

Landscaping with the Environment in Mind

Ellen Zagory, The UC Davis Arboretum and Public Garden

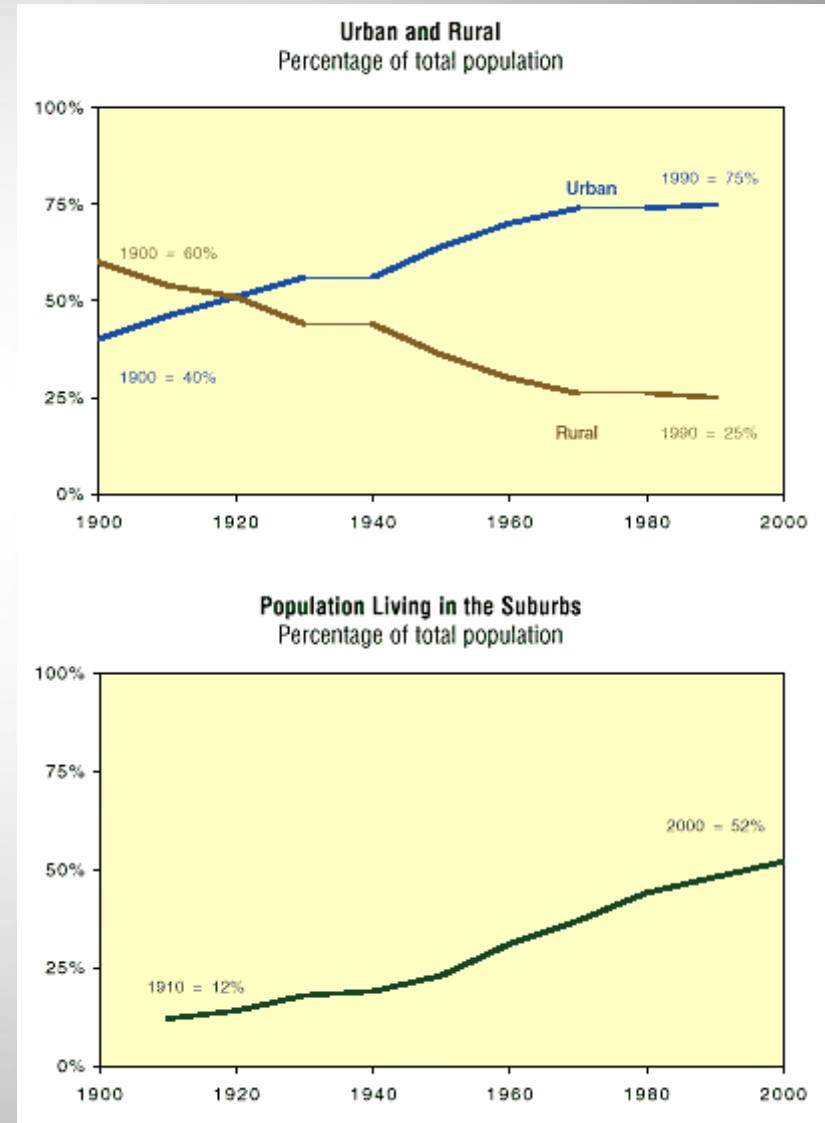
The Living Landscape March



Human society as altered the natural environment

- In the last century humans have made huge changes in how we live
- Populations have shifted from rural to urban and suburban
- Natural Landscapes have been radically altered by population growth

Reference PBS.org/the first measured century



The Effect of Land Use and Constructed Landscapes

- Urban and agricultural use by humans now dominates much of the earth's land
- Constructed landscapes are replacing native ones
- We are converting our native landscapes to exotic species.



Rapid reduction of natural landscapes: The Extinction Crisis?

- As native plants are removed habitat disappears for native creatures
- Loss of habitat can result in extinction of wild creatures
- Wildlife increasingly depends on parks, conservation areas and our *urban and suburban gardens*



Residential Landscapes can make valuable contributions to environmental quality

- In addition to visual beauty, new appreciation for landscape processes and function
- Plant selection and landscape structure will influence the animal species that plants support—knowledge of relationships of plants and animals (including us!)



Benefits we received from our landscapes “ecosystem services”

- Water purification
- Erosion and flood control
- Carbon storage and climate regulation
- Pollination
- Decomposition
- Spiritual and recreational benefits



Plant choices can improve ecosystem services: pollinator support

- Select plants that are known to provide nectar and pollen and support insect diversity
- Use plants that will bloom at various times of the year.
- Add California native plants to compatible non-native plants



Create more “niches” by designing your landscape in layers

Vertical Layers

- Canopy (large trees)
 - Understory trees
 - Shrubs
 - Herbaceous plants
 - Ground (including soil organisms)
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- Darke and Tallemey 2014
The Living Landscape



Planting in “Layers”

