

Welcome to WRP Natural Resources Committee Webinar on the Monarch Butterfly

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- We look forward to your input on this webinar
- Please be sure your phone is on mute (and not hold) This will ensure we will not have noise distractions on the webinar (such as beeps, other conversations, etc.)
 - *A phone can be muted on the phone or through Adobe Connect*
- Please let us know if you have any questions or comments by using the chat box



WRP

WESTERN REGIONAL PARTNERSHIP

Western Regional Partnership

*Reliable Outcomes for America's Defense, Energy,
Environment and Infrastructure in the West*

www.wrpinfo.org

August 2016

WRP Vision and Mission



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WRP Vision

WRP will be a significant resource to proactively identify and address common goals and emerging issues and to develop solutions that support WRP Partners.

WRP Mission

WRP provides a **proactive and collaborative framework for senior-policy level Federal, State and Tribal leadership** to identify **common goals and emerging issues** in the states of Arizona, California, Colorado, Nevada, New Mexico and Utah and to **develop solutions that support WRP Partners and protect natural resources, while promoting sustainability, homeland security and military readiness.**

Today's WRP Natural Resources Committee Webinar on the Monarch Butterfly

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- This presentation will be conducted by Dr. Julie McIntyre, Southwest Region Monarch Lead, U.S. Fish and Wildlife Service and will cover:
 - ▣ The Monarch Butterfly current status (life cycle, stressors, survival, migration) and habitat
 - ▣ Efforts undertaken to help support the Monarch (i.e. National Pollinator Strategy 2015, Partnerships, education and outreach)
 - ▣ Opportunities to help support the Monarch Butterfly

In 2015, WRP Natural Resources Committee asked WRP partners for their input on species of concern (report in the file share). The Monarch Butterfly was one of the top species of concern if listed.

Monarch Conservation: a focus on the Southwest

Julie McIntyre, Southwest Region Monarch Lead

U.S. Fish and Wildlife Service

Western Regional Partnership Webinar

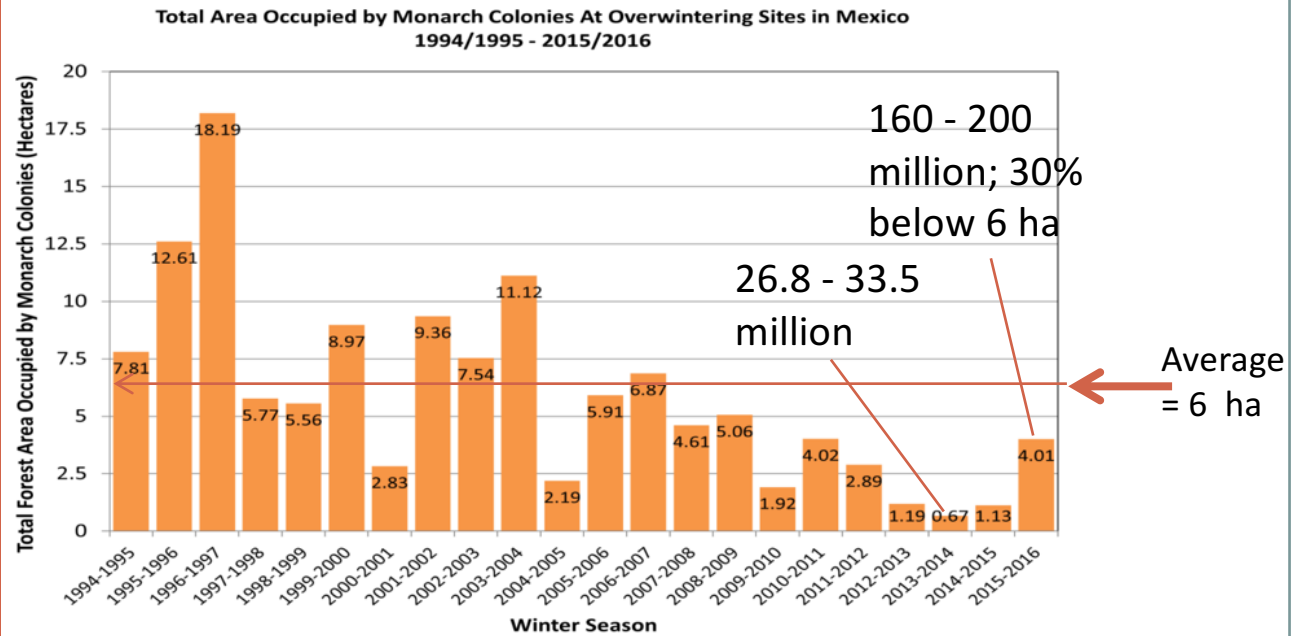
2 August 2016



USFWS Photo
Monarch on Common Milkweed

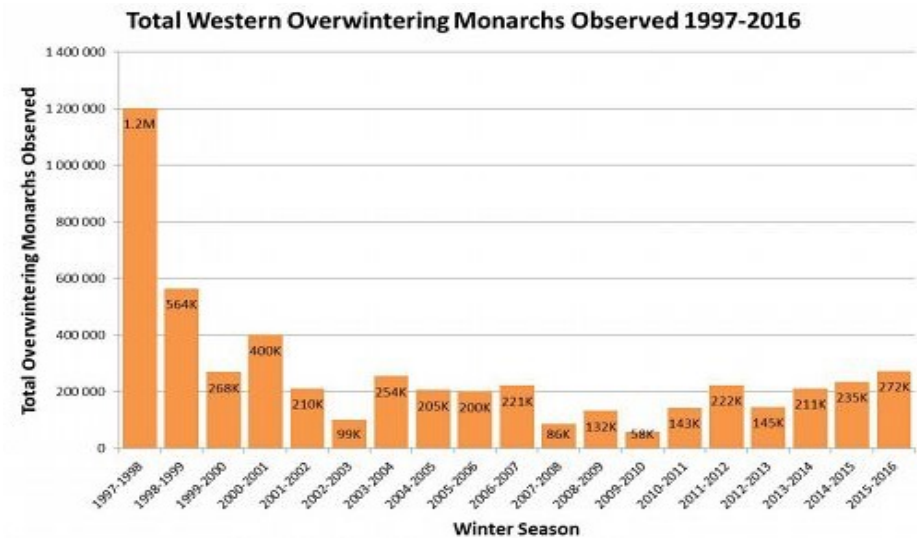
Why monarchs, why now?

- Lowest numbers ever in 2014 – 20 year decline
- Winter colony area decline in Mexico
- Winter colony numbers down in US – California
- Monarch migration at risk
- IUCN Red List: Endangered Phenomenon (1983)
- WWF: Top 10 Species to Watch (2010)
- Endangered Species Coalition “Vanishing” list (2014)
- August 2014 petition to USFWS to list as Threatened



July 2016 report:
1997-2014 = 74% decline CA overwintering sites; 12% population decline /year (Pelton et al. 2016)

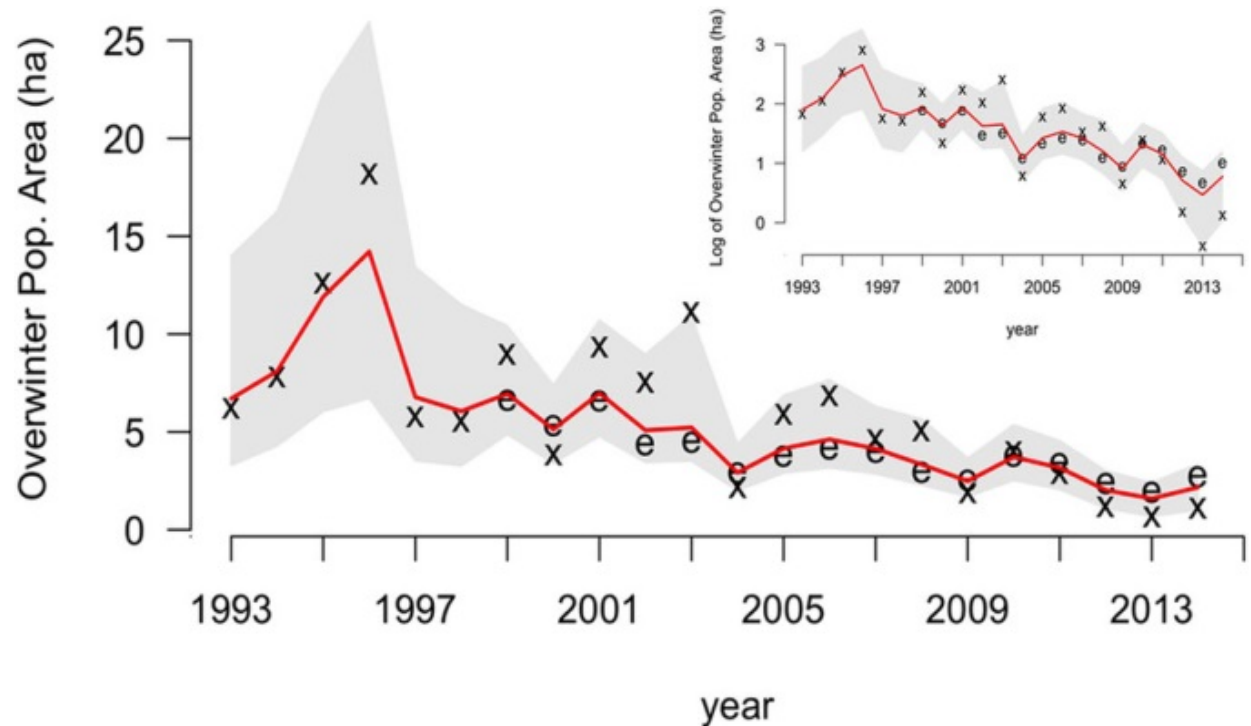
In CA, cluster at 400+ recorded sites



Quasi-extinction risk for Eastern migratory monarchs

- Population has 11-57% probability of quasi-extinction over 20 yrs.
- Driven by: very high population fluctuations, declining numbers, small current population size (Semmens et al. 2016)
- 40 million monarchs/ac

