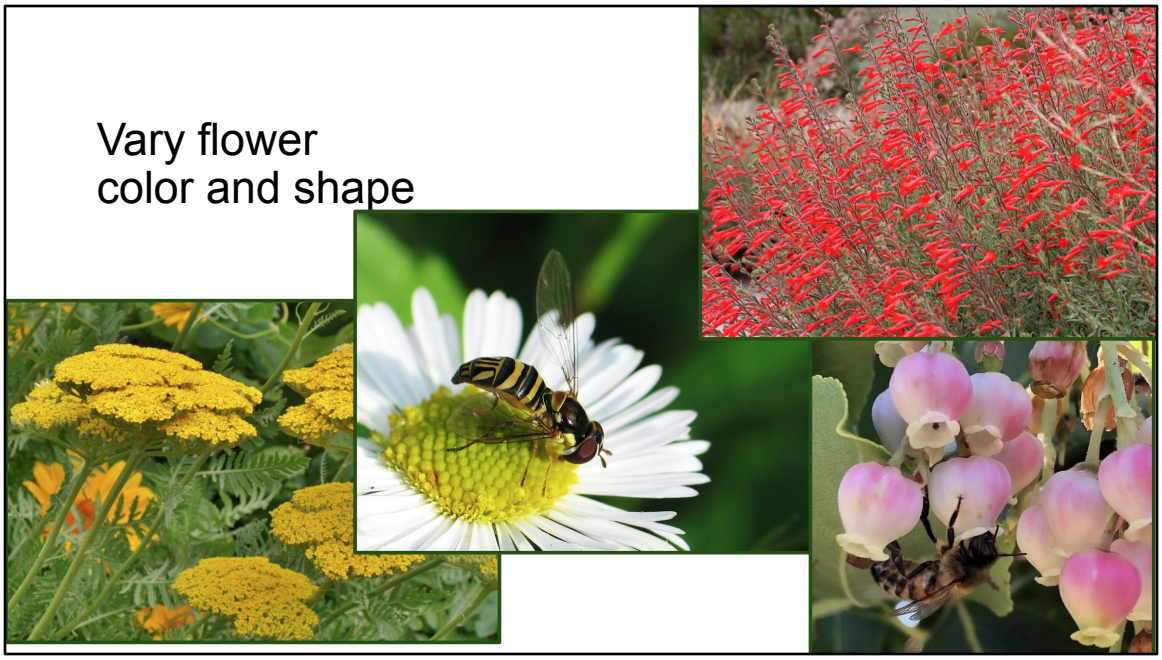
Pollinators’ Food, include plants that have these features when selecting plants to attract and sustain pollinators.

## Diversity: Plant 20 plant types if possible

**Autumn dry garden with California natives**

**Summer waterwise garden with plants from Mediterranean climates**

A greater diversity of plants invites a greater diversity of pollinators, and is more likely to cover their range of seasons, colors, shapes, and other requirements. Don't just think perennials. Trees, shrubs, and annuals add to the texture of the garden and richness of resources. Consider creating hedgerows. Choose plants with high quality pollen and nectar.




Umbel-shaped flowers are like a landing pad, with multiple tiny flowers to sample. Composite flowers like asters, daisies and sunflowers offer both nectar and pollen in easy access. Tubular flowers and urn-shaped flowers suit a hummingbird's bill or the long proboscis of many insects. Hummingbirds are drawn to the color red, but purple works too. Bees are attracted to blues and yellows, and don't see red.

## Mass plants in blocks of 3-4’ or more

Salvia and Clarkia

Coreopsis and Kangaroo Paw

Many pollinators, especially bees, exhibit floral constancy, visiting one type of flower per foraging episode. Planting in blocks of at least 3’-4’ makes for greater visibility and easy and efficient foraging.

## Plant Native Plants for Native Fauna

### Our climate zone: North coastal to moderate Inland Valley

Golden Rod

Red Flowered Buckwheat

Ceanothus 'Concha'

Research has shown that native bees and other pollinators greatly prefer native plants to non-natives. Plants native to our region of California have co-evolved with the animals and insects that depend upon them for food and shelter. This is especially important for migratory species that rely on plant blooming and seeding times to correspond with their migratory patterns. This is one of the challenges of climate change, which is disrupting the synchronicity of migration and bloom time.