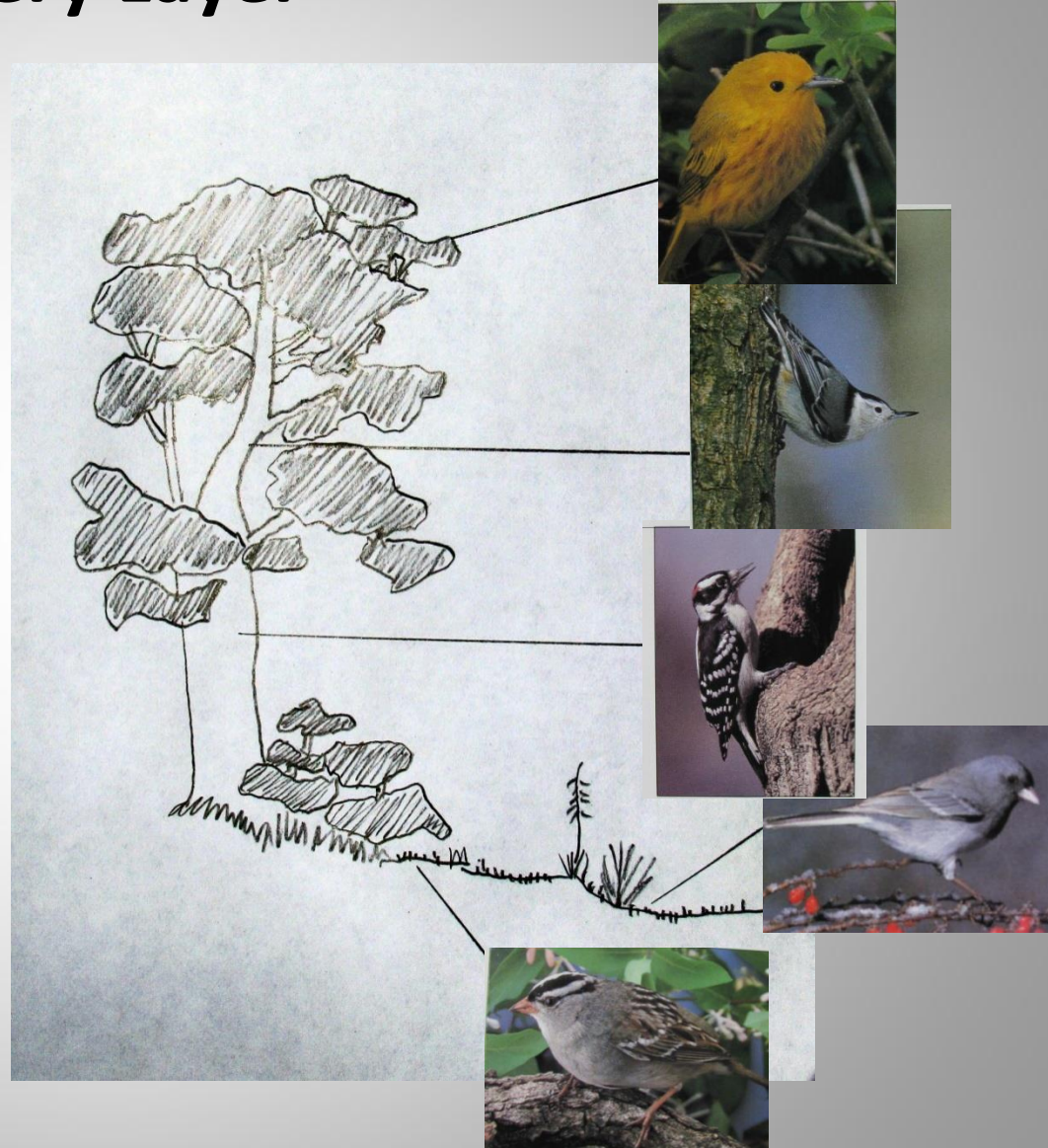
Horizontal (lateral)

- “Edges” where different types of vegetation meet
- Edges are dynamic spaces where creatures interact
 - Lawn or meadow and forest
 - Wet edges vs dry



Birds In Every Layer

- Birds need complex landscapes and trees for food, shelter and nesting sites
- Trees can support many different birds: leaf gleaners (warblers), bark-gleaners (creepers and nuthatches), wood and bark probers (woodpeckers).
- Sparrows and juncos feed on the ground



Planting to support birds

- Provide cover, thick shrubs and evergreens
- Plant variety of plants for food: nectar, fruit and seeds.
- Add water flowing if possible



Birds eat insects but also seeds and fruits

- Try and include fruit producers like toyon (fruit eaters like orioles and waxwings)
- Don't clip flowering perennials immediately, let go to seed.



Plants are the foundation of the “food web” by supporting insect populations

- *Insects provide food* for birds, bats, fish, frogs and lizards. 96% of terrestrial birds raise young on insects, mostly caterpillars.
- Predatory *insects eat other insects* and help keep pest insects under control
- Provide *decomposition* services (with fungi and bacteria), breakdown of wastes, dead animals and plants.



Other benefits of insects in our gardens and landscapes?

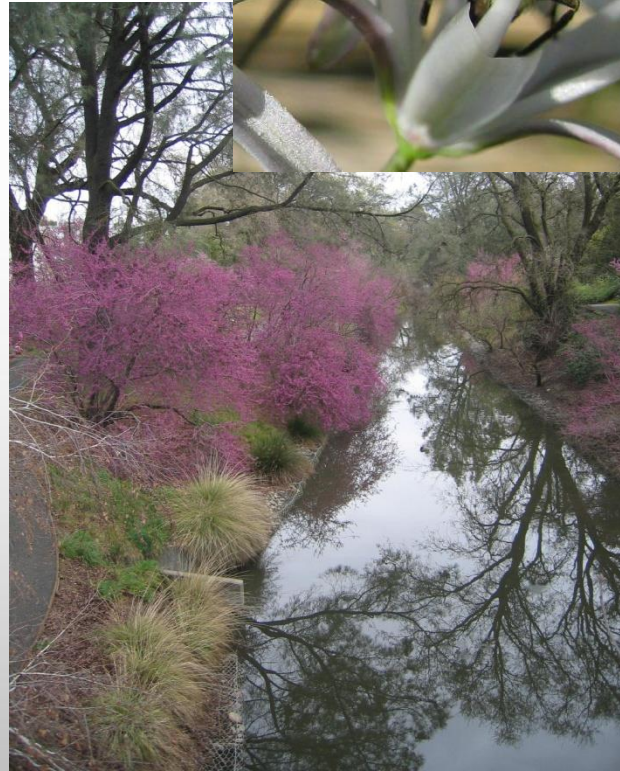
- Insects, especially bees, provide *pollination* services important to global food production
- This same process facilitates *native plant species* continued *reproduction and survival*