Model estimated annual overwintering population size with 95% credible intervals



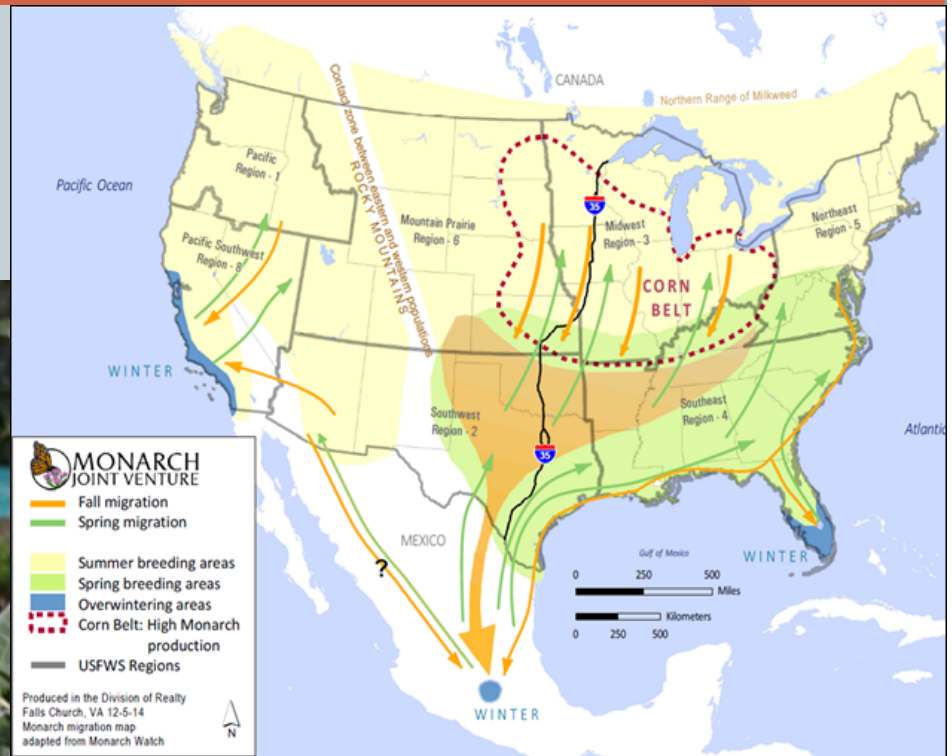
X symbols define overwintering habitat area data from Mexico; e symbols represent observations of annual egg production in the Midwest scaled to match magnitude of overwintering data. (Semmens et al. 2016, Nature – Monarch Conservation Science Partnership)

Monarchs are flagship, umbrella species

International Cooperation

Continental Conservation

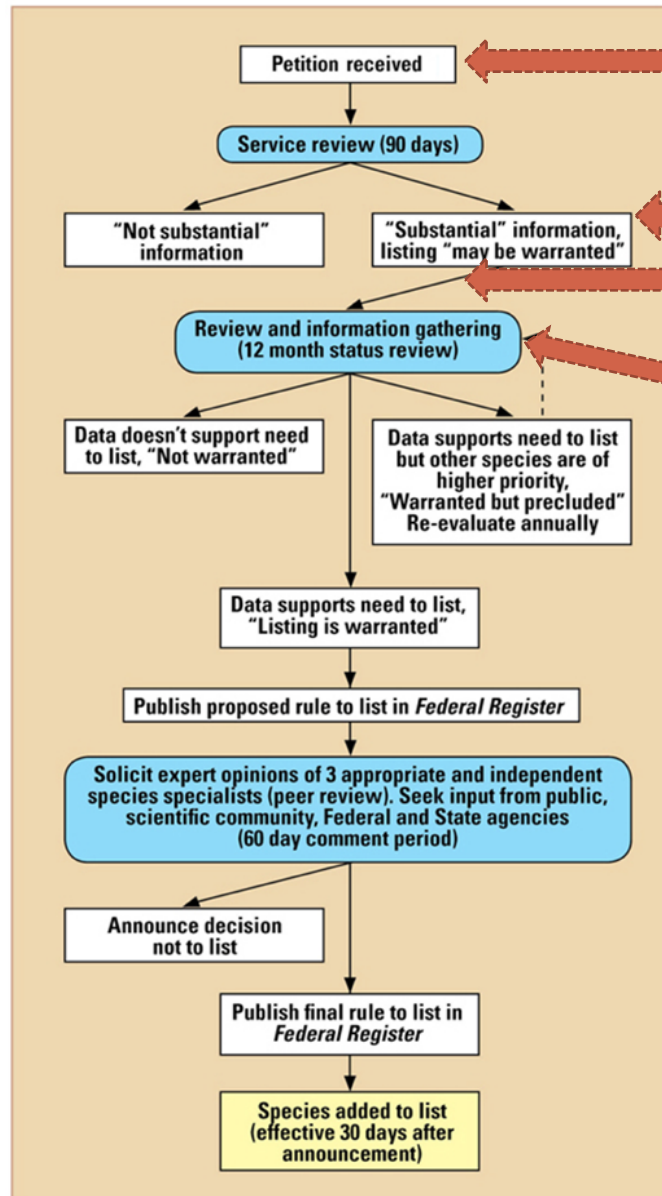
International effort
Mexico, Canada, US – Feb 2014



Migratory monarch occurs in all 48 lower states

Monarch Regulatory Process

- Dec 2014 positive 90-day finding initiates a species status review to produce 12-month finding
- Species Status Assessment framework (SSA) for review underway
- 12-month finding – after status review:
 - Warranted (Proposed Listing)
 - Warranted but precluded (Candidate)
 - Not warranted
- Conservation needs to States in March 2017



August 2014

December 2014

We are here!

June 30, 2019



Monarch Conservation Status

20 June 2014: Presidential Memorandum – *Creating a Federal Strategy to Promote the Health of Honeybees and other Pollinators*

- Calls for Federal & State action
- Identifies State Wildlife Action Plans (SWAPs)

Sept 2014: AFWA State Directors **unanimous Resolution** supporting voluntary efforts for monarch conservation

March 2015: MOU AFWA & USFWS encouraging States to collaborate, engage in projects for monarchs

State Wildlife Action Plan

The State Wildlife Action Plan conserves wildlife and natural places, enhancing our own quality of life.

- Each state has developed a proactive Wildlife Action Plan to conserve wildlife before they become more rare and more costly to protect.
- The State Wildlife Action Plan ensures we will be able to conserve wildlife and natural places that bring peace and relaxation to our busy lives.
- The State Wildlife Action Plan shows us how to conserve the wildlife and natural places that are important to many of our family traditions.

We need to invest in the State Wildlife Action Plan now to conserve wildlife and vital natural areas for future generations.

As our communities grow, the State Wildlife Action Plan can help us fulfill our responsibility to conserve wildlife and the places they live for future generations.

- The State Wildlife Action Plan outlines actions developed by scientists, sportsmen, conservationists AND members of the community, working together.

Transitions

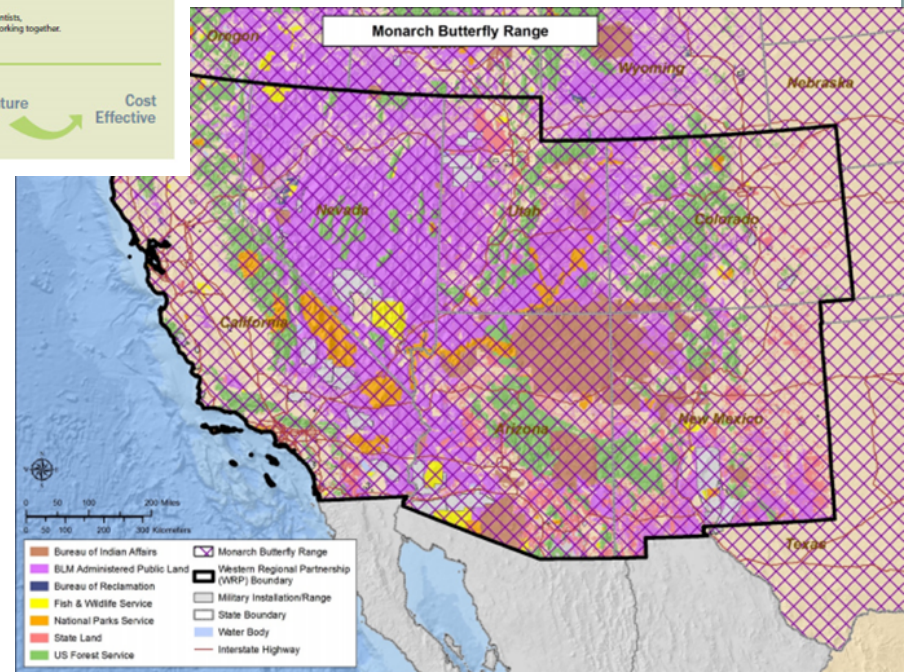
Benefits Both Humans and Wildlife → Investment in Future Generations → Cost Effective

Supporting the State Wildlife Action Plan will benefit the health of wildlife and people.

- The State Wildlife Action Plan conserves wildlife and natural places thereby protecting clean water and air—making both wildlife and people healthier.
- The health of wildlife is often an early indicator of disease and pollution that affect us all. Investing in the State Wildlife Action Plan will allow us to identify and prevent problems before they threaten wildlife and affect humans.

Monarch tied for 5th as a species that if listed could result in delays or increases in cost to program of work or mission in states: AZ, CA, NV, NM, UT

(WRP Partner Input on Species of Concern 2015)





Pollinator & Monarch Support - States

- States have management authority until determination made under ESA.
- States manage under fish & wildlife agency or Department of Agriculture
- States can include monarch in SWAP
- States can list monarch as Species of Greatest Conservation Need (SGCN)
- States can manage habitat to directly or indirectly benefit monarchs

US WAFWA States – Monarch Consideration

STATE *2006 also **Retracted	Wildlife Agency Authority	In SWAP revision	As SGCN	Direct Habitat Benefits	Indirect Habitat Benefits	Other – Outreach Monitoring Research
AZ	No	No	No			
CA*	Yes	Yes	No	Yes	Yes	Yes
CO	Yes	Yes	Yes			
HI		No	No			
ID	Yes	Yes	Yes			
KS*	Yes	Yes	Yes			
MT	No	No	No			
NE				Yes		
NV	No	No	No		Yes	
NM	No	Yes**	Yes**			
ND	Yes	Yes	No	Yes	Yes	
OK		Yes	No	Yes	Yes	
OR	Yes	Yes	Yes			
SD		No	No	Yes	Yes	Yes
TX	Yes	Yes	No	Yes	Yes	Yes
UT	No	No	No	No	Yes	
WA	Yes	Yes	Yes	Yes	Yes	
WY	No	No	No			Yes

9 WAFWA States include monarchs in their revised SWAPs; 5 WAFWA States support monarch as SGCN as of 2016. (AFWA 2015 - Monarch is the Official State Butterfly of 7 states, including Idaho and Texas.