# Supplement with high quality plants from other Mediterranean climates

**Lion's Tail**

(Leonotis leonurus )

**Calamintha nepeta**

**Pride of Madeira** (Echium candicans)

Native bees and pollinators are far more attracted to native plants than non-natives, but California native plants tend to bloom in early spring and summer. The blooming season can be greatly extended by adding plants from other Mediterranean climate zones, which include parts of Chile, South Africa, and Australia in the southern hemisphere.

Lion's Tail from So. Africa

Pride of Madeira from Madeira an island south of Portugal

Calamintha Nepeta from the Mediterranean region.

## Plan and Plant for Year-round Benefit

California buckwheat
(Eriogonum fasciculatum)

**Spring and summer**

**Fall and winter**

Leaving seedheads provides food and shelter for beneficial insects, pollinators and other creatures to overwinter, and add winter interest to the garden. In the background, this California native can tolerate dry conditions with good drainage.

## Plan sequence of bloom times, Feb.-Oct.

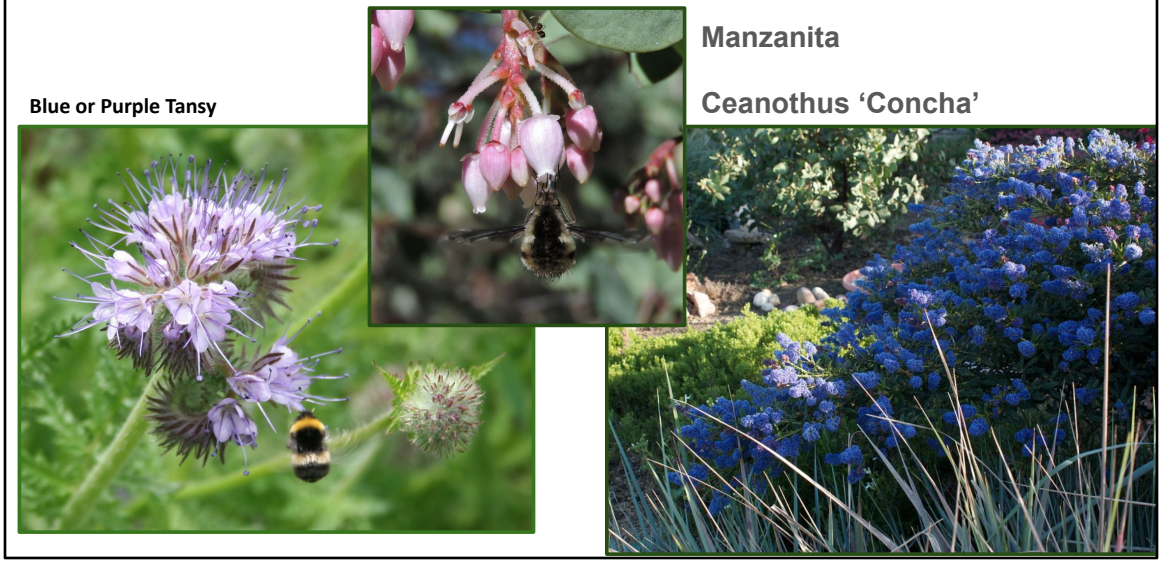
**California Lilac**
(Ceanothus thyrsiflorus repens)

**California Buckwheat**
(Eriogonum fasciculatum)

**Coyote bush**
(Baccharis pilularis)

The Pollinator Partnership states that a combination of the California natives Ceanothus, Eriogonum (buckwheat), and Baccharis pilularis (Coyote bush) provide food for native pollinators around the seasons.

## Winter-Early Spring



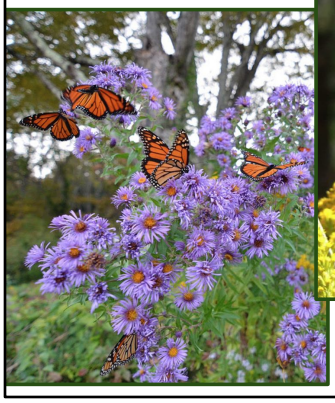

Blue or Purple Tansy (phacelia tanacetifolia) germinates with first rains and blooms through winter, dropping seed as summer arrives. Manzanita (Arctostaphylos) blooms in winter to early spring, depending on species. Ceanothus (California Lilac) has many different cultivars that can extend bloom times from winter through spring.


Perennials and annuals seeded in fall provide an abundance of nectar and pollen as weather warms and pollinators become more active. California poppy is a rich resource.


Migratory insects are showing up in the garden and things are in full roar! This milkweed is narrow-leafed milkweed (*Asclepias fascicularis*), which, with showy milkweed (*Asclepias speciosa*), are the two milkweed species native to our area and appropriate to our migratory population of Monarchs. Tropical milkweeds, though lovely, don't die back in the winter and may harbor disease that can sicken feeding Monarchs.