Native bees help pollinate crops

- California has approximately 1600 species of **native** bees
- Native bees found to make up a high proportion of bee visits in certain crops
- There is a shortage of European honeybees for crop pollination due to Colony Collapse Disorder.
- Proximity to *native habitat* increases the number of native bee visits

Kremen et.al. 2002



Why else should we plant for native insects?

- Many native insect species *cannot survive* without native plants
- One in every 3 mouthfuls of food we eat comes from plants pollinated by insects !
- Native insects have co-evolved with native plants and the two depend upon each other for survival

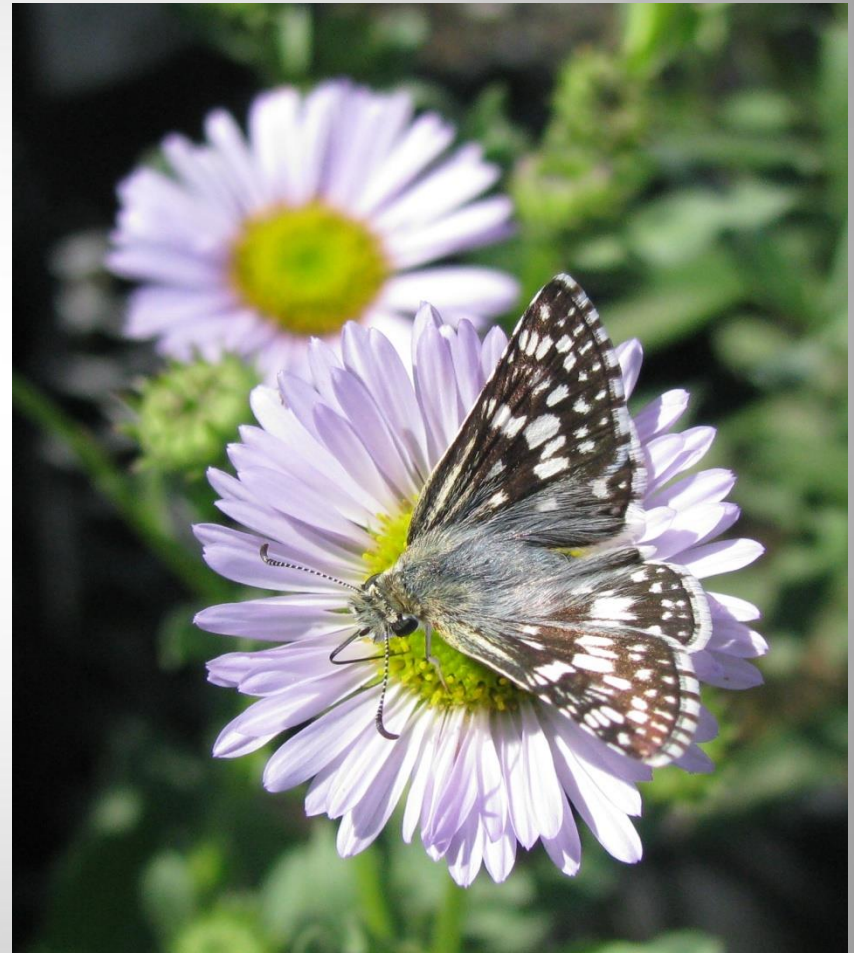
“a land without insects is a land without most forms of higher life”

-E.O. Wilson 1987



Insects need pollen and nectar

- Insects need nectar for energy and pollen for reproduction
- Some plants are better than others at providing this food source



Planting a diversity of native plants helps provide food for a diversity of native insects:

California lilac, oak and native grasses



But both native and non-native can be attractive

Flowers with nectaries and prominent pollen

Spring bloomers:

Ceanothus California lilac
Rhamnus, coffeeberry,
Nepeta, catmint
Lupinus spp., lupine,
Cercis occidentalis, redbud

Summer:

Yarrow, sunflowers, blanket flower,
coyote brush (daisy family)

Fall: wild buckwheats *Eriogonum*,
Aster

Also members of the carrot family
and more!