National Pollinator Strategy 2015

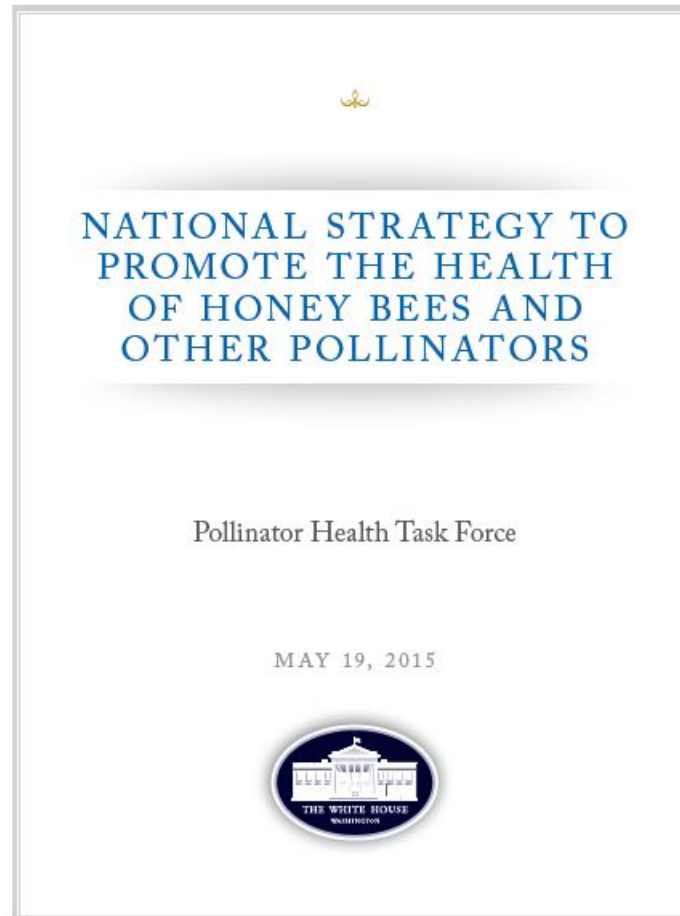
3 Goals:

1 – **Honey bees:** reduce colony losses to 15% in 10 yrs

2 – **Habitat:** restore, enhance 7 million ac in US over 5 yrs

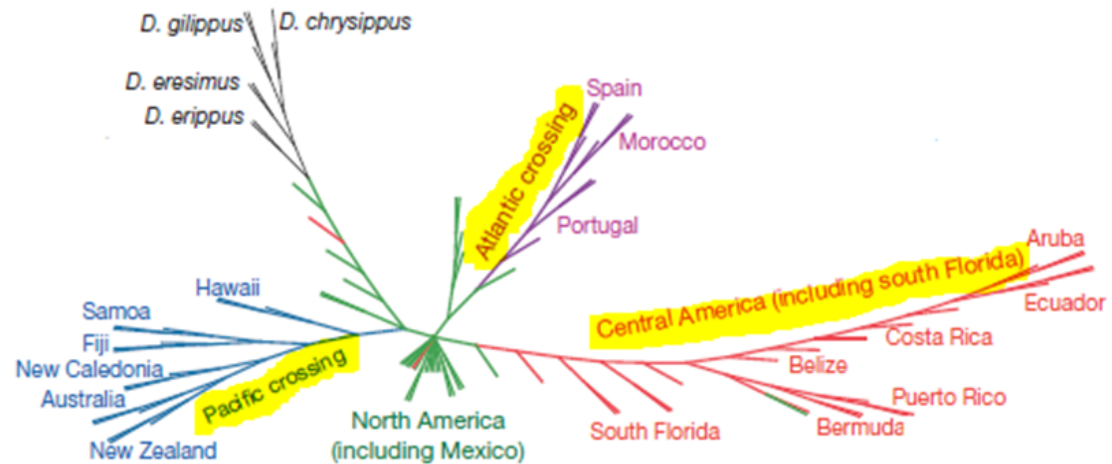
3 – **Monarch:** recover to 225 million monarchs by 2020 = 6 ha occupied in Mexico wintering grounds

Federal agencies tasked with taking action for pollinators



Evolutionary history: *Danaus plexippus plexippus*

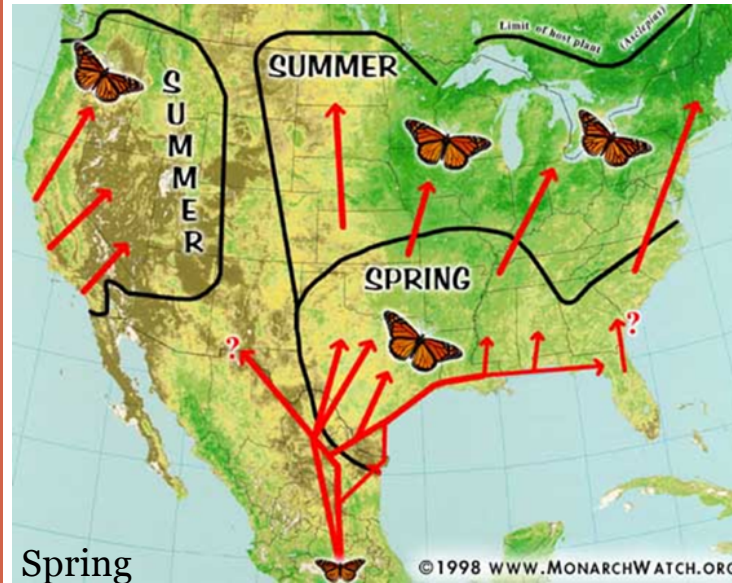
- Unique, roundtrip migrations up to 3000 miles
- Longest insect migration
- Huge breeding area vs small wintering area
- 55° - 100°F
- Move with nectar supply
- Catch winds (to 30mph)
- Fly up to 11,000 feet
- Cover 50 – 100 miles/day



Zahn et al. 2014. Nature

Migratory Cycle

- Subspecies migration
- Eastern and Western populations
- Multiple generations



Overwintering

- Western population = CA pine, eucalyptus trees
- Eastern population = Mexico oyamel, conifer trees
- Florida = non-migratory

Migration Cues

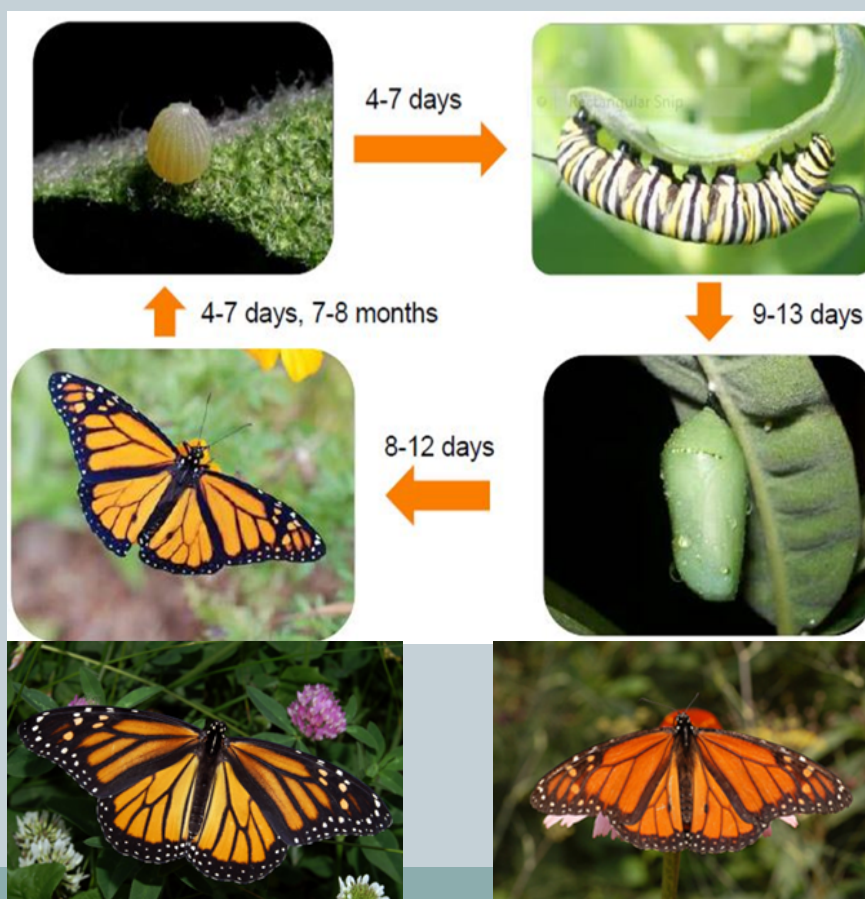
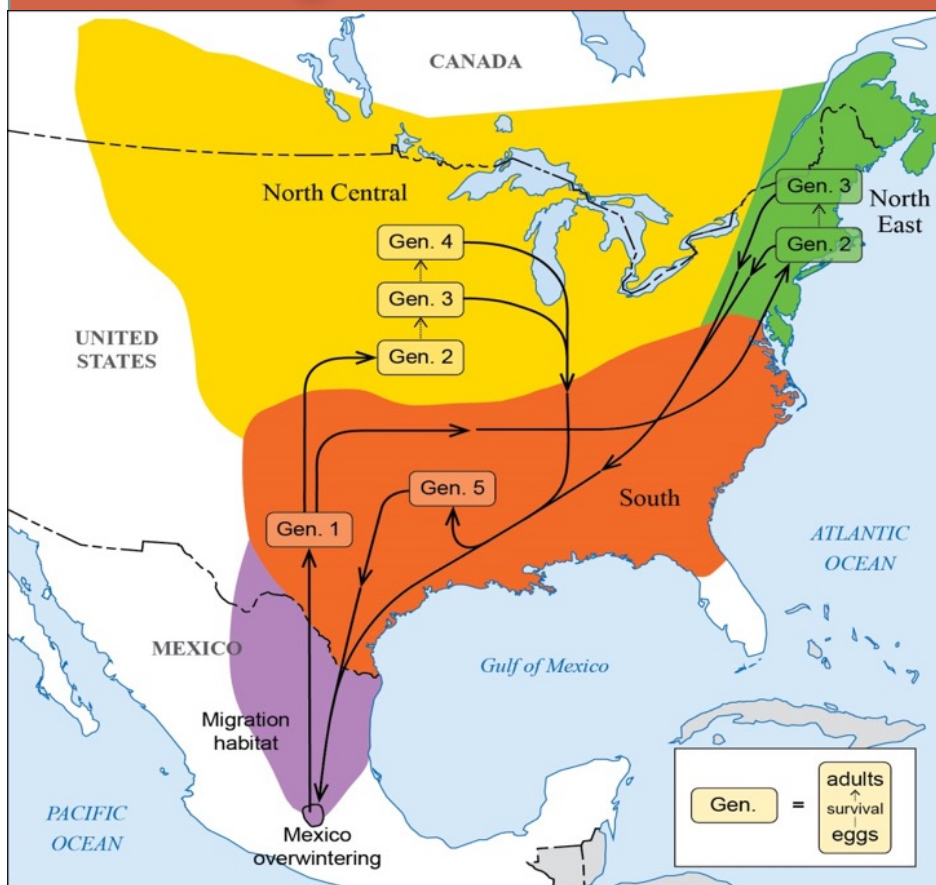
- Sun's angle
- Photoperiod
- Temperature
- Host plant condition
- Earth's magnetic field



Complex life cycle

Populations: 4-5 generations

Individuals: Life cycle timing varies (~30 days to ~8 months)



Monarchs and milkweed

Specialization on milkweed

- Adult monarchs feed on nectar
- Larvae feed on milkweed, sequester cardiac glycosides



Oviposition on *Asclepias* spp. Photo: Karen Oberhauser

Milkweed defenses, diversity

- Hairs on leaves
- Cardenolide toxins
- Latex fluids
- 112 spp NA





Southwest milkweed

AZ: 30 spp — Welsh's

CA: 15 spp

NV: 13 spp

NM: 28 spp

UT: 18 spp — Welsh's

OK: 25 spp

TX: 37 spp



Stressors

Suite of growing threats:

- Habitat conversion
- Changing agricultural practices
- Logging in Mexico
- Climate change, extreme weather
- Pesticide use
- Invasive species, predation, pathogens



Photo: WWF-México
North American Monarch Conservation
Plan, 2008
Illegal logging in Mexico