## Fall

**Aster**
(Symphyotrichum)



**Goldenrod**
(Solidago)

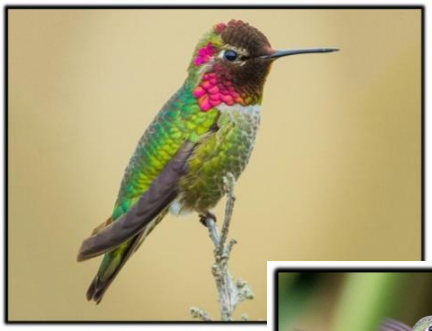
**California fuchsia**
(Epilobium)

A last blast of fuel to support dormancy or reduced activity for some pollinators. European honeybees are generalists and can continue to be active through the winter, but many native pollinators are specifically adapted and go dormant when their favorite plants are dormant.

## Let's meet our local pollinators and see what plants they like best

What you want to plant is for year-round blooms, but which plants do our local pollinators like best?
Plants that the local pollinators like that are in the Las Flores Learning Garden: https://napamg.ucanr.edu/demogarden/g4/

# Hummingbirds of Napa County



Anna's

Rufous

Allen's

Napa Audubon Society info link:
http://www.napasolanoaudubon.com/Monitoring/Hummingbirds

# Hummingbirds

## Harder to spot

**Calliope**
Prefers meadows & riparian areas
Smallest U.S. hummer

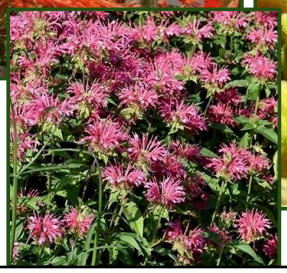
**Black-Chinned**
Easily mistaken for Anna's, but has white collar, longer bill, lighter underside

**Costa's**
Likes the desert

Napa Audubon Society info link:
http://www.napasolanoaudubon.com/Monitoring/Hummingbirds

## Plants for Hummers

California Fuchsia



Bee Balm

Kangaroo Paw

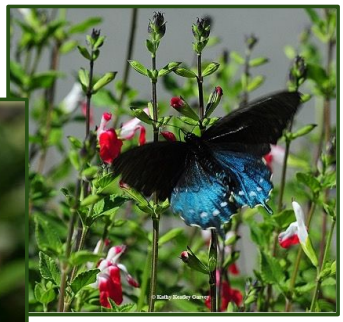
Cuphea Funny Face

Additional plants that hummingbirds like: Manzanita, Narrow Leaf Milkweed, Butterfly Bush, Hibiscus, Lion's Tail, Penstemon, Gaura

## Butterflies of Napa County

Monarch

Anise Swallowtail



Pipevine Swallowtail

registry of Nature Habitats information link:
http://www.registryofnaturehabitats.org/resource/distr/lepid/bflyusa/chklist/states/counties/ca_55.htm

# Butterflies of Napa County


**Fritillary**

registry of Nature Habitats information link:
http://www.registryofnaturehabitats.org/resource/distr/lepid/bflyusa/chklist/states/counties/ca_55.htm

## Butterflies of Napa County

**Mourning Cloak**


registry of Nature Habitats information link:
http://www.registryofnaturehabitats.org/resource/distr/lepid/bflyusa/chklist/states/counties/ca_55.htm

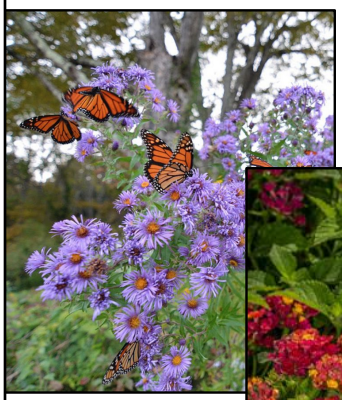
## Butterfly Pest

Cabbage White butterfly will quickly destroy these vegetable plants:

- Broccoli
- Cauliflower
- Cabbage
- Rutabaga


UC IPM Garden pests information link:
https://ipm.ucanr.edu/PMG/menu.homegarden.html?src=302-www&fr=3723