Some potential nectar and pollen sources and larval food for butterflies are available on line (CCUH website)

- Plants recommended for agricultural hedge rows
- Larval food plants for local caterpillar species
- UC Davis Arboretum All-Stars



Achillea millefolium	x	x			h
Arctostaphylos densiflora 'Howard McMinn'		x		x	t
Arctostaphylos manzanita		x		x	t
Aristolochia californica (under trees)					v
Artemisia californica		x			s
Asclepias fascicularis	x	x	x		h
Asclepias speciosus	x	x	x		h
Aster chilensis and cvs	x	x	x		h
Atriplex canescens		x	x		s
Atriplex canescens		x	x		s
Atriplex lentiformis (quail bush)		x	x		s
Baccharis pilularis (male clones)	x	x	x		s
Ceanothus 'Concha'		x	x		t
Ceanothus cuneatus		x	x		t
Ceanothus Ray Hartman'		x	x		t
Cercis occidentalis		x			t
Cercocarpus betuloides		x			t
Chrysothamnus nauseosus	x	x			s
Clematis lasiantha (under trees)		x	x		v
Clematis ligusticifolia (under trees)		x	x		v
Epilobium canum				x	h
Eriogonum arborescens		x	x		s
Eriogonum fasciculatum		x	x		t
Eriogonum fasciculatum		x	x		s
Eriogonum giganteum		x	x		t
Eriogonum nudum		x	x		t
Eriogonum nudum		x	x		s
Escholzia californica		x			h
Euthamia occidentalis		x	x		h
Grindelia camporum	x	x	x		h
heliotropium currasivicum	x	x	x		h
Heteromeles arbutifolia		x			t
Isomeris arborea				x	s
Lupinus albifrons		x		x	s
Prunus ilicifolia		x			t
Rhamnus californica		x	x		t
Rhamnus ilicifolia		x			s
Rhamnus tomentella		x	x		s
Rhus integrifolia		x		x	t
Rhus ovata		x			t
Rosa californica		x			t
Salix goodingii	x				t
Salix laevigata	x		x		t

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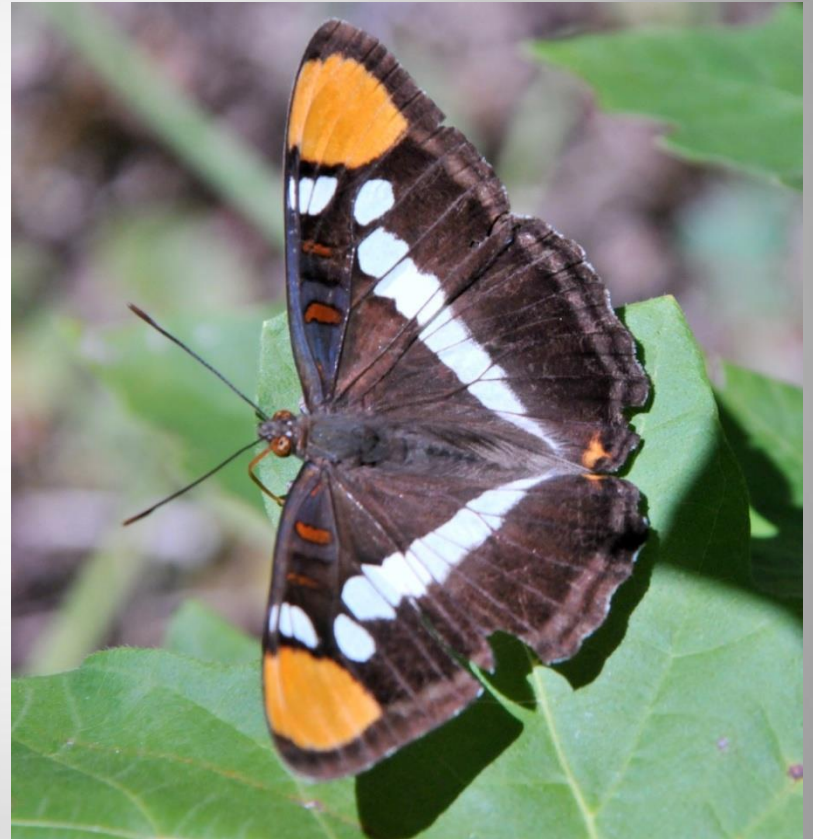
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Butterflies (Lepidoptera) need *larval food plants* as caterpillars as well as nectar as adults

meadow fritillary (violets) and California sister (oaks)



California pipevine for pipevine swallowtail larvae



larval food plants: milkweeds for monarch larvae



Host Plant recommende for butterflies noted in Arboretum and Reserve: Campus Master Plan

DRAFT ONLY: NOT FOR PUBLICATION

Butterflies breeding in Reserve or Arboretum

Tree Hosts

Platanus racemosa	western tiger swallowtail
Fraxinus native. species	western tiger swallowtail
Quercus lobata, Q. wislizenii, Q. agrifolia	sad duskywing
Salix both glabrous and pubescent	willow hairstreak

Annuals

Lotus purshianus	eastern tailed blue, common hairstreak
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grass

Distichlis spicata	field skipper
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vine

Aristolochia californica (shade)	pipevine swallowtail
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Host Plants of Species that Recolonize Every Year

Lomatium californicum, Angelica, Perideridea, fennel, Conium maculatum, Heracleum lanatum (try in shade only)	anise swallowtail
Distichlis spicata	fiery and sandhill skippers
Scrophularia californica	buckeye

shrub

Eriogonum nudum	Acmon blue
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Annual

Lotus purshianus	Acmon blue
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Plants for Migrant species

Trees

Salix, Celtis, Ulmus	mourning cloak
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Perennials

Boraginaceae: heliotropium currasavicum	painted lady
Asclepias fascicularis	monarch
Asclepias speciosa	monarch

Weeds to manage if possible

Sources for plant lists

- Hedgerows for California Agriculture. 2004. Community Alliance with Family Farmers. Sam Earnshaw
- Field Guide to the Butterflies of the San Francisco Bay and Sacramento Valley Regions.