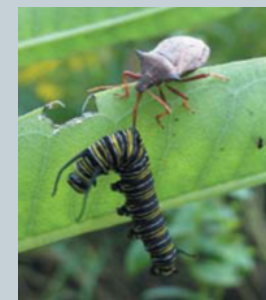


Photo: Mary Holland
North American Monarch
Conservation Plan, 2008
Spine-shouldered stinkbug
with monarch larva

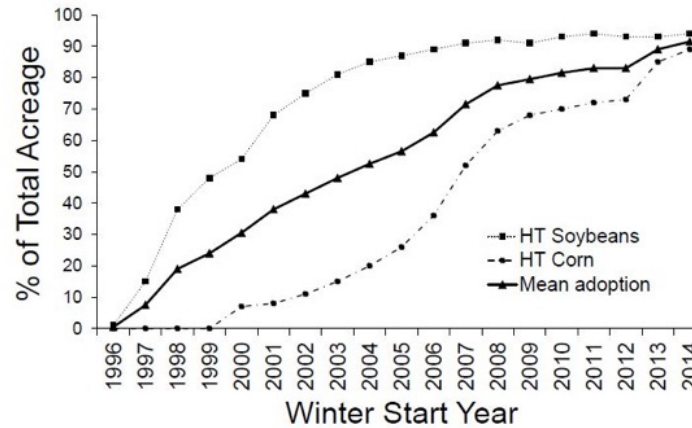


Photo: Texas Butterfly
Ranch, 2012
Dead monarch caterpillars
after eating milkweed laced
with pesticide Dursban
(chlorpyrifos) from nursery

Habitat Loss – Breeding grounds

- US is losing >5000 acres per day to real estate & energy development (Land Trust Alliance 2013).
- Over past 20 years, monarchs have lost 165 million acres of habitat
- In 2006-2011, >1 million acres of native prairie converted to cropland (NYT 2014).
- Most cropland now Roundup Ready corn, soy
- This land contained milkweed and nectar plants.

Herbicide Tolerant Crop Use in U.S.

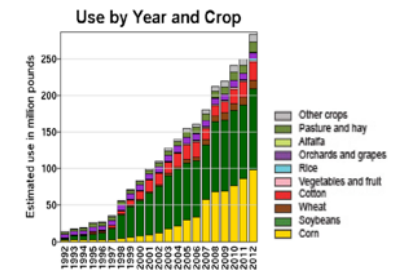
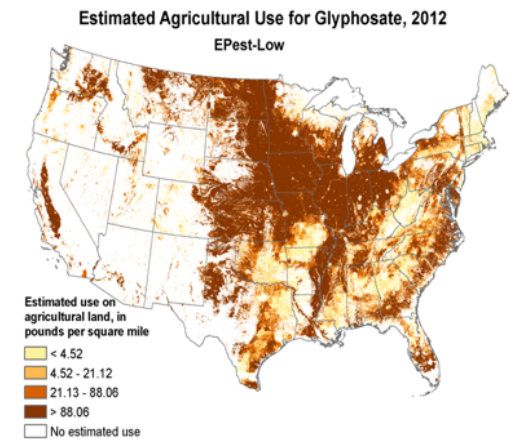


Data from USDA NASS

Courtesy of Karen Oberhauser 2015



Corn monocropping



GMO corn in US = 89%
GMO soy in US = 94%
(Pleasants and Oberhauser 2013)

Habitat Loss – Wintering grounds

Old-growth forests in
Michoacan, Mexico

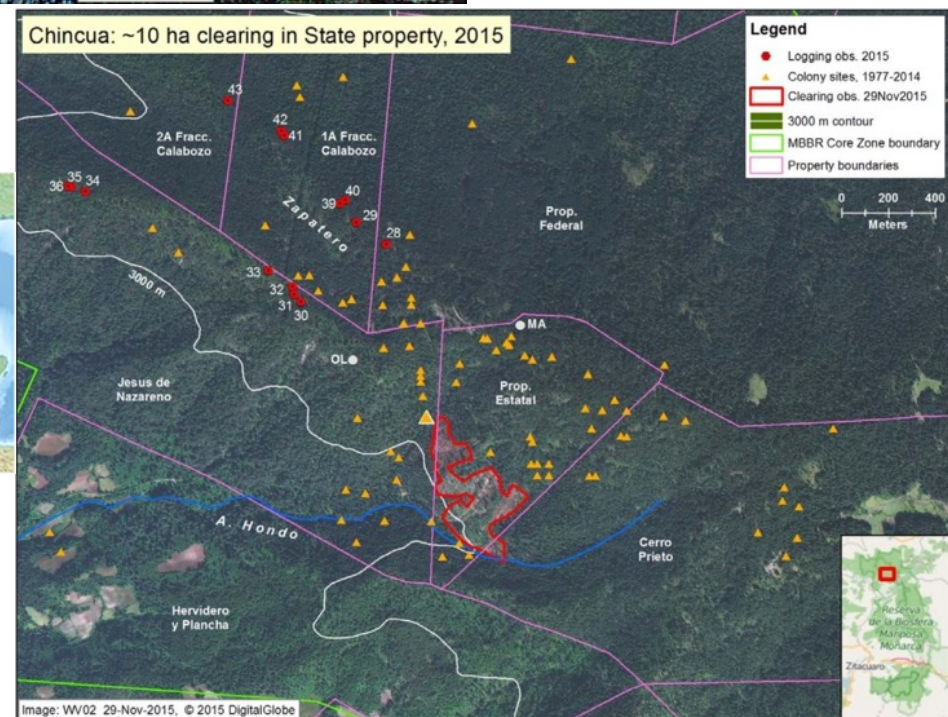
1975 - Found by Catalina Trail

1980 - Decreed Wildlife Refuge

1986 - Monarch Butterfly
Biosphere Reserve

2008 - UNESCO World
Heritage Site

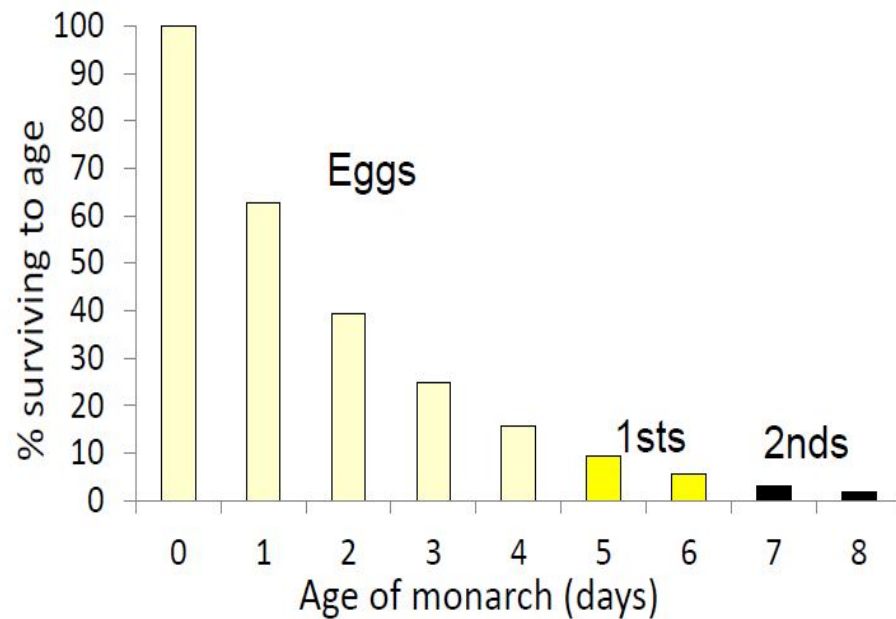
THREATS IN MEXICO:
logging, wood harvesting,
agricultural practices, forest
fires, climate change



Monarch individual survival is low

~99% do not make it to adulthood

Egg and Early Instar Survival



De Anda and Oberhauser 2015



Egg, 5 larval instars



National Goals for monarch

- **6 hectares** occupied habitat in Mexico (15 ac)
- **225 million** monarchs by 2020 (Semmens et al. 2016, *Nature*)
- **Engagement** of diverse sectors: Mexico, Canada, federal, state, tribal, counties, cities, NGOs, citizens, corporations
- Involve a **new generation** in conservation
- Manage and restore habitat to **benefit many species**

- **OBJECTIVE** – boost population to prevent need to list
- **STRATEGY** – proactive actions now
 - 1 – Partnerships
 - 2 – Education
 - 3 – Habitat Creation
 - 4 – Research



To achieve monarch goals:



Broad actions

- 1) Increase population size
- 2) Decrease mortality
- 3) Increase knowledge
- 4) Increase nectar, milkweed resources

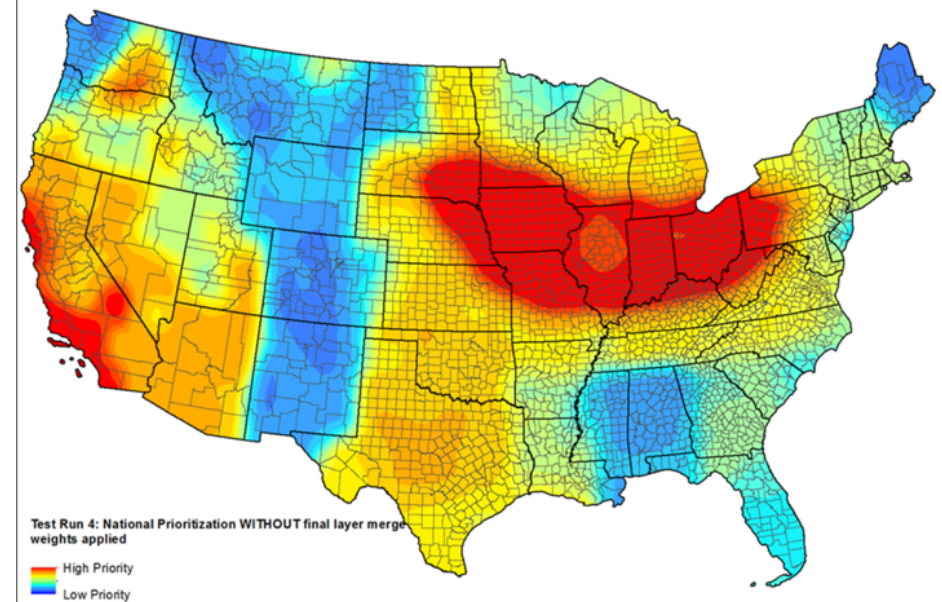
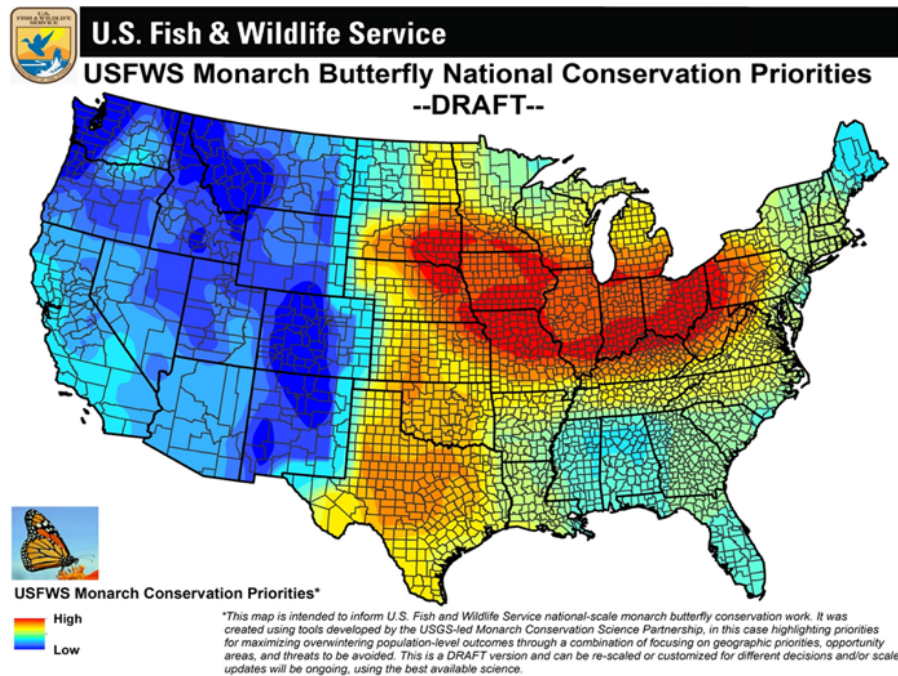
Management activities

