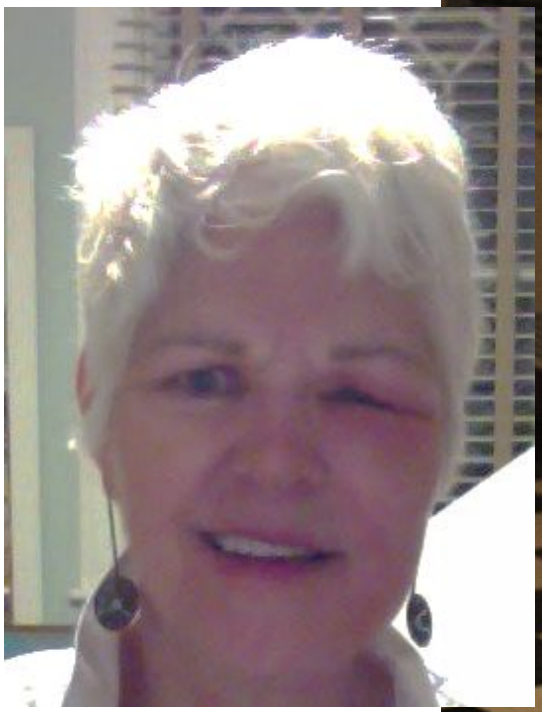
Making the World Safer for Pollinators,
One Campus At a Time

What is a BeeCampus?

- The Bee Campus USA program endorses a set of commitments, defined in an application, for creating sustainable habitats for pollinators, which are vital to feeding the planet.

  College students, faculty, administrators, and staff have long been among the nation's most stalwart champions for sustainable environmental practices. That's why our aim is for Bee Campus USA to become a national movement.

Phyllis Stiles, Founder and Director



Why Bee City USA was launched in 2012, & later, Bee Campus USA in 2015

Mystery Bee Disappearances Sweeping U.S.

National Geographic, February 23, 2007

What's Wrong With The Bees?

CBS News, October 25, 2007

Suddenly, the bees are simply vanishing

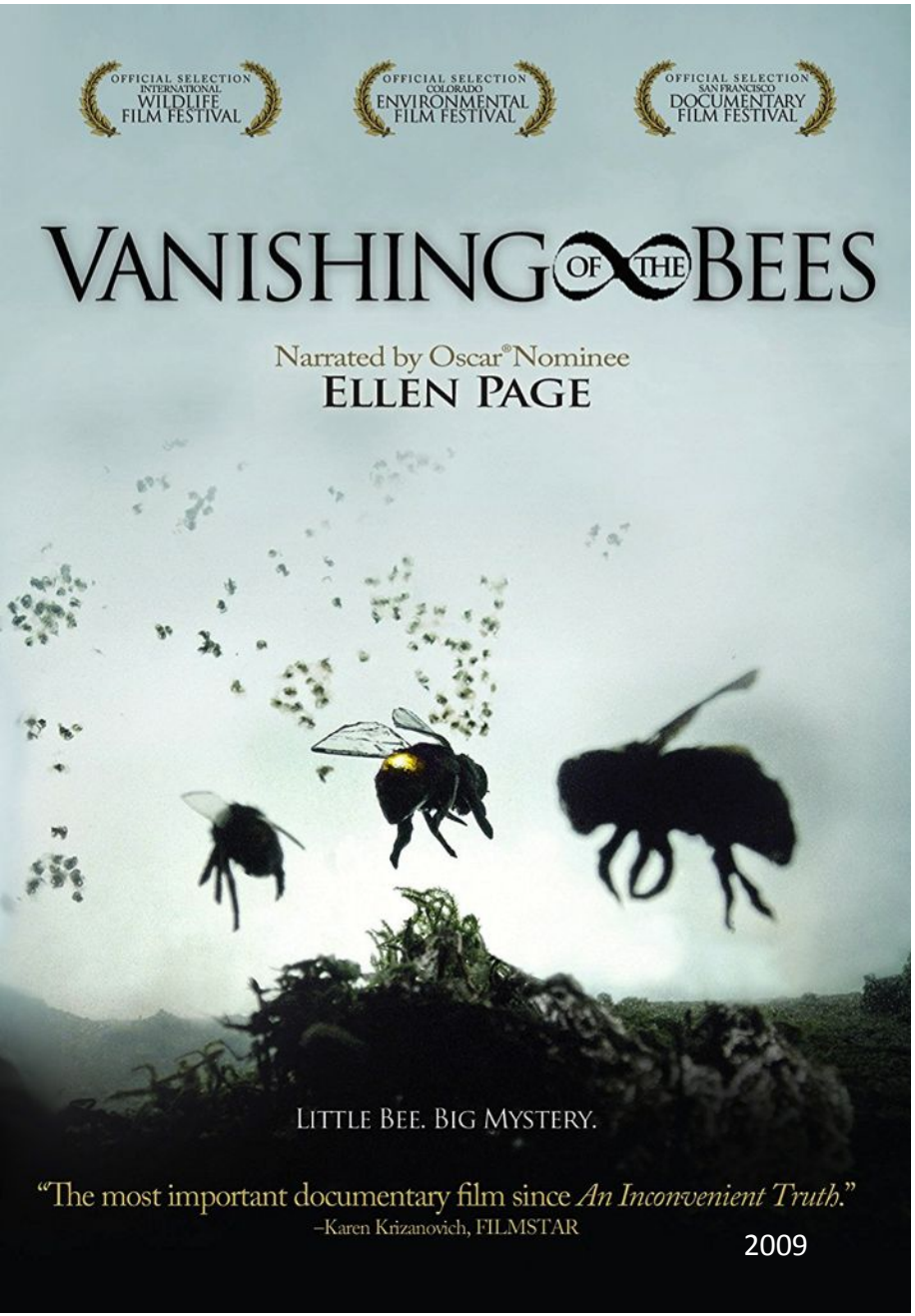
LA Times, June 10, 2007

Mystery Ailment Strikes Honeybees

The Associated Press, February 11, 2007

Deserted beehives, starving young stun scientists

USATODAY.com, April 30, 2007


OFFICIAL SELECTION INTERNATIONAL WILDLIFE FILM FESTIVAL
OFFICIAL SELECTION COLORADO ENVIRONMENTAL FILM FESTIVAL
OFFICIAL SELECTION SAN FRANCISCO DOCUMENTARY FILM FESTIVAL
VANISHING OF THE BEES
Narrated by Oscar® Nominee
ELLEN PAGE
LITTLE BEE. BIG MYSTERY.
"The most important documentary film since An Inconvenient Truth."
–Karen Krizanovich, FILMSTAR