California sister feeds on *Quercus* species



Some favorite plants from these lists



Buckwheats: known
to attract insects with
their nectar and
pollen

native buckwheat
Eriogonum fasciculatum



Giant buckwheat

Eriogonum giganteum



- Giant buckwheat
Eriogonum giganteum
- Large plant needs fairly well-drained soil
- Attract a diverse selection of beneficial insects that eat pests

Some will continue bloom summer through fall
Eriogonum fasciculatum and *E. grande* var. *rubescens*)



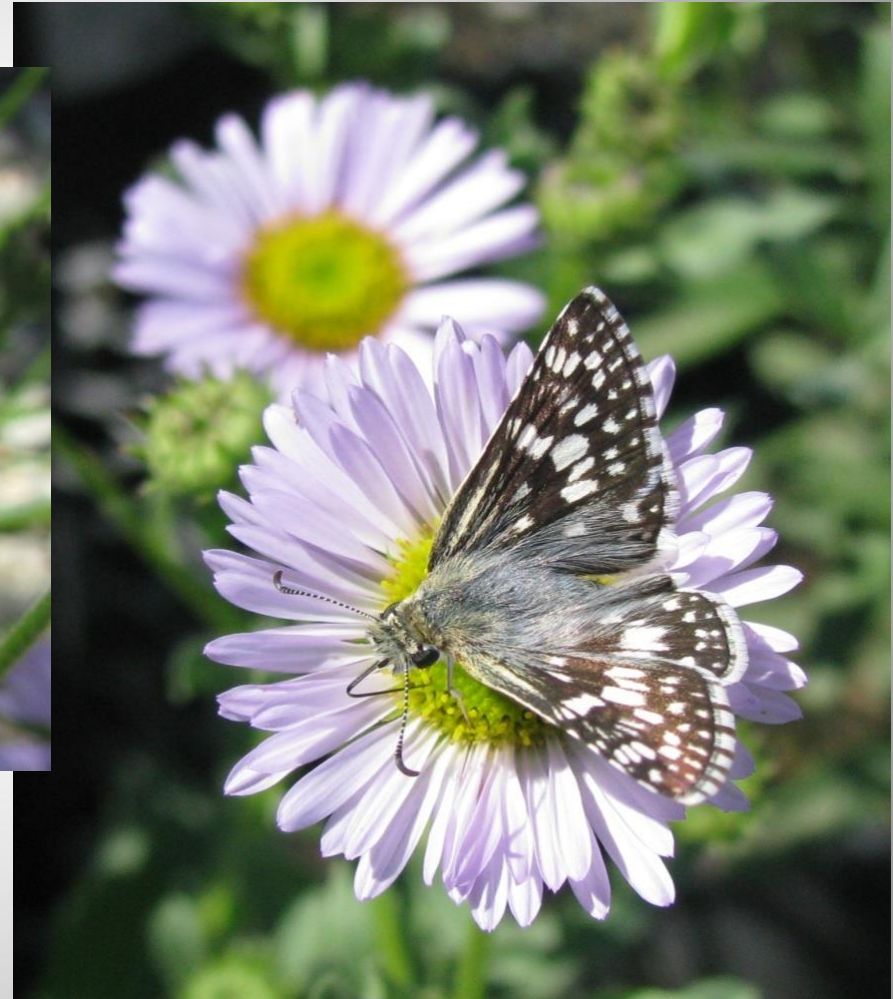
Goldenrod *Solidago californica* 'Cascade Creek'



- Great for bees and small butterflies
- Vigorous native perennial will crowd out weeds
- Mow to ground in late fall



Daisy family plants: Seaside daisy (*Erigeron* 'W.R.') attracts a variety of visitors over a long season



Ceanothus 'Concha'

- Spring bloom (March)
- Thick growth
- Evergreen foliage
- Taller to 4-6' but 8' wide
- Background or screen in large areas



California lilac for smaller yards

- *Ceanothus maritimus*
'Valley Violet'
- Need to be spaced close with other large plants like grasses
- Evergreen and dense



© Ellen Zagory

Important species: *Cercis occidentalis*, redbud



Daisy (Aster) family and mint family especially sages (*Salvia*)



Hummingbird sage *Salvia spathacea*



- More vigorous paler form called 'Las Pilitas'
- Will take part shade
- Hummingbirds and carpenter bees love it



California fuchsia *Epilobium canum*

Use more evergreen “needle leaf” forms, like ‘Bowman’s #1, Hurricane Point’

Tough and heat tolerant



Native hybrids for ground covers in shade

Heuchera 'Rosada' and *H. maxima*



Evergreen currant *Ribes viburnifolium*

- Perfect for full shade under oaks
- Shiny attractive foliage
- Maroon flowers
- Very drought tolerant



©UC Davis Arboretum

Important nectar source: *Triteleia* and
Brodiaea spring blooming bulbs



The most attractive plantings are combinations of Mediterranean and California plants—for structure in winter



- Spanish lavender (*Lavandula* 'Otto Quast')
- Catmint (*Nepeta X faassenii*)
- Toyon or Christmas berry (*Heteromeles arbutifolia*)
- Seaside daisy (*Erigeron* 'W.R.')