- Increase milkweed availability in right spatial distribution, habitat characteristics
- Increase female lifespan with more nectar at right times, locations
- Decrease pesticide exposure
- Increase monitoring
- Manage for favored conditions

Prioritized geographies

Model results

Without final population filter



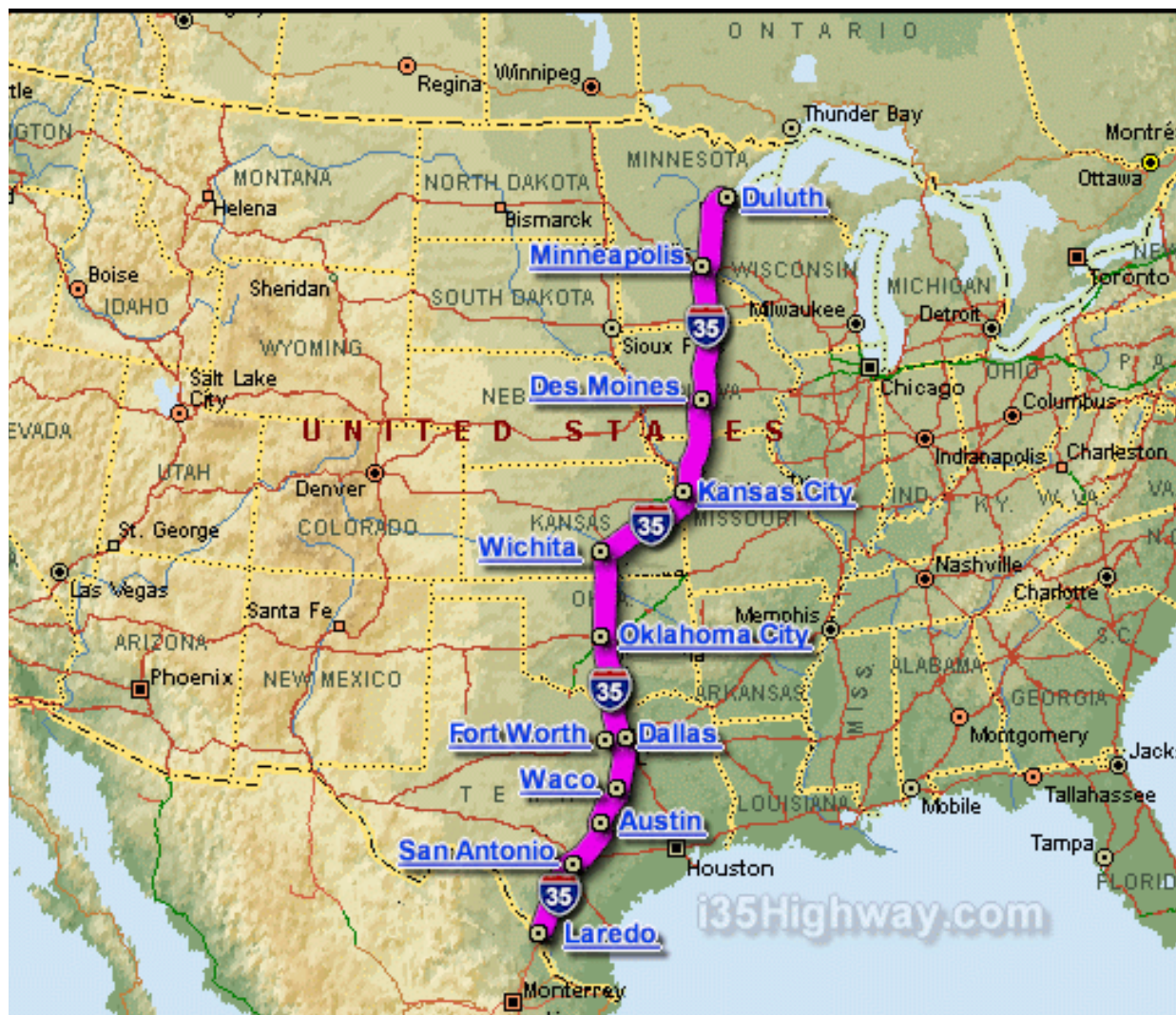
Data from Monarch Conservation Science Partnership
habitat model

Partnerships

- State Agencies
- Federal Agencies
- Tribes
- NGOs
- Schools
- Citizen scientists
- Landowners

Monarch Highway I-35 Corridor

- Monarch/pollinator gardens at **6+ rest areas**
- Adopt a **Pollinator Garden** program





Education and Outreach

- School programs
- Workshops
- Zoos
- Museums
- Botanic gardens
- Nature centers
- Libraries
- Media
- Outdoor gardens
- Fairs
- Citizen science



Friends of Brazoria Wildlife Refuges and the Texas Master Naturalist Program - Cradle of Texas Chapter helped bring a little “wild” to the banks of Buffalo Bayou in Houston, Texas, during their annual KBR Kids Day Celebration in October. Photo by Pete Romfh



Habitat - opportunists

Breeding Habitat

- Agricultural fields
- Pastures
- Prairie
- Urban, suburban areas
- Gardens
- Trees
- Roadsides, railways
- Rights of way
- Airports
- Mining reclamation sites

Wintering Habitat

- Access to clean water
- Sunlight
- Roosting vegetation
- Predator-free



Pacific Gas & Electric Company, California



Conserve, Create, Restore, Manage – pristine or disturbed areas



Schools – Opportunities for Education and Habitat

Habitat

Outdoor classrooms

Partners for Fish & Wildlife Program



BEFORE

AFTER



Monarch Habitat

Large-scale enhancements

Across Regions, using
Landscape Conservation
Cooperatives (LCCs)

Working with USDA-NRCS
Farm Bill monies to fund
pollinator habitat.

2016 - \$4 million for
monarch

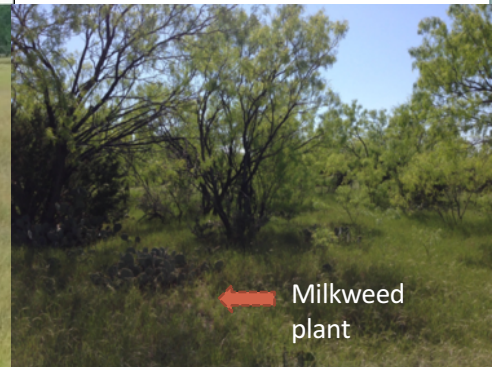
Benefits to other grassland
species too!



Habitat Improvement: Pastures for Upland Birds (PUB)



Before



October 2015

Biology Technical Note No. 78, 3rd Ed.

Using 2014 Farm Bill Programs for Pollinator Conservation



Habitat Improvement: Pastures for Upland Birds (PUB)



Research & Monitoring

Research

- USGS demographic models
- National habitat priority model
- Red Imported Fire Ant study
- Milkweed propagation
- Western Habitat Model

Monitoring

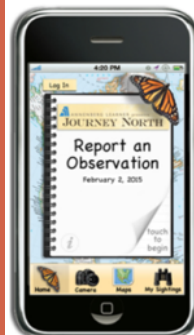
- Egg, larva, adult
- Monarch Waystations
- Citizen Science tagging
- Seed collecting
- Milkweed surveys
- Phenology-National Phenology Network

Citizen Science
Universities
Developing I&M National
Protocols

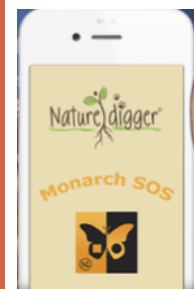


Monarch Waystations

New Monarch Apps



iNaturalist.org

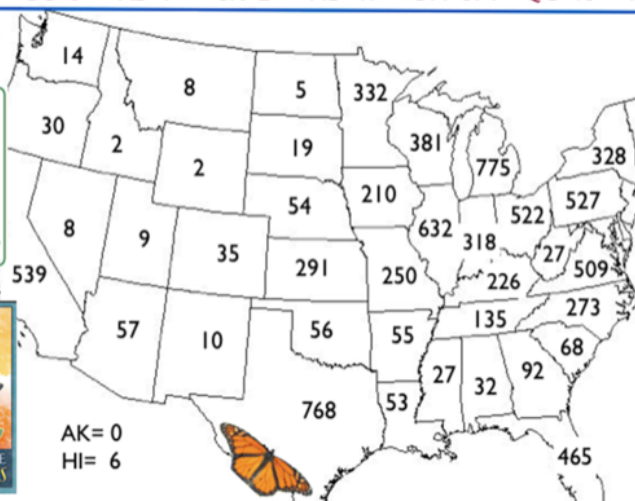


2014 Monarch Waystations

N=9,627

CAN= 448 BC=3 AB=1 SK=2 MB=41 ON=374 QC=13 NB=6 NS=13

USA= 9,172
Others= 7



Dec. 2014: 9627
Jan. 2014: -7322
New: 2305



For info on restoring habitat to help monarchs & pollinators, visit:
www.monarchwatch.org/waystations/