2009


AUGUST 19, 2013
Zakaria: The new al-Qaeda threat / Ted Cruz / Foroohar: Yellen over Summers for Fed chief / Low Rolling in Vegas
TIME
A WORLD WITHOUT BEES
THE PRICE WE'LL PAY IF WE DON'T FIGURE OUT WHAT'S KILLING THE HONEYBEE
BY BRYAN WALSH
$4.99US $5.99CAN
time.com

2013

The assessment report on

POLLINATORS, POLLINATION AND FOOD PRODUCTION

SUMMARY FOR POLICYMAKERS

ipbes

UN's 2016 report says 40% of pollinator species are at risk of extinction

Rusty Patched Bumble Bee Listed Endangered, March 2017

Rusty patched bumble bee in Wisconsin, 2015

Insect pollination
is worth
an estimated

$163bn

a year
around the world

BBC NEWS

Bee City USA Mission

Leafcutter bees and mason bees carry their pollen under their abdomen rather than their back legs like most bees.

To galvanize communities to sustain pollinators, by providing them with healthy habitat, rich in a variety of native plants and free to nearly free of pesticides.

Some common pollinators –beetles (oldest known), bees, flies, moths, butterflies, hummingbirds, and bats.

Western Monarch populations continue to decline in 2017

- In spite of monitoring twice as many sites as in previous years, the Xerces society volunteers recorded the least amount of monarchs found since 2012.
- Weather is being taken into consideration as 2017 was a warmer than average year, California had huge wildfires and drenching rain and mudslides shortly after.
- Xerces.org/monarchs

Why are honey bees, monarch butterflies & other pollinators declining?

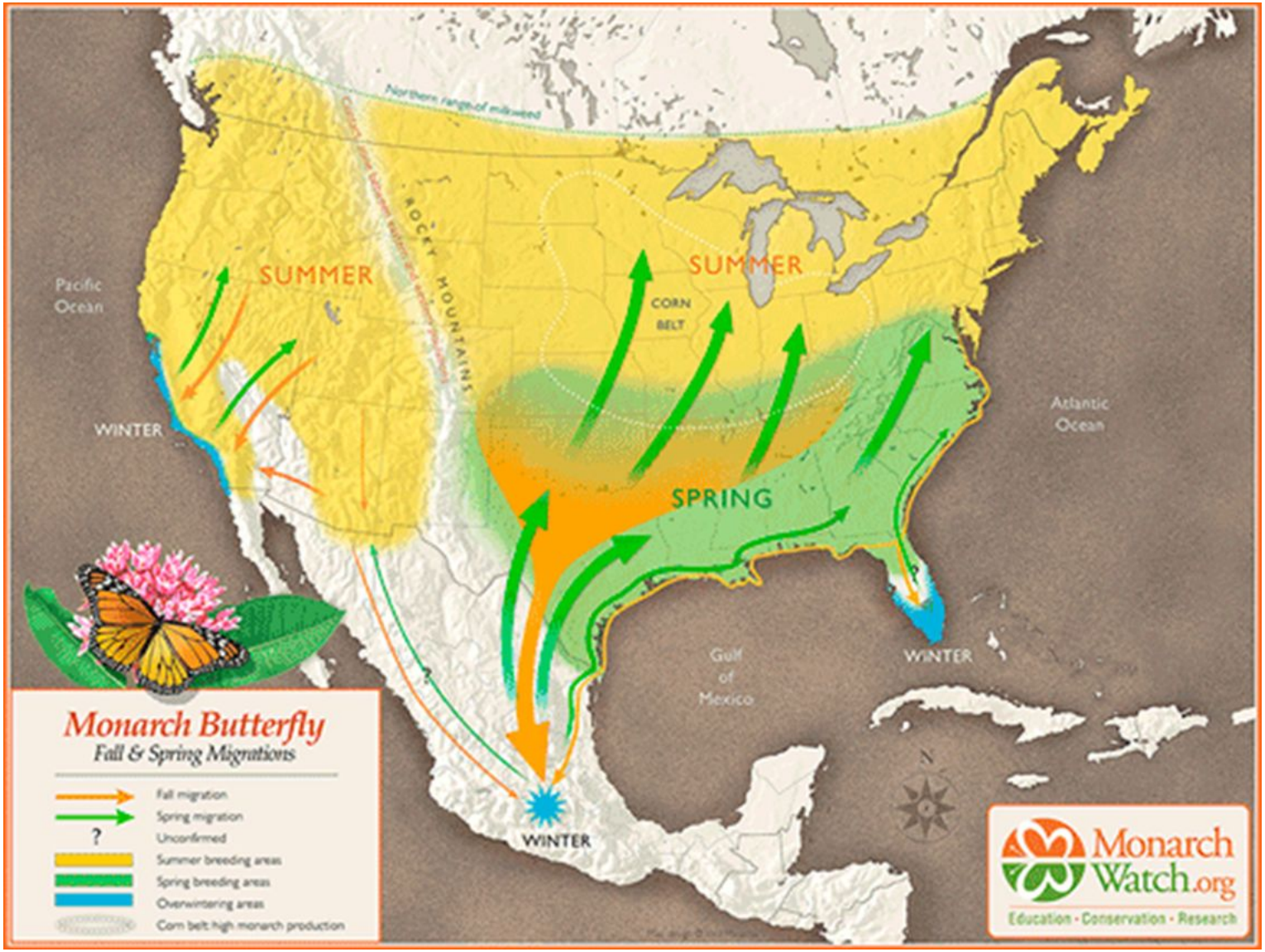
- Habitat loss (due to agriculture, development, invasive/exotic plant species) causing poor nutrition (quantity & quality) +
- Pesticides (insecticides, fungicides, herbicides) +
- Parasites (esp. Varroa mite) & Disease +
- Climate change +