Expanding your plant palette:

Non-natives are also utilized by bees

Teucrium chamaedrys dwarf germander

- Dark-green evergreen leaves
- Pink flowers in spring
- Can be mowed “high” if necessary
- Adaptable to part sun/shade



Rosmarinus 'Mozart'

- Evergreen leaves
- Drought tolerant
- Nice dark blue color
- Grows fast to fill in
- Nice combined with native grasses or accent plants
- Winter adult butterflies



Mint bush *Salvia microphylla*

- Tolerates a wide variety of conditions sun or shade
- Cut to the ground if needed to rejuvenate
- Attractive red flower
- Hybrids in many other colors



Prostrate catmint *Nepeta X faassennii*



- Vigorous ground cover smothers weeds in summer
- Can be mowed in fall
- May have spaces in winter so need mulch
- Attractive to pollinators

UCD Arboretum demonstration plantings to help us to learn as well as teach visitors about bees and other pollinators

spring



fall



You can have many visitors to your plantings



- European honeybee
- Valley carpenter bees
- Bumblebees
- Small native bees
- Butterflies
- Hummingbirds



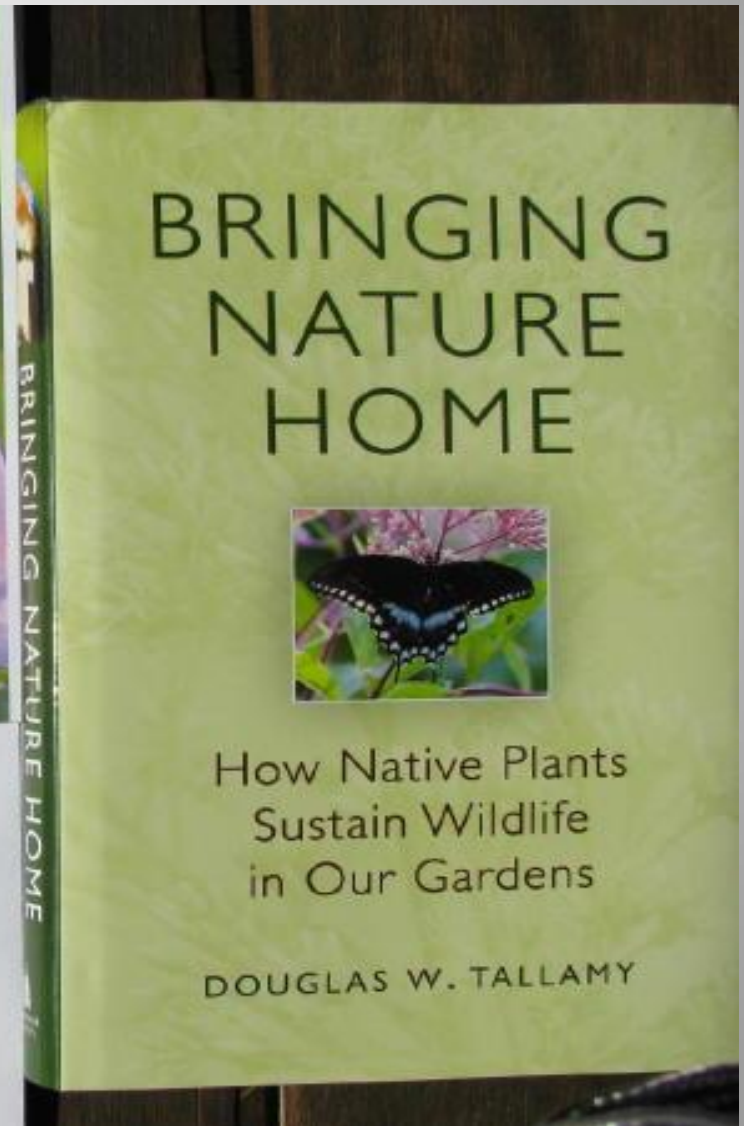
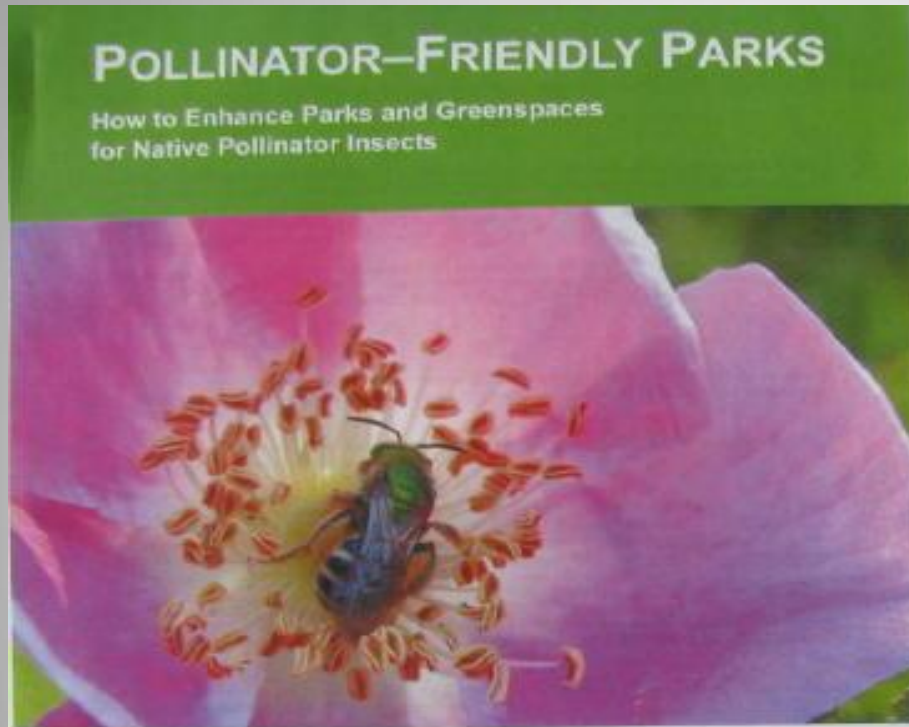
Hummingbird visits are daily on both native and non-native salvia



Where can I find out more?