Data: Jim Lovett, MonarchWatch.org
Graphic: Ina Warren, MonarchMentors.org

12,410 registered waystations as of Dec 2015



Monarch Monitoring Pilot Project

USFWS Regions: 2, 3, 6

National grid layer to
randomize points

5 Strata:

Protected grasslands

Unprotected grasslands

Agricultural lands

CRP

Actively farmed

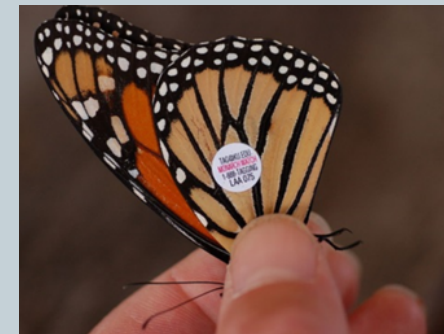
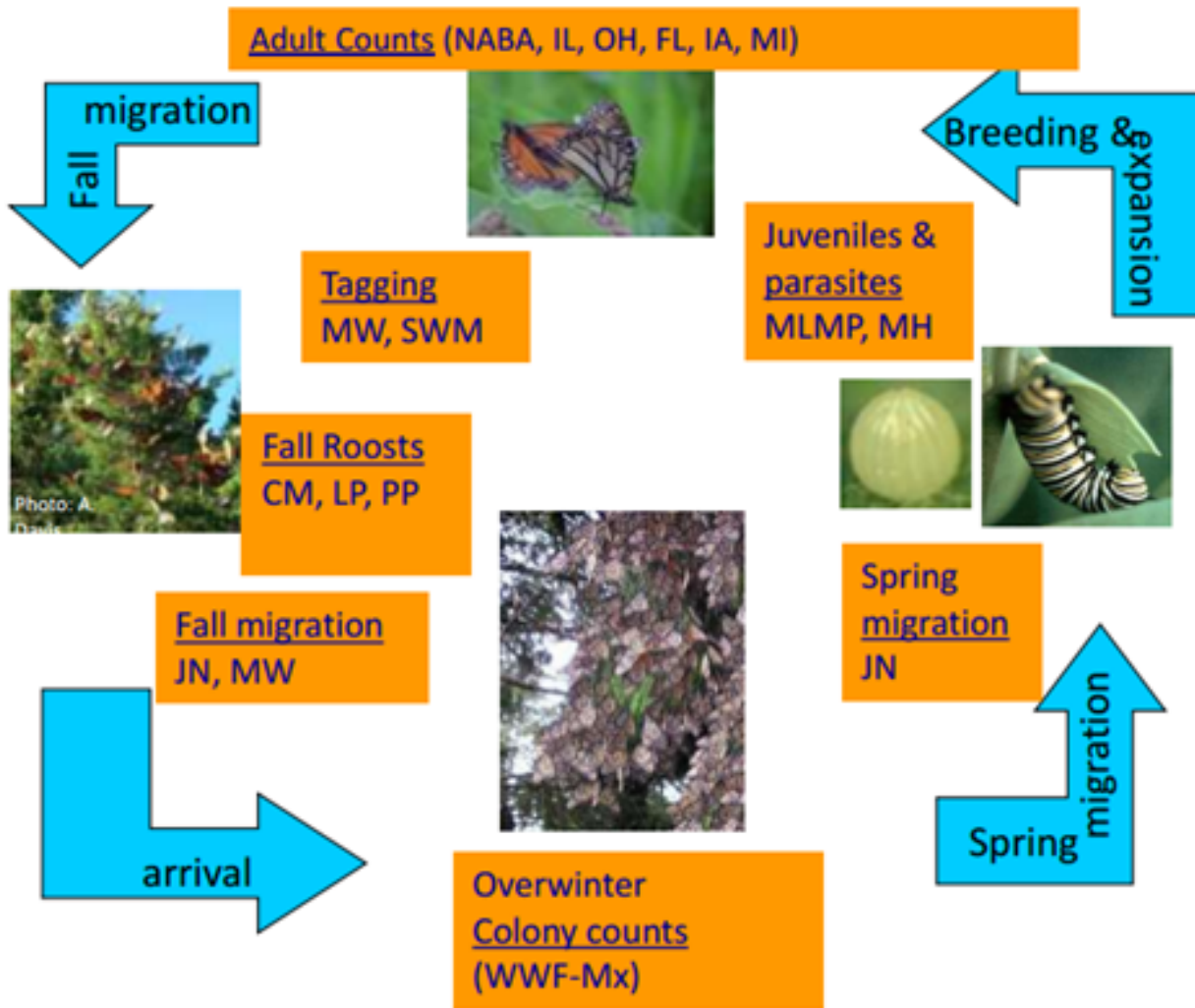
Roadsides

Urban/suburban areas

Variables measured/tested:

- 1) Egg, larval number, timing on milkweed
- 2) Adult number, density, timing
- 3) Milkweed species, number, density, location
- 4) Blooming plant species, number, location
- 5) Parasitism (sampled captive rearing)
- 6) Red imported fire ants (RIFA) density, location

Monarchs intensively monitored at every stage



MONITORING PROGRAMS

- NABA: North American Butterfly Association count program
- MLMP: Monarch Larvae Monitoring Project
- JN: Journey North
- MH: Monarch Health
- MW: Monarch Watch
- TMC: Thanksgiving Monarch Counts
- SWM: Southwest Monarch Study
- WWF-MX: World Wildlife Fund in Mexico
- TMMP: Texas Monarch Monitoring Project
- XMS: Xerces Milkweed Survey
- iNaturalist: app for monarchs & milkweed locations
- eButterfly: app for butterflies

Slide information courtesy of Leslie Riel, unpublished data

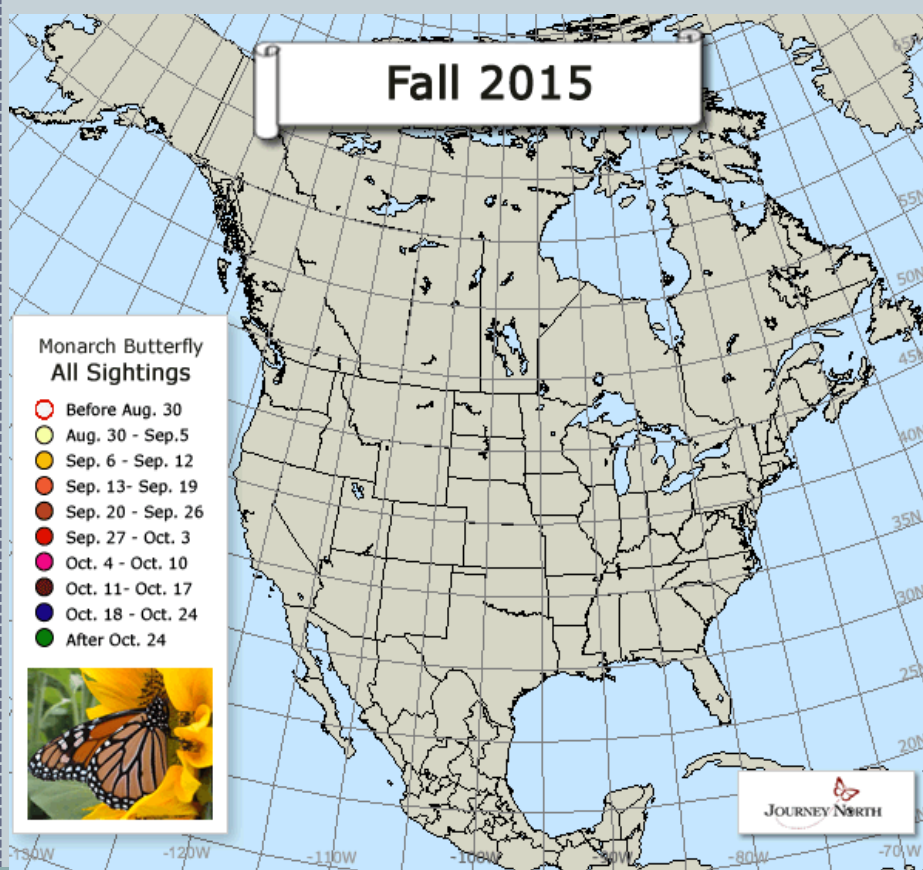
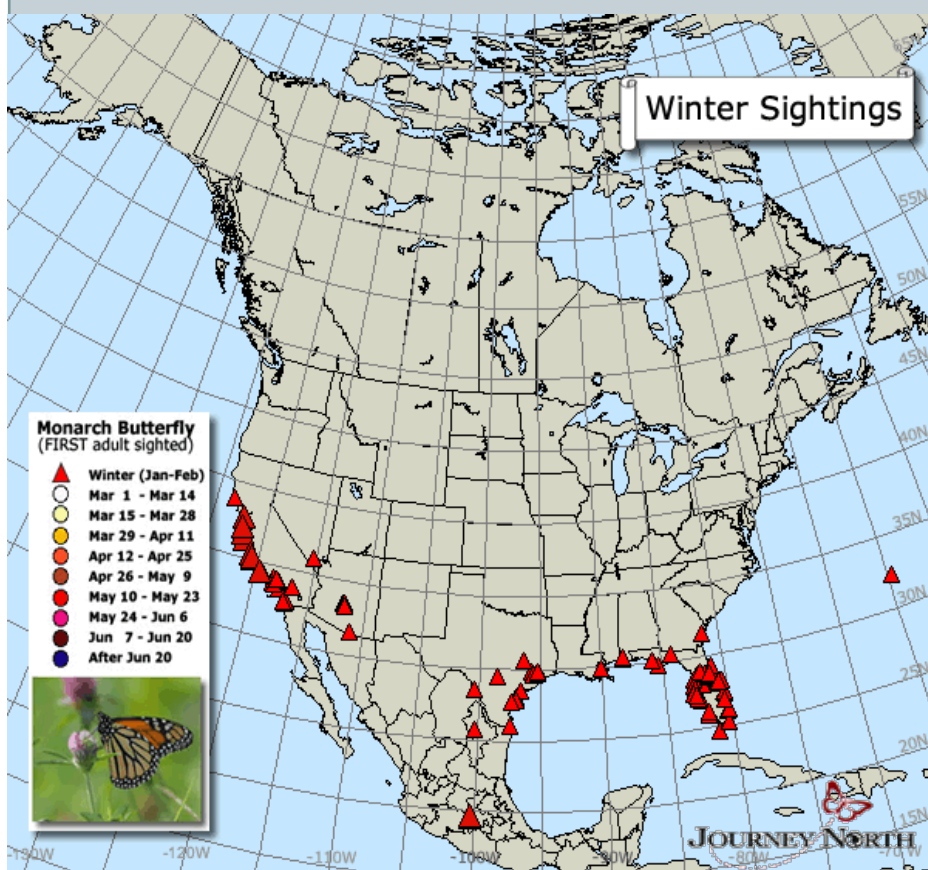
Monarch Migration – Citizen Science