Robin Stickney

Monarch at Hunter Welcome Center

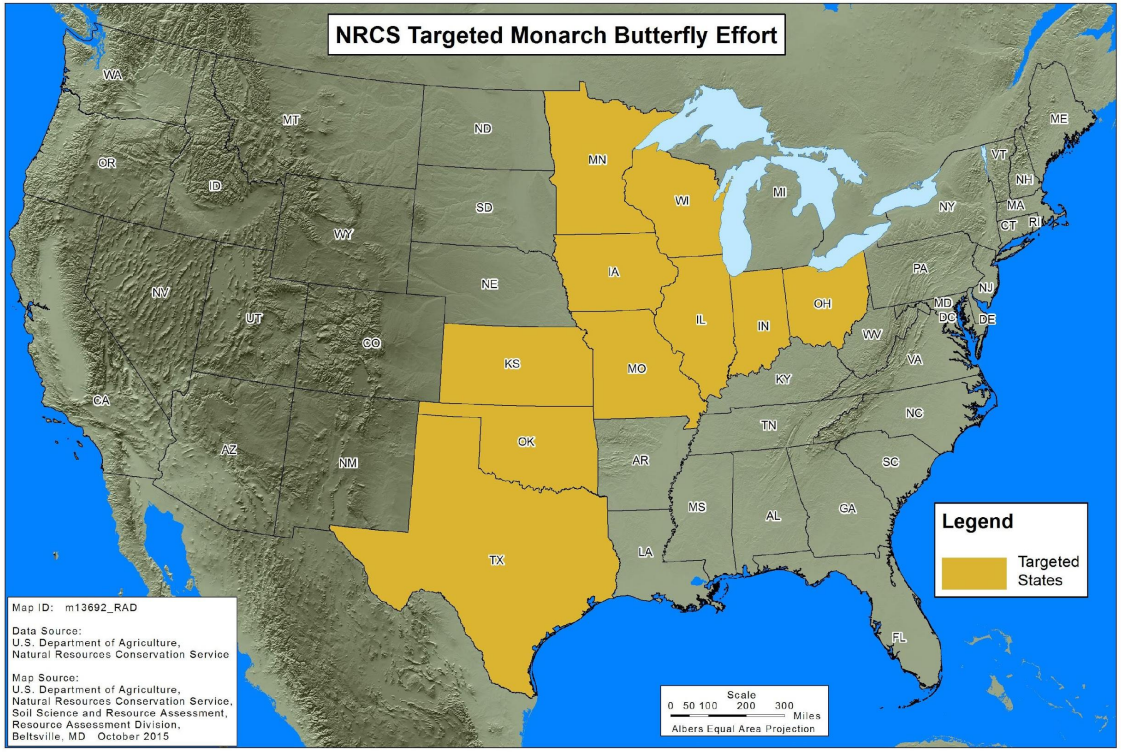
The 2008 & 2014 Farm Bills
Programs for Pollinator Conservation

- Prior to the 2008 Farm Bill, the USDA established conservation of pollinator habitat as a goal of the Conservation Security Program (now the Conservation Stewardship Program) (CSP) and a priority for the Conservation Reserve Program (CRP) State Acres for Wildlife (SAFE) practice
- The 2008 Farm Bill made pollinators and their habitat a priority for USDA, and authorized special consideration when determining payments for practices that promote pollinator habitat during Environmental Quality Incentive Program (EQIP) implementation.
- With the 2014 Farm Bill, Congress again recognized that pollinators are a crucial part of healthy agricultural and natural landscapes. The 2014 Act retains all of the pollinator conservation provisions of the 2008 Farm Bill and adds targeted support for the creation of honey bee habitat.
- 2016, Natural Resources Conservation Commission launches a 4 million dollar initiative to enhance pollinator protection across 10 states.



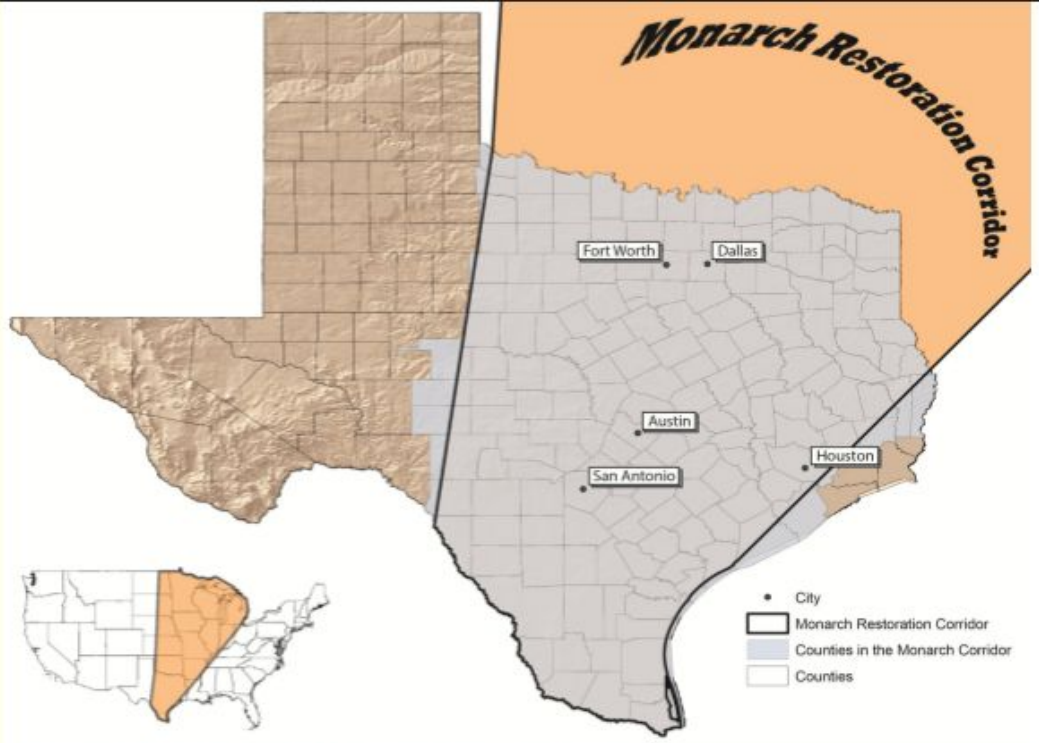
Pollinators in temperate zones have to address winter! Monarchs & hummingbirds migrate south.

Natural Resource Conservation Service
Targeted area for pollinator conservation



In 2016, $4 million dollars was set aside for improvement or establishment of pollinator gardens for schools, businesses or municipalities. These funds are no longer available.