- **The Xerces Society** (info@xerces.org)
 - Fact sheets: California plants for natives\ bees and butterflies
 - Booklet: Pollinator-friendly Parks
- **California Native Plant Society**
 - plant lists for Central Valley gardens
- **Ecolandscape California**
<http://www.ecolandscape.org/>
 - Upcoming events and conferences, CNPS plant list and resource list

Look for New Resources



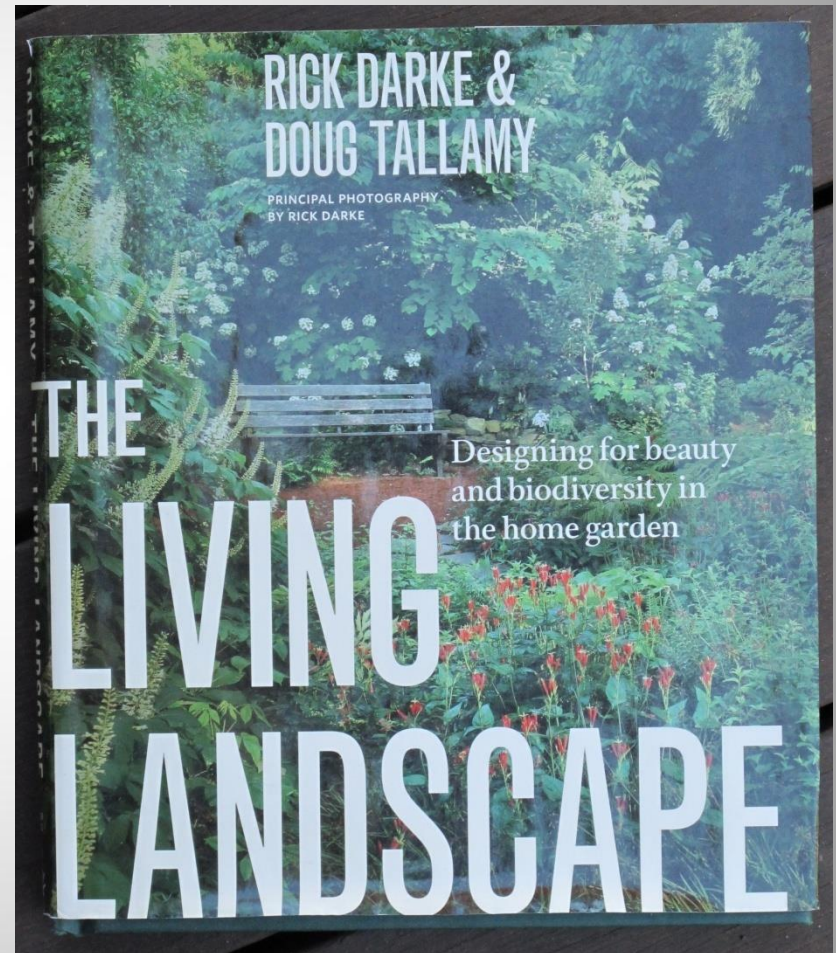
References

- *Butterflies of the SF Bay and Sacramento Region*, Shapiro and Manolis
- *California Bees and Blooms*, Frankie, Thorp, Coville and Ertter
- *Sibley Guide to Bird Life and Behavior*



Inspiration for this talk provided by

- An eastern garden
- Covers principles for design
- Plants not appropriate in our climate



More to come visit the Garden after!

- Honeybee Haven at Laidlaw Bee Facility UCD
- Afterward download resources



Plants of the Häagen-Dazs Honey Bee Haven Updated December 2014

- Use this list as a guide when you visit the garden
- Use this list to help you create your own bee garden

Water use will vary depending on exposure and soil:

VL = survives on normal rain but looks best with water every four to six weeks

L = water one time every three to four weeks

M = water one time every one to two weeks

H = water more than once per week

California native

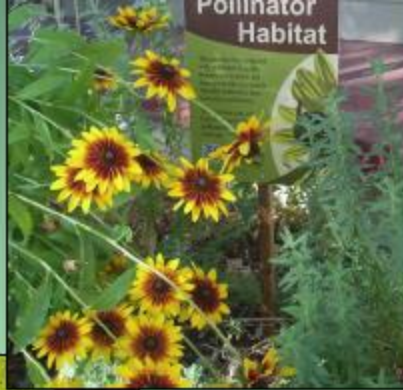


Common name	Genus	Species	Family	Water use
Annuals. These are seasonal and will not be in the garden year-round.				
Borage	<i>Borago</i>	<i>officinalis</i>	Boraginaceae	H
Honeywort	<i>Cerinthe</i>	<i>major</i> 'Purpurescens'	Boraginaceae	M
Farewell-to-spring	<i>Clarkia</i>	<i>amoena</i>	Onagraceae	VL
Chinese houses	<i>Collinsia</i>	<i>heterophylla</i>	Plantaginaceae	VL
Golden fleece	<i>Coreopsis</i>	<i>stillmanii</i>	Asteraceae	M
Tickseed 'Mahogany'	<i>Coreopsis</i>	<i>tinctora</i> 'Mahogany'	Asteraceae	M
Cosmos	<i>Cosmos</i>	<i>bipinnatus</i>	Asteraceae	M
California poppy	<i>Eschscholzia</i>	<i>californica</i>	Papaveraceae	VL
California poppy 'Sundew'	<i>Eschscholzia</i>	<i>caespitosa</i> 'Sundew'	Papaveraceae	VL
Globe gilia	<i>Gilia</i>	<i>capitata</i>	Polemoniaceae	VL
Delta sunflower	<i>Helianthus</i>	<i>annuus</i>	Asteraceae	L
Sunflower	<i>Helianthus</i>	<i>annuus</i> 'Lemon Queen'	Asteraceae	H
Golden lupine	<i>Lupinus</i>	<i>microcarpus densiflorus</i>	Fabaceae	VL
Arroyo lupine	<i>Lupinus</i>	<i>succulentus</i>	Fabaceae	VL

Basic requirements: food, water, shelter.