SPRING MIGRATION

Mexico to Canada & US

FALL MIGRATION

Canada & US to Mexico

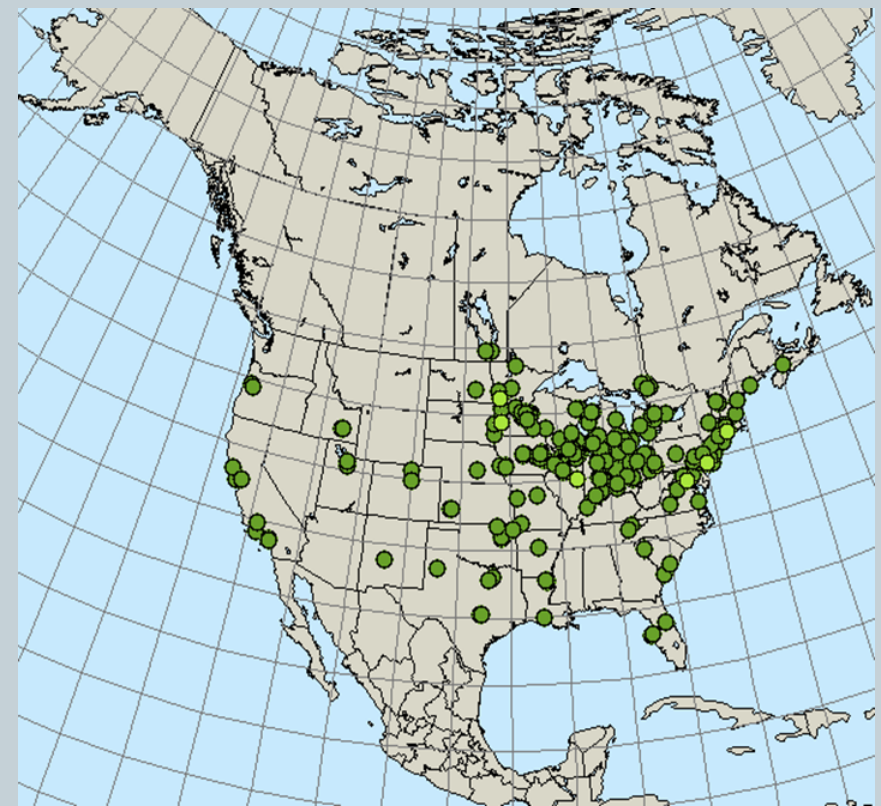
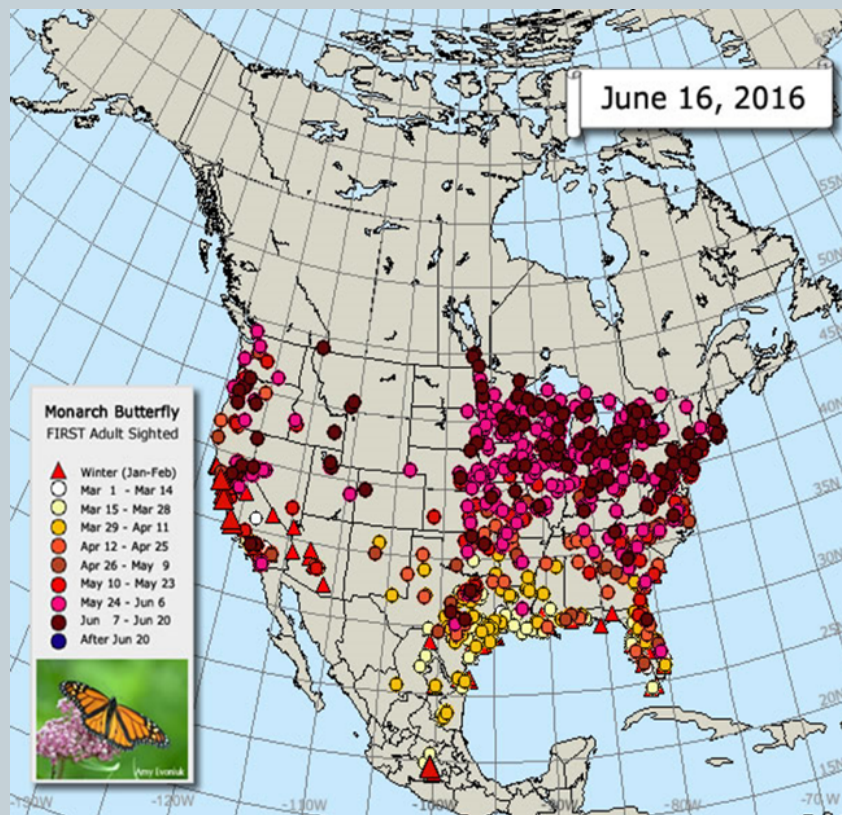


Monarch Migration – Citizen Science



First Adult Sightings

August 2016



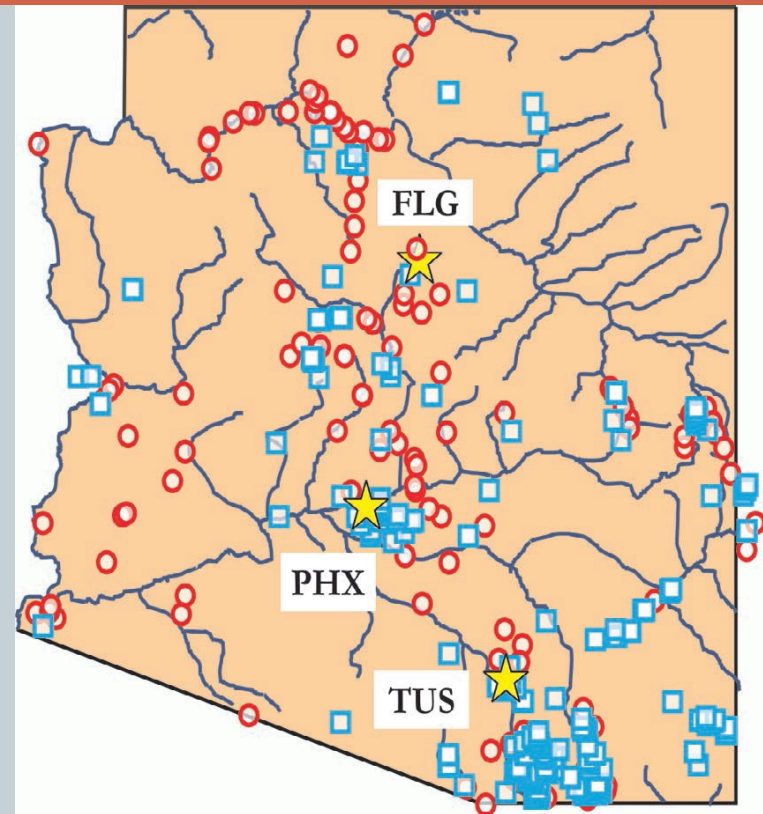
Monarchs in the Southwest

Monarchs follow rivers

Documentations in Arizona



Huachuca Mountains, 3 Oct 2012. Photo by Bob Herrmann, Morris et al. 2015



Locations of Monarch Tagging and Sighting. Each blue square represents the location where one or more monarchs was tagged. Each red circle represents the location where one or more monarch sightings have been reported.

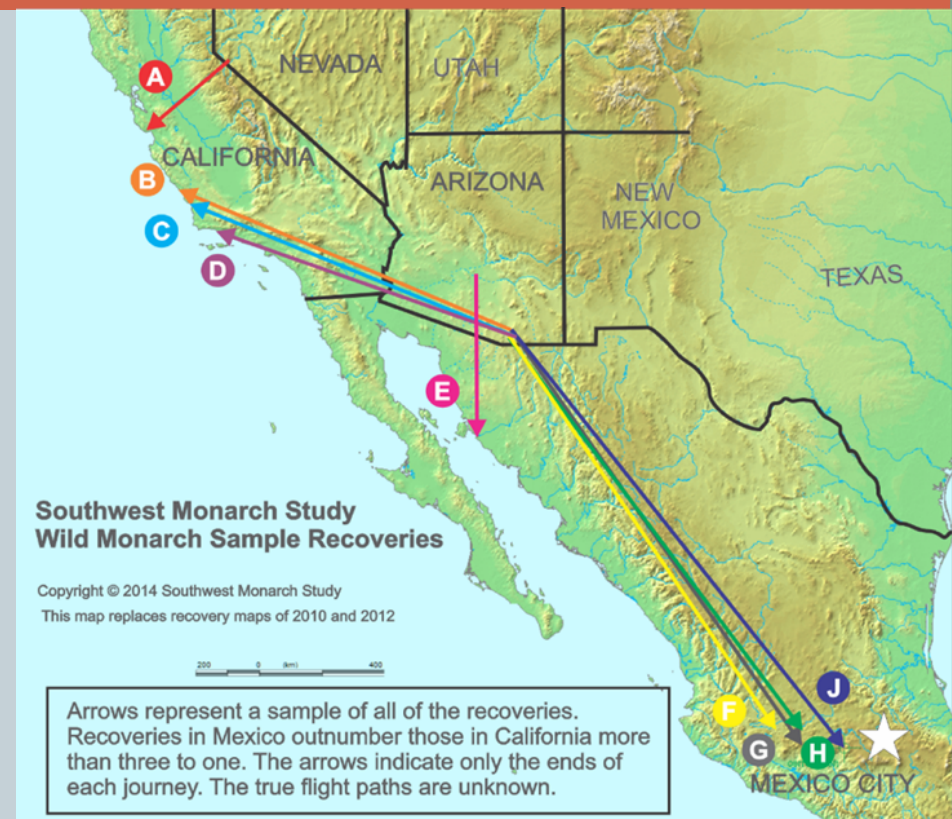
Southwest Monarch Study Tagging

Findings

- Approximately 12,000 in AZ, NV, NM, UT & CA deserts
- 23 recoveries in Mexico from AZ
- 10 sightings in CA from AZ
- 1 sighting in CA from NV
- Small overwintering aggregations in Phoenix, Yuma, Parker, Lake Havasu and Tucson.

Data courtesy of Gail Morris;
and see Morris et al. 2015. Status of *Daneus plexippus* Population in Arizona

Overwintering in West





Research needed



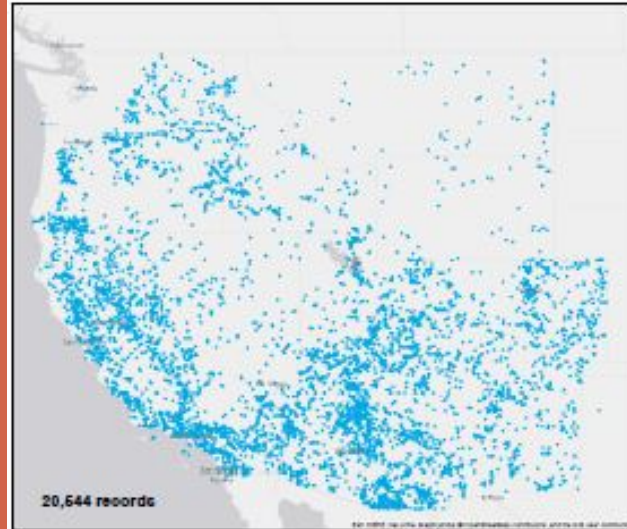
- Overwintering colony densities in Mexico,
- Correlation between habitat loss and number of monarch butterflies,
- Role of habitat as a limiting factor (i.e., energetics analysis),
- Milkweed stem densities in priority geographies using common protocols and practices for monitoring milkweeds,
- Links between habitat improvements and management to increased survival and fecundity (effectiveness monitoring),
- Nectar resources as a limiting factor,
- Best management practices,
- Seed development techniques,
- Red imported fire ant impacts, etc.....