PROJECT AREA



COUNTIES WITHIN THE PROJECT AREA:

Anderson	Burnet	Denton	Gregg	Jim Hogg	Limestone	Newton	Schleicher	Victoria
Angelina	Caldwell	DeWitt	Grimes	Jim Wells	Live Oak	Nolan	Shackelford	Walker
Aransas	Calhoun	Dimmit	Guadalupe	Johnson	Llano	Nueces	Shelby	Waller
Archer	Callahan	Duval	Hamilton	Jones	Madison	Palo Pinto	Smith	Washington
Atascosa	Cameron	Eastland	Hardeman	Karnes	Marion	Panola	Somervell	Webb
Austin	Camp	Edwards	Hardin	Kaufman	Mason	Parker	Starr	Wharton
Bandera	Cass	Ellis	Harris	Kendall	Matagorda	Polk	Stephens	Wichita
Bastrop	Chambers	Erath	Harrison	Kenedy	Maverick	Rains	Stonewall	Wilbarger
Baylor	Cherokee	Falls	Haskell	Kerr	McCulloch	Real	Sutton	Willacy
Bee	Clay	Fannin	Hays	Kimble	McLennan	Red River	Tarrant	Williamson
Bell	Coleman	Fayette	Henderson	Kinney	McMullen	Refugio	Taylor	Wilson
Bexar	Collin	Foard	Hidalgo	Kleberg	Medina	Robertson	Throckmorton	Wise
Blanco	Colorado	Fort Bend	Hill	Knox	Menard	Rockwall	Titus	Wood
Bosque	Comal	Franklin	Hood	La Salle	Milam	Runnels	Tom Green	Young
Bowie	Comanche	Freestone	Hopkins	Lamar	Mills	Rusk	Travis	Zapata
Brazoria	Concho	Frio	Houston	Lampasas	Montague	Sabine	Trinity	Zavala
Brazos	Cooke	Gillespie	Hunt	Lavaca	Montgomery	San Augustine	Tyler	
Brooks	Coryell	Goliad	Jack	Lee	Morris	San Jacinto	Upshur	
Brown	Dallas	Gonzales	Jackson	Leon	Nacogdoches	San Patricio	Uvalde	
Burleson	Delta	Grayson	Jasper	Liberty	Navarro	San Saba	Van Zandt	

This topic is important enough for the Federal Government to provide funding through multiple agencies for protecting or enhancing pollinator habitat.

US Fish & Wildlife *https://www.fws.gov*

Natural Resource Conservation Service
*https://**www.nrcs.usda.gov***

Farm Services Agency
*https://**www.fsa.usda.gov***

Monarch Math

In **4 generations** over the course of **1 year**,
if half were females & all survived to adulthood & reproduced,
1 monarch butterfly's offspring of **300**
could multiply to

1,012,500,000

WORKSHEET

Assumptions at each generation (in this example):

- Half of the offspring are female
- Each female lays 300 eggs
- All of the offspring survive

First Generation (children):

1 female x 300 eggs = 300 children (150 of the offspring are females)

Second Generation (grandchildren):

150 females x 300 eggs = 45,000 grandchildren
(22,500 of the offspring are females)

Third Generation (great-grandchildren):

22,500 females x 300 eggs = 6,750,000 great-grandchildren
(3,375,000 of the offspring are females)

Fourth Generation (great-great-grandchildren):

3,375,000 females x 300 eggs = 1,012,500,000 great-great-grandchildren

https://www.learner.org/jnorth/tm/monarch/sl/10/OneBillion.html):

Monarch on *Eupatorium greggi*


By Gayenell Rainwater


By Gayenell Rainwater

Brown Library was converted to partial rose garden (Drift roses) with the front bed being a pollinator garden.

Rose rosette disease at Hunter Welcome Center

Why Should We Care Whether Pollinators Are Declining?

Global Food Web

Honey bees on wingstem by Kim Bailey

90% of wild plant species rely on pollinators for reproduction; most species rely on those plants for food & shelter

Effects of losing 90% of pollinator habitat

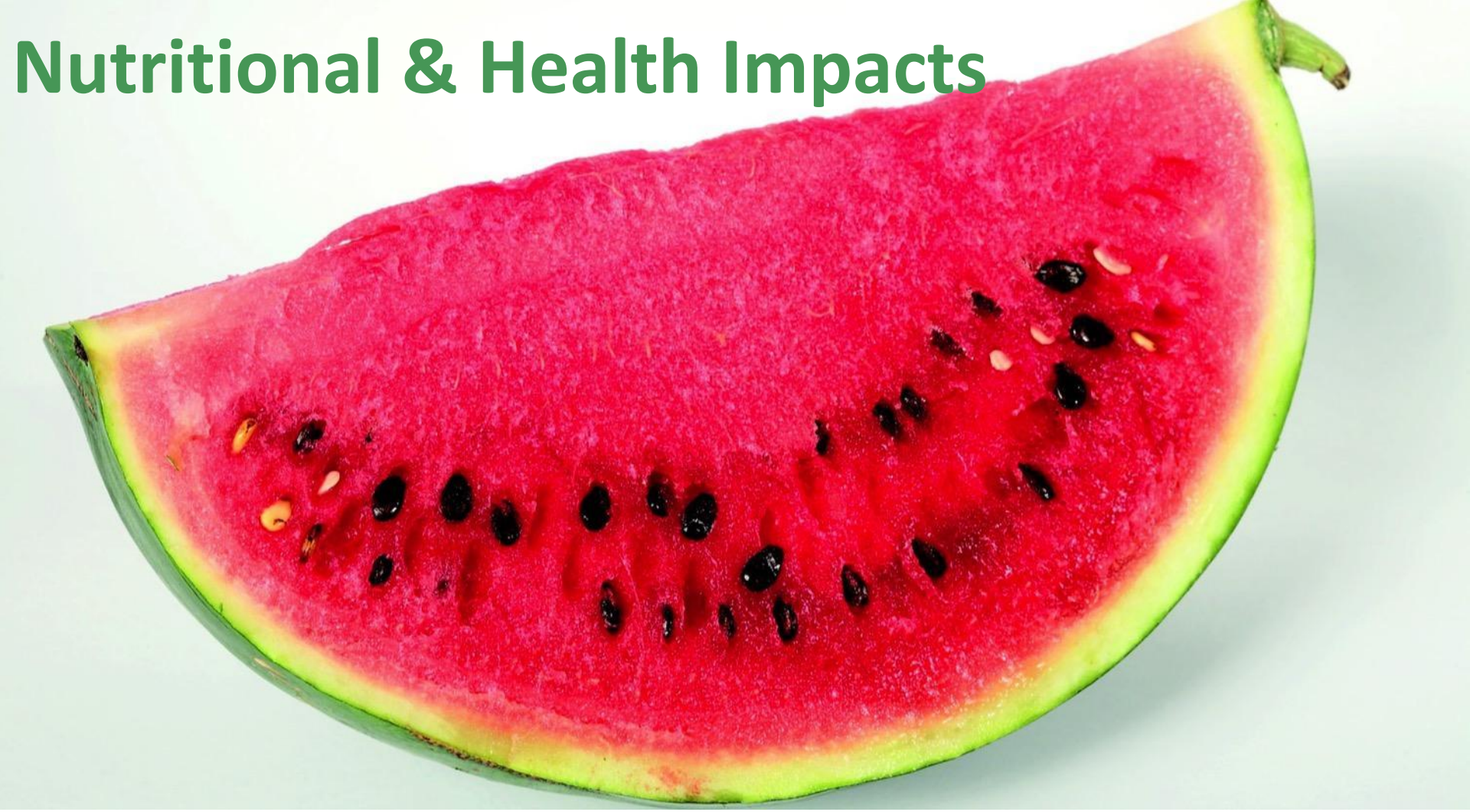
- Lose $4.5 Billion annually in US (value of naturally occurring insect predators & parasitoids present in “pollinator habitat”)
- Pest & weed control assistance
- Overall biodiversity & ecosystem services
- Removal of up to 97% of soil sediment before entering streams & 40%-94% reduction of nitrogen in crop fields before entering surface water
- Habitat & food for other wildlife, especially birds (90% feed only insects to their young)