FOOD: Design your garden
to have year-round bloom.

- Use a mix of plant families. Good choices include the Rosaceae, Lamiaceae, Asteraceae, Scrophulariaceae, and Rhamnaceae families.
- Bees vary in size, flower color preference, and feeding styles. Accommodate this with flowers of varying shapes, sizes, and colors.
- Place several of the same plant together, rather than spreading them around the garden.



and honey bees use it for cooling the hive. They need a dry place to perch and drink.



SHELTER: Three types of shelter are needed:

Ground level

- Bare soil
- Pavers set in sand
- Rock crevices
- Stumps and logs

Above ground

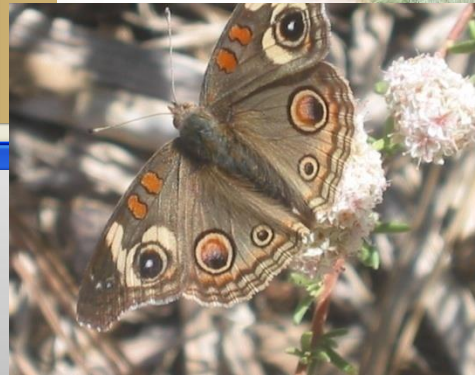
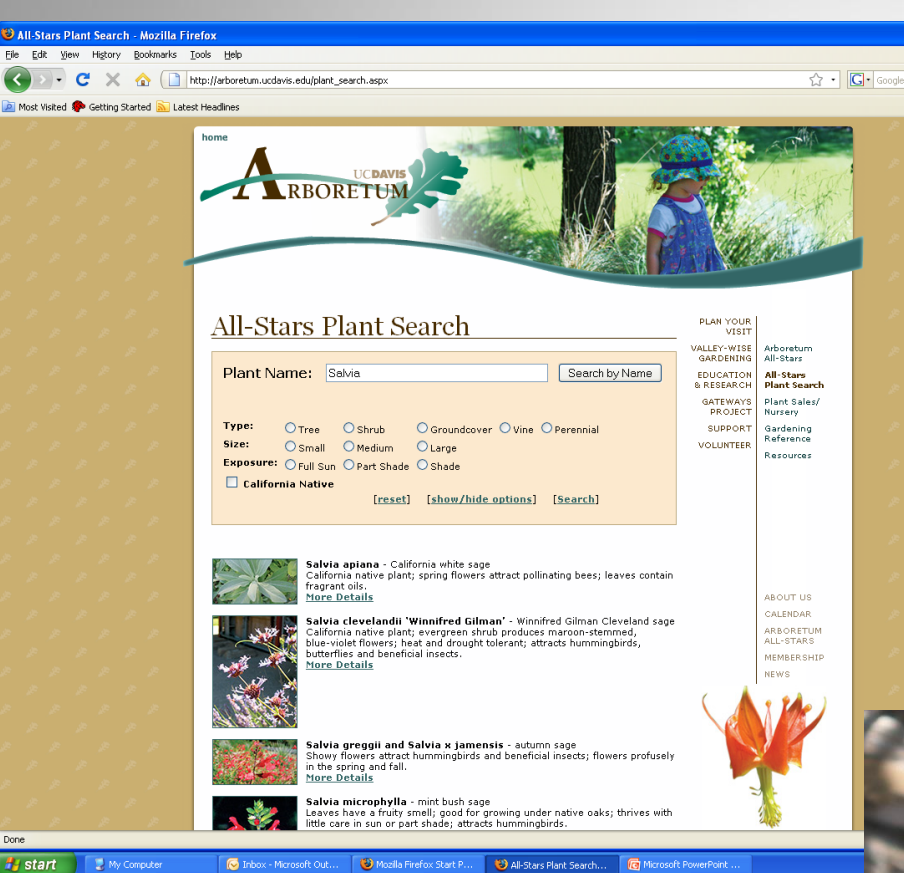
- Bee houses
- Grasses

Plant material

- Resin for propolis
- Foliage for leafcutter and carder bees



Visit our website for information on All-Stars <http://arboretum.ucdavis.edu>



Selected plants and use of layers will help you create a landscape that provides habitat for wild creatures

- Food (nectar, pollen, fruits and seed)
- Shelter (thick plantings)
- Nesting sites (trees, downed wood)

(Also provide dripping or flowing water if possible)



Your landscape will support wild creatures

- Provide diverse habitat even in small gardens
- Encourage more habitat by using natives in freeways, parks and greenbelts



If enough gardens --they could add up to a big impact

- Provide stepping stones between wildlife conservation areas
- Create a chain of refuges for migrating birds
- Contribute to environmental stability.



Wild creatures will thank you!



Questions?