Milkweed and monarch data for West

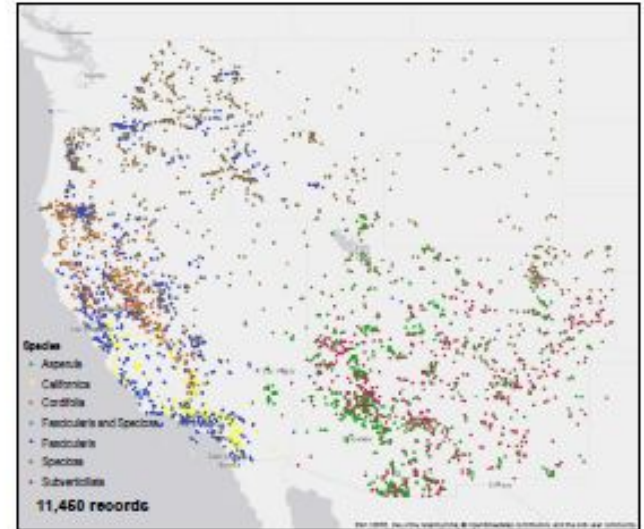
Preliminary data for Western monarch habitat niche model – USFWS and Xerces (2016)

Coastal wintering sites range from Mendocino Co to south of Ensenada, Baja, Mexico (monarchprogram.org)

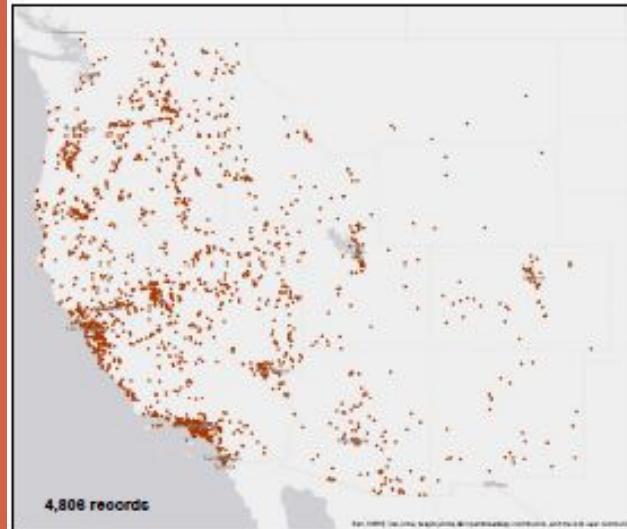
Over 80% of the recorded overwintering sites along west coast are in eucalyptus groves



All Milkweed, All Records



Target Milkweed, All Records



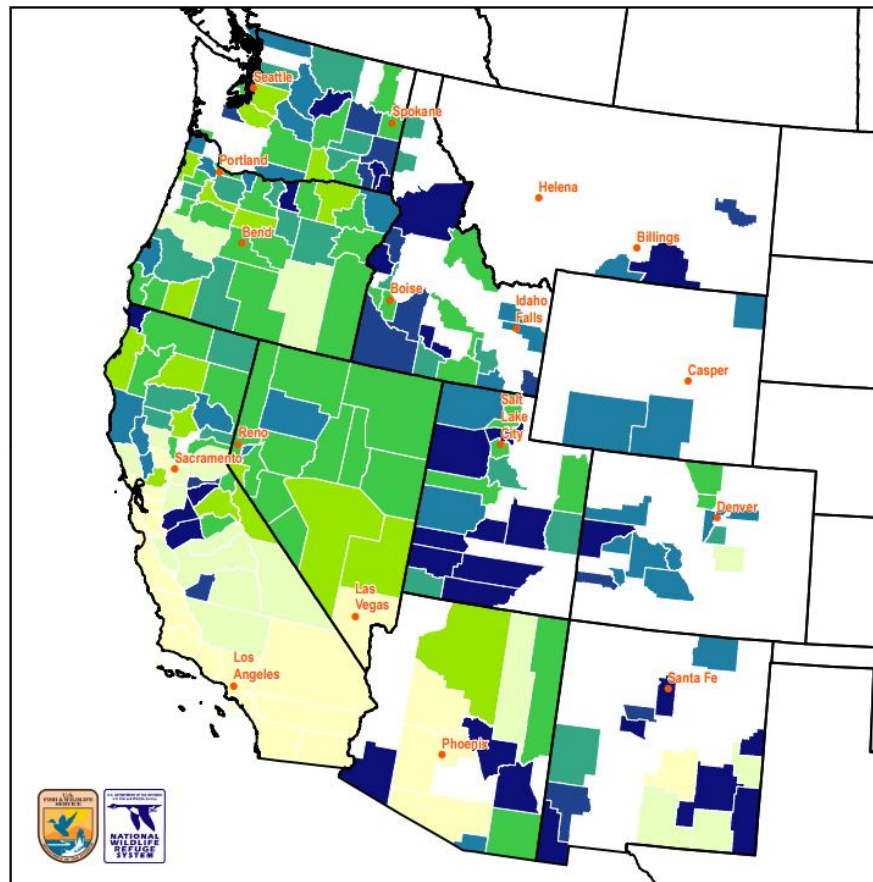
All Monarch, All Records



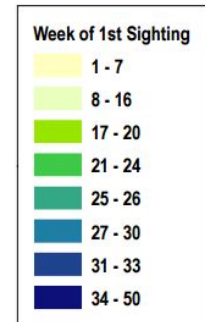
All Monarch, High and Medium Accuracy

Western Monarch Phenology

Pattern of movement from coast to interior, from January to May



Approximate Monarch Arrival by County



Source: 2015 Western Monarch and Milkweed Occurrence Database, USFWS/Xerces.

Note: All monarch occurrence records were used where [County] information was given. Week begins with the first week in the calendar year (1/1). Dates span from 1901 to 2015.



0 50 100 200 Miles

File name: 16-044-24.mxd
Date: 8/1/16

What States Can Do

Source: Heinz Center
Report. 2013. Pollinators
and the State Wildlife
Action Plans: Voluntary
Guidance for State
Wildlife Agencies



- 1) Highlight, recognize pollinator species already in SWAPs
- 2) Highlight key pollinator habitats in SWAPs
- 3) Conduct status review for pollinator groups
- 4) Emphasize habitat conservation activities that also benefit pollinators
- 5) Promote restoration of pollinator habitats in agricultural landscapes
- 6) Develop and implement community outreach programs

Lesser long-nosed bat covered in pollen.
Photo: US National Park Service



What States can do

Educate, engage citizens

Create, restore habitat

Conduct monitoring

Conduct research

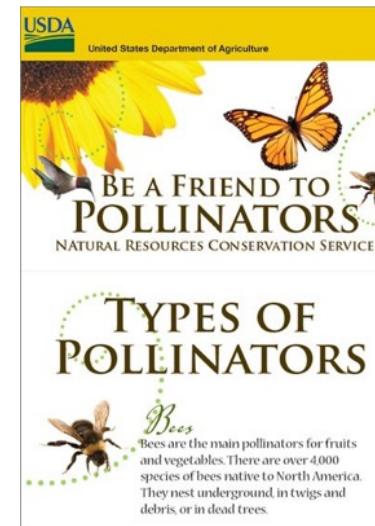
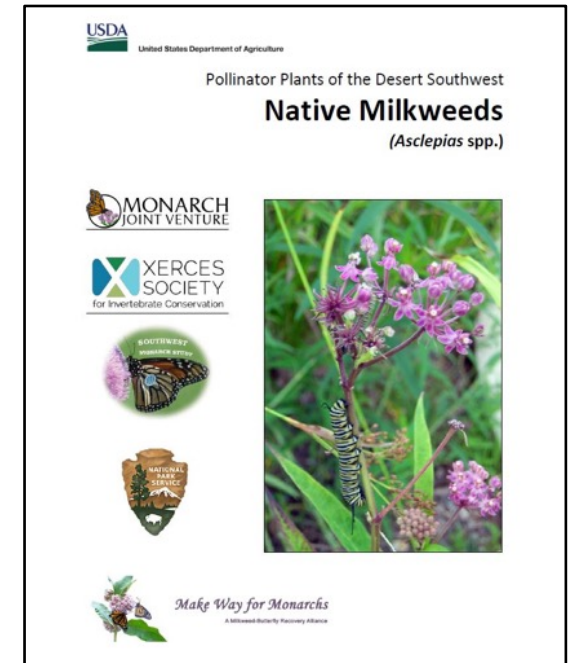
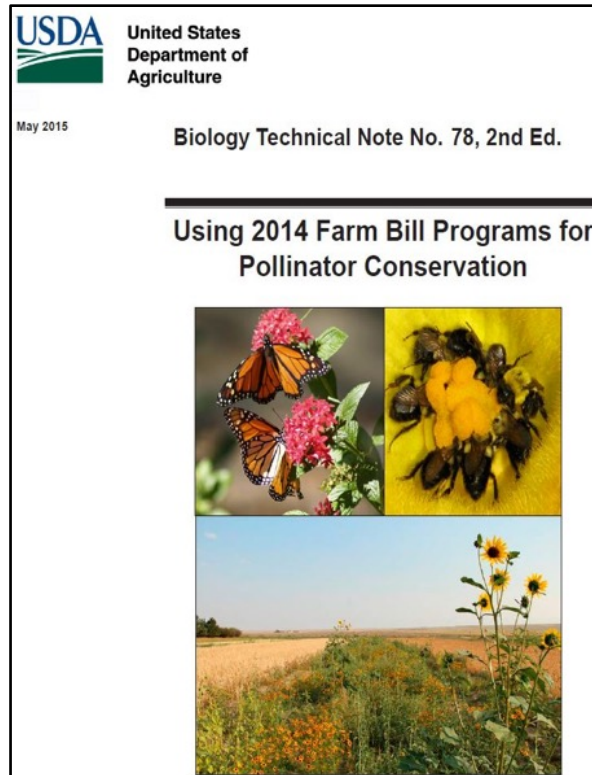
ALL HANDS, ALL LANDS

- Monarchs and pollinators need water, food, shelter
- All scales are helpful – large landscapes and small gardens
- People of all ages, backgrounds can make a difference
- Manage lowest hanging fruit –
 - Balance level livestock grazing to benefit monarchs
 - Plan mowing schedules to provide floral resources
 - Implement fire, if possible, at dormant times
 - Control invasive plants
 - Promote native, diverse communities
 - Enhance riparian areas, restore springs, seeps
 - Engage citizens, agencies, tribes, corporations in research, monitoring, gardening

Monarch Habitat

- Actively promote use of Farm Bill and NRCS programs
- 2014 Farm Bill – honey bee and monarchs funds. Development of habitat for native or managed pollinators (milkweed, nectar plants) on private lands
 - EQIP
 - CSP
 - ACEP

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/pollinate/help/>
<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/plantsanimals/pollinate/?cid=nrresprd402207>





To support pollinators:

- Plant local milkweed
- Limit pesticide use
- Grow native plants in clusters
- Provide spring, summer, fall blooms
- Create overwintering habitat
- Provide fresh water



EMBRACE UNMANICURED NATURE

Monarch Joint Venture

Established in 2009

30+ current partners

Focus is monarch conservation in
the continental U.S.

Guided by North American
Monarch Conservation Plan

Three project areas include:

Habitat creation, restoration,
and enhancement

Education and Outreach

Research and Monitoring

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THANK YOU!

MONARCH JOINT VENTURE



www.monarchjointventure.org