"Human beings have fabricated the illusion that in the 21st century they have the technological prowess to be independent of nature.

Bees underline the reality that we are more, not less, dependent on nature's services in a world of close to 7 billion people."

U.N. Environment Program Executive Director Achim Steiner and U.N. undersecretary-general, 2011

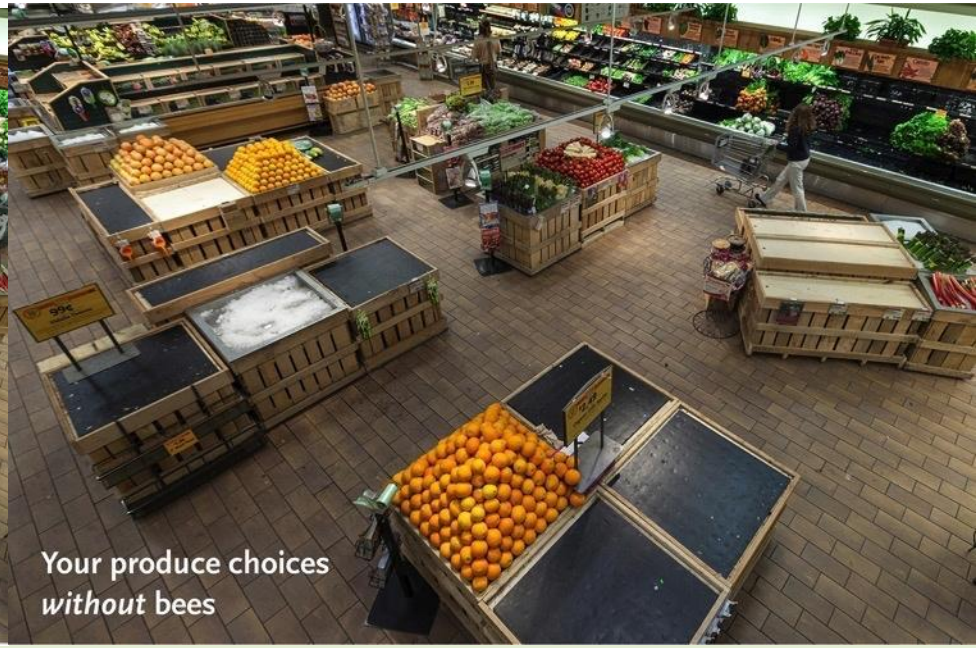
Nutritional & Health Impacts



90% of Watermelon crops are pollinated by native bees.
1 in 3 bites of all of our food can be attributed to pollinators.

What's missing in this Whole Foods produce section after staff removed products that required bees' help? Apples, avocados, bok choy, broccoli, broccoli rabe, cantaloupe, carrots, cauliflower, celery, cucumbers, eggplant, green onions, honeydew, kale, leeks, lemons, limes, mangos, mustard greens, onions, summer squash and zucchini (52% of produce).

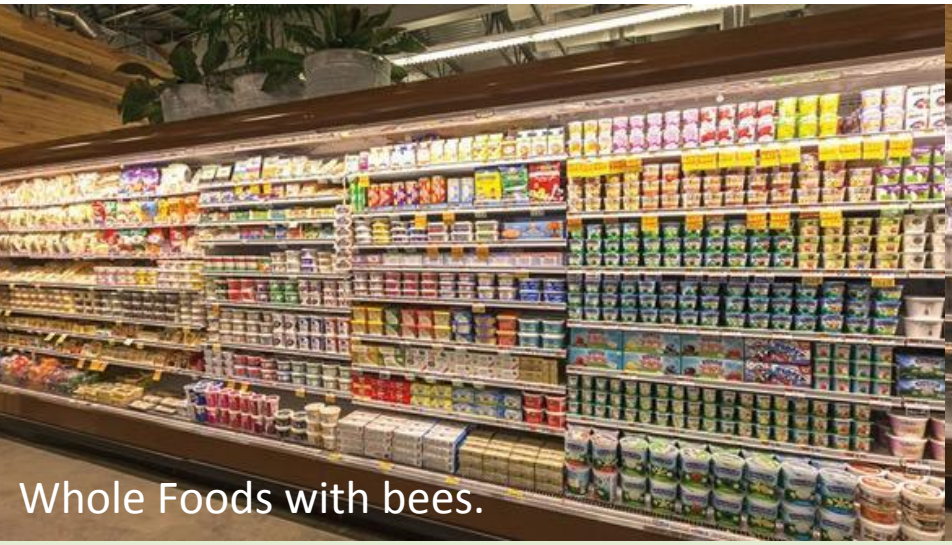
Photos: Whole Foods



75% of crops rely on pollinators for seed/fruit set & improved quality or increased yield)