## Plants for Butterflies



Aster

Lantana

Goldenrod

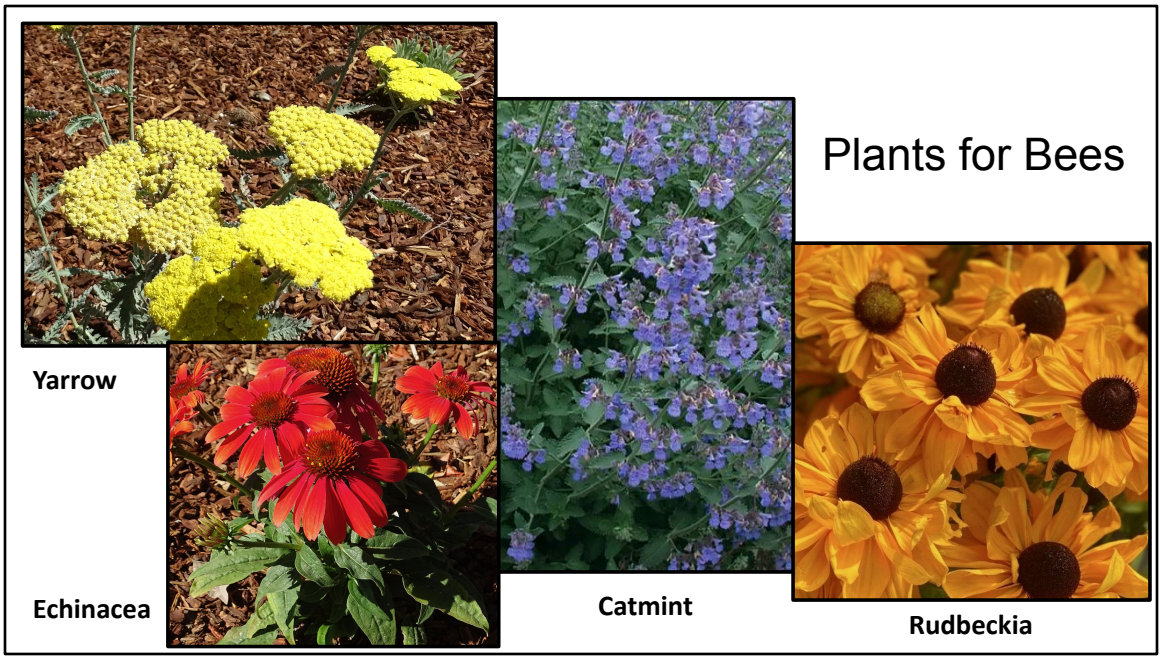
Butterfly Bush

Additional Butterfly plants:
Kangaroo Paw, Narrow Leaf Milkweed, Coreopsis, Cuphea Funny Face, California Buckwheat, Gaura, Hibiscus, Flame Giant (Leucospermum), Catmint, Penstemon, Rosemary, Rudbeckia, Salvia, Cardinal Catchfly, Mexican Sunflower

## Bees


Photo: ©Pollinator Partnership

Berkeley Urban Bee Lab information link:
http://www.helpabee.org/common-bee-groups-of-ca.html




Additional Bee plants:
Kangaroo Paw, Aster, Butterfly Bush, Coreopsis, Oregano, California Buckwheat, Flame Giant, Rosemary, Goldenrod, Manzanita, Quince, Germander, Lavender
Variety of Salvias: Hot Lips, Mystic Spire, Mexican, White Sage, Common Sage

## Wildflowers:  Support through the seasons

Wildflowers and annuals give everything they've got, going from seed to maturity and seeding again in one season, making them a rich resource for pollen and nectar. AND they often reseed for next year's plants.  Mix some into your perennial or vegetable beds.

Ojai Valley Land Conservancy information Link:  https://ovlc.org/native-flowers/

# Planning your garden:

- California Natives (North Coastal to moderate Inland Valley)
- Non-Natives compatible with a Mediterranean climate and with a high-quality nectar and/or pollen
- Food, water, shelter, a place to raise young, and sustainability
- Diversity and variety in species, color, bloom shape, height, and bloom time, planted in 3'-4'+ blocks of one species
- Year-round seasonal planning and overlapping bloom cycles
- Sustainable gardening practices for your hea health of all the guests in your garden

American Farm Bureau Foundation for Agriculture information link: Planning a Pollinator Garden
https://www.agfoundation.org/digitalskills/using-google-drawings-to-plan-a-pollinator-garden?gclid=Cj0KCQjw98ujBhCgARIsAD7QeAhDD3MJT56eSbaIGgEAnZiimKdqQj-mLOhuXwdDQk-WfJFjWqgicA8aAgVmEALw_wcB