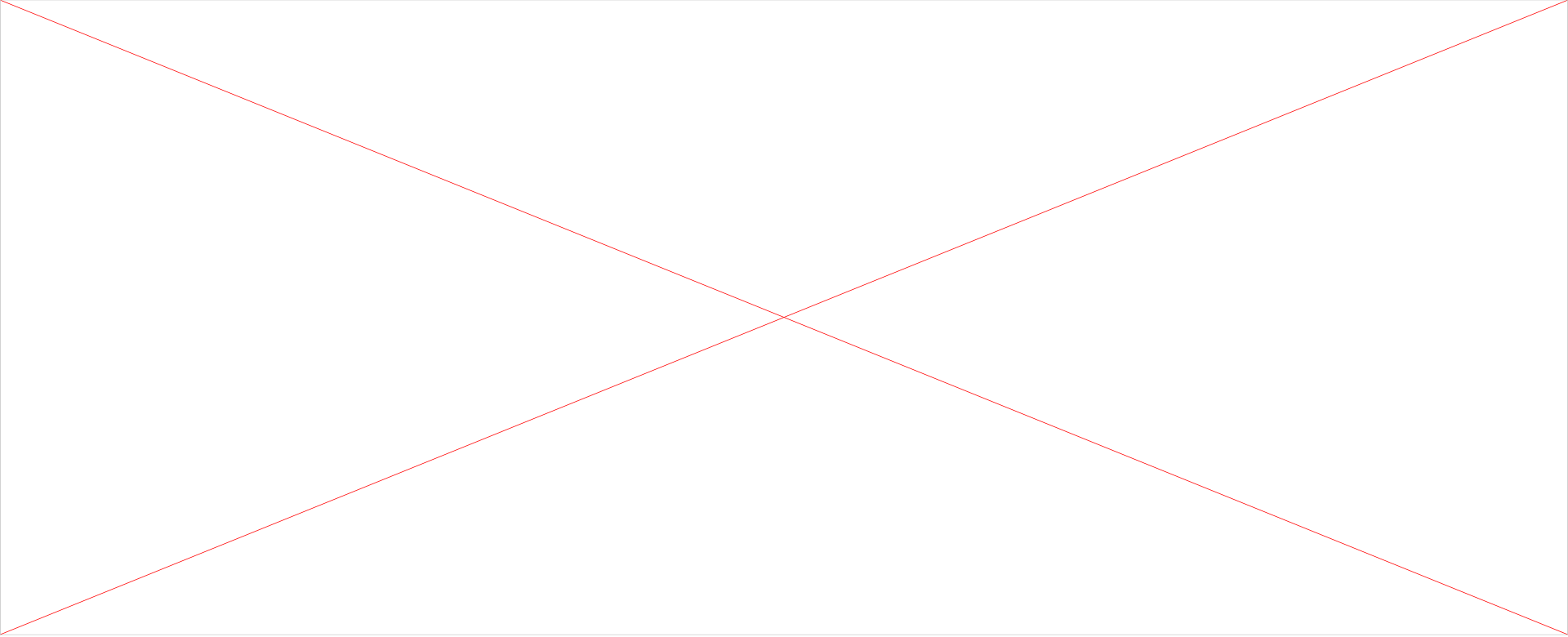
Dairy Products

Photos: Whole Foods


Whole Foods with bees.


Whole Foods without bees.

Cattle need clover and alfalfa to make milk. Clover and alfalfa require pollinators to reproduce.



Pollinator workhorses (20K+ species in world; 3.6K in US)

- Pollen: only source of protein
- 70% nest in ground
- Honey & bumble bees--social; others--solitary (i.e. not defensive!)
- Most live out lives within few hundred yards of birthplace

Agricultural Economic Impacts

- Total value of pollination worldwide estimated at $235-$577 billion
- Well pollinated crops look better, taste better, & have longer shelf-life.
- Volume of production of pollinator-dependent crops has increased by 300% over last 5 decades, making livelihoods increasingly dependent upon pollinators

From UN Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Thematic Assessment of Pollinators, Pollination and Food Production Report: Summary for Policy Makers, 2016 Photo: By Louisa Hooven/Oregon State University (Flickr) [CC BY-SA 2.0 (https://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons

PLANETARY RESILIENCY
Biodiversity=
Insurance Against Climate Change

- More pollinators = more plants
- More plant species = more species wildlife & greater chance surviving diseases/pests
- More well adapted plants = more stored carbon & water filtered into soil (vs. damaging run-off)

Bee City/Campus USA Focus

- Habitat loss (due to agriculture, development, exotic/invasive plant species) causing poor nutrition (quantity & quality) +
- Pesticides (insecticides, fungicides, herbicides) +
- Parasites (esp. Varroa mite) & Disease +
- Climate change +

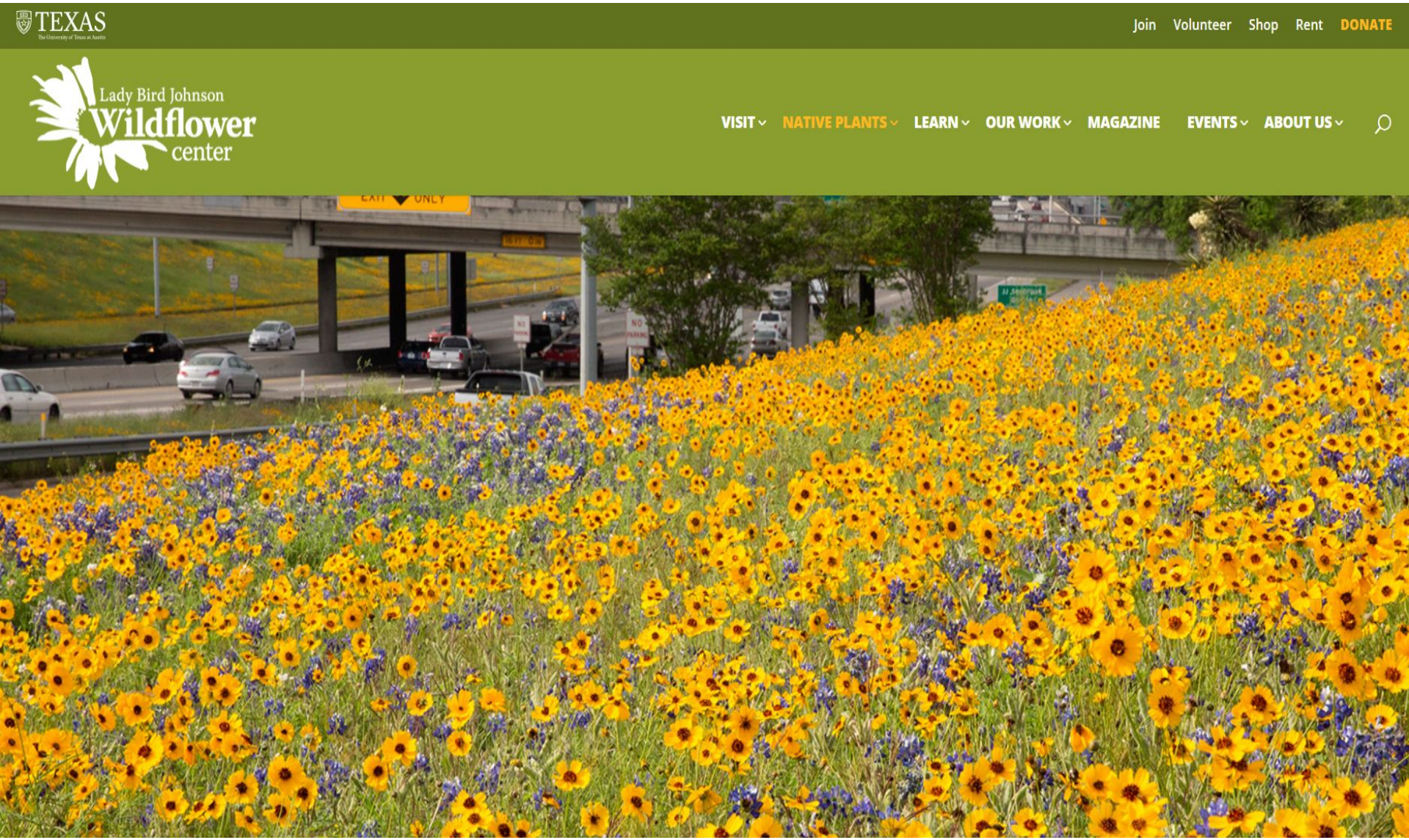
Photo: Robin Stickney

On average, each American uses 3.5 pounds of pesticides annually per capita

Bee Campus USA Commitments

- Committee (grounds staff, faculty, students, administrators)
- Signage about pollinators
- Service learning
- Include in at least 1 course every 2 years
- Pollinator Habitat Plan: Recommended native plant species list & Least toxic IPM plan
- Annual renewal with report of accomplishments

Signage is a must



Don’t know what to plant? Check out Wildflower.org/texas

List for Pollinator Gardens

Hunter Welcome Center pollinator gardens

Blue Mistflower – *Eupatorium greggi*
Augusta Duelberg salvia – *Salvia farinacea*
May Night salvia – *Salvia sylvestris*
Hot lips salvia – *Salvia microphylla*
Limerock Ruby Tickseed – *Coreopsis*
'Summer Pastel' Yarrow - *Achillea millefolium*
Autumn sage 'Moonlight' – *salvia greggi*
Flame Acanthus – *Anisacanthus quadrifidus*
Angelita 'Four Nerve' daisy – *Tetraneuris acaulis*
Tropical milkweed – *Asclepias curassavica*
Praire coneflower 'Cheyenne Spirit' – *Echinacea purpurea*
Autumn sage 'Sierra pink' – salvia greggi
Dwarf Mexican petunia 'Katie'– *Ruellia brittoniana*
Knock Out Rose 'White Out' – *Rosa radwhite*
Drift Rose 'Apricot'– *Rosa hybrid*
Indian Hawthorn 'Olivia' – Rhaphiolepsis olivia
Butterfly bush 'Black Knight' – *Buddlea davidii*
Fall Aster – *Symphotricum oblongifolium*
Mealycup sage – *Salvia farinacea*
Crape Myrtle– Lagerstromia indica x fauriei 'Natchez'
Juniper 'Brodie' – *Juniperus virginiana*

Brown Library pollinator gardens

Drift Rose 'Coral' – *Rosa hybrid*
Drift Rose 'Peach' – *Rosa hybrid*
Indian Hawthorn 'Pinkie' – *Rhaphiolepsis indica*
Chaste Tree 'Shoals Creek' – *Vitex agnus-castus*
Chaste Tree 'Daytona Heat Dale' – *Vitex agnus-castus*
Lavender 'Phenomenal' – *Lavendula intermedia*
Fall Aster – *Symphotricum oblongifolium*
Chinese privet – *Ligustrum sinese*
Holly 'Nellie R. Stevens' – *Ilex aquifolium x Ilex cornuta*
Yaupon holly – *Ilex vomitoria*
Crape Myrtle– Lagerstromia indica x fauriei 'Natchez'
Yucca 'Brakelights Red' – *Hesperaloe parviflora*
Turk's cap – *Malvaviscus arboreus var. drummondii*
Blue Mistflower – *Eupatorium greggi*
Prairie Coneflower – *Echinacea purpurea*

Plant it and they will come!

Phyllis Stiles found this egg on newly sprouted milkweed on April 15, 2017 (Easter weekend) laid by monarch mother migrating northward from Mexico—2000 miles!

CITIZEN SCIENCE
Report and follow monarch migration!

Journey North:
www.learner.org/jnorth/sightings/

Hunter Welcome Center
Pollinator Garden

Bye bye Knock Out Roses

Hello pollinator habitat

Non-migrating [insect] pollinator habitat needs

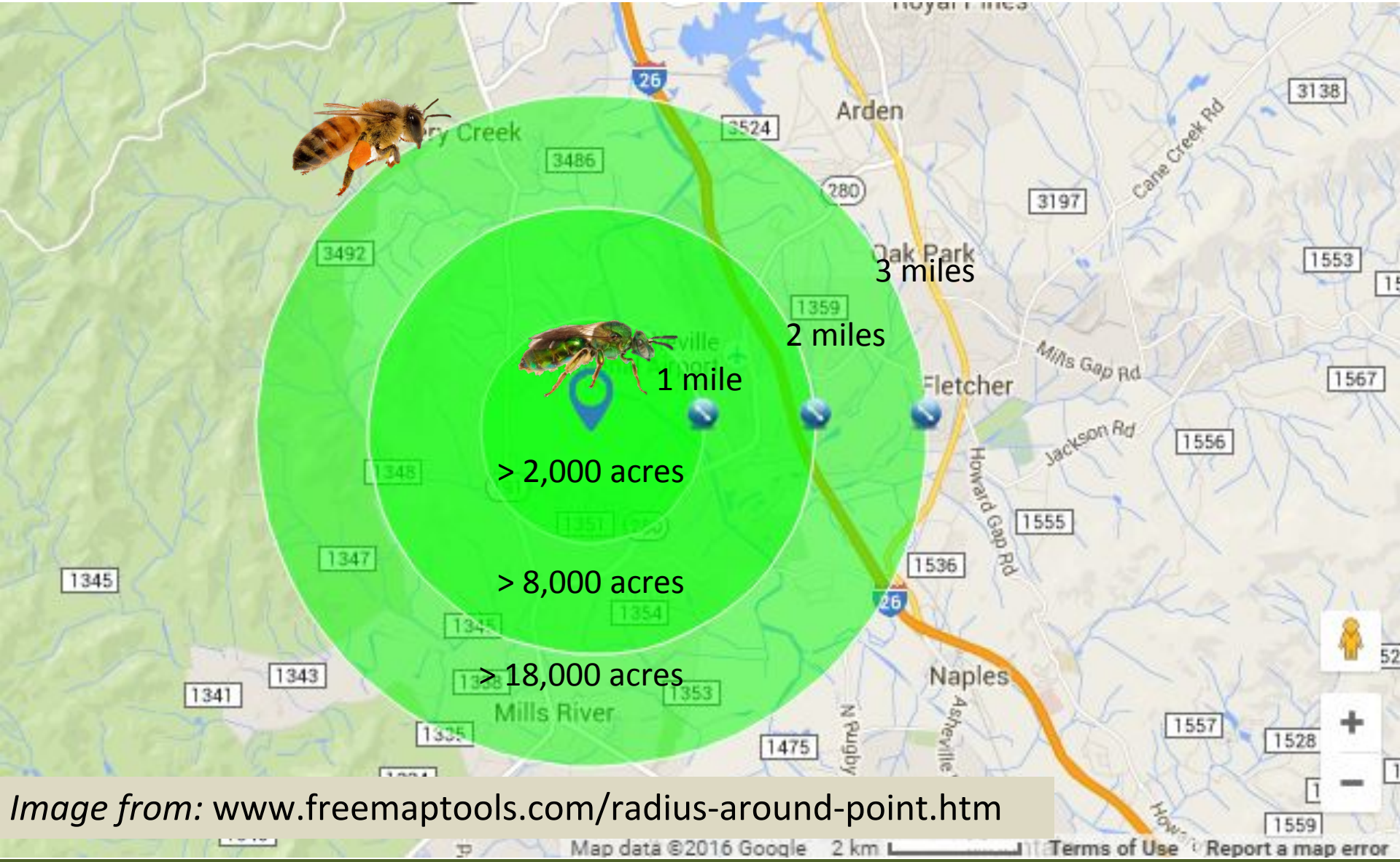


Image from: www.freemaptools.com/radius-around-point.htm

Except for honeybees, most pollinators live out their lives few 100 yards from where they were born!

Integrated Pest Management plan

- The EPA defines IPM like this:
- Integrated Pest Management is an environmentally sensitive approach to pest management that relies on a common sense practices.
- Good IPM programs rely on current information about the life cycle of pests and their interaction with the environment.
- This information, in combination with current pest control methods is used to minimize pest damage, the most economical way with the least amount of risk to people, property, and the environment.

- 1. **Set Thresholds** – at what point does this pest require treatment due to economic damage .
- 2. **Monitor & Identify** – know all insects in the area, not all are pests.
- 3. **Prevention** – Know what plants attract specific pests, use cultural practices like choosing other varieties.
- 4. **Control –** choose methods such as weeding, pheromones, trapping, or targeted spraying rather than broadcast, do research and choose less risky options.

Carpenter bee house

Provide areas where solitary bees like carpenter bees and masonry bees can reside. A single mason bee is equivalent to 120 honey bees in the pollination it provides.

Sofia Dill helps harvest honey at Randolph College Organic Garden in Virginia

Earth week April 2017

Provide continuing education, whether it be as a guest speaker at an event, or specific coverage in a semester long class.
Mark Hedley, Spiral Horn Apiary, Summer PGMS meeting 2017

Having Markers made ‘in house’ involved our Creative Services department and our Maker Lab, turning it into a community effort.

ACUgreen

Online | On-Campus | Admissions & Aid | Life at ACU | Athletics | About ACU | Alumni

About ACU > Offices > Sustainability | ACU

IN THIS SECTION
Offices

Bee Campus USA

Our campus continues to foster an ongoing dialogue to raise awareness of the role pollinators play in our communities and what each of us can do to provide them with healthy habitat. After all, one in three bites of food we eat is courtesy of insect pollination.

LEARN MORE

OUR POLLINATOR GARDENS

Feral Cat Initiative

The Feral Cat Initiative involves humanely capturing cats, neutering and vaccinating them, then returning them to campus. More than 100 cats have been spayed and neutered since the program began four years ago. About 70 "wild" cats make campus their home.

LEARN MORE

Tree Campus USA

ACU has been recognized as a Tree Campus USA by the Arbor Day Foundation for the third straight year. We continue making a commitment to planting and maintaining our trees to help reduce the amount of energy our campus needs to generate.

LEARN MORE

OUR ARBORETUM

"In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught."

Baba Dioum, Senegalese Forestry Engineer

(

General Benefits of Affiliation with Bee City/Campus USA

1. Helps ensure **survival of ecological keystone species**
2. Raises community awareness with signage, brings more visitors to campus.
3. Demonstrates **model for attractive pollinator-friendly landscaping** to community
4. **Educates** students by involving them in projects, speaking to their classes, creating curiosity about their environment.
5. Provides a sense of pride or ownership in the campus by students and staff that have been involved.
6. Supports **local honey**

Direct Benefits of Affiliation with Bee City/Campus USA

1. **Institutionalizes commitment.**
2. **Accountability** for achieving pollinator conservation results each year--shared with network & public through annual reporting
3. **Whole is greater than sum of its parts**: Being part of national network, enhances credibility for local efforts & offers opportunities to influence state/national policies & initiatives
4. Optional affiliate **network conference calls & webinars** with experts to promote collaboration & teaching and learning among affiliates
5. **Ongoing affiliate support** to assist with campus impact including current information about research & national trends in pollinator conservation through e-newsletters, website & Facebook page, + timely press release templates to bring local attention to pollinator issues
6. Access to online tools & documents, as well as **shared resources** for program promotion – posters, brochure templates, T-shirt designs, bee decals, pollinator garden signs, etc.
7. AASHE **STARS Grounds Certification exemplary practice credit points**

What will you do to help the pollinators?

www.beecampususa.org

Follow Bee City USA on Facebook & Twitter

beecampususa@gmail.com

#beecampususa

828-545-4282

Bumble bee in squash flower by Nancy Adamson

Register your Garden

- Millionpollinatorgardens.org
- Monarchwatch.org
- https://www.learner.org/jnorth/monarch